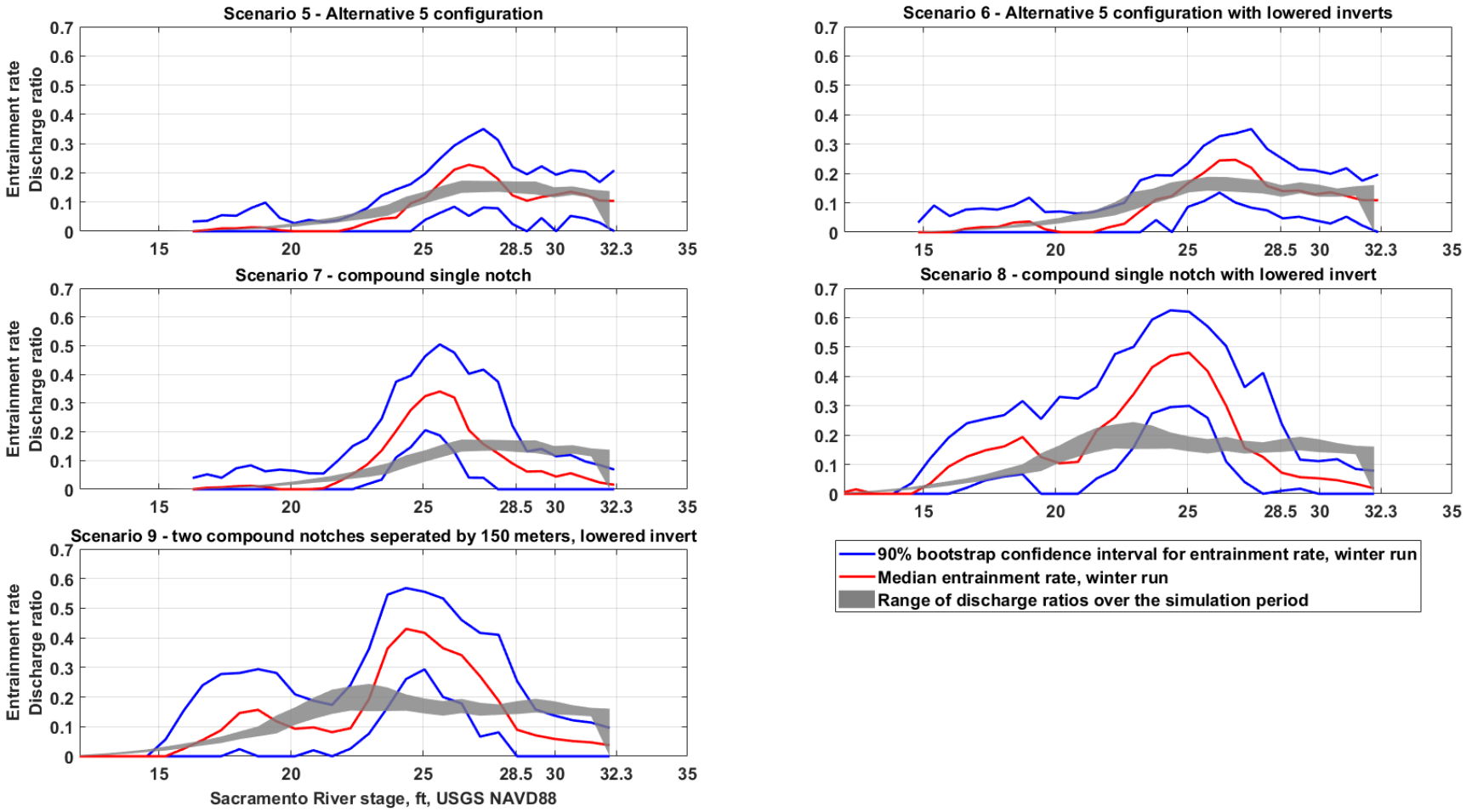


Figure 2 - Entrainment Rate and notch discharge ratio as a function of Sacramento River stage

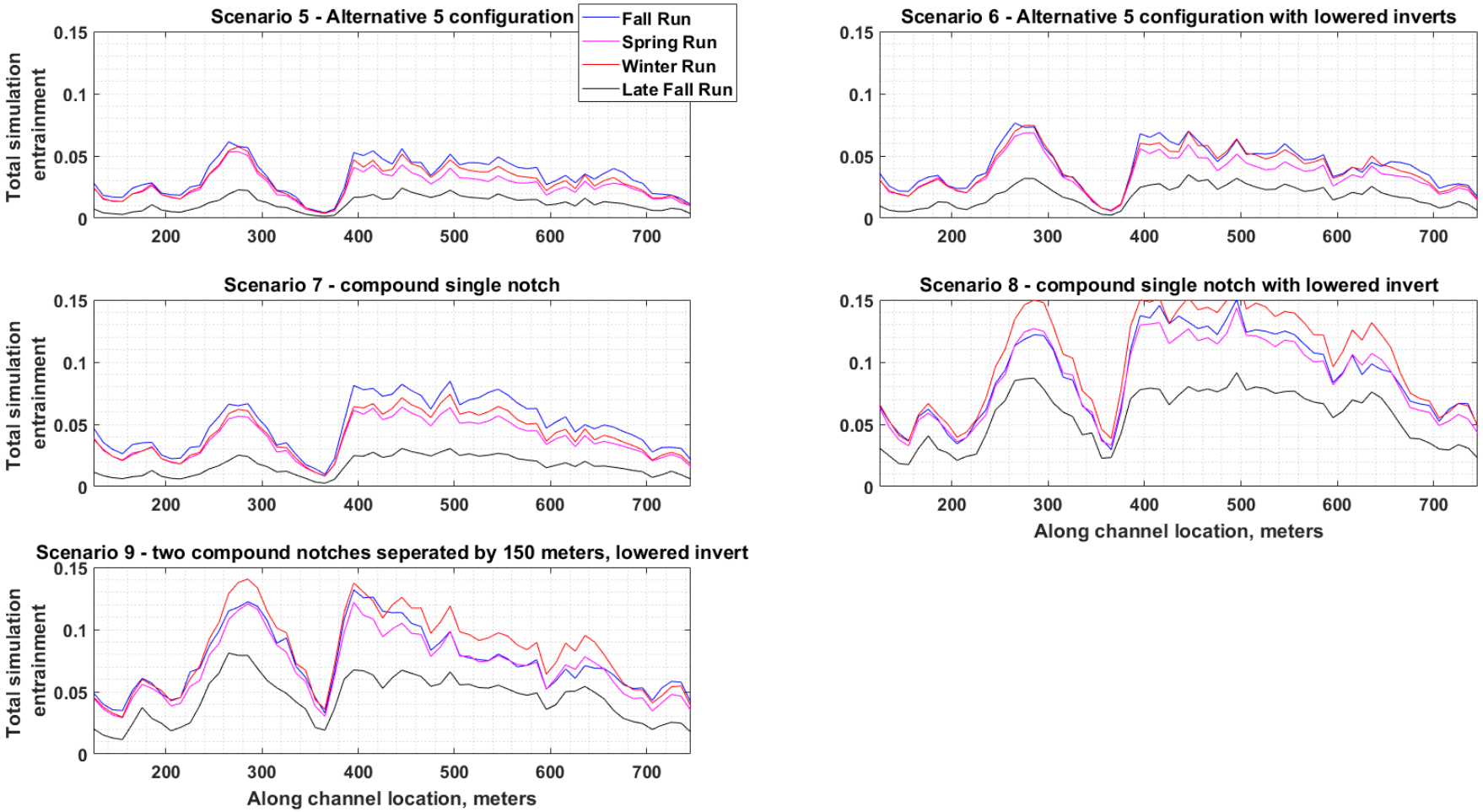


Figure 3 - Overall fraction of population entrained under each scenario over the 11 water year simulation period as a function of notch location adjacent to the western end of the Fremont Weir.

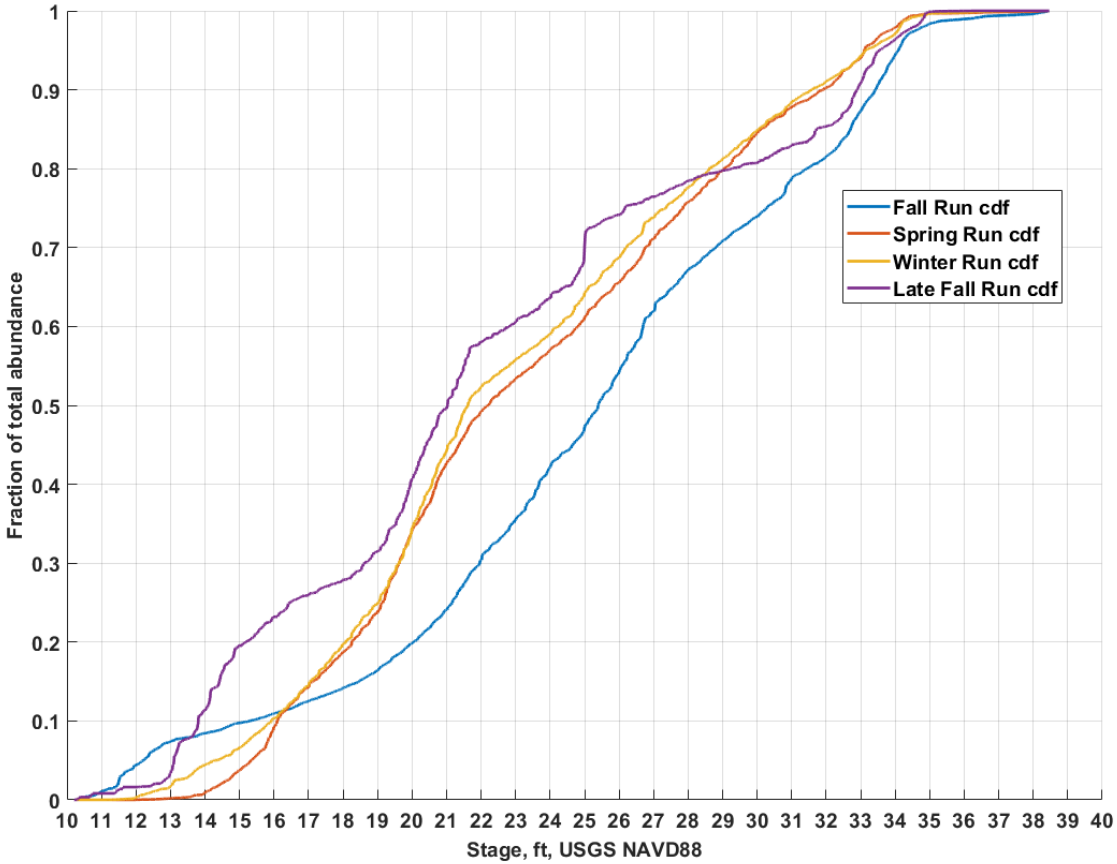


Figure 4 - CDF of discretized Knights Landing catch data as a function of associated stage at the western end of the Fremont Weir, water years 1997-2011.

Note that approximately 25% of Knights Landing catch for spring run and winter run Chinook salmon occurred when the Sacramento River stage was between 19’ and 22’ at the western end of the Fremont Weir

NDWA
NORTH DELTA WATER AGENCY

LA05

Chairman Steve Mello
Vice-Chairman Jack Kuechler
Secretary/Treasurer Tom Hester
Director Topper van Loben Sels
Director Ryan Mahoney
Manager Melinda Terry

February 15, 2018

***Submitted Via Email*:** bcnelson@usbr.gov

Mr. Ben Nelson
Bureau of Reclamation, Bay Delta Office
801 I Street, Suite 140
Sacramento, CA 95814-2536

SUBJECT: Comments on Draft EIR/EIS for Yolo Bypass Salmonid Habitat Restoration and Fish Passage Project (RPA I.6.1 and I.7)

Dear Mr. Nelson:

The following comments on the Yolo Bypass Salmonid Habitat Restoration and Fish Passage Draft EIR/EIS are submitted on behalf of the North Delta Water Agency (NDWA/Agency).

Background of Agency and 1981 Contract

NDWA has a statutory mandate under California law to assure that the lands within the North Delta have a dependable supply of water of suitable quality sufficient to meet present and future beneficial uses.[1] In accordance with its statutory responsibilities, in 1981 the NDWA and the Department of Water Resources (DWR/Department) executed the *Contract for the Assurance of a Dependable Water Supply of Suitable Quality* (1981 Contract). 1

The crux of the 1981 Contract, which remains in full force and effect, is a guarantee by the State of California that, on an ongoing basis, DWR will ensure through the operation of the State Water Project that suitable water will be available to satisfy all agricultural and other reasonable and beneficial uses in all channels within NDWA's boundaries. The 1981 Contract contains specific minimum water quality criteria to be maintained year-round and obligates DWR to avoid or repair damages from hydrodynamic changes resulting from conveyance of SWP water. The 1981 Contract also provides that, if necessary, DWR will provide alternative water supplies of suitable quality and quantity or to limit the operations of the SWP pumps and reservoirs in order to maintain compliance with the minimum water quality criteria contained in the contract.

[1] North Delta Water Agency Act, Chapter 283, California Statutes of 1973.

Subsequently, during "Phase IV" of the water right hearings that led up to Water Right Decision No. 1641 revised, DWR acknowledged its responsibilities to NDWA by means of a Memorandum of Understanding dated May 26, 1998. Taken together, the 1981 Contract and the 1998 Memorandum of Understanding constitute a broad commitment by DWR to provide a water supply of suitable quality and quantity within the jurisdictional boundaries of NDWA.

DWR's compliance with the binding terms of the 1981 Contract is not discretionary. Moreover, the legal standards that govern DWR's discharge of its obligations under the 1981 Contract are quite different from those that govern DWR's compliance with NEPA, CEQA and other applicable law. For example, while CEQA requires DWR to implement feasible mitigation measures to reduce significant impacts of projects to less-than-significant levels, DWR may not, as a matter of contract law, choose not to comply with the specific requirements of the 1981 Contract based on a determination of infeasibility, or otherwise.

Under the 1981 Contract, the State is prohibited from conveying SWP water so as to cause decrease in natural flow, increase in natural flow, reversal of natural flow direction, or alteration of water surface elevations in Delta channels to the detriment of Delta channels or water users within the Agency. So the Final EIR/EIS should analyze where any of these impacts occur in any of the channels and tributaries throughout the 300,000 acres of the Agency boundaries as a result of this project design and operation.

The State (SWP) is also required to either the repair or alleviate damage, improve the channels as necessary, or provide diversion facility modifications required for any seepage or erosion damage to lands, levees, embankments, or revetments adjacent to Delta channels within Agency associated with conveyance of SWP, which includes this habitat project. So the Final EIR/EIS should carefully analyze these potential impacts and design fixes where necessary. 2

The CVP and SWP are operated in accordance with the Coordinated Operation Agreement between the federal government and the State of California.[2] Therefore, the Project Proponents must ensure that the diversion through new Fremont Weir operable gates into the Yolo Bypass of any CVP and SWP water released from upstream storage does not impede DWR's ability to fully comply with the water quality and availability terms and conditions of the 1981 Contract. The following comments on the Draft EIR/EIS are intended to ensure continued compliance with the 1981 Contract and the requirements of the National Environmental Policy Act (NEPA). 3

Project Purpose

On June 4, 2009 the National Marine Fisheries Service (NMFS) issued its Biological Opinion 4

[2] Authorized by Public Law 99-546.

and Conference Opinion on the Long-Term Operations of the Central Valley Project and State Water Project (BiOp) that concluded if left unchanged, the SWP and CVP operations were likely to jeopardize the continued existence of four federally-listed anadromous fish species. Subsequently, the Department of Water Resources (DWR) and the Bureau of Reclamation (USBR) have issued their Fish Restoration Program Agreement Implementation Strategy (FRPA) to create aquatic habitat and fish passage improvements in the Delta as part of their requirement to maintain ESA incidental take permits for the operation of the SWP and CVP pumping facilities in the South Delta.

In order to comply with RPA I.6.1 and I.7 in the BiOps and FRPA, this Yolo Bypass fish restoration project (Project) was initially included in the Bay Delta Conservation Plan (BDCP) as Conservation Measure 2 and is now one of the projects in the California EcoRestore Program.

Deficiencies of Analysis in Draft EIR/EIS

The assumptions used for the analysis and impact conclusions in Chapter 5 *Water Supply* and Chapter 6 *Water Quality* are inadequate, failing to identify or analyze the full scope of water supply and quality impacts to water users located in the Yolo Bypass and downstream in the Delta. Diverting water from the Sacramento River during normal, dry or critically dry years through a notched weir may have significant effects on Sacramento River water quality and quantity effecting downstream areas and water users. 5

Reduced water quality conditions created by operation of new operable Fremont Weir gates could constitute a "taking" of water rights due to the water supplies in and downstream of the Plan Area essentially being degraded to the point of significant impairment of existing beneficial uses, requiring compensation under the law and under the 1981 Contract. The Final EIR/EIS must be revised to acknowledge and mitigate these adverse impacts in the Water Supply Chapter and consider whether the damage to water users is a violation of California's "No Injury Rule" statutes governing "Priority of Water Rights," or standards in CEQA and NEPA governing disclosure, weighting of impacts, and cumulative effects on environmental and human resources. 6

Both chapters analyze impacts to CVP and SWP contractors, but limit analysis of impacts to non-CVP/SWP water users with junior water rights and that are related to implementation of Term 91. Currently, the Draft EIR/EIS only acknowledges water availability impacts to the proposed new North Delta Diversions in the WaterFix project from the alternatives in this Project because of reduced flows in the Sacramento River between Fremont Weir and Delta. 7

Section 5.1.3 *Non-CVP and SWP Water Users* acknowledges there are hundreds of diverters with water rights junior to CVP/SWP that divert from Sacramento River and tributaries and within the Yolo Bypass, but fails to mention there are a total of approximately 2,500 individual water diversion intakes in the Delta, many of which have more senior water rights than 8

CVP/SWP and are gravity siphons that could be negatively impacted by lowered water surface elevations or increases in salinity regardless if Term 91 is implemented or not. The absence of describing the context in which local water supplies are accessed and used, results in the Draft EIR/EIS *Water Supply Chapter 5* failing to properly disclose the level of significant impacts imposed on agricultural and municipal water users in the Plan Area.

Section 5.3.1.4 analyzes how non-CVP/SWP water users with water rights *junior* to the CVP and SWP could be affected by changes in the application of Term 91, but does not disclose, analyze or mitigate impacts to water users with more senior water rights or water users within NDWA's boundaries. Sec 5.1.2 *State Water Project* also fails to mention NDWA Contract obligations that DWR must meet. 9

Chapter 5 *Water Supply* also fails to disclose that the water to be diverted from the Sacramento River is from CVP/SWP stored water supplies or that such diversion requires submission of a Change of Diversion Petition to the State Water Resources Control Board so that hearings can be held to ensure that no other legal water users are injured from the diversion of 6,000-12,000 cfs from the Sacramento River into the Yolo Bypass. 10

This Project was analyzed in the BDCP EIR/EIS as Conservation Measure 2, however no mention of the impacts identified in the Effects Analysis is included in the Yolo Bypass Draft EIR/EIS. The Final Yolo Bypass EIR/EIS should disclose and describe the many cumulative water surface elevation and water quality impacts identified in the BDCP Effects Analysis and EIR/EIS that would occur with implementation of both Conservation Measure 1 (WaterFix Project) and Conservation Measure 2 such as: 11

- In the North Delta, flow patters will be altered by the increased diversions to the Yolo Bypass (CM2) and operations of the new north Delta intake facilities (CM1). ***Chap 5, page, 5.3-2.***

- The average modeled annual inflow at Freeport for the evaluated starting operations was reduced by about 650,000 af compared to existing conditions, primarily as a result of the increased Fremont Weir Spills (CM2). ***Chap 5, 5.3-3.*** 12

- The Freeport median flows in January, February, and March for the evaluated starting ops cases were about 3,000 cfs less than existing conditions flows, reflecting the increased spills at the Fremont Weir into the Yolo Bypass (CM2). ***Chap 5, page 5.3-4.*** 13

- Overall, proposed operation of Fremont notch extended the duration of spills from 78 days under the EBC2_LLT to 117 days under the ESO_LLT, and the duration of floodplain inundation from 85 to 124 days, respectively. ***Chap 5, page 5C.5.4-28.*** 14

- A decrease of 6,000 cfs in the Sacramento River could result in as much as a 3-foot reduction in river stage, although understanding of how notch flows would affect river stage is incomplete. ***Chap 5, page 5C.5.4-6.*** 15

- In addition to flows from new north Delta intakes, BDCP habitat restoration may modify hydrodynamics in the Delta. These hydrodynamic changes in turn can change salinities, DO, turbidity, and flows. ***Chap 5, page 5C.1-1.*** 16

- The median diversions into Sutter and Steamboat Sloughs are lower under the evaluated starting ops because of the Fremont Weir notch increases the diversions to the Yolo Bypass and because north Delta intakes reduce the Sacramento River flow at these two sloughs. In addition, tidal restoration in the Cache Slough Complex was simulated to shift the tidal elevations and reduce the Sutter/Steamboat diversion fractions. The BDCP median diversion flows were reduced by about 1,000 cfs in January, about 5,000 cfs in February, and about 3,500 cfs in March compared to the existing conditions. The reductions in the Sutter/Steamboat Slough diversions were about 40% of the simulated north Delta intake diversions. ***Chap 5, page 5.3-10.*** 17

- Predicted reduced monthly median diversion flows to DCC and Georgiana Slough for evaluated starting ops because the north Delta intakes reduced the Sacramento River flow. The average annual diversions into the DCC and Georgiana Slough were about 3,750 TAF (24% of the Sacramento River flow at Freeport) for the existing conditions and were reduced to about 3,50 TAF (21% of Sac River flow) for the BDCP ops. ***Chap 5, page 5.3-10.*** 18

- North Delta intakes combined with diversion of water into Yolo Bypass (CM2) inevitably would result in less Sacramento River flow below intakes with potential for greater incidences of Sac River flow reversals in the vicinity of Georgiana Slough and the DCC. ***Chap 5, page 5C.4-78.*** 19

- Removal of road crossings and agricultural impoundments, earthwork and construction of structures to reduce Tule Canal/Toe Drain channel capacities. ***Chap 4, page 4-16.*** 20

- Modification of existing configuration of the discontinuous channels along the western edge of the Yolo Bypass to reduce diversion of Delta water for Yolo Bypass irrigation. ***Chap 4, page 4-16.*** 21

- Operations result in changes in flow and potentially changes in water quality, habitat, and predation. Operational impacts on fish may include changes in spawning, migration, and rearing habitat associated with changes in reservoir operations, diversion of water, and 22

the consequent changes in flow in the Sacramento River and water circulation and quality through the Delta. Placement and operation of intakes may also result in changes in the potential for predation. ***Chap 4, page 4-20.***

Unmitigated Water Quality and Availability Impacts

The Draft EIR/EIS fails to properly analyze and disclose several potential significant impacts to water users or analyze impacts to DWR's ability to comply with the water supply availability and quality terms and conditions contained in the 1981 Contract.

The Project Proponents need to broaden the analysis in the Final EIR/EIS to include disclosure of following impacts associated with diverting between 6,000-12,000 cfs from the Sacramento River more frequently and for longer duration, and provide mitigation measures if the following impacts are significant: 23

- Affects to water surface elevations in Delta waterways and the salinity criteria at seven monitoring locations identified in the 1981 Contract from implementation of RPA I.6.1 and I.7.
- If implementation of RPA I.6.1 and I.7 are successful in increasing the abundance of special status or endangered species in the Yolo Bypass, then ESA restrictions could become problems for existing water diversion intakes that currently do not have impacts on listed species. 24
- Diverting 6,000-12,000 cfs into the Yolo Bypass will lower water surface elevations in the Sacramento River and downstream tributaries, including Sutter and Steamboat Sloughs, reducing water availability for existing intakes. 25

The Final EIR/EIS should be revised to include: 26

1. A comprehensive description of the 1981 Contract and the Final EIR/EIS should focus on alternatives that are feasible in light of the requirements of the 1981 Contract.
2. Perform hydrologic and hydraulic modeling that assumes the terms and conditions of the 1981 Contract as the "baseline" condition (Existing Conditions), including but not limited to its water quality requirements, will remain in full force and effect at all seven monitoring locations. 27
3. Modeling should analyze not only the potential impacts to water quality, water surface elevations, flows and flow direction, increased seepage and erosion resulting from 28

various alternatives, but also the mitigations associated with the repair, modification, or replacement of existing landowner diversion facilities and levees as required under Article 6 of the 1981 Contract due to the modification of the Fremont Weir.

4. NEPA imposes an obligation to analyze and mitigate the significant effects (direct and indirect) associated with "human environment" (42 U.S.C. § 4332) and "economic, social or health" effects (40 C.F.R. § 1508.8). The Final EIS must analyze the extent that any of the project alternatives cause agricultural land within NDWA to be taken out of agricultural production. 29

Thank you for considering our comments and recommendations for revising the Final Draft EIR/EIS for the Yolo Bypass Fish Restoration Project.

Sincerely,



Melinda Terry,
Manager

LA06

Buckman, Carolyn

From: Bahia, Maninder@DWR <Maninder.Bahia@water.ca.gov>
Sent: Monday, January 29, 2018 12:23 PM
To: Buckman, Carolyn
Subject: FW: Fish passage project

-----Original Message-----
From: Kyle Lang [mailto:langorchardsllc@aol.com]
Sent: Friday, January 19, 2018 12:17 PM
To: Bahia, Maninder@DWR <Maninder.Bahia@water.ca.gov>
Cc: bypassfarms@gmail.com; Michele Clark <mclark@theyololandtrust.org>; jvnolan@yololaw.com; kentalang44@gmail.com
Subject: Fish passage project

Hi Manny,

I've been reviewing the documents regarding fish passage.

Our main concern is the drainage of Tule canal and public access.

Can you direct me to the section in the report that covers this.

Dominic and Michele please add any other questions you have.

Thanks Kyle Lang

Manager Reclamation District 1600

Sent from my iPhone

1

LA07

Buckman, Carolyn

From: Bahia, Maninder@DWR <Maninder.Bahia@water.ca.gov>
Sent: Monday, January 29, 2018 12:24 PM
To: Buckman, Carolyn
Subject: FW: Fish passage project

-----Original Message-----
From: Kyle Lang [mailto:langorchardsllc@aol.com]
Sent: Thursday, January 25, 2018 8:35 AM
To: Bahia, Maninder@DWR <Maninder.Bahia@water.ca.gov>; tct@lmce.net
Cc: bypassfarms@gmail.com; Michele Clark <mclark@theyololandtrust.org>; jvnolan@yololaw.com; kentalang44@gmail.com; Enstrom, Karen@DWR <Karen.Enstrom@water.ca.gov>; Nelson, Ben@usbr.gov <bcnelson@usbr.gov>; Buckman, Carolyn (BuckmanCM@cdmsmith.com) <BuckmanCM@cdmsmith.com>
Subject: Re: Fish passage project

Hi Manny,

After reviewing section 5 I can see when and how much flow is expected.

However I don't see the actual condition of the Tule canal addressed. As in our meeting we asked that the condition and ability of the Tule canal be studied and addressed.

From visual inspection of the Tule canal it has filled in with soil and vegetation. Currently the canal barely handles our natural flow drain which is located 2.2 miles south of the Fremont Weir.

This drain is our only drain and we rely on it. If we are unable to use it the cost of pumping water out of the district will cost upwards of $20,000.

We request this be studied and a maintenance plan by Dwr be created and part of the funding for this project be the continuing operations and maintenance of the Tule Canal.

1

Thanks Kyle Lang
Manager
Reclamation District 1600

Sent from my iPad

> On Jan 19, 2018, at 2:02 PM, Bahia, Maninder@DWR <Maninder.Bahia@water.ca.gov> wrote:
>
> Hi Kyle,
>
> Thank you for reviewing the document.
>

> Appendix H5 has lots of graphs that can be used to figure out the timing of when existing and project flows enter and drain out of the Bypass.
>
> Carrie,
>
> Can you help me point Kyle to where he could find info regarding public access.
>
> Thanks,
>
> Manny
>
> -----Original Message-----
> From: Kyle Lang [mailto:langorchardsllc@aol.com]
> Sent: Friday, January 19, 2018 12:17 PM
> To: Bahia, Maninder@DWR <Maninder.Bahia@water.ca.gov>
> Cc: bypassfarms@gmail.com; Michele Clark <mclark@theyololandtrust.org>; jvnolan@yololaw.com; kentalang44@gmail.com
> Subject: Fish passage project
>
> Hi Manny,
>
> I've been reviewing the documents regarding fish passage.
>
> Our main concern is the drainage of Tule canal and public access.
>
> Can you direct me to the section in the report that covers this.
>
> Dominic and Michele please add any other questions you have.
>
> Thanks Kyle Lang
>
> Manager Reclamation District 1600
>
> Sent from my iPhone

LA08

Buckman, Carolyn

From: Nelson, Benjamin <bcnelson@usbr.gov>
Sent: Friday, February 16, 2018 11:29 AM
To: Buckman, Carolyn
Subject: Fwd: Reclamation District 1600 Comments :Yolo Bypass Salmonid Habitat Restoration and Fish Passage Project

---------- Forwarded message ----------
From: **Kyle Lang** <langorchardsllc@aol.com>
Date: Thu, Feb 15, 2018 at 2:56 PM
Subject: Reclamation District 1600 Comments :Yolo Bypass Salmonid Habitat Restoration and Fish Passage Project
To: Karen.Enstrom@water.ca.gov, bcnelson@usbr.gov
Cc: Michele Clark <mclark@theyololandtrust.org>, Dominic Bruno <bypassfarms@gmail.com>, kentalang44@gmail.com, Jim Nolan <jvnolan@yololaw.com>

Karen and Ben,

1 Table ES-2 – HYD-1 – In reading the no action, the text reads as if there is no change from the existing condition. If that's correct, how can it have "2 additional occurrences of monthly flows greater than the maximum existing conditions monthly flow, 136,869 cfs?" Is this due to unrelated changes to reservoir operations or planned projects upstream of the Fremont Weir?

2 Table ES-2 – HYD-2 – Same comments as above.

3 Table ES-2 – WS-3, 4 and 5 – These should be reviewed by water supply interests to confirm they agree with the findings and significance.

4 Section 2.4.2.1 - Identifies 7-8 acres of land that would be purchased for disposal. Long term sediment removal will require an additional 38-43 acres for disposal of soils from periodic maintenance removal of sediment. It's not clear that the impacts of converting Ag land for sediment disposal has been evaluated.

5 Section 2.4.4.3 - Identifies that grasses and woody vegetation can remain in the channel unless it is an obstruction to flow. Chapter 4 does not evaluate the impacts of leaving the woody vegetation in the channel. Removal of woody vegetation in the floodway has become increasingly challenging from a regulatory perspective. 6 The project description should be revised to remove woody vegetation annually and provide the ESA clearance for the removal. 7 The project should also mitigate for any long term impacts that result from this O&M activity.

8 Section 2.4.5 - Says DWR will monitor GW and work with property owners to implement a physical solution if necessary. Who determines what is necessary? Consideration should be given to empowering an independent third party to make the determination of whether there is an impact and what the appropriate mitigation is. I don't think you want DWR deciding this. I also questions whether their approach to this issue is sufficient to meet CEQA requirements to disclose the project impacts. The safe thing to do would be to identify the impact and mitigation measure and then only implement if the groundwater data confirmed the impact.

9 Chapter 4 -H&H - The impact of increased flows leading to natural recruitment of riparian vegetation was discussed, but not evaluated. A baseline for woody vegetation along the tule canal should be evaluated and the project should have an

10 O&M element that maintains this annually. The impacts should be evaluated as part of the project so that at the time the maintenance is conducted mitigation is not required. The Section 7 and CESA consultation should also cover this activity.

11 Chapter 12 - Geology and Soils - Impact GEO-1 - The analysis identifies a 13 percent increase in annual sedimentation rates and that while sediment removal will need to occur more frequently, it's a less than significant impact. Sediment removal in the floodway has become increasingly more difficult to get permitted and more costly due to mitigation requirements. Any change should be considered significant.

12 The project should include CESA and ESA coverage for all O&M activities, including sediment removal.

13 Impacts on RD 1600 gravity drain – The project as propose will have an adverse impact on RD 1600 drainage. When the notch has water flowing through it, the backwater in the Tule canal will prevent the gravity drain from draining the district. This will require the pump station to be used more often resulting in increased electrical costs and wear and tear on the pump station requiring more frequent maintenance, repair and rehabilitation. The increase in sedimentation that is associated with the project will also reduce the effectiveness of the gravity drain. The project should include periodic removal of sediment in the Tule Canal to avoid impacting the gravity drain.

14 CESA and ESA coverage should include coverage for this O&M activity.

15 Public access - In your report it states there is a public parking area. There is no public parking area it is the top of the bypass levee. Department of Water Resources has a easement to maintain the levee and perform flood related activities.

16 In your report it mentions a 3000 foot slurry wall starting at the Fremont Weir. This slurry wall needs to continue south approximately 3 miles to the point the ridge cut enters the Tule canal. At this connection the water flows keep the Tule canal from filling in with sediment.
Between the Fremont Weir and Ridge cut the water barely flows due to sediment filling up the canal and primrose growing. There are also 4 beaver dams that go across the entire Tule Canal.

17 During the project itself what will the impacts be to the district and farmers? Any issues with damaging our roads from traffic?

18 Any issues with draining our main canal into the Tule Canal?

CHAPTER 6:

6.3.3.2.1 Impact WQ-1: Construction- or maintenance-related degradation of surface water quality such that it would exceed regulatory standards or would substantially impair beneficial uses of surface water

19 Construction activities under Alternative 1 would involve demolition of a portion of the existing Fremont Weir; construction of a headworks structure, intake channel and outlet channel; and grading of the transport channel. These activities could affect water quality temporarily during the construction period. Possibilities include mobilizing sediment and associated contaminants during excavation and grading, release of construction-related chemicals such as oils, fuels, cement, solvents, etc. from improper handling or accidents.
Maintenance activities would include sediment removal every five years within the Fremont Weir Wildlife Area using construction equipment to load and haul it from the bypass; these maintenance activities have the potential to affect water quality in the Yolo Bypass in the same ways as construction activities at the beginning of the project. Maintenance activities would not include dredging in the Sacramento River or Tule Canal. 6-25 WHY NOT?

Thanks Kyle Lang
Manager Reclamation District 1600

--
Ben Nelson

Natural Resources Specialist

Bureau of Reclamation, Bay-Delta Office

801 I St, Suite 140, Sacramento, CA 95814

office - 916-414-2424

cell - 916-539-9510

LA09

Buckman, Carolyn

From: Nelson, Benjamin <bcnelson@usbr.gov>
Sent: Friday, February 16, 2018 11:30 AM
To: Buckman, Carolyn
Subject: Fwd: RD 1600
Attachments: RE RD 1600 Drainage Timing

---------- Forwarded message ----------
From: **Todd Tommeraason** <tct@lmce.net>
Date: Thu, Feb 15, 2018 at 11:11 AM
Subject: RD 1600
To: "Karen.Enstrom@water.ca.gov" <Karen.Enstrom@water.ca.gov>
Cc: "bcnelson@usbr.gov" <bcnelson@usbr.gov>

Karen,

See my comments on attached email.

Let me know if you need anything else

Todd C. Tommeraason | Principal, P.E.

Laugenour and Meikle

Civil Engineering • Land Surveying • Planning

608 Court Street, Woodland, CA 95695

p: 530.662.1755 • c: 530.908.7740

tct@lmce.net • www.lmce.net

---------- Forwarded message ----------
From: Todd Tommeraason <tct@lmce.net>
To: Kyle Lang <langorchardsllc@aol.com>, "Bahia, Maninder@DWR" <Maninder.Bahia@water.ca.gov>
Cc: "kentalang44@gmail.com" <kentalang44@gmail.com>, "Dominic Bruno (bypassfarms@gmail.com)"

<bypassfarms@gmail.com>, "Martinez, Analisa@DWR" <Analisa.Martinez@water.ca.gov>, Michele Clark <mclark@theyololandtrust.org>, "Reinhardt@mbkengineers.com" <Reinhardt@mbkengineers.com>
Bcc:
Date: Thu, 15 Feb 2018 16:00:19 +0000
Subject: RE: RD 1600 Drainage Timing

Manny,

The project proposes to construct a channel that will discharge flows to the Tule Canal "Tule Pond" without any improvements to the existing Canal downstream of this connection.

This canal has not been cleaned out in years and there needs to be an allowance for this maintenance work to be completed during construction of this project and a plan for regular maintenance to clean out vegetation and sediment in the future.

1

These improvements should at a minimum take place from the new point of discharge in to the Tule Canal south to the new agricultural crossing#1.

Without these improvements water levels will increase in the area of RD 1600's drainage pumping plant reducing their ability to gravity discharge their drainage and forcing them to pump drainage waters and adding significant costs to their annual budget.

Todd C. Tommeraason | Principal, P.E.

Laugenour and Meikle

Civil Engineering • Land Surveying • Planning

608 Court Street, Woodland, CA 95695

p: 530.662.1755 • c: 530.908.7740

tct@lmce.net • www.lmce.net

From: Kyle Lang [mailto:langorchardsllc@aol.com]
Sent: Monday, February 05, 2018 10:48 AM

To: Bahia, Maninder@DWR <Maninder.Bahia@water.ca.gov>
Cc: Todd Tommeraason <tct@lmce.net>; kentalang44@gmail.com; Dominic Bruno (bypassfarms@gmail.com) <bypassfarms@gmail.com>; Martinez, Analisa@DWR <Analisa.Martinez@water.ca.gov>; Michele Clark <mclark@theyololandtrust.org>; Reinhardt@mbkengineers.com
Subject: Re: RD 1600 Drainage Timing

Hi Manny,

Depending on when farmers start irrigation. If it's a dry spring then irrigation begins in April. We will be irrigating fields until September 1.

There is no way to work out an irrigation schedule because it is determined by the weather.

It may be best to meet out at project to understand the different factors that will affect the project.

Thanks Kyle Lang

Sent from my iPhone

On Jan 29, 2018, at 9:13 AM, Bahia, Maninder@DWR <Maninder.Bahia@water.ca.gov> wrote:

> Good morning Kyle,
>
> We are planning construction activities for the Fremont Weir Adult Fish Passage Modification Project, the smaller project that has no inundation changes, and wanted to know when RD 1600 drains their fields. This project is different than the project documents you're currently reviewing This project includes the improvement of Ag-Xing 2 and the removal of Ag-Xing 3 (see below) to improve fish passage. Construction is scheduled to begin in May and go through October. Knowing the timing of when RD 1600 drains their fields into the Tule Canal will help us plan construction activities. Please feel free to give me a call or reply all.
>
> Thanks,

Manny

916-376-9835

<image003.jpg>

Manny Bahia, PE

Senior Water Resources Engineer

DWR Division of Environmental Services

3500 Industrial Blvd.

West Sacramento, CA, 95691

(916) 376-9835

--

Ben Nelson

Natural Resources Specialist

Bureau of Reclamation, Bay-Delta Office

801 I St, Suite 140, Sacramento, CA 95814

office - 916-414-2424

cell - 916-539-9510

SMUD®

LA10

Sent Via E-Mail

February 14, 2018

Karen Enstrom
California Department of Water Resources
3500 Industrial Blvd.
Sacramento, CA 95691
karen.enstrom@water.ca.gov

Subject: Yolo Bypass Salmonid Habitat Restoration and Fish Passage Project (Project No. SCH#2013032004)

Dear Ms. Enstrom:

The Sacramento Municipal Utility District (SMUD) appreciates the opportunity to provide comments on the Draft EIR for the Yolo Bypass Salmonid Habitat Restoration and Fish Passage. SMUD is the primary energy provider for Sacramento County and has facilities within the project area. SMUD's vision is to empower our customers with solutions and options that increase energy efficiency, protect the environment, reduce global warming, and lower the cost to serve our region. As a Responsible Agency, SMUD aims to ensure that the proposed Project limits the potential for significant environmental effects on SMUD facilities, employees, and customers.

1

We have no comments to offer at this time, but would appreciate if the Department of Water Resources would continue to keep SMUD facilities in mind as environmental review of the Project moves forward as **SMUD maintains a high pressure gas line that crosses the Yolo Bypass just north of I-80. The current design does not conflict with SMUD's facilities; however, any redesign would need to be subject to additional review by SMUD for conflict aversion.** Please reroute the Project analysis for SMUD's review if there are any changes to the scope of the Project.

If you have any questions regarding this letter, please contact Ammon Rice at 916-732-7466 or ammon.rice@smud.org

Sincerely,

Nicole Goi

Nicole Goi
Regional & Local Government Affairs
Sacramento Municipal Utility District
6301 S Street, Mail Stop A313
Sacramento, CA 95817
entitlements@smud.org
Cc: Ammon Rice

LA11

Yolo Habitat Conservancy

County of Yolo • City of Davis • City of Winters • City of West Sacramento
City of Woodland • University of California, Davis

February 15, 2018

Mr. Ben Nelson
Bureau of Reclamation
801 I Street, Suite 140
Sacramento, CA 95814

Ms. Karen Enstrom
California Department of Water Resources
3500 Industrial Blvd.
West Sacramento, CA 95691

Subject: Draft Environmental Impact Statement/Environmental Impact Report for the Yolo Bypass Salmonid Habitat Restoration and Fish Passage Project (State Clearinghouse # 2013032004)

Dear Mr. Nelson and Ms. Enstrom,

Thank you for the opportunity to review and comment on the Yolo Bypass Salmonid Habitat Restoration and Fish Passage ("Yolo Bypass Salmonid Project") Draft Environmental Impact Statement/ Environmental Impact Report ("EIS/EIR"). As you know, the Yolo Habitat Conservancy is in the final stages of completing the Yolo Habitat Conservation Plan/Natural Community Conservation Plan (Yolo HCP/NCCP) and expects the California Department of Fish and Wildlife and the U.S. Fish and Wildlife Service to issue permits by June 2018. The Yolo HCP/NCCP is a comprehensive, countywide plan to provide for the conservation of 12 sensitive species ("covered species")[1] and the natural communities and agricultural land on which they depend. The Yolo HCP/NCCP's Plan Area encompasses the entire area of Yolo County and prioritizes conservation of habitat in the Yolo Bypass, especially for giant garter snake and western pond turtle.

1

[1] Yolo HCP/NCCP covered species include: palmate-bracted bird's beak (*Chloropyron palmatum*), Valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*), California tiger salamander (*Ambystoma californiense*), western pond turtle (*Actinemys marmorata*), giant garter snake (*Thamnophis gigas*), Swainson's hawk (*Buteo swainsoni*), white-tailed kite (*Elanus leucurus*), western yellow-billed cuckoo (*Coccyzus americanus hypugaea*), western burrowing owl (*Athene americanus occidentalis*), least Bell's vireo (*Vireo bellii pusillus*), bank swallow (*Riparia riparia*), and tricolored blackbird (*Agelaius tricolor*).

The Conservancy understands the need to improve habitat in the Yolo Bypass for endangered and threatened fish species, but urges the Bureau of Reclamation and the Department of Water Resources to work with the Yolo Habitat Conservancy to develop a preferred alternative that minimizes the impact of the project on endangered and threatened terrestrial species, including the species covered by the Yolo HCP/NCCP. After over 15 years of work on the Yolo HCP/NCCP, the investment of $3.7 million in state and federal planning grants, and the investment of over $5 million in local funding, it is critical that the Yolo Bypass Salmonid Project complement, and not conflict with, the Yolo HCP/NCCP.

Based on our review of the Yolo Bypass Salmonid Project Draft EIS/EIR, we have identified several areas of this document warranting further clarification and analysis. Descriptions and recommendations for your consideration are provided below.

Page ES-17 (Issues of Known Controversy) and Section 23-9 (Controversies and Issues Raised by Agencies and Public – CEQA requires that the EIR address areas of controversy and issues to be resolved (CEQA Guidelines Section 15123(b)(2) and (3)). Page ES-17 and Section 23-9 make no mention of concerns raised by multiple stakeholders, including Yolo County and the Yolo Habitat Conservancy among others, that the project is designed and analyzed in a silo with only superficial consideration of consistency with the impending Yolo HCP/NCCP. These discussions also fail to identify that, as proposed, the project will potentially adversely affect the success of the Yolo HCP/NCCP and the ability of the YHC to successfully establish the Yolo HCP/NCCP conservation reserve system. The Yolo HCP/NCCP identifies approximately 22,316 acres of the Yolo Bypass as Priority 1 acquisition lands and approximately 6,237 acres of the Yolo Bypass as Priority 2 acquisition lands for the Yolo HCP/NCCP reserve system (See **Attachment A**). These lands have been identified as having a high acquisition priority for the conservation of the Yolo HCP/NCCP's covered species based on the potential habitat that they provide to multiple Yolo HCP/NCCP covered species including giant garter snake, western pond turtle, Swainson's hawk, white-tailed kite, yellow-billed cuckoo, and least Bell's vireo (See **Attachments B-G**). Please expand the sections of the EIS/EIR identified above to include an adequate discussion of these areas of controversy and issues to be resolved. 2

Preferred Project Analysis -- The EIS/EIR acknowledges that NEPA and CEQA have different requirements but does not accurately or completely articulate the relevant extent of these differences. As a result, the impact analysis is inadequate and it is not possible to discern the required CEQA impact conclusions. The requirements for analysis of the impacts of the preferred project under CEQA are substantively different from the same requirements under NEPA. For CEQA the proper baseline for determining whether the Proposed Project/Preferred Action/Alternative 1 will have adverse impacts is existing conditions or setting (CEQA Guidelines Section 15125), whereas under NEPA the baseline is the No Project/No Action Alternative. This distinction is not apparent in the EIS/EIR, yet is required by law. Please revise the EIS/EIR to clearly reflect this analysis and conclusions, and recirculate the document to allow stakeholders such as the YHC to properly consider the analysis and results. 3

Alternatives Analysis – The EIS/EIR also does not clearly recognize that the requirements for alternatives analysis under CEQA are substantively different from the requirements for alternatives analysis under NEPA. For CEQA the proper point of comparison for alternatives is the Proposed Project/Preferred Action/Alternative 1 (CEQA Guidelines Section 15126.6(d)). Under NEPA the proper point of comparison for alternatives is the No Project/No Action Alternative. This distinction is not apparent in the EIS/EIR, yet is required by law. Please revise the EIS/EIR to clearly reflect this analysis and conclusions, and recirculate the document to allow stakeholders such as the YHC to properly consider the analysis and results. 4

Standard for Adequacy – The basic CEQA standard for adequacy is an evaluation of the environmental effects of a proposed project in light of what is reasonably foreseeable (CEQA Guidelines Section 15151). Implementation of the Yolo HCP/NCCP is reasonably foreseeable. The final HCP/NCCP and related EIS/EIR were delivered to the FWS and CDFW on January 23, 2018 and are awaiting the authorization of those agencies for formal release and final action. Both the federal and state governments have extensive investments in this plan and common interests in ensuring its success. In light of this please revise the second to last threshold of significance in Chapter 9 (Vegetation, Wetlands, and Wildlife Resources) related to HCP consistency to include "impending" as well as adopted HCPs, such as the Yolo HCP/NCCP. Also, please revise this chapter generally, and in Impact TERR-11 in particular, to include a complete analysis of the potential for conflict with the Yolo HCP/NCCP, and recirculate the document to allow stakeholders such as the YHC to properly consider the analysis and results. 5

Chapter 9 (Vegetation, Wetlands, and Wildlife Resources) Analysis and Approach – Section 9.3.2 (Thresholds of Significance – CEQA) is missing the mandatory discussion of the following issues (CEQA Guidelines Section 15065(a)(1)): 1) whether the project has the potential to substantially degrade the quality of the environment; 2) whether the project has the potential to substantially reduce the habitat of a fish or wildlife species; 3) whether the project has the potential to cause a fish or wildlife population to drop below self-sustaining levels; and 4) whether the project threatens to eliminate a plant or animal community. Please revise Section 9.3.2 to include these mandatory thresholds, and please revise this Chapter to include an analysis of these impacts, including substantiated conclusions, and feasible mitigation. 6

Impact TERR-3 – The analysis provided in Section 9.3.3.2.3 and elsewhere in this chapter related to the impact of operations on giant garter snake resulting from changes in the duration of inundation acknowledges "inundation of occupied burrows below the elevation of floodwaters may result in the loss of giant garter snake individuals," but considers these direct or indirect adverse effects on giant garter snake less than significant. The analysis relies on an increased number of days of inundation as the metric for making this determination; however, there is no discussion of any analysis that was conducted to determine the increase in inundation area resulting from the project that would not otherwise have occurred (such as during below-average water years). This additional inundation may cause a significant impact to giant garter snake and should be evaluated and discussed in the EIS/EIR. Analyzing only a potential incease to the number of days of inundation could artificially deflate the magnitude of 7



the impact by failing to account for the fact that the occurrence of inundation, not just its length, will also be influenced by project implementation.

Impact TERR-5 – The analysis provided in Section 9.3.3.2.5 and elsewhere in this chapter discusses the impact of operations on foraging habitat for bird species. The EIS/EIR contemplates the potential effects on foraging habitat based on the inundation of their prey. This analysis neglects to evaluate the impact of changes to foraging habitat types and cultivation patterns that may result from inundation periods and how those changes may impact the availability and accessibility of prey. For example, Swainson's hawks utilize tomato fields harvested just prior to their migration period as an important source of prey (Estep 2015). Section 16.3.3.2.2 (Impact SOC-2) states that "rice and processing tomatoes are the dominant Yolo Bypass crops likely to be affected by Project alternatives"; however, there is no evaluation regarding the potential impact that changes to these crops will have on species that utilize them for foraging habitat. (See Yolo County's comment letter for more information about the potential for the project to impact cropping patterns in the Yolo Bypass. Yolo County's letter and attachments are incorporated by reference into this letter.) These potential impacts should be evaluated as part of the overall assessment associated with TERR-5. 8

Impact TERR-11 – The analysis provided in Section 9.3.3.2.11 and elsewhere in this chapter related to conflict with the Yolo HCP/NCCP is conclusory. No evidence or analysis is provided to support the discussion. Also, please correct the citation used. While ICF is a YHC consultant, they are not the lead agency or regulatory author of the plan. Please cite the YHC as the author of the Yolo HCP/NCCP and its related EIR. 9

Mitigation Measures MM-TERR-10 and MM-TERR-14 – Both of these measures should include mitigating for impacts within Yolo County to the extent that mitigation options are available, and that mitigation coverage is to be sought through the Yolo HCP/NCCP prior to seeking the purchase of mitigation credits elsewhere. 10

Chapter 9 Mitigation Measures -- All of the missing areas of impact identified above, plus the other areas of impact that are identified in this Chapter, could be feasibly lessened or avoided by including the following reasonable and feasible mitigation measures:

- Implement all aspects of the project in a manner consistent with and not in conflict with the Yolo HCP/NCCP. 11
- Coordinate with the YHC to provide mitigation through the Yolo HCP/NCCP.
- Ensure that no aspect of the proposed project is implemented in a manner that precludes the Yolo HCP/NCCP from successful implementation of the identified Yolo HCP/NCCP conservation measures, conservation strategy, or conservation reserve system.
- Modify the project as necessary to avoid adverse effects to properties identified as Yolo HCP/NCCP priority conservations lands.

Mitigation Measures Not Identified -- As explained in these comments, there are simple, reasonable, prudent mitigation measures the lead agencies can and should adopt that will address many of the concerns raised in this comment letter.

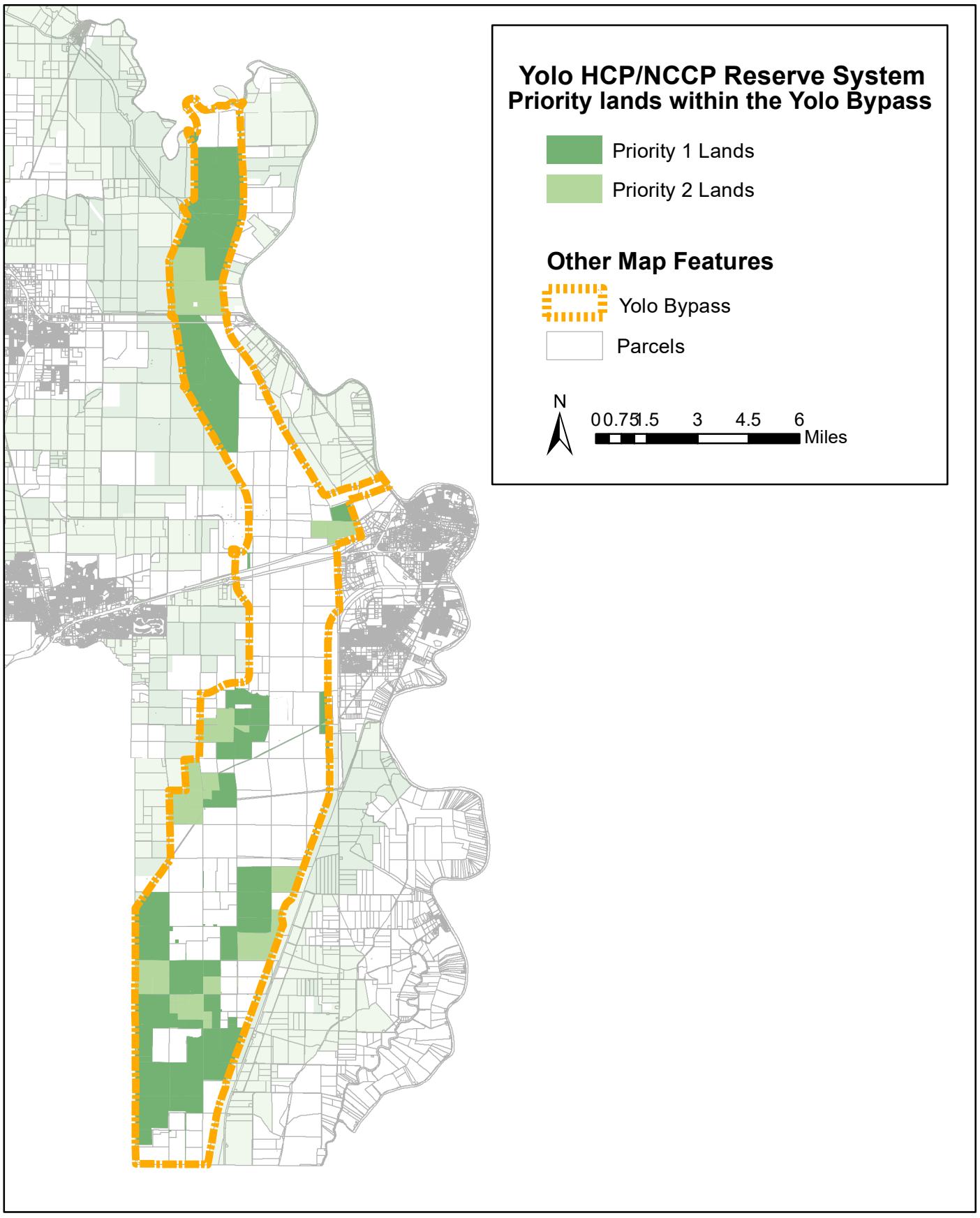
Thank you for the opportunity to comment. We look forward to working with you to develop a preferred alternative that further protects habitat for both terrestrial and fish species in the Yolo Bypass.

Sincerely,

Jim Provenza
Chair, Yolo Habitat Conservancy

cc: Yolo County Board of Supervisors
John Laird, Secretary, California Natural Resources Agency
Kris Tjernell, Special Assistant for Water Policy, California Natural Resources Agency
Karla Nemeth, Director, California Department of Water Resources
David Murillo, Regional Director, Mid-Pacific Region, U.S. Bureau of Reclamation
Rep. Doris Matsui
Rep. John Garamendi
Senator Dianne Feinstein
Senator Kamala Harris
Senator Bill Dodd
Assemblymember Cecilia Aguiar-Curry
Assemblymember Kevin McCarty
Senator Richard Pan

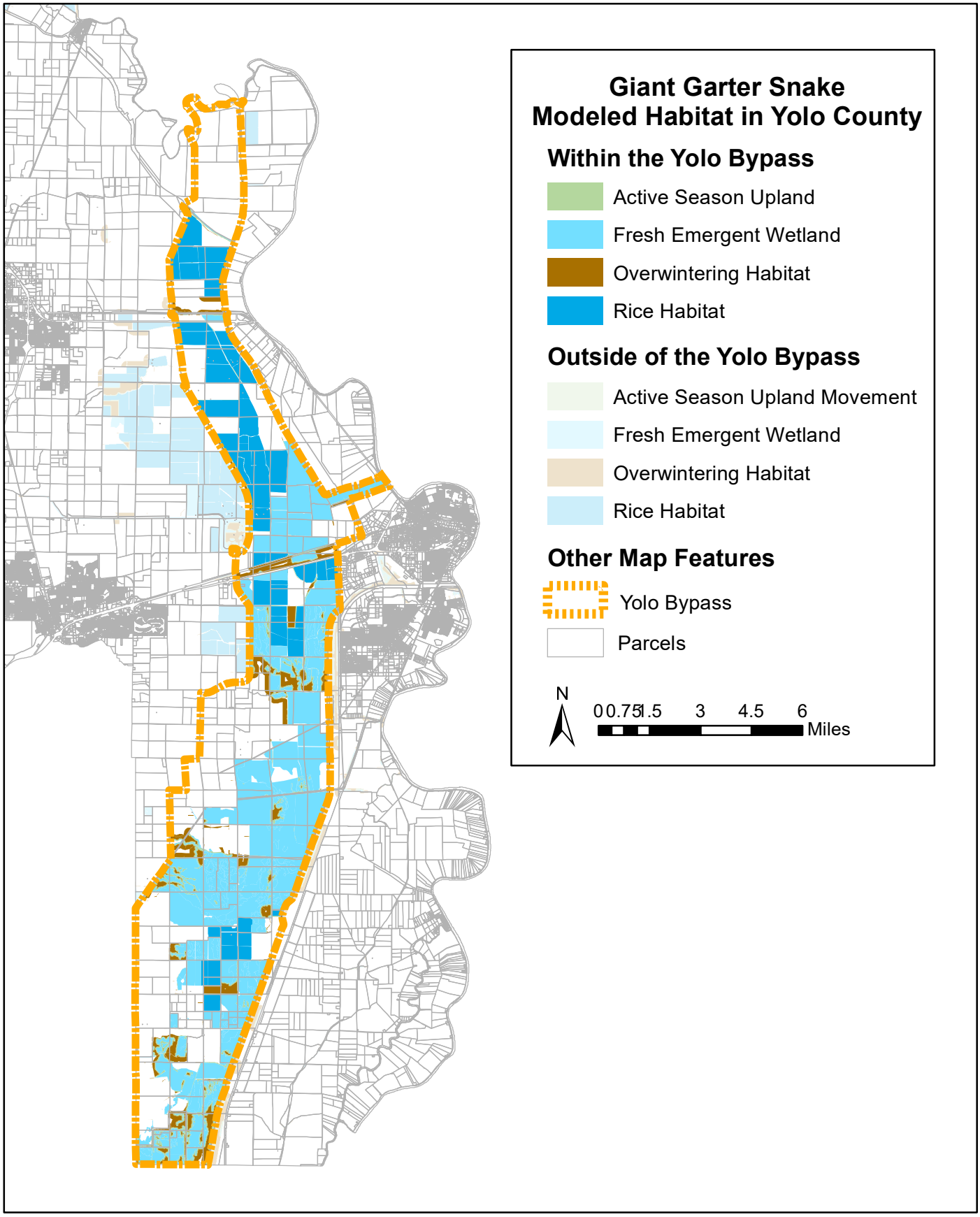
ATTACHMENT A



Yolo Habitat Conservancy 2/9/18

Yolo HCP/NCCP Reserve System Priority Lands in the Yolo Bypass

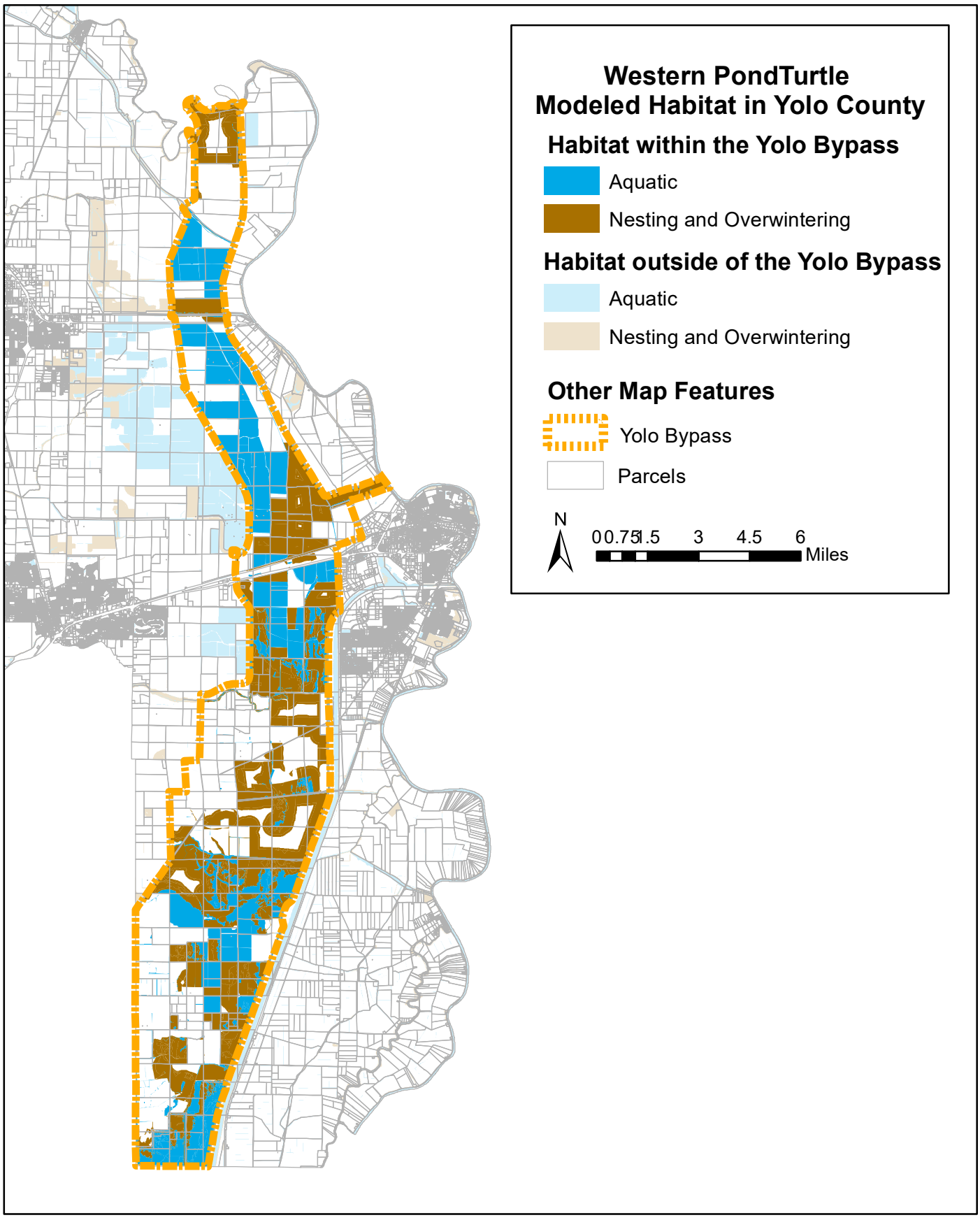
ATTACHMENT B



Yolo Habitat Conservancy 2/9/18

Giant Garter Snake Modeled Habitat in the Yolo Bypass

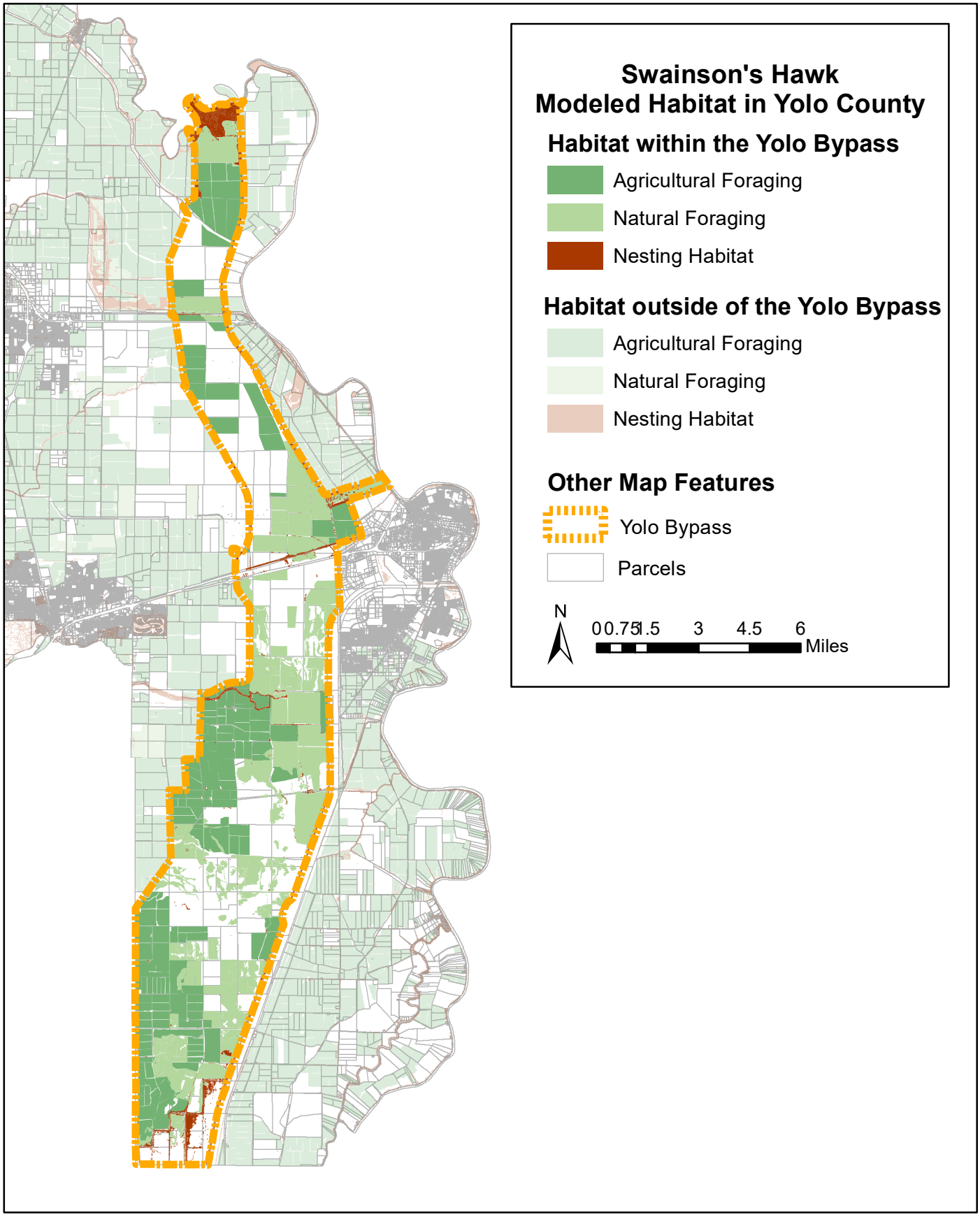
ATTACHMENT C



Yolo Habitat Conservancy 2/9/18

Western Pond Turtle Modeled Habitat in the Yolo Bypass

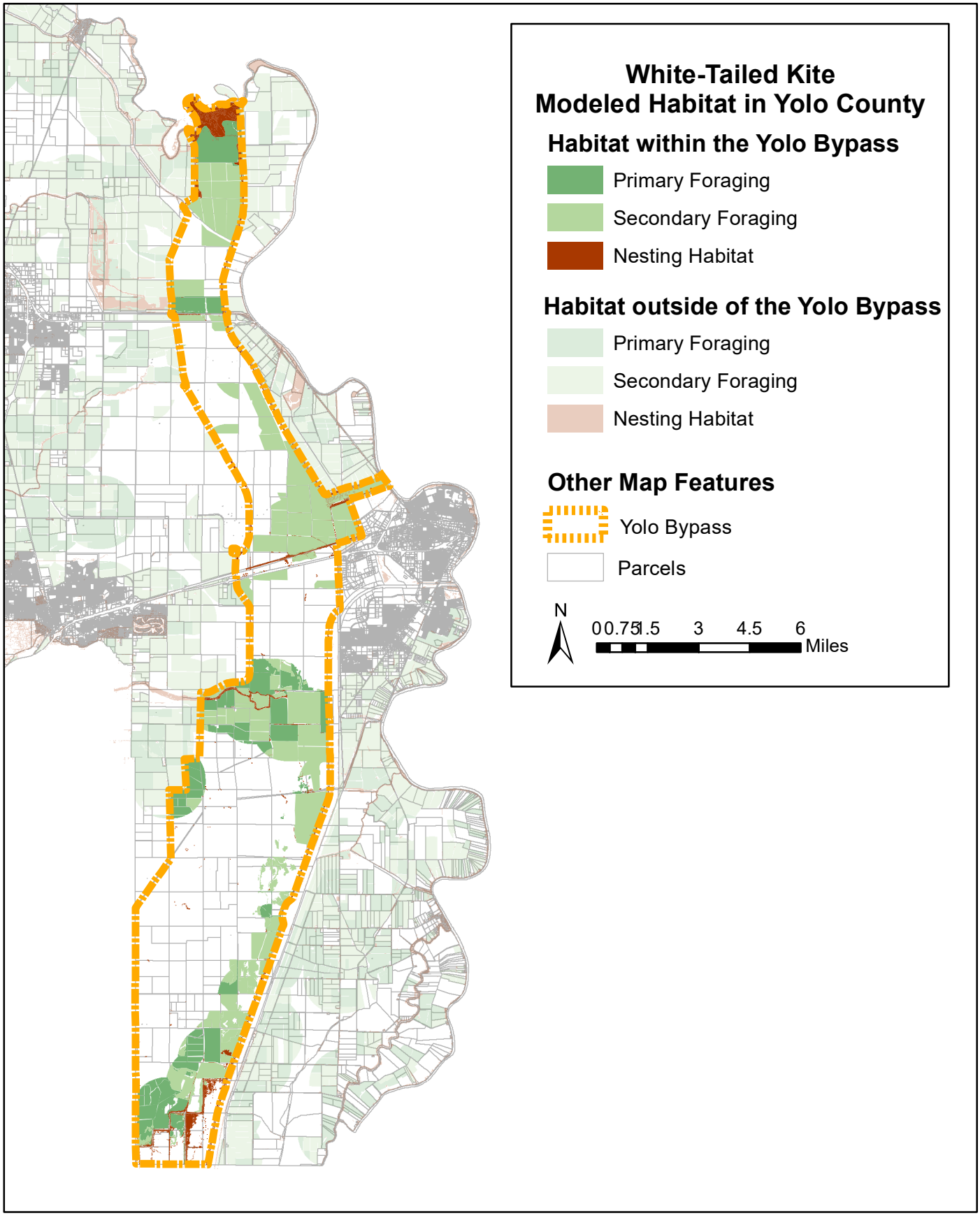
ATTACHMENT D



Yolo Habitat Conservancy 2/09/18

Swainson's Hawk Modeled Habitat in the Yolo Bypass

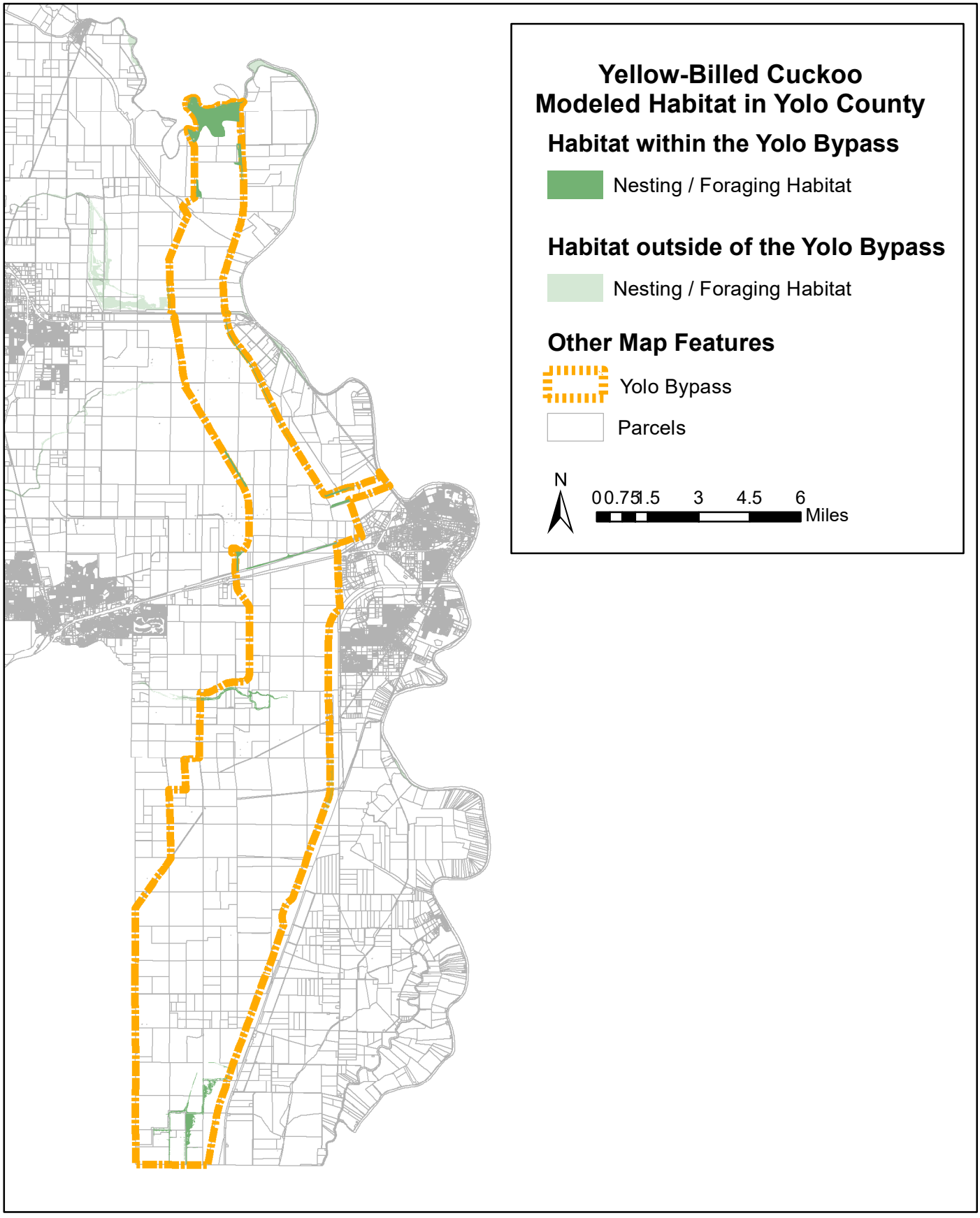
ATTACHMENT E



Yolo Habitat Conservancy 2/09/18

White-Tailed Kite Modeled Habitat in the Yolo Bypass

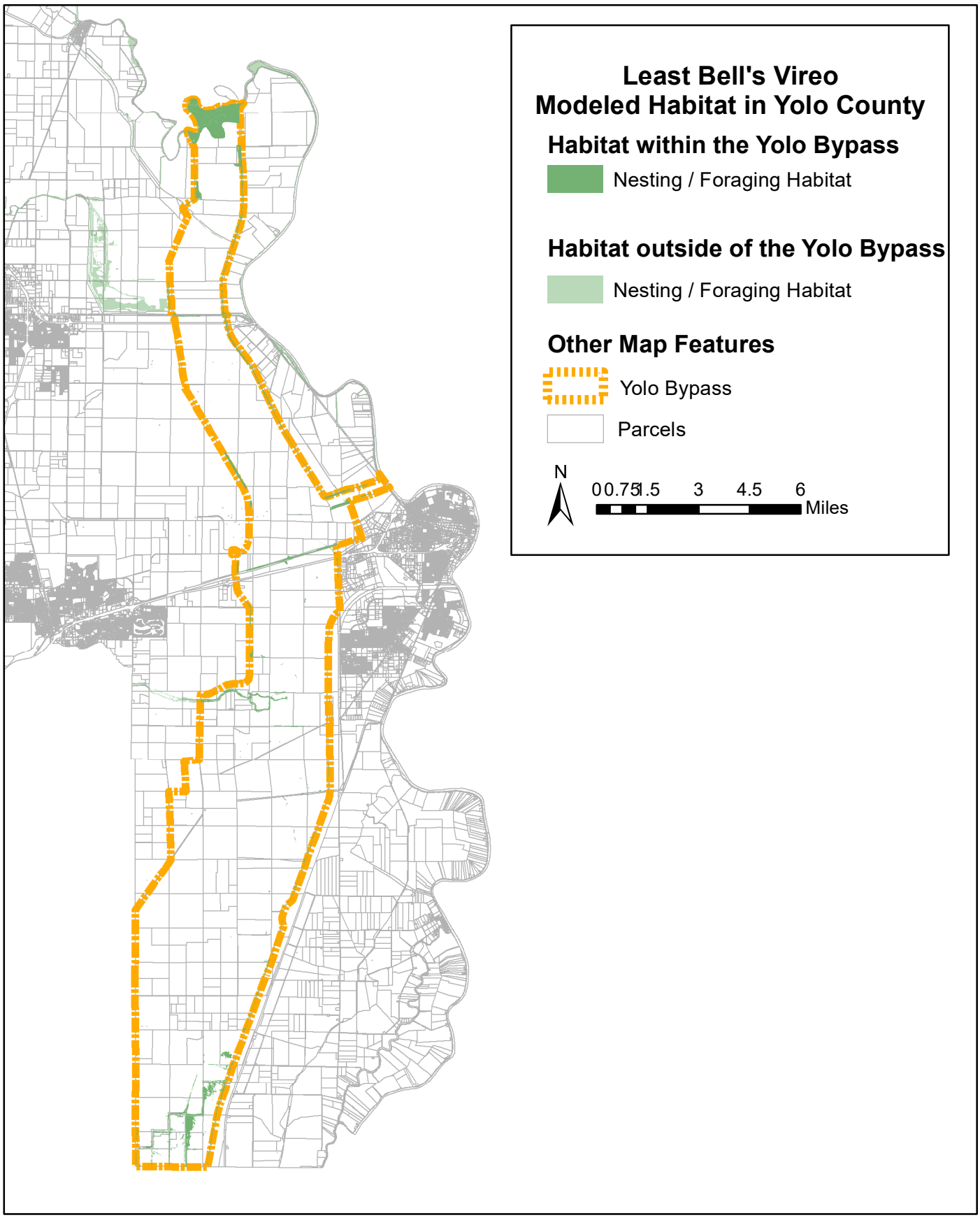
ATTACHMENT F



Yolo Habitat Conservancy 2/09/18

Yellow-Billed Cuckoo Modeled Habitat in the Yolo Bypass

ATTACHMENT G



Yolo Habitat Conservancy 2/09/18

Least Bell's Vireo Modeled Habitat in the Yolo Bypass

LA12

Buckman, Carolyn

From: Mark Pruner (p) <mark@markpruner.com>
Sent: Monday, March 05, 2018 2:45 PM
To: Nelson, Benjamin; Buckman, Carolyn
Cc: Janice Pinero; Enstrom, Karen@DWR; Manny Bahia; Mark Pruner
Subject: RE: Yolo Bypass Salmonid Habitat Restoration & Fish Passage - Admin Draft EIS/EIR - Friday, August 4th

Ben and company,

I do not believe the EIS/EIR analyzed the effects of the projects, including all proposed alternatives, of the build-up of sedimentation (that is, the increase in the elevation of the water/flood beds) and the resulting effects on raising water levels, and the consequent increase in flood potentials. 1

Please include these analysis in the EIS/EIR.

Please let me know if you have any questions.

Mark

From: Nelson, Benjamin [mailto:bcnelson@usbr.gov]
Sent: Thursday, August 3, 2017 4:14 PM
To: Carrie Buckman <BuckmanCM@cdmsmith.com>
Cc: Janice Pinero <jpinero@usbr.gov>; Enstrom, Karen@DWR <Karen.Enstrom@water.ca.gov>; Manny Bahia <Maninder.Bahia@water.ca.gov>
Subject: Yolo Bypass Salmonid Habitat Restoration & Fish Passage - Admin Draft EIS/EIR - Friday, August 4th

Good afternoon,

As I'm sure you know, Reclamation and the California Department of Water Resources (DWR) are currently developing the Yolo Bypass HabitatRestoration and Fish Passage Environmental Impact Statement/Environmental Impact Report (EIS/EIR). You are agency has signed a Memorandum of Understanding (MOU) with Reclamation to be a Cooperating Agency. As a Cooperating Agency, you have the opportunity to review the **Administrative Draft EIS/EIR**, which will be released **tomorrow, August 4th**.

You should expect an email from Carrie Buckman (BuckmanCM@cdmsmith.com) with a link to download the document. Some sections are too large for email. You are listed as your agency contact on the letter accepting cooperating agency status. If this has changed please let me know.

Please provide comments in track changes by close of business **September 5th**. We do need to stick to this deadline but you will have future opportunities to provide comments during the Public Draft starting at the end of October. Please remember the confidentiality term in the MOU to keep all documents confidential to the extent allowable by law. If you have any questions please let me know, my contact info is located below.

Thank you,

Ben Nelson

--
Ben Nelson

Natural Resources Specialist

Bureau of Reclamation, Bay-Delta Office

801 I St, Suite 140, Sacramento, CA 95814

office - 916-414-2424

cell - 916-539-9510

NG01

CALIFORNIA FARM BUREAU FEDERATION
OFFICE OF THE GENERAL COUNSEL
2300 RIVER PLAZA DRIVE, SACRAMENTO, CA 95833-3293 · PHONE (916) 561-5665 · FAX (916) 561-5691

Sent via email
bcnelson@usbr.gov
Karen.Enstrom@water.ca.gov

February 15, 2018

Karen Enstrom
California Department of Water Resources
3500 Industrial Blvd.
West Sacramento, CA 95961

Ben Nelson
Bureau of Reclamation
801 I Street, Suite 140
Sacramento, CA 95814

RE: **Draft Environmental Impact Statement/ Environmental Impact Report for the Yolo Bypass Salmonid Habitat Restoration and Fish Passage Project, Yolo, Sutter, and Solano Counties, California**

Dear Ms. Enstrom and Mr. Nelson:

The California Farm Bureau Federation ("Farm Bureau") is a non-governmental, non-profit, voluntary membership California corporation whose purpose is to protect and promote agricultural interests throughout the state of California and to find solutions to the problems of the farm, the farm home and the rural community. Farm Bureau is California's largest farm organization, comprised of 53 county Farm Bureaus currently representing approximately 40,000 agricultural, associate and collegiate members in 56 counties. Farm Bureau strives to protect and improve the ability of farmers and ranchers engaged in production agriculture to provide a reliable supply of food and fiber through responsible stewardship of California's resources. 1

These comments are based on a high-level review of the DEIS/R, but by no means an exhaustive one. The objective is not to offer a comprehensive review of the various issues, but rather merely to provide some general perspectives on the project from an agricultural perspective.

From a statewide perspective, the California Farm Bureau recognizes the significance of the Yolo Bypass as the focus of a variety of state processes of considerable importance in a variety of areas, including statewide water supply reliability, species conservation, flood

management, and agricultural preservation. From a local and regional perspective, Farm Bureau likewise recognizes the importance of the Bypass as a unique area, successfully managed today for multiple benefits including flood protection, fisheries and water fowl conservation, hunting, recreation, education and, of course, agriculture.

Having reviewed key portions of the DEIS/R, Farm Bureau takes no position on any particular alternative in the DEIS/R, but instead offers the following general observations, bearing in mind the DEIS/R's representations that a final selected alternative may change and (in response to public comments perhaps) might potentially look different than any of the alternatives currently described.

As an overarching comment, Farm Bureau is struck by the notable disconnect between the agencies' commitment to 'willing seller' acquisition of any necessary lands or interests in land on the one hand, and the contrary direction of the agencies' current approach on the other. All parties are, of course, cognizant of the government's constitutional powers of eminent domain. An exercise of eminent domain, however, would be hardly conducive to efficient project implementation or collaborative management—thus, the agencies' choice of 'willing seller' acquisition is, no doubt, a wise one. To make 'willing seller' acquisition an implementable strategy, however, implementation must include, not only adequate compensation for any lands or interests in lands, but also some negotiated suite of financial, contractual, or other suitable mechanisms to address project impacts and make affected landowners, operators, and existing uses in the Bypass whole. Additionally, the project design itself should seek, as fully as possible, to avoid or address potential conflicts, inconveniences, and disruptions of various existing uses and activities that might also, otherwise, work against the agencies' strategy of 'willing seller' acquisition. 2

Framed within the context of this overarching comment, Farm Bureau offers the following additional input:

- Assuming affected landowners are found to be amenable in necessary negotiations, a final alternative that can accommodate the following key variables might generally help to promote successful implementation by maximizing project effectiveness, while partially reducing potential impacts: 3

    - A definite shut-off date on inundation via the proposed operable gates and fish passage structure of March 1st or earlier.

    - Managed inundation, including means of control to maximize localized inundation times and depths (for rearing habitat and to reduce predation, to limit impacted acreages and downstream impacts, and to make efficient use of water, for example), limiting impacts, promoting adequate drying, and maximizing desired benefits at lower flow thresholds (e.g., 3,000 cfs or less with management).

  - If flow management within the Bypass is *not* feasible on a willing-partner basis, then lower flows and earlier shut-off times can nonetheless help to minimize impacts on existing uses.

- Operations proposing inundation via the proposed operable gates after March 1st work against a collaborative partnership and 'willing seller' scenario, and unacceptably impact existing agricultural operations in the Bypass by multiplying uncertainties and complicating factors beyond the growers' control (e.g., drying and prep times, weather, increased flood risks, reduced yields, rice prices, crop insurance, contracts to supply, leasing arrangements, terms of and access to bank loans, etc.). 4

- An implementation approach that can achieve sufficient support from willing partners in the Bypass will need to fully account for, and provide financial mechanisms to address various impacts of increased inundation either not recognized or only partially acknowledged and analyzed in the DEIS/R including: 5

  - increased costs of and the need for ongoing maintenance of ditches, canals, roads, levees, and drainage and irrigation structures, etc.;

  - potential new liabilities and permitting challenges or burdens relating to the increased presence and potential take of threatened and endangered species;

  - the related need for regulatory assurances, be that in the form of some safe harbor protections or another appropriate mechanism;

  - impacts of increased sediment loading and the need for debris removal.

- As another way to promote willing partner cooperation within the Bypass and to avoid, minimize, or mitigate for potential adverse impacts, the agencies should consider directly incorporating, or should at least closely coordinate with, the County of Yolo to implement the infrastructure and drainage improvements outlined in the County's April 2014 "Yolo Bypass Drainage and Water Infrastructure Improvement Study."[1] 6

- If implemented, as noted, the proposed project will complicate farming in the Bypass and have significant impacts on the local and regional economy that are only partially analyzed and quantified in the DEIS/R. If only out of self-interest, however, the State of California should recognize the importance sustaining existing agricultural uses in the Bypass for at least two reasons: First, income from agricultural lands in the Bypass are what financially sustains many recreational, educational, and wildlife uses of Bypass lands owned by the Department Fish and Wildlife. Secondly, and even more importantly, it is the continuous plowing, tilling, and harvesting of agricultural lands in the Bypass that saves the taxpayers and the State of California many millions of dollars 7

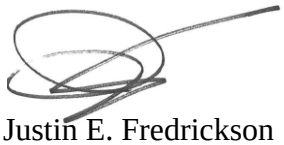
[1] Accessed February 14, 2018 at http://www.yolocounty.org/home/showdocument?id=23985.

> a year, by keep the Bypass clear and open, and maintaining flood adequate conveyance capacity in the area. It is important to understand that, in the flood-prone Yolo Bypass, the line between a profit-turning, viable farming operation Yolo Bypass, on one hand, and a non-viable, money-losing one, on the other, is perhaps a much thinner one than the agencies realize. Protecting and sustaining the delicate web of conditions that allow farming to continue in the Bypass is integral to all of the important functions the area currently fulfills—not least of all of them, critical flood protection for adjacent urban areas in both Yolo and Sacramento County.

If implemented, entities and individuals farming and/or owning lands in the Yolo Bypass will face numerous increased burdens associated with the proposed Bypass Salmonid Habitat Restoration and Fish Passage Project. In reality, however, these same entities, individuals, and landowners *already* contend with various burdens in providing the general public and the State of California numerous invaluable benefits and services inherently that are, in turn, linked to current uses and functions of the Bypass itself. To make the proposed project a feasible one, there is a present need for the agencies to candidly identify increased burdens and impacts, and to then come to the table with all affected persons in an open and collaborative spirit. Policy calls must be made, negotiations had, and hard commitments made. These are aspects that are not captured well in the DEIS/R. For a successful project, however, they are essential. 8

Farm Bureau thanks the Bureau of Reclamation and the Department of Water Resources for the opportunity to provide these comments.

Very truly yours,



Justin E. Fredrickson
Environmental Policy Analyst

NG02











February 14, 2018

Ben Nelson
Bureau of Reclamation
801 I Street, Suite 140.
Sacramento, CA 95814

Via e-mail: *bcnelson@usbr.gov*

Re: **Comments on the Draft EIS/EIR for the Yolo Bypass Salmon Habitat Restoration and Fish Passage Project**

Dear Mr. Nelson:

I am writing to offer the following comments on behalf of the Golden Gate Salmon Association, Pacific Coast Federation of Fishermen's Associations, Institute for Fisheries Resources, Coastside Fishing Club and Nor-Cal Guides and Sportsmen Association regarding the DEIS/DEIR for the Yolo Bypass Salmon Habitat Restoration and Fish Passage Project. Our organizations, which represent commercial, recreational and other aspects of the salmon fishing industry, strongly support a well-designed salmon fish habitat and passage project for the Yolo Bypass. To this end, we strongly recommend the selection of a different preferred alternative in the final document that would maximize benefits for Central Valley salmon runs. 1

Preferred Alternative: The draft document states that Alternative 1 is "currently" the preferred alternative (P. 2-17). Fortunately, this language suggests that the selection of this alternative is not a final decision. Our organizations recommend that Alternative 6 be selected as the preferred alternative, both because of its 12,000 cfs capacity and its selection of the west side of Fremont Weir for the location of the primary intake facility. However, we believe that some features considered in other alternatives should be considered for inclusion in a final preferred alternative based on alternative 6. These issues are discussed in our specific comments below.

Specific Comments

Inadequate Focus on the Fall Run: The criteria for developing alternatives (Table 2-2) are focused on winter-run and spring-run Chinook, Central Valley steelhead and green sturgeon. This focus is seen in many places in the document (e.g. Table 8- 2

3). In addition to this focus on listed species, it is important for the document to reflect the fact that fall-run Chinook salmon could also benefit from a carefully designed project. Given that some fall run characteristics, such its upstream migration period and the details of its outmigration period, vary from those of some listed species, we believe the final document should pay greater attention to the needs of and potential benefits for the fall run. The need to add the fall run to the criteria for selecting and evaluating alternatives is discussed below.

Additional State Mandates for Salmon Restoration: As the draft indicates (p. 8-55), restoration of the fall run, specifically to double the naturally reproducing population from 1967-1992, is required by the CVPIA. This doubling requirement is also included in the State Board Bay-Delta Water Quality Control Plan and in Senate Joint Resolution 19 (1983.) However, the discussion of state plans, policy and regulations (Sec. 8.2.2) does not discuss either of these state doubling requirements. Further, Senate Joint Resolution 7, passed in 2017, urges state agencies to make "salmon fishery restoration an urgent and high priority." In addition, the discussion of relevant state plans, policy and regulations does not include the fisheries responsibilities associated with the Public Trust or Section 5937 of the Fish and Game Code. Together, these mandates require a more ambitious approach to salmon restoration and to a greater focus on the fall-run. We recommend that all of these additional salmon restoration mandates be included in the final document. As a result of all of these obligations, GGSA believes that fall run should be listed on the document's criteria for developing and evaluating alternatives. We also believe that these obligations suggest that the preferred alternative should reflect the approaches with the greatest potential to benefit salmon.

3

4

Status of Central Valley Salmon Runs and the Salmon Fishery: The draft includes a discussion of the fish species evaluated. That discussion includes all of the salmonids in the Sacramento Valley. However, that section of the document does not include a thorough discussion of the current status of all of these species. That status is important, because it highlights the need for urgent and ambitious action to maximize benefits for salmon from this project.

The California salmon fishing industry, as well as the coastal salmon fishery in Oregon, rely overwhelmingly on Central Valley fish. As a result, the fishing industry suffers significantly when Central Valley runs decline. Those runs, the fishing industry and fishing communities, have suffered dramatic harm in the past decade. The following are only a few examples of this decline.

5

- In 2008-2009, as a result of low adult populations, the California commercial and recreational salmon fisheries were closed for the first time in state history. This decision shut down an industry that, in recent previous years, had generated 23,000 jobs and than $1.4 billion in annual economic activity.

- In 2017, as a result of low adult populations, commercial salmon fishermen along the California coast lost 2/3 of the fishing season they had five years ago.

- The California commercial salmon harvest has fallen more than 90 percent, from nearly 800,000 fish a quarter century ago, to 56,000 fish in 2016. The final numbers for the 2017 commercial harvest will be similarly poor.

- During 2014 and 2015, 95 to 98% of juvenile fall and winter run salmon were killed in the Sacramento River as a result of poor water management.

- Sacramento River basin winter and spring run spawning adult populations have reached dangerous lows in the past year.

The document should be revised to reflect recent trends in the populations of all runs of salmon in the Sacramento Valley. This is important context that should be considered in selecting the final preferred alternative.

Benefits of Larger Intake Capacity: GGSA supports the largest potential capacity for the operable intake faculty for this project. Alternative 1, the current preferred alternative, has a capacity of only 6,000 cfs, only half of the 12,000 cfs capacity of Alternative 6.

The description of Alternative 6 clearly states the benefit of a larger intake capacity: the large capacity in that alternative is intended to draw more fish and water into the bypass (p. 2-64). Greater flows that would result from this alternative will result in a greater area of inundation and greater food production. Perhaps most importantly, a larger capacity can maximize the number of fish that benefit from Yolo Bypass floodplain habitat. As a result, a 12,000 cfs capacity intake facility offers the greatest potential benefits for listed and non-listed species in terms of the number of fish that would receive benefits, increased growth rates and increased survival to adulthood. A large capacity maximizes flexibility and maximizes relatively natural floodplain habitat, while retaining the potential benefits from managed wetlands. 6

The document demonstrates that the potential benefits from a larger intake facility are dramatically greater than the current preferred alternative. The following are a few examples, excerpted from the draft.

<u>Average Number of Juvenile Fall-Run Chinook Rearing in the Bypass for One or More Days</u> (Difference between existing conditions and the alternative)

	Alternative 1	Alternative 6
Entire Simulation	1,574,215	2,676,043

Period		
Above Normal years	2,557,474	4,217,227

Source: Tables 8-11, 8-40

Average Number of Fall-Run Chinook Adult Returns (Difference between existing conditions and the alternative)

	Alternative 1	Alternative 6
Entire Simulation Period	11,176	18,580
Above Normal	16,281	25,251

Source: Tables 8-8, 8-37

Average Monthly Wetted Area (Difference, in km^2, between existing conditions and the alternative)

	Alternative 1	Alternative 6
February - Entire Simulation Period	14.8	22.4
February - Above Normal	26.9	39.1

Source: Tables 8-7, 8-36

In summary, alternative 6 could produce up to 51% more floodplain habitat, benefit up to 70% more juveniles and produce up to 66% more returning adults. These compelling numbers clearly indicate that Alternative 6 should be the foundation for the final preferred alternative.

Inundation Period: The alternatives included in the document primarily include an inundation period that extends to March 15. However, alternative 4 provides for ending the inundation period by March 7 or March 15 (Table 2-4.) We recommend that the final preferred alternative include the longer inundation period, which would increase benefits for spring and fall run Chinook salmon. We also urge the Bureau to consider an inundation period that extends beyond the end of March. 7

The spring-run salmon outmigration period extends until mid-May (p. 2-2), and the fall run outmigration period extends into June. The operations of the operable gate should match this outmigration period to the greatest extent possible. The document should carefully justify any inundation period shorter than the full outmigration period for all salmon runs.

The management of operable gates after the final inundation period is also important. Specifically, we urge the Bureau to adopt an operations strategy that 8

allows for the use of the operable gates to extend brief flood events that overtop the weir after the conclusion of the inundation period. This could extend the salmon benefits of brief flood events late in the season. For example, should a natural flood overtop the weir for a day or two in late March or early April, we urge an operations plan that allows for the operable gates to be used to extend that inundation period for a total of 10-14 days.

Location of Intake: The summary of alternative 6 suggests that the location of the gate on the western portion of the weir would increase the number of fish entrained into the Yolo bypass (P. 2-64.) Clearly, the size of the opening produces significantly greater benefits for salmon. It also appears that a Western location would deliver additional benefits. However, the draft does not clearly describe the benefits of different gate locations. We recommend that the final document clearly discuss the potential benefits produced by the location of the intake, as distinguished from capacity. For example, the document does not include an evaluation of benefits from a 12,000 cfs facility at locations different from that in Alternative 6. GGSA recommends that the preferred alternative include the location, as well as the size, that would provide the greatest benefits. 9

Integration of Gate Operations with Pulse Flows: GGSA believes that pulse flows should be required on the Sacramento and Feather Rivers to increase the survival of outmigrating juvenile salmon and believes that such flows may be required in the future. The document should be revised to discuss the potential additional benefits from integrating the operations of new operable gates in the Fremont Weir with potential future spring pulse flows. 10

OCAP BO Mitigation Requirement: The document should include a clear analysis of the relevant mitigation requirements in the OCAP BOs and the extent to which alternatives would fully meet the floodplain habitat mitigation requirement. 11

Fish Passage Related to Additional Management Options: GGSA is supportive of potential additional management actions that could provide additional benefits in the bypass, including the use of managed wetland/rice field habitat to provide additional rearing habitat, as well as berms to allow the inundation period in the bypass to be extended. Both of these options offer the potential to provide additional floodplain benefits in drier years. However, in both cases, it will be essential to ensure that upstream and downstream fish passage is unimpaired and that facilities related to these management options do not create predation hot spots. We understand that there is a new propose facility design related to managed wetlands that could reduce the potential for fish migration impacts. We look forward to learning about that design, and reading the updated fish passage analysis, in the final document 12

Thank you for considering our comments.

Sincerely,



John McManus
GGSA
President



Noah Oppenheim
PCFFA and IFR
Executive Director



Dick Pool
Water4Fish
President



Jeff Richards
Coastside Fishing Club
President



James Stone
President
NorCal Guides and Sportsmen's Associations

TULEYOME
TULEYOME.ORG | EST. 2002

607 NORTH STREET
WOODLAND, CA 95695
TEL 530.350.2599
FAX 530.350.2729

February 15, 2018

NG03

Ben Nelson
Bureau of Reclamation, Bay-Delta Office
801 I Street, Suite 140
Sacramento, CA 95814
bcnelson@usbr.gov

Karen Enstrom
California Dept. of Water Resources
3500 Industrial Boulevard
West Sacramento, CA 95691
Karen.Enstrom@water.ca.gov

Erin Curtis
Public Affairs Officer
916-978-5100
eccurtis@usbr.gov

RE: Yolo Bypass Salmonid Habitat Restoration and Fish Passage Project

Tuleyome submits these comments in support of the Yolo Bypass Salmonid Habitat Restoration and Fish Passage Project.

This project will implement the National Marine Fisheries Service Biological and Conference Opinion on the Long-Term Operations of the Central Valley Project and State Water Project (NMFS BO) issued on June 4, 2009.

1

We appreciate the on-going research that has been conducted in the Yolo Bypass demonstrating the effectiveness of using this flood plain for rearing salmon and the potential for helping to restore salmon in the Sacramento River.

Tuleyome looks forward to this critical project moving forward as soon as possible.

Sincerely,

Bob Schneider, Senior Policy Director
530-304-6215
bschneider@tuleyome.org.

NG04

YOLO BASIN FOUNDATION

February 14, 2018

Mr. Ben Nelson
Bureau of Reclamation
801 I Street, Suite 140, Sacramento, CA 95814

Ms. Karen Enstrom
California Department of Water Resources
3500 Industrial Blvd., West Sacramento, CA 95691

RE: Response to the Yolo Bypass Salmonid Habitat Restoration and Fish Passage Project Draft EIS/EIR

Dear Mr. Nelson and Ms. Enstrom:

Thank you for the opportunity to comment on the Yolo Bypass Salmonid Habitat Restoration and Fish Passage Project ("Yolo Bypass Salmonid Project") Draft Environmental Impact Statement/Environmental Impact Report ("EIS/EIR"). We recognize the tremendous effort of the California Department of Water Resources and the U.S. Bureau of Reclamation to develop the alternatives, model fisheries and hydraulic impacts, and produce the document and appendices. Our comments focus on the need to balance the long history of state, federal, and local partnerships in the Yolo Bypass to conserve habitat for terrestrial species with the interest in providing habitat for threatened and endangered fish species. Additional comments are also included in a table enclosed with this letter (Attachment 1).

The Yolo Basin Foundation asks the state and federal government to take no action that will undermine the decades of successful conservation work already providing benefits to countless species in the Yolo Bypass that enjoy the support of thousands of local citizens, as well as foundations, conservation organizations, and federal, state, and local agencies. The Yolo Basin Foundation believes we can help the state and federal government identify a sustainable and successful mix of project actions and mitigation measures that will provide both benefits to fish and continue the conservation work already underway for terrestrial species. We can only develop this solution if the Yolo Basin Foundation, farmers, wetlands managers, other stakeholders with a land management interest in the Yolo Bypass, the Yolo Habitat Conservancy, and Yolo County are an integral part of the process to develop a preferred alternative. Now that the EIS/EIR is publicly available and we have information about potential impacts, the Yolo Basin Foundation hopes to start an important conversation about project details.

1

Our comments focus on four areas:

2

- **Background on existing Yolo Bypass habitat conservation.** The Yolo Basin Foundation believes it is critical for representatives of the state and federal government responsible for the EIS/EIR to have a thorough understanding of conservation efforts successfully undertaken over decades in the Yolo Bypass. These efforts required tens of millions of dollars in state, federal, and local investments, as well as thousands of hours of volunteer and government agency staff time. In addition to the Yolo Bypass Wildlife Area; hereafter Wildlife Area (see Exhibit A), the Yolo Bypass currently contains approximately 14,000 acres of state and federal wetland conservation easements (see Exhibit B), including easements consistent with the Central Valley Joint Venture Implementation Plan (see Exhibit C). The Bypass also contains giant garter snake and Swainson's hawk easements purchased by the Yolo Habitat Conservancy, the California Department of Water Resources, and the Wildlife Conservation Board.

- **Background on stakeholder outreach efforts**. The Yolo Basin Foundation is uniquely qualified to comment on this EIS/EIR and work with the state and federal government to craft solutions to issues identified in this letter because of our history of stakeholder outreach in the Yolo Bypass. The Yolo Basin Foundation coordinates with stakeholders through the Yolo Bypass Working Group (see Exhibit L) and has long led efforts to provide input into the development of the Yolo Bypass Salmonid Project. This participation resulted in partnerships with Yolo County, farmers, wetlands managers, and the University of California, Davis to fill information gaps and propose new approaches for achieving the necessary balance between existing and new conservation goals. 3

- **Comments on the EIS/EIR analysis.** The analyses of the impacts to recreation, education, and environmental justice in the EIS/EIR are unclear, vague, and not properly supported. The analysis also does not include impact conclusions for biological impacts to wetlands, including impacts on migratory and resident birds. In addition, some of the impact determinations are not supported by substantial evidence. In this letter and Attachment 1, the Yolo Basin Foundation provides comments to help improve the clarity and accuracy of the document. The Yolo Basin Foundation looks forward to working with the California Department of Water Resources and the U.S. Bureau of Reclamation to improve the analysis and develop a preferred alternative. 4

- **Proposed Mitigation Measures.** The Yolo Basin Foundation recognizes there will be some impacts on wetlands and existing educational programs as a result of the Yolo Bypass Salmonid Project and further recognizes the need to provide habitat for threatened and endangered fish species in the Yolo Bypass. As a result of our long history of involvement in Yolo Bypass conservation efforts, our leadership in stakeholder coordination, and our dedicated participation in public forums related to development of the Yolo Bypass Salmonid Project alternatives (see Exhibit H), the Yolo Basin Foundation asks for a leadership role in helping the California Department of Water Resources and the U.S. Bureau of Reclamation develop a preferred alternative. This letter also outlines potential and specific opportunities to mitigate for impacts from the proposed project on terrestrial species habitat in the Wildlife Area. 5

BACKGROUND ON EXISTING YOLO BYPASS CONSERVATION

Yolo Bypass is home to the Yolo Bypass Wildlife Area and is habitat for countless terrestrial species, including rare, threatened, and endangered terrestrial species prioritized for conservation by the Yolo Habitat Conservancy, the California Department of Fish and Wildlife, and the U.S. Fish and Wildlife Service through the Yolo Habitat Conservation Plan and Natural Community Conservation Plan. The Yolo Bypass is a key component of habitat restoration planned as part of prior largescale state conservation efforts (e.g. CALFED Ecosystem Restoration Program) and is a vital element of the Central Valley Habitat Joint Venture's habitat restoration goals associated with implementation of the North American Waterfowl Management Plan (see Exhibit D) and the United States' international commitment to the 1918 Migratory Bird Treaty Act (see Exhibit E).

6

The state and federal government has invested millions of dollars in grant funding to support the construction and management of wetlands in the Yolo Bypass (see Exhibit F). These funds are from the federal North American Wetlands Conservation Act (see Exhibit G), an act passed in part to support activities under the North American Waterfowl Management Plan and to create the infrastructure to manage wetland ecosystems in the Yolo Bypass; and, in the U.S. Fish and Wildlife (wetlands conservation easements on Swanston Ranch north of I-80 and south of the Wildlife Area) and the Natural Resources Conservation Services' wetland conservation easements (Exhibit G). This funding supported the conservation of wetlands and associated upland habitats for waterfowl and other migratory birds in North America. The agencies must recognize these easements require landowners to manage for wetlands habitat in perpetuity.

The 16,800-acre Wildlife Area is a critical part of the history of partnerships to create terrestrial species habitat in the Yolo Bypass. Local citizens and elected officials started plans to develop the Wildlife Area in the 1980s, eventually succeeding in securing a $4.75 million Wildlife Conservation Board grant to purchase the initial 3,700 acres. Interior Secretary Bruce Babbitt spoke at the groundbreaking ceremony of the new wetlands project in 1995 and President Bill Clinton dedicated the Wildlife Area in 1997. In 2001, the Nature Conservancy helped facilitate another $16 million grant to add 12,000 acres to the Wildlife Area. The state then secured an additional $8 million in federal NAWCA funds to implement restoration projects on these new acres.

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In addition to providing a significant link in the chain of wetlands that comprise the Pacific Flyway for migrating birds, the Wildlife Area is home to pockets of riparian forests, uplands, vernal pools, and wildlife-friendly agriculture (Exhibit F). Agricultural and grazing lease revenue provides $600,000 annually in funding for Wildlife Area management and public access, as well as implementation of a successful adaptive management program. The Yolo Basin Foundation complements the Wildlife Area's amenities by offering its signature "Discover the Flyway" education program to over 70,000 K-12 school children since 1997. As a result of decades of demonstrated success, the Wildlife Area is considered a national model of sustainability, illustrating that flood protection, agriculture, wildlife habitat and public use can cooperatively exist in close proximity to a large metropolitan area.

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BACKGROUND ON STAKEHOLDER OUTREACH EFFORTS

Yolo Basin Foundation looks forward to building on our long history of coordinating with local stakeholders to work with the state and federal government to provide input into development of the Yolo Bypass Salmonid Project preferred alternative. Throughout the history of proposals to modify the Fremont Weir to increase the frequency and duration of flooding for fish habitat, the Yolo Basin Foundation has consistently provided comments, participated in public forums, identified opportunities for analytical improvements based on on-the-ground information, and worked to find positive solutions. The Yolo Basin Foundation has also maintained strong relationships with the farmers, ranchers, and wetlands managers who intimately know the Yolo Bypass, as well as local government staff, elected officials, state and local Farm Bureau representatives, and other stakeholders in Yolo County and Solano County.

9

The Yolo Basin Foundation's participation in stakeholder forums related to the proposed Fremont Weir modification, originally proposed by the CALFED Bay-Delta Authority, dates back to the first meeting of the Yolo Bypass Working Group in 1999 (Exhibit L). The Yolo Basin Foundation and other stakeholders involved with the development of the Wildlife Area realized the proposal to modify the Fremont Weir would have an adverse impact on the goals described in the Wildlife Area Land Management Plan (hereafter LMP), a long-term management plan developed in coordination with local stakeholders[1]. As a result of stakeholder advocacy, the California Department of Fish and Wildlife committed to work with CALFED to minimize the impacts on the Wildlife Area of the proposed project:

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> "This LMP represents the commitment of DFG to manage the resources of the Yolo Bypass Wildlife Area…[it] proposes practical, science-based management and conservation of the natural resources, consistent with the necessary flood water conveyance purpose of the Bypass, including provisions for compatible agriculture and public recreation use. It is based on an ecosystem approach to habitat management consistent with the principles of the Ecosystem Restoration Program (ERP) included in the CALFED Bay-Delta Program (CALFED) as implemented by the California Bay-Delta Authority (CBDA) and DFG." (2008, p 1-6)

Since the inaugural meeting in 1999, the Working Group raised concerns about impacts to managed wetlands and agriculture at many of the next 46 meetings (Exhibit L). The Yolo Basin has also commented numerous times on this and similar projects since 2008 (Exhibit H).

After the CALFED Bay-Delta Authority proposal stalled, the California Department of Water Resources included the project in the proposed Bay-Delta Conservation Plan in the mid-2000s as Conservation Measure 2. The Yolo Basin Foundation participated for over four years in meetings of the Yolo Bypass Fisheries Enhancement Planning Team to further discuss the proposal. Early on in these discussions, it became clear the California Department of Water Resources did not have the data necessary to complete an analysis for development of project alternatives. As a

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[1] 2008. Yolo Bypass Wildlife Area Land Management Plan. California Department of Fish and Game & Yolo Basin Foundation.

result of these discussions, the Yolo Basin Foundation proactively developed a partnership with Yolo County to help fill many identified information gaps, such as working with University of California, Davis economists to adopt the existing Bypass Production Model to analyze the agricultural impacts of project alternatives[2] and a review by Ducks Unlimited of potential impacts on waterfowl foraging habitat and hunting opportunities[3].

After the state and federal government transitioned the Bay-Delta Conservation Plan into California Water Fix and California EcoRestore, the Yolo Bypass Fisheries Enhancement Planning Team ceased to meet and was replaced by a series of stakeholder meetings associated with implementation of the Yolo Bypass Salmonid Project. These meetings included the U.S. Bureau of Reclamation's Value Planning Exercise, the locally-led Post Value Planning Team, the Locally Preferred Alternative stakeholder group, and the Yolo Bypass Biological Opinion Working Group. Also, during this time, the Yolo Basin Foundation worked with Yolo County to develop the Yolo Bypass Drainage and Water Infrastructure Improvement Study[4], which identified 12 priority projects to improve drainage and water infrastructure to benefit agricultural production and wetlands management in the Bypass. More information is available in Exhibit I regarding the timing and extent of Yolo Basin Foundation involvement in different iterations of this Yolo Bypass Salmonid Project. 12

EIS/EIR Analysis Questions and Comments

The Yolo Basin Foundation highlights the most significant comments on the EIS/EIR in this letter but has also compiled a detailed document with specific comments on the EIS/EIR and references to additional exhibits in Attachment 1. The Yolo Basin Foundation believes the analysis of impacts to managed wetlands, recreation, education, and environmental justice is inadequate and incomplete. In addition, the EIS/EIR lacks impact conclusions related to the impacts on migratory and resident birds (including food supply and nesting habitat), education, wildlife viewing, hunting, increased operations and maintenance activities due to additional flooding, and increased sedimentation. In addition, the impact conclusions are not supported by substantial evidence. We look forward to helping the state and federal government improve the analysis. 13

The Yolo Basin Foundation agrees with the following findings in the EIS/EIR:

- Impact HAZ-8: Risk of exposure to mosquito-borne viruses could increase as a result of inundation period expansion in the Yolo Bypass for fish passage and rearing
- Impact EJ-4: Project actions would reduce educational opportunities offered in the Yolo Bypass Wildlife Area for low-income students
- Impacts associated with methylmercury in the Yolo Bypass are expected to be a cumulatively significant impact, and the increased inundation from the Project would be cumulatively considerable

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[2] Howitt, R. et al. 2013. Agricultural and Economic Impacts of Yolo Bypass Fish Habitat Proposals. Yolo County.
[3] Petrik, K. et al. 2012. Waterfowl Impacts of the Proposed Conservation Measure 2 for the Yolo Bypass: An Effects Analysis Tool. Bay Delta Conservation Plan – Yolo Bypass Fisheries Enhancement Planning Team.
[4] Bowles, C. et al. 2014. Yolo Bypass Drainage and Water Infrastructure Improvement Study. Yolo County.

The Yolo Basin Foundation also urges the California Department of Water Resources and the Bureau of Reclamation to further analyze the Sutter Bypass as a location for floodplain habitat. The California Department of Water Resources and the Bureau of Reclamation rejected this alternative in 2014 in part because the Reasonable and Prudent Alternative in the Biological Opinion required the development of Yolo Bypass fish passage improvements, regardless of the location of floodplain habitat[5]. The agencies at the time proposed to combine Yolo Bypass fish passage and floodplain habitat improvements into a single project. A couple of years later, the Bureau of Reclamation and the Department of Water Resources decided to separate these two projects. Now that they are separate, the agencies should again evaluate the Sutter Bypass as an appropriate location for floodplain habitat to benefit threatened and endangered fish species. 15

The Yolo Basin Foundation has identified a number of serious deficiencies in the analysis, described below.

General

1. **Failure to analyze entire project.** The EIS/EIR fails to adequately analyze the impacts from operations of the proposed project downstream of Ag Crossing #1. There is a significant amount of analysis regarding construction impacts, but insufficient analysis of long-term project operational impacts associated with additional flooding. These impacts include the increase in operation and maintenance costs and related activities a result of additional flooding, increased sedimentation impacts to both farmers and wetlands managers, impacts to movement of wildlife, impacts to nesting and foraging bird habitat, impacts to wetlands management, and impact of revenue needed to sustain habitat management and other operations of the Wildlife Area from potential loss of lease revenue. 16

Chapter 9: Vegetation, Wetland, and Wildlife Resources

1. **Impact TERR-5: Potential disturbance or mortality of nesting bird species and loss of suitable nesting and foraging habitat (p. 9-69).** The determination that the impact on nesting and foraging habitat from operations is less than significant is not supported by substantial evidence. The only language in the EIS/EIR is as follows: 17

> "Under Alternative 1, the Lead Agencies do not expect operations to result in adverse effects on suitable nesting habitat for special-status bird species because operations would extend the duration of inundation only between November and March, which is outside of the nesting season. Operational effects on foraging habitat may vary by species based on the effects of inundation on their prey. The small expected change in average number of wet days under Alternative 1 may reduce foraging habitat for some species, particularly in the eastern part of the Yolo Bypass; however, the effects on foraging habitat are not expected to be substantial."

[5] Yates, G. et al. 2002. Habitat Improvement for Native Fish in the Yolo Bypass. CALFED Bay-Delta Program.

The Yolo Basin Foundation has repeatedly described the potential impacts to nesting and foraging habitat in the Wildlife Area from increased frequency and duration of flooding since 2008[6], such as reduced food supply. The LMP, for example, acknowledges flooding constrains management of the Wildlife Area's biological resources:

> "These constraints include: adverse effects of spring flooding on management and operations, wildlife nesting, and farming" (p. 5-6).

Nesting in the Yolo Bypass could start as early as February. In addition, inundation later than the date the California Department of Fish and Wildlife would normally drain the wetlands increases production of invasive weeds and decreases production of favored waterfowl foods. There is no analysis referenced in the EIS/EIR to support the statements above. Additional analysis is required to evaluate the impacts on nesting and foraging habitat.

2. **Impact TERR-9: Potential effects on USACE, RWQCB, and CDFW jurisdictional wetlands, waters, and riparian areas (p. 9-76).** The EIS/EIR analyzes construction impacts on wetland and riparian areas, but fails to analyze the impact of operations. The EIS/EIR states only:

> **"**Under Alternative 1, operations would not result in adverse effects on areas subject to USACE and CDFW jurisdiction as no fill materials would be placed in waters during operations." (p. 9-81)

The EIS/EIR fails to analyze the impact of additional flooding from the proposed project on USACE, RWQCB, and CDFW jurisdictional wetlands.

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<u>Chapter 13: Recreation</u>

1. **Calculation of 2% reduction in days available for educational programs and activities is not properly supported.** The analysis states the project will result in a 2% reduction in educational days and therefore there will not be an elimination or substantial reduction in the educational uses of the Wildlife Area (e.g. Table 13-4, Page 13-27). This analysis is not properly supported. There is no reference to an appendix showing the source of the calculations. According to email communication with agency staff, the Wildlife Area closure was estimated based on the number of additional days the water level at Lisbon Weir is higher than 12 feet, which is an indicator of when the Wildlife Area typically has to close due to flooding. However, the Yolo Basin Foundation believes the Wildlife Area may have to close when the water level at Lisbon Weir is as low as eight feet. Through email communication, agency staff also provided a table not included in the EIS/EIR that shows the number of additional closure days resulting from the TUFLOW model for each of the 16 years modeled, based on 12 feet water elevation at the Lisbon Weir. The TUFLOW output ranged from 0-21 days of additional closure as a

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[6] 2008. Yolo Bypass Wildlife Area Land Management Plan. California Department of Fish and Game & Yolo Basin Foundation.

result of the project, with an average of 5.3 days. The Yolo Basin Foundation requests the following improvements to this analysis:

- ***Include the table showing the number of estimated closure days in the EIS/EIR.*** This information is helpful to the reader to understand the basis for the calculation.

- ***Provide a range of potential closure dates based on a sensitivity analysis of TUFLOW model outputs.*** The TUFLOW model is based on a number of assumptions that Yolo County documented in their review of the model[7], therefore the analysis should provide a range of estimated closure days for each year, not a point estimate for each year. The final estimate should provide a range of closure days, as well as the average number of closure days. 20

- ***Account for drainage time.*** The analysis does not take into account that the Wildlife Area will stay closed until the water has drained from the Wildlife Area. The addition of drainage time will increase the number of days the Wildlife Area is closed as a result of the project and should be included in the analysis of impacts. 21

- ***Account for time to dry.*** Once enough of the area has drained for roads to be accessible, the roads still need to dry out. The Yolo Basin Foundation believes that it takes at least a week to dry under the best of circumstances, such as warm weather and no rain. Next, CDFW personnel must perform required maintenance before public access is allowed. The time needed depends on the severity of the damage, usually related to the length of time flooded and the velocity of the flood water. If there is less than two weeks between spill events, then the area does not open at all until this whole process starts over. 22

The Yolo Basin Foundation believes the addition of these factors to the analysis will double, if not triple, the number of estimated education days lost as a result of the project.

2. **Estimate of 4.1% reduction in hunting days is not properly supported.** Similar to the estimate of lost education days, the estimate of lost hunting days is not properly supported. The analysis should include a table showing the lost days by year, sensitivity analysis, and include the additional days the Wildlife Area will remain closed to drain and dry out. 23

3. **Impact conclusions for education, wildlife viewing, and hunting days are lacking.** The EIS/EIR should contain impact conclusions for the loss of education, wildlife viewing, and hunting days in the Wildlife Area, along with appropriate mitigation measures. 24

4. **Failure to analyze increase in operation and maintenance costs.** The project alternatives will all result in a significant increase in operations and maintenance activities on the Wildlife 25

[7] Fleenor, W. 2015. Review of the Yolo Bypass Salmonid Habitat Restoration and Fish Passage Hydrodynamic Modeling Draft Report. Center for Watershed Sciences, University of California, Davis.

Area. The increase in frequency and duration of flooding will result in more staffing and equipment expense to remove flood deposited debris and repair damage to roads, supply and drainage ditches, signs, fences, and gates. An increase in flood frequency and duration will also mean additional expense to mow and disk invasive plants, including emergent vegetation to meet requirements of the Memorandum of Understanding between the California Department of Fish and Wildlife, the California Department of Water Resources, and the Central Valley Flood Protection Board (see Exhibit J).

5. **Failure to analyze impacts on wildlife viewing.** Although the Wildlife Area is open and used all year round, November to February is the peak wildlife viewing season. Additional closures as a result of the project will impact wildlife viewing, which should be analyzed in this EIS/EIR. 26

6. **Comparison of new shallow floodplain habitat to existing wetlands habitat is not supported by substantial evidence.** The EIS/EIR analysis assumption that the large areas of temporary shallow water created when the Yolo Bypass drains after a flood event is the equivalent of existing managed floodplain habitat for waterfowl is incorrect (Impact TERR-9). While some birds may utilize the receding flood waters, the habitat created is not comparable to habitat values provided by managed wetlands in the Wildlife Area and on private lands. The seasonal wetlands in the Wildlife Area and on private wetlands (duck clubs) are intensively managed to provide food and cover for terrestrial species. The management regime for these wetlands is based on Best Management Practices developed over many years (see Exhibit K). Management activities include controlled fall flood up to maximize primary and secondary food production in time for the arrival of migratory birds traveling the Pacific Flyway. Drawdown in the spring is timed to maximize seed germination that will provide protein resources for migratory and residents birds. Early spring drawdown is important for controlling invasive species, such as cocklebur and sweet clover, that have no food value. Early spring drawdown is also important in preventing growth of emergent vegetation including tules and cattails that can impede the flow of floodwaters (Exhibit J). The timing of flood up and drawdown is also important in preventing mosquito larvae production. 27

7. **Inaccurate assertion of benefits from food production (p. 8-112, p. 9-3).** The EIS/EIR states the proposed alternatives all increase floodplain food production to benefit juvenile salmonids, and that this food could also be exported to the Delta. This conclusion is questionable. The predicted floodplain inundation would occur in December at the earliest under all proposed alternatives. By December 1, the majority of the floodplain is already inundated in the form of tens of thousands of acres of flooded rice fields and managed wetlands. (Managed wetlands are flooded up as early as September 1). As a result of this targeted Wildlife Area management, wetland food production is well underway at least one month before additional flooding would occur due to the six proposed alternatives. The Bureau of Reclamation and the Department of Water Resources should remove or caveat this conclusion of benefits in their analysis. 28

Chapter 22: Environmental Justice

1. **Analysis of reduction in educational opportunities for low-income students in the Yolo Bypass Wildlife Area is vague and general.** The analysis uses the percent of Title 1 schools in the Davis Joint Unified School District and the Sacramento City Unified School District as a proxy for percent of low-income students who attend Wildlife Area field trips. The Yolo Basin Foundation can provide more accurate data (see Exhibit N). For the 2016-17 school year, for example, there were 181 Discover the Flyway field trips. Approximately 3,656 students and over 200 adults attended the field trips. This equals nearly 4,000 participants in Discover the Flyway field trips in 2016-17. On average, approximately 44% of the Discover the Flyway participants are low-income students from Title 1 schools, approximately 1,600 students in 2016-17. The Yolo Basin Foundation appreciates the conclusion that "disproportionately high or adverse effects to the educational opportunities offered in the YBWA on low-income students could occur due to increases in inundation in the YBWA" and offers potential mitigation measures in the next section. 29

PROPOSED MITIGATION MEASURES

Improving rearing habitat for juvenile salmonids and passage for adult winter, spring and fall run Chinook salmon, steelhead and green sturgeon is an urgent need. The Yolo Basin Foundation has long recognized this need, as demonstrated by Foundation staff participation in discussions regarding increased juvenile floodplain habitat in the Yolo Bypass since the 1990s and staff participation in development of the Putah Creek Accord. All six project alternatives define the end date of project operations as either March 7th or March 15th as a result of robust stakeholder discussions and stakeholder sponsored studies. This illustrates the importance of stakeholder input and the potential for developing alternatives with local support. 30

Yolo Basin Foundation believes there is a sustainable and successful mix of project actions and mitigation measures that will provide both benefits to fish and continue the conservation work already underway for terrestrial species in the Wildlife Area. To begin the discussion, we recommend the mitigation measures briefly described in the following section to mitigate for the impacts on operations and maintenance in the Wildlife Area, education, and recreation, including wildlife viewing and hunting. Many of the proposed actions are described in the Yolo Bypass Wildlife Area LMP (see Exhibit M) Chapter 5, Section 5.2.4 beginning on Page 5-32.

The analysis fails to include feasible mitigation measures for the following identified impacts: 31

- **Impact TERR-5: Potential disturbance or mortality of nesting bird species and loss of suitable nesting and foraging habitat**
- **Impact TERR-9: Potential effects on USACE, RWQCB, and CDFW jurisdictional wetlands, waters, and riparian areas** 32
- **Impact EJ-4: Project actions could reduce educational opportunities offered in the YBWA on low-income students** 33
- **Reduction in education days (Yolo Basin Foundation requests an impact conclusion)** 34
- **Reduction in hunting days (Yolo Basin Foundation requests an impact conclusion)** 35

- **Reduction in wildlife viewing days (Yolo Basin Foundation requests an impact conclusion)**
- **Impacts associated with methylmercury in the Yolo Bypass are expected to be a cumulatively significant impact, and the increased inundation from the Project would be cumulatively considerable**

36

37

The Yolo Basin Foundation suggests the following mitigation measures to include for the impacts listed above. In addition, the Yolo Basin Foundation supports the efforts of Yolo County to ensure farming will continue in the Yolo Bypass, including economic mitigation for loss of yield from late flooding and other impacts. Wildlife friendly agriculture is a critical element of the habitat provided in the Yolo Bypass Wildlife Area.

38

1. **Develop additional wetlands to offset those that will be inundated more often due to proposed project.** The Yolo Basin Foundation can work with the California Department of Fish and Wildlife to identify potential projects, such as wetland habitat restoration outside the Bypass in partnership with DWR, CDFW, City of Davis, Yolo Habitat Conservancy, Yolo Land Trust, and others. This mitigation measure will help address impacts identified in Impact TERR-5 and TERR-9 because it will provide additional wetlands and more nesting and foraging habitat, as well as Impact EJ-4 because it will provide areas to visit with low-income children outside of the Yolo Bypass.

39

2. **Increase in maintenance and operations funding to CDFW for the Yolo Bypass Wildlife Area.** Due to the increase in frequency and duration of flooding, the following will occur in the Wildlife Area: increased sediment deposition, road damage, loss of road gravel, flood debris removal, replacement/repair of signs, invasive weed removal, increase in mosquito control costs, and damage to gates and fences. Project proponents should provide CDFW with additional staffing, funding, and equipment for operations and maintenance. This mitigation measure will help address the impacts in TERR-9.

40

3. **Maintain and improve public use.** Improve the current wildlife viewing loop, including development of interpretive and directional signage and facilities, viewing blinds, board walks, and platforms (Refer to Yolo Bypass Wildlife Area LMP Page 5-32). This mitigation measure will address the loss of education and wildlife viewing days.

41

4. **Develop new public access for wildlife viewing**. The Yolo Basin Foundation can work with project proponents to identify new public access opportunities for wildlife viewing, such as: 1) access to Tule Ranch with westside public access south of Putah Creek; 2) a new public viewing loop using Tule Ranch wetlands (refer to Exhibit M: Yolo Bypass Wildlife Area LMP Page 5-35); improve trail designations and maintenance (Exhibit M: Yolo Bypass Wildlife Area LMP Page 5-36); and 3) improve physical separation of wildlife viewing and hunting by creating new, westside hunter check station on Tule Ranch. This mitigation measure will address the loss of wildlife viewing days.

42

5. **Improve current hunting program**. Project proponents could improve the current hunting program by: 1) providing westside access for hunting on higher areas that may not flood as frequently due to Fremont Weir modification for more frequent and longer duration of flooding; 2) moving hunter access to the Tule Ranch by creating new, westside hunter check station on Tule Ranch (refer to Yolo Bypass Wildlife Area LMP Page 5-35); and 3) provide additional hunting area outside the Yolo Bypass. This mitigation measure will help address the loss of hunting days. 43

6. **Implement remaining recommendations in the Yolo Bypass Drainage and Water Infrastructure Improvement study.** These projects include the Parker United water supply project, water supply for wetlands south of the umbrella barn, and improvements to the South Davis Drain. In addition to reducing the time the Wildlife Area stays closed because of improved drainage times, some of these projects will also increase wetlands acreage. This mitigation measure addresses the impacts of a reduction in education days, wildlife viewing days, and hunting days, as well as Impact EJ-4. 44

7. **Develop an Adaptive Management Plan for the proposed project.** The Adaptive Management Plan should include wetlands and public use elements in the Wildlife Area, not just operation of gates and canals associated with the Fremont Weir modification. 45

8. **Implement and fund methylmercury Best Management Practices**. Project proponents should develop a cost share agreement with CDFW and private landowners on implementation of Methylmercury BMPs to meet Bay-Delta Methylmercury TMDL future requirements. This is proposed as a mitigation measure for cumulatively significant impacts associated with methylmercury. 46

Thank you for the opportunity to comment. The Yolo Basin Foundation looks forward to working with you to identify a preferred alternative and identify opportunities to improve wildlife habitat, educational and recreational opportunities in the Yolo Bypass Wildlife Area.

Sincerely,



Pete Bontadelli
Chair, Yolo Basin Foundation Board of Directors

cc: Congressman John Garamendi, U.S. Representative
Senator Bill Dodd, California State Senate
Assemblymember Cecilia Aguiar Curry, California State Assembly
Kris Tjernell, Special Assistant for Water Policy, California Natural Resources Agency
Yolo County Board of Supervisors
Yolo Basin Foundation Board of Directors

YOLO BASIN FOUNDATION

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Exhibit B	Existing Protected Lands in the Yolo Bypass Map
Exhibit C	Central Valley Joint Venture 2006 Implementation Plan
Exhibit D	North American Waterfowl Management Plan 2012: People Conserving Waterfowl and Wetlands
Exhibit E	North American Migratory Bird Treaty Act Policy Brief
Exhibit F	Map – Figure 6. Updated Wetland Base in the Yolo Bypass, 2011
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Exhibit L	Yolo Basin Foundation Working Group Meeting Minutes, 1999-2017 (No. 1-46)
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Exhibit N	Yolo Basin Foundation – Discover the Flyway 2016-17 School Statistics
Exhibit O	Habitat and resource use by waterfowl in the northern hemisphere in autumn and winter. Davis et al. (2014) *Wildfowl* Special Issue 4: 17-69
Exhibit P	2016 National Survey of Fishing, Hunting and Wildlife-Associated Recreation: National Overview (Director's Message included)
Exhibit Q	California Watchable Wildlife Program – Yolo Bypass Wildlife Area
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Chapter	Section	Page No.	Comments & Questions	Exhibit/Reference	
Executive Summary	ES. 7	ES-17-18	Issues of controversy that are not listed in current draft, include: grazing, operations and maintenance on YBWA, education access, hunting & wildlife viewing access, impacts to existing wetland habitat, impacts to CVJV Implementation Plans, impacts to state and federal wetland conservation easements in the Yolo Bypass.	**Refer to Exhibits B, H & L:** Planning Team mtgs.; YBF mtgs. w/ agency staff; Yolo County Board of Supervisors mtgs.; YB Bi-ops Working Group Mtgs.; Value Planning Exercise; Conservation Easements map	47
	Table ES-2	ES-34-35	Impact TERR-3: GGS impact - Would there be impacts to GGS in YBWA? This is not discussed in draft.		48
		ES-36-37	Impact TERR-5: Nesting bird species impact - More spring flooding could impact growth quality of spring nesting habitat but this is not discussed in draft for construction impacts. There will also be impacts for nesting habitat on the YBWA due to long term project operations.		49
		ES-39-40	Impact TERR-10: Interference with movement of native resident or migratory wildlife species. Draft doesn't acknowledge permanent impact of operations on YBWA, only describes the temporary impact at construction site.	**Refer to Exhibit M:** Page 4-1	50
		ES-42	Impact AGR-2: Conversion of farmland - What are impacts of sedimentation below I-80 due to long term project operation?		51
		ES-50	Impact HAZ-8: Mosquito-borne virus risk - What analysis was used to analyze this impact finding of LTS?		52
	Table ES-3	ES-54-55	Impact SOC-2: Economic impact - What analysis was used to specifically address loss of agriculture jobs on YBWA rice fields and grazing leases?		53
		ES-56	Impact EJ-4: Reduced educational opportunities to low-income students - CORRECTION: Percentage of Title 1 students served by YBF is 44%. Washington School District (West Sacramento) also has Title I schools that participate in YBF school program. They should be part of analysis.	**Refer to Exhibit N**	54
	Table ES-6	ES-58	Water Quality - Signification methylmercury impact should be mitigated through cost sharing research projects to develop BMPS and for implementation of BMPS on public and private land as required by MeHg TMDL.		55
Chapter One	Figure 1-1	1-7	Update project area map	**Refer to Exhibits B & F**	56
	1.6.2	1-13	Refer to Section ES-7 comments above	**Refer to Exhibits H & L:** Scoping docs; YBWG meeting summaries. Additional items of controversy were discussed in: YBF and Yolo County scoping docs; YBWG meeting summaries; YB Fish Enhancement Planning Team mtgs.; YBF mtgs. w/ agency staff and Yolo County Board of Supervisors	57

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Chapter	Section	Page No.	Comments & Questions	Exhibit/Reference	
Chapter Two	Table 2-3	2-8	Sutter Bypass Alternative - What was the analysis used to assess acceptability? Does this imply that there is acceptability among Yolo Bypass stakeholders? How was this measured? YBF does not believe this effect was seriously analyzed.		58
Chapter Three	Table 3-2	3-22	Sac-San Joaquin Delta Estuary TMDL for Methylmercury - SUGGESTED MITIGATION: Water Quality - Signification methylmercury impact should be mitigated through cost sharing research projects to develop BMPS and for implementation of BMPS on public and private land as required by MeHg TMDL		59
Chapter Four	4.1.2.5	4-9	CORRECTION: Yolo Basin Wetlands is the name of the USACOE project that was completed in 1998. That project was on the original 3700 acres of the YBWA. In draft YBWA acreage is listed as 3,700 acres of wildlife habitat, but the YBWA was enlarged to 16,800 acres by a land purchase in 2001. Of the 16,800 acres, approximately 7,000 acres are managed wetlands.	**Refer to Exhibit B**	60
	4.3.3.2	4-24	Alt 1 "larger areas with the bypass would be inundated at low flows" However the draft EIR/EIS does not recognize this as either a CEQA or NEPA impact. Why not?		61
	Figure 4-6; Figure 4-12	4-29; 4-56	The description of supplemental adult fish passage for all alternatives makes the assumption that 1,000 cfs flows will stay in Toe Drain and not cause impact yet these maps show otherwise. Please clarify whether or not the operation of supplemental adult fish passage under all alternatives would remain in the current Tule Canal/Toe Drain. Would it impact agriculture, grazing, education or recreation on the YBWA?		62
		4-56	Same comment as above but pertaining to impacts of the Lower Elkhorn setback levee.		63
Chapter Eight	Impact Fish-13	8-111	Is the impact to terrestrial species of increased methylation of mercury recognize elsewhere in the document? Where?	**Refer to Exhibit M:** Pages ES-5-6; 3.1-7; 3.4-33 5-53	64
	Impact Fish-14	8-112	What is the net benefit to primary and secondary food production of increasing frequency and duration of flooding with this project? Most of the Yolo Bypass is already activated floodplain by Nov. 1 due to the summer flood up of rice fields and managed wetlands.	**Refer to Exhibit O**	65
	8.5.9.2	8-320	Adaptive Management should be applied to assess long term operations activities on a real time basis to minimize impacts to wetlands, recreation, and education values on the YBWA.		66
Chapter Nine	9.1	9-2	CORRECTION: Update YBWA acreage to 16,800 - Jones and Stokes 2001 is old reference. Include: list of sensitive special-status species, 7,000 acres of managed wetlands.	**Refer to Exhibit B & M:** pages 1-1; 1-8	67
			Correct error in first paragraph. "The west side of the south portion of the YB is bounded by the west bypass levee just south of Putah Creek…" This should say the NORTH side of Putah Creek.		68

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Chapter	Section	Page No.	Comments & Questions	Exhibit/Reference	
Chapter Nine	9.1	9-2	First line should be Fremont and Sacramento Weirs not weirs.		69
			CORRECTION: 4th paragraph states, "most of the land in the YB is farmed, with a smaller amount (located mainly in the southern portion of the YB)." This is incorrect: There are a much larger number of acres of managed wetlands south of I-80.		70
	9.1	9-3	QUESTION: Last paragraph "…migration route and spawning and rearing habitat for many sensitive special-status fish species endemic to the region…" What are these sensitive special-status fish species? Which of these species spawn in the YB?		71
			Second sentence. "As the floodwaters inundate and then receed, the YB also provides habitat for shorebirds, waterfowl, and terrestrial species." It should be added that the YB floodway is already an activated floodplain by the time the floodwaters arrive. YB is already covered by flooded rice fields and managed wetlands.	**Refer to Exhibits K & O**	72
			CORRECTION: Yolo Bypass described as terrace, this is incorrect. It is a basin created by natural levees created by overflow sediment from the Sacramento River. Also, managed shorebird habitat in the bypass is already present before inundation occurs, not just afterwards.		73
	Table 9-2	9-4	QUESTION: Why are detailed descriptions of vegetation communities in Yolo Bypass not provided in the EIS/EIR? What year are the data from? CORRECTION: Managed annual wetland vegetation should be more than 4,743 acres. YBWA has 7,000 acres and there are thousands of acres of managed wetlands are private lands (duck clubs). Does the 51 acres of Vernal pool complex include the Tule Ranch vernal pools? Where are the 1,620 of managed alkali wetlands. Where are the 4,207 acres of salt grass flats. What are the 37,770 acres of Other. Where are they?		74
	9.1.1.4.3	9-11	Most of YBWA (7,000 acres of managed wetlands) were funded with N. American Wetlands Conservation Act grants matched by state funds - this is not mentioned in draft. YBF would like more description of management guidelines for wetlands at YBWA and for it to be noted that the same mgmt. approach is used on private wetlands in Yolo Bypass.	**Refer to Exhibit M:** Page 5-10	75

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Chapter	Section	Page No.	Comments & Questions	Exhibit/Reference	
Chapter Nine	Table 9-4	9-19-25	CORRECTION: For special-status wildlife: on-going operations and not just construction, will be impacted in YBWA for Conservancy fairy shrimp, vernal pool fairy shrimp, vernal pool tadpole shrimp and giant garter snake, sharp-shinned hawk, Cooper's hawk, tricolored blackbird, grasshopper sparrow, great egret, great blue heron, short-eared owl, burrowing owl, redhead, Swainson's hawk, black tern, northern harrier, California yellow warbler, snowy egret, white-tailed kite, California horned lark, merlin, prairie falcon, American peregrine falcon, least bittern, loggerhead shrike, California gull, song sparrow, long-billed curlew, black-crowned night-heron, osprey, American white pelican, white-faced ibis, double-crested cormorant, least Bell's vireo, yellow-headed blackbird, pallid bat.		76
	9.1.4	9-26	EIS/EIR does not mention that the Yolo Bypass in part of the Pacific Flyway as migratory bird corridor, nor does it include shorebird mudflat as sensitive habitat vegetation community in study area. YBF suggests including these in sensitive habitats.		77
	9.2.2	9-32-36	In section 9.2.2 include Central Valley Joint Venture Implementation Plan.		78
	9.3.1	9-41	QUESTION: Why is only the part of the study area associated with construction impacts shown in this chapter? Why aren't impacts from long term project operations included?		79
	9.3.1	9-42	CORRECTION: See second paragraph sentence: "For this analysis...." The No Action condition assumes there will be no anticipated changes to terrestrial biological resources for the future; however, this doesn't include more flooding from climate change? This is confusing, please clarify - is this referring to the CEQA or NEPA definition of existing conditions? Any impact to existing conditions due to climate change will change conditions for terrestrial species.		80
	9.3.2	9-43	Thresholds of significance: There is a potential for adverse effects on wetlands regulated under Section 404 of the CWA. There is also potential for interference with the movement of native resident or migratory wildlife species. QUESTION: Why are these two thresholds NOT addressed in the document under any of the alternatives?	**Exhibits K & O**	81
	9.3.3.2	9-45	See figure 4-6. This figure shows an extension of inundation outside the Toe Drain on YBWA including rice fields and managed wetlands as a result of project operations. Construction impacts are recognized. Why isn't the impact of operations recognized?		82
	Note: All of the Terrestrial impacts commented on in the following sections pertain to each of the 6 alternatives.				

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Chapter	Section	Page No.	Comments & Questions	Exhibit/Reference	
Chapter Nine	9.3.3.2	9-45; 9-62	Last paragraph states: "During operations, Alternative 1 generally would result in an overall increased number of wet days within the YB of one week (with localized areas in the east experiencing an increased average number of wet days of up to three week)...In general, areas in the eastern part of the YB would experience a greater increase in the number of wet days than the west..." This is referring to special status plant species. However in 9.3.3.2.3 Terr-3 potential disturbance or mortality of and loss of suitable habitat for GGS is not mentioned for long term operation of the project. GGS are known to exist in areas of the YBWA that would be flooded under conditions described in the sentence listed above. QUESTION: Why are impacts from construction described but not impacts from project operations?		83
	9.3.3.2.1	9-46-47	Impact TERR-1: What permanent mitigation measures for impact on special-status plant species be? Mitigation measures provided for construction only in EIS/EIR.		84
	9.3.3.2.3	9-64	QUESTION: In paragraph beginning "During operations, change in the duration of inundation...." Does this paragraph refer to operations at the Fremont Weir? What about impact of operations on GGS on the YBWA?	**Refer Exhibit H:** YBF scoping and comment documents. Already referred in previous comments here. Also refer to comments for Table 9-4 above.	85
	9.3.3.2.5	9-69	Impact TERR-5: Potential disturbance or Mortality of Nesting Bird Species and Loss of Suitable ...." This section refers to construction impacts. QUESTION: Why aren't the impacts to nesting on the YBWA described? This is an issue that has repeatedly been described in YBF scoping documents and comment letters beginning in 2008.	**Refer Exhibit H:** YBF scoping and comment documents. Already referred in previous comments here. Also refer to comments for Table 9-4 above.	86
			QUESTION: Why isn't there a TERR-xx for impacts of operations to sensitive species on lands south of the Fremont Weir including the YBWA?		87
	9.3.3.2.8	9-75-76	Impact TERR-8: Increased O&M costs are not included, but could occur with 1,000 cfs after Mar. 15. QUESTION: How will flows of 1,000 cfs affect ag. and wetlands and access for education and wildlife viewing at YBWA?		88
	9.3.3.2.10	9-84	Impact TERR-10: Does this statement pertain to just the area around the Fremont Weir and associated ponds and canals? If it is, movement of wildlife south of this area would be impacted by operations. The impacts described in this section are not consistent with impacts of deeper flooding of seasonal wetlands described in other chapters. The issue is not the movement of wetland dependent wildlife. It is that migratory and resident birds are adapted to feeding and resting in the shallow waters of seasonal wetlands. The wetlands in the YB are intensively managed to provide food and shelter when and where the birds need it. The substitution of flood waters is not equivalent habitat. Flood waters move at a much higher velocity than water circulating through managed wetlands and flooded rice fields. Many wetland dependent wildlife are not adapted to the velocities of floodwater.	**Refer to Exhibit O**	89

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Chapter	Section	Page No.	Comments & Questions	Exhibit/Reference	
Chapter Nine	9.3.3.2.11	9-85	CEQA conclusion: Why isn't there a CEQA finding for impacts of long term operation of the project to YBWA rice fields and managed wetlands?	**Refer to Exhibit O**	90
Chapter Eleven	Figure 11-2	11-3	CORRECTION: Current figure does not distinguish all of the 5,000 acres of managed wetlands that occurs within the land use area described as pasture (area is highlighted in green for pasture). Also the tomato area highlighted in red on the YBWA is now partway through a five year grazing lease.		91
	Table 11-1	11-5	YBF would like to emphasize that 9,000 acres categorized as grazing land are part of Tule Ranch within YBWA.		92
	11.3.1	11-15	CORRECTION: Methods should distinguish lost revenue from agriculture leases in YBWA. Current lease income on YBWA from rice and grazing is $650,000 annually. Implementation of any of the 6 alternatives could impact the willingness of potential leasees to bid on future leases and could impact the lease economic value. Lease income is used to fund most of the operations and maintenance costs associated with the YBWA.		93
	Comments in the following sections apply to all alternatives.				
	11.3.3.2.2	11-18	11.3.3.2.2 Impact AGR-2 states: "Implementation of Alternative 1 could affect farmland within the entire YB through increased periods of inundation, also referred to as effects related operations." Agricultural operations in the YB provide significant income to individual farmers, leasees, and their field workers. Using county-wide data does not show this impact.		94
			Floodway function impact: Any action that reduces farming and ranching operations in the YB also reduces the important vegetation management function that keeps the floodway open. Without agriculture , thousands of acres in the YB would fill up with vegetation that could slow down flood flow.		95
			Wildlife Habitat impact: Any action that reduces farming and ranching operations in the YB also reduces the habitat values that wildlife friendly farming contributes.		96
	11.3.3.2.2	11-19	While impacts to agriculture in Yolo County as a whole may be LTS, If lease income on the YBWA is reduced due to additional flooding, the funding of O&M for the YBWA could be reduced or eliminated because there may not be interested tenants to bid on the lease contracts (YBWA leases are for 5 year based on the state competitive bidding process). See impacts to lost lease income in previous comment.		97
	Figures 11-5; 11-6	11-21	YBF requests to see these figures for every year and specifically for YBWA.		98
			QUESTION: Are these figures based on an average of 12 years modeled? Can the highest flow year and the lowest flow year be used for a similar figure? Can similar figures be shown that are specific to the YBWA?		99

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Chapter	Section	Page No.	Comments & Questions	Exhibit/Reference	
Chapter Eleven	Figures 11-7; 11-11; 11-12; 11-14; 11-16	11-22-42	QUESTION: Why is 2002 used as comparison for Existing Conditions?		100
Chapter Twelve	**Note: Comments regarding GEO impacts apply to all six alternatives.**				
	12.3.2	12-11	YBF recommends including an additional CEQA or NEPA threshold of significance for increased operations and maintenance costs for farmers and wetland managers resulting from increased sedimentation below new infrastructure at FW and Ag Crossing 1 including the YBWA. Sedimentation is an issue for farmers and wetland managers after flooding throughout the YB.	**Refer to Exhibit M:** Page 4-3; 5-12	101
Chapter Twelve	12.3.3.2.1	12-13	Impact GEO-1: What is the change in sedimentation downstream of Ag Crossing 1, including YBWA, due to operation of project? For all alternatives, what is the baseline below Ag Crossing 1 for existing conditions/no action? How will removal of sediment deposited in YBWA be paid for? Were impacts modeled below Ag Crossing 1 including YBWA? While farmers may till sediment into fields, there is also sedimentation in irrigation supply and drainage canals and other infrastructure. Sedimentation is also an impact for wetland managers. Tilling of ponds is not an annual activity. Supply and drainage canals used for wetland management will also be impacted by increased rates of sedimentation. Operations and maintenance costs on the YBWA will increase due to the increase in sedimentation under all 6 alternatives. Will project proponents pay for the additional O&M costs associated in the increase in sedimentation on the YBWA?		102
	12.4.2	12-22	Cumulative impacts assumes there is funding for maintenance activities related to sediment deposits.		103
Chapter Thirteen	**Note: The following comments regarding Chapter 13 recreation apply to the equivalent sections for analysis of all six alternatives.**				
	13.1.2	13-2	YBF would like to emphasize that YBWA is open and used for wildlife viewing year-round, but late fall-early February is the peak wildlife viewing season. The EIS/EIR does not make this clear.		104
	13.1.2.3	13-6	13.1.2.3 Yolo Bypass Wildlife Area: This section significantly understates the popularity of the YBWA to the wildlife viewing. While there are no studies on wildlife viewing visits to the YBWA, it can be estimated that there are thousands of visitors. The YBWA is a place valued for its wildlife viewing by the regional community as well as statewide and nationally. It is designated as a premium "Watchable Wildlife" site by CDFW.	**Refer to Exhibit P**: Director's Message; **Exhibit Q**	105

Chapter	Section	Page No.	Comments & Questions	Exhibit/Reference	
Chapter Thirteen	13.1.2.3	13-6	CORRECTION: Hunting blinds are only used by hunters. They are not a benefit for non-hunting recreation or education. YBF description needs updating to include CA Duck Days wetlands festival, bat viewing tours, volunteer program (7,000 hours annually). All of the programs are provided as a service to the public in partnership with CDFW. For the 2017-2018 school year, the Discover the Flyway program provides class visits Monday through Friday. Teaching days were fully reserved by late spring when registration opened for 2017-2018. Every year there is a waiting list in case of cancellations.		106
			CORRECTION: Only hunt areas are closed to non-hunting purposes during waterfowl season. The YBWA wildlife viewing loop that starts at the entrance to the YBWA is open prior to and during hunting season.		107
			CORRECTION: CDFW owns and manages the YBWA. YBF works in partnership with CDFW to provide educational and outreach programs. Through the CDFW/YBF partnership, the YBWA is made accessible to the public to further the mission of CDFW.		108
	13.1.2.5	13-7	CORRECTION: There are additional hunt clubs located in Yolo Bypass north of I-80 including multiple clubs on the Swanston Ranch property. It should be noted that there are thousands of acres of wetlands on the private hunting club and that they provide significant managed wetland habitat for the Pacific Flyway as well hunting opportunities.		109
	13.2.1	13-8	QUESTION: Why does EIS/EIR not include N. American Wetlands Conservation Act or N. American Bird Treaty Act as guiding documents? YBWA is known for large flocks of migratory birds specifically listed in N. American Wetlands Conservation Act. YBF recommends including descriptions of these other federal regulations.	**Refer to Exhibits E & G**	110
			The North American Wetlands Conservation Act (NAWCA) mandated a grant program that fulfills a Congressional mandate declaring that maintenance of healthy populations of birds in North America depends on "the protection, restoration, and management of wetland ecosystems and associated habitats in Canada, as well as the United States and Mexico." NAWCA was passed, in part, to support activities under North American Waterfowl Management Plan (NAWMP), an international agreement that provides a strategy for the long-term protection of wetlands and associated uplands habitats needed by waterfowl and other migratory birds in North America. In December 2002, Congress reauthorized NAWCA and expanded its scope to include the conservation of all habitats and birds associated with wetlands ecosystems.	**Refer to Exhibit D**	111
		13-13	Policy CO-1.23: All alternatives for project proposal decreases public access, compromising this action within Yolo County General Plan.		112

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Chapter Thirteen	13.3.3.2	13-21	2nd paragraph states: "In contrast to the access affects, the operation of Alt 1 could result in a more widespread reduction in the amount of lands available for recreation opportunities as the established wildlife areas due to an increased frequency of inundation. This impact would reduce the overall amount of lands available for recreation...." We agree with this statement as it applies to the YBWA. QUESTION: Why isn't this impact noted as a NEPA social impact? As noted in comment for page 13-6 above: the value of the YBWA to the wildlife viewing public is understated throughout this chapter.	**Refer to Exhibit Q**	113
			Reduction in recreation areas is also caused by mandated CDFW closures for public safety when the Fremont Weir spills.	**Refer to Exhibit R**	114
		13-27	CORRECTION: the first paragraph on page 13-27 states: "At the YBWA, Alternative 1 would result in an overall increase in the duration of inundation across 84 percent of the **SBWA**, or **14,062.1** acres, as shown in Table 13-3..." **SBWA should read YBWA and 14,062.1 should read 16,770 as shown in Table 13-3.**		115
			CORRECTION: The first paragraph goes on to say: "13% of YBWA lands, mostly in the **northern and central** portion of the YBWA as show on Figure 13-6. Alternative 1 would result in **only** small acreages...." The increase in flooding includes the entire eastside of the YBWA as well as northern and central portions. "only" is a qualitative term that has no place in a technical analysis.		116
			Loss of popular wildlife viewing and education opportunities would be impacted as well as loss of popular waterfowl hunting. The third paragraph is hunting centric and while this is an important point, the increase in closures on the YBWA will impact equally important wildlife viewing and education activities.		117
			The third paragraph states: "The CDFW closes the YBWA when the water surface elevation at Lisbon Weir is greater than 12 feet...." This is correct but it is not the entire story. The YBWA is closed to all public access when the Fremont Weir spills whether or not Lisbon Weir elevation is above 12 feet. Additionally, when the Lisbon Weir is at 8 feet elevation Parking Lot F is closed, which closes down hunting access to most if not all of the eastside. At 10 feet elevation the flooding is more widespread and all access can be impacted. These numbers are based on many years of CDFW personnel experience in managing the YBWA.		118

Chapter	Section	Page No.	Comments & Questions	Exhibit/Reference	
Chapter Thirteen	13.3.3.2	13-27	The last sentence on this page states: "However, the change in comparison to the 100-day hunting season would only be a 4.1 percent reduction in the number of hunting days, which would not be substantial" QUESTIONS: 1. Why is an average of days (10.3) an accurate number for this analysis. A more accurate number would be the median of days closed or a range of days showing the highs and lows? The average does not accurately predict the true impact. 2. Does the analysis of days closed include the descending hydrograph after a spill event for each year modelled? Based on many years of observation, the YBWA does not open immediately after the peak flood date. There is a period of time where fields and ponds are draining. The draining process cannot begin until the Toe Drain is below the elevation of the main drainage canals. Could this be when Lisbon Weir elevation is below 8 feet? Can the hydraulic modeling predict the drainage time period? Once the access roads are above water, it takes at least a week for the roads to dry depending on the weather. Once the roads are dry enough for CDFW personnel to safely access the area, then road repair and other maintenance activities can begin. The length of time this takes can vary based weather conditions, availability of equipment and personnel, and amount of damage to repair, debris to remove, etc. If another flood event occurs within this period the process starts all over again. Short but successive Fremont Weir spilling events can close the YBWA for weeks if not months.		119
		13-28	Reduction in wildlife viewing is an additional impact because there is no access to YBWA when area is flooded. According to USFWS recreation studies, there are significantly more wildlife viewers nationwide and the pastime is increasing while hunting is decreasing nationwide.	**Refer to Exhibit P:** Director's Message	120
			CORRECTION: First paragraph states: "...Less than 18 inches " This should read 6 to 14 inches. 18 inches is too deep for most birds except Canada geese and herons and egrets.	**Refer to Exhibit K**	121

Chapter	Section	Page No.	Comments & Questions	Exhibit/Reference	
Chapter Thirteen	13.3.3.2	13-28	Paragraph is very confusing. Paragraph starts with: "The change in depth of the inundation could affect the recreation opportunities particularly for waterfowl hunting in the Yolo Bypass due to reductions in available shallow-flooded (i.e., less than 18 inches in depth). Seasonal managed wetlands (shallow-flooded wetlands), that are critical to waterfowl. Alternative 1 would result in a loss of shallow-flooded wetlands, which are critical lands/habitat for waterfowl. This loss of shallow-flooded wetlands would affect the amount of lands available for recreational waterfowl hunting...." QUESTION: Is the point here to state that shallow-flooded wetlands are critical waterfowl habitat? We agree with this. Is the point also that hunting opportunities are impacted when shallow-flooded wetlands are inundated? Both are important points: 1). Inundation impacts managed seasonal wetlands because the water is too deep and the velocity too great for waterfowl and shorebirds to access the food and shelter provided by the wetlands. 2). Inundation of shallow-flooded wetlands means that birds will not be there and therefore hunting opportunities will be impacted on both private lands and on the YBWA. The same impacts to wetlands also mean that there are fewer opportunities for wildlife viewing and education programs.	**Refer to Exhibit O**	122
		13-28; 13-33; 13-37	QUESTIONS: 1). This section says that there is a significant reduction in critical shallow-flooded wetlands that impacts both waterfowl and shorebirds. Why is there no CEQA finding for the physical and biological loss of shallow-flooded managed wetlands? This includes physical impacts to wetlands and loss of access to critical food supply for waterfowl, shorebirds and other wetland dependent species. 2). For NEPA purposes, why are the impacts described in this section not considered social impacts to recreation and education? Does recreation here includes hunting and wildlife viewing? A significant reduction in shallow-flooded wetlands under CEQA and NEPA requires mitigation measures.	**Refer to Exhibit M:** Page 4-6	123
		13-33	Same comment for this page as above for page 13-28. This page is very confusing and multiple important issues are touched upon. Please show the maps and charts from the 2017 Ducks Unlimited Report that the analysis on page 13-33 is based on. Why does the year of record begin in 1922 while the year of record begins in 1997 for hydraulic modeling in other chapters? Where does the 3700-acres under normal years come from? What is a normal year? Using one period of record for waterfowl impacts analysis and a different period of record for the hydraulic modeling seems like comparing apples to oranges.	**Refer to Exhibit S**	124
	Figure 13-6	13-29	CORRECTION: Map does not accurately depict YBWA. All areas within main YBWA boundary are within the wildlife area. Internal lines are incorrect.	Figure 13-1, Page 13-3 is correct	125

Chapter	Section	Page No.	Comments & Questions	Exhibit/Reference	
Chapter Thirteen	Figures 13-8-10	13-34-36	These figures are very confusing. Figure 13-8 seems to be showing that there is a 3,000 acre decrease in shallow flooded wetlands over a 10 day period in Dec. 1999. Then in January, the amount of shallow habitat goes back to 10,000 acres. QUESTION: By Feb 16 are there are only 2,000 acres of shallow flooded habitat? Does this mean that the Fremont Weir floods again? Does this mean all of the shallow-flooded wetlands throughout the entire Bypass are dry or are they flooded over 18 inches? How does this apply to the six project alternatives? In our experience on the YBWA, CDFW staff are told to pull as many water box boards as possible when they know the Fremont Weir is going to spill. This is done to equalize water levels to prevent damage to pond levees. Once the spill is over and the YB begins to drain, the wetlands where the boards were pulled are dry. It is impossible for CDFW staff to go out to the flooded Bypass and put boards back in to retain the shallow water wetland habitat. They may not have time to reflood these ponds and the habitat is gone until the following fall flood up.		126
	13.3.3.2.1	13-37	First paragraph states: "....Alternative 1 could result in additional closures at YBWA due the increase in the duration of inundation since current CDFW management closes the YBWA when certain levels of inundation occur." They close the YBWA for public safety purposes. When the Fremont Weir spills under implementation of any of the six alternative, the YBWA will be closed because it will flood within a day or two. CDFW does not formally close the FWWA but it is closed due to flooding. QUESTIONS: Is that informal? What is the point of this statement? The analysis says that the YBWA will be closed 22.6 percent over existing conditions. What year is this comparison being done with? The analysis then says that Alt 1 would result in 1.4 percent increase in the number of days closed over the year, which is not substantial. Is that based on an average of all years modeled? Is this the DU analysis or the DWR analysis? Additionally, does this analysis use just days when the YBWA is closed due to spilling of the Fremont Weir? The YBWA is closed beyond the end of the spill because it takes at least a week if not more to drain the 16,800 acres of the YBWA and then there is the time needed for maintenance before the gates can be opened to the public.		127
			The most popular season for wildlife viewing is late Fall - February, when the migratory birds are present. Using a calculation based on the YBWA being open all year is not accurate. Also the hunting season is not all year. It is unclear what the point of the first paragraph is.		128

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Chapter	Section	Page No.	Comments & Questions	Exhibit/Reference	
Chapter Thirteen	13.3.3.2.1	13-37	The second paragraph contains an analysis of the impact of increased flooding on the Discover the Flyway program. This is also confusing. Are the days closed under Alt 1 an average? Does the days closed include the days it takes to drain the YBWA and then do any flood related maintenance? This can take anywhere from 10 days to 3 weeks under the best of conditions. The same comments and questions regarding this conclusion are found on page 13-27 and else where in this document. Basing closure of the area on an average does not reflect what the impact will be.		129
	Note: All Alternatives conflict with environmental justice				130
Chapter Nineteen	**Note: All comments for Chapter 19 pertain to Alternatives 1-6, as the impact is the same.**				
	19.3.3.2.8	19-16	Impact HAZ-8: Risk of exposure to mosquito-borne viruses could increase as a result of inundation-period expansion in the Yolo Bypass for fish passage and rearing: Proposed gate operations under Alt 1 would increase the typical inundation period in some locations between one day and over four weeks.....Yolo Bypass wetland managers currently work with the SYMVD to implement BMPS .....DWR and/or CDFW would continue to implement BMPs recommended by the SYMVD to minimize the potential for impacts to public health from mosquito-borne viruses." The CEQA conclusion is that the impact would be less than significant because current activities would continue. There will be an economic impact to CDFW for increased mosquito related costs on the YBWA associated with this acknowledged impact. This impact requires mitigation to cover the additional costs to CDFW.		131
Chapter Twenty-two	22.1.1.5.4	22-16	Impact EJ-4: Project actions could reduce educational opportunities offered in the YBWA for low-income schools. Yolo Basin Foundation staff and volunteers operate the Discover the Flyway program for schools in partnership with CDFW five days a week from September through mid-June. The Discover the Flyway program opens reservations for the following school year in May. By mid-summer all teaching days are fully subscribed and a waiting list builds. Teachers rarely cancel their class trips, even during rainy, cold weather. The large flocks of migratory birds present on the YBWA between late Fall and late February provide a spectacular field experience for students. The program serves Title 1 schools in Sacramento City Unified School District, Washington Union School District (West Sacramento), Woodland Unified School District, Esparto School District, Davis Unified School District, and others. All six proposed alternatives will increase frequency and duration of flooding making fewer days available for low income students to participate in a field trip to the YBWA. Low-income students rarely have the opportunity to enjoy the natural environment. They are less likely to play outside and enjoy the benefits of a summer vacation to a park or other natural area.	**Refer to Exhibit N**	132

Chapter	Section	Page No.	Comments & Questions	Exhibit/Reference	
Chapter Twenty-two	22.3.4	22-26	The Summary of Impacts for EJ-4 states that for all action alternatives, adverse and disproportionate effects could occur. We believe that mitigation in the form of equivalent, accessible managed wetlands on the YBWA outside the Yolo Bypass are necessary.		133
Appendix A	4.7.4.1	**Note: Sedimentation Impacts described in this section apply to all 6 alternatives.**			
		4-49	Additional sedimentation on the YBWA due to this feature will increase operations and maintenance costs to CDFW. QUESTION: How will these costs be paid for?		134
	5.2.3.3	5-20	Waterfowl Impacts: This section describes waterfowl impacts in a more organized and easier to read manner than any of the descriptions and comparisons made in Chapter 9 on Vegetation, Wetlands and Wildlife Resources and Chapter 13 on Recreation. In fact, Waterfowl Impacts are not included in Chapter 9. Waterfowl Impacts are a proxy for the managed wetland community that is an important component of the YBWA LMP and other wetlands conservation policies. Other natural communities are described. Why was this one left out? Impacts to waterfowl and managed wetlands are touched on in Chapter 13, but buried in confusing sections on impacts to hunting. In the Yolo Bypass as in the entire Pacific Flyway, managed wetlands and the waterfowl and other birds they support are an important public policy goal. We suggest clarifying these sections in the chapter text using the text on this page. If the text of the document used this section, the impacts would be clearer and less likely to be dismissed as LTS. This point is much clearer on page 5-20.	**Refer to Exhibits K & O**	135
		5-21	The clarity of this section breaks down with the bullet point regarding the YBWA. Please refer to comments for section 13.2.3.1, page 13-27.		136
		5-21; 5-23	Refer to comments and questions for Chapter 13, Figures 13-8, 13-9 and 13-10.		137
	5.2.3.4	5-23	Education impacts: This description of the impact to education programs should be included in Chapter 13, Section 13.1.2.3, Yolo Bypass Wildlife Area, page 13-7. It is a more thorough description of the impacts. It should also be included in Chapter 22, Environmental Section 22.1.1.5.4, page 22-16.		138
	Figure 5-20	5-24	This a helpful figure for understanding the impacts to managed wetlands, public use and education on the YBWA. We respectively request similar figures for each water year that was modeled (hydraulic modeling).		139
	Figure 5-16	5-25	The results of this figure for the YBWA are confusing because the shades of blue are hard to differentiate. It appears to show areas of flooding of 3-4 weeks in specific parcels throughout the YBWA. This would appear to be in conflict with statements in the 3rd paragraph on page 5-21. We also respectively request a set of maps for each year modeled with the colors easier to differentiate.		140

Chapter	Section	Page No.	Comments & Questions	Exhibit/Reference	
Appendix A	Table 5-5	5-26	This table appears to show only the potential impact due to construction at the FWWA. Is this correct? If so, we respectively request to see a similar table for the impacts to YBWA managed wetlands as a result of long term operations of the proposed project.		141
	5.2.3.5	5-28	As stated in Chapter 9, GGS is know to use wetlands in the YBWA. When the Yolo Bypass is flooded, the only known refugia is the levee on the westside. QUESTION: Would more flooding mean more impact? Is there a similar Table for impacts due to long term operations?		142
		5-30	Second paragraph states: "Additionally operations of all alternatives could result in in adverse effects on suitable nesting habitat for listed bird species as the alternatives might extend the duration of flooding between November and March." We agree with this statement, although this should be explained further. Nesting season begins in March for many birds on the YBWA. Providing nesting cover is a management goal for the YBWA LMP. Spring flooding promotes the growth of invasive weeds like cockleburr and sweet clover which do not provide suitable nesting habitat. Spring flooding also delays the growth of grasses and forbs that provide good nesting cover. Nesting can be delayed if there isn't suitable cover habitat. Delayed nesting can impact habitat conditions needed to successfully raise young birds.	**Refer to Exhibit D**	143
	Table 5-9		This table appears to show only the potential impact due to construction at the FWWA. Is this correct? If so, we respectively request to see a similar table for the impacts to YBWA nesting cover as a result of long term operations of the proposed project.		144
	5.2.3.9	5-33	QUESTION: Does this section describe compatibility of the proposed project with ongoing flood management planning efforts? Aren't there compatibility issues between the proposed project and agriculture, wetlands, public use and education? There are ongoing planning efforts associated with these activities as well, but they are not included.		145

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Appendix A	Table 5-12	5-35	QUESTION: Does this table include lost income to the YBWA due to the impacts of project operations on rice and grazing leases? The annual income from these leases in $600,000. This income is used by the CDFW to fund the majority of operations and maintenance costs associated with implementing the YBWA LMP. The lease income covers all O&M costs except salaries of CDFW YBWA staff. If this income is increased or leasees fail to renew leases due to the uncertainty of the impacts of the proposed project on their operations, this funding will need to be replaced in order for YBWA O&M to continue. Does the O&M calculation used for this table include the increase in O&M costs associated with the increase in frequency and duration of flooding? These costs include debris removal, road and water infrastructure repair, gravel replacement on roads and removal and control of invasive weeds such as cockleburr. There is also the loss of hunting income to CDFW.		146
			We request a similar table that shows the data used to calculate the YBWA portion of this table. We would like to see the associated totals under annual O&M costs and agricultural loss on the YBWA.		147
	Table 5-17	5-40; 5-41	QUESTION: What does high performance under effects on agriculture mean? What does medium performance mean for effects on winter maintenance activities, inundation of recreation areas, reduced food production and access restriction for waterfowl, impacts to biological resources, and compatibility with other related efforts? What does neutral performance or minor benefits mean for waterfowl foraging habitat and inundation of educational areas? If this means there is not impact, how is this consistent with statements made in Chapters 9, 13 and 22? How is this consistent with statements made on pages 5-19, 5-20, 5-21, 5-23, 5-24, 5-30 in Appendix A, Evaluation and comparison of alternatives?		148
Appendix C	3	C-2	QUESTION: How will Yolo County, Yolo Basin Foundation, CDFW YBWA managers, Yolo Bypass landowners, wetland managers, farmers be integrated into the Adaptive Management Governance framework?		149
	4	C-4	Second paragraph states: "This connection imports allochthonous riverine nutrients and organic matter to the broad floodplain of the YB. Primary productivity is stimulated by temperatures and DO concentrations..." QUESTION: What are allochthonous riverine nutrients? How does the increased frequency and duration of flooding impact the food web and primary and secondary food production in the managed wetlands and flooded rice fields? Does the "import of allochthonous riverine nutrients" impact the production of food in the previously flooded up shallow seasonal wetlands that are the basis of Moist Soil Management BMPs? Are juvenile salmon using the primary and secondary food web produced in managed wetlands and flooded rice fields?		150

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Appendix C	4	C-5	First paragraph reads: "While the majority….the floodplain may be modified following the adaptive management process to affect growth, survival, and life history diversity of juvenile salmonid benefiting from the project." QUESTION: While this project is fish centric in order to meet biological opinion objectives, how will adaptive management be used to ensure that the wetland conservation objectives of the Migratory Bird Treaty Act, North American Wetlands Conservation Act, Central Valley Joint Venture and YBWA Land Management Plan?		151
			QUESTION: How will Adaptive Management be used to meet the biological objectives of the thousands of acres of NAWCA funded wetlands restoration and the associated management objectives?		152
			QUESTION: How will Adaptive Management be used to meet the management objectives and easement requirements of the thousands of acres of wetland conservation easements already present in the Yolo Bypass?		153
	5.1	C-6	Food Web Contributions: How will the monitoring categories Physical Process and Hydrology; and, Food Web be used to meeting the wetland restoration goals of the programs described in C-5 above?		154
	5.3	C-7	QUESTION: Salmonid Rearing - How will the potential management Reponses to lengthen the Fremont Weir Notch operation between first and last operational dates impact agriculture, grazing and wetland management in the YB?		155
	5.4	C-8	QUESTION: Adult Fish Passage - How will the potential management Reponses to operate the Fremont Weir Notch and Wallace Weir impact agriculture, grazing and wetland management in the YB?		156
		C-8	QUESTION: Physical processes and hydrology - How will extension of operations improve fish passage? How will the potential management Reponses to lengthen the Fremont Weir Notch operation between first and last operational dates impact agriculture, grazing and wetland management in the YB?		157
Appendix D	Figures 9-24	N/A	We respectively request to see these figures based on the YBWA only. Would figures based on elevations at Lisbon Weir be more useful to our evaluation?		158

Exhibit A

The Yolo Bypass Wildlife Area: History, Management and Significance for Birds

Ann Brice, Yolo Basin Foundation, P.O. Box 943, Davis, CA 95617
abrice@yolobasin.org

The 16,771-acre Yolo Bypass Wildlife Area, located between Davis and Sacramento in the Central Valley of California, is an incredible resource for the Sacramento Region. It accommodates farmers, birders, duck hunters, school children, and other recreational uses, but it wasn't always so; in fact, the Wildlife Area was established less than 20 years ago.

This paper presents a history of the Yolo Bypass and describes the establishment and current management of the Yolo Bypass Wildlife Area with a focus on its importance to birds.

HISTORY OF THE YOLO BYPASS

The Yolo Bypass Wildlife Area sits in the Yolo Basin, one of five natural basins located along the Sacramento River. These basins, Butte, Sutter, American (Natomas), Colusa and Yolo, held floodwaters from the river in the days before levees were built, and with high water events, the basins often remained flooded for months at a time.

The almost-80,000-acre Yolo Basin provided seasonal marshy habitat for tule elk (*Cervus canadensis nonnodes*), many species of fish, and thousands of birds including large numbers of waterfowl. Native Americans lived in this area for thousands of years, taking took advantage of its abundant resources.

In the early 19th century millions of waterfowl migrated south along the Pacific Flyway to winter in the Central Valley, including the extensive tule marsh in the Yolo Basin, but all that began to change by the middle of the century. Reclamation for agriculture, concerns about flooding, exacerbated by hydraulic mining debris from the Sierra, as well as market hunting all contributed to the demise of the great flocks of wintering birds.

The era of market hunting peaked in the late 1800s (Hickman and Morrill 2015). Encouraged by the wheat farmers, who had prospered from earlier reclamation efforts, hunters shot waterfowl, considered agricultural pests, by the thousands and sold them in the larger cities. It wasn't until the turn of the century that the state hired game wardens and set bag limits and seasons on hunting to control the steep decline in birds. In addition, federal legislation like the Migratory Bird Treaty with Canada and Mexico in 1918 gave greater protection to all migratory species.

In 1911 the state passed the Flood Control Act, and construction of the Yolo Bypass began. In 1917, the Sacramento Flood Control Project, a federal flood control act was also passed. Philip Garone commented in *The Fall and Rise of the Wetlands of California's Great Central Valley* (2010, p. 93), "While offering flood protection for the Sacramento Valley, the combination of the new state and federal flood control acts also guaranteed the destruction of the valley's vast tule basins, the ancestral winter home for millions of migratory waterfowl." Of the five natural basins, the Butte Basin was the only one that didn't ultimately have levees, and to this day it supports the largest concentration of wintering waterfowl along the entire Pacific Flyway.

In *The Game Birds of California,* Grinnell et al. (1918) acknowledged that reclamation had a profound effect on the decline of waterfowl and game, but their greatest condemnation was for the market hunters, who made a resurgence during the Great Depression that lasted until the 1950s, when state and federal agencies finally were able to shut it down for good Hickman and Morrill 2015).

The rise of duck clubs and wildlife refuges in the first half of the 20th century gave some protection to waterfowl. The early refuges were established primarily to lure birds away from the rice crops that had become big business starting around 1912, as well as to provide them with good wintering habitat. In the 1930s, Ducks Unlimited was formed in the U.S. to provide funds to Canada for waterfowl habitat protection in their breeding grounds. In 1931, Gray Lodge became the first state refuge in the Sacramento Valley and for 20 years was strictly a sanctuary for waterfowl.

The Central Valley Project was authorized by President Franklin Roosevelt in 1935. As a federal reclamation project, dams and canals were built to move water throughout the Central Valley. The vast wetlands, and thus the wintering waterfowl habitat and populations, were further reduced by the altered hydrology and increased acreage under cultivation.

The flooding patterns of the Yolo Basin were altered significantly by the construction of dams and reservoirs for the Central Valley Project. By the mid-20th century the basin became the most important flood control feature of the Yolo Bypass, a 59,000-acre floodplain, some 40 miles long, which allows the floodwaters of the Sacramento River to bypass the city of Sacramento.

The Yolo Bypass, which extends south from the Fremont Weir, floods on average once every three years and can move five times the amount of water that the river can—500,000 acre feet per second versus 100,000 in the river. The bulk of the floodwater comes from the Sacramento River over the Fremont Weir above Woodland, but depending on the conditions, there can be significant amounts of water from Cache Creek, Willow Slough, and Putah Creek on the west side and from the Sacramento Weir on the east.

QUIET YEARS IN THE BYPASS

The Wildlife Conservation Board was established in 1947, which provided a funding mechanism for a large increase in the number of state refuges. The returning World War II veterans couldn't afford private duck clubs and pressured the state to provide hunting areas open to the public (Cloyd 2001). Waterfowl Management Areas, such as Gray Lodge, became "Wildlife Areas" that provided for greater recreational use, including more extensive hunting programs.

Meanwhile, the middle years of the 20th century were a relatively uneventful period in the history of the Yolo Basin. The levees had been built, and the floodwaters moved through quickly every few years. The Basin consisted mainly of agriculture--farming and grazing--and duck clubs, which maintained some habitat for waterfowl.

In the winter months, especially when the Bypass flooded, the birds were abundant. The first Audubon Christmas count on record for the Sacramento count circle, which includes a part of the Bypass, was completed in 1949 by the Sacramento Audubon Society and has continued ever since.

CHANGE IN THE YOLO BASIN

The official opening of the Yolo Bypass Wildlife Area took place in 1997, but the plans were in the making for some ten years before that. Ted Beedy covered the Yolo Basin on many Audubon Christmas counts. He and fellow birders, including Terry Colborn and Andy Engilis, knew that the area was a significant place for birds when flooded. A year-round managed wetland became the dream. Beedy and Steve Chainey, at the time both ecologists at the environmental consulting firm Jones and Stokes Associates, drew a conceptual map and later developed a plan for a refuge and began talking to people about it. Robin Kulakow, one of the founders of the Putah Creek Council joined the core group with an idea of forming a non-profit to support the proposal. This group was to become the Yolo Basin Foundation.

Meanwhile Ted Beedy took U.S. Congressman Vic Fazio out to look at the proposed site, and Fazio liked what he saw. The plan gained momentum with support from the Yolo County Board of Supervisors, the US Fish and Wildlife Service, and California Waterfowl Association. Supervisor Betsy Marchand, initially opposed to the concept, became a strong proponent, and it was she who first approached State Assemblyman Tom Hannigan to work on a purchase by the state.

In 1991, the State Wildlife Conservation Board approved $4.75 million for the purchase of 3,100 acres, but, before the Board could move, developers bought the property.

Vic Fazio remained involved, and spearheaded the effort to convince the U.S. Army Corps of Engineers to implement one of its early restoration projects. This was possible because the Yolo Bypass levees had been built by the Corps. In May 1991, the U.S. House of Representative approved $1.6 million in the Corps' budget for the Yolo Basin Wetlands Project.

By the end of 1991, the developers who had bought the Yolo Basin property sold it to the Wildlife Conservation Board, and the California Department of Fish and Wildlife (CDFW; then called *Department of Fish and Game*) released a draft management plan for the Wildlife Area.

In 1993, The Central Valley Habitat Joint Venture funded "*A Suitability Analysis for Enhancing Wildlife Habitat in the Yolo Basin*" (Jones and Stokes Associates 1993), prepared by Steve Chainey, Marcus (Pete) Rawlings, and Ted Beedy, among others. This study provided a comprehensive resource inventory of the property. The Yolo Basin Action Plan Working Group began monthly meetings to discuss solutions related to vegetation maintenance within flood control guidelines, endangered species habitat management, and mosquito control.

IF YOU BUILD IT, THEY WILL COME

Several years of meetings by local, state, and federal organizations ensued. In August of 1995, Secretary of the Interior Bruce Babbitt was the keynote speaker at the groundbreaking ceremony. The Corps of Engineers gave the go-ahead, and Ducks Unlimited completed the first phase of wetlands restoration in November. In December, during the Sacramento Audubon Christmas count, the first Northern Pintails (*Anas acuta*) were observed using the newly constructed ponds in the Yolo Basin Wetlands, which was renamed the Vic Fazio Yolo Wildlife Area to honor the congressman who had helped make it happen.

On a rainy day in November 1997, President Clinton spoke at the celebration held at the Wildlife Area to mark the completion of the Yolo Basin Wetlands Project by the Corps of Engineers and its transfer to the California Department of Fish and Game. At that time, the name officially became the Yolo Bypass Wildlife Area (California Department of Fish and Game 2008), although many people still call it the Vic Fazio Yolo Wildlife Area, and Congressman Fazio continues to be a strong supporter.

CREATIVE MANAGEMENT

In October 1998, Dave Feliz was hired as the Manager of the Yolo Bypass Wildlife Area, a position he held for nearly 12 years. An avid birder, reptile and amphibian enthusiast, and nature photographer, Dave brought a unique perspective to the newly created Wildlife Area. A supporter of the CDFW's hunting mission, Feliz was also interested in doing more for non-game wildlife and the non-hunting public than traditionally seen at state wildlife areas.

He was well aware that the primary role of the Yolo Bypass was to move flood waters, and he quickly realized the importance of water management in driving design. The auto tour loop was redesigned under Feliz's direction to make bird viewing better for the public, while still remaining attractive for migratory birds, as well as allowing the flood waters to pass through unimpeded. As part of the restoration of the new lands, existing wetlands were reworked. This effort included the creating many loafing islands, which also increased wildlife viewing opportunities on the auto tour route.

In 1999, Feliz and Robin Kulakow, then the Executive Director of the Yolo Basin Foundation, began the Yolo Working Group. The group represented a diverse cross-section of Bypass interests, including landowners, farmers, duck club representatives, government agencies, vector control, and conservation organizations. The Working Group has provided a forum to settle many potentially contentious issues over the years, and it still meets when there are concerns to discuss.

In 2001, facilitated by The Nature Conservancy, the opportunity arose for the Wildlife Conservation Board to purchase an astounding 12,000 additional acres for the Wildlife Area, and by 2002 Feliz was in charge of over 16,000 acres, instead of 3,700. The state paid $16 million for the additional 12,000 acres in 2001. Half that purchase price could be used as a match for North America Wetlands Conservation Act funds, which were then used to restore wetlands on these new lands. As a result Ducks Unlimited and California Waterfowl Association each received $4 million to implement restoration projects at the Wildlife Area.

The acquisition of the Glide Ranch and Los Rios properties brought new habitat types to the Wildlife Area. The riparian forests along Putah Creek and vernal pools of the native prairie were spectacular additions to the Wildlife Area landscape. Unfortunately the expanded acreage did not come with any more funds to operate the greatly enlarged property.

Local farmers were interested in keeping some agriculture active on these newly acquired lands. Additionally, land managers had long observed the importance of agricultural lands to wildlife in the Central Valley. It became clear that agriculture would play an important long-term role in the management of the Wildlife Area.

Feliz worked with John Currey of the Dixon Resource Conservation District (RCD) to develop a plan to continue farming and ranching on some of the Wildlife Area. This would provide funding from agricultural leases for infrastructure improvements, and the RCD would handle the leases and the funds generated by these leases. As a result of this unique arrangement, the Wildlife Area eventually has earned about $500,000 annually from the farming and grazing leases, and the money was invested directly back into the property. Transportation and irrigation infrastructure was improved

throughout the Wildlife Area, which has increased public access and made the management of additional wetlands possible. That innovative program, however, was stopped by the state in 2013 and replaced with another system that has allowed the agricultural activities to continue.

The farmers and ranchers who have leases at the Wildlife Area know that managing for the benefit of wildlife is part of the package, and this is well illustrated by Jack DeWit, whose family farms some 1,800 acres of rice, most of it wild rice. He and Feliz began a then very innovative program to attract shorebirds. Every year DeWit fallows around 200 acres of his rice fields and then floods them a few inches deep for the shorebirds in the summer months, usually 100 acres in July and 100 in August. The birding community has been very pleased with the results of this program.

When Dave Feliz left the Wildlife Area in June 2011, over 6,000 acres had been restored to wetlands.

NEW LEADERSHIP

The Wildlife Area was without a manager for nine months, until Jeff Stoddard arrived in March 2012. Stoddard had been the coordinator of Fish and Wildlife's California Landowner Incentive Program, and before that he was the manager of the Orange County Ecological Reserve.

Stoddard admires the work in growing the Wildlife Area from 3,700 acres to 16, 800, but he feels strongly that with CDFW's limited budget, his job is to organize and consolidate the existing recourses, not expand them. He says, "I think in five year blocks of time. You've got to, with such a large, complex property." His goal is to "reset" the seasonal and permanent wetlands every three to five years. By that he means that Fish and Wildlife employees drain a given pond, then go in with an excavator to remove overgrown vegetation, disc it, and, finally, add water. Jeff wants to redo 20-30% of the ponds each year, thus the five-year time horizon to rotate through all of them (Brice 2012).

Jeff also has begun a policy of staggering the fall flood-up. Some water is put on early for the hunting season, but most is held back until November-December to provide fresh food sources for the bulk of the waterfowl arriving from the north. This later flooding also helps with mosquito control.

Stoddard has held two meetings with representatives of the Yolo and Sacramento chapters of the Audubon Society in the last year and plans to continue them in the future. He explained his management plans and listened to suggestions from the birding community at the meetings. One of the important outcomes was that the Wildlife Area now has a new exit road for hunters. This has relieved tensions between the birders and the hunters by decreasing the overlap of the two groups.

Table 1. Listed Threatened and Endangered bird species and California Bird Species of Special Concern that occur regularly at the Yolo Bypass Wildlife Area. (Information sources: Shuford and Gardali (2008), eBird, and S. Hampton, E. Whisler, M. Perrone, C. Conard, and D. Airola, personal communications.)

Species[1]	Legal Status[2]	Status at Yolo Bypass Wildlife Area
Redhead (*Aythya americana*)	CSSC-P3	Irregular year round; rare local breeder.
American White Pelican (*Pelecanus erythrorhynchos*)	CSSC-P1	Common, non-breeding year-round resident
Least Bittern (*Ixobrychus exilis*)	CSSC-P2	Apparently rare regular breeder, with records in summers 2009-2013, and young seen in some of these years. Difficult to detect due to secretive behavior.
Northern Harrier (*Circus cyaneus*)	CSSC-P3	Common year-round, but more abundant in fall-spring. Presumably, small numbers breed annually
Greater Sandhill Crane (*Grus canadensis tabida*)	ST	Irregular, but present through fall to spring
Lesser Sandhill Crane (*G. c. canadensis*)	CSSC-P3	Irregular, but present through fall to spring
Snowy Plover (*Charadrius alexandrines*, inland population)	CSSC-P3	Rare but regular spring and fall migrant; has nested on two occasions
Black Tern (*Chlidonias niger*)	CSSC-P2	Rare spring and fall migrant. Several mid-summer records
Burrowing Owl (*Athene cunicularia*)	CSSC-P2	Uncommon spring and fall migrant; nests locally within Wildlife Area

Table 1 continued.

Species[1]	Legal Status[2]	Status at Yolo Bypass Wildlife Area
Short-eared Owl (*Otis flammeus*)	CSSC-P3	Irregular migratory and wintering resident.
Loggerhead Shrike (*Lanius ludovidianus*)	CSSC-P2	Uncommon year-round. Presumed breeding species
Least Bell's Vireo (*Vireo belli pusillus)*	FE	1-3 singing males occupied Putah Creek Sink area during 2010, 2011, and 2013, but no nesting observed.
Purple Martin (*Progne subis*)	CSSC-P2	Irregular migrant. Attempts to attract breeders to nest boxes since 2008 have been unsuccessful
Yellow Warbler *(Setaphaga petechia*)	CSSC-P2	Regular spring and fall migrant. No nesting records
Oregon Vesper Sparrow (*Pooecetes gramineus affinis*)	CSSC-P2	Rare fall migrant
Bryant's Savannah Sparrow (*Passerculus sandwichensis alaudinus*)	CSSC-P3	Breeds locally but apparently regularly.
Grasshopper Sparrow (*Ammodramus savannarum*)	CSSC-P2	Rare regular breeder.
Song Sparrow (Modesto population) (*Melospiza melodia*)	CSSC-P3	Common breeding and wintering taxa
Tricolored Blackbird (*Agelaius tricolor*)	CSSC-P1	Uncommon winter resident; irregularly nests locally.
Yellow-headed Blackbird (*Xanthocephalus xanthocephalus*)	CSSC-P3	Common spring migrant. Uncommon summer breeder and winter resident.

[1]Status designations are: FE–Federally Endangered ST–State Threatened CSSC–CA Species of Special Concern P1, 2, 3–Priority 1, 2, 3
[2]The following species were not included because their occurrence is highly limited and irregular: Tule White-fronted goose (*Anser albifrons elgasi*), Bald Eagle (*Haliaeetus leucodpehalus*), and Yellow-breasted Chat (*Icteria virens*).

SIGNIFICANCE OF THE WILDLIFE AREA TO BIRDS

In 1998, Joan Humphrey and Don Stoebel wrote the article "*Yolo Bypass Wildlife Area: A Birding Hotspot in the Making*" for the CVBC Bulletin (Humphrey and Stoebel 1998) and said it was just waiting to be discovered by birders. They pointed out that the area had already been designated as "Globally Important" in the American Bird Conservancy's United States Important Bird Areas Program. In 2004, Audubon California (2004) included the Yolo Bypass, and specifically the Wildlife Area, in its publication "*Important Bird Areas of California*".

As time passes, more and more people are coming to the Yolo Bypass Wildlife Area to look for birds, and they find them. For example, birders have submitted nearly 2,500 checklists from the Yolo Bypass (as of 30 April 2015) to eBird, the global electronic bird record database. Two hundred forty-three species have been recorded from the Bypass in eBird (http://ebird.org/ebird/hotspots).

Establishment and management of the Wildlife Area has contributed to changes in bird species occurrence and abundance in recent years (Perrone 2015). The availability of at least some wetlands all year and flooding after rice harvest has been a boon for the birds.

The Wildlife Area supports populations of sensitive bird species that are of local, regional, and statewide importance. Three bird species that are formally listed as federal or state Endangered or Threatened occur (Table 1). The Greater Sandhill Crane *(Grus canadensis tabida*) occurs regular in low numbers. Persistently singing male Least Bell's Vireos (*Vireo belli pusillus*) have occurred on the Wildlife Area in several recent years, but no breeding has been documented. Tricolored Blackbirds are common wintering birds on the Wildlife Area, but do not breed there. Eighteen species designated as California Species of Special Concern (Shuford and Gardali 2008) occur regularly in the area (Table 1). The Wildlife Area is contributing to maintaining populations of these species, which reduces the potential need for future listing.

Since its inception and provision of public access, the Yolo Bypass Wildlife Area also has attracted a large number of rare birds that often attract substantial attention from birders (Hampton 2015).

The Wildlife Area also supports a diverse array of other vertebrates, invertebrates, and plants associated with wetlands, rice fields, and grassland, including the state-listed giant garter snake (*Thamnophis gigas*).

THE ROLE OF THE YOLO BASIN FOUNDATION

No history of the Yolo Bypass Wildlife Area is complete without presenting the role of the Yolo Basin Foundation. Founded in 1990, the non-

profit Foundation was a driving force behind the establishment of the Wildlife Area. It is dedicated to the appreciation and stewardship of wetlands and wildlife through education and innovative partnerships. It carries out this mission with a 20-member board of directors, a small staff, and over 100 volunteers. The organization's work is funded by grants and private donations. Its signature education program is "Discover the Flyway," which hosts over 4,000 school children a year at the Wildlife Area and strives to develop future environmental stewards. The Foundation also sponsors a variety of outreach events for people of all ages, including monthly tours to the wetlands, a speaker series, a summer bat program, California Duck Days, and other special tours and activities. In addition, Yolo Basin Foundation serves as an advocate for issues involving the Wildlife Area and plays a significant role in policy discussions relating to the larger Yolo Bypass and the Wildlife Area's place within it.

Yolo Basin Foundation communicates with the public via a monthly e-newsletter, a printed newsletter for members, a Facebook page, and a website (www.yolobasin.org), which has up-to-date information on Wildlife Area activities, such as road closures, rare bird sightings, and tours.

MOVING FORWARD–THE IMPORTANCE OF PARTNERSHIPS

The history of the Yolo Bypass Wildlife Area is a story of vision and collaboration. The initial vision was realized, and in fact greatly exceeded, through dedication and cooperation of a diverse group of local individuals and organizations as well as large, federal and state entities including the US Army Corps of Engineers and California Department of Fish and Wildlife. The existence of the Yolo Basin Foundation, as the nonprofit partner for 25 years, has been a unique relationship in the world of wildlife refuges. Guidance from the Central Valley Joint Venture, as well as California Waterfowl Association and Ducks Unlimited has helped set the management course. The unprecedented partnership with the Dixon Resource Conservation District in managing the farm leases, and the ongoing relationships with the local farmers and ranchers have benefited the Wildlife Area in many ways. Finally, the growing communication between local conservation and birding groups and Wildlife Area managers will help steer the direction in the future. The Yolo Bypass Wildlife Area would not be what it is today without the countless partners standing with it.

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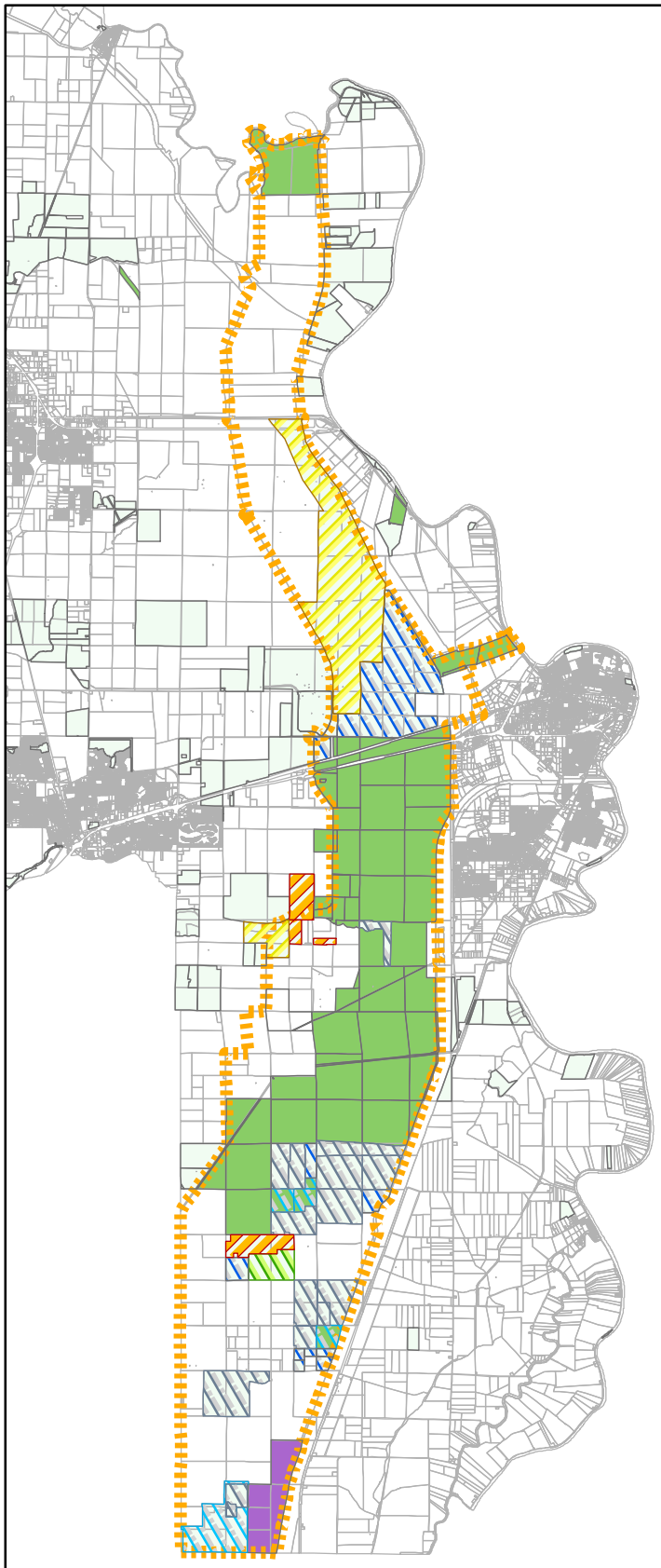
Tundra Swans and the Sacramento Skyline. Yolo Bypass Wildlife Area, Yolo County, California. *Photo ©* Dave Feliz



Umbrella barn & Goldfields. Yolo Bypass Wildlife Area, Yolo County, California.

Exhibit B

Existing Protected Lands in the Yolo Bypass



Legend

- Yolo Bypass
- Easements and Agency Fee Title Properties Outside of the Yolo Bypass
- Parcels

Existing Conservation Easements

- Wetlands (NRCS-WRP) (~4,300 acres)
- Wetlands (USFWS Sac River National Wildlife Refuge) (~3,190 acres)
- Wetlands (other) (~1,310 acres)
- Giant Garter Snake (391.31 acres)
- Swainson's hawk (~485 acres)*
- Agriculture (~4,245 acres)*

Agency Fee Title Properties

- Bureau of Reclamation (~1,087 acres)*
- California Department of Fish and Wildlife (~17,440 acres)*

N

0 0.75 1.5 3 4.5 6 Miles

* Total acres are approximate based on GIS evaluation and are not actual property surveys

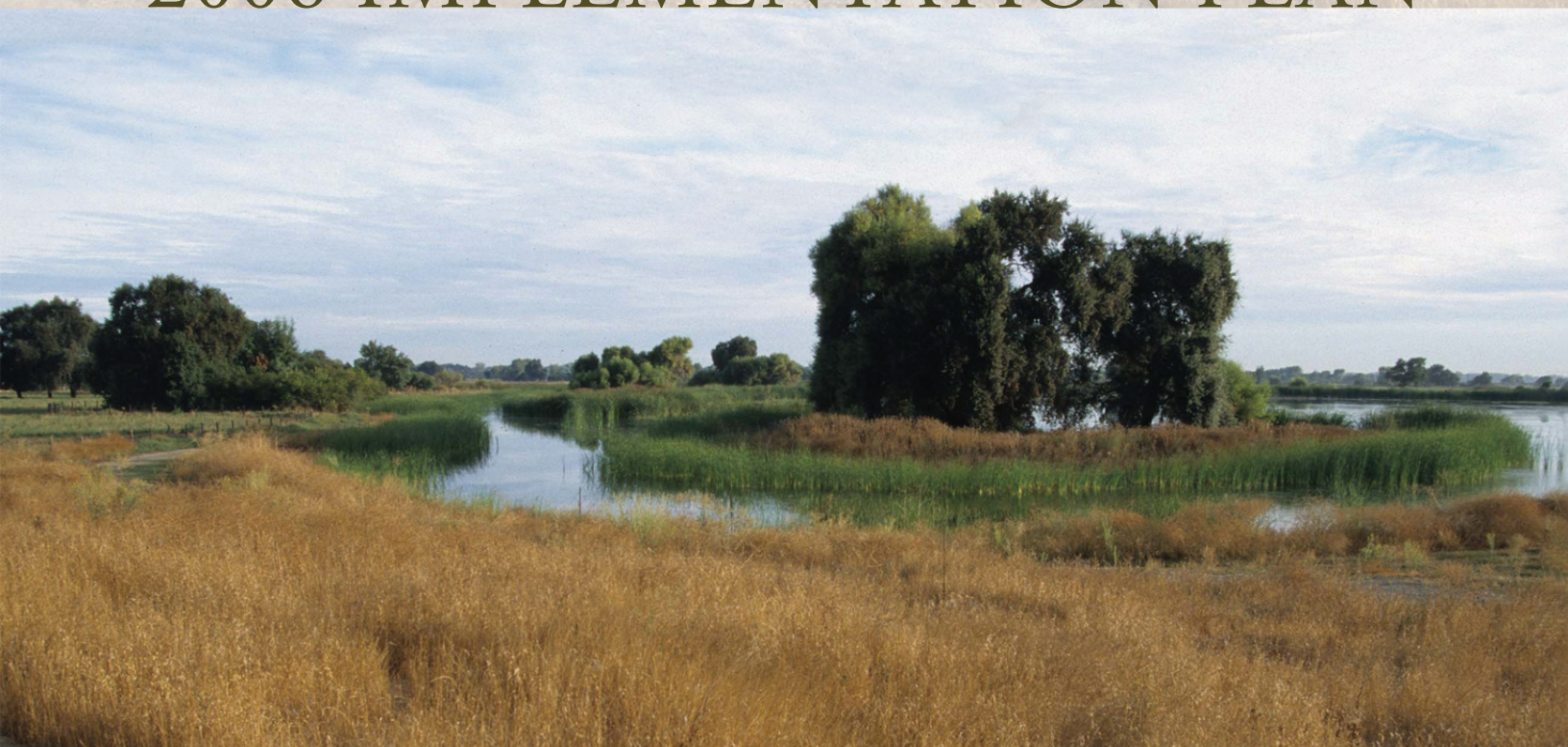
Exhibit C



CENTRAL VALLEY JOINT VENTURE

CONSERVING BIRD HABITAT

2006 IMPLEMENTATION PLAN





2006 IMPLEMENTATION PLAN

When referring to this document, please use the following:
Central Valley Joint Venture, 2006.
Central Valley Joint Venture Implementation Plan – Conserving Bird Habitat.
U.S. Fish and Wildlife Service, Sacramento, CA.
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Bob Shaffer
Coordinator
Central Valley Joint Venture

Plan Contributors:

Organizations

Audubon California – Julia Levin, Glenn Olson, Vance Russell, Dan Taylor

California Association of Resource Conservation Districts – Tacy Currey

California Rice Commission – Paul Buttner

California Waterfowl Association – Ed Burns, Rob Capriola, Bill Gaines, Mark Hennelly, Dan Loughman, Bob McLandress, Jake Messerli, Dennis Orthmeyer, Jason Rhine, Chadd Santerre, Greg Yarris

Colusa Basin Drainage District – Anjanette Martin

Conaway Conservancy – Mike Hall

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Delta Protection Commission – Margit Aramburu

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California Department of Fish and Game – John Anderson, Andy Atkinson, John Beam, Ryan Broddrick, Brad Burkholder, Bill Cook, Dave Feliz, Paul Forsberg, Steve Juarez, Dean Kwasny, Bill Loudermilk, Carol Oz, Ed Penny, Glenn Rollins, Jeff Single, Dave Smith, Carl Wilcox, Dan Yparraguirre, Dave Zezulak

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Environmental Protection Agency – Carolyn Yale

Fish and Wildlife Service – Brad Bortner, Lorna Daskalu, Steve Dyer, John Engbring, Kim Forrest, Scott Frazer, Dale Garrison, Michael Green, Matt Hamman, Dave Hardt, Tom Harvey, Craig Isola, Rob Holbrook, Tom McCabe, Ken McDermond, Greg Mensik, Shawn Milar, Maura Naughton, Ruth Ostroff, Dave Paullin, Mark Pelz, Loren Rupport, Bob Shaffer, Debra Schlafmann, Mike Wolder, Dennis Woolington, Bea Treiterer, Tara Zimmerman

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Central Valley Bird Club – John Sterling

Ghostwriters – Jean Duncan

Greenfield Management Strategies – Bob Greenfield

Hedgerow Farms – John Anderson

Joel Miller Environmental Consulting – Joel Miller

North American Waterfowl Management Plan Committee – Eldridge "Red" Hunt

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PARTNERS

The mission of the Central Valley Joint Venture is to work collaboratively through diverse partnerships to protect, restore, and enhance wetlands and associated habitats for waterfowl, shorebirds, waterbirds, and riparian songbirds, in accordance with conservation actions identified in the Joint Venture's Implementation Plan.











CENTRAL VALLEY JOINT VENTURE TENETS

The Central Valley Joint Venture (CVJV) Management Board is comprised of representatives from the agencies and organizations that form the joint venture partnership. Their purpose is to provide overall leadership, guidance, resources and support for bird habitat conservation within the CVJV administrative boundary. Each member is responsible for ensuring that their agency or organization contributes to the overall goals of the CVJV.

The following provides a general framework for accomplishing the CVJV mission. The CVJV focuses on waterfowl, but integrates the needs of other bird groups, as outlined in its Implementation Plan. The focus will broaden, subject to future funding opportunities, to implement bird conservation strategies consistent with the CVJV mission statement.

Land Use Principles:

The CVJV will accomplish its habitat goals by means of land protection, restoration, and enhancement. Terms are defined as follows:

- Protection – the removal of a threat to land via fee title acquisition, perpetual conservation easement or perpetual agricultural easement from willing sellers. This action does not result in a gain in habitat acreage. Unprotected is defined as any privately owned land not covered by perpetual easement.
- Restoration – the physical manipulation of a former wetland or upland site with the goal of mimicking natural/historic functions. Only restoration under long-term protection will be counted as acreage gained.
- Enhancement – the physical manipulation of a wetland or upland site to repair or improve natural/historic functions or to manipulate successional stages of vegetation for the benefit of wildlife. Any manipulations for wildlife habitat improvements on lands protected less than perpetually will be counted as enhancement. This action does not result in a habitat acreage gain.
- The CVJV strongly encourages the assurance of adequate long-term water supplies with all wetland protection, restoration, and enhancement projects.
- The CVJV encourages land conservation through fee title acquisition or perpetual conservation easements. The CVJV will also support non-perpetual conservation programs. However, they will not count towards the JV's protection objectives.
- Habitat objective accomplishments do not transfer from one basin to another.
- The CVJV encourages non-regulatory actions prior to mitigation whenever possible.
- The CVJV seeks at least 50% of the energetic requirement for waterfowl from wetlands in each basin.

Biological Principles:

- The basis of the CVJV biological principles is to provide habitat for six bird groups, as addressed in the Implementation Plan. These bird groups include the following: breeding and non-breeding waterfowl, breeding and non-breeding shorebirds, riparian dependent songbirds, and waterbirds.
- The CVJV Implementation Plan objectives will not be implemented at the expense of other native/sensitive habitats such as vernal pools, remnant native grasslands, etc.

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Northern pintails
Photo: Bob McLandress, CWA

Central Valley Joint Venture 2006 Implementation Plan EXECUTIVE SUMMARY

Plan Background

The 2006 *Central Valley Joint Venture Implementation Plan* (2006 Plan) allows the Central Valley Joint Venture (JV) and its individual partners to examine the habitat needs of various bird groups in the nine basins within the Central Valley, and to formulate and prioritize activities to meet those needs. The 2006 Plan updates the 1990 *Central Valley Habitat Joint Venture Implementation Plan* (1990 Plan; USFWS 1990), the original guiding document for wetland habitat conservation in the Central Valley of California. The 2006 Plan will direct the efforts of the JV for the next five years.

The 2006 Plan brings together research, monitoring data and evaluation from many sources, and represents the combined expertise of a wide range of professionals from conservation organizations, State and Federal agencies, and the private sector. Their knowledge and experience comprise the foundation for this plan.

Historical and Current Conditions of the Central Valley

The Central Valley stretches 450 miles down the center of California. It totals approximately 10 million acres, or 10% of the state, and includes portions of 19 counties. The Valley provides some of the most important bird habitat in North America, hosting one of the largest concentrations of migratory birds in the world during the fall and winter.

In the 1800s, the Central Valley contained more than 4 million acres of wetland habitats, supporting an estimated 20 to 40 million waterfowl annually. Grassland and riparian habitats once bordered most of these wetlands. Since then, agricultural and urban development have destroyed or modified more than 95% of the historic wetlands and over 90% of all riparian habitats. Today, just over 205,000 acres of managed wetlands remain in the Central Valley, and of those, two thirds are in private ownership.

The 2006 Plan brings together research, monitoring data and evaluation from many sources, and represents the combined expertise of a wide range of professionals from conservation organizations, State and Federal agencies, and the private sector.

Origins of the Central Valley Joint Venture

In 1986, United States and Canadian wildlife agencies developed the North American Waterfowl Management Plan (NAWMP). The NAWMP recognized that wide-ranging degradations to wetlands and associated uplands across the continent required a comprehensive response to improve landscapes using public policies, wildlife friendly agriculture, and traditional habitat restoration programs. The purpose of the plan was, and remains, to sustain abundant waterfowl populations by conserving landscapes, through self-directed partnerships (joint ventures) guided by sound science.

The Central Valley Habitat Joint Venture was formally organized in 1988 and was one of the original six priority joint ventures formed under the NAWMP. Renamed the Central Valley Joint Venture in 2004, the Management Board has expanded from nine to twenty conservation organizations, and State and Federal agencies. With this growth, the JV has broadened its focus from exclusively waterfowl to include the conservation of habitats for other birds, consistent with major national and international bird conservation plans, and the North American Bird Conservation Initiative.

Organization and Content

The 2006 Plan incorporates new information and broadens the scope of conservation activities to include objectives for breeding waterfowl, breeding and non-breeding shorebirds, waterbirds, and riparian-dependent songbirds. It has identified specific goals and objectives for these species, stepped down to each of the Valley's nine basins. The 2006 Plan relies on both quantitative and qualitative approaches for establishing bird-group conservation objectives, and considers both biological and non-biological factors.

Chapter 1 explains the origin and purposes of the JV, the background for this updated implementation plan, and the historical and current conditions of the Central Valley.

Chapter 2 identifies the conservation objectives provided in the 1990 Plan, and summarizes accomplishments both Valley-wide and by basin for each objective. It also describes challenges faced in meeting certain objectives.

Chapter 3 provides a description of significant basin characteristics within the JV. The Central Valley is divided into nine basins that reflect regional differences in drainage patterns, and these serve as conservation planning units in the 2006 Plan for most bird groups.

Chapter 4 identifies the conservation objectives for wintering waterfowl, defined as non-breeding migrating or wintering ducks, geese, and swans using the Central Valley between August and March.

Chapter 5 discusses the habitat needs and corresponding limiting factors associated with the conservation of breeding waterfowl for basins in the Central Valley.

Chapter 6 addresses the needs of wintering shorebirds, defined as non-breeding shorebirds that occupy the Central Valley between July and May, each year.

Chapter 7 addresses the needs of seven species of shorebirds that breed within the Central Valley.

Chapter 8 addresses conservation needs within the Central Valley for waterbirds, a large and diverse group that includes seabirds, coastal waterbirds, wading birds and marshbirds that rely on aquatic habitats.

Chapter 9 addresses the conservation needs and strategies associated with breeding riparian songbirds in the Central Valley and is based on a suite of focal bird species that breed primarily in riparian habitat.

Chapter 10 outlines the need for water supplies for Central Valley wetlands and alternatives for obtaining needed water supplies to meet the 2006 Plan objectives. It summarizes the history of wetland water supplies and includes a topical summary of the most current and pressing water related issues within each basin.

Chapter 11 collates conservation objectives by habitat, and by basin or regional planning unit, for all bird groups addressed in this Plan. Table 11-1 lists these objectives by habitat type as follows:

Table S-1. Central Valley-wide conservation objectives and strategies combined across all bird groups for all basins.

Central Valley wide objectives by habitat type		
Habitat type	*Strategy*	*Objective*
Seasonal wetlands	Protection	Protect all unprotected wetlands with fee or conservation easements
Seasonal wetlands	Restoration	108,527 acres
Seasonal wetlands	Enhancement	23,884 acres annually[a]
Semi-permanent wetlands	Restoration	12,500 acres
Riparian areas	Restoration	10,000 acres
Rice cropland	Enhancement[b]	170,000 acres
Agricultural cropland	Protection using Type I[c] and Type II[d] Agricultural Easements	Recommended for specific basins[c,d]
Agricultural cropland	Enhancement to benefit waterfowl	307,000 acres

[a]*Annual enhancement needs when restoration goals have been met.*
[b]*Post-harvest (winter flooding) of rice cropland.*
[c]*Type I agricultural easements: easements that protect waterfowl food sources, focused in the American, Butte, and Sutter Basins.*
[d]*Type II agricultural easements: easements that buffer existing wetlands from urban and residential development, focused in the American, Butte, Sutter, Delta, and San Joaquin Basins.*

The JV has made considerable progress toward achieving the goals of its 1990 Plan. This success has been due to the efforts of many partners and a wide range of habitat programs. In addition, JV partners have invested in research to evaluate biological assumptions on which the 1990 Plan was based. This investment has considerably strengthened the biological foundation of the 2006 Plan.

The JV's efforts to protect, restore and enhance wetlands have significantly increased wildlife habitat resources in the Central Valley, not only for waterfowl, but for numerous other wetland dependent species as well. These benefits have also included improved water quality, flood control, and increased recreational opportunities. Using a collaborative, non-regulatory approach, and guided by the 2006 Plan, the JV will work together to insure that those benefits continue to expand for wildlife and the general public.



Snow geese
Photo: Ducks Unlimited

Chapter One: INTRODUCTION

This chapter explains the origin and purposes of the Central Valley Joint Venture (JV), the background for this updated implementation plan, and the historical and current conditions of the Central Valley.

The mission of the Central Valley Joint Venture is to work collaboratively through diverse partnerships to protect, restore, and enhance wetlands and associated habitats for waterfowl, shorebirds, waterbirds, and riparian songbirds, in accordance with conservation actions identified in the Joint Venture's Implementation Plan.

Through these biologically based actions, the JV will advance in achieving its vision of providing a diversity of habitats necessary to sustain migratory bird populations in perpetuity for the benefit of those species, resident wildlife, and the public.

Origins of the Central Valley Joint Venture

The JV has its origins in the North American Waterfowl Management Plan (NAWMP), an international treaty signed on May 14, 1986 by the Canadian Minister of the Environment and the United States Secretary of the Interior. Mexico became a signatory to the plan during the 1994 NAWMP Update. The NAWMP was initiated in response to declining numbers of North American waterfowl. It established population goals for key waterfowl species, and identified a framework for recovering these populations through habitat enhancement, restoration and protection. Although the goals of the NAWMP were continental in scope, its success ultimately depended on regional efforts to increase waterfowl habitat. The joint venture concept of merging the efforts of government agencies, non-profit organizations, corporations, tribes, and individuals was ideally suited to the task of meeting waterfowl needs at regional scales. As a result, joint ventures were eventually formed in all of North America's key waterfowl areas to meet NAWMP goals.

Central Valley Joint Venture Partners

Audubon California

CA Association of Resource Conservation Districts

California Waterfowl Association

Defenders of Wildlife

Ducks Unlimited, Inc.

PRBO Conservation Science

River Partners

The Nature Conservancy

The Trust for Public Land

CA Dept. of Fish and Game

CA Dept. of Water Resources

CA Resources Agency

CA State Parks

CA Wildlife Conservation Board

U.S. Army Corps of Engineers

U.S. Bureau of Land Management

U.S. Bureau of Reclamation

U.S. Environmental Protection Agency

U.S. Fish and Wildlife Service

U.S. Natural Resources Conservation Service



Cache Creek Nature Preserve
Photo: Brian Gilmore

The Central Valley Habitat Joint Venture (CVHJV) was formally organized in 1988 and was one of the original six priority joint ventures formed under the NAWMP. California Waterfowl Association, Defenders of Wildlife, Ducks Unlimited Inc., National Audubon Society, The Nature Conservancy, Trust for Public Land, Waterfowl Habitat Owners Alliance, CA Department of Fish and Game, and U.S. Fish and Wildlife Service (USFWS) were the nine founding partners and comprised the CVHJV's first Management Board (Board). Renamed the Central Valley Joint Venture in 2004, the Board now enjoys the membership of twenty conservation organizations, state and federal agencies. The partners have combined their efforts to cooperatively meet the habitat needs of migrating and resident bird species in the Central Valley of California associated with four international bird conservation initiatives.

In 1990, the CVHJV partnership developed its first strategic plan to deliver partnership-based waterfowl habitat conservation, the *Central Valley Habitat Joint Venture Implementation Plan* (1990 Plan). This *2006 Central Valley Joint Venture Implementation Plan* (2006 Plan) incorporates new information and broadens the scope of conservation activities to include objectives for shorebirds, waterbirds, and riparian songbirds.

The USFWS provides guidance for the establishment and organization of migratory bird joint ventures: "A joint venture is a self-directed partnership of agencies, organizations, corporations, tribes, or individuals that has formally accepted the responsibility of implementing national or international bird conservation plans within a specific geographic area or for a specific taxonomic group, and has received general acceptance in the bird conservation community for such responsibility" (U.S. Fish and Wildlife Service 2005).

The JV is currently administered through a coordination office within the USFWS, and is guided by a Management Board that receives input and recommendations from a variety of working committees.

The Central Valley: Historical and Current Conditions

The Central Valley averages 40 miles wide and stretches 450 miles from north to south. It is bordered by the foothills of the Coast Range on its west and the Sierra Nevada on its east. The valley consists of two lesser valleys drained by California's two largest rivers, the Sacramento in the north and the San Joaquin in the south. These rivers flow from opposite directions and converge 40 miles southwest of Sacramento in a maze of channels, marshes and islands known as the Sacramento-San Joaquin Delta. These waters eventually reach the San Francisco Bay and empty into the Pacific Ocean.

The Central Valley totals about 10 million acres, or 10% of the State, and includes portions of 19 counties. Prior to the Gold Rush of the mid-1800s, the valley contained more than 4 million acres of wetland habitat. Most of these wetlands were bordered by grassland and riparian habitats. Many wetlands were seasonal in nature and resulted from over-bank flooding of rivers and streams that inundated large areas of the valley during winter and spring. Estimates from the 1800s suggest these habitats supported between 20 million and 40 million waterfowl annually. By the 1970s waterfowl numbers were estimated to be between 6 to 7 million, but declined significantly by the late 1980s (Heitmeyer 1989). Unfortunately, loss of these habitats has been dramatic. More than 95% of historic wetlands and 98% of all riparian habitats have been destroyed or modified. The remnant intensively managed wetlands and associated agricultural habitats now support an average of 5.5 million waterfowl annually. Few places on earth have greater concentrations of wintering waterfowl than the Central Valley.

Today, just over 205,000 acres of managed wetlands remain in the Central Valley (Figure 1-1), and of these, two thirds are in private ownership. The over-bank flooding that once characterized the valley is essentially gone. Dams, levees, and flood bypasses confine these historic flows to controlled pathways.

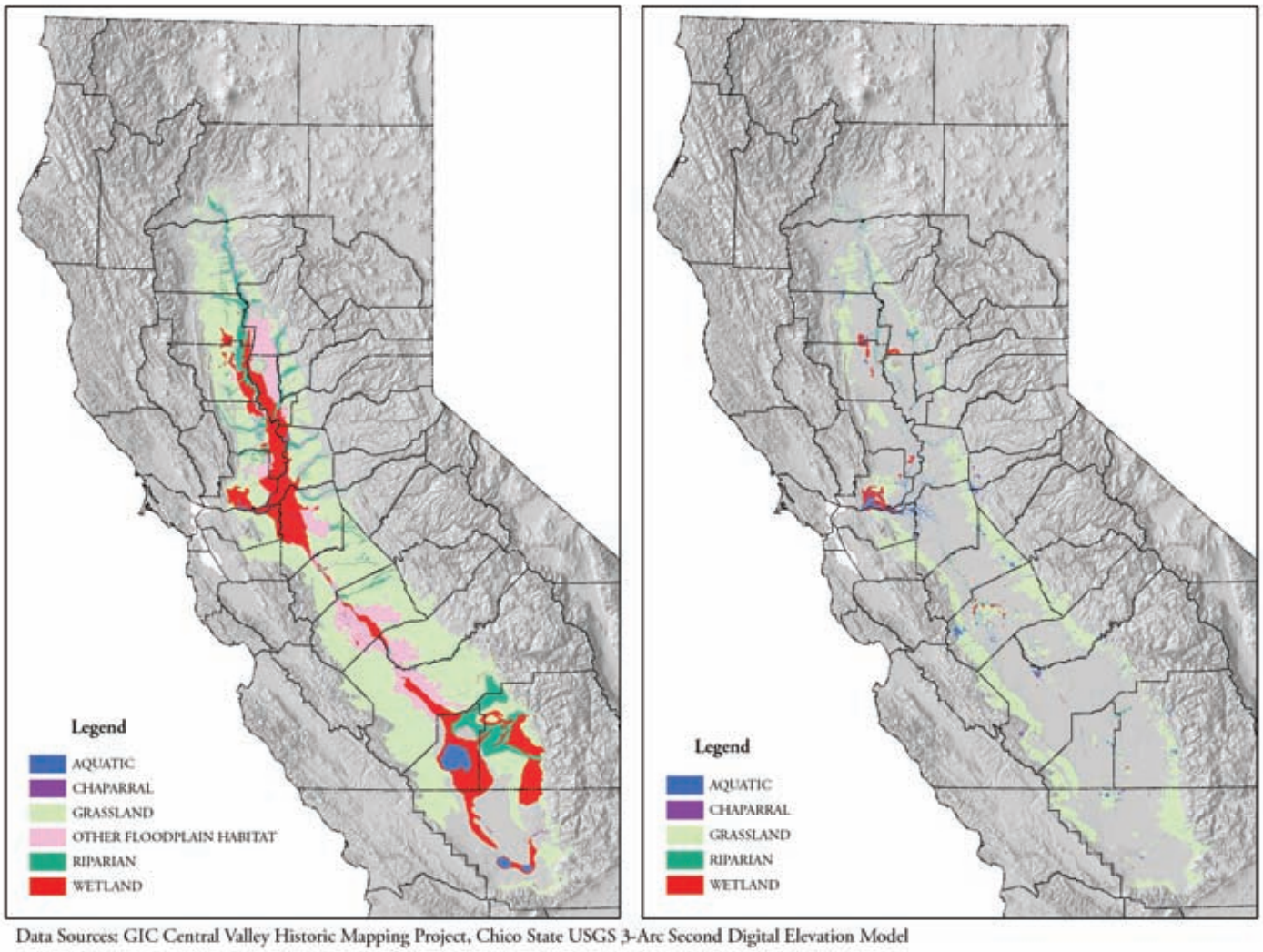


Figure 1-1. Changes in Central Valley wetlands and associated habitats from 1900 (left) to 1990 (right).

Threats to wildlife habitat in the Central Valley continue to grow. Most of the valley's wetlands now rely on the application of water through managed systems. The long term reliability and affordability of water supplies for these wetlands is uncertain, as other water users compete for this limited resource. Water shortages in California are expected to grow as urban demand for water increases. The likely result is that water supplies needed for wetland management will become increasingly expensive, or worse yet, unavailable. According to the California Department of Finance, there are currently more than 34 million people in the state. This number is projected to reach 59 million by 2040, with an increase in the Central Valley from 5.4 million to 15.6 million. California's Central Valley ranks number one among the nation's twenty most threatened farming regions (American Farmland Trust 1997). The state's projected population increase will be accompanied by a loss of nearly one million acres of irrigated farmland within the valley (American Farmland Trust 1995), some of which contributes to meeting the needs of waterfowl and other wetland dependent wildlife.


Snow geese, white-fronted geese, northern pintails
Photo: Bob McLandress, CWA

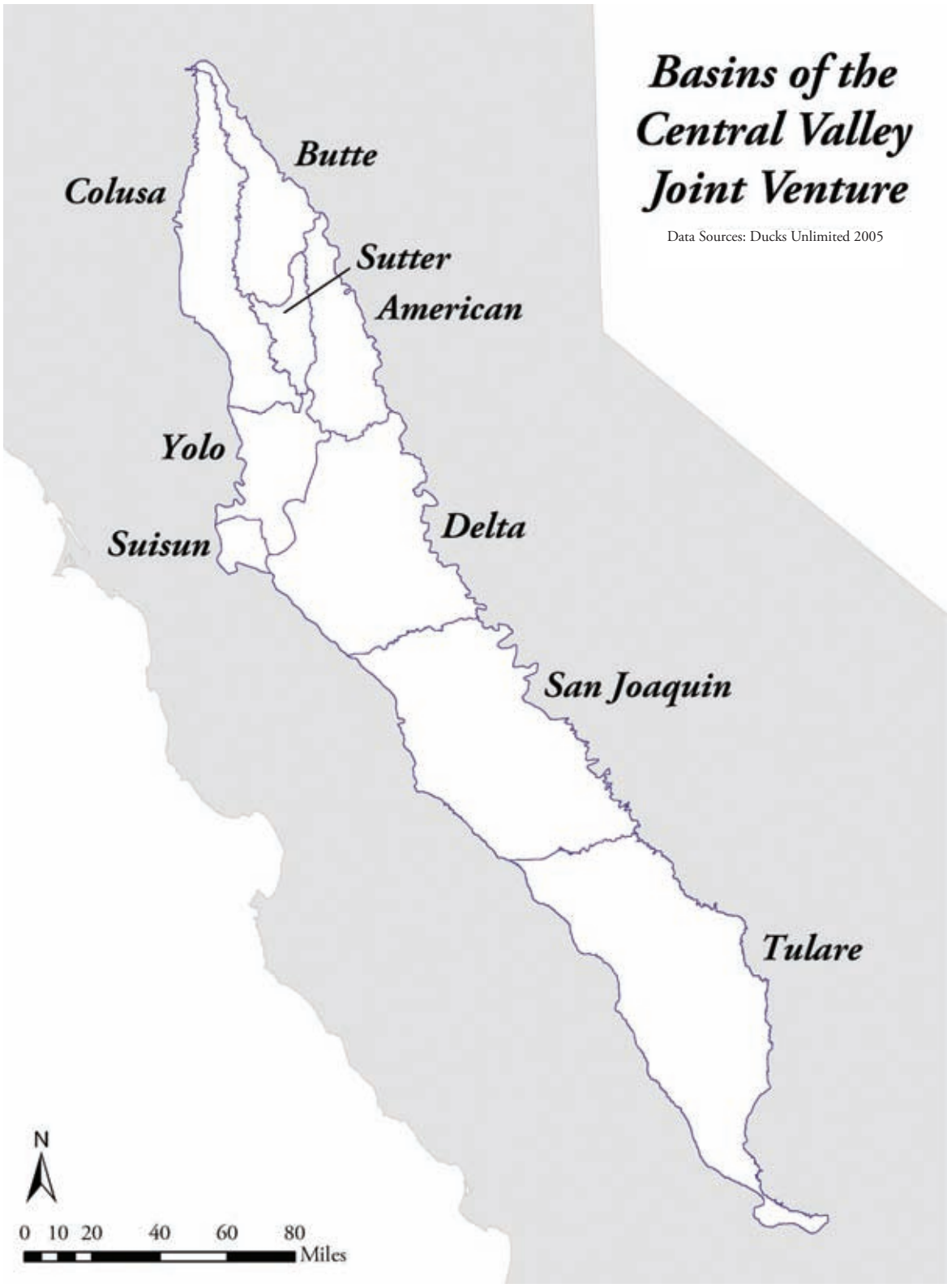


Figure 1-2. Central Valley Joint Venture basins.

Focus of the 1990 Plan

In 1990, the JV developed its first planning document, the *Central Valley Habitat Joint Venture Implementation Plan*. The 1990 Plan primarily focused on the needs of wintering waterfowl (herein defined as non-breeding waterfowl that rely on the Central Valley floor during August-March). Breeding waterfowl needs were also addressed, although to a lesser degree. Waterfowl population objectives were generally linked to the NAWMP. Six conservation objectives were established to meet the habitat needs of Central Valley waterfowl:

1. Protect 80,000 additional acres of existing wetlands through acquisition of fee-title or perpetual conservation easements.
2. Secure an incremental, firm 402,450 acre-foot water supply that is of suitable quality and is delivered in a timely manner for use by National Wildlife Refuges (NWR), State Wildlife Areas (WA), and the Grasslands Resource Conservation District (GRCD).
3. Secure Central Valley Project power for NWRs, WAs and GRCD, and other public and private lands dedicated to wetland management.
4. Increase wetland acres by 120,000 acres and protect these wetlands in perpetuity by acquisition of fee-title or conservation easement.
5. Enhance wetland habitats on 291,555 acres of public and private lands.
6. Enhance waterfowl habitat on 443,000 acres of agricultural lands.

Each of these objectives was based mainly on the foraging habitat needs of wintering waterfowl, and also on enhancement of upland cover for breeding waterfowl in the Central Valley. The objectives were then stepped down to the valley's nine basins, based on historic waterfowl distribution. These basins served as planning units in the 1990 Plan (Figure 1-2).

The JV has made considerable progress toward achieving the goals of its 1990 Plan, and these accomplishments are detailed in Chapter 2. During the past 15 years, Joint Venture partners have invested in research to evaluate biological assumptions on which the 1990 Plan was based. This investment has considerably strengthened the biological foundation of the 2006 Plan.

Focus of the 2006 Plan

As previously stated, the 1990 Plan focused mainly on the needs of wintering waterfowl. Although meeting waterfowl needs remains central to the JV's purpose, the 2006 Plan has been expanded to include multiple bird groups.

In 1999, the North American Bird Conservation Initiative (NABCI) was formed to advance integrated bird conservation by capitalizing on partnership opportunities, promoting all-bird planning, and developing nation-wide Bird Conservation Regions. Joint ventures offer an existing structure for achieving the NABCI vision of integrating the goals of the various bird conservation plans. The USFWS encourages joint ventures to develop the capacity to deliver partnership based migratory bird habitat conservation (U.S. Fish and Wildlife Service 2005), although to date this direction has not come with additional funding sources to accomplish the task. The JV has consequently expanded its planning efforts to include six bird groups. Information for some bird groups is lacking compared to migrating and wintering waterfowl. However, the 2006 Plan is a first step in developing sound conservation objectives for each of the following:

- Wintering Waterfowl
- Breeding Waterfowl
- Non-breeding Shorebirds
- Breeding Shorebirds
- Waterbirds
- Breeding Riparian Songbirds

As part of its expanded responsibility to provide habitat for shorebirds, waterbirds and riparian birds along with waterfowl, the JV has increased its boundaries to include most of the Central Valley watershed, and has identified secondary and tertiary areas of focus within this expanded area. (Figure 1-3). Although the 2006 Plan continues to focus on the nine basins identified in the 1990 Plan, future planning efforts by the JV will reflect habitat needs within the expanded boundaries.

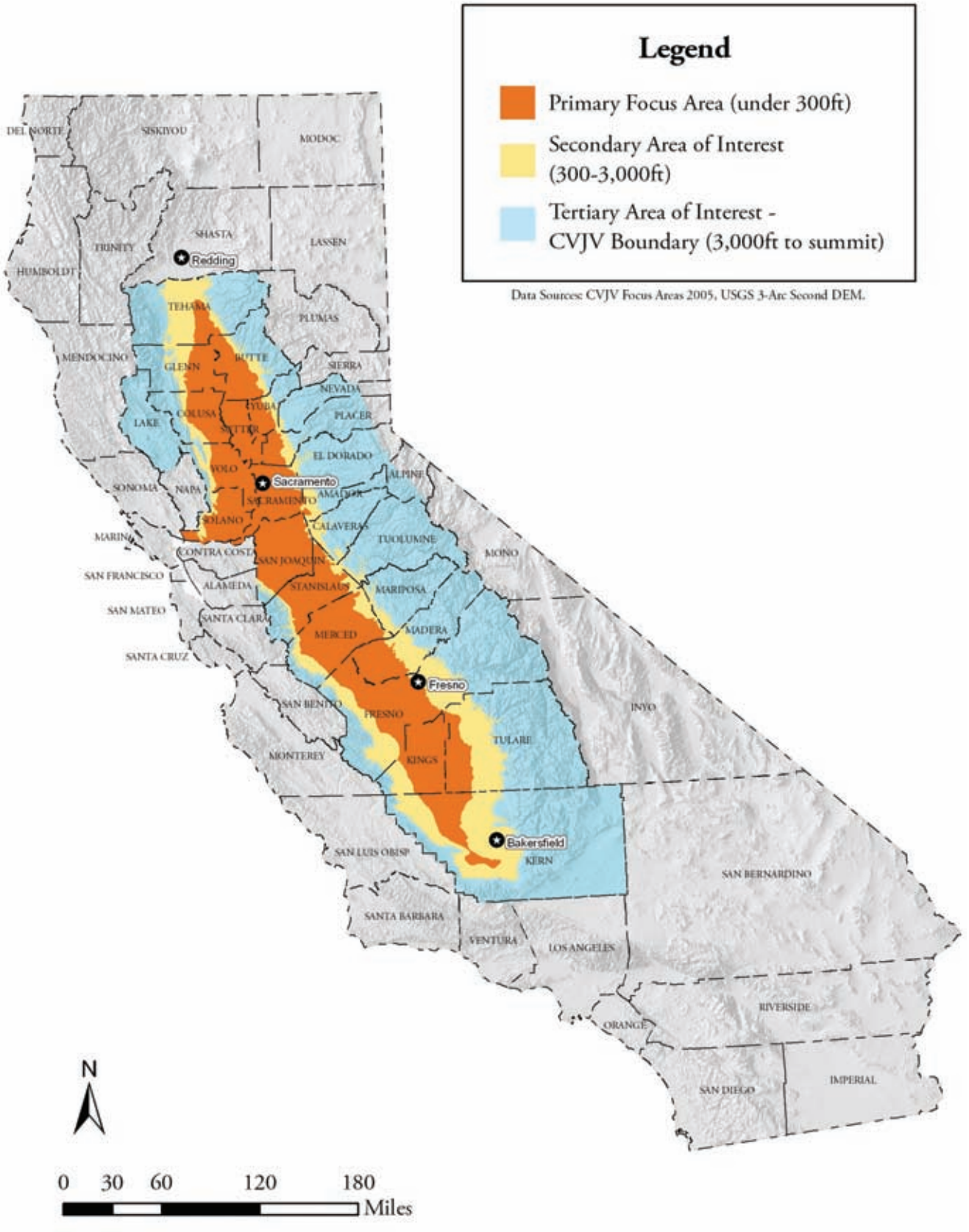


Figure 1-3. Central Valley Joint Venture boundary and focus areas.



Gray Lodge Wildlife Area
Photo: Brian Gilmore

While this 2006 Plan addresess the needs of multiple bird groups, wintering waterfowl remain a key focus of the JV's conservation activities. The *2004 NAWMP Strategic Guidance* document emphasizes a strengthening of the biological foundations of waterfowl conservation in North America. The JV has responded to this call by clearly linking waterfowl objectives for the Central Valley to continental population objectives established under the NAWMP. The 2006 Plan identifies the landscape conditions needed in the Central Valley to sustain waterfowl populations at NAWMP goals. Linking landscape conditions in the valley to continental population goals for waterfowl reflects the spirit of the 2004 NAWMP, which also acknowledged the need to integrate habitat objectives for waterfowl with those of other wetland dependent bird groups.

The 2006 Plan relies on both quantitative and qualitative approaches for establishing bird-group conservation objectives. Where possible, the Plan seeks a direct relationship between bird population objectives and habitat needs when establishing bird-group conservation objectives, because it allows these objectives to be expressed quantitatively (e.g., acres). In contrast, some bird groups lack population objectives or lack a clear link between population objectives and habitat needs. In those cases, conservation objectives reflect present understanding of breeding or non-breeding ecology but are not linked to a population objective.

Regardless of the approach, the 2006 Plan also considers non-biological factors when establishing conservation objectives. Human population growth, changing land use, and competition for limited water supplies all present real challenges to bird conservation efforts in the Central Valley. By taking into consideration biological factors, socio-economic forecasts, potential changes in agricultural practices, and an increasingly competitive water market, habitat programs can anticipate and to some degree mitigate landscape changes that are otherwise detrimental to birds.

The remainder of the 2006 Plan includes ten chapters. Chapter 2 describes JV accomplishments since 1990. Chapter 3 provides an overview of habitat conditions in each of the Central Valley's nine basins, as well as important socio-economic factors that characterize these regional planning units. Chapters 4 through 9 establish conservation objectives for each of the six bird groups. Chapter 10 examines water issues in the Central Valley and identifies the water needs and challenges faced by the JV to secure reliable and affordable supplies now and in the future. Chapter 11 provides integrated conservation objectives for all bird groups.

There are several locally-driven conservation efforts underway in areas such as the Tulare and American Basins which may identify conservation needs that are beyond the scope of the 2006 Plan, in terms of the amount and types of habitats to be protected, restored and enhanced. The JV fully supports these efforts, as many of its partners are participating in such scoping and planning activities. Future updates to this plan will reflect the accomplishments of these regional efforts.



Ducks in a Seasonal Wetland
Photo: Dale Garrison, USFWS

Chapter Two: JOINT VENTURE ACCOMPLISHMENTS

This chapter identifies the conservation objectives provided in the 1990 *Central Valley Habitat Joint Venture Implementation Plan*, and summarizes accomplishments both valley-wide and by basin for each objective. It also describes challenges faced in meeting certain objectives.

Introduction

The Central Valley Joint Venture partnership (JV) has an impressive record of accomplishment since its inception in 1988, and has made excellent progress towards meeting the objectives adopted in the 1990 Central Valley Habitat Joint Venture Implementation Plan (1990 Plan). The 1990 Plan established conservation objectives outlined in Chapter 1 and are summarized below:

- Wetland Protection: Protect in perpetuity 80,000 acres of existing wetland habitats.
- Wetland Water Supplies: Secure adequate power and water supplies for wetland management.
- Wetland Restoration: Restore and protect in perpetuity 120,000 acres of former wetlands.
- Wetland Enhancement: Enhance all existing wetlands.
- Agricultural Land Enhancement: Enhance waterfowl habitat on 443,000 acres of agricultural lands.

"The Central Valley Joint Venture is internationally recognized as an outstanding model of cooperative conservation, where partnerships working collectively toward common goals have protected, enhanced and restored thousands of acres of wetland, riparian, and associated upland habitat in the Central Valley for the benefit of migratory birds, resident wildlife and the public."

David Paullin
Coordinator
National Joint Venture Assessment Team

Summary of Central Valley-wide Accomplishments

The JV has reached 71% of the Wetland Protection objective through the purchase or donation of fee title and conservation easements from willing sellers. Significant progress has been made toward the Water Supply objective through the passage of the Central Valley Project Improvement Act (CVPIA) Title 34 of Public law 102-575, passed by Congress on October 30, 1992. The purpose of the CVPIA was to achieve optimum water supplies for all public wetlands and private wetlands within the GCRD.The CVPIA provided for 72% of the wetland water supply needs identified by the JV. Fifty-nine percent of the Wetland Restoration objective has been met. Since the Wetland Enhancement objective involves annual habitat enhancements of 50,000 to 75,000 acres per year, it is not expressed here as an accomplishment percentage. Agricultural Enhancement objectives for wintering waterfowl are 119% of the 1990 goal due to tremendous increases in winter-flooded rice.

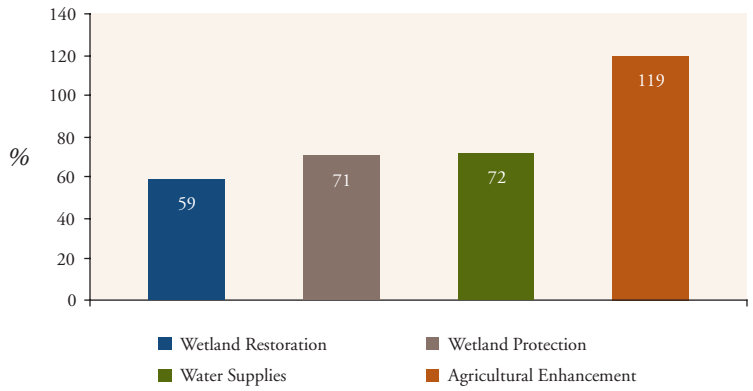


Figure 2-1. Progress in meeting conservation objectives as a percentage of objectives identified in the 1990 Plan.

The JV's efforts to protect, restore, and enhance wetlands have significantly increased wildlife habitat resources in the Central Valley (Figure 2-1), not only for waterfowl, but numerous other wetland dependent species as well. These benefits have also included improved water quality, flood control, and increased recreational opportunities.

Accomplishments by Basin

Wetland Protection

Protect In Perpetuity 80,000 Acres of Existing Wetland Habitats

The 1990 Plan had a stated objective of protecting 80,000 acres of existing privately owned wetlands through acquisition of fee-title or perpetual conservation easements. The 1990 Plan assumed 291,555 acres of wetlands were present in the Central Valley and that fifty nine percent of these wetlands (172,665 acres) were already protected through fee-title acquisition, perpetual easements or legislative actions. Accordingly, this left 118,810 acres of unprotected wetlands in the Central Valley.

Although the JV preferred that all wetlands receive protection, it recognized that many private wetland owners would be unwilling sellers or would not wish to enlist their properties in easement programs. Therefore, the JV adopted a wetland protection objective of 80,000 acres, which represented 67% of all remaining unprotected wetlands. This objective was seen as feasible, challenging, and large enough to make a significant difference to

Table 2-1. 1990 Wetland Protection objectives by basin. Basins are listed in priority based on the percent of wetlands in 1990 that were unprotected.

Basin	*Unprotected Wetlands (acres)*	*JV Protection Objective[a] (acres)*
Yolo	8,700	5,000
American	3,150	2,000
San Joaquin	67,000	52,500
Tulare	19,560	5,000
Butte	12,200	10,000
Delta	4,300	3,000
Colusa	3,400	2,000
Suisun	0[b]	no objective
Sutter	500	500
Total	**118,810**	**80,000**

[a]These acres reflect two thirds of the estimated unprotected wetlands in the Central Valley in 1990, and was considered to be a reasonable and achievable objective for the JV at that time.

[b]The entire 58,000 acre Suisun Marsh was assumed to be protected by the Suisun Marsh Protection Act of 1977.

waterfowl in the Central Valley. This 80,000-acre objective was divided among the nine basins. Basins were listed in order of priority based on the percent of existing wetlands that remained unprotected (Table 2-1).

Tracking of wetland protection efforts indicates that 56,778 acres of wetlands were protected between 1990 and 2003. To better understand how wetland protection was distributed among basins, and how this related to the JV's priorities (Table 2-1), wetland protection accomplishments between 1990 and 2003 are reported by basin (Table 2-2). There were some inconsistencies in actual protection efforts relative to how basins were prioritized. For example, efforts to protect wetlands were highest in the Butte Basin, although it ranked fifth in priority (effort to protect wetlands is defined as 1990 protection objectives divided by actual acres protected between 1990 and 2003). In contrast, efforts to protect wetlands in American Basin ranked seventh, despite being identified as the second highest priority basin. Alternatively, efforts to protect wetlands in the San Joaquin Basin nearly matched the basin's 1990 priority rank. Those inconsistencies may be explained by the presence or absence of local interest and/or opportunity for protection actions in individual basins.

Table 2-2. 1990 Wetland Protection objectives vs. accomplishments. Basins are listed in priority based on the percent of existing wetlands that were unprotected in 1990.

Basin	*JV Protection Objective (acres)*	*Wetlands Protected 1990 2003 (acres)*
Yolo	5,000	2,935
American	2,000	318
San Joaquin	52,500	40,138
Tulare	5,000	54
Butte	10,000	10,690
Delta	3,000	1,704
Colusa	2,000	794
Sutter	500	145
Total	80,000	56,778

Wetland Power and Water Supplies

Secure Adequate Power and Water Supplies for Wetland Management

Power Supplies

Procuring low-cost rates for power necessary to supply water to Central Valley National Wildlife Refuges (NWR), State Wildlife Areas (WA) and the Grassland Resource Conservation District (GRCD) wetlands has been an elusive endeavor for many years. JV partners have had limited success in attaining these rates due to a variety of complicated factors including, but not limited to: (1) the unwillingness of Pacific Gas and Electric Company (PG&E) to deliver power from other power distribution sources (e.g., Western Area Power Administration); (2) lack of dedicated capacity in major transmission facilities; (3) PG&E's requirement for minimum amounts of energy delivered to a single distribution point; the requirement of paying for stand-by power when electricity is not being used; (3) the high cost of maintenance of power lines and distribution facilities; and (4) current policy interpretations by the Bureau of Reclamation as to what existing or proposed pumping facilities qualify or don't qualify for Central Valley Project Use power, which is the lowest cost rate available.


White-faced ibis
Photo: Dave Feliz, CDFG

The JV recognizes that affordable power must be included in the formula to provide reliable water supplies to Central Valley wetlands. This is particularly true in areas such as the Tulare Basin where pumped groundwater is the primary water source and in the Suisun Marsh where pumping is necessary to drain diked, managed wetlands for leaching and habitat management. A JV Power Committee organized to reengage in these issues may develop acceptable solutions in the near future.

Water Supplies

The passage of the CVPIA significantly increased the reliability of water supplies for public wetlands and for private wetlands in the GRCD. The 1990 Plan had a stated objective of securing a 402,450 acre-foot water supply that is of "suitable quality and is delivered in a timely manner" for optimum management of wetlands on NWRs, WAs, and in the GRCD. The GRCD includes most private wetlands in the San Joaquin Basin, with the San Joaquin Basin itself containing 38% of all private wetlands in the Central Valley (see Chapter 3). Thus, the JV's water objectives targeted a significant fraction of privately managed wetlands in the valley, as well as all existing publicly-owned wetlands.

Water objectives in the 1990 Plan for NWRs, WAs, and the GRCD are presented in Table 2-3. Level 1 supply equaled reliable water supplies that were available by 1990, while Level 2 supplies equaled the average delivery of water to public habitats and the GRCD prior to the 1990 Plan. Of the 363,000 acre-feet annually delivered to public habitats and the GRCD by 1990, only 95,200 acre-feet were considered reliable (Table 2-3). Level 3 water supplies in the 1990 Plan equaled the amount of water needed for optimum management of existing wetland habitats, while Level 4 equaled the amount of water needed to permit full habitat development on public wetland areas and the GRCD.

Passage of the CVPIA automatically guaranteed Level 2 water supplies for NWRs, WAs, and the GRCD. The CVPIA also stipulated that Level 4 water supplies would be achieved in 10% increments between 1993 and 2002. This would include securing reliable water through annual water purchases, and the necessary construction of conveyance facilities to refuges not yet in place but needed to carry these water supplies. Although the intent of the CVPIA was to reach reliable Level 4 supplies through incremental gains over a ten-year period, this has not been achieved because of chronic funding shortages and ongoing competition with other CVPIA programs for limited funds. Mendota WA, as well as Kern and Pixley NWRs, also lack the facilities to convey Level 4 supplies. Gray Lodge WA conveyance facilities were only recently completed in 2005. The result is that water purchases for public habitats and the GRCD remain unreliable.

Water acquisition to achieve Level 4 supplies relies upon spot market purchases by the Bureau of Reclamation from willing sellers every year. The escalating cost of water makes these purchases increasingly expensive. For example, average costs for water have increased from $50 per acre-foot to $125 per acre-foot during the last five years, despite normal rainfall amounts. An extended drought in California could make future water purchases prohibitively expensive. Chapter 10 discusses the challenges and issues that will most likely affect the JV's ability to secure water for wetlands in the near future.

Table 2-3. Water supply needs (acre-feet) identified in the 1989 *Report on Refuge Water Supply Investigations, Central Valley Hydrologic Basin, California.*

Area	*Level 1*[a]	*Level 2*[b]	*Level 3*[c]	*Level 4*[d]	*Objective*[e]
Sacramento NWR	0	46,400	50,000	50,000	50,000
Delevan NWR	0	20,950	25,000	30,000	30,000
Colusa NWR	0	25,000	25,000	25,000	25,000
Sutter NWR	0	23,500	30,000	30,000	30,000
Gray Lodge WA	8,000	35,400	41,000	44,000	36,000
Grassland RCD	50,000	125,000	180,000	180,000	130,000
Volta WA	10,000	10,000	13,000	16,000	6,000
Los Banos WA	6,200	16,670	22,500	25,000	18,800
Kesterson NWR	3,500	3,500	10,000	10,000	6,500
San Luis NWR	0	13,350	19,000	19,000	19,000
Merced NWR	0	13,500	16,000	16,000	16,000
Mendota WA	25,500	18,500	24,000	29,650	4,150
Pixley NWR	0	1,280	3,000	6,000	6,000
Kern NWR	0	9,950	15,050	25,000	25,000
Total	**103,200**	**353,050**	**473,550**	**505,650**	**402,450**

[a] *Existing firm water supply in 1990*
[b] *Average annual water deliveries prior to 1990 Plan*
[c] *Full use of existing development (as it existed in 1990)*
[d] *Water needed to permit full habitat development*
[e] *Additional firm water needs identified in the 1990 Plan (Level 4 minus Level 1)*

Wetland Restoration

Restore and Protect In Perpetuity 120,000 Acres of Former Wetlands

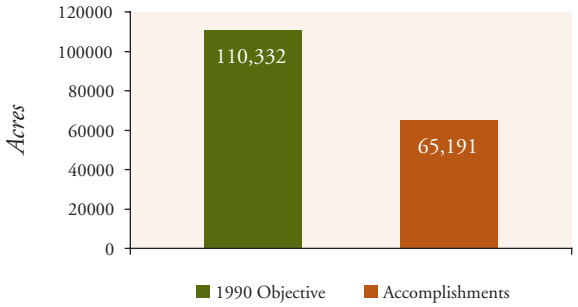


Figure 2-2. 1990 Wetland restoration objectives (acres) vs. wetlands restored between 1990 and 2003 for the entire Central Valley.

The 1990 Plan had a stated objective of restoring 120,000 acres of wetland habitat. Restoration of 9,668 acres of wetlands in the Central Valley between 1986 and 1989 was applied towards this conservation objective, leaving an actual restoration objective of 110,332 acres.

The 1990 Plan identified 291,555 acres of existing wetlands in the Central Valley, but this number actually included a significant number of upland acres on federal, state, and private lands. Improved wetland inventory capabilities have shown that this initial number of wetland acres was an overestimation, and it has been revised in the 2006 Plan to 140,363 acres, in order to more accurately reflect the actual number of Central Valley wetlands that existed in 1990.

As of April 1, 2003 managed wetlands in the Central Valley totaled 205,554 acres. This represents a gain of 65,191 acres of wetland habitat, or 59% of the 1990 revised wetland acres (Figure 2-2). It also represents a 46% increase in the acres of managed wetlands that were present in 1990.

Wetland restoration objectives and accomplishments are presented by basin in Table 2-4. While significant progress has been made in meeting the 1990 wetland restoration objective for the entire Central Valley, there is disparity among basins. JV progress in meeting 1990 wetland restoration objectives for the American, Delta, and Sutter Basins lags well behind the overall figure of 59% for the Central Valley. In contrast 1990 wetland restoration objective for the San Joaquin Basin has been exceeded.



Yolo Basin Wildlife Area wetland restoration
Photo: Jill Shirley, CVJV



Wetland restoration, San Joaquin Valley
Photo: Ducks Unlimited

Table 2-4. Wetland restoration objectives (acres) and accomplishments in the Central Valley by basin 1990 to 2003.

Basin	*1990 Objective*	*Wetlands Restored 1990-2003*	*Percent of Objective*
American	9,517	2,658	28%
Butte	28,080	17,793	63%
Colusa	12,990	6,079	47%
Delta	19,060	4,226	22%
San Joaquin	19,980	22,742	114%
Suisun	No Objective[a]	234	N/A
Sutter	10,960	760	7%
Tulare	No Objective[b]	6,445	N/A
Yolo	9,745	4,254	44%
Total	**110,332**	**65,191**	**59%**

[a]The entire 58,000 acre Suisun Marsh was assumed to be already in wetlands, therefore, no wetland restoration objective was established for this basin. Tidal restoration was not considered in the 1990 Plan, due to limited waterfowl benefits.
[b]No restoration was proposed in the 1990 Plan, but this did not preclude future restoration efforts by public or private interests.

Wetland Enhancement

Enhance All Existing Wetlands

The 1990 Plan had a stated objective of enhancing all acres of existing public and privately managed wetlands. Although wetland enhancement in the Central Valley has proven difficult to track. Wetland enhancement has been redefined for the 2006 Plan (see Chapter 4), and the JV has developed a new web-based system to track accomplishments. This system will allow the JV to better measure progress in meeting enhancement objectives.

Agricultural Land Enhancement

Enhance Waterfowl Habitat On 443,000 Acres of Agricultural Lands Annually

The JV has made great strides towards its 1990 objective by enhancing over 384,000 acres of agricultural lands (J.D. Garr, Ducks Unlimited, Inc., personal communication). The 1990 Plan had a stated objective of annually enhancing waterfowl habitat on 443,000 acres of agricultural land. This conservation objective was broadly divided into two categories:

1. Enhancement of 332,290 acres of grain fields to help meet the food energy needs of wintering waterfowl, and
2. Enhancement of 110,800 acres of upland habitat to ensure adequate nest success for breeding waterfowl.

Enhancement of grain fields for wintering waterfowl was further divided into 83,075 acres of deferred tillage and 249,215 acres of winter flooding.

Table 2-5. Agricultural enhancement objectives and accomplishments for wintering waterfowl by basin.

Basin	1990 Winter Flooding Goal[a]	Current Winter Flooding	1990 Deferred Tillage Goal	Current Deferred Tillage	1990 Basin Total Goal[b]	Current Basin Total[c]
American	11,140	72,049	3,713	0	14,853	72,049
Butte	72,151	99,494	24,050	0	96,201	99,494
Colusa	63,268	141,895	21,093	0	84,361	141,895
Delta	39,078	30,495	13,026	0	52,104	30,495
San Joaquin	0	0	0	0	0	0
Suisun	0	0	0	0	0	0
Sutter	33,845	33,168	11,282	0	45,127	33,168
Tulare	14,854	Unknown	4,951	0	19,805	Unknown
Yolo	14,879	7,020	4,960	0	19,839	7,020
Total	**249,215**	**384,121**	**83,075**	**0**	**332,290**	**384,121**

[a] *Winter flooding refers exclusively to winter flooding of rice habitat with the exception of the Delta Basin where 29,488 acres of winter flooded corn and 1007 acres of winter flooded rice are estimated. Winter flooded acres in Tulare Basin are unknown but not believed to be large.*
[b] *Sum of Winter Flooding and Deferred Tillage goals in the 1990 Plan.*
[c] *Estimated sum of current Winter Flooding and Deferred Tillage acres as of 2003. Current Deferred Tillage is zero in all basins.*

Deferred tillage increases the amount of waste grain available to waterfowl by not deep plowing fields immediately after harvest, while winter flooding increases bird access to agricultural food resources. Although agricultural enhancement objectives were developed to provide additional habitat for breeding waterfowl, no upland programs for nesting waterfowl have been developed since 1990. Instead, efforts to meet the agricultural enhancement objectives in the 1990 Plan have largely focused on improving waterfowl access to agricultural foods during migration and winter.

Winter flooding, particularly of rice lands, has proved to be so widespread since 1990 that the conservation objective was achieved without relying on other approaches. Winter flooding of agricultural habitats in the Central Valley is now estimated at over 384,000 acres, with over ninety percent of this habitat being rice (information on how winter flooding was estimated is provided in Chapter 3). This estimate exceeds the 1990 objective for winter flooding by 135,000 acres (Figure 2-3). Although a pilot program to encourage deferred tillage was initiated in 1989, the JV partners did not actively pursue this program. Winter flooding alone now exceeds the 1990 objective of enhancing 332,000 acres of agricultural habitat. Therefore, the lack of a deferred tillage program has not prevented the JV from meeting its overall conservation objectives for farmed lands. If winter flooding declines and post-harvest disking becomes more common, the JV may need to revisit the issue of deferred tillage.



Figure 2-3. Winter flooding objectives vs. accomplishments from 1990 through 2003.

The overall objective of enhancing 332,000 acres of grain fields to help meet the food energy needs of wintering waterfowl was divided among the American, Butte, Colusa, Delta, Sutter, and Yolo Basins. No agricultural enhancement objectives for wintering waterfowl were developed for the San Joaquin, Tulare, and Suisun Marsh Basins (Table 2-5). Agricultural enhancement objectives have been exceeded for the American, Butte, and Colusa Basins. Current estimates of winter flooding in the Yolo Basin are less than half of the 1990 objective. While winter flooding objectives for this basin exceed 14,000 acres, rice production averaged only 9,750 acres in Yolo Basin between 1997 and 2001. Therefore, this objective was unlikely to be met. Although the Delta and Sutter Basins each approached their goals for winter flooding, the overall objective for agricultural enhancement (winter flooding + deferred tillage) was not met for either basin (Table 2-5).

Summary

The JV has reached 71% of the Wetland Protection objective through the purchase or donation of fee title and conservation easements from willing sellers. Significant progress has been made toward the Water Supply objective through the passage of the Central Valley Project Improvement Act (CVPIA). The CVPIA provided for 72% of the wetland water supply needs identified by the JV. Fifty-nine percent of the Wetland Restoration objective has been met. Every year 50,000 to 70,000 acres of wetlands are enhanced. Agricultural Enhancement objectives for wintering waterfowl are 119% of the 1990 goal due to tremendous increases in winter-flooded rice.

The JV's efforts to protect, restore, and enhance wetlands have significantly increased wildlife habitat resources in the Central Valley, not only for waterfowl, but numerous other wetland dependent species as well. These benefits have also included improved water quality, flood control, and increased recreational opportunities.



Suisun Basin
Photo: Bob McLandress, CWA

Chapter Three: BASIN CHARACTERISTICS

This chapter provides a description of important basin characteristics within the JV. The Central Valley is divided into nine basins that reflect regional differences in drainage patterns (Figure 3-1), and these serve as conservation planning units in the 2006 Plan for most bird groups. The first section describes each basin, its general location, size, and hydrology. The second provides a summary of habitat conditions in each basin including a description of wetland, agricultural and associated habitat resources that are important to specific bird groups. The final section of this chapter discusses anticipated human population growth and associated changes in land use.

"Each of the nine Central Valley hydrologic basins is unique, providing its own set of biological values for wintering and breeding birds. The JV has been adept at working directly with those individuals, agencies and organizations with the greatest local knowledge, effectively gathering the best information available to develop landscape-level habitat objectives for all of the major bird groups."

Peter Perrine
Wetlands Program Manager
California Wildlife
Conservation Board

Basin Description, Hydrology, and Other Features

Butte Basin

The Butte Basin encompasses 1,100 square miles and extends 75 miles from Red Bluff south to the Sutter Buttes. The basin is bordered by the Sacramento River on its west, and the Sierra Nevada foothills and Feather River on its east (Figure 3-2). Butte Creek drains the basin between the city of Chico and the Sutter Buttes. Historically, creeks north of Chico flooded adjacent lands. However, these lands are now protected by levees and have



Figure 3-1. Central Valley Joint Venture basin boundaries.

been developed for urban and agricultural use. Below Chico, over-bank flooding from Butte Creek and the Sacramento River produced large tracts of seasonal wetlands. Some of these overflows reached the Butte Sink, a large marsh in the southern portion of the basin. However, in the early 1900s, a series of levees and drainage facilities was built to contain these floodwaters as well. The southwestern part of the basin is now managed by the Sacramento River Flood Control District to convey flood flows into the Sutter Bypass.

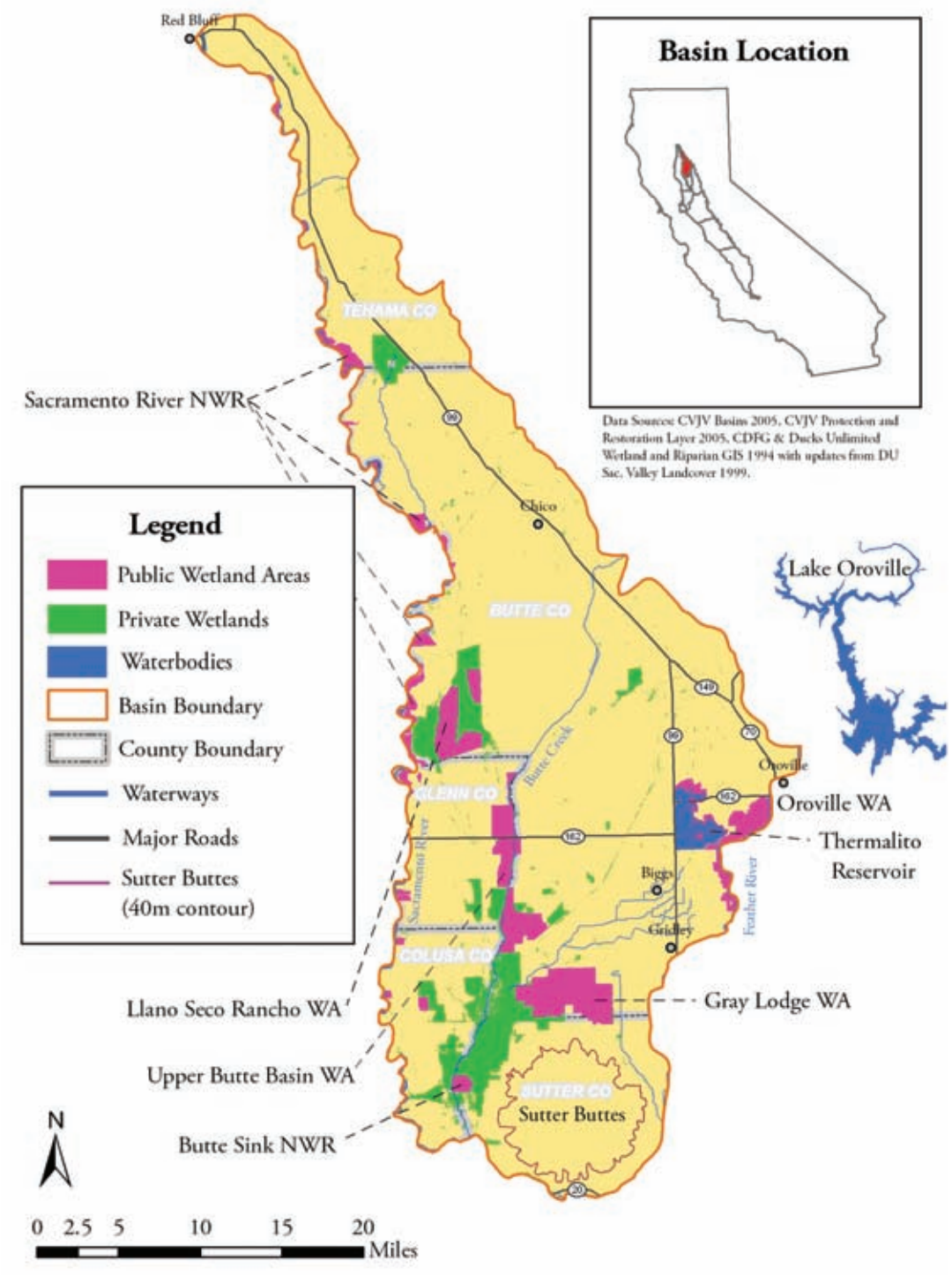


Figure 3-2. Map of the Butte Basin

Sutter Basin

The Sutter Basin totals 350 square miles and extends south from the Sutter Buttes to the confluence of the Feather and Sacramento Rivers. These rivers also border the basin to its east and west (Figure 3-3). Overflow from the Sacramento and Feather Rivers and the Butte Sink historically flooded 40,000 to 50,000 acres of wetlands. Although construction of the Sutter Bypass and flood control systems on the Sacramento and Feather Rivers have eliminated most of this overflow, portions of the bypass continue to provide wetland habitat.

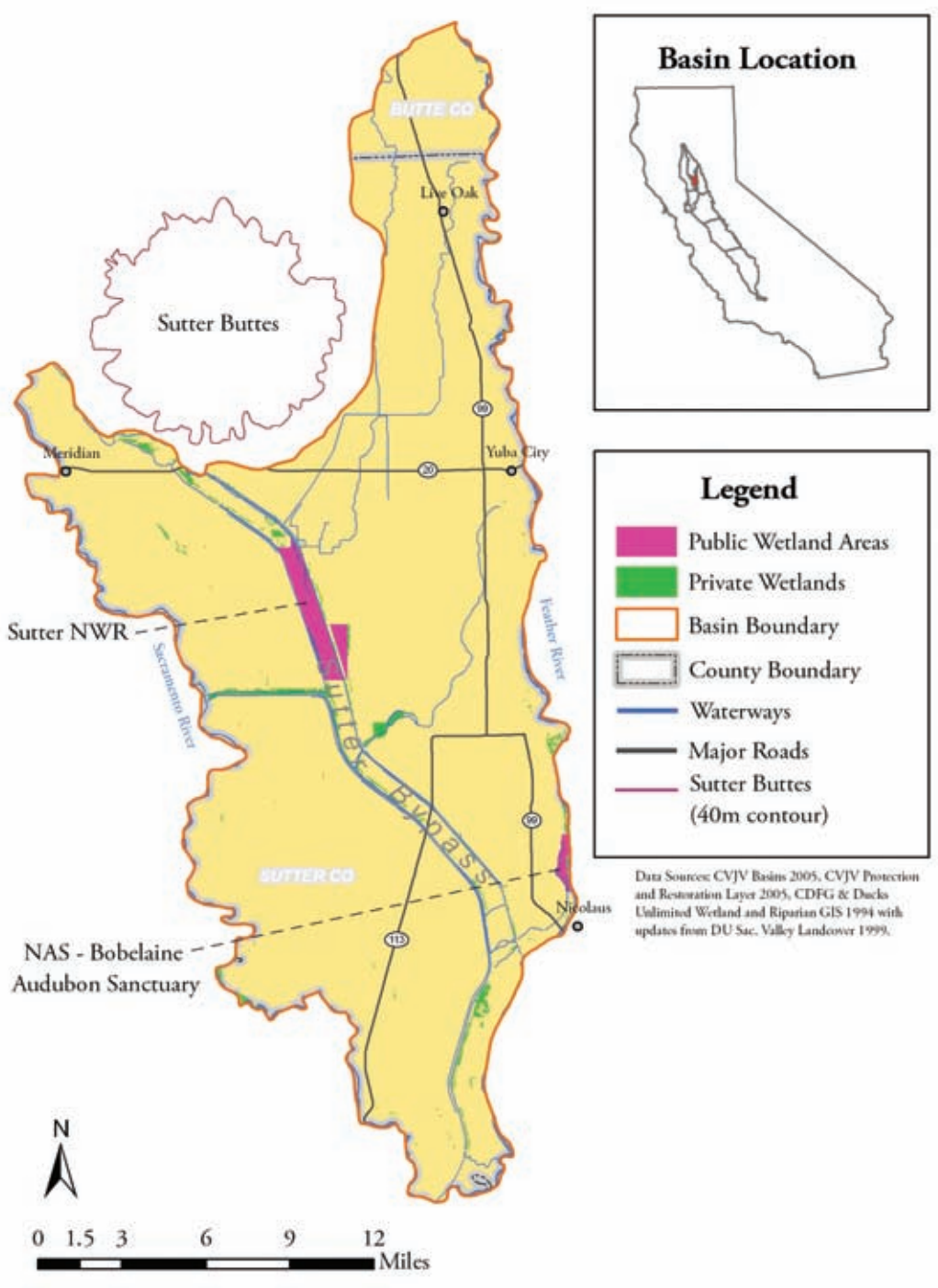


Figure 3-3. Map of the Sutter Basin

Colusa Basin

The Colusa Basin extends 106 miles from Red Bluff south to Cache Creek and is bordered on the east by the Sacramento River and on the west by the Coast Range. The basin totals 1,600 square miles, though most wetland habitat is located south of the Stony Creek drainage (Figure 3-4). Colusa Trough, a naturally formed depression that enters the Sacramento River near Knight's Landing, drains the basin. Historically, overflow from the Sacramento River joined with streams draining the east slopes of the Coast Range to flood basin marshes in winter and spring. The development of levee networks, drains, and pumping stations have eliminated those flood events in all but the wettest years.

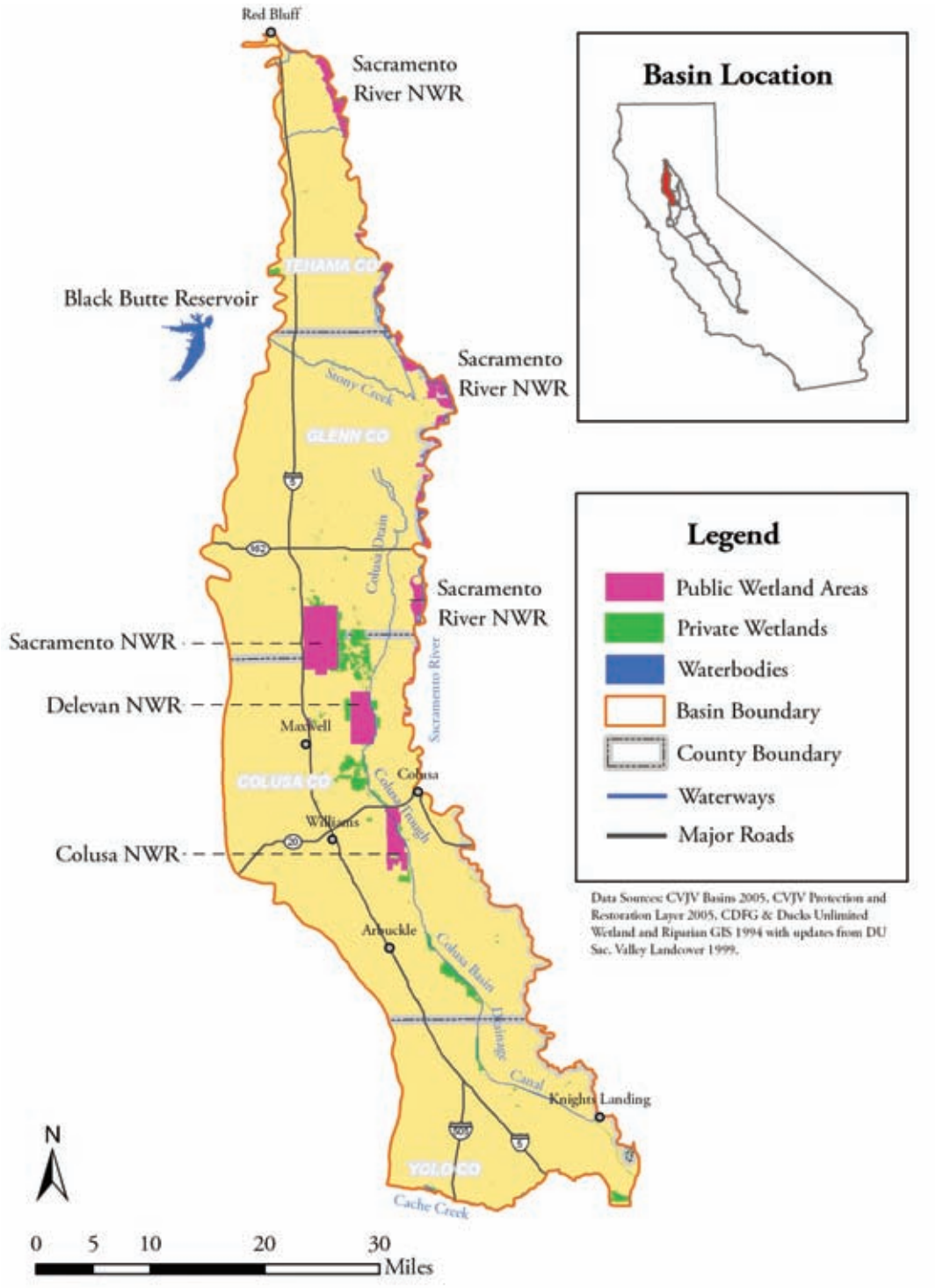


Figure 3-4. Map of the Colusa Basin

American Basin

The American Basin lies east of the Sacramento and Feather Rivers and west of the Sierra Nevada foothills from Oroville in the north to the American River in the south. The basin totals about 860 square miles (Figure 3-5). Historically, water from the American, Yuba, Feather, Sacramento, and Bear Rivers flooded this area. This basin includes the District 10 and Honcut Creek areas, which constitutes a large block of privately owned wetlands. Construction of flood control reservoirs, levees, and dams at Folsom, Oroville, and Bullards Bar, have eliminated most of this over-bank flooding.

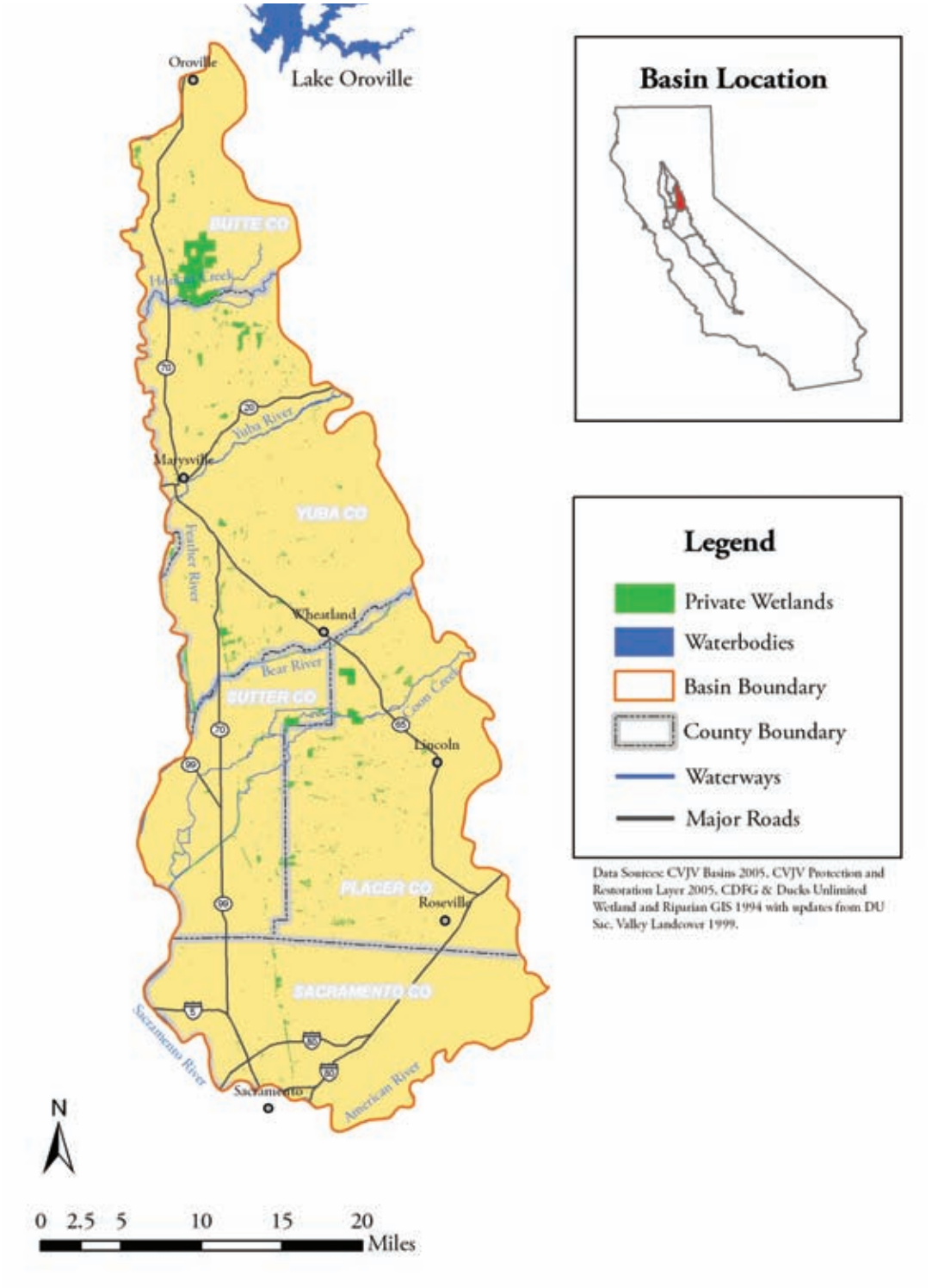


Figure 3-5. Map of the American Basin

Suisun Basin

The Suisun Basin encompasses 170 square miles in southern Solano County and is bordered on the east by the Sacramento-San Joaquin Delta and on the west by the Carquinez Strait (Figure 3-6). Suisun Marsh dominates the basin, and is the largest brackish (diked, managed) wetland remaining in California. In 1963 landowners created the 116,000-acre Suisun Resource Conservation District (Suisun RCD), which includes a complex of managed and unmanaged wetlands as well as upland habitat. There are 158 privately owned wetlands in the Suisun Basin. There are also 15,000 acres owned by the California Department of Fish and Game in the Grizzly Island Wildlife Area complex. Landowners must meet standards for wetland habitat and water quality set by the Suisun Marsh Preservation Act of 1977, enacted by the State of California.

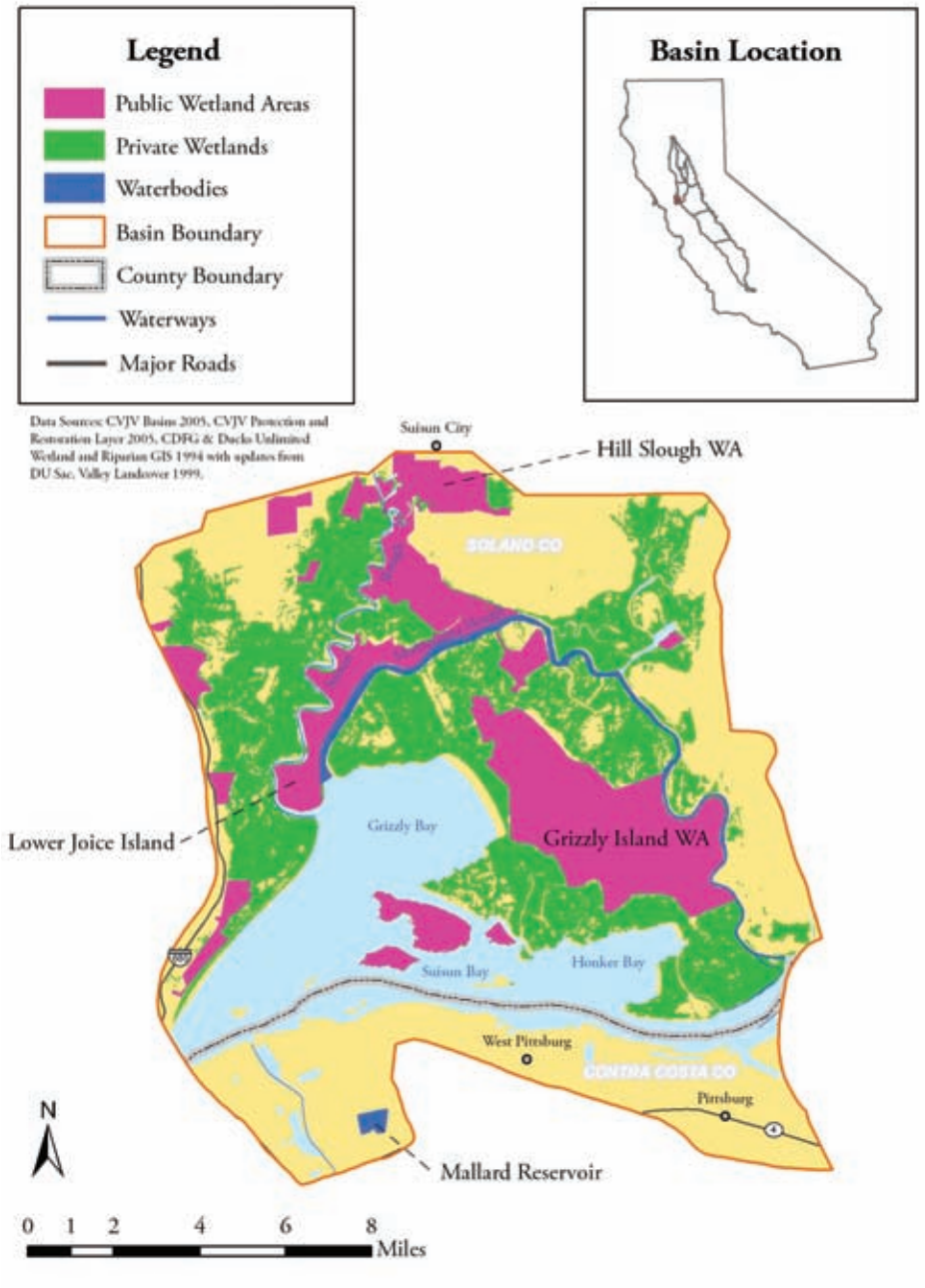


Figure 3-6. Map of the Suisun Basin

Historically, the Suisun Marsh was a tidally influenced basin that totaled 74,000 acres. Large portions of the marsh were submerged daily until levee construction in the 1850s restricted tidal flows. Tide gates and levees currently protect most of the Marsh from flooding, however salinities have gradually increased because of freshwater diversions from the San Joaquin and Sacramento Rivers. Vegetation communities in the marsh reflect this increase in salinity, as many common plant species are salt tolerant (Heitmeyer et al. 1989).

Yolo Basin

The Yolo Basin lies west of the Sacramento River between Cache Creek to the north and the Montezuma Hills and the Delta Basin to the south, and totals about 800 square miles (Figure 3-7). The basin historically received overflow waters from the Sacramento River as well as Cache, Putah, and Ulatis Creeks. Low lying areas near the Delta were tidally influenced and supported permanent marshes, while flooding at higher elevations produced seasonal wetland habitat. Like much of the Central Valley, the hydrology of the Yolo Basin has been modified by levees and flood control structures. The Yolo Bypass was developed along the east side of the basin, and provides flood protection for adjacent lands when flows in the Sacramento River are high.

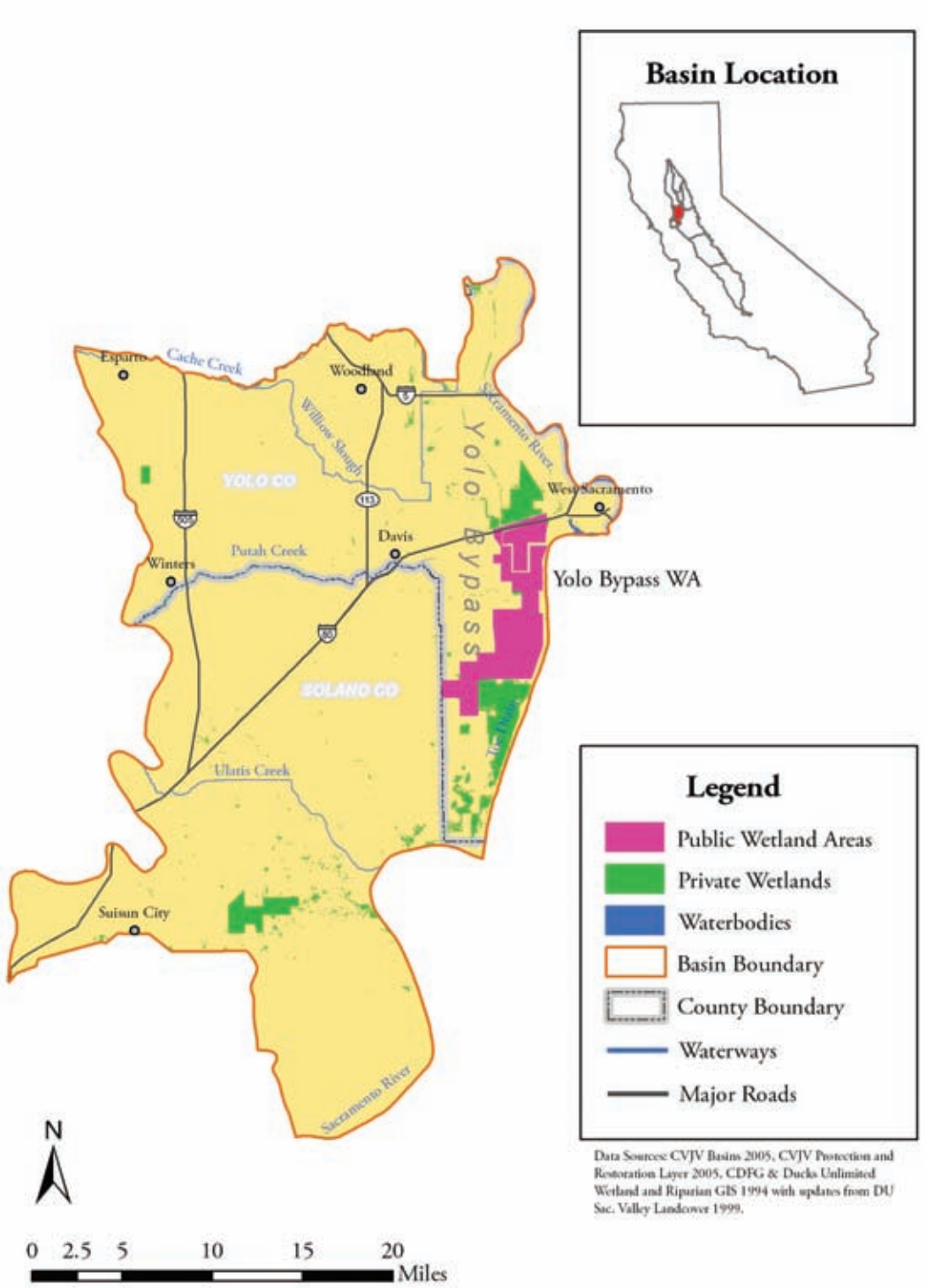


Figure 3-7. Map of the Yolo Basin

Delta Basin

The Delta Basin totals 2,100 square miles and extends from the American River in the north, to the Stanislaus River in the south. Other borders are the Sierra Nevada foothills to the east, the Sacramento River to the northwest, and the Coast Range to the southwest (Figure 3-8). Prior to the mid-1800s, the Delta Basin was tidally influenced and part of a larger estuary that included Suisun Marsh and the San Francisco Bay. Development of the basin began in the 1850s, when the Swamp Land Act transferred ownership of all "swamp and overflow land" from the federal government to the State. By the early 1900s, nearly all the Delta's wetlands had been converted to agriculture.

The basin is formed by the convergence of the Sacramento, San Joaquin, Cosumnes, Mokelumne, and Calaveras Rivers. This confluence is subject to tidal movement and water diversions as it flows into the San Francisco Bay. A 1,000-mile network of levees has reclaimed sixty former wetland islands in the Delta. These islands are intensively farmed and some are managed as duck hunting clubs after crop harvest.

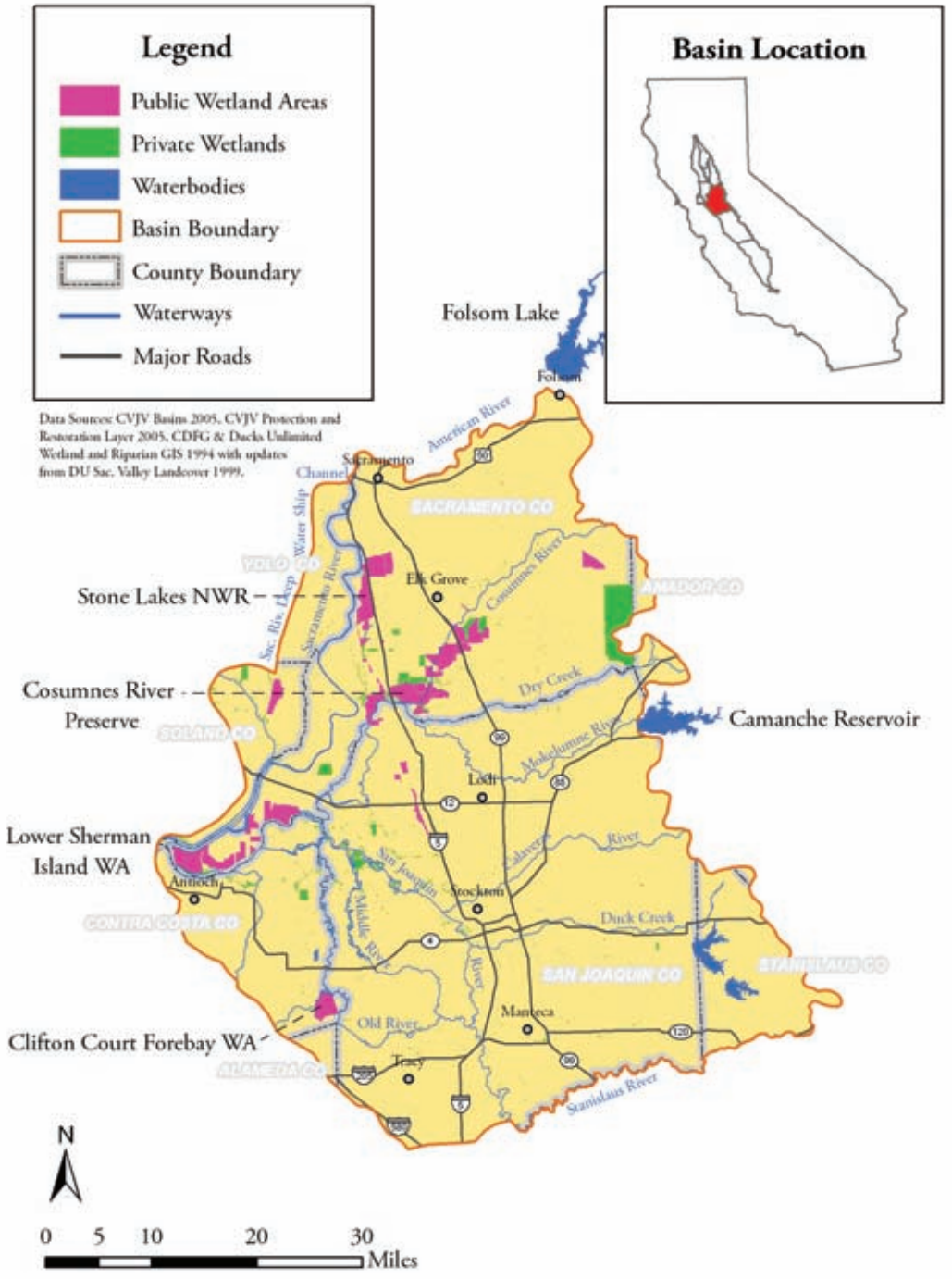


Figure 3-8. Map of the Delta Basin.

San Joaquin Basin

The San Joaquin Basin totals 2,900 square miles, extending from the Stanislaus River in the north, to the San Joaquin River in the south. The 80-mile-long basin is bordered on its west by the California Aqueduct, and on its east by the foothills of the Sierra Nevada (Figure 3-9). Major tributaries to the San Joaquin River include the Chowchilla, Merced, and Tuolumne Rivers.

Most private wetlands as well as several federal and state areas in the San Joaquin Basin are located in the Grassland Resource Conservation District (GRCD) on the western edge of the basin. Many of these private wetlands have been permanently protected by U.S. Fish and Wildlife Service conservation easements. Wetland areas in existence in 1991 have been guaranteed average annual (Level 2) water supplies as a result of the Central Valley Project Improvement Act (CVPIA) of 1992. Soils on the western side of the San Joaquin Basin are derived from marine sediments that are high in salts and trace elements. Post-harvest irrigation was formerly used to leach these substances from the upper soil, and return flows were used as a wetland water source. Selenium concentrations in this tailwater proved damaging to a wide range of birds and consequently, use of this water has been greatly restricted.

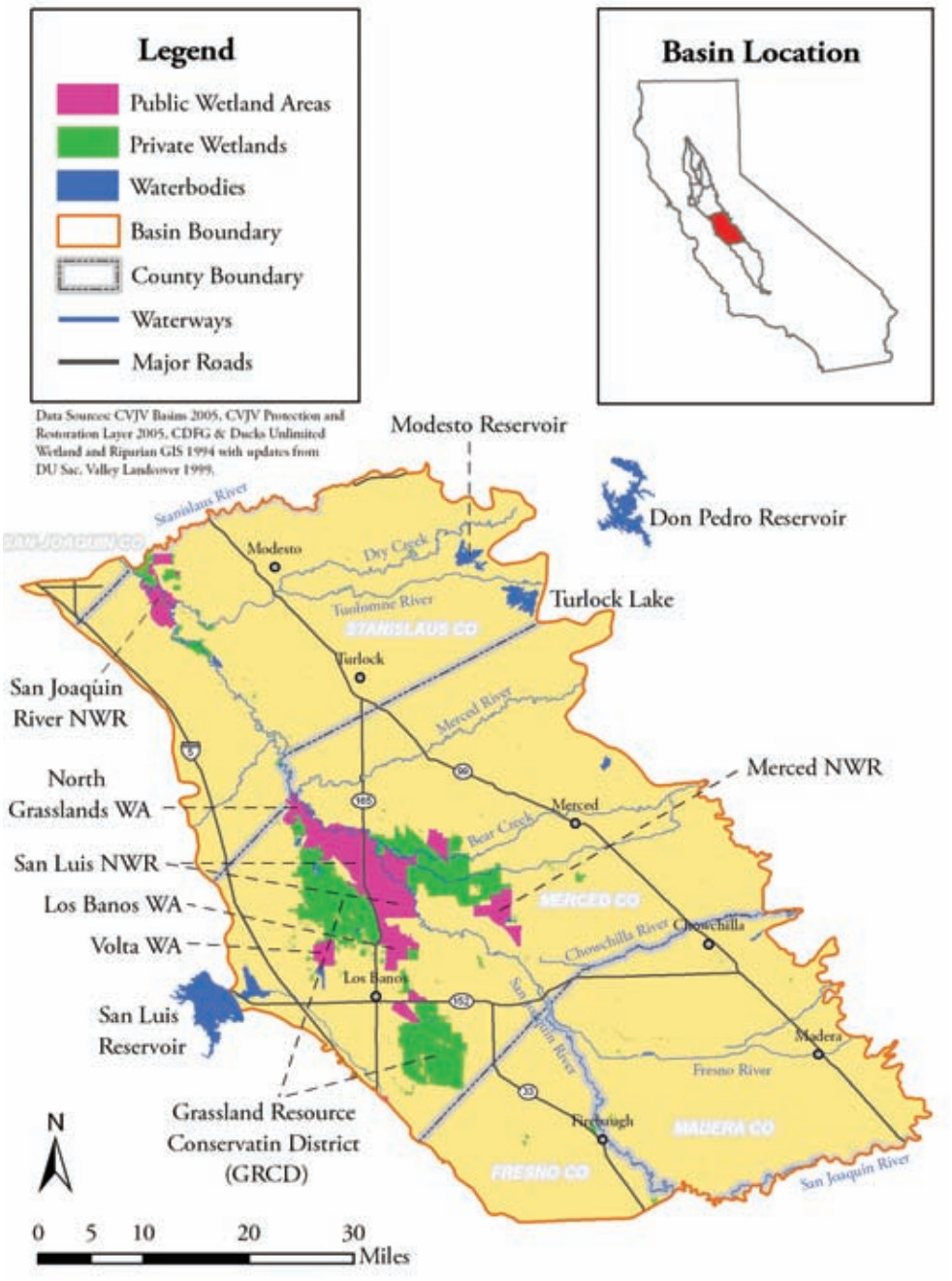


Figure 3-9. Map of the San Joaquin Basin

Tulare Basin

Tulare Basin is the largest basin in the Central Valley and totals 5,600 square miles. This basin is 135 miles long and is bordered to the west by the Coast Range, and to the east by the southern Sierra Nevada foothills (Figure 3-10). The San Joaquin River divides the Tulare and San Joaquin Basins.

Despite being the driest region of the Central Valley, the Tulare Basin once contained the largest single block of wetland habitat in California and provided over 500,000 acres of permanent and seasonal wetlands. During most years the basin functioned as a sink, where water from the Sierra Nevada flowed down a number of streams including the Kern, Kings, and Tule Rivers, into a series of shallow lake basins within the sink. These lakes provided habitat for millions of migrant waterfowl and shorebirds. During exceptionally wet years, water flowed north from these lakes into the San Joaquin River.

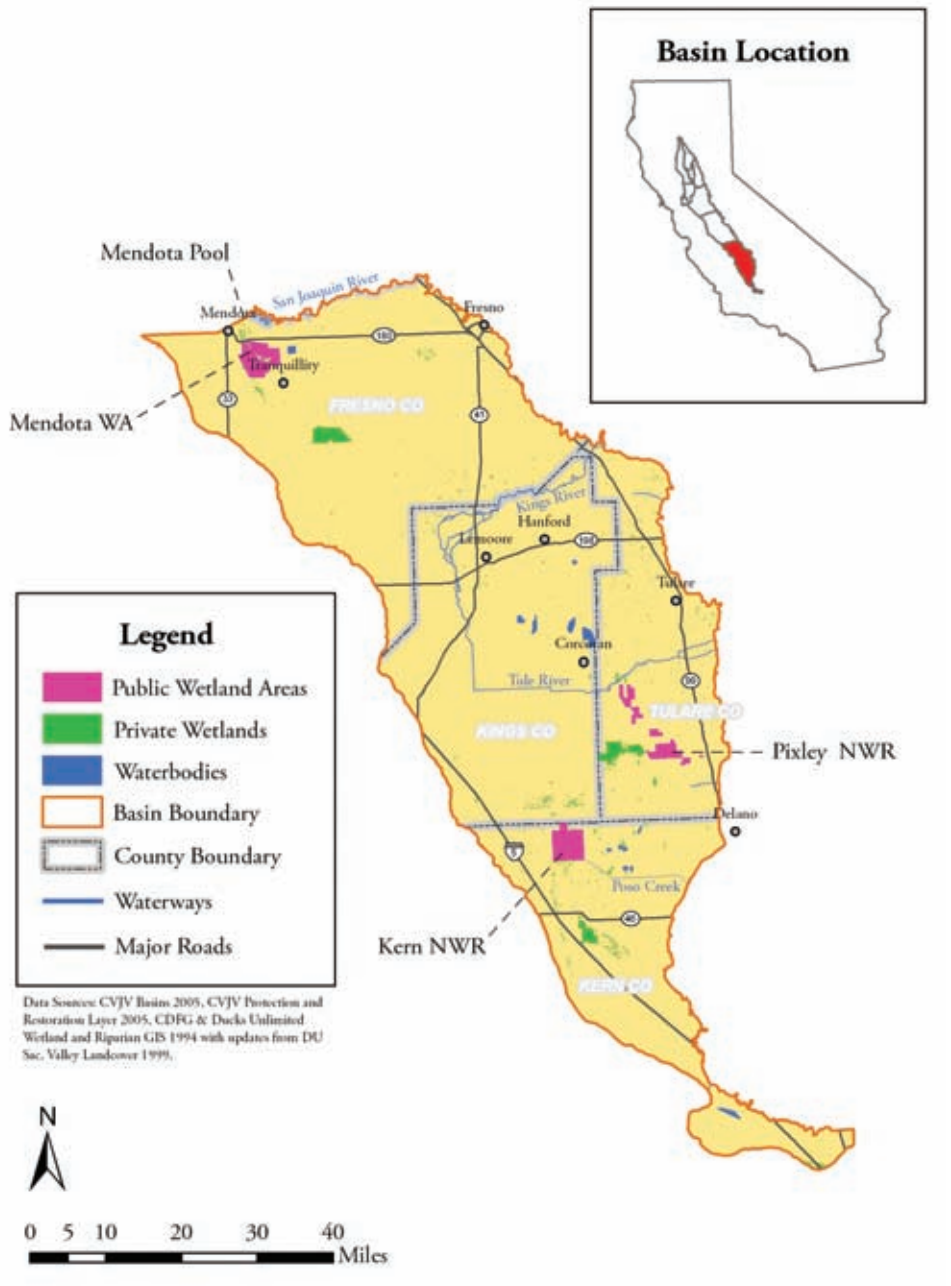


Figure 3-10. Map of the Tulare Basin

Diversion of water for agricultural and municipal purposes ultimately drained the Tulare Basin lakebeds, and allowed these wetlands to be reclaimed for agriculture. These lakebeds now remain dry in all but the wettest years and the amount of wetland habitat remaining in the Tulare Basin is less than one percent of historic levels. Although agriculture dominates the basin, surface water supplies are not sufficient to meet crop needs. As a result, agricultural producers rely heavily on groundwater to augment supplies. The end result is that surface water supplies for private wetland management are virtually non-existent in many parts of the basin, and landowners are forced to rely on groundwater. Many private wetland owners are unable to afford the high pumping costs for groundwater, resulting in a loss of nearly half of the wetlands over the past two decades. Although the Tulare Basin poses significant challenges for the JV, the area sees tremendous waterbird use during wet years. This use testifies to the historical and continuing importance of the basin within the Central Valley.

Habitat Types and Locations

Wetlands

Managed wetlands in the Central Valley are broadly categorized as seasonal, semi-permanent or permanent. Seasonal wetlands are typically flooded in the fall, with drawdown occurring between March and May. Semi-permanent wetlands are usually flooded from early fall through early July, while permanent wetlands are flooded year round. Since the majority of these non-seasonal wetland habitats are semi-permanent, for planning purposes, semi-permanent and permanent wetlands are combined.



Butte Sink wetlands
Photo: Bob McLandress, CWA

Refined estimates of managed wetlands indicate that wetland acreage was overestimated in the 1990 plan. The 2000 *Central Valley Wetland Water Supply Investigations, CVPIA 3406 (d)(6)(A,B), A Report to Congress* (Water Report; USFWS 2000) stated that there were 165,834 acres of managed wetland acres as of November 1996. The Water Report relied on satellite imagery to estimate wetland acres during winter 1993-1994, and JV accomplishments from 1993-1994 to November 1996 were added. Wetland acreage estimates were updated from the Water Report by adding JV accomplishments from December 1, 1997 to April 1, 2003. To date, 205,554 acres of managed wetlands are estimated for the Central Valley. Wetland acres by type and ownership are presented for each basin in Table 3-1.

About two thirds of all managed wetlands in the Central Valley are privately owned, while nearly 90% of all wetlands are managed on a seasonal basis. Seventy-seven percent of all wetlands are located in four basins: Butte, Colusa, Suisun, and San Joaquin. The San Joaquin Basin alone contains a third of all wetlands in the Valley, most within the Grassland Resource Conservation District (GRCD). The overall distribution of wetlands in the Central Valley is depicted in Figure 3-11.

Table 3-1. Acres of managed seasonal wetlands (SW) and semi-permanent wetlands (SPW) in the Central Valley.[a]

Basin	*Private SW*	*Public SW*	*Private SPW*	*Public SPW*	*Total SW*	*Total SPW*	*Total Wetlands*
American	3,187	0	562	0	3,187	562	3,749
Butte	16,170	7,170	2,853	1,266	23,340	4,119	27,459
Colusa	11,086	11,304	1,956	1,995	22,390	3,951	26,341
Delta	3,741	2,608	661	460	6,349	1,121	7,470
San Joaquin	46,857	14,156	5,206	1,573	61,013	6,779	67,792
Suisun	25,364	6,868	4,476	1,212	32,232	5,688	37,920
Sutter	247	1,704	43	301	1,951	344	2,295
Tulare	6,718	13,494	746	1,499	20,212	2,245	22,457
Yolo	5,803	2,755	1,027	485	8,558	1,512	10,070
Total	**119,173**	**60,059**	**17,530**	**8,792**	**179,232**	**26,322**	**205,554**



Figure 3-11. Distribution of wetlands in the Central Valley in 2005.



Figure 3-12. Distribution of riparian habitat in the Central Valley in 2005.

Riparian

Current and historical acre estimates for the extent of riparian habitat are presented for each basin in Table 3-2. Riparian habitat is defined as plant communities supporting woody vegetation along rivers, creeks, and streams. Riparian habitat estimates were obtained using multiple GIS layers, as there is no single riparian data layer for the Central Valley (D. Stralberg, PRBO Conservation Science, personal communication). The overall distribution of riparian habitat in the Central Valley is presented in Figure 3-12.

Table 3-2. Current and historical acres of riparian habitat.

Basin	*Current Acres*	*Historic Acres*
American	16,370	67,520
Butte	32,535	105,452
Colusa	19,798	171,013
Delta	Unavailable	Unavailable
San Joaquin	12,245	48,755
Suisun	Unavailable	Unavailable
Sutter	3,641	20,338
Tulare	7,195	272,158
Yolo	3,569	48,320
Total	**107,813**	**733,556**

Upland

Upland areas that may serve as waterfowl nesting habitat in the Central Valley include grain and hay crops, grasslands, and pasture (McLandress et al. 1996). The distribution of these three cover types was mapped using data from the California Department of Water Resources (Figure 3-13). Acres of each habitat by basin are presented in Table 3-3.

Table 3-3. Acres of upland habitat among Central Valley basins.

Basin	*Grassland*	*Pasture*	*Grain & Hay*
American	170,649	30,026	19,042
Butte	174,539	20,423	19,636
Colusa	330,681	81,802	116,942
Delta	206,300	167,611	112,138
San Joaquin	357,244	279,516	74,528
Suisun	21,235	517	983
Sutter	8,750	3,387	11,626
Tulare	452,355	318,573	239,177
Yolo	121,633	57,973	90,657
Total	**1,843,386**	**959,828**	**684,729**

Agriculture

Rice

U.S. Department of Agriculture (USDA) statistics indicate that planted rice in the Central Valley averaged 502,600 acres between 1997 and 2002, and varied between 460,000 and 550,000 acres during this 5-year period (Figure 3-14).

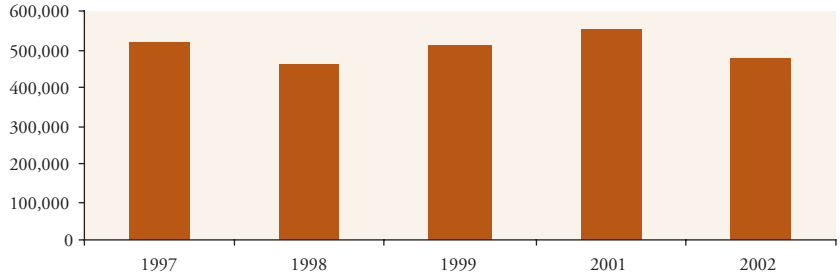


Figure 3-14. Acres of rice planted in the Central Valley between 1997 and 2002.

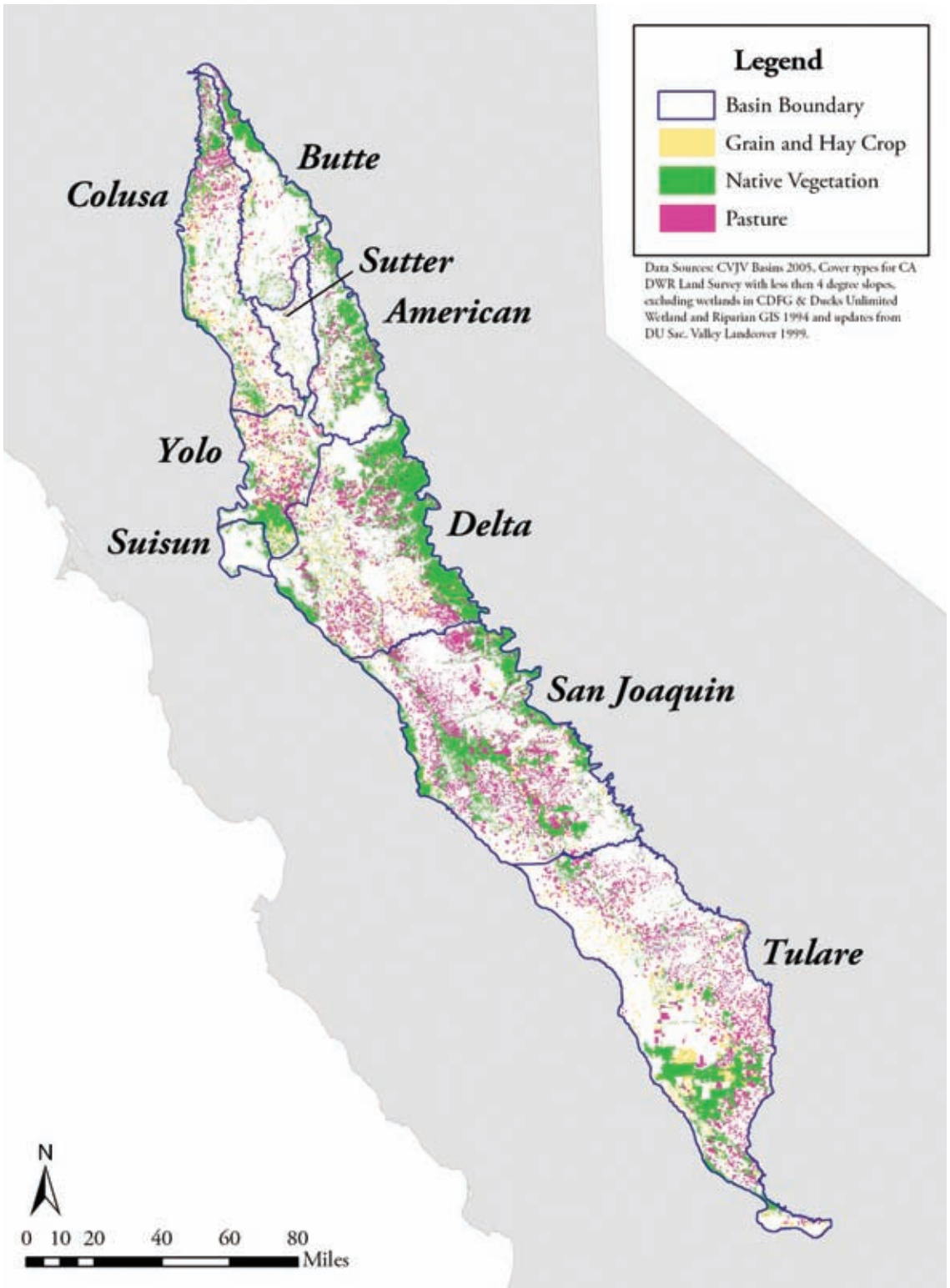


Figure 3-13. Distribution of native vegetation, pasture, and grain and hay crops in the Central Valley.

Because USDA statistics are county-based, they cannot be used to estimate basin rice acres, as counties frequently cross basin boundaries. In both 1998 and 1999 the amount of rice planted in each basin, as well as for the entire Central Valley, was estimated using satellite imagery. Rice acre totals estimated from imagery were slightly less than USDA crop statistics for the 1998 and 1999 growing seasons, so basin estimates were adjusted upward to reflect these differences. The JV chose to use the 1998 imagery when making this adjustment because the agreement between crop statistics and rice image estimates was slightly better for 1998 than 1999.

Table 3-4. Estimate of rice acres in the Central Valley.

Basin	*Planted Acres*	*Winter Flooded Acres*	*Non Flooded Acres*
American	100,068	72,049	28,019
Butte	138,186	99,494	38,692
Colusa	197,076	141,895	55,181
Delta	1,399	1,007	392
Sutter	46,066	33,168	12,898
Yolo	9,750	7,020	2,730
Total[a]	**492,545**	**354,633**	**137,912**

[a]Excludes the 10,000 acres of rice annually planted in San Joaquin Basin. Post harvest treatment of rice in this basin is believed to render it of little use to wetland dependent species.

Rice acreage in the Central Valley varies from one year to the next, so 1998 imagery estimates were further adjusted to reflect the average acres of rice planted between 1997 and 2001 (Table 3-4). The distribution of rice in the Central Valley is depicted in Figure 3-15.

The value of rice habitat for wetland dependent birds is increased by winter flooding in the post-harvest period. Beginning in 1995-1996, growers were interviewed to determine the amount of rice that is winter-flooded for waterbirds and/or straw decomposition. These annual surveys included between 180 and 220 growers that accounted for over 40 % of all rice grown (J.D. Garr, Ducks Unlimited, unpublished report).

The total area of winter-flooded rice has increased as a result of an increase in total rice acreage, the 1992 legislated ban on rice straw burning, a growing awareness of the environmental benefits of this agricultural practice, and improved agronomics (Fleskes et.al. 2005). During winter 1995-1996, half of all rice acreage was winter-flooded. By 2002-2003, this figure had increased to over 70%. The 2006 Plan assumes that 72% of all rice grown in the Central Valley is now intentionally flooded in winter (J.D. Garr, Ducks Unlimited, unpublished report). This estimate was applied to all major rice growing basins (Table 3-4).

Corn

Corn acreages are available for all counties in the Central Valley according to USDA crop statistics summaries. Because parts of some counties occur outside the Valley, corn acres were "deleted" from these outlying areas using GIS when estimating the amount of corn planted in a basin. Although substantial amounts of corn are grown in the San Joaquin and Tulare Basins, most is harvested as silage for the dairy industry. As a result, corn was not considered as a potential habitat in these two basins (Table 3-3).

Many harvested cornfields are intentionally flooded in the Delta Basin to provide waterfowl habitat, and to minimize subsidence of Delta soils that are high in organic content. Surveys to determine the amount of flooded corn were conducted in Delta Basin, and these estimates are used in the 2006 Plan (M. Casazza, U.S. Geological Service, unpublished data).

Socio-economic Factors

Human Population Growth

Human population growth forecasts for all of California as well as for individual counties are available to 2040 (California State Department of Finance). Human populations in California are projected to increase from 34.7 million in 2000 to 58.7 million by 2040, an increase of nearly 70%. Forecasts for Central Valley counties predict a population increase from 5.7 million to 13.1 million people over the same period, a 130% gain (Figure 3-16). To understand how population growth forecasts differ by basin, population



Figure 3-15. Distribution of rice in the Central Valley.

projections were combined for all counties in a basin. These forecasts suggest higher growth rates in the southern half of the Central Valley (Figure 3-17). Population increases by 2040 are expected to exceed 2 million in both the Tulare and Delta Basins, while increases in the San Joaquin Basin will surpass one million people. Growth forecasts for the northern basins vary between 100,000 and 500,000. The southern portion of the American Basin provides an exception to this south to north trend because of its proximity to Sacramento. Sacramento County, which leads the Central Valley in projected growth, includes parts of both the Delta and American Basins. However, all these population increases have been assigned to the Delta Basin, as forecasts cannot be divided at less than a county level. In reality, much of the growth forecasted for Sacramento County is likely to occur in the southern end of the American Basin, as housing developments north of the city of Sacramento continue to expand.

Table 3-5. Estimates of planted corn for Central Valley basins.

Basin	*Planted Acreage*	*Winter Flooded Acreage*	*Non Flooded Acreage*
American	2,292	0	2,292
Butte	5,019	0	5,019
Colusa	26,841	0	26,841
Delta	117,953	29,488	88,465
Sutter	5,750	0	5,750
Yolo	41,280	0	41,280
Total[a]	**199,135**	**29,488**	**169,647**

[a]*Excludes the 218,724 acres of corn planted in San Joaquin and Tulare Basins, as post-harvest treatment of corn in these basins is believed to make it unavailable to waterfowl.*

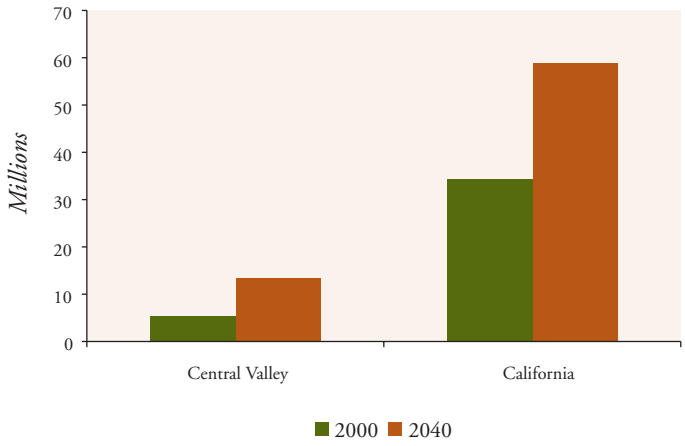


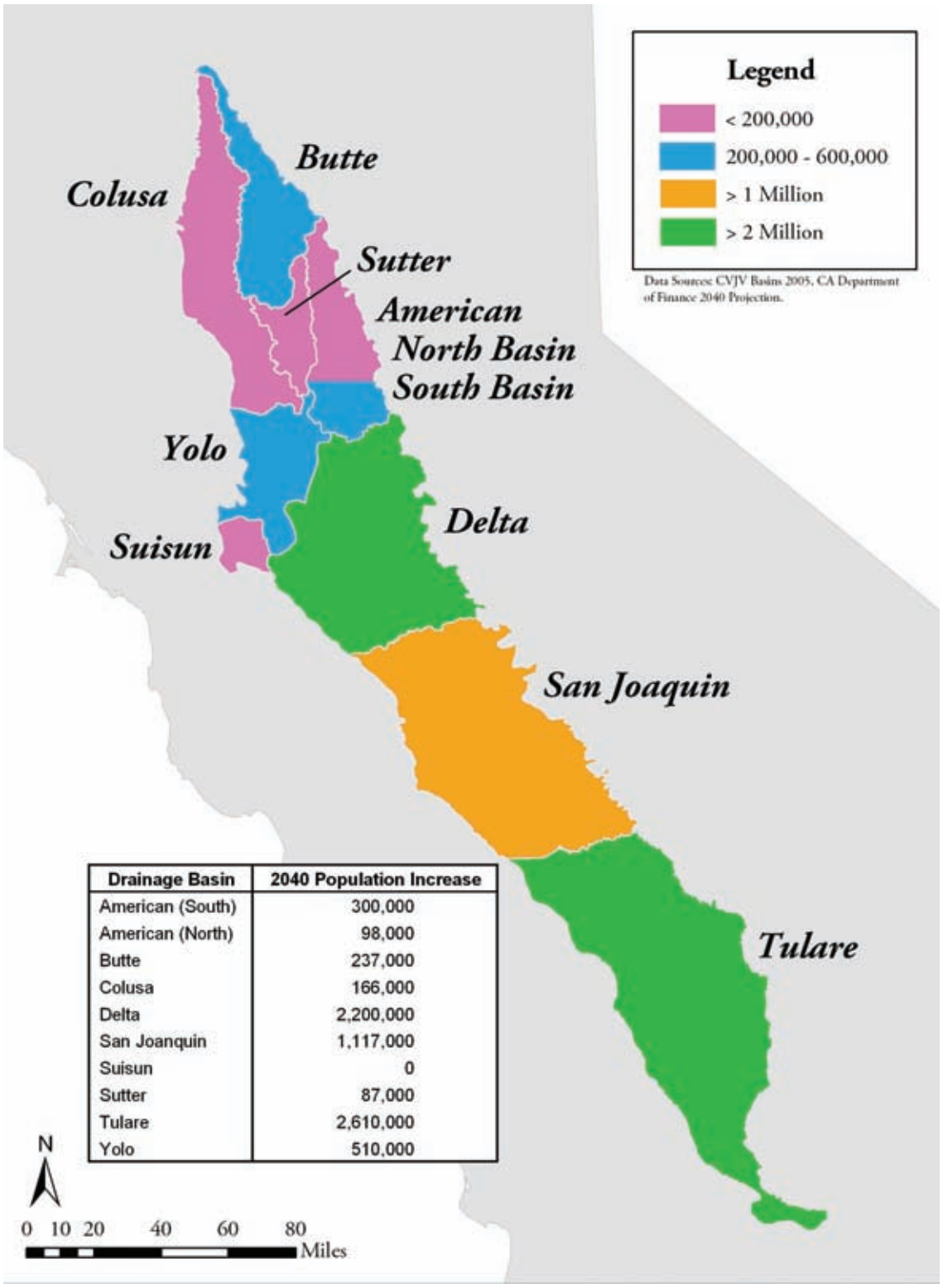
Figure 3-16. Population increases (millions) for the Central Valley and for California as a whole.

Changes in Land Use

Population growth within the Central Valley will result in substantial increases in urban development, mostly occurring on agricultural lands. The effects of land conversion are twofold and include loss of agricultural habitats important to wetland dependent birds, and loss of agricultural buffers that increase the quality of wetland and riparian habitats. Probable urban development patterns for the Central Valley have been mapped using 2040 population forecasts and actual development trends from 1988 to 1992 (American Farmland Trust 1995). These mapping efforts identified three major areas of urban development centered on the cities of Fresno, Modesto, and Sacramento. A general corridor of development was identified along Highway 99 from Bakersfield to Yuba City.


San Joaquin River National Wildlife Refuge
Photo: USFWS

The effect of population growth on agricultural crops was also estimated for the Central Valley to 2040 (American Farmland Trust 1995). Crop type in the Central Valley is broadly categorized as irrigated or non-irrigated, and acreage losses in each of these categories were estimated for eleven of nineteen Central Valley counties (American Farmland Trust). The JV assumes that irrigated crop types (e.g., rice) represent the most important agricultural habitat types for wetland dependent birds, though not all irrigated crops have wildlife value (e.g., vineyards). Thus, only forecasted losses of irrigated cropland to 2040 were considered.



Drainage Basin	2040 Population Increase
American (South)	300,000
American (North)	98,000
Butte	237,000
Colusa	166,000
Delta	2,200,000
San Joanquin	1,117,000
Suisun	0
Sutter	87,000
Tulare	2,610,000
Yolo	510,000

Figure 3-17. Forecasted population increases to 2040 for the Central Valley basins.



Faith Ranch, Lake Marie
Photo: Gary Zahm

There is a strong relationship between population growth forecasts and loss of irrigated cropland for the eleven counties included in the urban growth analysis (Figure 3-18). This relationship suggests that one acre of irrigated farmland is lost for every 10 additional people. On this basis, the JV used population forecasts to predict loss of irrigated cropland for Central Valley counties not included in the American Farmland Trust report.

County estimates of irrigated cropland loss were combined to provide information on farmland conversion for each basin. The predicted loss of irrigated cropland was highest for the Tulare, San Joaquin, and Delta Basins, as well as for the south end of American Basin (Figure 3-19). In contrast, basins in the Sacramento Valley were expected to experience only modest losses in irrigated farmland by 2040. Finally, the loss of rice habitat to 2040 was estimated for each basin by assuming that loss rates for rice were similar to that for other irrigated crops. The loss of rice acreage was generally small for all basins, and the total predicted loss of rice was less than 40,000 acres (Table 3-6). This is equivalent to 6% of the rice base in the Central Valley, and agrees with the 3% rice loss predicted by 2020 (California Department of Water Resources 1998).

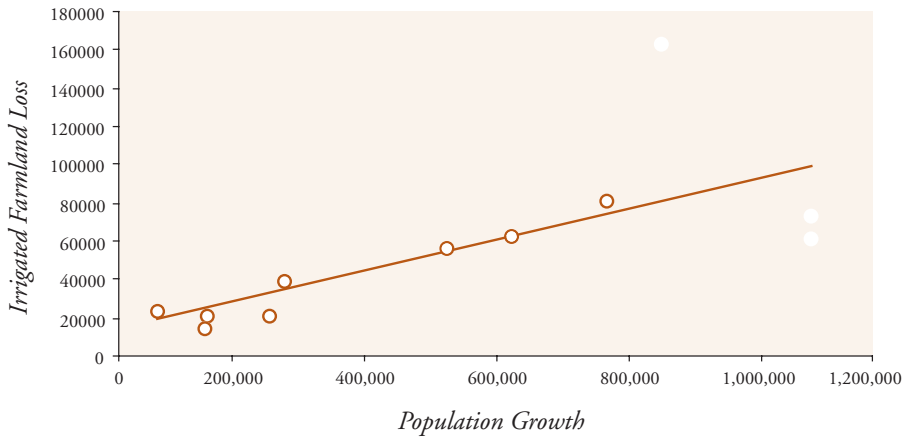
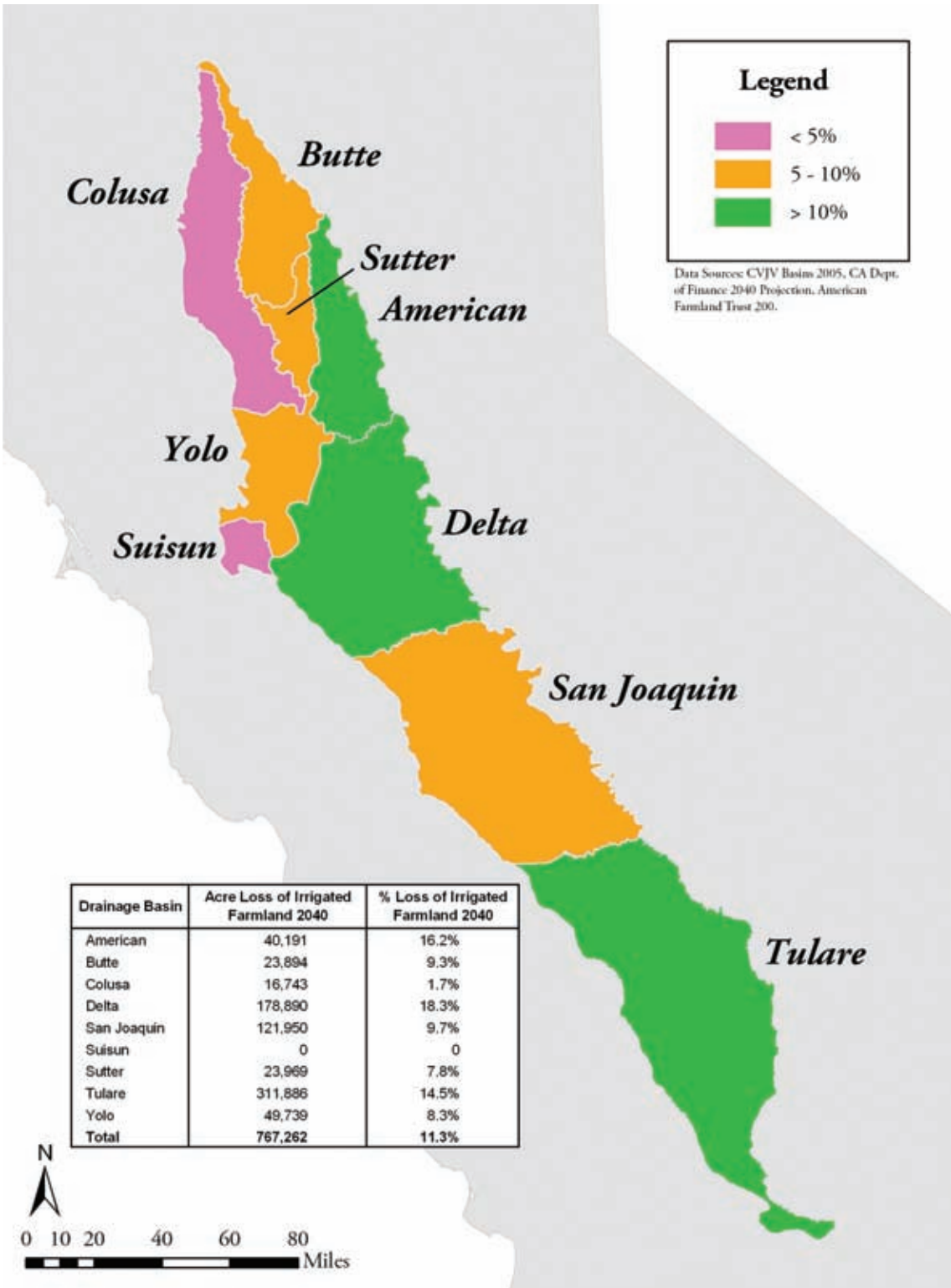


Figure 3-18. The relationship between population growth and loss of irrigated farmland for 11 Central Valley counties (from American Farmland Trust 1995).

Table 3-6. Projected loss of planted rice by basin.

Basin	*Current Acreage*	*Forecasted Acre Loss 2040*
American	100,068	16,211
Butte	138,186	12,851
Colusa	197,076	3,350
Delta	1,399	256
Sutter	46,066	3,593
Yolo	9,750	809
Total	**492,545**	**37,070**



Drainage Basin	Acre Loss of Irrigated Farmland 2040	% Loss of Irrigated Farmland 2040
American	40,191	16.2%
Butte	23,894	9.3%
Colusa	16,743	1.7%
Delta	178,890	18.3%
San Joaquin	121,950	9.7%
Suisun	0	0
Sutter	23,969	7.8%
Tulare	311,886	14.5%
Yolo	49,739	8.3%
Total	**767,262**	**11.3%**

Figure 3-19. Projected loss of irrigated farmland by 2040 for Central Valley basins.



Northern pintails
Photo: Bob McLandress, CWA

Chapter Four: WINTERING WATERFOWL

This chapter identifies the conservation objectives for wintering waterfowl, defined as non-breeding migrating or wintering ducks, geese, and swans using the Central Valley between August and March. The chapter is divided into five sections: (1) Introduction; (2) Biological inputs used in the TRUEMET model; (3) Overall assessment of habitat conditions in the Central Valley; (4) Methods for establishing and prioritizing conservation objectives for winter waterfowl in each basin; and (5) Conservation objectives and priorities for wintering waterfowl in each basin.

Introduction

The Central Valley of California is the most important waterfowl wintering area in the Pacific Flyway, supporting up to 60% of the total Flyway population in some years. Food availability is a key factor limiting waterfowl populations during migration and winter (Miller 1986, Conroy et al. 1989, Reinecke et al. 1989), and habitat conditions on the wintering grounds may influence reproductive success (Heitmeyer and Fredrickson 1981, Kaminski and Gluesing 1987, Raveling and Heitmeyer 1989). The JV assumes that food limits waterfowl populations during migration and winter. Specifically, food is the primary need of waterfowl during migration and winter. Adequate foraging habitat will ensure that survival outside of the breeding season does not limit population growth.

The Central Valley Habitat Joint Venture Implementation Plan (1990 Plan, "Central Valley Habitat Joint Venture 1990) included a food energy model that linked population and habitat objectives for wintering waterfowl. Using this approach the food energy needs of waterfowl populations in the Central Valley were converted into foraging habitat objectives. Figure 4-1 depicts this model. Waterfowl energy needs are a product of population objectives and the daily energy requirement (DER) of an average bird, while food supplies are a product of habitat acres and the amount of food provided by each acre. Foraging habitat is adequate when food supplies equal or exceed waterfowl energy needs.

"The Central Valley of California is, and will always remain, one of the critical wintering areas for waterfowl in North America. We have an enduring obligation to ensure the vitality and viability of our remaining wetlands and associated agricultural habitats upon which millions of wintering waterfowl and other wetland-dependent wildlife rely."

John Eadie, Ph.D.
Professor, Department of Wildlife, Fish & Conservation Biology
University of California, Davis

The JV has retained the food energy approach for the 2006 Plan. However, research efforts by JV partners over the past decade have greatly improved the biological inputs used in the energetic model. In addition, a computer model (TRUEMET) was developed for use in the 2006 Plan. The model calculates population energy demand and population energy supplies for specific time periods, and can incorporate effects like food decomposition and temporal variation in habitat availability (Figure 4-2). The model was used to evaluate the current status of waterfowl food resources in the Central Valley based on a defined set of habitats and to estimate conservation objectives for wintering waterfowl in each basin.

The TRUEMET Model

Most joint ventures use a food energy approach when establishing habitat objectives for wintering waterfowl. The TRUEMET model was developed to estimate waterfowl habitat requirements by comparing food energy needs to food energy supplies. The model calculates population energy needs from the daily energy requirement of a single bird and from time specific population objectives. Food energy supplies are dependant on the availability and amount of waterfowl habitat, as well as the quantity and quality of foods contained in these habitats. The model accounts for the effects of waterfowl food consumption, decomposition of foods over time, and changes in habitat availability that result from flooding schedules or other events like freezing. Waterfowl populations can also be divided into foraging guilds to reflect differences in the foods eaten. Although the model may be useful for assessing current habitat conditions for wintering waterfowl, it can also be used to predict how changes in policy, land use, or habitat programs might impact the birds. For example, the loss of agricultural habitats can be evaluated and habitat programs needed to offset these losses can be identified.

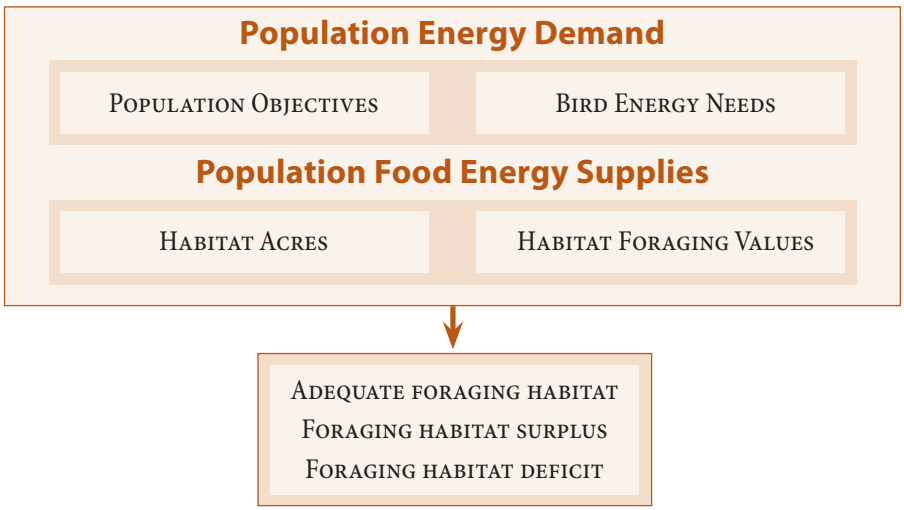


Figure 4-1. Basic energy model used to assess the availability of foraging habitat relative to waterfowl needs.

Biological Inputs Used in the TRUEMET Model

Biological inputs used in the TRUEMET model include: (1) population objectives; (2) daily energy requirements for individual birds; (3) habitat acreage; and (4) habitat foraging values (energy density). This section describes how these inputs were derived and describes many of the assumptions made for wintering waterfowl in the 2006 Plan. Some biological inputs are applied to all basins, while other inputs are basin-specific. Inputs that are applied across basins are presented here to avoid redundancy. However, basin-specific inputs are presented in the final section of this chapter when establishing conservation objectives for wintering waterfowl. Biological inputs that were used to provide an overall assessment of habitat conditions in the Central Valley are also reported in this section.

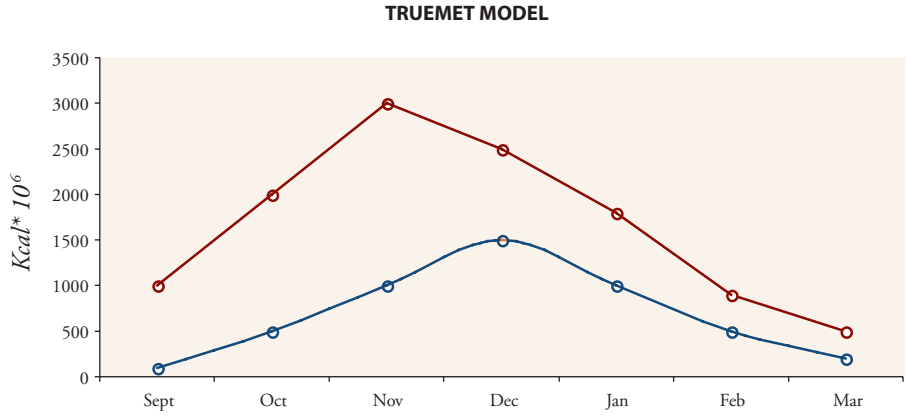


Figure 4-2. A hypothetical example of the TRUEMET model. Population energy demand (blue) vs. food energy supplies (red).

Population Objectives

Ducks

In 1986 the North American Waterfowl Management Plan (NAWMP; North American Waterfowl Management Plan Committee 1986) developed population objectives for North American duck species based on environmental conditions and breeding waterfowl numbers from 1970-1979. Waterfowl populations in the 1970's met the demands of both consumptive and non-consumptive users and provided a basis for future conservation efforts. The 1990 Implementation Plan identified a peak population objective of 4.7 million ducks in the Central Valley. Populations were assumed to peak in late December or early January and decline thereafter. Because the 1990 objective was based on the annual mid-winter inventories (MWI), waterfowl numbers in the Central Valley between 1970 and 1979 provided a direct link to the NAWMP. However, MWI counts alone are not suitable for establishing population objectives, because they do not represent bird numbers at other times. In addition, the pattern of waterfowl use varies among the JV basins, and peak use in some basins does not occur at the time of the mid-winter survey, as was assumed in the 1990 Plan (Fleskes 2000).

Duck population objectives from the NAWMP have recently been stepped down to each Joint Venture. By combining information from the mid-winter waterfowl survey with estimates of waterfowl harvest and mortality, population objectives for the mid-winter period (late December-early January) were estimated for every county in the U.S. Counties were then combined to develop Joint Venture population objectives (Koneff 2003). Population objectives stepped down from the NAWMP only apply to the late December–early January period. However, wintering waterfowl rely on the Central Valley from August through March and therefore, population objectives must be developed for this entire period. As a result, population objectives from the NAWMP (Table 4-1) were combined with information on migration chronology for the Central Valley to generate population objectives at fifteen-day intervals between August 16 and March 31 (Figure 4-3). Migration chronology was determined from monthly surveys of waterfowl between September and March of 1998-1999 and 1999-2000 (Figure 4-3, Fleskes et al. 2000).

Duck populations stepped down from the NAWMP were modified for some species. The NAWMP objective for gadwall ducks *(Anas strepera)* in the Central Valley is 102,420 birds during mid-winter (Table 4-1). However, the MWI in 1999 reported 223,800 gadwalls in the Central Valley, with nearly 150,000 birds observed in 1998 (Fleskes et al. 2000). These surveys suggest that NAWMP goals for gadwalls in the Central Valley have been exceeded. This was expected because gadwall populations in the late 1990's were substantially higher than populations in the 1970's, and NAWMP objectives are based on bird numbers from this earlier period. To "adjust" gadwall population objectives, the JV assumed that gadwall and wigeon were observed with equal probability during the 1998 and 1999 surveys. The ratio of gadwall to wigeon averaged 0.35 during these two years, with wigeon populations at or near NAWMP goals. The mid-winter NAWMP population objective for wigeon is 1,103,440 (Table 4-1). As a result, the gadwall objective was adjusted upward to 386,204 birds (1,103,440 x 0.35). Population objectives for other duck species were also adjusted because some foods eaten by these species were not included in the energetic model. For example, invertebrates make up 49% of northern shoveler diets during fall and winter in the Central Valley; while seeds from managed wetlands make up the other 51% (Heitmeyer 1989). The biomass and type of invertebrates eaten by shovelers have not been estimated for Central Valley wetlands, though these habitats obviously provide some of these food resources. In contrast, seed abundance has been estimated for managed wetlands, and this food source is included in the energetic model. Using NAWMP objectives for shovelers would overestimate the impact shovelers have on seed resources in managed wetlands, because the model would assume that 100% of their energy requirements are met from seeds. This leads to an overestimate of duck habitat needs. To correct this overestimate, shoveler numbers were reduced to 51% of the NAWMP objective when using the energetic model to estimate habitat needs.



American widgeon
Photo: Dale Garrison, USFWS

Table 4-1. Mid-winter population objectives for ducks in the Central Valley.

Species	*NAWMP Objective*	*Duck numbers used in TRUEMET model*
Mallard *(Anas platyrhynchos)*	670,074	670,074
Northern pintail *(Anas acuta)*	2,418,339	2,418,339
Gadwall *(Anas strepera)*[b]	102,420 (386,204)[a]	270,343
American wigeon *(Anas americana)*[b]	1,103,440	772,408
Green-winged teal *(Anas crecca)*	486,215	486,215
Cinnamon teal *(Anas cyanoptera)*	2,990	2,990
Northern shoveler *(Anas clypeata)*[b]	581,999	296,819
Wood duck *(Aix sponsa)*	106,137	106,137
Total Dabblers	**5,471,613**	**5,023,325**
Redhead *(Aythya americana)*[b]	1,007	504
Canvasback *(Aythya valisineria)*[b]	39,336	19,668
Greater and lesser scaup *(Aythya marila, A. affinis)*[b]	223,406	111,703
Ring-necked duck *(Aythya collaris)*[b]	42,327	21,164
Ruddy duck *(Oxyura jamaicensis)*[b]	155,167	77,584
Total Ducks	**5,932,856**	**5,253,948**

[a]*Gadwall objectives were adjusted to reflect population increases from the 1970's.*

[b]*Population objectives for these duck species were adjusted because some foods eaten by these species were not included in the energetic model.*

Bird number adjustments based on diet were also made for wigeon and gadwall, as well as for all diving ducks (Table 4-1). Food habitat studies indicate that plant material other than seeds make up 30% of wigeon diets in the Central Valley (Heitmeyer 1989), and gadwall were assumed to have a similar diet. As a result, bird numbers for these two species were reduced to 70% of NAWMP goals in the model. Food habit studies indicate that seeds make up half the diet of diving ducks, and bird numbers for these species were reduced by 50% (Table 4-1).

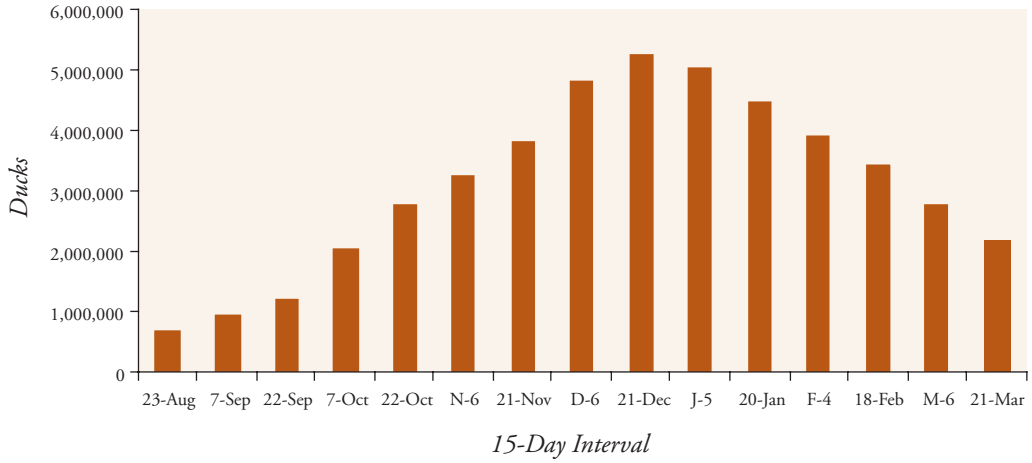


Figure 4-3. Population objectives by 15-day intervals for ducks in the Central Valley.

Correcting population objectives based on diet assumes that food sources not included in the energy model are available to the birds. For example, the JV assumes that plant materials other than seeds are available in quantities > 30% of wigeon energy needs. Although these assumptions can lead to an underestimate of habitat needs, duck population objectives used in the 2006 Plan were 90% of the original NAWMP goal (Table 4-1). In addition, the peak mid-winter population objective of 4.7 million birds used in the 1990 Plan was close to the 5.3 million peak adopted in the 2006 Plan.

Population objectives for Central Valley ducks were divided among basins to reflect current and historic waterfowl distribution. The distribution of duck objectives closely followed the 1990 Plan, although objectives did change for some basins (Table 4-2). Population objectives stepped down to the basins were further divided into 15-day intervals by using information from waterfowl surveys conducted between September and March 1998-1999 and 1999-2000 (Fleskes et al. 2002).

Table 4-2. Distribution of 1990 and 2005 Central Valley duck population objectives among basins.

Basin	*1990 Population Objectives*	*2005 Population Objectives*
American	5%	9%
Butte	23%	20%
Colusa	15%	12%
Delta	10%	13%
San Joaquin	25%	25%
Suisun	5%	5%
Sutter	7%	3%
Tulare	5%	8%
Yolo	5%	5%

Geese and Swans

Although goose populations have been stepped down from the NAWMP, Joint Ventures have been advised to use recent goose counts for establishing population objectives (M. Koneff, U.S. Fish and Wildlife Service, personal communication). As a result, waterfowl surveys between September and March 1998-1999 and 1999-2000 were used to develop population objectives for geese and swans (Fleskes 2000). There are three groups of geese in the Central Valley; (1) "white geese" [lesser snow geese (*Chen caerulescens*), Ross's geese (*C. rossii*) and tundra swans (*Cygnus columbianus*)]; (2) white-fronted geese [Greater Pacific (*Anser albifrons*) and Tule (*A.a. gambelli*)subspecies); and (3) Canada geese [primarily Aleutian Canada geese (*Branta canadensisia leucopareia*)]. All swans were assumed to be tundra swans (Fleskes et al. 2000). White-fronted geese and Canada geese were combined to establish "dark goose" population objectives because these two species exploit similar habitat types. Swans were also included with white geese because the two bird groups rely on similar habitats in the Central Valley. Dark and white goose population objectives for each fifteen-day interval were established for the entire Central Valley, as well as for individual basins (Figure 4-4 and 4-5).

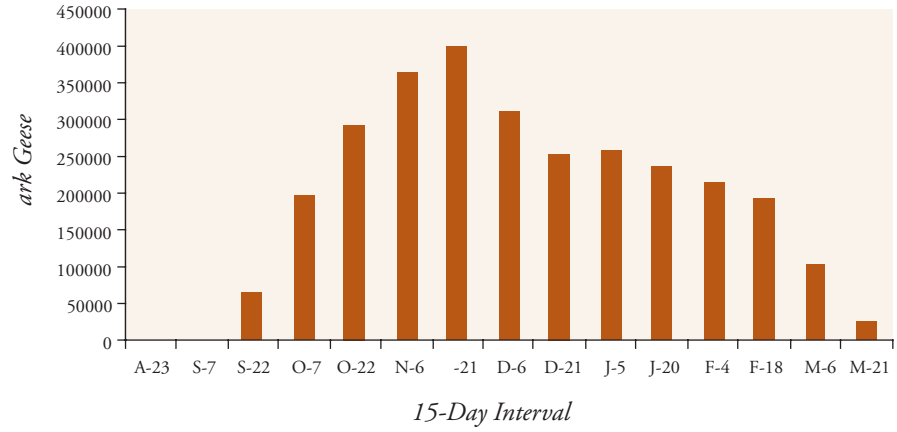


Figure 4-4. Population objectives by 15-day intervals for dark geese in the Central Valley.

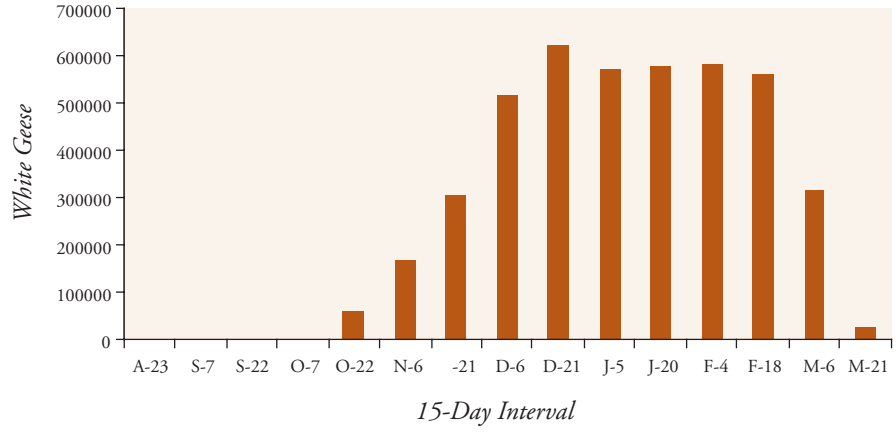
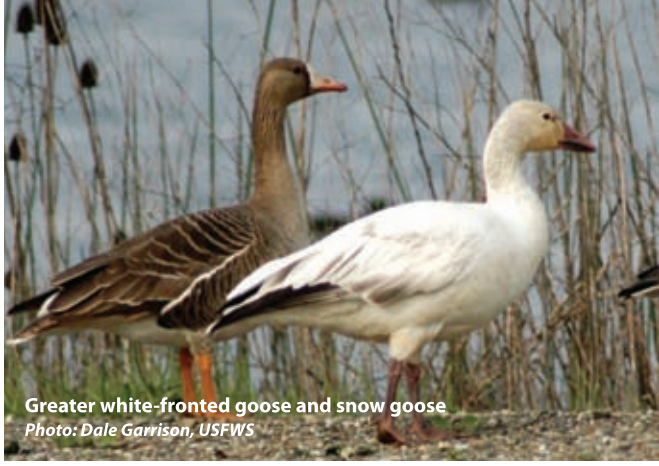


Figure 4-5. Population objectives by 15-day intervals for white geese in the Central Valley.

Daily Energy Requirements for Individual Birds


Greater white-fronted goose and snow goose
Photo: Dale Garrison, USFWS

Ducks

Waterfowl energy needs are strongly dependent on body mass, and equations exist to estimate food energy needs using body mass. Duck population objectives for the Central Valley include several species. As a result, a weighted body mass was calculated for Central Valley ducks based on each species' contribution to total duck numbers and average body mass for that species. The average body mass included male and female weights, and was adjusted for the ratio of males to females in the population (Bellrose 1980).

Weighted body mass for ducks in the Central Valley is 0.84 kg or 1.87 lbs. This estimate is similar to that for northern pintails alone (0.92 kg), which represent 46% of the total valley duck population objective (Table 4-1). Pintail energy requirements have been measured in the valley using information on body mass and carcass composition, and changes in pintail energy needs between August and March have been determined (Miller and Newton 1999). This approach provides a more accurate estimate of energy needs than body mass equations. Because pintail mass and weighted body mass for all ducks in the Central Valley were similar, estimates of pintail daily energy requirements was applied to all ducks by Miller and Newton (1999).

Daily energy requirements of pintails by 2-week time periods are presented in Table 4-3. Miller and Newton (1999) provided estimates of pintail energy requirements for both a wet and dry year in the Central Valley and these results were averaged. Energy requirements of male and female pintails also differ, and information on seasonal changes in pintail sex ratios was used to adjust daily energy needs in each 2-week interval (Heitmeyer 1989). The daily energy requirements presented in Table 4-3 were applied across basins. Although daily duck flight distances vary among basins (Fleskes et al. 2005), data are lacking to determine whether this translates into differences among basins in energy needs.

Dark Geese

Daily energy requirements for both geese and swans were estimated using body mass equations. Body mass estimates for white-fronted geese were available on a monthly basis and this information was used to estimate daily energy requirements in that month. These energy needs were then applied to the appropriate 15-day period. The make-up of dark goose populations (% white-fronted vs. % Canada geese) varies by time interval for all basins and for the entire Central Valley. As a result, daily energy requirements for dark geese were based on the relative abundance of white-fronted and Canada geese in each 15-day interval. These energy needs were estimated for the entire Central Valley (Table 4-4), and for each basin.

White Geese and Swans

Energy needs for white geese were determined by calculating a weighted body mass for lesser snow and Ross's geese. Survey data indicate that lesser snow geese make up 60% of white geese in the Central Valley, with Ross's geese accounting for 40% (M. Wolder, U.S. Fish and Wildlife Service, personal communication). Body mass estimates for both species were available from November through February, and this information was used to estimate daily energy requirements in those months. These energy needs were then applied to appropriate 15-day interval. No time-specific body mass estimates were available for swans. Instead, a single body mass value reported by Bellrose (1980) was used to calculate a daily energy need of 1106 kcal/day. This estimate was applied to all intervals. The make-up of white goose populations varies by time interval for all basins and for the entire Central Valley. As a result, daily energy requirements for white geese were based on the relative abundance of snow/Ross's geese and swans in each 15-day interval. These energy needs were estimated for the entire Central Valley (Table 4-5), and for each basin.

Table 4-3. Daily energy requirements (DER) of ducks in the Central Valley.

Interval	*DER (Kcal/day)*
Aug 23	194
Sept 7	194
Sept 22	236
Oct 7	231
Oct 22	231
Nov 6	233
Nov 21	210
Dec 6	208
Dec 21	218
Jan 5	218
Jan 20	260
Feb 4	260
Feb 19	224
Mar 6	224
Mar 21	224

Habitat Acreage

Although waterfowl rely on a variety of wetland and agricultural habitats to meet their food energy needs, specific assumptions were made about the types of habitats used by ducks and geese and the foods consumed in these habitats. Ducks were assumed to rely on seed resources in managed wetlands, waste grain in rice fields that are winter-flooded, and waste grain in harvested cornfields, regardless if these fields are flooded. Ducks undoubtedly exploit food resources in unmanaged wetlands. However, the JV lacks an estimate of the amount of unmanaged habitat available to waterfowl in the Central Valley, and the food resources that are provided by these habitats. While managed wetlands are available in most years, it is not clear how reliable unmanaged habitats are from one year to the next. For these reasons, the JV did not include unmanaged habitats in the TRUEMET model when evaluating waterfowl food supplies. However, the importance of understanding the role of unmanaged wetlands in meeting waterfowl needs in the Central Valley and how the JV might address maintaining these habitats is recognized. Finally, the JV assumed that ducks consumed macro-invertebrate food resources in managed wetlands in late winter and early spring (see following section on invertebrate food resources in managed wetlands). Although this assumption appears to contradict our earlier statement that invertebrate food resources used by shovelers were not included in the TRUEMET model, shovelers rely heavily on non-macroinvertebrates (e.g., zooplankton), for which there is no available information.

Table 4-4. Daily energy requirements (DER) for dark goose populations in the Central Valley.

Interval	*Canada goose DER (Kcal/Day)*	*White fronted goose DER (Kcal/Day)*	*Dark goose DER (Kcal/Day)[a]*
Aug 23	387	523	0
Sept 7	387	523	0
Sept 22	387	523	522
Oct 7	387	523	522
Oct 22	387	523	522
Nov 6	387	539	538
Nov 21	387	539	538
Dec 6	365	547	544
Dec 21	365	547	540
Jan 5	365	506	497
Jan 20	365	506	498
Feb 4	365	563	553
Feb 19	365	563	553
Mar 6	365	563	549
Mar 21	365	563	538

[a]Dark goose DER based on the relative abundance of Canada geese and white-fronted geese in the Central Valley during each 15-day interval.

Dark geese were assumed to rely on seed resources in managed wetlands and waste grain in winter-flooded rice fields, dry rice fields and harvested cornfields. It was assumed that white geese and swans use the same agricultural habitats as dark geese, though swans are largely restricted to flooded agricultural habitats. The JV also assumed that white geese and swans did not exploit food resources in managed wetlands (see Habitat Foraging Values Section). Table 4-6 provides a summary of the natural and agricultural habitats available to wintering waterfowl in the Central Valley. As with the 1990 Plan, the JV assumed that 25% of all dry or unflooded rice is unavailable to waterfowl because of post-harvest practices. The JV also assumed that 50% of all unflooded corn is unavailable to waterfowl because of post-harvest practices (M. Casazza, U.S. Geological Survey, personal communication). These assumptions were applied to all basins except the San Joaquin and Tulare Basins where post harvest practices make all corn unavailable to waterfowl on private lands. Basin specific totals for each foraging habitat are presented later in this chapter. Information on how habitat estimates were derived is presented in Chapter 3.

Table 4-5. Daily energy requirements (DER) for white goose populations in the Central Valley.

Interval	*Snow/Ross s goose DER (Kcal/Day)*	*Swan DER (Kcal/Day)*	*White goose DER (Kcal/Day)[a]*
Aug 23	499	1106	0
Sept 7	499	1106	0
Sept 22	499	1106	499
Oct 7	499	1106	499
Oct 22	499	1106	632
Nov 6	499	1106	632
Nov 21	499	1106	636
Dec 6	486	1106	635
Dec 21	486	1106	622
Jan 5	486	1106	575
Jan 20	486	1106	557
Feb 4	488	1106	541
Feb 19	488	1106	525
Mar 6	488	1106	520
Mar 21	488	1106	503

[a]White goose DER based on the relative abundance of snow/Ross's geese and swans in the Central Valley during each 15-day interval.

Temporal variation in habitat availability can strongly influence the food supplies available to ducks and geese. To better understand when food resources become available to waterfowl, information on flooding schedules was obtained for public and privately managed wetlands, as well as for harvest and flooding of important agricultural crops. Timing of rice harvest was based on earlier work in the Colusa Basin, and is assumed to be representative of other rice growing regions in the Central Valley (Figure 4-6).

Flooding schedules were developed for public and privately managed wetlands in the Central Valley (Figure 4-7), as well as for rice habitat that is winter-flooded (Figure 4-8). Flooding schedules were also developed for private and public wetlands in the Sacramento Valley and applied to basins in the region (Figure 4-9). Flooding schedules that are specific to public and private wetlands in the San Joaquin and Tulare Basins were also developed (Figure 4-9).

Habitat Foraging Values

The 1990 Implementation Plan assumed that managed wetlands in the Central Valley provided an average of 750 lbs of food per acre. This estimate was based on studies of managed wetlands in the Midwest. The 2006 Plan updates this information by using food production estimates from several sites in the Central Valley during fall and winter of 1999-2000 (hereafter 2000) and 2000-2001 (hereafter 2001). Three major habitat types were sampled: (1) semi-permanent wetlands that are primarily managed for brood habitat; (2) seasonal wetlands managed for watergrass (*Echinochloa crus-galli*); and (3) seasonal wetlands managed for swamp timothy (*Crypsis schoenoides*, (Naylor et al. 2002). In both 2000 and 2001, seasonal wetlands dominated by watergrass and swamp timothy were sampled in the Sacramento Valley and San Joaquin Basin. These sampling efforts focused exclusively on seed density, and included both irrigated and non-irrigated seasonal wetlands. Semi-permanent wetlands were sampled only in 2000, because results indicated few seeds available in this habitat type (Naylor et al. 2002).

Table 4-6. Foraging habitats available to wintering waterfowl in the Central Valley.[d]

Managed Seasonal Wetlands[a]	*Flooded Rice*	*Dry Rice*[b]	*Flooded Corn*	*Dry Corn*[c]
179,232	354,633	103,435	29,488	70,080

[a] *Includes 119,173 acres of private wetlands and 60,059 acres of public wetlands.*

[b] *Excludes 25% of all dry rice acres in the Sacramento Valley that provide no food resources because of post harvest practices. Excludes all 10,000 acres of rice annually planted in the San Joaquin Basin because post harvest practices in the basin eliminate waste rice.*

[c] *Excludes 50% of all dry corn acres in the Sacramento Valley that provide no food resources because of post harvest practices. Excludes 218,724 acres of corn planted in the San Joaquin and Tulare Basin because post harvest practices in these Basins eliminate waste corn.*

[d] *Excludes cropland that is flooded after harvest from one to several weeks in Tulare Basin.*

Food density estimates for seasonal wetlands were based on 2001 results because sample sizes were larger in 2001. Sampling also began earlier in 2001 and provided a better estimate of food density in the Central Valley prior to bird arrival. Differences in food density between seasonal wetlands dominated by watergrass vs. swamp timothy were not significant, nor were differences in food abundance between the Sacramento Valley and San Joaquin Basin (Naylor et al. 2002). As a result, the average value of 566 lbs/acre reported for these two plant communities was used (Naylor et al. 2002) and applied to all seasonal wetlands in all basins (see exceptions for the Suisun and Tulare Basins).

Waterfowl do not consume all the foods available in wetlands because foraging efficiency declines with decreasing food densities (Reinecke et al. 1989). To estimate this "foraging threshold," seed density left in wetlands after spring migration was estimated in 2000 and 2001 (Naylor et al. 2002). These densities were lower in 2000 than 2001, and the 2000 result (about 30 lbs/acre) was adopted as the foraging threshold for wetland habitats. This figure was subtracted from the seed density estimate of 566 lbs/acre to yield a seasonal wetland food density of 533 lbs/acre.

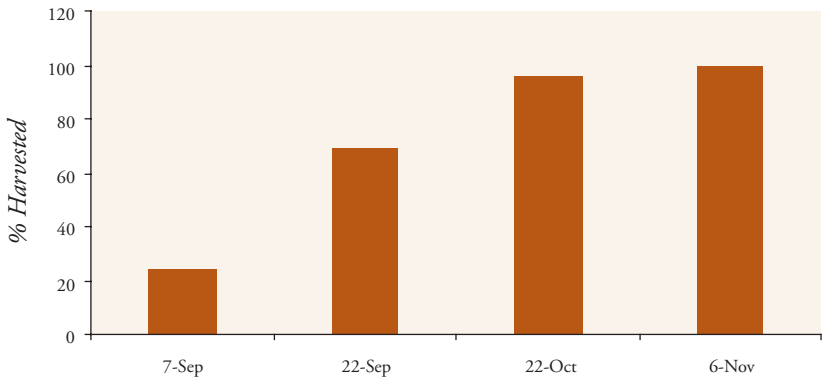


Figure 4-6. Percent of planted rice harvested by time period in the Central Valley.

Results from 2000 indicate that seed density in semi-permanent wetlands was less than the 30 lbs/acre foraging threshold (Naylor et al. 2002). As a result, semi-permanent wetlands were assumed to provide no food for either ducks or dark geese. However, waterfowl may consume the leaf, stem, and root/tuber

material of some wetland plants. Although these foods do not appear to be important for ducks in the Central Valley (Euliss and Harris 1987, Miller 1987), geese may exploit them. For example, snow geese are known to consume alkali bulrush in semi-permanent wetlands throughout the Central Valley (C. Isola, U.S. Fish and Wildlife Service, personal communication). Semi-permanent wetlands only account for 10-15% of all wetlands in a basin. However, a better understanding of food resources in this habitat type would allow a better assessment of waterfowl needs in the future.

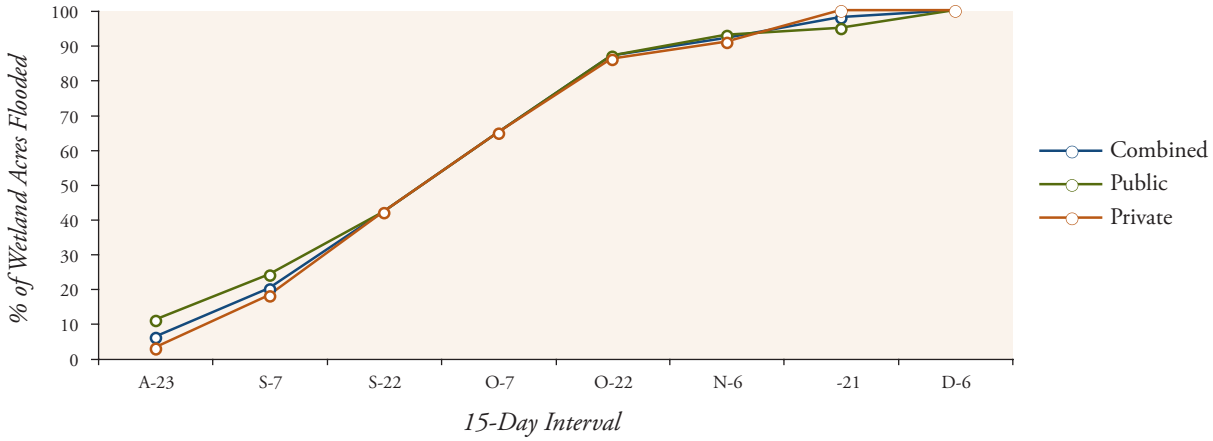


Figure 4-7. Flooding schedules for managed public and private seasonal wetlands in the Central Valley. A "combined" flooding schedule for private and public wetlands was estimated using the relative abundance of these ownership classes.

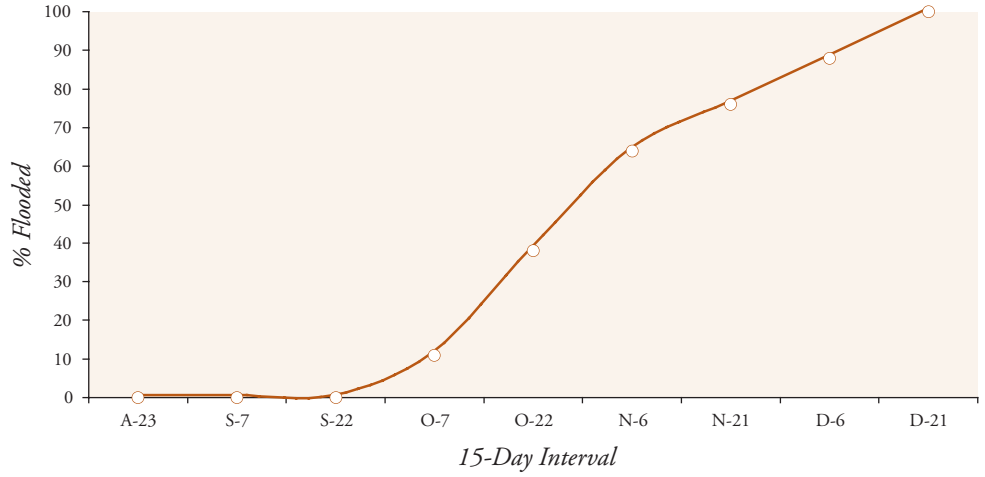


Figure 4-8. Winter-flooding schedule for harvested rice fields in the Central Valley. This flooding schedule was applied to all rice growing basins.

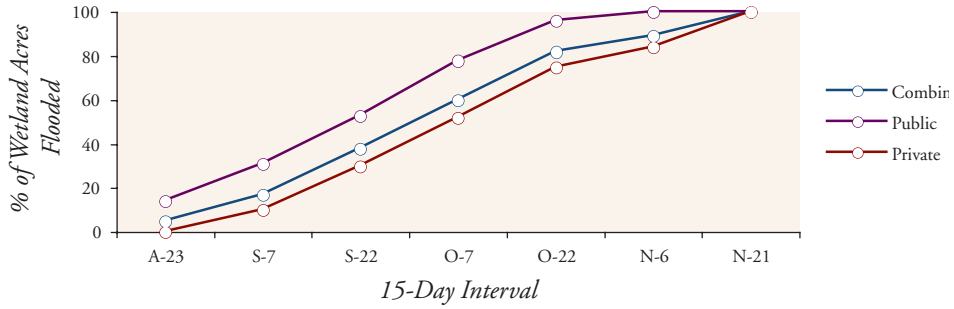


Figure 4-9(a).

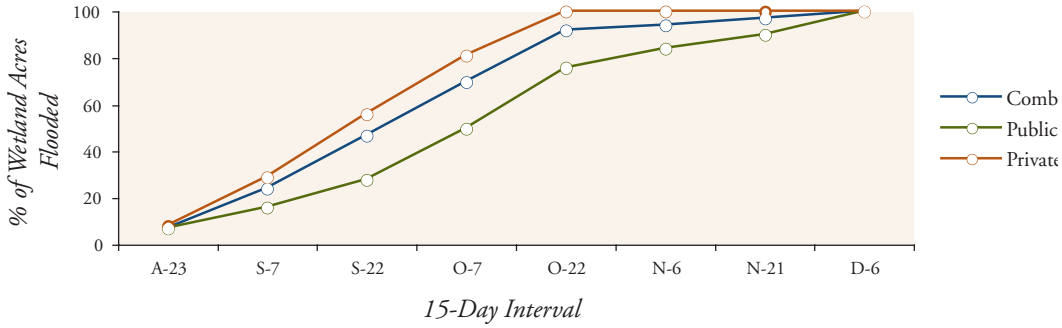


Figure 4-9(b).

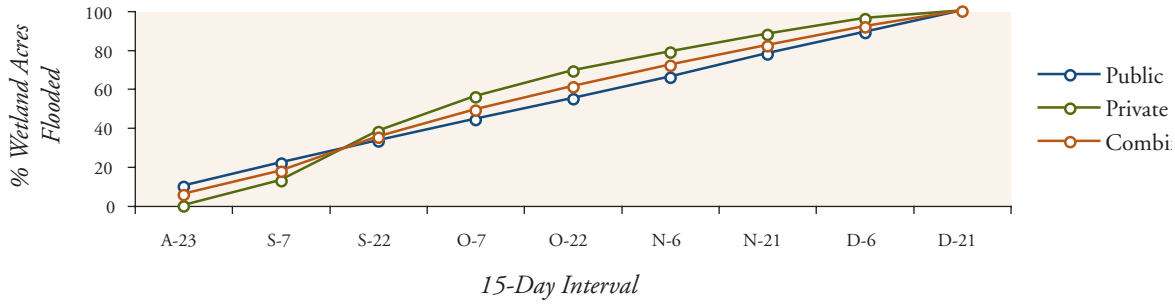


Figure 4-9(c).

Figure 4-9. Seasonal wetland flooding schedules for basins in Sacramento Valley (a), San Joaquin Basin (b), and Tulare Basin (c).

Food habitat studies in the Central Valley indicate that invertebrates become increasingly important to dabbling ducks in late winter and spring (Euliss and Harris 1987), and may be important throughout the wintering period in some habitats in the Tulare Basin (Euliss 1984, J. Fleskes, U.S. Geological Survey, personal communication). Unfortunately, information on invertebrate biomass is lacking for Central Valley wetlands. However, there is evidence that increases in invertebrate populations in late winter and spring correspond to increased waterfowl consumption (Batzer et al. 1993). Seasonal shifts in diet suggest that invertebrate consumption by most Central Valley ducks is minimal prior to January. However, invertebrates can make up twenty-five percent of the diet from January through March (Euliss and Harris 1987). To recognize the importance of invertebrates during late winter in the Central Valley, the JV estimated that seasonal wetlands provide 28 lbs of macro-invertebrate matter per acre beginning January 1. This estimate is based on late winter estimates of invertebrate biomass for seasonal wetlands in the Mississippi Alluvial Valley (Manley 1999).

The 1990 Plan assumed that rice and corn habitats provide 250 lbs (280Kg/ha) of food per acre. This estimate equaled the amount of rice left in fields that are burned after harvest in the Sacramento Valley (Heitmeyer 1989). Although the 1990 Plan recognized that moist-soil and invertebrate food resources were likely present in rice, the amount of these food resources was unknown. Thus, 1990 foraging values were based solely on waste rice availability. The food density of corn was assumed to be the same as for rice because no information was available for this habitat type.

Miller et al. (1989) estimated that 349 lbs/acre of rice was left in conventionally harvested fields in the mid-1980's. Rice harvest technique has changed in the last decade to include "strip harvest" that may leave less rice in the field (Miller and Wylie 1996). Post-harvest treatment of rice has also changed in response to air quality restrictions and the new strip harvest methods. For example, few rice fields are now burned in the Central Valley and current manipulation of straw in harvested fields (e.g., disking, bailing, and flooding) may have reduced the amount of waste rice that is accessible to waterfowl. The 2006 Plan also assumes that 349 lbs/acre of rice is available to waterfowl immediately after harvest (Miller et al. 1989). Consumption of rice by non-waterfowl species reduces the amount of grain available to ducks and geese between harvest, bird arrival, and winter flooding of rice fields. As a result, 15% of waste rice is assumed to be eaten by non-waterfowl species based on estimates of this loss in the Mississippi Alluvial Valley; (Stafford et al. 2006), leaving 297 lbs/acre. Moist-soil food resources average 25 lbs/acre in California rice fields (M.R. Miller, U.S. Geological Survey, unpublished data). This further increased the food density for rice habitat to 322 lbs/acre. Finally the 30 lb/acre foraging threshold established for wetland habitats was applied to rice, which reduced food density in this habitat to 292 lbs/acre. Although work in the Mississippi Alluvial Valley indicates that invertebrates average five to six lbs/acre in rice fields in winter (Hohman et al. 1996, Manley 1999), invertebrates were not included as a food resource in the Central Valley due to uncertainty over the type, biomass, and seasonal availability of invertebrates in rice fields.

Food densities used for rice in the 2006 Plan were based on twenty-year-old estimates. Increases in harvest efficiency, rice yields, and changing post-harvest practices may have reduced the amount of waste grain now available to waterfowl. Although these uncertainties do not affect wetland restoration goals, they do reduce the JV's ability to estimate the amount of rice that must be available to meet waterfowl needs.

Table 4-7. Densities (lbs/acre) and true metabolizable energy (TME) of important waterfowl foods in the Central Valley.

Food[a]	*Density (lbs/acre)*	*TME (Kcal/g)*
Moist-Soil[b]	533	2.5
Invertebrates[c]	28	2.39
Rice[d]	292	3.0
Corn[e]	463	3.9

[a]*Does not include agricultural foods unique to Tulare Basin.*
[b]*TME estimates for moist-soil seeds from Checkett et al. 2002.*
[c]*TME estimates for invertebrates from Checkett et al. 2002.*
[d]*TME estimates for rice from Reinecke et al. 1989.*
[e]*TME estimates for corn from Petrie et al. 1997.*

While rice provides most of the agricultural habitat for waterfowl in the Central Valley, corn is an important food source in some areas, particularly the Delta Basin. Food density of corn was determined by multiplying average corn yields for the Central Valley by the amount of corn remaining on the ground after harvest (5.6%). Non-waterfowl consumption of corn was assumed to be the same as for rice, as was the 30 lb/acre foraging threshold. Overall, cornfields are assumed to provide 463 lbs/acre of waste grain (Table 4-7). In the Tulare Basin, waterfowl rely heavily on post-harvest flooded fields of several different crop types during August–October (e.g., safflower, barley/wheat, alfalfa; Fleskes et al. 2003).

Waterfowl carrying capacity is strongly dependant on food densities. However, the energy or calories provided by these foods also influences waterfowl carrying capacity. As a result, metabolizable energy density estimates for moist soil seeds, rice, corn, and invertebrates were obtained from published studies for use in the energetic model (Table 4-7).

Moist soil seeds and agricultural grains decompose under flooded conditions, and deterioration of these foods can significantly reduce waterfowl energy supplies. Decomposition rates for moist soil seeds have been determined from fall through spring in the Central Valley (Naylor et al. 2002), while decomposition rates for rice and corn have been determined for agricultural habitats in the Mississippi Alluvial Valley (Nelms and Twendt 1996). These decomposition rates were incorporated into the energetic model when estimating waterfowl food supplies between August and March.

Overall Assessment of Habitat Conditions in the Central Valley

Habitat conditions for wintering waterfowl were evaluated for the entire Central Valley, as shown in Figure 4-10. This figure depicts the relationship between food energy supplies and population energy demand for all ducks in the Central Valley between August and March as estimated by the TRUEMET model. Duck food supplies are adequate even when duck populations are at NAWMP goals. Prior to mid-September energy supplies are low, as few seasonal wetlands are flooded and no winter-flooded rice is available. However, food supplies are well above population needs by late October, as the majority of public and private wetlands are flooded for opening of hunting season. Habitat conditions continue to improve for ducks well into November, as winter-flooded rice becomes

available. Duck energy supplies begin to decline by mid to late December as fewer habitats are added to the landscape, and the effects of waterfowl consumption and food decomposition begin to take effect. However, food supplies remain well above population needs through March when most ducks begin leaving the Valley (Figure 4-10).

Food supplies for both dark and white goose populations in the Central Valley are also well above population needs (Figure 4-11). Geese begin arriving in the valley at the peak of rice harvest and food supplies become increasingly available through November. Although food supplies begin to decline after this point, both dark and white goose populations continue to have access to abundant food resources throughout winter and early spring (Figures 4-11a and 4-11b).

Wetland restoration efforts over the past two decades coupled with increases in winter-flooded rice have substantially improved habitat conditions for Central Valley ducks. To illustrate, food supplies in the 1970's were compared to duck energy needs. Seasonal wetlands in the 1970's were estimated at 140,000 acres by subtracting the number of acres restored between 1986 and 2003 from current wetland estimates. Wetland restoration was not tracked prior to 1986. Winter-flooded rice was estimated at 50,000 acres based on interviews with resource professionals, while corn acres were assumed to be the same. Waterfowl populations during the 1970's were assumed to be at NAWMP goals.

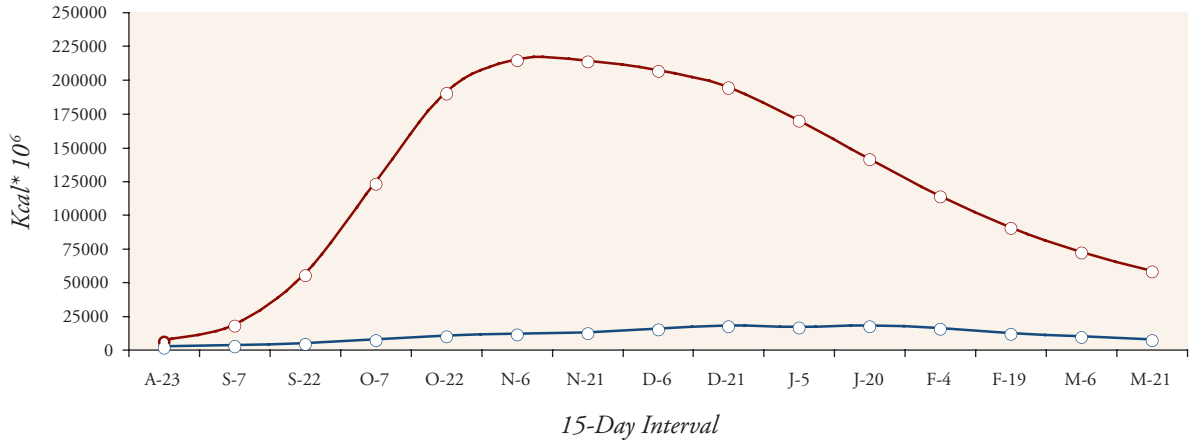


Figure 4-10. Population energy demand (blue) vs. food energy supply (red) for ducks in the Central Valley when duck populations are at NAWMP goals.

Food supplies for dabbling ducks during the 1970s may have been inadequate after late January (Figure 4-12). The likelihood that duck populations in the Central Valley are limited by conditions on the wintering grounds has almost certainly declined during the past twenty-five years.

Approximately two-thirds of the waterfowl habitat in the Central Valley is privately owned. To demonstrate the importance of these habitats, ducks were restricted to foraging on public lands in the TRUEMET model. Duck food resources in this "public lands only" scenario were exhausted by early November (Figure 4-13). This result demonstrates the importance of private lands for waterfowl and the need to develop conservation objectives for these habitats.

Food resources for ducks in the Central Valley are adequate even when populations are at NAWMP goals. However, 68% of all food resources are provided by agricultural habitats, with winter-flooded rice providing the bulk of these foods. Agricultural habitats are currently afforded little or no long-term protection. As a result, conservation objectives should be aimed at increasing the security of waterfowl food resources in each of the valley's basins.

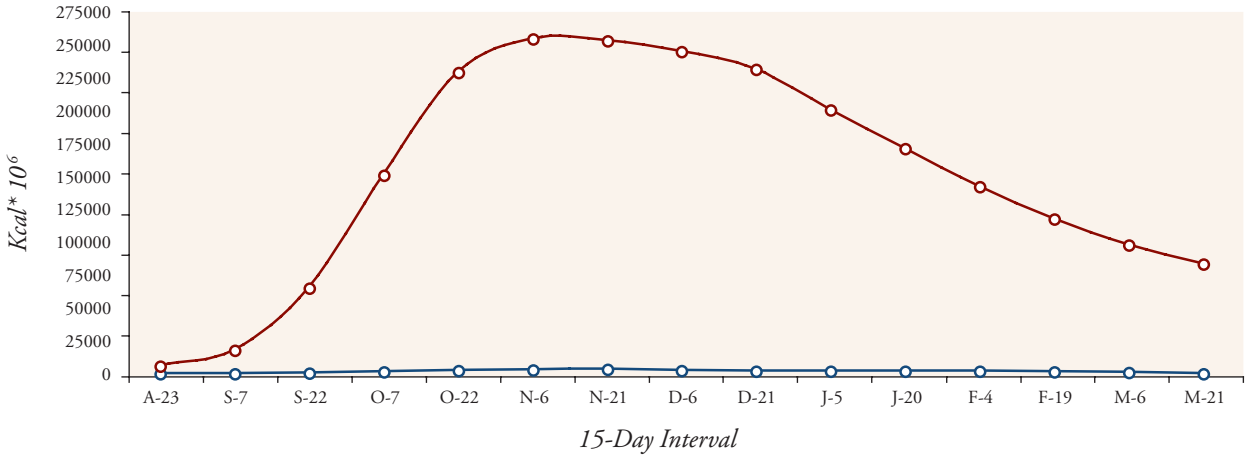


Figure 4-11(a). Dark goose population energy demand (blue) vs. food energy supplies (red) for the Central Valley.

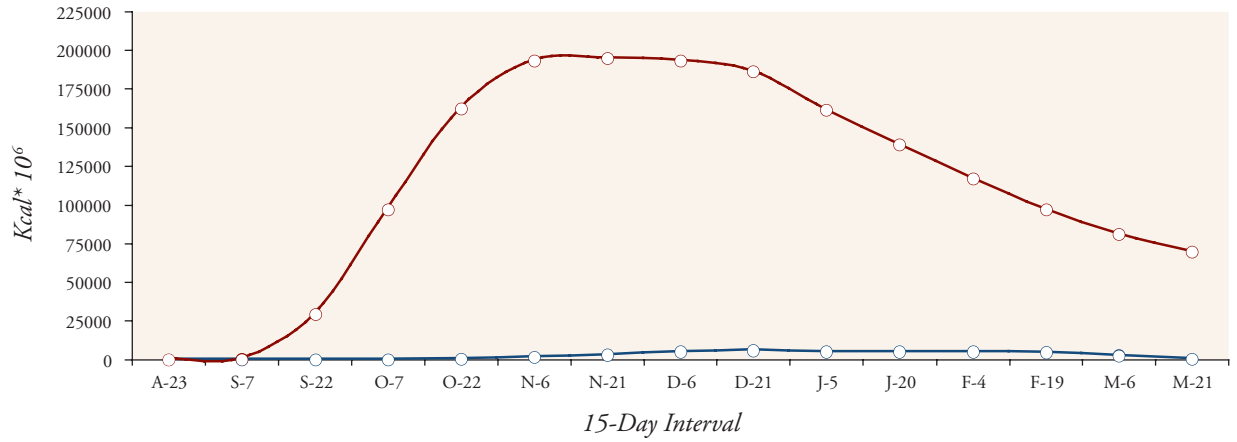


Figure 4-11(b). White goose population energy demand (blue) vs. food energy supplies (red) for the Central Valley.

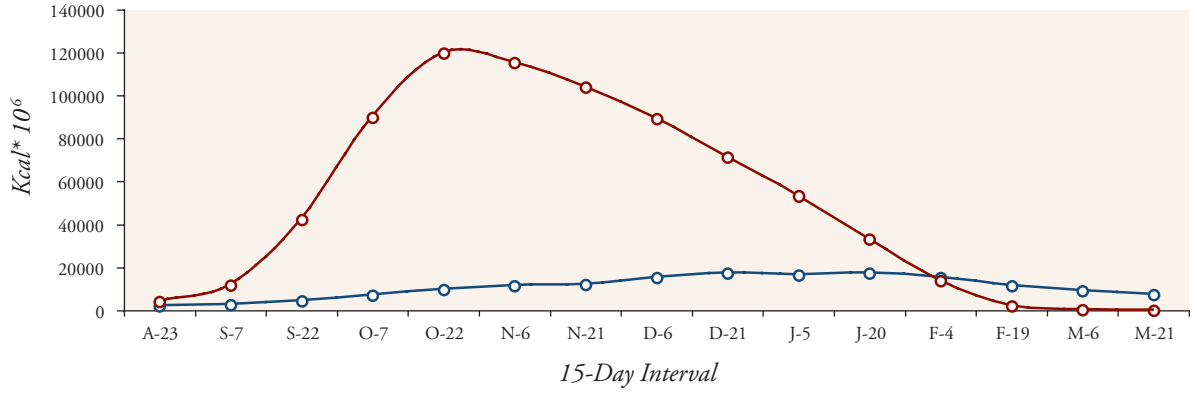


Figure 4-12. Population energy demand (blue) vs. food energy supply (red) for ducks in the Central Valley during the 1970s.

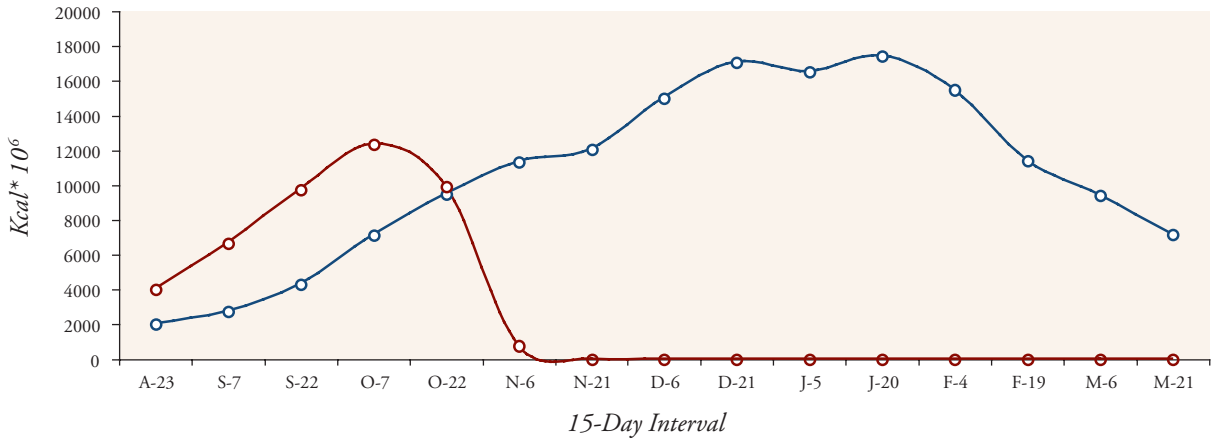


Figure 4-13. Population energy demand (blue) vs. food energy supply (red) for ducks in the Central Valley if only public lands are available.

Methods for Establishing and Prioritizing Conservation Objectives for Wintering Waterfowl in Each Basin

Conservation objectives for wintering waterfowl in the Central Valley were established at the basin scale. The 1990 Plan identified five conservation objectives for wintering waterfowl including: (1) Wetland restoration; (2) Protection of existing wetland habitats; (3) Wetland enhancement; (4) Adequate power and water supplies for wetland management; and (5) Agricultural land enhancement. Two additional conservation objectives were added in the 2006 Plan to recognize the agricultural community's critical role in meeting waterfowl needs and to provide greater flexibility in working with landowners. These include farmland easements that maintain waterfowl food resources on agricultural land (Type I), and farmland easements that buffer existing wetlands from urban and residential growth (Type II). Type I easements seek to maintain waterfowl-friendly practices on agricultural land in perpetuity (e.g., winter-flooding of rice, use of wildlife friendly crop types and post-harvest practices). Type II easements are designed to serve as buffers between wetland habitats and industrial and residential development. This type of easement would not require landowners to provide waterfowl food sources, but would place development restrictions on a property (the legal conditions and qualifications of both easement types are beyond the scope of this document).

For the 2006 Plan, the JV elected to meet at least 50% of all duck energy needs through managed seasonal wetlands; hereafter this is referred to as the "wetland constraint." This planning goal was applied to all basins. The decision to meet 50% of all duck energy needs from wetlands considered both biological and socio-economic factors. Captive studies of non-breeding waterfowl indicate that ducks require a balance of natural and agricultural foods (Loesch and Kaminski 1989), and the JV favors habitat complexes that provide a mixture of agricultural and wetland resources. In addition, increases in harvest efficiency and changing agricultural markets could significantly reduce the food resources provided by grain crops. These events are largely beyond the control of the JV, and seeking a long-term balance between agricultural and wetland habitat is prudent. Agriculture now provides almost 70% of all waterfowl food resources in the Central Valley.

The same approach was used to establish conservation objectives in each basin. First, the relationship between population energy demand and existing food supplies was evaluated for ducks, dark geese, and white geese using the TRUEMET model. Second, the relative contribution that agriculture and managed seasonal wetlands make to waterfowl food supplies in the basin was estimated. Finally, changes in waterfowl carrying capacity that would result from the loss of agriculture were evaluated, as was the ability of public lands to meet duck energy needs. This overview of basin conditions provided the basis for establishing habitat conservation objectives, and may help identify which of these objectives should receive priority. Methods for establishing conservation objectives are described below.

Wetland Restoration Objectives

To determine how much wetland habitat was needed for each basin under the wetland constraint, duck population objectives in a basin were reduced by 50% and the TRUEMET model was used to estimate the wetland acres needed to meet the energy demands of

this reduced population. Acres of wetland habitat were incrementally added to the basin until TRUEMET simulations indicated that food energy supplies remained above population energy demand for the entire August to March period. No agriculture was included. The number of wetland acres needed to achieve this result was compared to current wetland acres in the basin. The difference between these two figures represents the wetland restoration objective.

Wetland Enhancement

Water management is critical to producing sufficient quantities of waterfowl food in Central Valley wetlands. However, water control structures, levees, and water conveyance networks used to manage water levels must be periodically repaired or enhanced to maintain or improve food production. Interviews with resource professionals suggest that wetlands in the Valley should undergo some level of structural enhancement every ten to fifteen years. The JV assumes that managed wetlands in the Central Valley need some form of enhancement on average every twelve years. As a result, enhancement objectives are expressed on an annual basis and are perpetual. For example, a basin containing 24,000 acres would have an annual enhancement objective of 2,000 acres. Wetland acres will increase in most basins because of restoration efforts. As a result, enhancement objectives were calculated by 2,000-acre increments between existing wetland acres and basin wetland objectives. Failure to at least maintain the management capabilities of these wetlands will mean a decline in food production over time. These declines would result in an underestimate of the acres of wetlands needed to meet duck energy requirements.

The JV also recognizes the importance of management-based enhancement (e.g., vegetative manipulation and timing of drawdowns), and the cost-sharing programs that promote these activities. However, it is beyond the scope of this document to prescribe site specific enhancement recommendations. The JV assumes that wetland managers are best prepared to determine and to implement these activities.

Water Supplies for Seasonal Wetland Management

The Central Valley Wetlands Water Supply Investigations (Water Report; US Fish and Wildlife Service 2000) provides an estimate of the amount of water needed for optimal management of seasonal wetlands in the Central Valley. These water requirements differ by both time period and basin and this information was used when estimating basin water needs (Figure 4-14). These estimates assumed that wetland restoration objectives have been met, and represent the amount of reliable and affordable water needed for wetland management on public and private lands. Note that the water supply objective equals the amount of water needed for seasonal wetlands, and not the amount of water that is currently secured for wetland management.

Wetland Protection

The 1990 Plan estimated that forty percent of managed wetlands in the Central Valley were unprotected. Tracking of JV accomplishments indicate that most of these wetlands have received long-term protection (likely > 95%; see Chapter 2). Independent estimates of unprotected wetlands also indicate that less than five percent of managed wetlands in the Central Valley remain unprotected (K. Petrik, Ducks Unlimited, Inc., personal communication). Although most wetlands are now protected, the JV is unable to determine how many acres of managed wetlands remain unsecured in each basin. As a result, no wetland acreage protection objectives were established in the 2006 Plan. However, the JV will seek to secure long term protection as these wetlands are identified. The JV will document the amount of unprotected habitat in each basin in the immediate future, and these efforts will form the basis of new wetland protection goals in the next plan update.



Hedgerow Farms, Yolo County
Photo: John Anderson

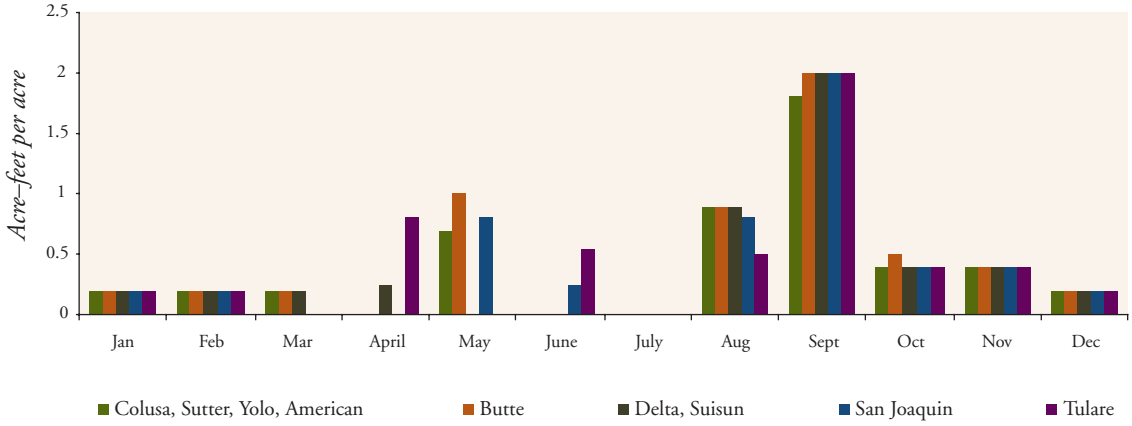


Figure 4-14. Monthly water requirements, acre-feet per acre, for seasonal wetlands in each of the Central Valley's basins.

Agricultural Enhancement

The Joint Venture's wetland constraint provides a balanced mix of agricultural and wetland habitat for each basin, as the JV assumes that agriculture will likely continue to provide 50% of all duck energy needs in most basins. The agricultural enhancement objective represents the amount of agricultural habitat that must be maintained for ducks, even when wetland restoration objectives are met in a basin. For ducks, agricultural enhancement includes rice fields that are winter-flooded or cornfields that are either winter-flooded and/or not deep plowed following harvest.

Geese in the Central Valley rely heavily on agricultural food sources to meet their daily energy requirements. Agricultural enhancement objectives that are based solely on duck needs may not be adequate for geese. As a result, TRUEMET was used to estimate the amount of agricultural habitat that must be maintained to meet the needs of ducks and geese when wetland restoration goals are met. The JV defines agricultural habitat types necessary to meet duck and goose energy requirements as waterfowl-friendly rice and/or waterfowl-friendly corn, depending on the basin. For basins dominated by rice, the waterfowl-friendly agricultural objective is divided into flooded and non-flooded categories because ducks are limited to winter-flooded fields, while geese would utilize dry fields provided they are not deep plowed. For basins dominated by corn, the waterfowl-friendly agricultural enhancement objective reflects the amount of corn that is either winter-flooded and/or not deep plowed following harvest.

Agricultural Easements for Maintaining Waterfowl Food Production (Type I)

Agricultural enhancement objectives represent the amount of farmland needed to meet waterfowl food energy needs when wetland restoration objectives are met. Agricultural easements that permanently maintain waterfowl food sources on farmlands (e.g., winter flooding of rice) contribute to this objective. This plan does not identify specific areas that are candidates for this type of agricultural easement. Instead, it provides background information that may be helpful to the JV in identifying what basins require an easement program in the immediate future and the general location within the basin where these easements might be sought. Three criteria were evaluated for each basin: (1) the importance of agricultural food resources in meeting waterfowl needs in the basin (e.g., Suisun Marsh Basin has no agriculture); (2) the extent to which these agricultural lands are threatened by human population growth and associated land conversion (see Chapter 3); and (3) wetland restoration goals. Most wetland restoration in rice growing basins will occur on rice ground. While wetland restoration provides obvious benefits, it also reduces the rice habitat available to waterfowl. Changes in rice habitat must consider the loss of riceland to development and conversion of rice to wetland habitat. This process is demonstrated using a hypothetical basin (Figure 4-15). The basin has 100,000 acres of planted rice. Seventy thousand acres are winter-flooded, while 20,000 acres are dry but are not deep plowed following harvest and thus, provide waterfowl food resources. The remaining 10,000 acres are dry and are deep plowed following harvest. The agricultural enhancement objective for the basin is 80,000 acres of waterfowl-friendly rice. Within the basin 20,000 acres will be lost to development and 10,000 acres will be converted to wetlands to meet the JV's wetland restoration objective. This leaves a planted rice base of only 70,000 acres, which is insufficient to meet the basin's agricultural enhancement goal (Figure 4-15).

Basins where waterfowl meet most of their food energy needs from agricultural habitats, and where these habitats are threatened by development are likely candidates for an easement program. Geographic Information Systems and local knowledge provided by the JV's basin working groups were used to assess development threats to agricultural habitats in each basin. Large wetland restoration objectives that further reduce the rice base may contribute to the need for a Type I easement program.

Agricultural Easements that Buffer Urban and Residential Growth (Type II)

The quality of existing wetlands may be reduced where urban or residential growth occurs at or near wetland boundaries. Easements that maintain land in agricultural production can buffer this development, even though these lands may contain no waterfowl foods. The 2006 Plan does not identify specific areas that are candidates for this type of agricultural easement. Instead, the 2006 Plan provides background information that may be helpful to the JV in identifying what basins require an easement program of this type (Type II), and generally where in the basin these easements might be sought. Basins that contain large blocks of private and/or public wetlands in areas of high urban or residential growth are likely candidates for an easement program. Geographic Information Systems and local knowledge provided by basin working groups were used to assess development threats to wetlands in each basin.

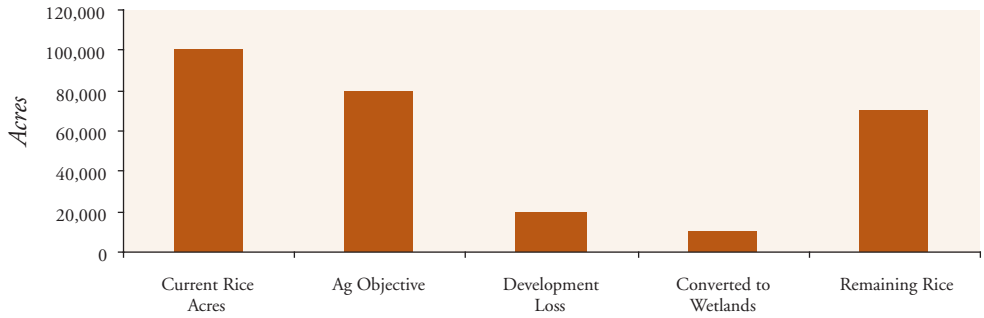


Figure 4-15. Forecasted changes in rice acreage for a hypothetical basin compared to the basin's agricultural enhancement objective.

Conservation Objective Priorities

Each conservation objective described above represents important habitat needs for ducks and geese. However, the JV recognizes that some of these objectives may need to be emphasized, at least in the short term. For example, should wetland restoration be highlighted in a basin or should efforts focus on enhancing agricultural habitats? In some cases multiple conservation objectives may be emphasized at the same time, especially where funding sources are tailored to specific objectives. To provide some insight into which objectives may be most important in the near future, the JV reviewed five biological and socio-economic factors that are described below. Some of these socio-economic factors were reviewed in Chapter 3 and this information is frequently referenced. The intent here is not to establish a rigid list of conservation objective priorities for each basin (i.e., there is no scoring process). Instead, the 2006 Plan seeks to provide resource managers with material that may help determine which objectives should be emphasized in the short and long term.

1. Population Energy Demand vs. Food Energy Supplies: Current Conditions

Overall, food resources in the Central Valley are currently adequate for waterfowl, even if duck populations were at NAWMP goals. However, food resources in some basins may not meet population energy needs. The extent to which existing food supplies now meet waterfowl needs in a basin when duck populations are at NAWMP goals was categorized as low (< than 75% of waterfowl energy needs met), moderate (75%-100% of waterfowl energy needs met), or high (> 100% of food energy needs met). In general, conservation objectives aimed at increasing the protection of existing habitats may be favored where waterfowl food energy supplies are already high in the basin.

2. Habitat Protection


Yolo Wildlife Area
Photo: Dave Feliz, DFG

The majority of waterfowl food resources in the Central Valley are found on agricultural lands that have little or no long-term protection. In contrast, most managed wetlands are afforded long-term protection through fee title purchases and conservation easements. However, the contributions that agricultural and wetland habitats make to total food supplies differ among basins. Current habitat protection for each basin was estimated as the percent of duck energy needs now supplied by wetlands, although the JV recognizes that not all wetlands are protected. One example involves a basin where 50% of duck energy needs are to be met through a wetland base of 30,000 acres, while the remaining 50% is met by a 50,000-acre agricultural enhancement objective. If 15,000 acres of wetland currently exist (leaving a 15,000 acre wetland restoration goal), then 25% of the food sources needed by ducks are currently protected (this assumes no current agricultural protection). This level of protection would increase as the wetland restoration goal is met and easements are obtained on farmland, provided that restored wetlands are also afforded permanent protection. Four levels of overall habitat protection were recognized: (1) very low (0-25%); (2) low (26-50%), (3) moderate (51-75%), and (4) high (76-100%).

3. Progress in Meeting Wetland Needs

Wetland restoration objectives are critical to offsetting the long-term risks of meeting waterfowl needs on unprotected agricultural habitat. The degree to which wetland acres in a basin meet the Joint Venture's 50% wetland constraint was categorized as; (1) very low (0-25%); (2) low (26-50%); (3) moderate (51-75%); and (4) high (76-100%). For example, "Progress in Meeting Wetland Needs" would be "very low" in a basin having 2,500 acres of wetlands, but needing 10,000 acres of wetlands to provide 50% of duck energy needs.

4. Human Population Growth

Although human populations in the Central Valley are predicted to increase by 130% over the next four decades, this growth will not be uniform among basins. Some basins will experience substantial increases in population growth by 2040, while growth in other basins will be modest. Forecasts for population growth were made earlier for each basin (Chapter 3). Four categories of population growth to 2040 were recognized when establishing conservation objective priorities: (1) very low (< 200,000); (2) low (200,000-600,000); (3) moderate (> 1,000,000); and (4) high (> 2,000,000). Geographic Information systems were also used to depict the spatial pattern of this growth relative to wetland and agricultural habitats.

5. Changes in Land Use

Changes in land use track increases in human populations. Some basins are projected to lose substantial amounts of irrigated farmland by 2040. This loss is important in basins where agriculture provides the majority of waterfowl food supplies. Estimates of farmland loss were made for each basin in Chapter 3. Estimates of rice loss were also made for basins where rice is an important crop. Three categories of pre-irrigated farmland or rice loss by 2040 were recognized: (1) low (< 5%); (2) moderate (5-10%); and (3) high (> 10%).

The 2006 Plan established some guidelines when interpreting these five factors. First, agricultural easements are emphasized in areas that are predicted to experience substantial urban or residential growth. Less emphasis is placed on easements in basins where little growth is predicted (an alternative view may be to emphasize easements in these basins as easements costs may be lower because of less competition from development). Second, wetland enhancement is emphasized in basins where wetland objectives are closer to being

met. Enhancement is also necessary in basins that are farther from meeting their wetland restoration objectives, though restoration may ultimately be emphasized. It bears repeating that some resource managers may reach different conclusions when deciding what objectives to emphasize. However, the purpose here is to provide information that allows informed decisions when considering conservation priorities, not to develop a rigid list of those priorities.

Figure 4-16 describes conditions in a hypothetical basin. The basin contains 5,000 acres of seasonal wetlands and 50,000 acres of flooded rice. All 5,000 wetland acres are protected, while no agricultural habitat is under easement. Fifteen thousand acres of seasonal wetlands are needed to meet the JV's wetland constraint. This leaves a wetland restoration objective of 10,000 acres. Forty thousand acres of flooded rice are needed when the wetland restoration objective is met (i.e., when 15,000 acres of wetlands are present in the basin). An assessment of food energy demand vs. food energy supply concluded that the food resources provided by these existing habitats exceed 100% of duck needs (high). Although 100% of the basin's wetlands are protected (complete protection), the overall level of habitat protection was rated very low because only 5,000 of the 15,000 acres of wetlands needed are present, resulting in an overall level of habitat protection of less than 17%. (If wetland restoration objectives were met 50% of duck energy needs would be provided by protected habitats. Because only a third of these 15,000 acres are present, the current level of habitat protection is only 16.7% or 0.33 x 0.5).

Progress in meeting wetland needs was rated low because only 33% of needed wetlands are present (5,000/15,000). Most food resources are found on agricultural lands that are unprotected. However, population growth is forecasted as very low (< 200,000). As a result, loss of irrigated farmland is also expected to be low (< 5%).

Wetland restoration is emphasized for the hypothetical basin described in Figure 4-16. While most food resources are provided by agriculture, there is little evidence that these habitats are threatened by development prior to 2040. This lack of development may increase opportunities for wetland restoration, as land prices are not influenced by real estate speculation. Focusing on wetland restoration now may offset agricultural losses that occur after 2040.

Current Food Supplies	*Habitat Protection*	*Progress in Meeting Wetland Needs*	*Population Growth*	*Loss of Irrigated Farmland*	*Conservation Objective Priorities*
High	High	High	High	High	Wetland Restoration
Moderate	Moderate	Moderate	Moderate	Moderate	
Low	Low	Low	Low	Low	
	Very Low	Very Low	Very Low		

Figure 4-16. Factors used to identify which conservation objectives may be emphasized in a hypothetical basin.

Conservation Objectives and Priorities for Wintering Waterfowl in Each Basin

American Basin

Population Energy Demand vs. Food Energy Supplies: Current Conditions

Population objectives for wintering waterfowl in the American Basin are presented in Figures 4-17 through 4-19. Duck population objectives are highest during late winter, while population objectives for dark and white geese peak during November and early January respectively. Rice provides the majority of foraging habitat, as there are few privately owned wetlands and no publicly managed habitats (Table 4-8).

Food supplies for American Basin ducks are adequate in all time periods with peak supplies occurring in November and December (Figure 4-20). However, duck energy needs do not peak until late winter when food supplies are well below the November-December maximum. Food supplies for dark and white geese are also well above population needs, with peak use coinciding with maximum food resources (Figure 4-21). Agricultural habitat provides 95% percent of the food energy available to ducks in the American Basin. Loss of these agricultural foods would significantly reduce carrying capacity, as food supplies would be exhausted by early December if ducks are restricted to foraging in wetlands (Figure 4-22).

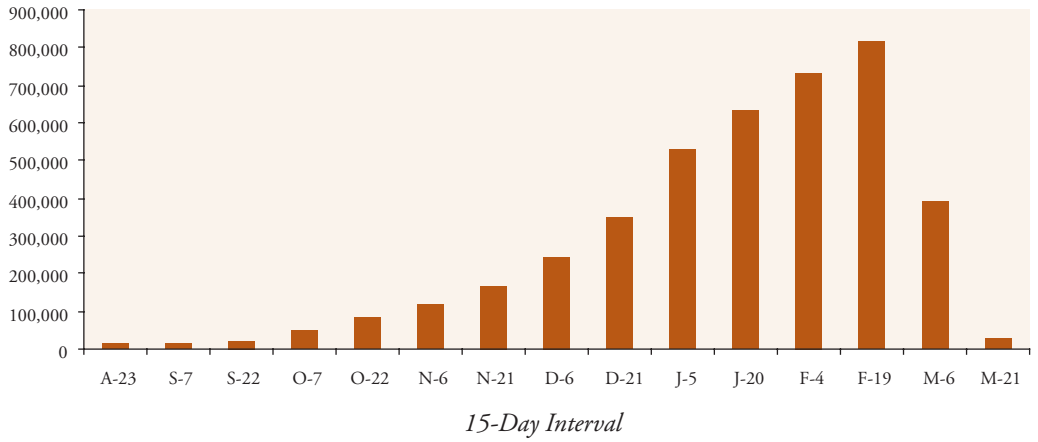


Figure 4-17. Population objectives by 15-day intervals for ducks in American Basin.

Conservation Objectives

Wetland Restoration

The amount of seasonal wetlands required to meet 50% of duck energy needs in American Basin is estimated at 23,187 acres. There are currently 3,187 acres of seasonal wetland habitat in the basin, leaving a wetland restoration objective of 20,000 acres.

Wetland Enhancement

The annual enhancement objective for existing wetlands in American Basin is 266 acres/year. Wetland enhancement objectives increase to 1,932 acres/year when wetland restoration objectives are met for the basin (Table 4-9).

Water Supplies for Seasonal Wetland Management

Annual management of seasonal wetlands in American Basin will require 115,945 acre-feet of water when wetland restoration objectives in the basin have been met. These annual water requirements are further broken down by time period to reflect flooding and summer irrigation needs (Table 4-10).

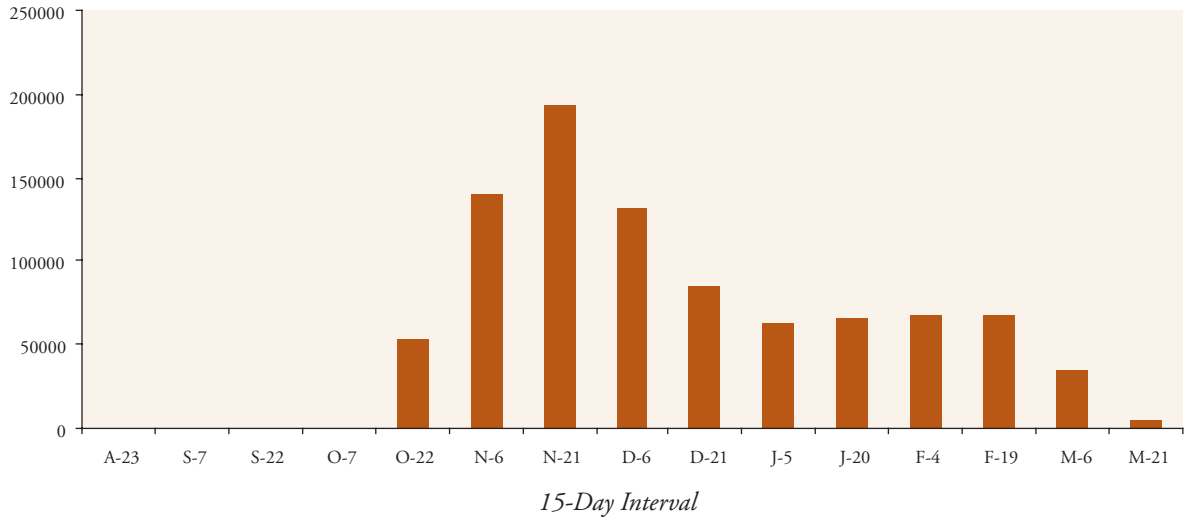


Figure 4-18. Population objectives by 15-day intervals for dark geese in American Basin.

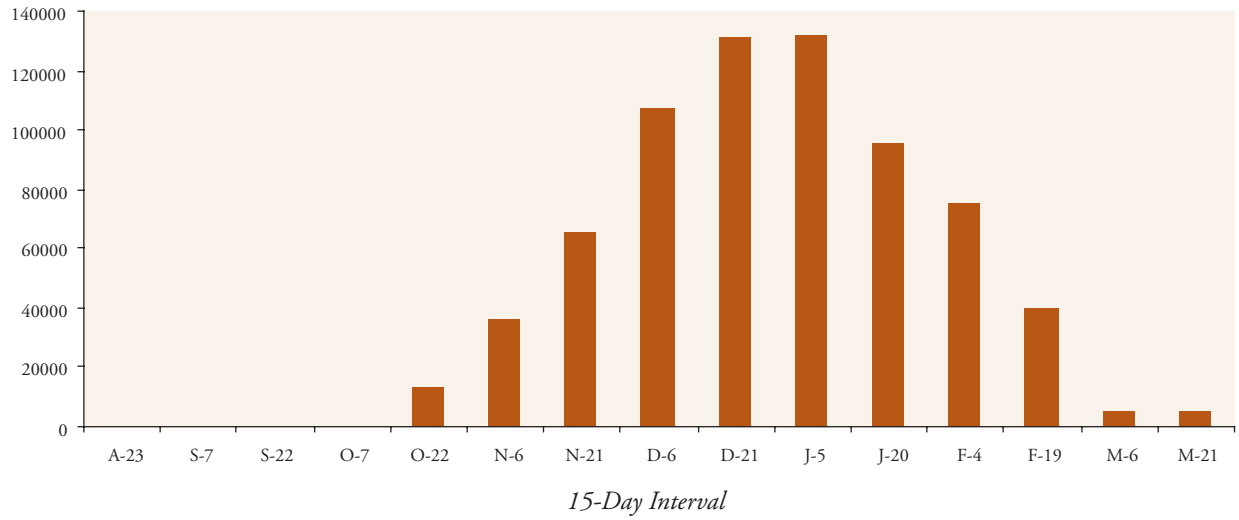


Figure 4-19. Population objectives by 15-day intervals for white geese in American Basin.

Table 4-8. Foraging habitats available to wintering waterfowl in the American Basin.

Seasonal Wetlands	*Flooded Rice*	*Unflooded Rice*	*Corn*
3,187	72,049	21,014	1,146

Agricultural Enhancement

The agricultural enhancement objective for American Basin is 69,000 acres, all of which is assumed to be rice. This objective represents the amount of rice habitat that must be maintained in a waterfowl-friendly state when wetland restoration objectives have been met for the basin. Fifty thousand of these acres must be winter-flooded to meet duck energy needs. Waterfowl-friendly rice habitat in the basin is currently estimated at over 93,000 acres with over 72,000 of these acres winter-flooded (Table 4-11). Agricultural enhancement objectives are currently exceeded for the basin.

Agricultural Easements for Maintaining Waterfowl Foods (Type I)

Agricultural habitats are extremely important to waterfowl in American Basin and provide 95% of the food energy now available to ducks (Figure 4-22). The loss of irrigated farmland in the basin by 2040 is predicted to be 40,000 acres or 16% of all irrigated lands (Figure 3-15). At least 16,000 acres will be riceland. This projected loss of rice should be considered a minimum because most development is occurring in rice growing areas and is not equally distributed among the different types of irrigated farmland (Figure 4-23). Most wetland restoration occurs on rice ground, and meeting wetland restoration goals for the basin could reduce rice acreage by an additional 20,000 acres. Planted rice in the basin is estimated at about 100,000 acres (Table 3-4). However, this figure could be reduced by a minimum of 36,000 acres if growth projections are accurate and wetland restoration objectives are met. This reduction in the rice base would make it extremely difficult to meet the basin's 69,000 acre objective for waterfowl-friendly rice (Figure 4-24). These forecasts suggest that easements to maintain agricultural foods are needed in the basin.

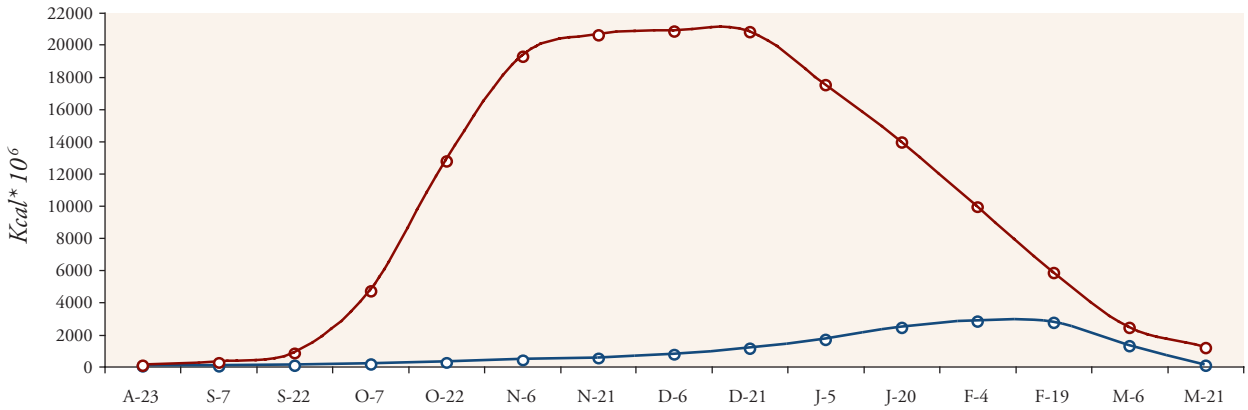


Figure 4-20. Population energy demand (blue) vs. food energy supply (red) for ducks in American Basin when duck populations are at NAWMP goals.

Agricultural Easements To Buffer Residential and Urban Growth (Type II)

Large wetland complexes that would benefit from Type II agricultural easements are currently lacking in the American Basin. However these complexes will develop if wetland restoration objectives are met. Agricultural easements to buffer the effects of growth will likely be needed at that time given growth projections for the basin.

Conservation Objective Priorities

Conservation objectives for the American Basin are summarized in Table 4-12. The information used to prioritize conservation objectives for American Basin is presented in Figure 4-25. Food supplies exceed 100% of duck needs and were classified as high, though habitat protection was rated as very low (7%). Progress in meeting wetland needs is also very low (3,178 acres present vs. 23,178 needed; or 13.7% of need). Loss of irrigated farmland is predicted to be high, and future reductions in the basin's rice acreage may make it difficult to meet agricultural enhancement objectives.

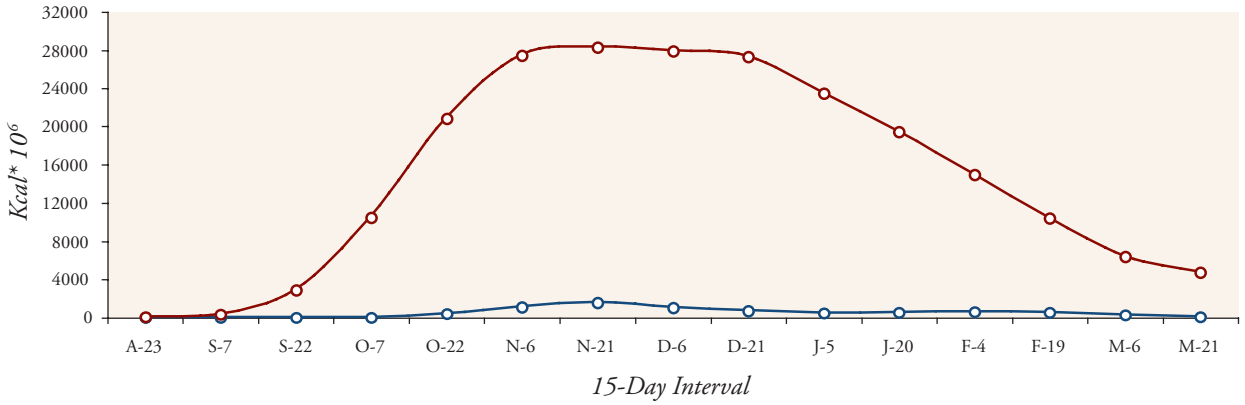


Figure 4-21 (a). Dark goose population energy demand (blue) vs. food energy supplies (red) in American Basin.

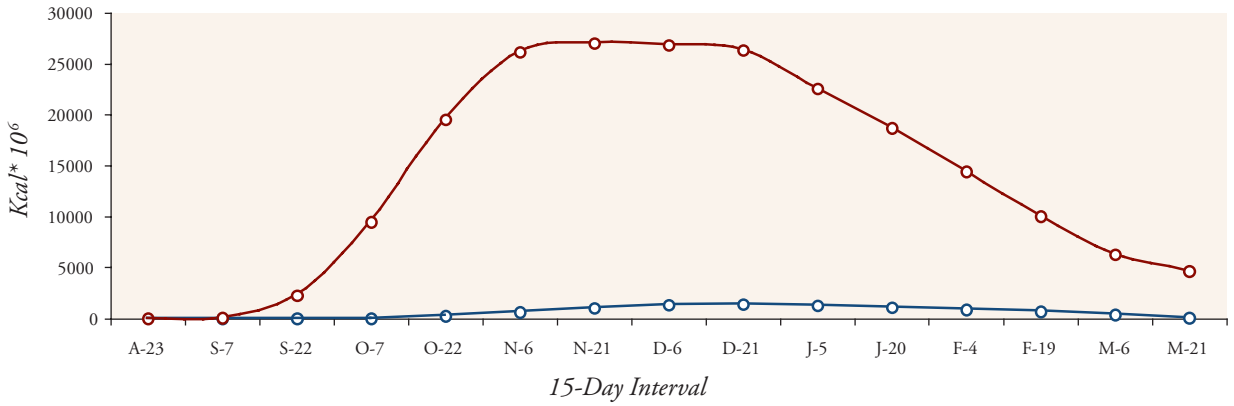


Figure 4-21 (b). White goose population energy demand (blue) vs. food energy supplies (red) in American Basin.

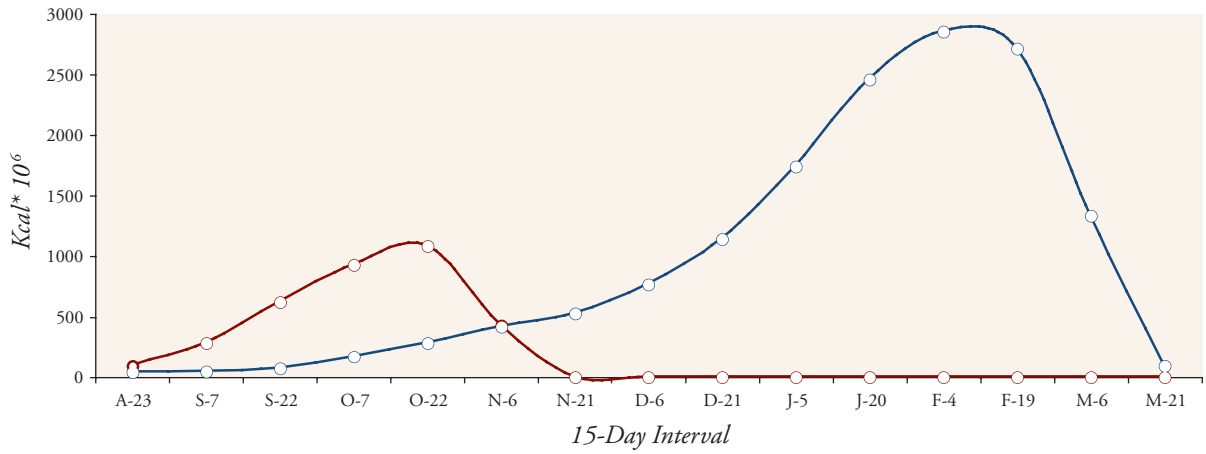


Figure 4-22. Population energy demand (blue) vs. food energy supply (red) for ducks in American Basin when no agricultural food supplies are available.

Wetland restoration is a priority for American Basin, because less than 14% of wetland needs have been met for ducks. Establishing an easement program to protect agricultural food sources should also be considered a priority in the immediate future.

Table 4-9. Annual wetland enhancement objectives for American Basin.

Wetland Acres	*Annual Enhancement Objective (Acres)*[c]
21,187	1,766
23,187[b]	1,932

[a]*Current acres of wetlands in the American Basin.*
[b]*Acres of wetlands in the American Basin when wetland restoration objectives are met.*
[c]*Annual enhancement objectives reflect progress in meeting wetland restoration objectives for American Basin.*

Table 4-10. Water needs for seasonal wetlands in American Basin.

Month	*Water Need (Acre Feet)*
January	4,636
February	4,636
March	4,636
April	0
May	16,225
June	0
July	0
August	20,860
September	41,720
October	9,271
November	9,271
December	4,636
Annual Need	**115,890**

Table 4-11. Agricultural enhancement objectives for American Basin.

	Waterfowl friendly Rice[a]	*Flooded Rice*
Objective	69,000	50,000
Current	93,063[b]	72,049

[a]*Waterfowl-friendly rice includes rice that is flooded and rice that is not deep plowed following harvest but which remains dry.*
[b]*Planted rice acreage in American Basin is estimated at 100,000 acres (Table 3-6). The JV assumes that 93,063 of these acres provide waterfowl-friendly habitat.*

Table 4-12. Conservation objectives for wintering waterfowl in American Basin.

Wetland Restoration (Acres)	*Wetland Enhancement (Acres)*	*Water Supplies (Acre Feet)*	*Agricultural Enhancement (Acres)*	*Type I Agricultural Easements*	*Type II Agricultural Easements*
20,000	1932[a]	115,890[b]	69,000[c] 50,000[d]	Needed	Needed in Future

[a]*Annual enhancement objective when the wetland restoration objective is met.*
[b]*Annual water supply need when the wetland restoration objective is met.*
[c]*Total acres of rice that must be enhanced (includes 50,000 acres that must be flooded). Objective has been met.*
[d]*Total acres of rice that must be flooded out of the total enhancement objective of 69,000 acres. Objective has been met.*

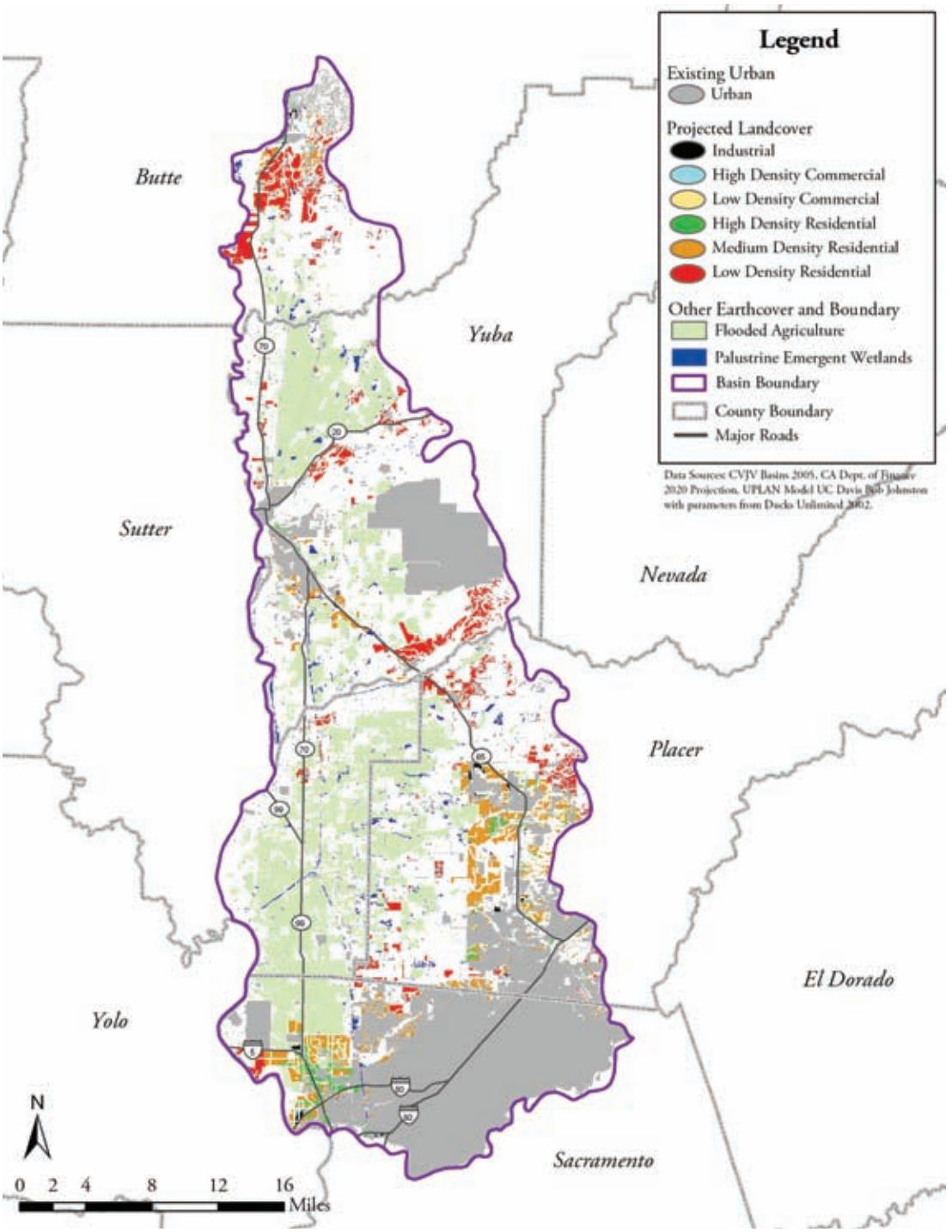


Figure 4-23. Projected growth in American Basin to 2020.

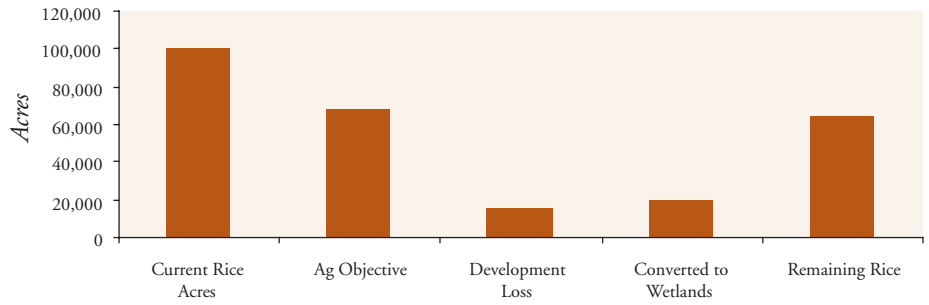


Figure 4-24. Forecasted changes in rice acreage for the American Basin compared to the basin's agricultural enhancement objective.

Current Food Supplies for Ducks	*Overall Level of Habitat Protection*	*Progress in Meeting Wetland Need*	*Population Growth*	*Loss of Irrigated Farmland*	*Conservation Objective Priorities*
High	High	High	High	High	Wetland Restoration
Moderate	Moderate	Moderate	Moderate	Moderate	Type I Agricultural Easements
Low	Low	Low	Low	Low	
	Very Low	Very Low	Very Low		

Figure 4-25. Factors used to identify conservation objective priorities for American Basin.

Butte Basin

Population Energy Demand vs. Food Energy Supplies: Current Conditions

Population objectives for wintering waterfowl in Butte Basin are presented in Figures 4-26 through 4-28. Duck and white goose population objectives are highest during late December, while population objectives for dark geese peak during November. Although rice provides the majority of foraging habitat in the basin, seasonal wetlands exceed 23,000 acres (Table 4-13).

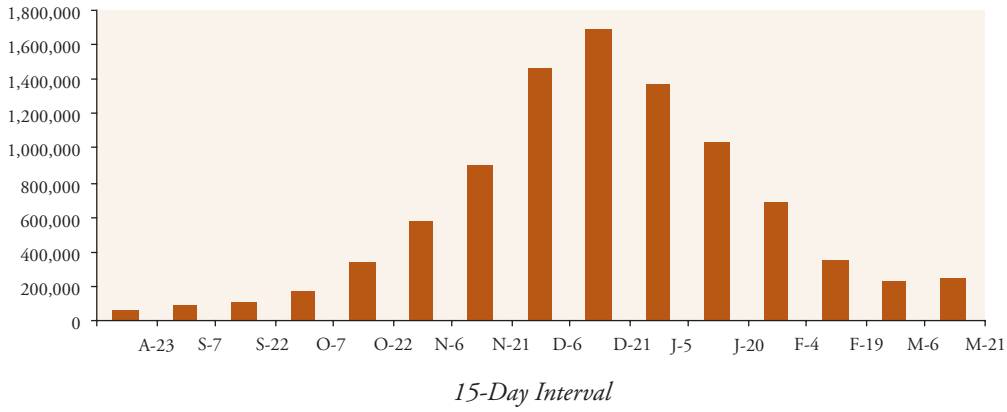


Figure 4-26. Population objectives by 15-day intervals for ducks in Butte Basin.

Food supplies for Butte Basin ducks are adequate in all time periods. Peak food supplies occur in November and December and coincide with high duck use of the basin (Figure 4-29). Dark and white goose food supplies are also well above population needs and large food surpluses occur in all time periods (Figure 4-30). Agricultural habitats provide 74% of the food energy available to ducks in the basin. Loss of these agricultural foods would significantly reduce carrying capacity, because food supplies are exhausted by mid-December if ducks are restricted to foraging in wetlands (Figure 4-31). Public wetlands alone can only meet duck needs through early November (Figure 4-32), though most duck use of the basin occurs after this date.

Conservation Objectives

Wetland Restoration

The amount of seasonal wetlands required to meet 50% of duck energy needs in Butte Basin is estimated at 40,340 acres. There are currently 23,340 acres of seasonal wetlands in the basin, leaving a wetland restoration goal of 17,000 acres.

Wetland Enhancement

The annual enhancement objective for existing wetlands in Butte Basin is 1,945 acres/year. Wetland enhancement objectives increase to 3,362 acres/year when wetland restoration objectives are met for the basin (Table 4-14).

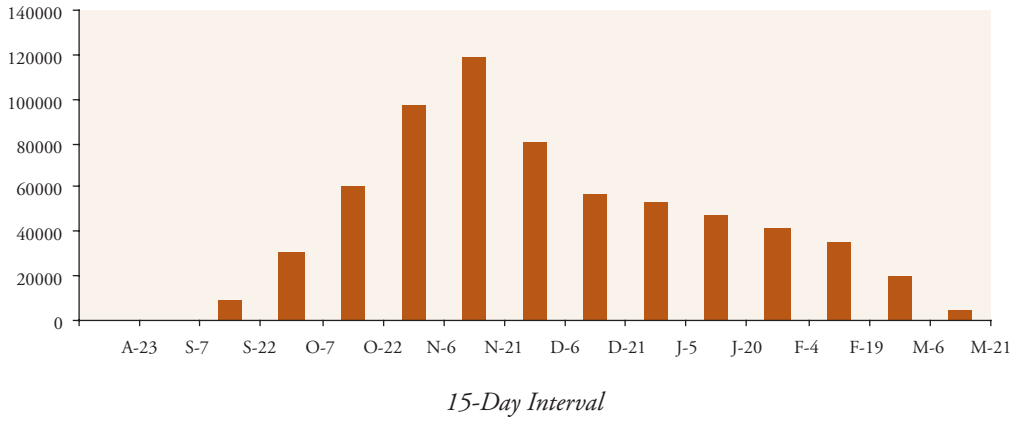


Figure 4-27. Population objectives by 15-day intervals for dark geese in Butte Basin.

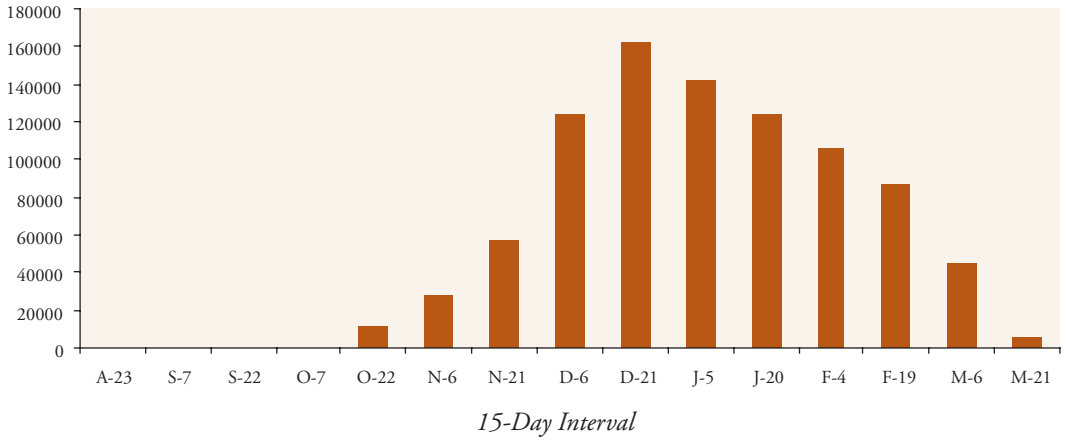


Figure 4-28. Population objectives by 15-day intervals for white geese in Butte Basin.

Table 4-13. Foraging habitats available to wintering waterfowl in Butte Basin.

Seasonal Wetlands	*Flooded Rice*	*Unflooded Rice*	*Corn*
23,340	99,494	29,019	2,510

Water Supplies for Seasonal Wetland Management

Annual management of seasonal wetlands in Butte Basin will require 225,904 acre-feet of water when wetland restoration objectives in the Basin have been met. These annual water requirements are further broken down by time period to reflect flooding schedules and summer irrigation needs (Table 4-15).

Agricultural Enhancement

The agricultural enhancement objective for Butte Basin is 104,000 acres, all of which is assumed to be rice. This objective represents the amount of rice habitat that must be maintained in a waterfowl-friendly state when wetland restoration objectives have been met for the basin. Sixty-two thousand of these acres must be winter-flooded to meet duck energy needs. Waterfowl-friendly rice habitat in the basin is currently estimated at over 128,000 acres with nearly 100,000 of these acres winter-flooded (Table 4-16). Agricultural enhancement objectives are currently exceeded for the basin.

Agricultural Easements for Maintaining Waterfowl Foods

Agricultural habitats are extremely important to waterfowl in Butte Basin and provide 74% of the food energy now available to ducks (Figure 4-31). The loss of irrigated farmland in the basin by 2040 is predicted to be almost 24,000 acres or 9% of existing lands (Figure 3-15). Nearly 13,000 of these acres are predicted to be rice (Table 3-4). Most wetland restoration occurs on rice ground, and meeting wetland restoration goals for the basin could reduce rice acreage by an additional 17,000 acres. (Table 4-16). Planted rice in the basin is estimated at 138,000 acres (Table 3-4). However, that figure may be reduced by 30,000 acres if growth projections are accurate and wetland restoration objectives are met. This reduction in the rice base could make it increasingly difficult to meet the basin's 104,000 acre objective for waterfowl-friendly rice (Figure 4-33).

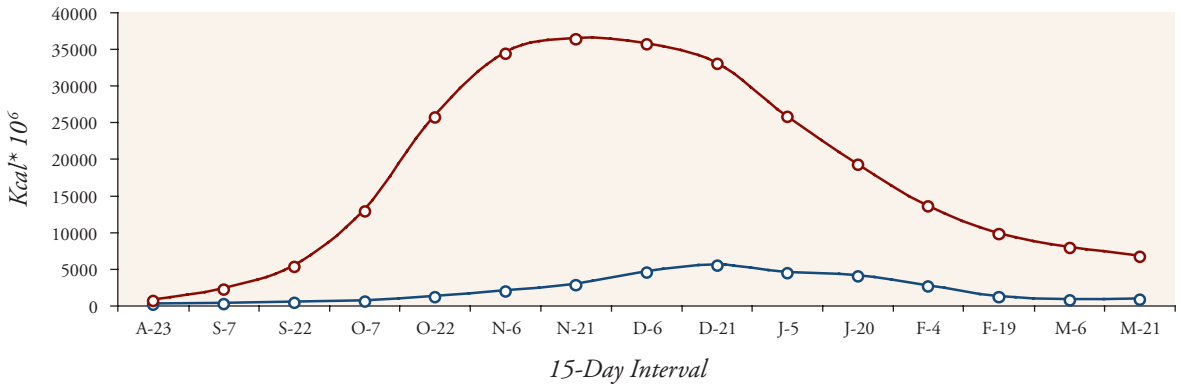


Figure 4-29. Population energy demand (blue) vs. food energy supply (red) for ducks in Butte Basin when duck populations are at NAWMP goals.

Agricultural Easements to Buffer Residential and Urban Growth

Growth projections for Butte Basin indicate that low-density residential housing southeast of Gridley may eventually abut key wetland habitats in the Butte Sink area, especially near Gray Lodge Wildlife Area (Figure 4-34). An easement program northeast of Gray Lodge could buffer the effects of this development.

Conservation Priorities

Conservation objectives for the Butte Basin are summarized in Table 4-17. The information used to prioritize these objectives is provided in Figure 4-35. Food supplies exceed 100% of duck needs and were classified as high, though habitat protection in the basin is low (29%). Progress in meeting wetland needs was rated medium (23,340 acres present vs. 40,340 acres needed; or 58% of need), while 2040 population forecasts for the basin are low at 237,000 people. Although agricultural enhancement objectives are currently met for the basin, the loss of rice habitat to development is projected to be 13,000 acres by 2040. Therefore, meeting wetland restoration objectives may diminish the planted rice base by a further 17,000 acres.

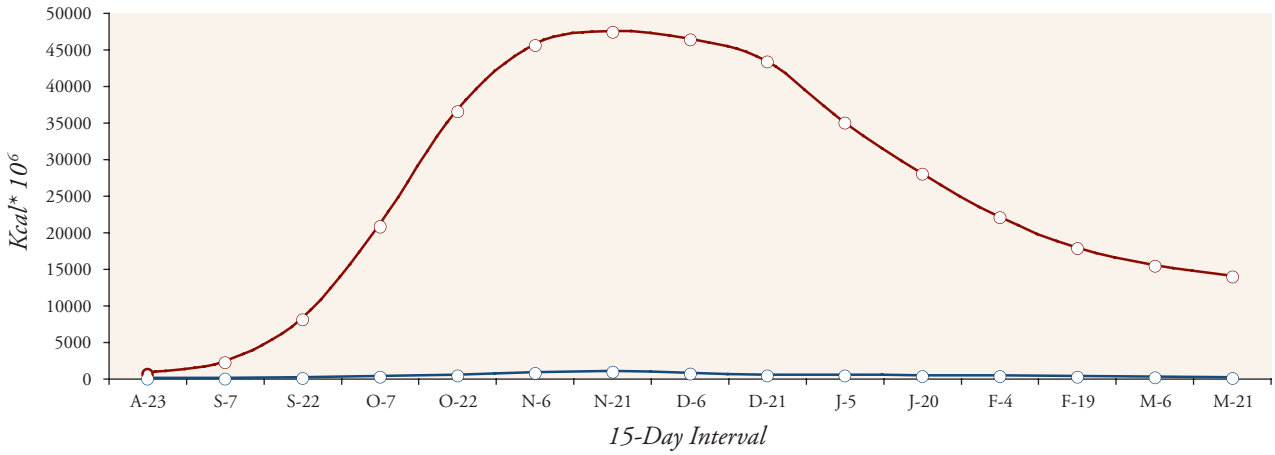


Figure 4-30 (a). Dark goose population energy demand (blue) vs. food energy supplies (red) in Butte Basin.

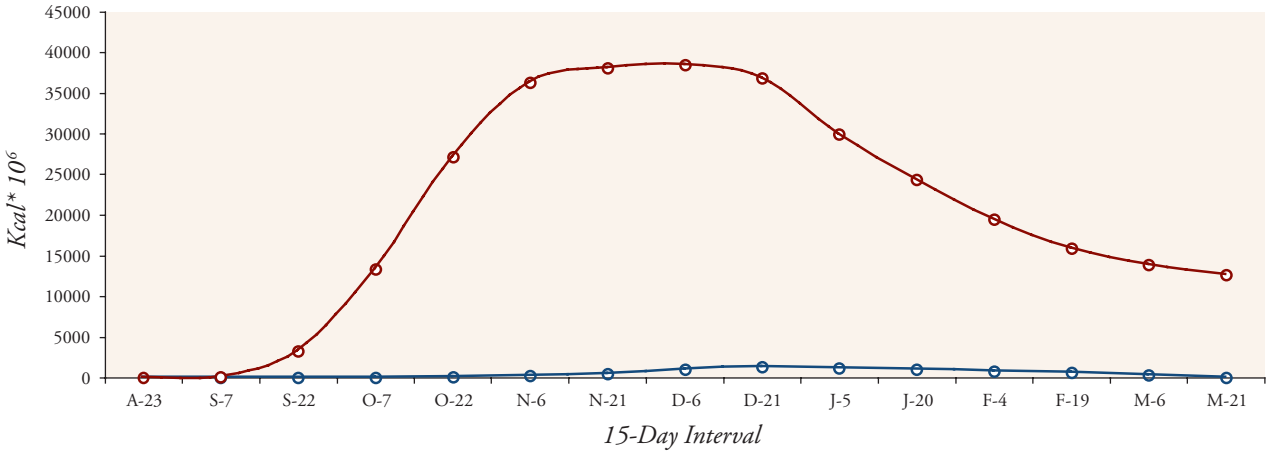
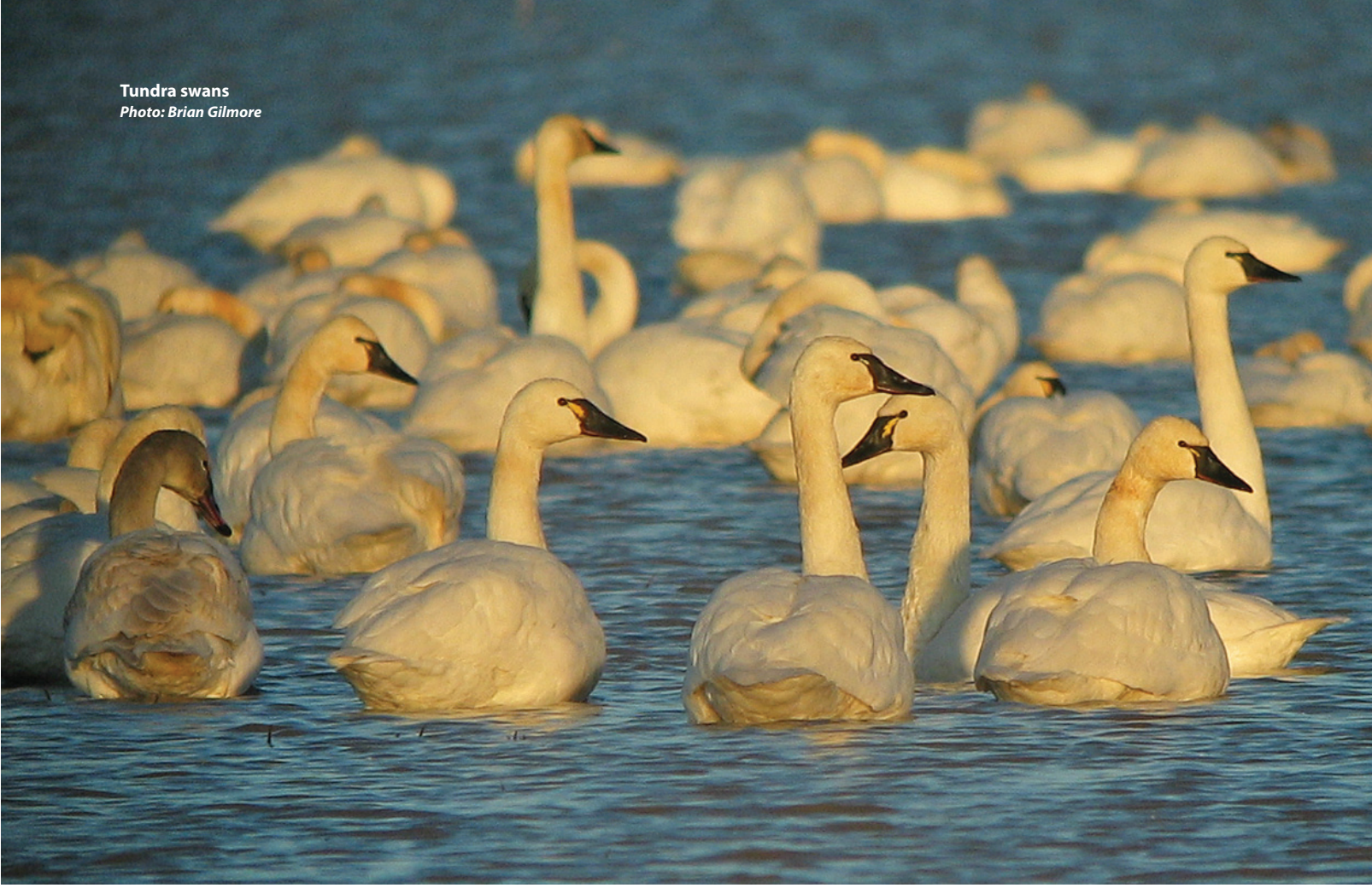


Figure 4-30 (b). White goose population energy demand (blue) vs. food energy supplies (red) in Butte Basin.

Wetland restoration may be a priority for Butte Basin, especially in the short term, as less than 60% of wetland needs have been met for ducks. Although agricultural enhancement objectives are currently met, forecasted declines in the basin's rice acreage may require an easement program that maintains agricultural food supplies.



Tundra swans
Photo: Brian Gilmore

Table 4-14. Annual wetland enhancement objectives for Butte Basin.

Wetlands Acres	*Annual Enhancement Objective (Acres)*[c]
23,340[a]	1,945
25,340	2,112
27,340	2,278
29,340	2,445
31,340	2,612
33,340	2,778
35,340	2,945
37,340	3,112
39,340	3,278
40,340[b]	3,362

[a]Current acres of wetlands in Butte Basin.
[b]Acres of wetlands in Butte Basin when wetland restoration objectives are met.
[c]Annual enhancement objectives reflect progress in meeting wetland restoration objectives for Butte Basin.

Table 4-15. Water needs for seasonal wetlands in Butte Basin.

Month	*Water Need (Acre Feet)*
January	8,068
February	8,068
March	8,068
April	0
May	40,340
June	0
July	0
August	36,306
September	80,680
October	20,170
November	16,136
December	3,227
Annual Need	**225,904**

Table 4-16. Agricultural enhancement objectives for Butte Basin.

	Waterfowl friendly Rice[a]	*Flooded Rice*
Objective	104,000	62,000
Current	128,513[b]	99,494

[a]Waterfowl-friendly rice includes rice that is flooded and rice that is not deep plowed following harvest but which remains dry.
[b]Planted rice acreage in Butte Basin is estimated at 138,186 acres (Table 3-6). The JV assumes that 128,513 of these acres provide waterfowl-friendly habitat.

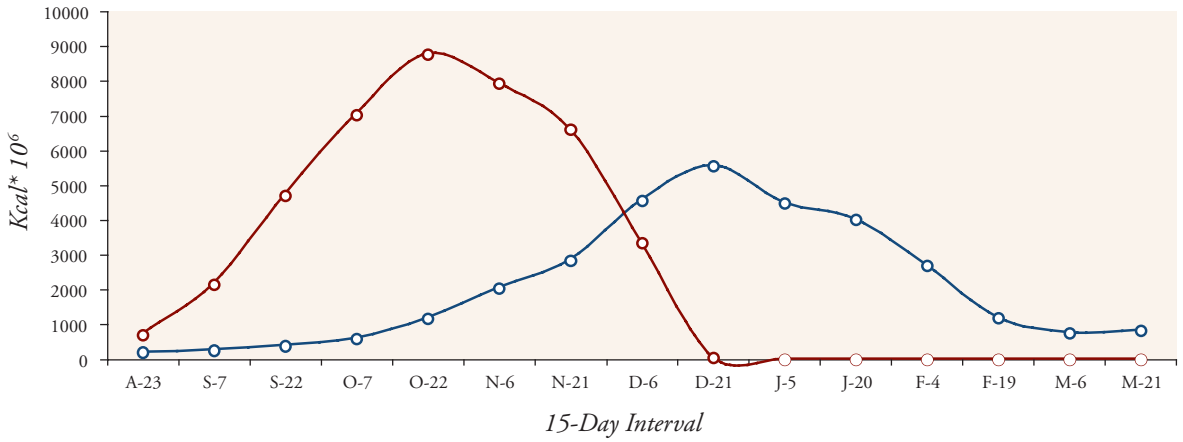


Figure 4-31. Population energy demand (blue) vs. food energy supply (red) for ducks in Butte Basin when no agricultural food sources are available.

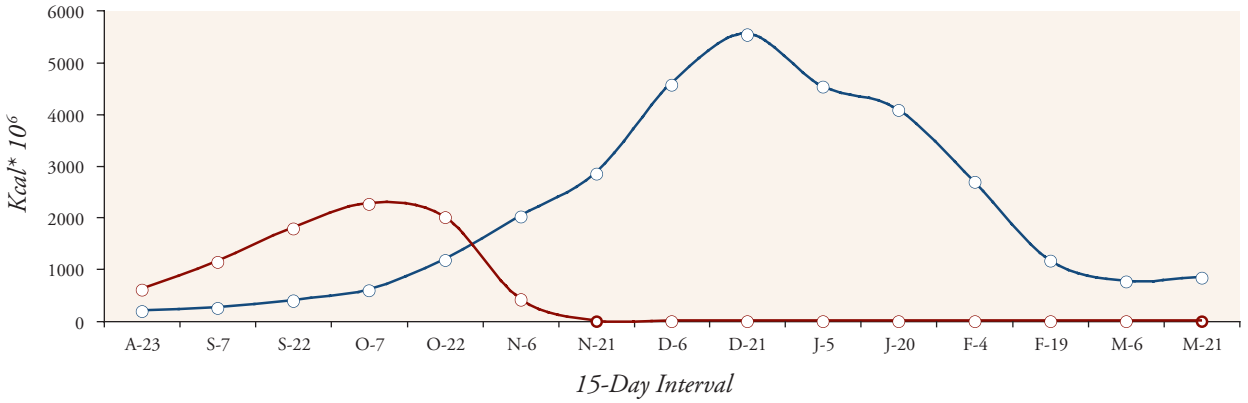


Figure 4-32. Population energy demand (blue) vs. food energy supply (red) for ducks in Butte Basin if ducks are restricted to foraging on public lands.

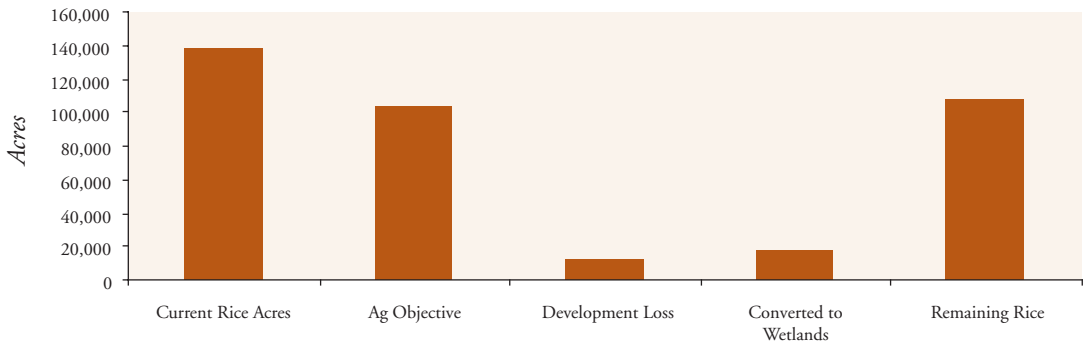


Figure 4-33. Forecasted changes in rice acreage for Butte Basin compared to the basin's agricultural enhancement objective.

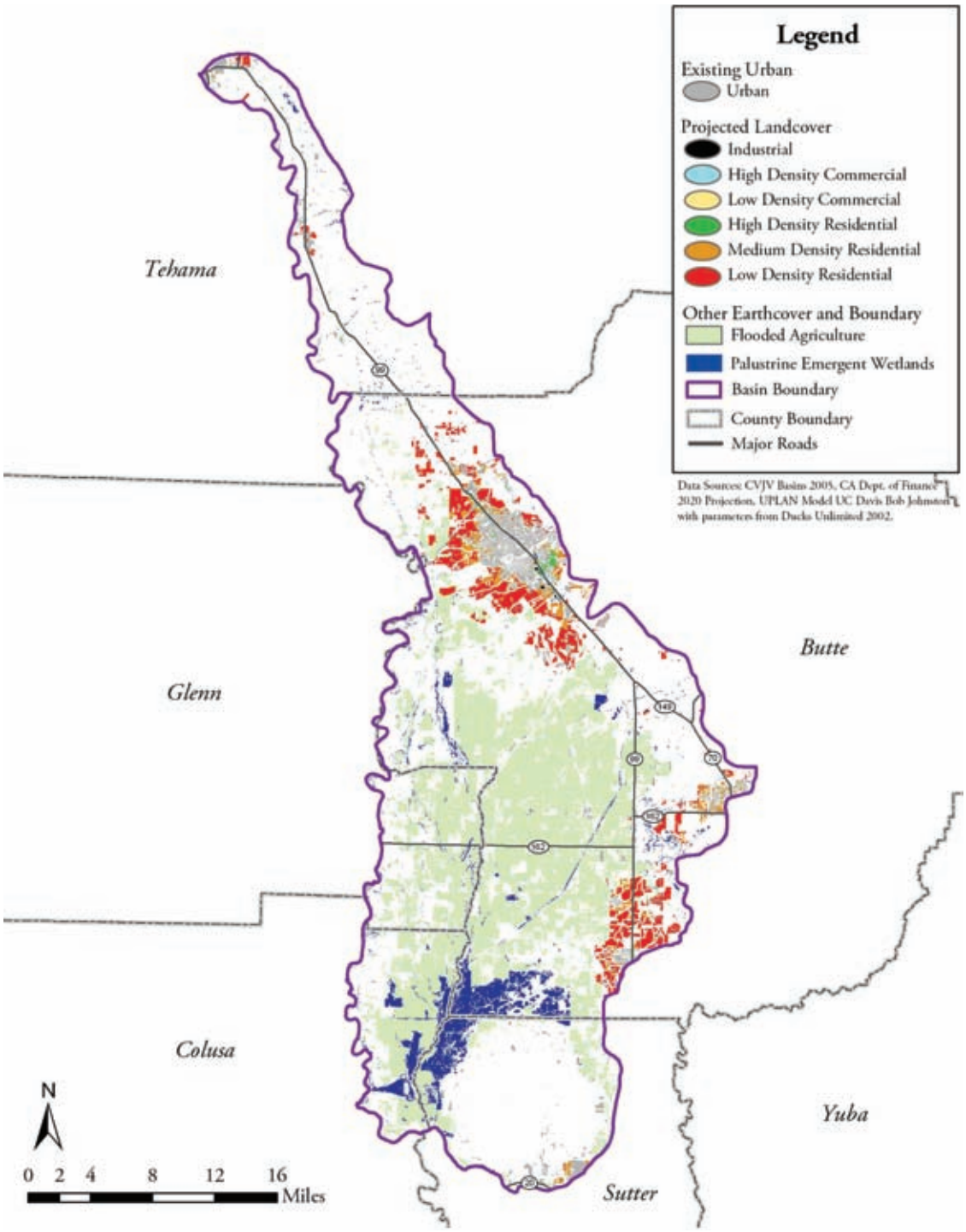


Figure 4-34. Projected growth in Butte Basin to 2020.

Table 4-17. Conservation objectives for wintering waterfowl in Butte Basin.

Wetland Restoration (Acres)	*Wetland Enhancement (Acres)*	*Water Supplies (Acre Feet)*	*Agricultural Enhancement (Acres)*	*Type I Agricultural Easements*	*Type II Agricultural Easements*
17,000	3362[a]	225,904[b]	104,000[c] 62,000[d]	Needed	Needed

[a] *Annual enhancement objective when the wetland restoration objective is met.*
[b] *Annual water supply need when the wetland restoration objective is met.*
[c] *Total acres of rice that must be maintained in a waterfowl-friendly state (includes 62,000 acres that must be flooded). Objective has been met.*
[d] *Total acres of rice that must be flooded out of the total enhancement objective of 104,000 acres. Objective has been met.*

Current Food Supplies	*Habitat Protection*	*Progress in Meeting Wetland Needs*	*Population Growth*	*Loss of Irrigated Farmland*	*Conservation Priorities*
High	High	High	High	High	Wetland Restoration
Moderate	Moderate	Moderate	Moderate	Moderate	Type I Agricultural Easements
Low	Low	Low	Low	Low	
	Very Low	Very Low	Very Low		

Figure 4-35. Information used to identify conservation objective priorities for Butte Basin.

Colusa Basin

Population Energy Demand vs. Food Energy Supplies: Current Conditions

Population objectives for migrating and wintering waterfowl in Colusa Basin are presented in Figures 4-36 through 4-38. Duck and white goose population objectives are highest during mid-winter, while population objectives for dark geese peak during October. Rice provides the majority of foraging habitat in the basin, though seasonal wetlands exceed 22,000 acres (Table 4-18).

Food supplies for Colusa Basin ducks are adequate in all time periods, with peak supplies occurring in late December (Figure 4-39). Food supplies are also well above the needs of both dark and white geese, and large food surpluses occur in all time periods (Figures 4-40a and 4-40b). Agricultural habitats provide 83% of the food energy available to ducks in the basin. Although loss of these food resources would significantly decrease carrying capacity, there are enough wetland acres to meet duck energy needs through mid-January (Figure 4-41). Public wetlands alone could meet duck needs through late November (Figure 4-42).

Conservation Objectives

Wetland Restoration

The amount of seasonal wetland habitat needed to provide 50% of duck energy needs in Colusa Basin is estimated at 24,396 acres. There are currently 22,396 acres of seasonal wetlands in the basin, leaving a wetland restoration goal of 2,000 acres.

Wetland Enhancement

The annual enhancement objective for existing wetlands in Colusa Basin is 1,866 acres/year. Wetland enhancement objectives increase to 2,033 acres/year when wetland restoration objectives are met for the basin (Table 4-19).

Water Supplies for Seasonal Wetland Management

Annual management of seasonal wetlands in Colusa Basin will require 121,980 acre-feet of water when wetland restoration objectives for the basin have been met. These annual water requirements are further broken down by time period to reflect flooding schedules and summer irrigation needs (Table 4-20).

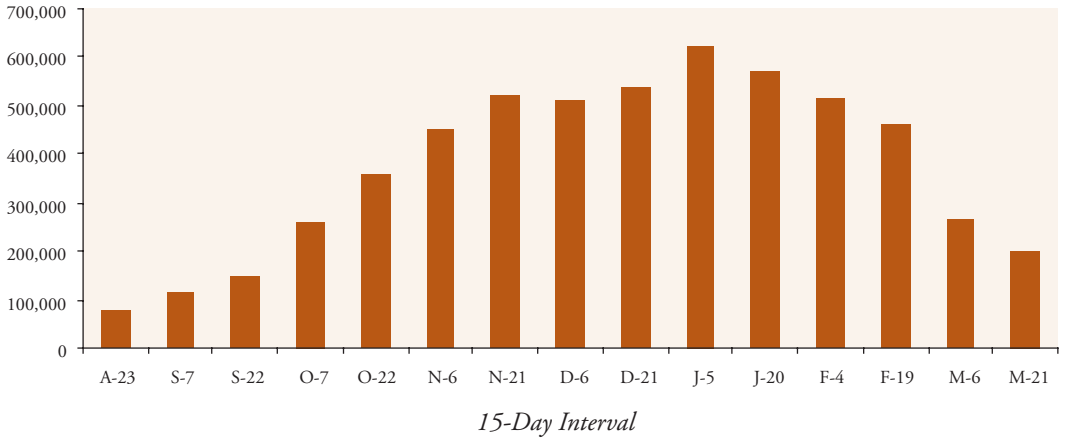


Figure 4-36. Population objectives by 15-day intervals for ducks in Colusa Basin.

Agricultural Enhancement

The agricultural enhancement objective For Colusa Basin is 85,000 acres, all of which is assumed to be rice. This objective represents the amount of rice habitat that must be maintained in a waterfowl-friendly state when wetland restoration objectives have been met for the basin. Forty-five thousand of these acres must be winter-flooded to meet duck energy needs. Waterfowl-friendly rice habitat in the basin is currently estimated at over 183,000 acres with nearly 142,000 of these acres winter-flooded (Table 4-21). Agricultural enhancement objectives are currently exceeded for the basin.

Agricultural Easements for Maintaining Waterfowl Foods (Type I)

Agricultural habitats are extremely important to waterfowl in Colusa Basin and provide 83% of the food energy now available to ducks (Figure 4-41). The loss of irrigated farmland by 2040 is estimated at nearly 17,000 acres or 1.7% of existing lands (Figure 3-15). Approximately 3,300 of these acres are predicted to be rice (Table 3-4). Although most wetland restoration occurs on rice ground, wetland restoration objectives for the basin only total 2,000 acres. Planted rice in the basin is now estimated at 197,000 acres, and the loss of 5,300 acres to development and wetland restoration should not impair the JV's ability to meet its 85,000 acre agricultural enhancement objective (Figure 4-43). As a result, agricultural easements to maintain waterfowl foods may not be needed in the near future.

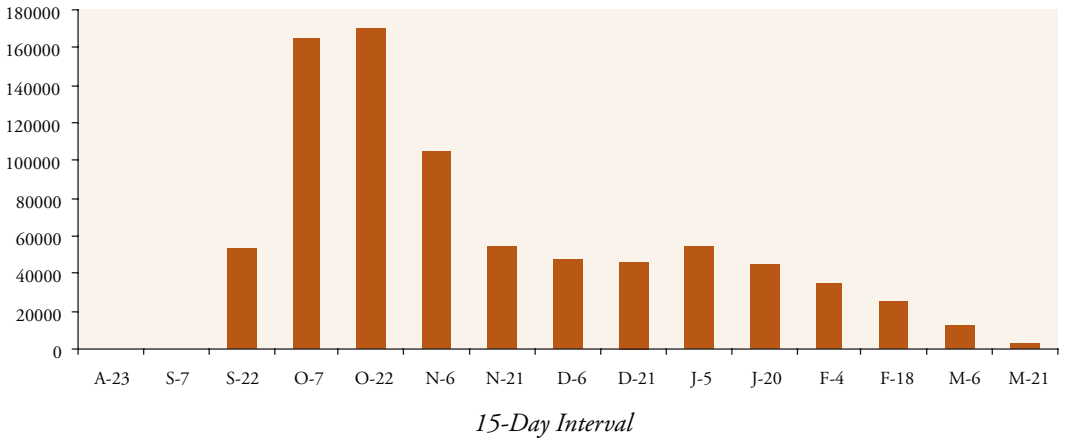


Figure 4-37. Population objectives by 15-day intervals for dark geese in Colusa Basin.

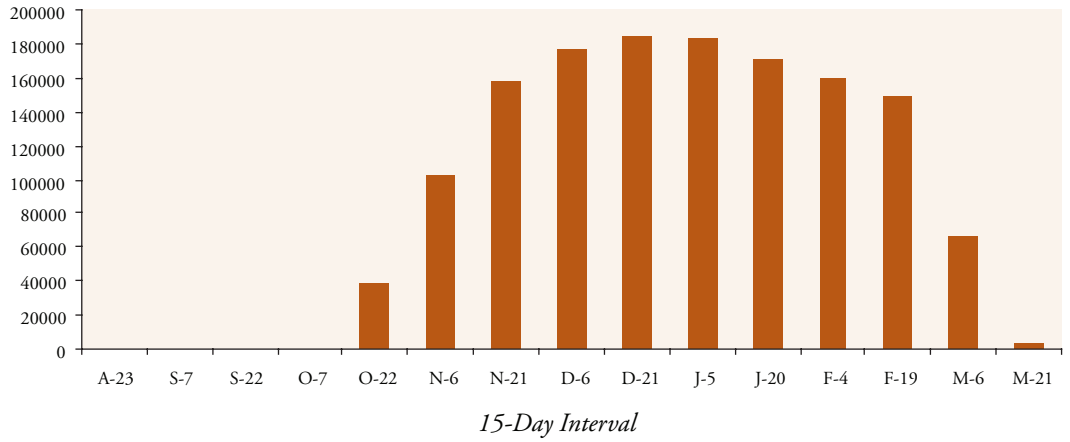


Figure 4-38. Population objectives by 15-day intervals for white geese in Colusa Basin.

Agricultural Easements To Buffer Residential and Urban Growth (Type II)

Growth projections for Colusa Basin indicate that little residential or urban development will occur near existing wetlands (Figure 4-44). As a result, no agricultural easements to buffer growth are suggested for the basin.

Table 4-18. Foraging habitats (acres) available to wintering waterfowl in Colusa Basin.

Seasonal Wetlands	*Flooded Rice*	*Unflooded Rice*	*Corn*
22,396	141,895	41,386	13,421

Conservation Objective Priorities

Conservation objectives for Colusa Basin are summarized in Table 4-22. The information used to prioritize these objectives is provided in Figure 4-45. Current food supplies exceed 100% of duck needs and were rated high, while habitat protection was rated low (but approaching moderate at 46%). Progress in meeting wetland needs was rated as high (23,396 present vs. 24,396 needed; or 92% of need). Population increase forecasts were very low and loss of rice land was rated as low.

Table 4-19. Annual wetland enhancement objectives for Colusa Basin.

Wetland Acres	*Annual Enhancement Objective (Acres)*[c]
22,396[a]	1,866
24,396[b]	2,033

[a]Current acres of wetlands in Colusa Basin.
[b]Acres of wetlands in Colusa Basin when wetland restoration objectives are met.
[c]Annual enhancement objectives reflect progress in meeting wetland restoration objectives for Colusa Basin.

Wetland enhancement was identified as a conservation priority for Colusa Basin. Wetland restoration objectives are nearly met, while agricultural enhancement objectives are exceeded by several thousand acres. A wetland enhancement program in the basin should track when wetlands were last enhanced, and should periodically determine when future maintenance or repair is needed. The JV is developing a database that will include these tracking functions. Wetlands in the basin could be placed on a formal schedule for assessing enhancement needs and this system could be applied to other basins as other conservation objectives are met.

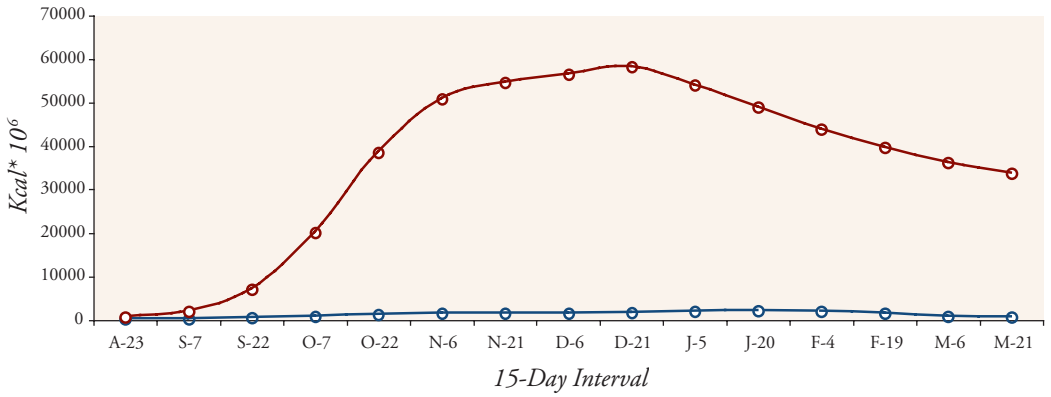


Figure 4-39. Population energy demand (blue) vs. food energy supply (red) for ducks in Colusa Basin when duck populations are at NAWMP goals.



Cinnamon teal
Photo: Dale Garrison, USFWS

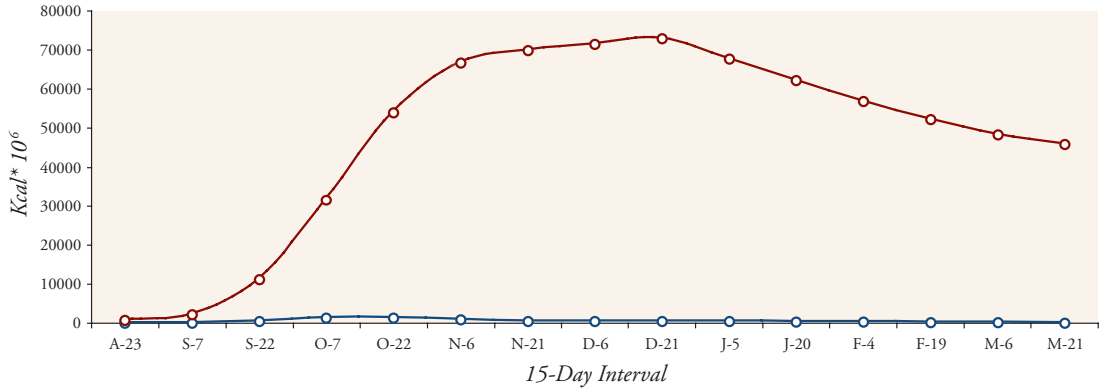


Figure 4-40 (a). Dark goose population energy demand (blue) vs. food energy supplies (red) in Colusa Basin.

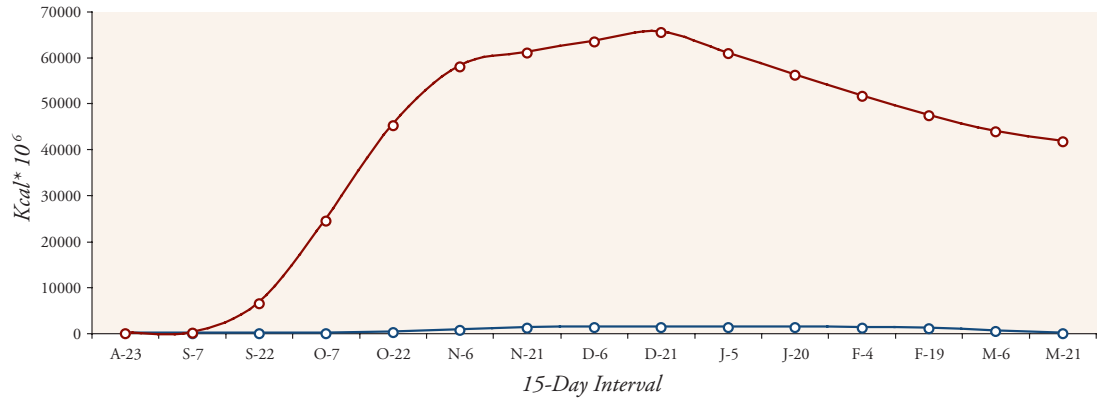


Figure 4-40 (b). White goose population energy demand (blue) vs. food energy supplies (red) in Colusa Basin.

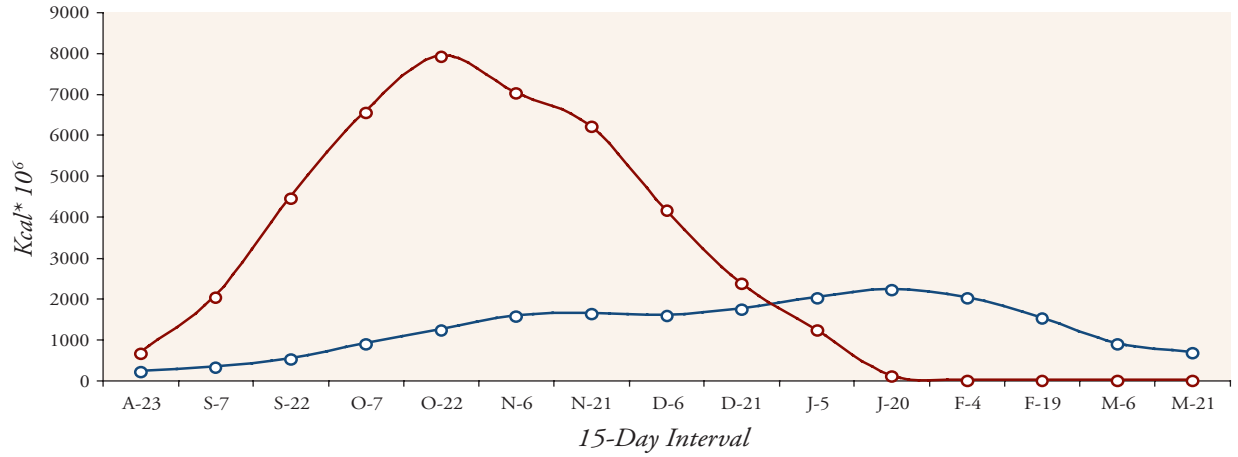


Figure 4-41. Population energy demand (blue) vs. food energy supply (red) for ducks in Colusa Basin if no agricultural foods are available.

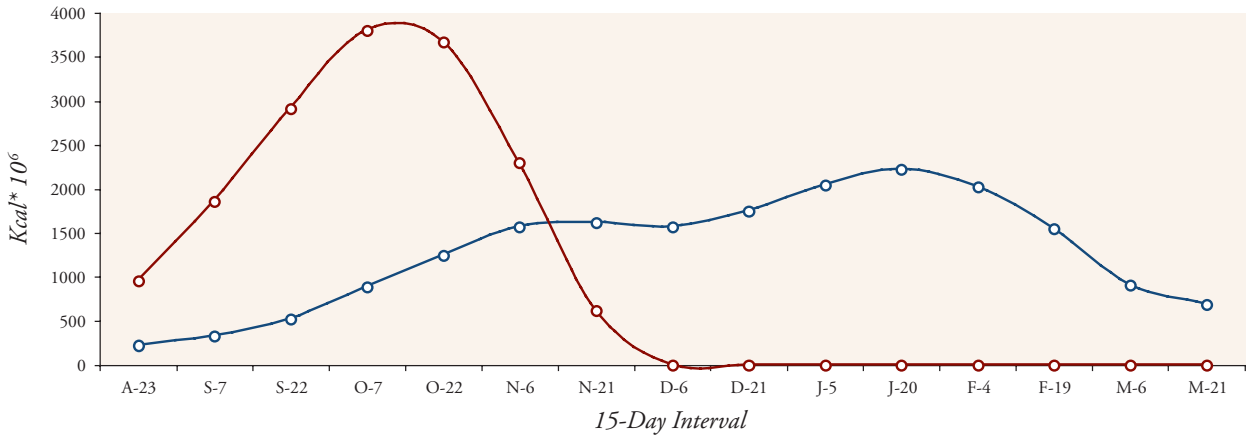


Figure 4-42. Population energy demand (blue) vs. food energy supply (red) for ducks in Colusa Basin if ducks are restricted to foraging on public habitats.

Table 4-20. Water needs for seasonal wetlands in Colusa Basin.

Month	*Water Need (Acre Feet)*
January	4,879
February	4,879
March	4,879
April	0
May	17,077
June	0
July	0
August	21,956
September	43,913
October	9,758
November	9,758
December	4,879
Annual Need	**121,980**

Table 4-21. Agricultural enhancement objectives for Colusa Basin.

	Waterfowl friendly Rice[a]	*Flooded Rice*
Objective	85,000	45,000
Current	183,281[b]	141,895

[a] *Waterfowl-friendly rice includes rice that is flooded and rice that is not deep plowed following harvest but which remains dry.*

[b] *Planted rice acreage in Colusa Basin is estimated at 197,076 acres (Table 3-6). The JV assumes that 183,281 of these acres provide waterfowl-friendly habitat.*



Greater white-fronted geese
Photo: Dale Garrison, USFWS



Waterfowl hunting
Photo: USFWS

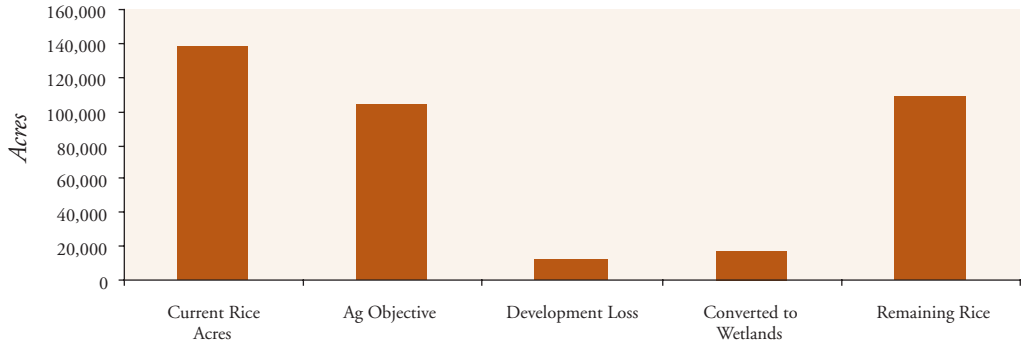


Figure 4-43. Forecasted changes in rice acreage for Colusa Basin compared to the basin's agricultural enhancement objective.

Table 4-22. Conservation objectives for wintering waterfowl in Colusa Basin.

Wetland Restoration (Acres)	*Wetland Enhancement (Acres)*	*Water Supplies (Acre Feet)*	*Agricultural Enhancement (Acres)*	*Type I Agricultural Easements*	*Type II Agricultural Easements*
2,000	2,033[a]	121,980[b]	85,000[c] 45,000[d]	None	None

[a] *Annual enhancement objective when the wetland restoration objective is met.*
[b] *Annual water supply need when the wetland restoration objective is met.*
[c] *Total acres of rice that must be enhanced (includes 45,000 acres that must be flooded). Objective has been met.*
[d] *Total acres of rice that must be flooded out of the total enhancement objective of 85,000 acres. Objective has been met.*

Current Food Supplies	*Habitat Protection*	*Progress in Meeting Wetland Needs*	*Population Growth*	*Loss of Irrigated Farmland*	*Conservation Priorities*
High	High	High	High	High	Wetland Enhancement
Moderate	Moderate	Moderate	Moderate	Moderate	
Low	Low	Low	Low	Low	
	Very Low	Very Low	Very Low		

Figure 4-45. Information used to identify conservation objective priorities for Colusa Basin.

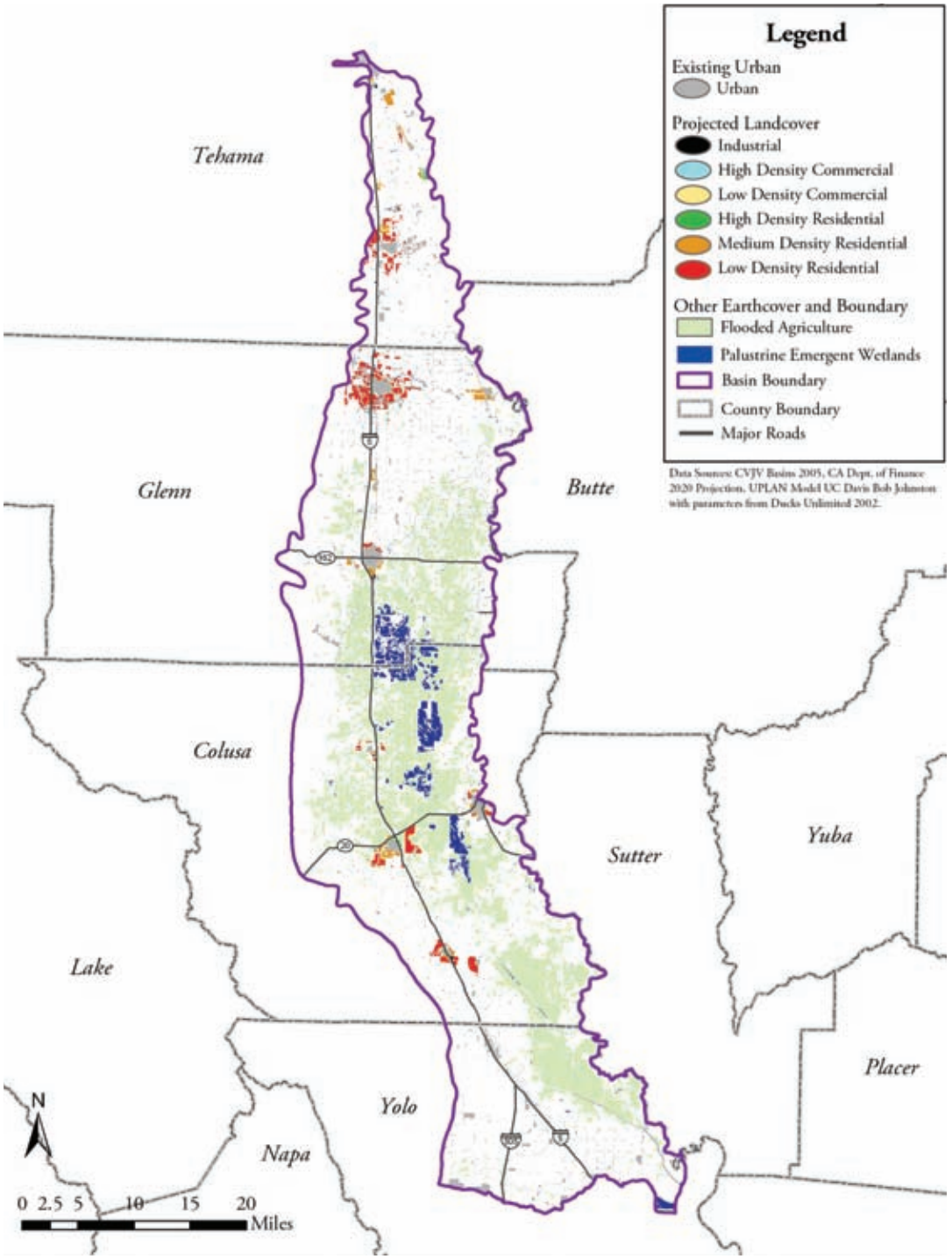


Figure 4-44. Projected growth in Colusa Basin to 2020.

Delta Basin

Population Energy Demand vs. Food Energy Supplies: Current Conditions

Population objectives for wintering waterfowl in Delta Basin are presented in Figures 4-46 through 4-48. Duck population objectives are highest in late December and early January, while population objectives for dark and white geese peak during December. Corn provides the majority of foraging habitat in the basin, while seasonal wetlands total less than 6,500 acres (Table 4-23).

Table 4-23. Foraging habitats available to wintering waterfowl in Delta Basin.

Habitat Type	*Acres*
Seasonal Wetlands	6,349
Flooded Corn	29,488
Unflooded Corn	29,488
Flooded Rice	1,399
Unflooded Rice	294

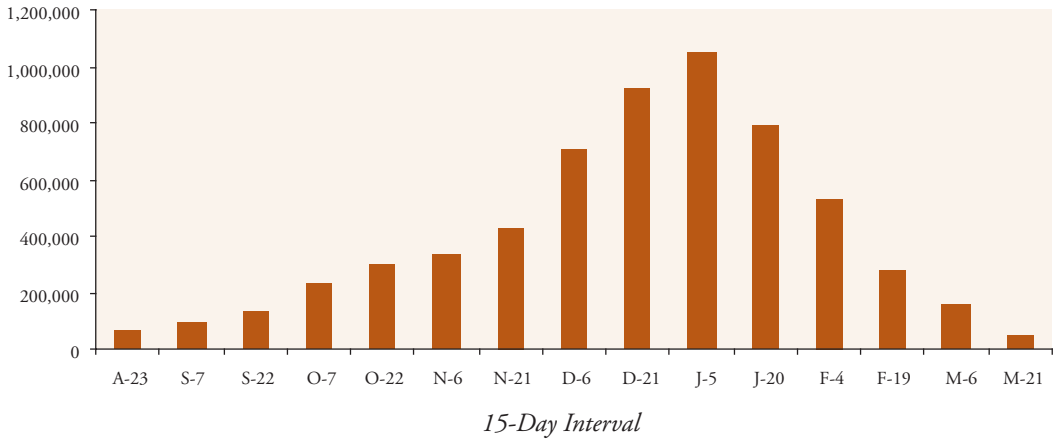


Figure 4-46. Population objectives by 15-day intervals for ducks in Delta Basin.

Duck food supplies in Delta Basin are adequate from fall through spring with peak supplies occurring in early November. Duck energy needs remain high from late November through early February (Figure 4-48). Food supplies are also adequate for dark and white geese with large food surpluses occurring in most time periods (Figure 4-49).

Agricultural habitats provide 81% of the food energy available to ducks in the basin. Loss of these agricultural foods would significantly decrease duck carrying capacity, as food supplies are exhausted by mid-November if ducks are restricted to foraging in wetlands (Figure 4-50). Public wetlands alone can only meet duck energy needs through early October (Figure 4-51).

Conservation Objectives

Wetland Restoration

The amount of seasonal wetland habitat required to meet 50% of duck energy needs in Delta Basin is estimated at 25,349 acres. There are currently 6,349 acres of seasonal wetlands in the basin, leaving a wetland restoration goal of 19,000 acres.

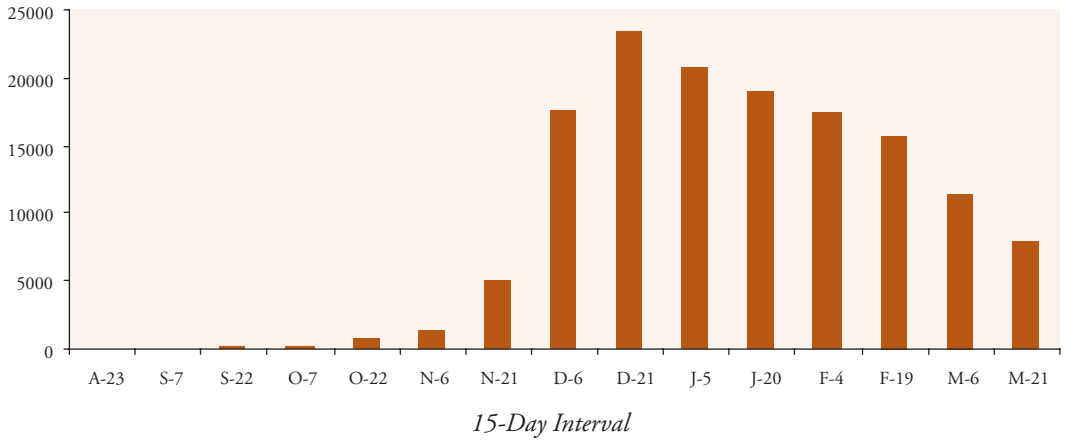


Figure 4-47. Population objectives by 15-day intervals for dark geese in Delta Basin.

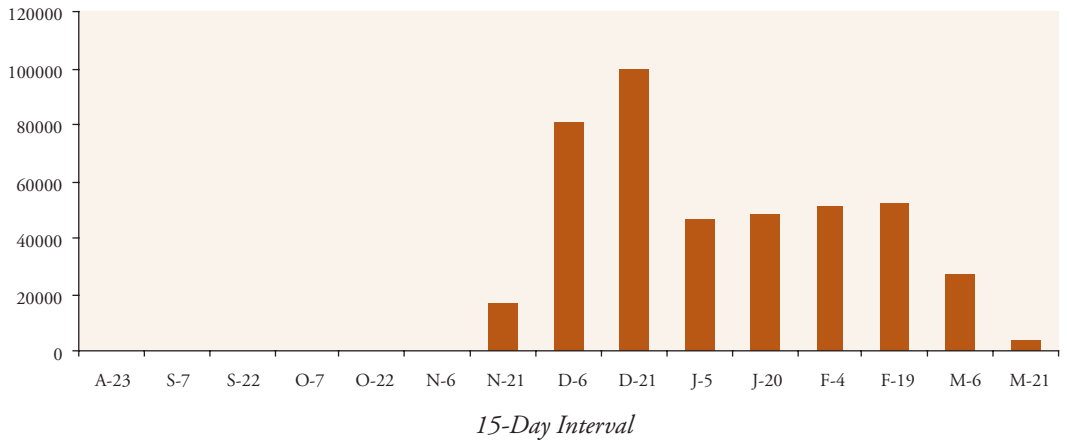


Figure 4-48. Population objectives by 15-day intervals for white geese in Delta Basin.

Wetland Enhancement

The annual enhancement objective for existing wetlands in Delta Basin is 529 acres/year. Wetland enhancement objectives increase to 2,112 acres/year when wetland restoration objectives are met for the basin (Table 4-24).

Water Supplies for Seasonal Wetland Management

Annual management of seasonal wetlands in Delta Basin will require 120,408 acre-feet of water when wetland restoration objectives for the basin are met. These annual water requirements are further broken down by time period to reflect flooding schedules and summer irrigation needs (Table 4-25).

Agricultural Enhancement

The agricultural enhancement objective for Delta Basin is 23,000 acres, all of which is assumed to be corn. This objective represents the amount of corn habitat that must be maintained in a waterfowl-friendly state when wetland restoration objectives have been met for the basin. Corn habitat in the basin is currently estimated at 58,976 acres (4-26). Agricultural enhancement objectives are currently exceeded for the basin.


Consumnes River Preserve
Photo: Ducks Unlimited

Agricultural Easements for Maintaining Waterfowl Foods

The loss of irrigated farmland in the Delta Basin is estimated at nearly 180,000 acres or 18.3% of existing lands by 2040 (Figure 3-15). Much of this loss will result from residential and urban growth along the I-99 corridor from Manteca to Sacramento (Figure4-53). Although most of this agricultural land may not be used by waterfowl, the ongoing urbanization of Brentwood, Oakley, and Discovery Bay does threaten agricultural areas that have been traditionally important to ducks and geese. Similar growth around Tracy, Lathrop, and Stockton also threaten agricultural lands used by waterfowl (B. Burkholder, California Department of Fish and Game, personal communication). These land use projections suggest that Type I agricultural easements may be needed in the basin, especially in the southern portion of the Sacramento-San Joaquin River Delta.

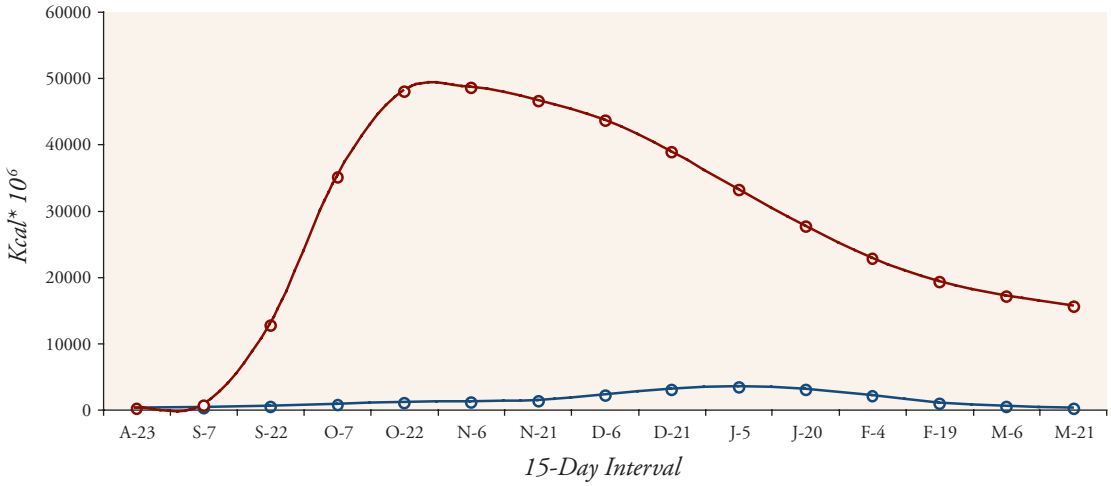


Figure 4-49. Population energy demand (blue) vs. food energy supply (red) for ducks in Delta Basin when duck populations are at NAWMP goals.

Agricultural Easements to Buffer Urban Growth

Many wetlands in the Delta Basin lie west of the I-99 corridor and outside areas of intensive growth. However, development in the cities of Elk Grove and Galt has continued to move south and west. The Stone Lakes National Wildlife Refuge and a portion of the Cosumnes River Preserve are located in the City of Elk Grove Planning Area for future development, while Galt continues to expand west and north. An easement program that buffers existing wetlands from growth of Elk Grove and Galt may be needed.

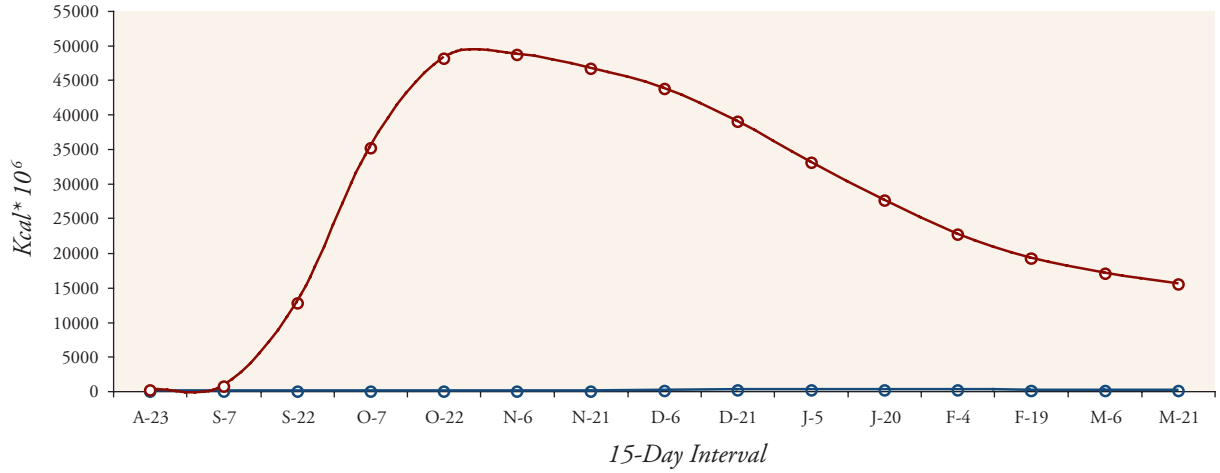


Figure 4-50 (a). Dark goose population energy demand (blue) vs. food energy supplies (red) in Delta Basin.

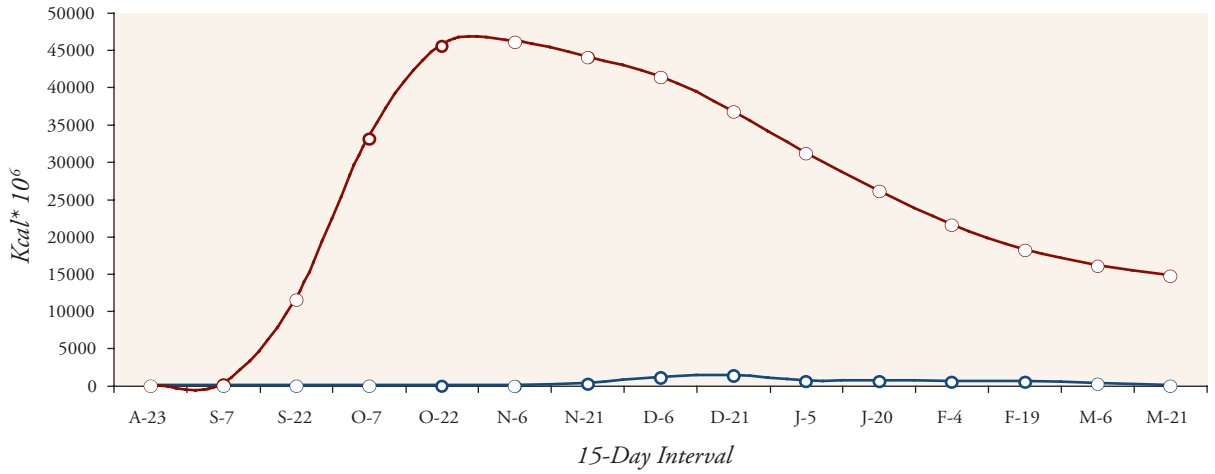


Figure 4-50 (b). White goose population energy demand (blue) vs. food energy supplies (red) in Delta Basin.

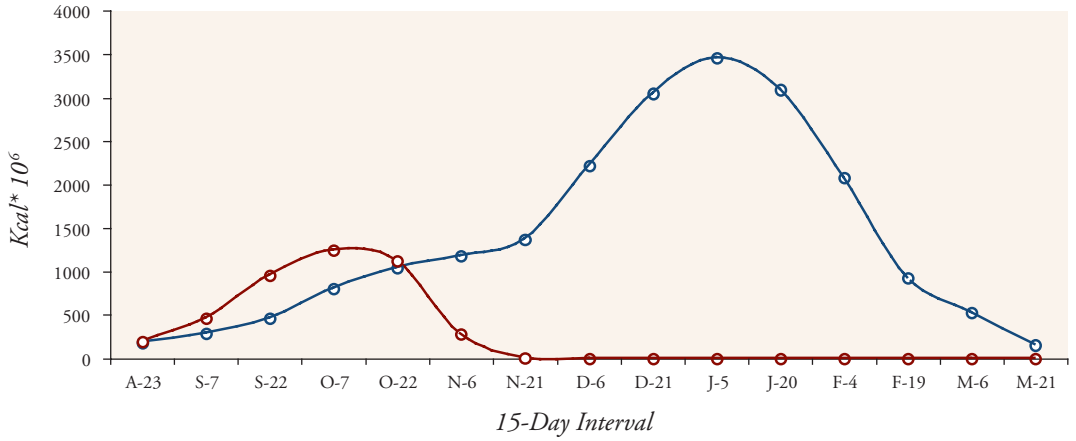


Figure 4-51. Population energy demand (blue) vs. food energy supplies (red) for ducks in Delta Basin when no agricultural food sources are available.

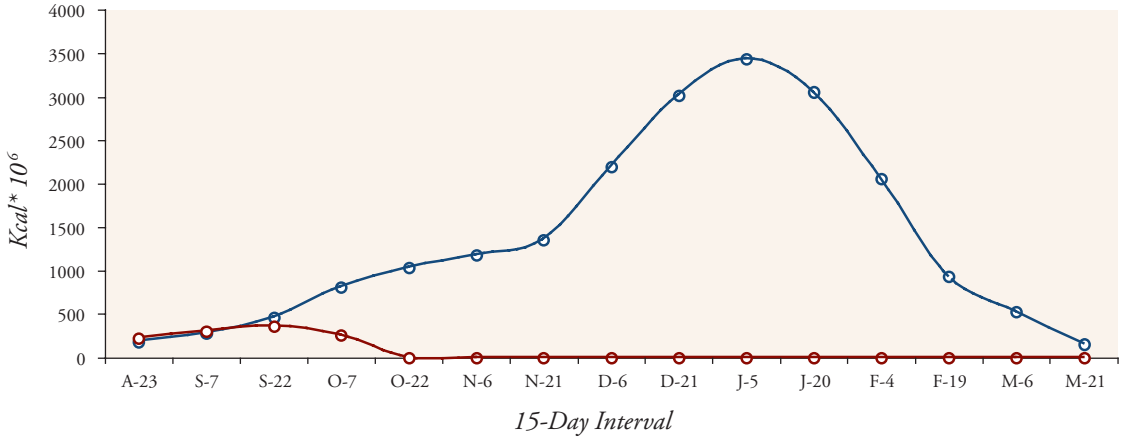


Figure 4-52. Population energy demand (blue) vs. food energy supplies (red) for ducks in Delta Basin if ducks are restricted to foraging on public lands.

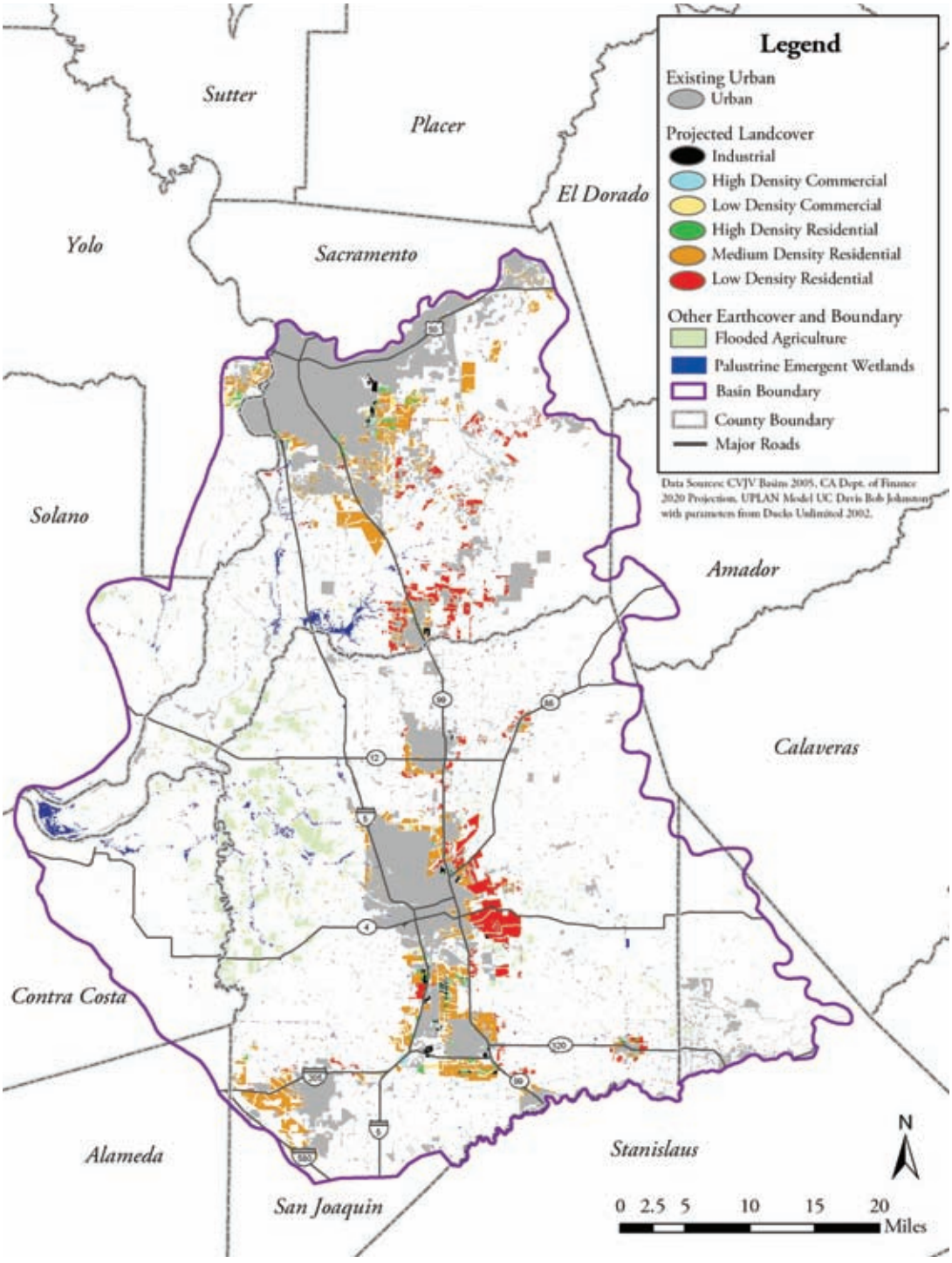


Figure 4-53. Projected growth in Delta Basin to 2020.

	High				Wetland Restoration
Moderate	Moderate		Moderate		Type II Easements
Low		Low			

Figure 4-54. Information used to identify conservation objective priorities for Delta Basin.

Table 4-24. Annual wetland enhancement objectives for Delta Basin.

Wetland Acres	*Annual Enhancement Objective (Acres)[c]*
6,349[a]	529
8,349	696
10,349	862
12,349	1,029
14,349	1,196
16,349	1,362
18,349	1,529
20,349	1,696
22,349	1,862
24,349	2,029
25,349[b]	2,112

[a]Current acres of wetlands in Delta Basin.
[b]Acres of wetlands in Delta Basin when wetland restoration objectives are met.
[c]Annual enhancement objectives reflect progress in meeting wetland restoration objectives for Delta Basin.

Table 4-25. Water needs for seasonal wetlands in Delta Basin when wetland restoration objective is met.

Month	*Water Need (Acre Feet)*
January	5,070
February	5,070
March	5,070
April	6,337
May	0
June	0
July	0
August	22,814
September	50,698
October	10,140
November	10,140
December	5,070
Annual Need	**120,408**

Conservation Objective Priorities

Conservation objectives for Delta Basin are summarized in Table 4-27. The information used to identify conservation objective priorities for the basin is presented in Figure 4-54. Food supplies exceed 100% of duck needs and were rated high. Habitat protection is very low at 13%, as is progress in meeting wetland needs (6,349 acres present vs. 25,349 needed or 25% of need). Population growth and loss of irrigated farmland were rated high for the basin. Wetland restoration is a priority for the basin as only 25% of seasonal wetland needs have been met. Agricultural easements that buffer existing wetlands from growth may also be a conservation priority.

Table 4-26. Agricultural enhancement objective for Delta Basin.

	Total Corn	*Flooded Corn*
Objective	23,000	undetermined
Current	58,976	29,488

Table 4-28. Foraging habitats available to wintering waterfowl in San Joaquin Basin.

Habitat Type	*Acres*
Seasonal Wetlands	61,013

Table 4-27. Conservation objectives for wintering waterfowl in Delta Basin.

Wetland Restoration (Acres)	*Wetland Enhancement (Acres)*	*Water Supplies (Acre Feet)*	*Agricultural Enhancement (Acres)*	*Type I Agricultural Easements*	*Type II Agricultural Easements*
19,000	2,112[A]	120,408[B]	23,000	Needed	Needed

[a]Annual enhancement objective when the wetland restoration objective is met.
[b]Annual water supply need when the wetland restoration objective is met.

San Joaquin Basin

Population Energy Demand vs. Food Energy Supplies: Current Conditions

Population objectives for migrating and wintering waterfowl in San Joaquin Basin are presented in Figures 4-55 through 4-57. Duck population objectives are highest from mid-October through early November, while population objectives for dark and white geese peak during late winter. Wetlands are assumed to provide all the food resources available to ducks, because post-harvest treatment of most rice and corn in the basin makes these foods unavailable to waterfowl (Table 4-28).

The energetic model predicts that food supplies for ducks in the San Joaquin Basin are completely depleted by early February (Figure 4-58). This result assumes that ducks are at NAWMP goals. However, pintails make up 46% of the Central Valley's duck population objective, and pintails have been well below NAWMP goals since the early 1980s. Therefore, it is unlikely that duck food supplies are now exhausted prior to spring migration. Duck use of the basin generally tracks food supplies. Peak populations occur during periods of maximum food energy, while declines in duck numbers track the depletion of food resources. Ducks in the basin are assumed to rely exclusively on wetlands so the loss of agriculture has no affect on duck carrying capacity. However, 75% of all managed wetlands in the basin are privately owned and public habitats can only sustain duck populations through mid-October (Figure 4-59).

The JV did not model food supplies for geese in the San Joaquin Basin because of uncertainty over the type and amount of foraging habitat available to geese. However, some food resources are clearly available given goose population estimates for the basin. For example, management efforts in the San Luis NWR complex include providing corn for Aleutian and Ross's geese, as well as managing grasslands for the benefit of geese (M. Miller, U.S. Geological Survey, personal communication). Future JV planning efforts will better define the food resources available to geese in the San Joaquin Basin.

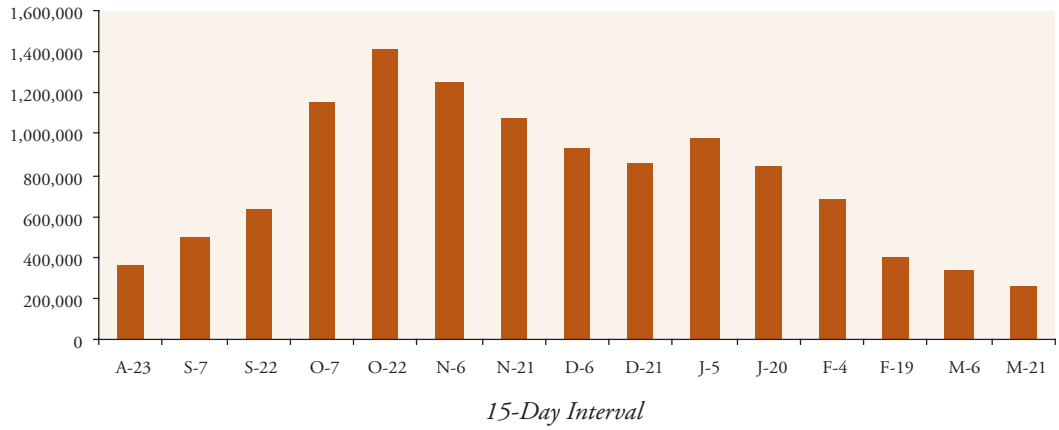


Figure 4-55. Population objectives by 15-day intervals for ducks in San Joaquin Basin.

Conservation Objectives

Wetland Restoration

Wetland restoration objectives for San Joaquin Basin assume that 100% of duck energy needs are met from wetland food sources. The amount of seasonal wetland habitat needed to provide this food is estimated at 81,013 acres. There are currently 61,013 acres of seasonal wetlands in the basin leaving a wetland restoration goal of 20,000 acres.

Wetland Enhancement

The annual enhancement objective for existing wetlands in San Joaquin Basin is 5,084 acres/year. Wetland enhancement objectives increase to 6,751 acres/year when wetland restoration objectives are met for the basin (Table 4-29).

Water Supplies for Wetland Management

Annual management of seasonal wetlands in San Joaquin Basin will require 441,521 acre-feet of water when wetland restoration objectives for the basin have been met. These annual water requirements are further broken down by time period to reflect flooding schedules and summer irrigation needs (Table 4-30).

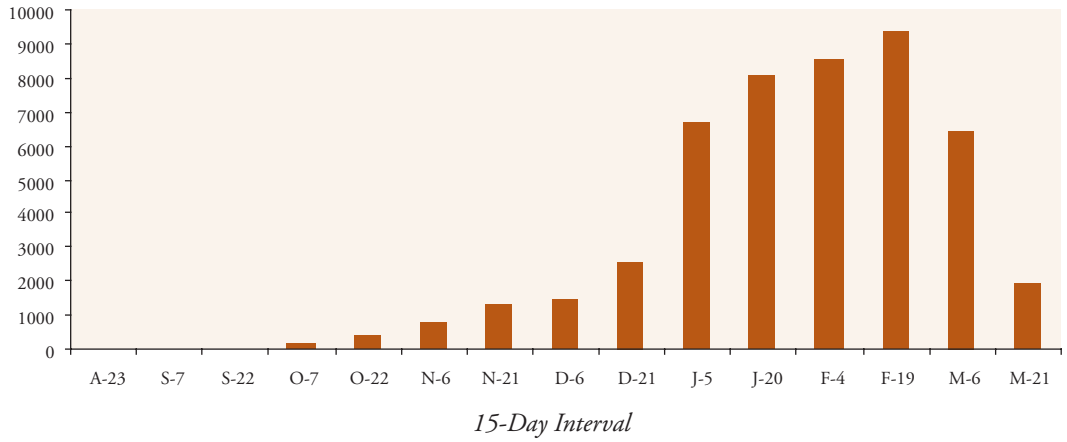


Figure 4-56. Population objectives by 15-day intervals for dark geese in San Joaquin Basin.

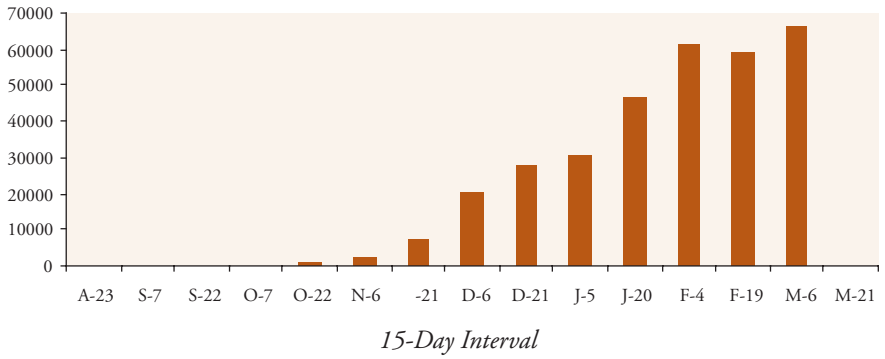


Figure 4-57. Population objectives by 15-day intervals for white geese in San Joaquin Basin.

Agricultural Enhancement

There is no agricultural enhancement objective for San Joaquin Basin, because wetlands provide the overwhelming majority of food sources.

Agricultural Easements for Maintaining Waterfowl Foods (Type I)

No easement areas of this type are proposed for San Joaquin Basin, because wetlands provide the overwhelming majority of food sources.

Agricultural Easements to Buffer Residential and Urban Growth (Type II)

Human population projections for San Joaquin Basin are the second highest in the Central Valley (Figure 3-15). Growth is projected from several directions towards public and private wetlands in the Grasslands, but is especially prevalent along the Interstate 5 corridor and State Highways 165, 152, and 33 (Figure 4-60). Easements that buffer wetlands from this growth should be considered.

Table 4-29. Annual wetland enhancement objectives for San Joaquin Basin.

Wetland Acres	*Annual Enhancement Objective (Acres)*[c]
61,013[a]	5,084
63,013	5,251
65,013	5,418
67,013	5,584
69,013	5,751
71,013	5,918
73,013	6,084
75,013	6,251
77,013	6,418
81,013[b]	6,751

[a] *Current acres of wetlands in San Joaquin Basin.*
[b] *Acres of wetlands in San Joaquin Basin when wetland restoration objectives are met.*
[c] *Annual enhancement objectives reflect progress in meeting wetland restoration objectives for San Joaquin Basin.*

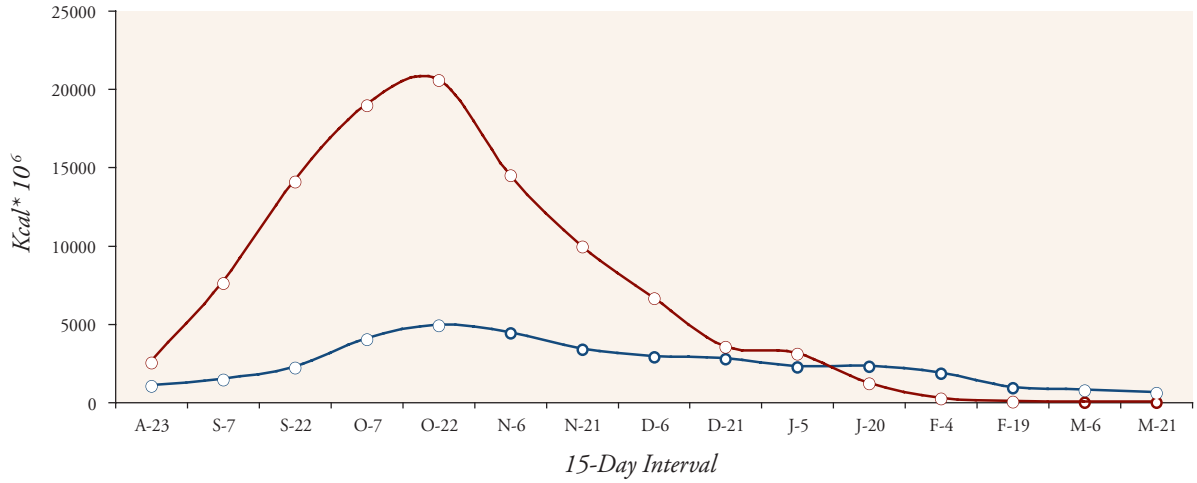


Figure 4-58. Population energy demand (blue) vs. food energy supplies (red) for ducks in San Joaquin Basin when duck populations are at NAWMP goals.

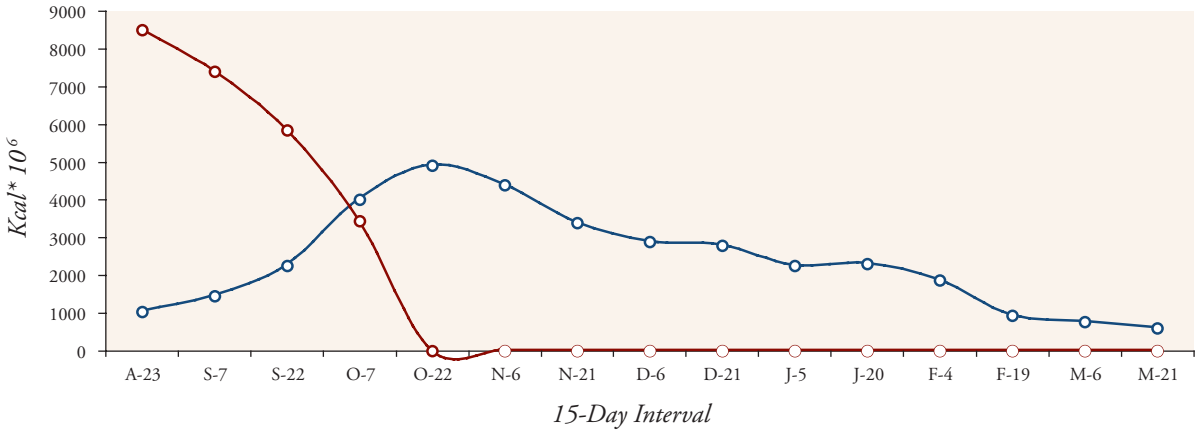


Figure 4-59. Population energy demand (blue) vs. food energy supply (red) for ducks in San Joaquin Basin if ducks are restricted to foraging on public lands.

Conservation Objective Priorities

Conservation objectives for San Joaquin Basin are summarized in Table 4-31. The information used to prioritize these objectives is provided in Figure 4-61. Current food supplies are moderate because only 75% of duck needs are met by existing food resources when duck populations are at NAWMP goals. Habitat protection was also rated moderate at 75% (high ratings begin at 76%), as was progress in meeting wetland needs (61,013 present vs. 81,013 needed or 75% of need). High ratings in this category begin at 76%. Population growth and loss of irrigated farmland are both moderate for the basin.

Wetland restoration is a priority for San Joaquin Basin, because only 75% of the wetlands needed by ducks exist. However progress in meeting wetland needs is high which may allow increased emphasis on wetland enhancement. Finally, agricultural easement programs that buffer wetlands from growth should be considered.

Table 4-30. Water needs for seasonal wetlands in San Joaquin Basin when wetland restoration objective is met.

Month	*Water Need (Acre Feet)*
January	16,203
February	16,203
March	16,203
April	0
May	64,810
June	20,253
July	0
August	64,810
September	162,026
October	32,405
November	32,405
December	16,203
Annual Need	441,521

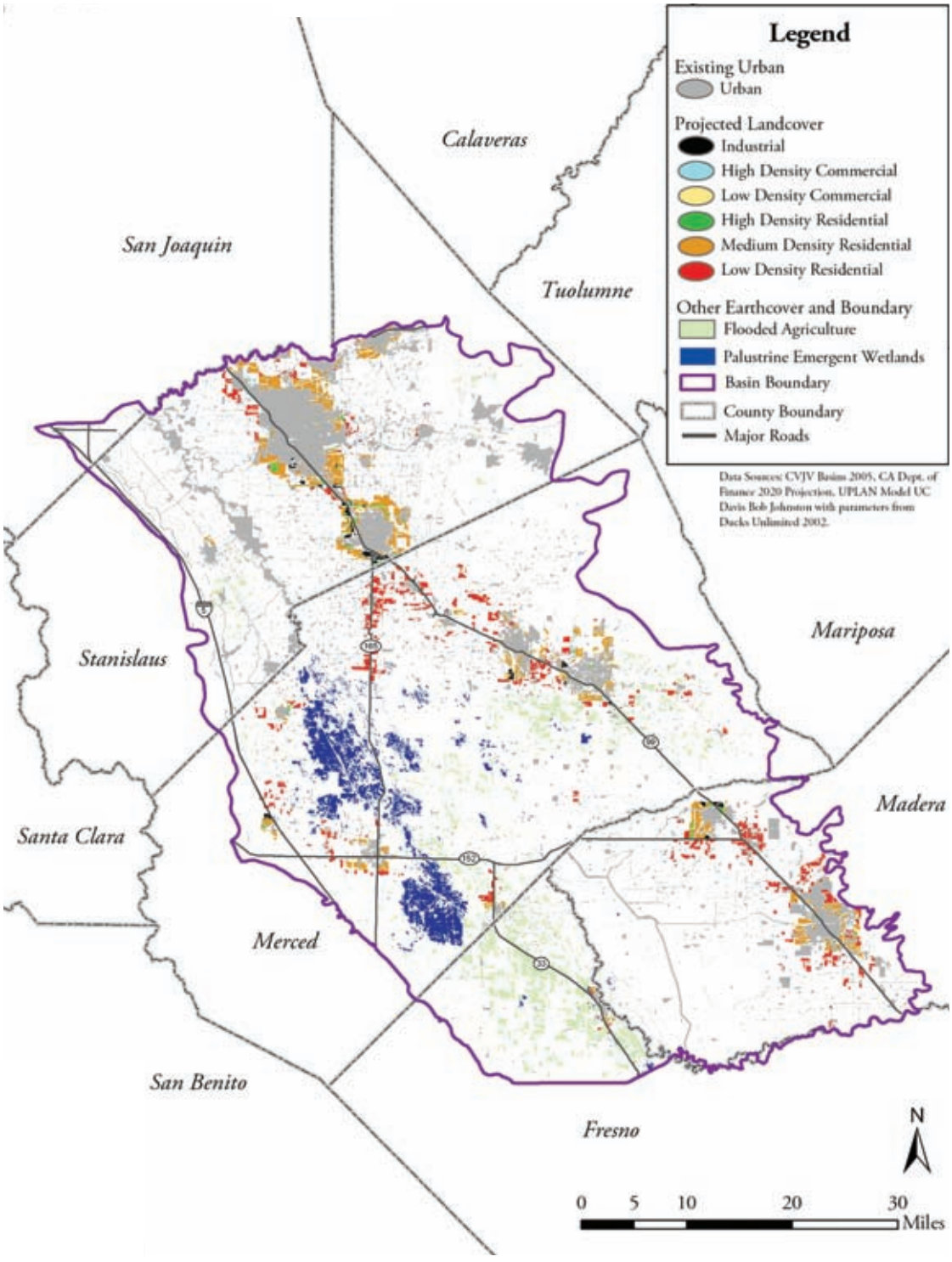


Figure 4-60. Projected growth in San Joaquin Basin to 2020.

Table 4-31. Conservation objectives for wintering waterfowl in San Joaquin Basin

Wetland Restoration (Acres)	*Wetland Enhancement (Acres)*	*Water Supplies (Acre Feet)*	*Agricultural Enhancement (Acres)*	*Type I Agricultural Easements*	*Type II Agricultural Easements*
20,000	6,751[a]	441,521[b]	None	None	Needed

[a] *Annual enhancement objective when the wetland restoration objective is met.*
[b] *Annual water supply need when the wetland restoration objective is met.*

Current Food Supplies	*Habitat Protection*	*Progress in Meeting Wetland Need*	*Population Growth*	*Loss of Irrigated Farmland*	*Conservation Objective Priorities*
High	High	High	High	High	Wetland Restoration
Moderate	Moderate	Moderate	Moderate	Moderate	Wetland Enhancement
Low	Low	Low	Low	Low	Type II Agricultural Easements
	Very Low	Very Low	Very Low		

Figure 4-61. Information used to identify conservation objective priorities for San Joaquin Basin.

Sutter Basin

Population Energy Demand vs. Food Energy Supplies: Current Conditions

Population objectives for migrating and wintering waterfowl in Sutter Basin are presented in Figures 4-62 through 4-64. Duck population objectives are highest in December, while population objectives for dark and white geese peak during January and February respectively. Rice provides the majority of foraging habitat in the basin, while seasonal wetlands total less than 2,000 acres (Table 4-32).

Food supplies for ducks in Sutter Basin are adequate in all time periods with peak supplies occurring in December (Figure 4-65). Food supplies for dark and white geese also peak in December and are well above population needs from fall through spring (Figure 4-66). Agriculture provides 92% percent of the food energy available for ducks in the basin. Loss of these agricultural habitats foods would significantly reduce duck carrying capacity, as food supplies are exhausted by mid-November, if ducks are restricted to foraging in wetlands (Figure 4-67). Public wetlands alone can only meet duck energy needs through the end of October (Figure 4-68).

Conservation Objectives

Wetland Restoration

The amount of seasonal wetlands required to meet 50% of duck energy needs in Sutter Basin is estimated at 5,951 acres. There are currently 1,951 acres of seasonal wetlands in the basin, leaving a wetland restoration goal of 4,000 acres.

Wetland Enhancement

The annual enhancement objective for existing wetlands in Sutter Basin is 163 acres/year. Wetland enhancement objectives increase to 496 acres/year when wetland restoration objectives are met for the basin (Table 4-33).

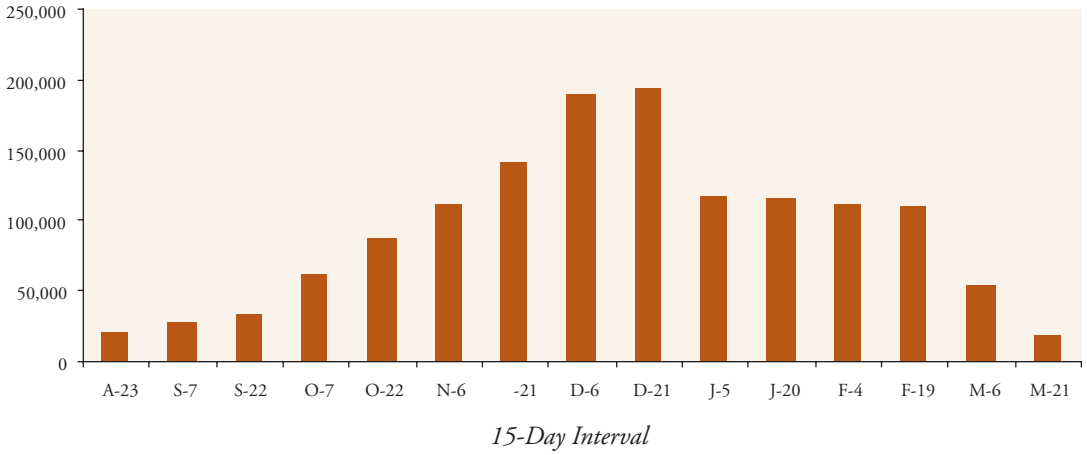


Figure 4-62. Population objectives by 15-day intervals for ducks in Sutter Basin.

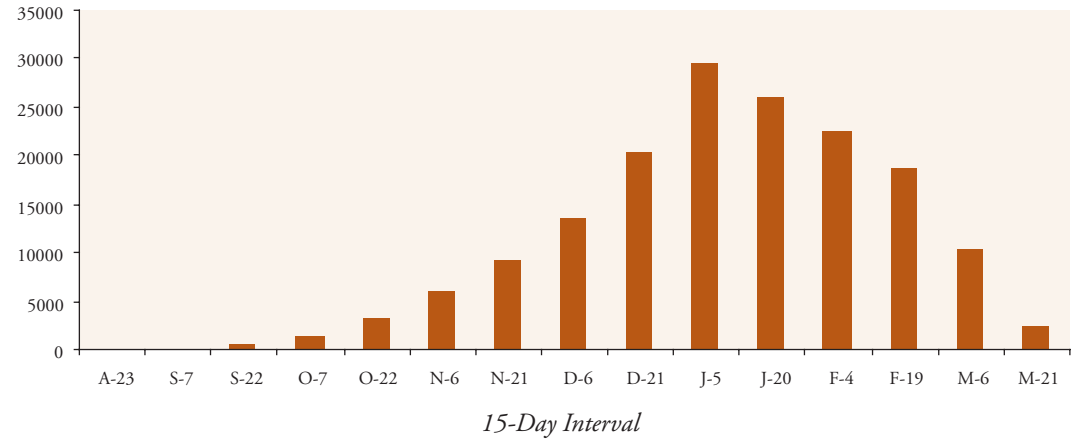


Figure 4-63. Population objectives by 15-day intervals for dark geese in Sutter Basin.

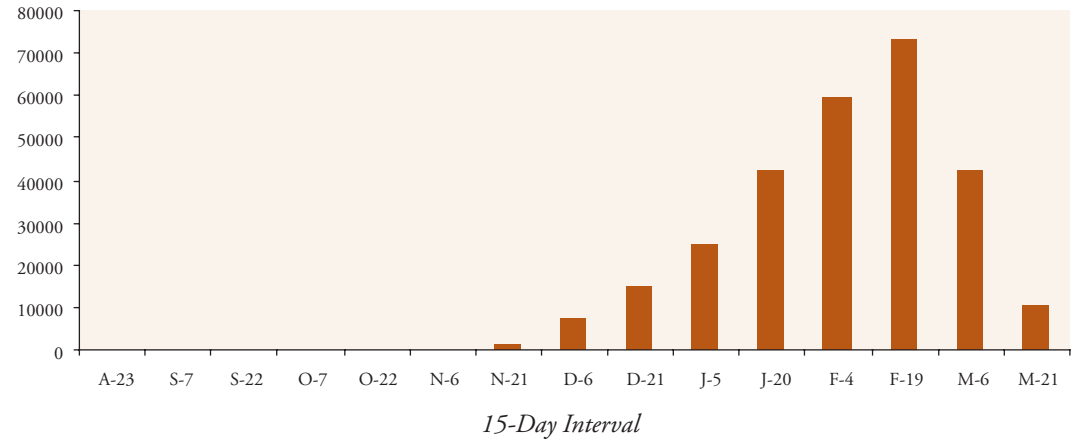


Figure 4-64. Population objectives by 15-day intervals for white geese in Sutter Basin.

Water Supplies for Wetland Management

Annual management of seasonal wetlands in Sutter Basin will require 29,755 acre-feet of water when wetland restoration objectives for the basin are met. These annual water requirements are further broken down by time period to reflect flooding schedules and summer irrigation needs (Table 4-34).

Agricultural Enhancement

The agricultural enhancement objective for Sutter Basin is 18,000 acres, all of which is assumed to be rice. This objective represents the amount of rice habitat that must be maintained in a waterfowl-friendly state when wetland restoration objectives have been met for the basin. Ten thousand of these acres must be winter-flooded to meet duck energy needs. Waterfowl-friendly rice habitat in the basin is currently estimated at nearly 43,000 acres. Over 33,000 of these acres are winter-flooded (Table 4-35). Agricultural enhancement objectives are currently exceeded the basin.

Agricultural Easements for Maintaining Waterfowl Foods

Agricultural habitats are extremely important to waterfowl in Sutter Basin and provide 92% of the food energy available to ducks (Figure 4-68). The loss of irrigated farmland in Sutter Basin by 2040 is estimated at 8,700 acres or 3.6% of existing lands (Figure 3-15). Approximately 1,700 of these acres are predicted to be rice (Table 3-4). Most wetland restoration occurs on rice ground, and meeting wetland restoration goals for the basin could reduce rice acreage by an additional 4,000 acres. Planted rice in the basin is now estimated at 46,000 acres. This acre base would be reduced by 5,700 acres if growth projections are accurate and wetland restorations are met.

Reducing Sutter Basin's rice acreage by 5,700 acres would not appear to prevent the JV's agricultural enhancement goal from being met, because over 40,000 acres of rice would remain to meet the 18,000 acre objective for waterfowl-friendly rice (Figure 4-69). However, some resource professionals believe that growth projections for the basin underestimate the future impacts on riceland, especially for the area between Yuba City and Sutter NWR (Figure 4-70). This rice currently buffers wetlands in the Sutter Bypass, the only major wetland complex in the basin. Thus, the JV may need to consider establishing agricultural easements in this portion of the basin.

Agricultural Easements to Buffer Urban Growth (Type II)

Growth west of Yuba City may ultimately reduce the quality of wetlands in Sutter NWR (Figure 4-70), and a Type II easement program could divert development away from this important wetland complex.

Conservation Objective Priorities

Conservation objectives for Sutter Basin are summarized in Table 4-36. The information used to prioritize these objectives is presented in Figure 4-71. Food supplies exceed 100% of duck needs and were rated high. The overall level of habitat protection is very low at 16%, while progress in meeting wetland needs is low (1,951 acres present (vs. 5,951 acres needed or 33% of need). Population growth and loss of irrigated farmland were both considered low. Wetland restoration is a conservation priority for the basin as only 33% of wetland needs have been met for ducks. Although projected losses of irrigated farmland are low, agricultural easements that specifically buffer Sutter NWR are needed.

Table 4-32. Foraging habitats available to wintering waterfowl in Sutter Basin.

Habitat Type	*Acres*
Seasonal Wetlands	1,951
Flooded Rice	33,168
Unflooded Rice	9,674
Corn	2,875

Table 4-33. Annual wetland enhancement objectives for Sutter Basin.

Wetland Acres	*Annual Enhancement Objective (Acres)*[c]
1,951[a]	163
3,951	329
5,951[b]	496

[a]Current acres of wetlands in Sutter Basin.
[b]Acres of wetlands in Sutter Basin when wetland restoration objectives are met.
[c]Annual enhancement objectives reflect progress in meeting wetland restoration objectives for Sutter Basin.

Table 4-34. Water needs for seasonal wetlands in Sutter Basin when wetland restoration objective is met.

Month	*Water Need (Acre Feet)*
January	1,190
February	1,190
March	1,190
April	0
May	4,166
June	0
July	0
August	5,356
September	10,712
October	2,308
November	2,308
December	1,190
Annual Need	**29,755**

Table 4-35. Agricultural enhancement objectives for Sutter Basin.

	Waterfowl friendly Rice[a]	*Flooded Rice*
Objective	18,000	10,000
Current	42,842[b]	33,168

[a]Waterfowl-friendly rice includes rice that is flooded and rice that is not deep plowed following harvest but which remains dry.
[b]Planted rice acreage in Sutter Basin is estimated at 46,066 acres (Table 3-6). The JV assumes that 42,842 of these acres provide waterfowl-friendly habitat.

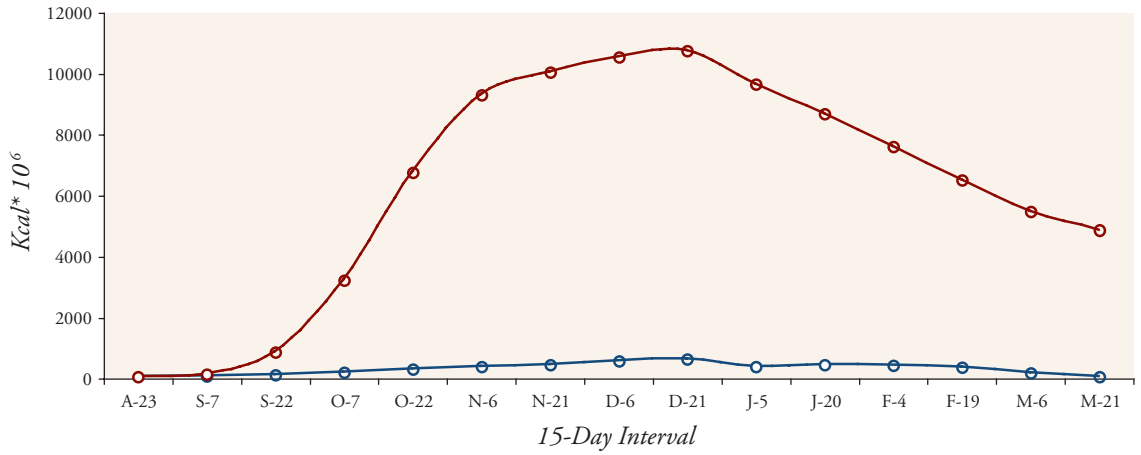


Figure 4-65. Population energy demand (blue) vs. food energy supply (red) for ducks in Sutter Basin when duck populations are at NAWMP goals.

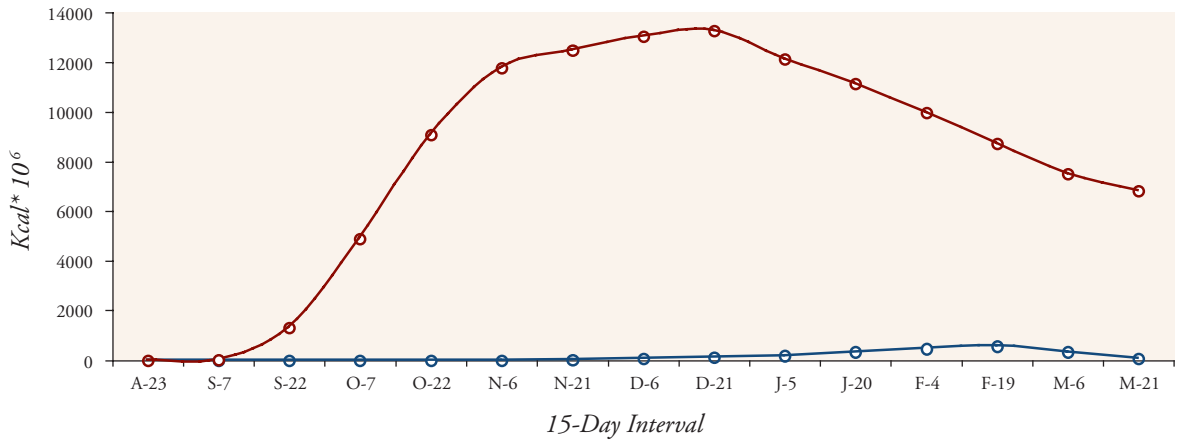


Figure 4-66 (a). Dark goose population energy demand (blue) vs. food energy supplies (red) in Sutter Basin.

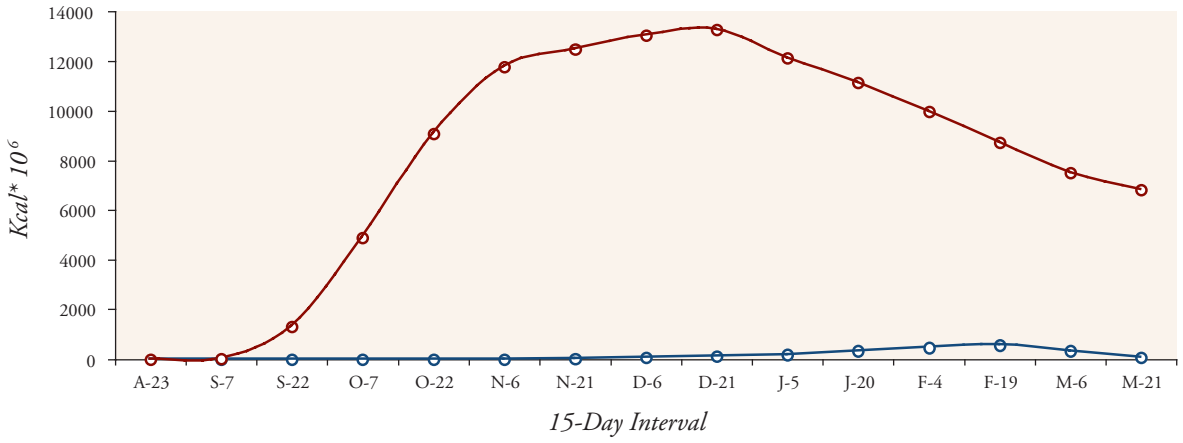


Figure 4-66 (b). White goose population energy demand (blue) vs. food energy supplies (red) in Sutter Basin.

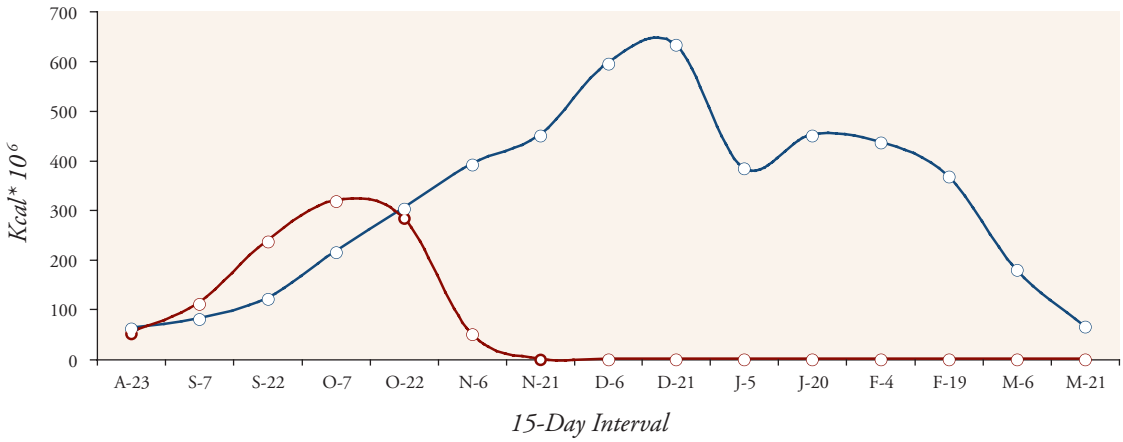


Figure 4-67. Population energy demand (blue) vs. food energy supply (red) for ducks in Sutter Basin when no agricultural food sources are available.

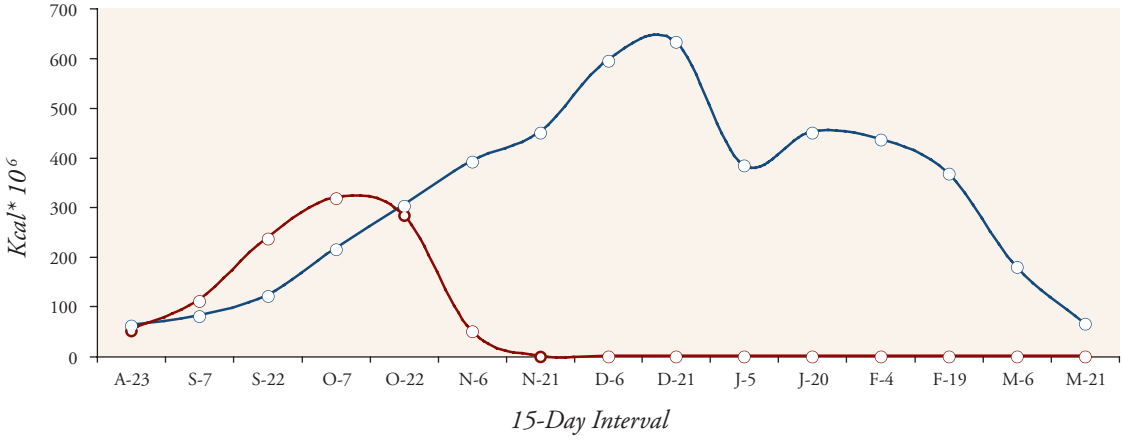


Figure 4-68. Population energy demand (blue) vs. food energy supply (red) for ducks in Sutter Basin if ducks are restricted to foraging on public lands.

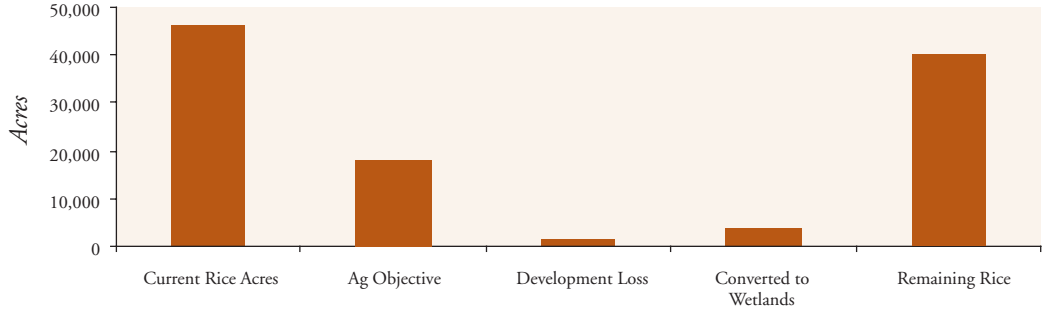


Figure 4-69. Forecasted changes in rice acreage for the Sutter Basin compared to the basin's agricultural enhancement objective.

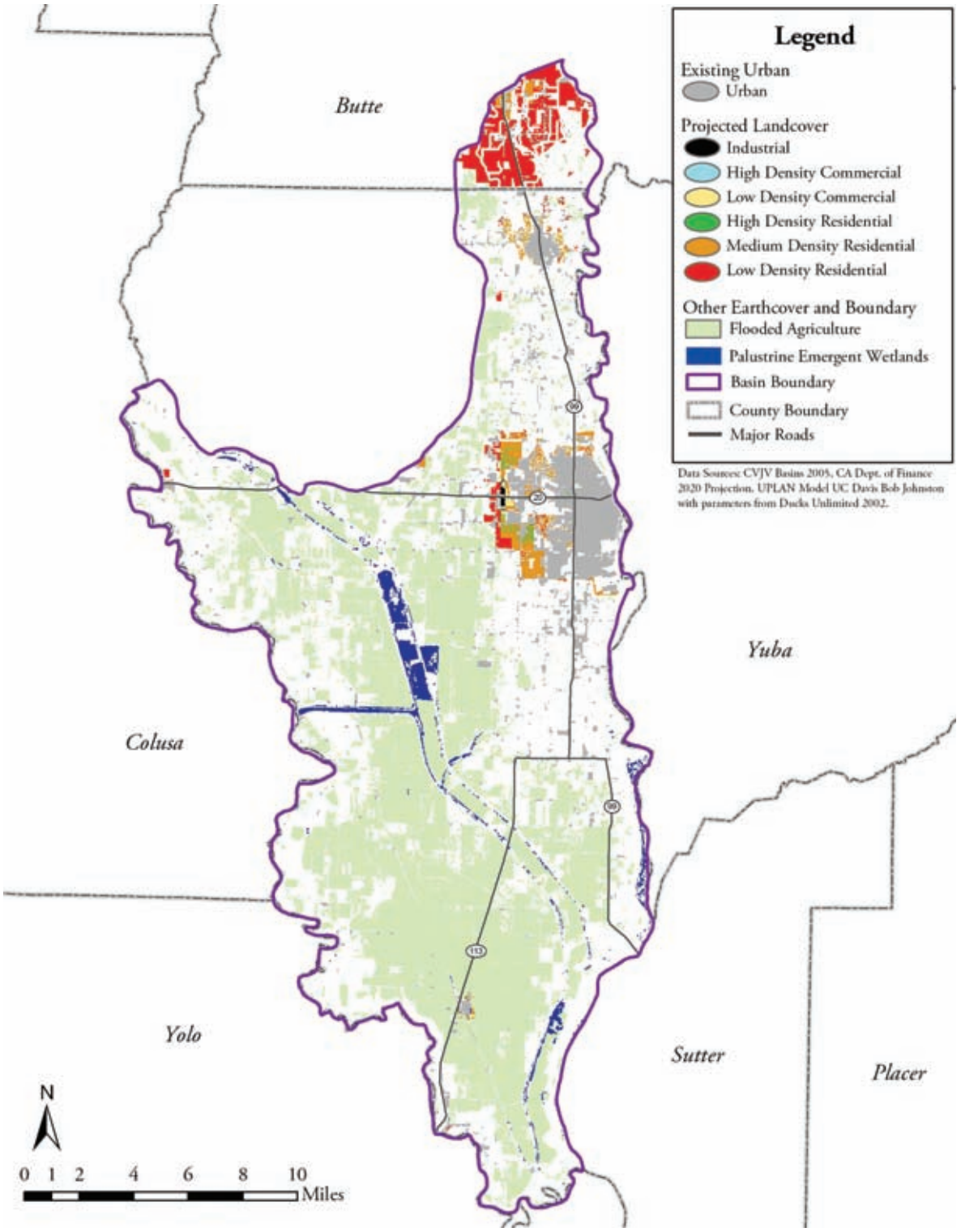


Figure 4-70. Projected growth in Sutter Basin to 2020.

Table 4-36. Conservation objectives for wintering waterfowl in Sutter Basin.

Wetland Restoration (Acres)	*Wetland Enhancement (Acres)*	*Water Supplies (Acre Feet)*	*Agricultural Enhancement (Acres)*	*Type I Agricultural Easements*	*Type II Agricultural Easements*
4,000	496[a]	29,755[b]	18,000[c] 10,000[d]	Needed	Needed

[a]*Annual enhancement objective when the wetland restoration objective is met.*
[b]*Annual water supply need when the wetland restoration objective is met.*
[c]*Total acres of rice that must be maintained in a waterfowl-friendly state (includes 10,000 acres that must be flooded). Objective has been met.*
[d]*Total acres of rice that must be flooded out of the total enhancement objective of 18,000 acres. Objective has been met.*

Current Food Supplies	*Level of Habitat Protection*	*Progress in Meeting Wetland Needs*	*Population Growth*	*Loss of Irrigated Farmland*	*Conservation Objective Priorities*
High	High	High	High	High	Wetland Restoration
Moderate	Moderate	Moderate	Moderate	Moderate	Type I Agricultural Easements
Low	Low	Low	Low	Low	Type II Agricultural Easements
	Very Low	Very Low	Very Low		

Figure 4-71. Information used to identify conservation objective priorities for Sutter Basin.

Suisun Basin

Population Energy Demand vs. Food Energy Supplies: Current Conditions

Population objectives for migrating and wintering waterfowl in Suisun Marsh are presented in Figures 4-72 through 4-74. Duck population objectives are highest for December, while population objectives for dark and white geese peak during January. However, dark and white goose populations in Suisun Marsh are very small relative to most other basins and no further results are presented for these birds. Wetlands provide all the food resources in Suisun Marsh, as there are no agricultural habitats in the basin (Table 4-37).

Table 4-37. Foraging habitats available to wintering waterfowl in Suisun Marsh.

Habitat Type	*Acres*
Seasonal Wetlands	32,232

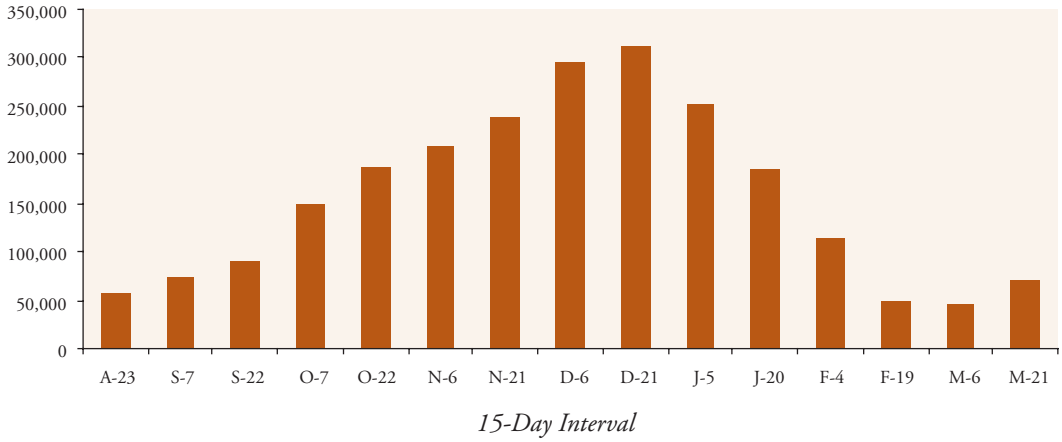


Figure 4-72. Population objectives by 15-day intervals for ducks in Suisun Basin.

Recent proposals to restore 5,000 acres of Suisun Marsh to tidal flow have raised some concern that carrying capacity will be reduced because food production in saline habitats may be lower than in freshwater environments. Duck food supplies are adequate in all time periods if seed production in Suisun wetlands is similar to other basins (566 lbs/acre) (Figure 4-75). Food supplies remain adequate from fall through spring, even if 5,000 acres of wetlands are restored to tidal flow and no food production is assumed for these tidally restored habitats (Figure 4-76).

Although much of the Suisun Marsh is isolated from tidal flows, wetland habitats are more saline than elsewhere in the Central Valley. Plant communities that are associated with high salinities often produce less seed than plants adapted to freshwater environments. As a result, the JV has assumed that seed production in Suisun Marsh is 50% of other Basins (283 lbs/acre). Food supplies for ducks are adequate even when seed production is assumed to be 283 lbs/acre (Figure 4-77). However, restoring tidal flow to 5,000 acres of existing habitat could result in food supplies being exhausted by early February, if few food resources are provided in these tidal areas and the remaining wetlands provide only 283 lbs of seed/acre (Figure 4-78).

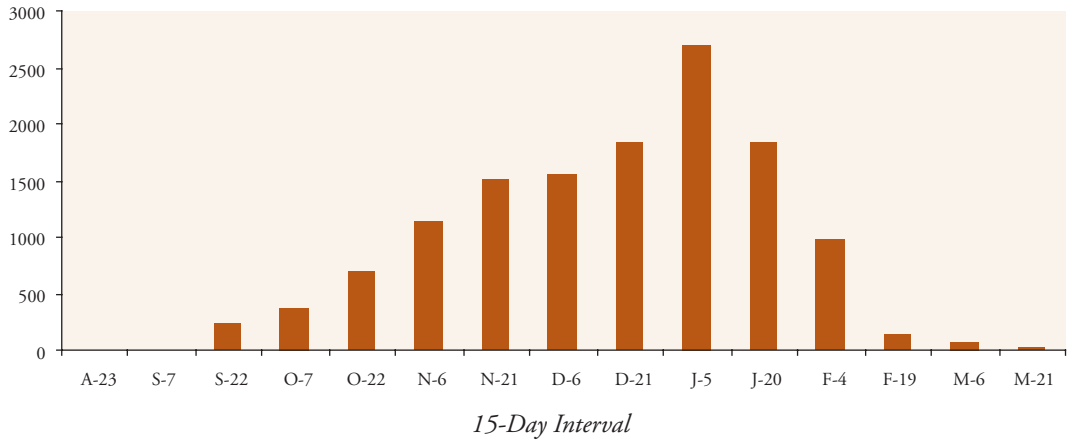


Figure 4-73. Population objectives by 15-day intervals for dark geese in Suisun Marsh.

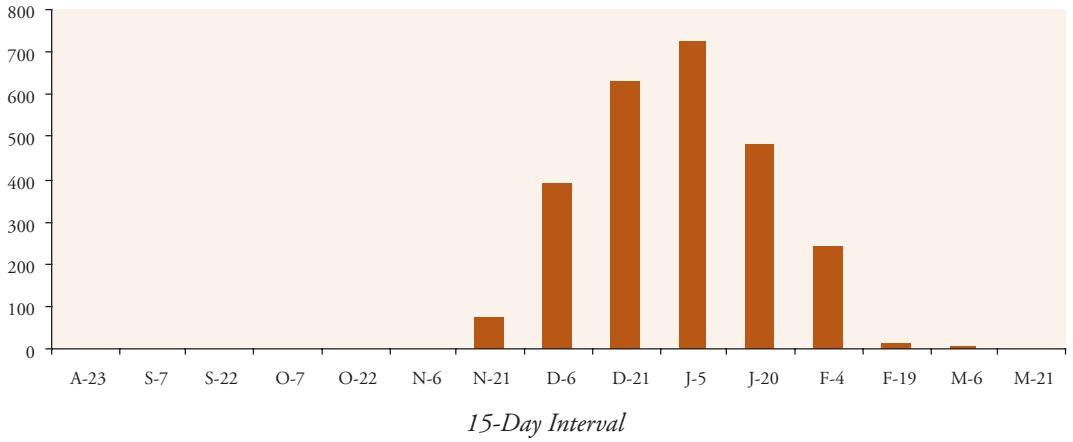


Figure 4-74. Population objectives by 15-day intervals for white geese in Suisun Marsh.

Uncertainty over the food resources provided by Suisun wetlands, and the possible effect of tidal restoration, make any assessment of food supplies difficult. Future studies to estimate food production in existing habitats and in tidally influenced areas would greatly improve the JV's ability to estimate duck carrying capacity in this basin.

Conservation Objectives

Wetland Restoration

There is no wetland restoration objective for Suisun Marsh. Wetlands currently meet 100% of duck energy needs even when seed production is assumed to be half that of other basins.

Wetland Enhancement

The annual enhancement objective for existing wetlands in Suisun Marsh is 2,686 acres/year.

Water Supplies for Wetland Management

Annual management of seasonal wetlands in Suisun Marsh requires 153,102 acre-feet of water. These annual water requirements are further broken down by time period to reflect flooding schedules and summer irrigation needs (Table 4-38).

Table 4-38. Water needs for seasonal wetlands in Suisun Marsh.

Agricultural Enhancement

There is no agricultural enhancement objective for Suisun Marsh, as no crops are grown in the basin.

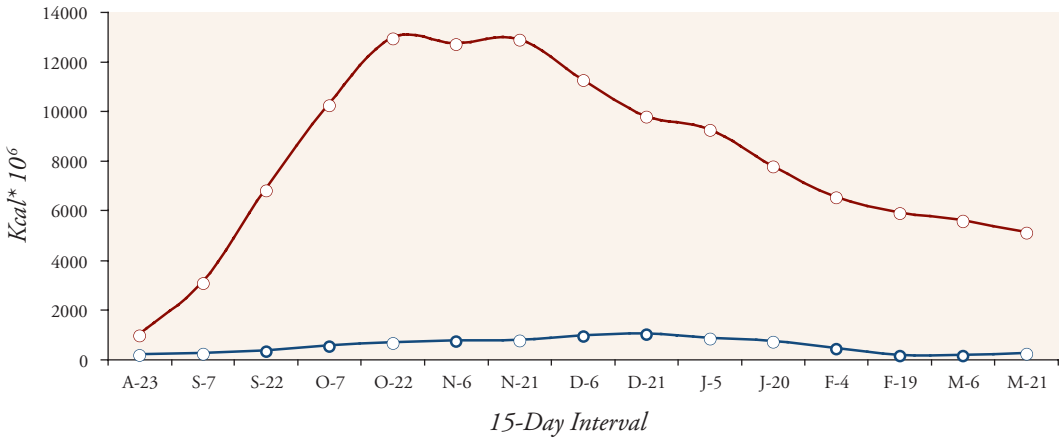


Figure 4-75. Population energy demand (blue) vs. food energy supply (red) for ducks in Suisun Marsh if wetland seed production is similar to other areas of the Central Valley (566 lbs/acre).

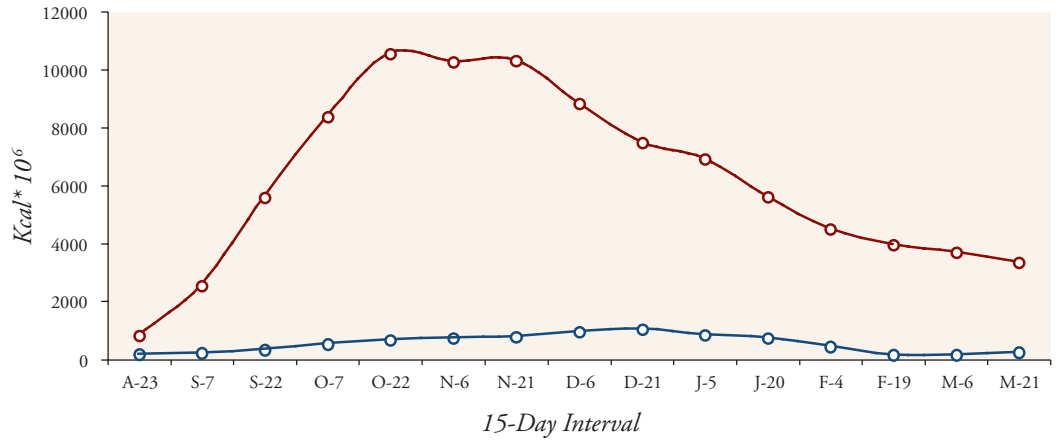


Figure 4-76. Population energy demand (blue) vs. food energy supply (red) for ducks in Suisun Marsh, if wetland seed production is similar to other areas of the Central Valley (566 lbs/acre), and tidal flow is restored to 5,000 acres of existing wetlands.

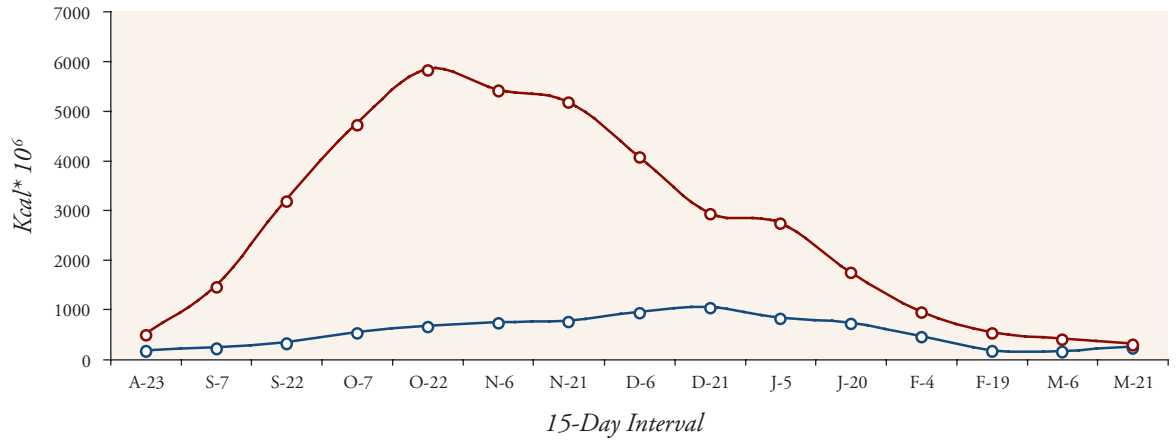


Figure 4-77. Population energy demand (blue) vs. food energy supply (red) for ducks in Suisun Marsh if wetland seed production is assumed to be 50% of other areas of the Central Valley (283 lbs/acre).

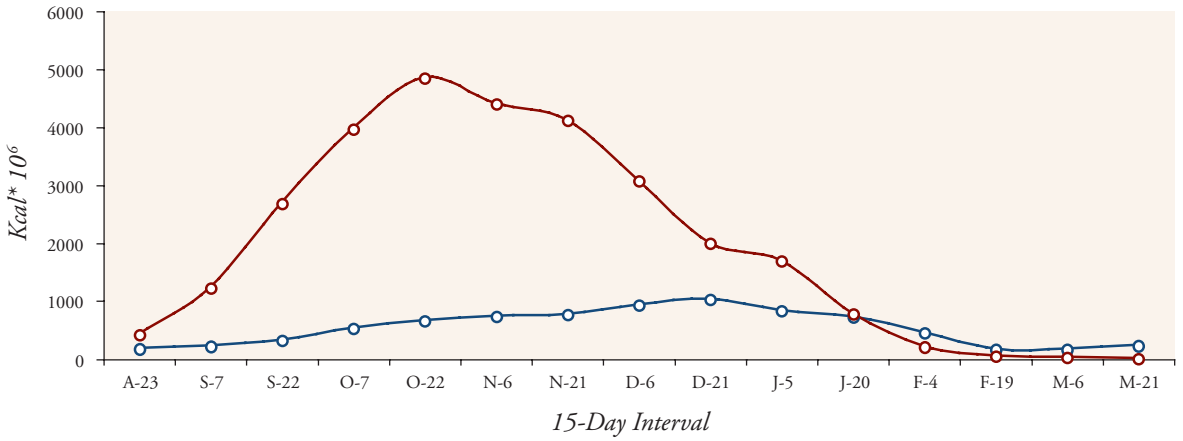


Figure 4-78. Population energy demand (blue) vs. food energy supply (red) for ducks in Suisun Marsh if wetland seed production is assumed to be 50% of other areas of the Central Valley (283 lbs/acre), and tidal flow is restored to 5,000 acres of existing wetlands.

Agricultural Easements for Maintaining Waterfowl Foods

No easements of this type are proposed, as there are no crops grown in the basin.

Agricultural Easements to Buffer Residential and Urban Growth

No easements of this type are proposed, as there are no crops grown in the basin and no projected residential or urban growth.

Conservation Objective Priorities

Conservation objectives for Suisun Marsh are summarized in Table 4-39. Information used to prioritize these conservation objectives is presented in Figure 4-79. Food supplies exceed 100% of duck needs and were rated high. The level of habitat protection is high (100%) as is progress in meeting wetland needs (no future wetland restoration proposed). No population growth or loss of irrigated farmland is anticipated for the basin. As a result, wetland enhancement is the only conservation priority identified for Suisun Marsh.

Table 4-39. Conservation objectives for wintering waterfowl in Suisun Marsh.

Wetland Restoration (Acres)	Wetland Enhancement (Acres)	Water Supplies (Acre Feet)	Agricultural Enhancement (Acres)	Type I Agricultural Easements	Type II Agricultural Easements
0	2,686[a]	153,102[b]	0	None	None

[a] *Annual enhancement objective for existing wetlands.*
[b] *Annual water supply need for existing wetlands.*

			High	High	Wetland Enhancement
Moderate	Moderate	Moderate	Moderate	Moderate	
Low	Low	Low	Low		
	Very Low	Very Low			

Figure 4-79. Information used to prioritize conservation objectives for Suisun Marsh.

Yolo Basin

Population Energy Demand vs. Food Energy Supplies: Current Conditions

Population objectives for wintering waterfowl in Yolo Basin are presented in Figures 4-80 through 4-82. Duck and white geese population objectives are highest in February, while population objectives for dark geese peak during January. Agriculture provides the majority of foraging habitat in the basin, although significant amounts seasonal wetlands are also present (Table 4-40).

Table 4-40. Foraging habitats available to wintering waterfowl in Yolo Basin.

Habitat Type	Acres
Seasonal Wetlands	8,558
Flooded Rice	7,020
Unflooded Rice	2,048
Corn	20,640

Food supplies for Yolo Basin ducks are adequate in all time periods, although supplies peak six to eight weeks before bird numbers reach their maximum (Figure 4-83). Food supplies for dark and white geese are also well above population needs and large food surpluses occur from fall through spring (Figure 4-84). Agriculture provides 79% of the food energy available for ducks in the basin. Loss of these agricultural foods would decrease duck carrying capacity, as food supplies are exhausted by early February if ducks are restricted to foraging in wetlands (Figure 4-85). Public wetlands are capable of meeting duck needs through mid-December (Figure 4-86).

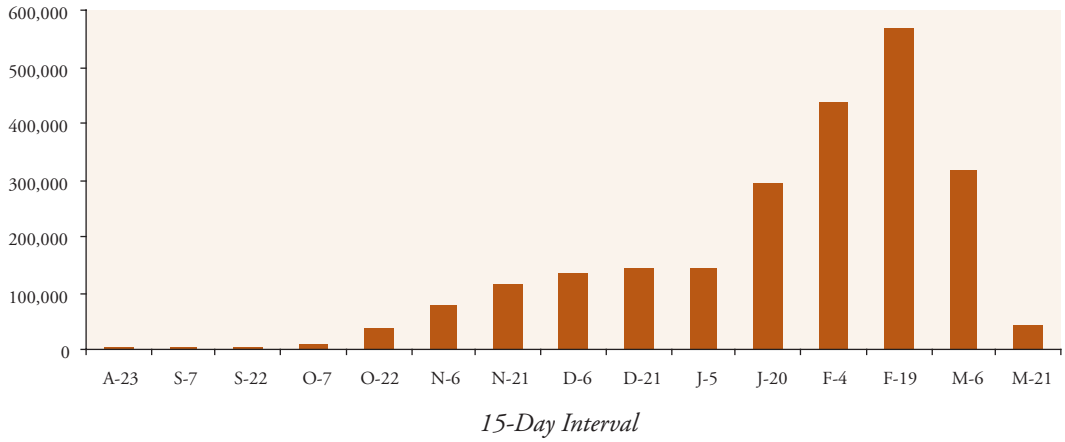


Figure 4-80. Population objectives by 15-day intervals for ducks in Yolo Basin.

Conservation Objectives

Wetland Restoration

The amount of seasonal wetlands required to meet 50% of duck energy needs in Yolo Basin is estimated at 11,558 acres. There are currently 8,558 acres of seasonal wetlands in the basin, leaving a wetland restoration goal of 3,000 acres.

Seasonal Wetland Enhancement

The annual enhancement objective for existing seasonal wetlands in Yolo Basin is 713 acres/year. Wetland enhancement objectives will increase to 963 acres/year when wetland restoration objectives are met for the basin (Table 4-41).

Water Supplies for Wetland Management

Annual management of seasonal wetlands in Yolo Basin will require 57,790 acre-feet of water when wetland restoration objectives in the basin have been met. These annual water requirements are further broken down by time period to reflect flooding schedules and summer irrigation needs (Table 4-42).

Agricultural Enhancement

The Yolo Basin contains significant amounts of both corn and rice, and agricultural enhancement objectives for the basin reflect the relative abundance of these two crop types. The enhancement objective for the basin is 11,000 acres, of which 8,000 is assumed to be corn. The remaining 3,000 acres is assumed to be flooded rice. This objective represents the amount of corn and rice that must be maintained in a waterfowl-friendly state when wetland restoration objectives have been met for the basin. Corn acreage is currently estimated at 20,640, while flooded rice totals 7,020 acres (Table 4-43). Agricultural enhancement objectives are currently exceeded for the basin.

Agricultural Easements for Maintaining Waterfowl Foods

Agricultural habitats are extremely important to waterfowl in Yolo Basin and provide 79% of the food energy now available to ducks (Figure 4-85). The loss of irrigated farmland in the basin by 2040 is estimated at nearly 50,000 acres or 8.3% of existing lands (Figure 3-15). Approximately 800 of these acres are predicted to be rice, while 3,400 acres of corn will be lost (8.3% loss rate applied to existing acres of corn). Most wetland restoration occurs on rice ground, and an additional 3,000 acres of rice may be converted to wetlands if wetland restoration objectives are met for the basin.

Forty-one thousand acres of corn and nearly 10,000 acres of rice are planted annually in Yolo Basin (Table 3-6). The loss of 3,400 acres of corn to development will not prevent agricultural enhancement objectives for corn being met, especially since objectives for corn are now exceeded by over 100% (Table 4-43). However, reducing the basin's 10,000 acre rice base by nearly 4,000 acres is a significant loss. While this loss may not prevent agricultural enhancement objectives being met for rice (Figure 4-87), changes in the rice base should be closely monitored to determine if a Type I easement program is needed in the future.

Agricultural Easements to Buffer Urban Growth

Growth projections for Yolo Basin indicate that little residential or urban development will occur near existing wetlands (Figure 4-88). As a result, no agricultural easements to buffer growth are proposed for the basin.

Table 4-41. Annual wetland enhancement objectives for Yolo Basin.

Wetland Acres	*Annual Enhancement Objective (Acres)[c]*
8,558[a]	713
10,558	880
11,558[b]	963

[a]Current acres of wetlands in Yolo Basin.
[b]Acres of wetlands in Yolo Basin when wetland restoration objectives are met.
[c]Annual enhancement objectives reflect progress in meeting wetland restoration objectives for Yolo Basin.

Table 4-42. Water needs for seasonal wetlands in Yolo Basin when wetland restoration objective is met.

Month	*Water Need (Acre Feet)*
January	2,312
February	2,312
March	2,312
April	0
May	8,091
June	0
July	0
August	10,402
September	20,804
October	4,623
November	4,623
December	2,312
Annual Need	57,790

Table 4-43. Agricultural enhancement objectives for Yolo Basin.

	Waterfowl Friendly[a] Corn	*Flooded Rice*
Objective	8,000	3,000
Current	20,640[b]	7,020

[a]Waterfowl-friendly corn includes corn that is flooded and corn that is not deep plowed following harvest but which remains dry.
[b]Planted corn in Yolo Basin is estimated at 41,280 acres (Table 3-6). The JV assumes that 20,640 or 50% of these acres provide waterfowl-friendly habitat, most of which is dry.

Table 4-45. Foraging habitats available to wintering waterfowl in Tulare Basin.

Habitat Type	*Acres*
Seasonal Wetlands	20,212

Table 4-44. Conservation Objectives for wintering waterfowl in Yolo Basin.

Wetland Restoration (Acres)	Wetland Enhancement (Acres)	Water Supplies (Acre Feet)	Agricultural Enhancement (Acres)	Type I Agricultural Easements	Type II Agricultural Easements
3,000	963[a]	57,790[b]	8,000[c] 3,000[d]	None	None

[a] *Annual enhancement objective when the wetland restoration objective is met.*
[b] *Annual water supply need when the wetland restoration objective is met.*
[c] *Total acres of corn that must be enhanced. Objective has been met.*
[d] *Total acres of rice that must be flooded. Objective has been met.*

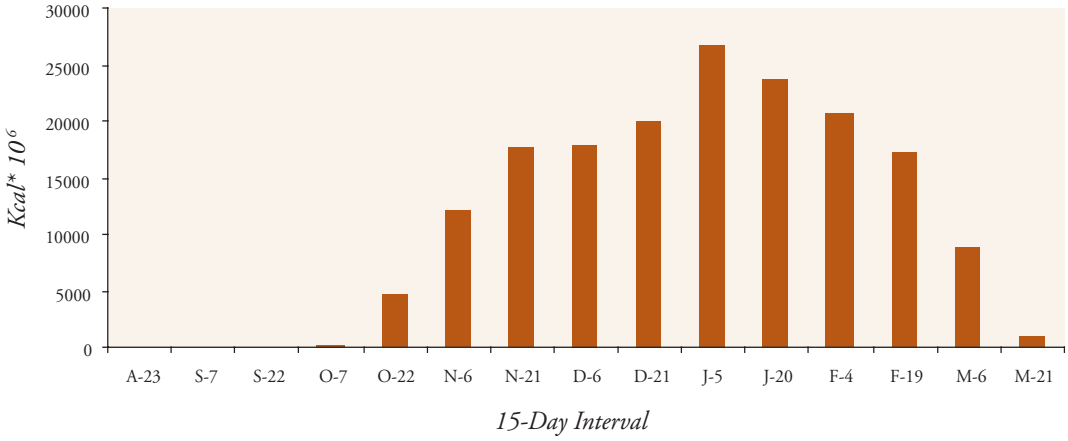


Figure 4-81. Population objectives by 15-day intervals for dark geese in Yolo Basin.

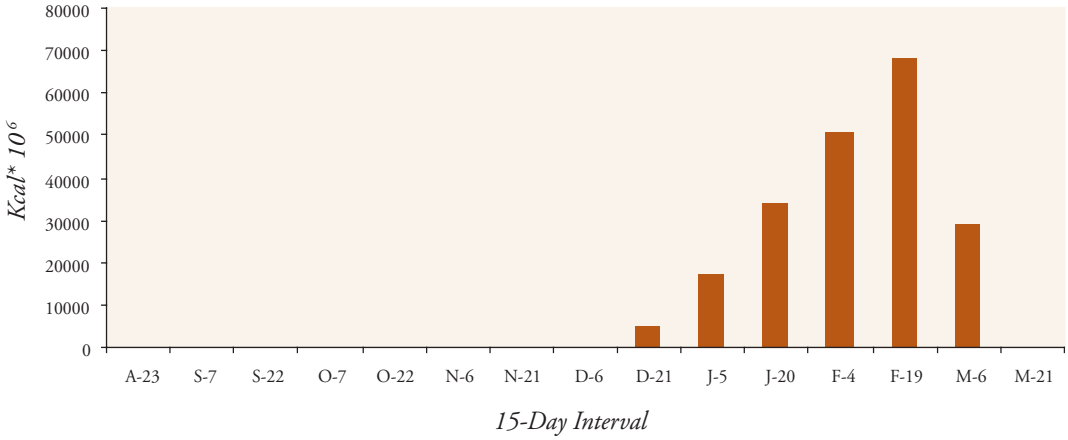


Figure 4-82. Population objectives by 15-day intervals for white geese in Yolo Basin.

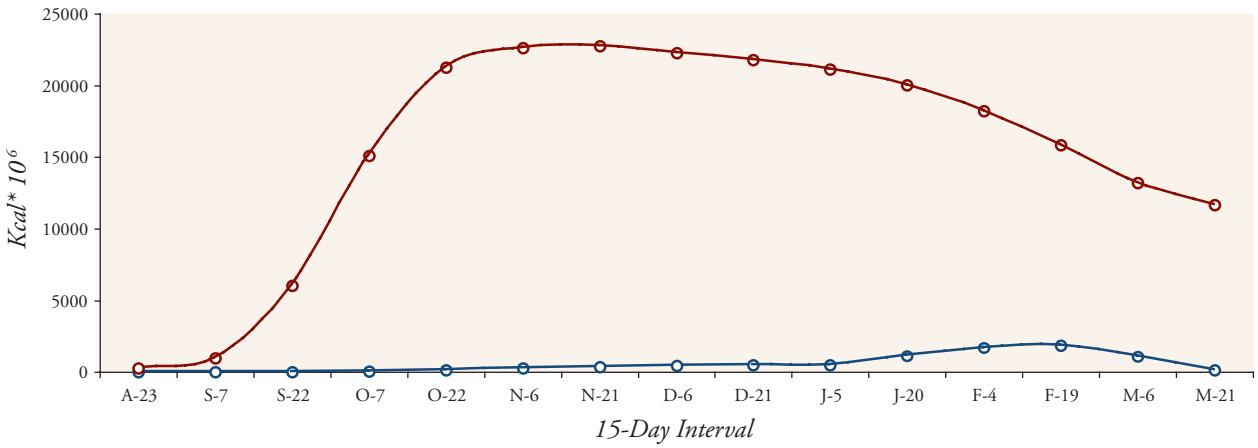


Figure 4-83. Population energy demand (blue) vs. food energy supply (red) for ducks in Yolo Basin when duck populations are at NAWMP goals.

Conservation Objective Priorities

Conservation objectives for Yolo Basin are summarized in Table 4-44. The information used to identify conservation objective priorities for the basin is presented in Figure 4-89. Food supplies exceed 100% of duck needs and were rated high. Habitat protection in the basin is low at 36%, while progress in meeting wetland needs is moderate (8,000 acres present vs. 11,000 acres needed or 72% of need). Human population growth for the basin was categorized as low, while the projected loss of irrigated farmland is moderate. Wetland restoration is a priority for the basin.

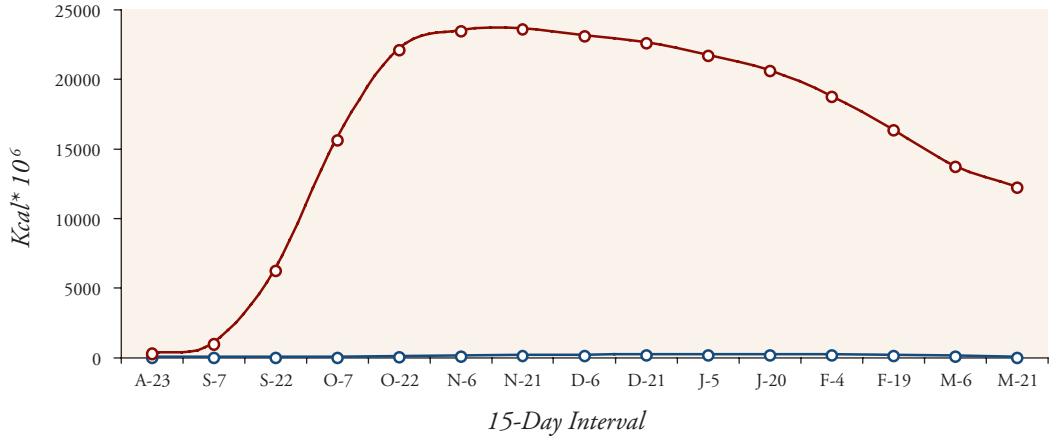


Figure 4-84 (a). Dark goose population energy demand (blue) vs. food energy supply (red) in Yolo Basin.

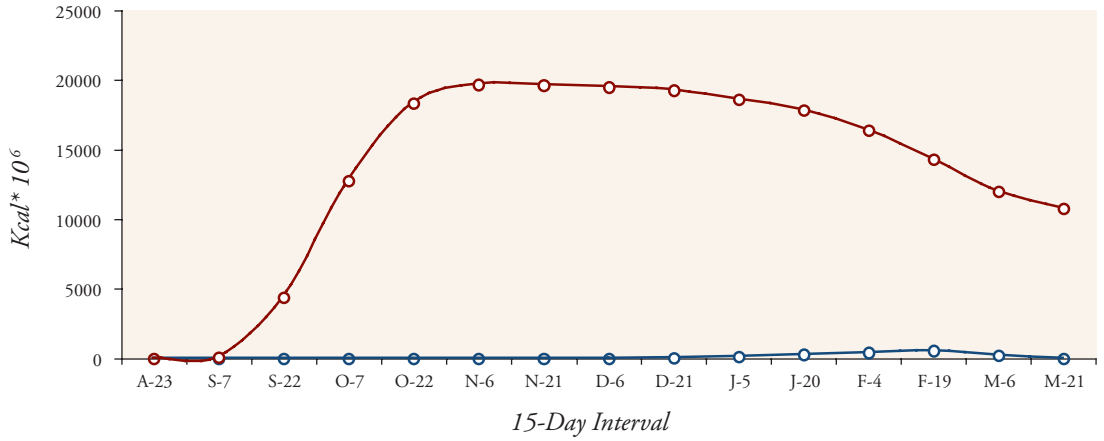


Figure 4-84 (b). White goose population energy demand (blue) vs. food energy supply (red) in Yolo Basin.

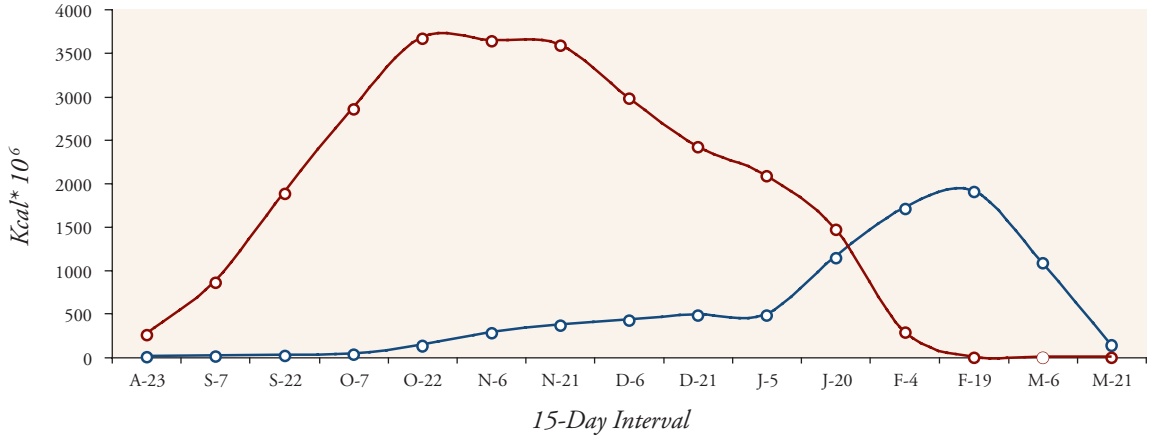


Figure 4-85. Population energy demand (blue) vs. food energy supply (red) for ducks in Yolo Basin when no agricultural food sources are available.

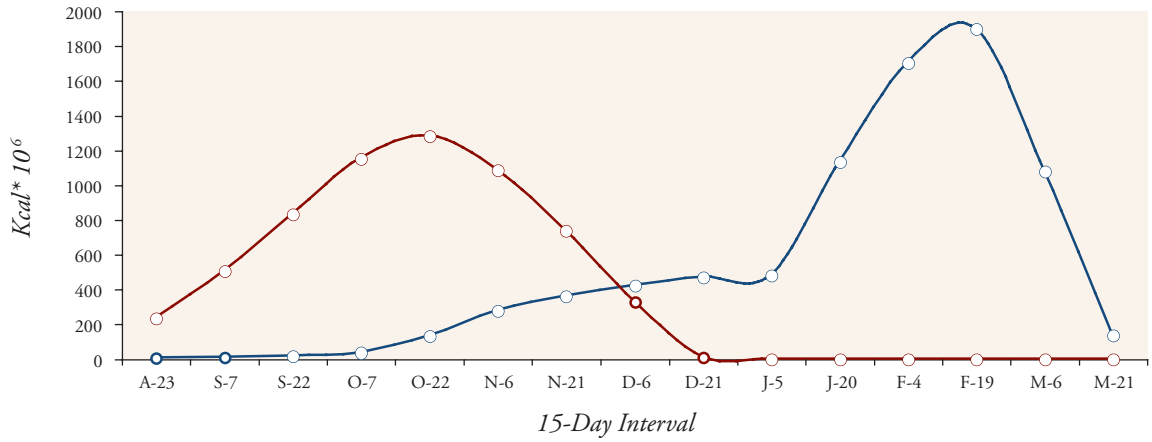


Figure 4-86. Population energy demand (blue) vs. food energy supply (red) for ducks in Yolo Basin when ducks are restricted to foraging on public lands.

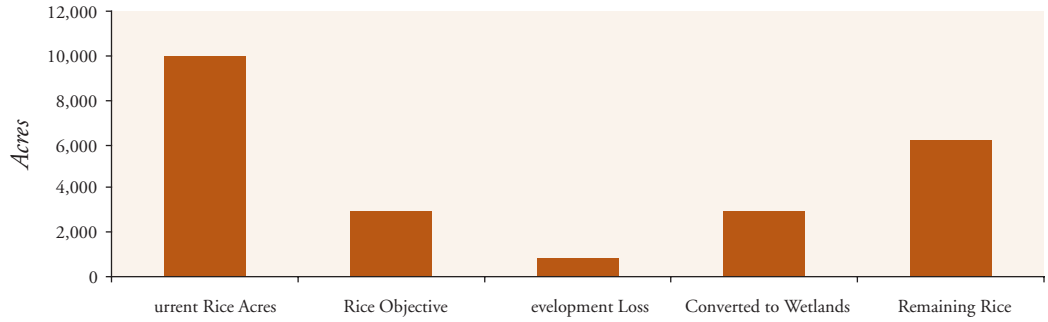


Figure 4-87. Forecasted changes in rice acreage for the Yolo Basin compared to the basin's rice habitat objective.

Current Food Supplies	*Level of Habitat Protection*	*Progress in Meeting Wetland Needs*	*Population Growth*	*Loss of Irrigated Farmland*	*Conservation Objective Priorities*
High	High	High	High	High	Wetland Restoration
Moderate	Moderate	Moderate	Moderate	Moderate	
Low	Low	Low	Low	Low	
	Very Low	Very Low	Very Low		

Figure 4-89. Information used to prioritize conservation objectives for Yolo Basin.

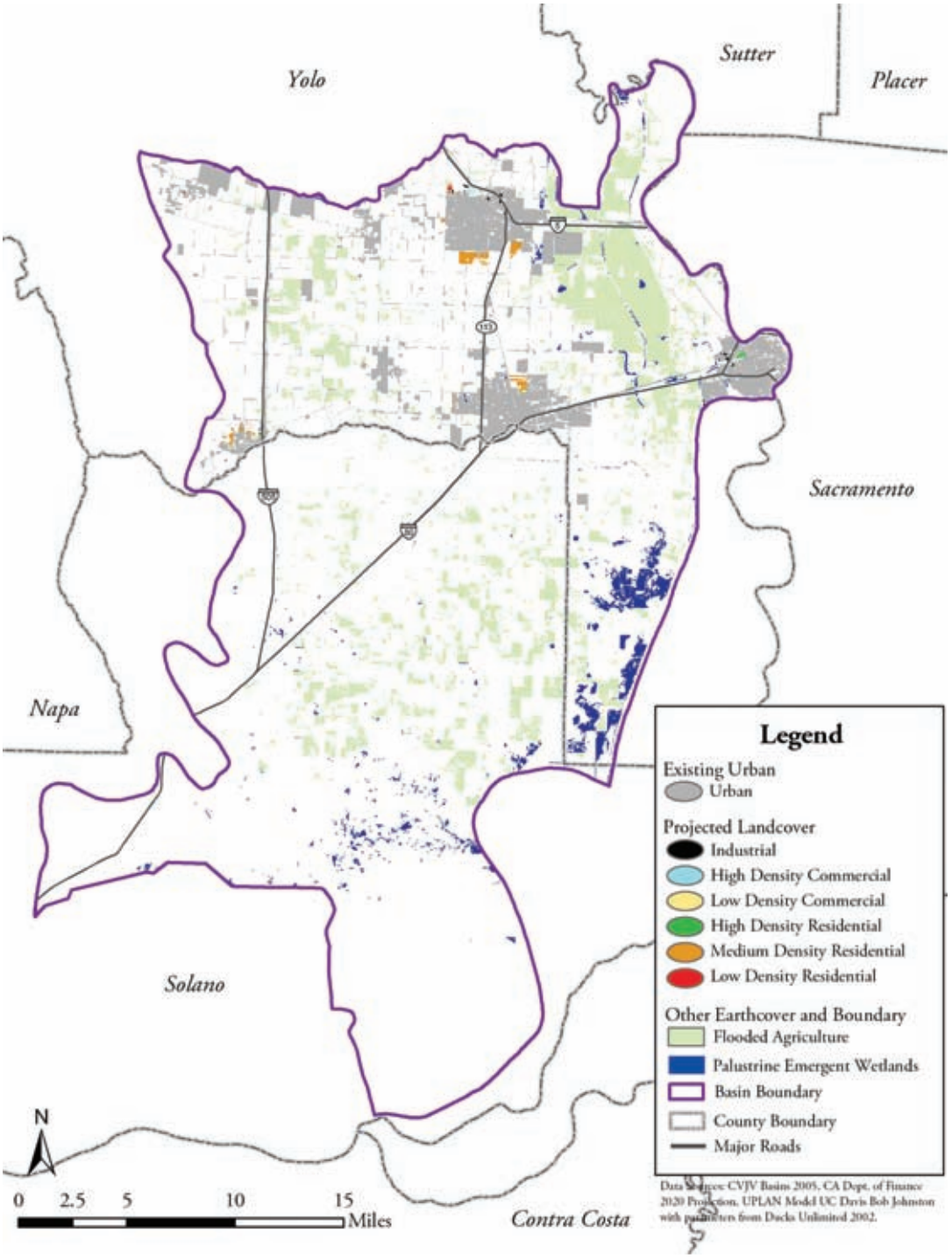


Figure 4-88. Projected growth in Yolo Basin to 2020.

Tulare Basin

Population Energy Demand vs. Food Energy Supplies: Current Conditions

Although most basins have lost the majority of their wetlands habitat, changes in the Tulare Basin have been especially detrimental for waterfowl. As a result, additional information was considered when evaluating current conditions for waterfowl in the basin and when establishing conservation objectives and priorities.

Canvasback
Photo: USFWS

Tulare Basin once contained a series of shallow lake beds that provided 260,000 acres of seasonal wetlands and over 250,000 acres of permanent and semi-permanent Tule marshes (Wershkull 1984). Prior to being converted to agriculture, these marshes provided much of the late summer/early fall habitat available to waterfowl in the Central Valley. Most wetlands in other basins in the valley resulted from over-bank flooding that historically occurred well after fall migration had begun.

It is assumed that early migrants flew directly to Tulare Basin because the lake beds provided reliable habitat. In contrast, most wetlands north of the basin remained dry until late fall or early winter. When over-bank flooding and precipitation made these habitats available, waterfowl moved north out of the basin. In essence, birds were over-flying much of the Central Valley and then undergoing a south to north migration as winter progressed. This type of reverse migration has been documented for pintails in both the Central Valley (Fleskes et al. 2002) and Mississippi Flyway (Cox and Afton 1992).

The loss of late summer-early fall habitat in Tulare Basin has substantially altered waterfowl use of the basin. Recent surveys indicate that duck migration is similar to other basins, with peak numbers occurring in late December and early January (Fleskes et al 2002; Figure 4-90a). In contrast, surveys conducted in the early 1970's indicate that duck numbers in the basin were highest in late September and early October (Figure 4-90b). These earlier surveys are consistent with how ducks historically used the basin, while recent surveys are not. Moreover, duck populations in the early and mid-1970's had averaged 350,000 birds during September. By the 1980s that number had shrunk to 51,000 (Jones and Stokes 1988). Early season bird use of the basin has significantly declined over the past three decades.

Declines in early season use do not appear related to any recent loss of permanent wetlands. By 1945 the vast majority of the basin's lake beds had been converted to agriculture, yet early season use of the basin remained high until the 1970s (Jones and Stokes 1988). Instead, reduced duck numbers during September and October may be related to declines in pre-irrigation of agricultural crops.

Pre-irrigation is the application of water on agricultural lands outside of the growing season. Prior to the mid-1970s, much of the land farmed for wheat and other grain crops in Tulare Basin was pre-irrigated during early fall and winter to store soil moisture and to flush salts from the soil (Houghton et al. 1985). Waterfowl relied heavily on these pre-irrigated fields in early fall when few managed wetlands were flooded. However, the amount of pre-irrigated farmland began to decline in the mid-1970s, especially land that was pre-irrigated in August and September (Houghton 1985). This decline continued into the 1980s, though more recent work in the basin indicates that the amount of pre-irrigated habitat has stabilized (Fleskes 1999).

Recent research indicates that waterfowl continue to rely heavily on the pre-irrigated fields in Tulare Basin and that these habitats provide both waste grain and invertebrate food resources (Moss et al. 2005). These agricultural habitats are available from mid-August through mid-October and have the potential to meet the bulk of waterfowl needs during this early period. Early season flooding of seasonal wetlands in the basin is increasingly difficult due to both the rising cost of water and the general lack of available water. Pre-irrrigation flooding may substantially reduce the need for early season wetland habitat in the basin. Efforts are now ongoing to determine how much pre-irrigation habitat is needed from mid-August through mid-October to meet waterfowl needs. Although a pre-irrigation program to benefit waterfowl may not substantially reduce wetland objectives for the basin, it may reduce the need for costly early season flooding of seasonal wetland habitat.

Although pre-irrigated fields once supported large numbers of birds, it is not clear how much of this habitat remains or what food resources it provides. As a result, only existing seasonal wetlands were considered when evaluating food supplies for ducks in the basin. However, research to quantify the foraging quality of pre-irrigated fields is expected in the near future. If pre-irrigated fields still have the potential to support large numbers of early season birds, future conservation objectives for the basin will be modified to include this habitat type.

Tulare Basin presents difficult choices from both a planning and habitat delivery standpoint. Restoring early season waterfowl use of the basin will require a substantial increase in the amount of habitat available in August and September. Providing these early season habitats may be especially difficult because of the basin's chronic water shortages. Finally, the need to provide early season habitat in the basin has been questioned. Management efforts in the Central Valley now provide a substantial amount of early fall habitat, which may compensate for the loss of early season wetlands in Tulare Basin.

Table 4-46. Annual wetland enhancement objectives for Tulare Basin.

Wetlands Acres	*Annual Enhancement Objective (acres)*
20,212[a]	1,684
22,212	1,851
24,212	2,018
26,212	2,185
28,212	2,352
30,212	2,519
32,212	2,686
34,212	2,853
36,212	3,020
38,212	3,187
39,212[b]	3,268

[a]*Current acres of wetlands in Tulare Basin.*
[b]*Acres of wetlands in Tulare Basin when wetland restoration objectives are met.*

Table 4-47. Water needs for seasonal wetlands in Tulare Basin when wetland restoration objectives have been met.

Month	*Water Need (Acre Feet)*
January	7,842
February	7,842
March	0
April	31,370
May	0
June	21,567
July	0
August	19,606
September	78,424
October	15,684
November	15,684
December	7,842
Annual Need	**205,861**

The JV's Tulare Basin Working Group (Working Group) considered these challenges as well as the need to maintain and improve hunting opportunities in the basin. Private landowners incur considerable costs to maintain wetland habitat in the basin and the number of duck clubs in the region has declined significantly over the past four decades (Jones and Stokes 1988). The Working Group concluded that increasing early season use of the basin was important, as was maintaining and improving hunting opportunities.

Increasing early season habitat and concerns over hunting opportunities were considered when assuming a migration pattern for Tulare Basin ducks. Migration chronology for other basins was based on recent waterfowl surveys in the Central Valley (Fleskes et al. 2000). However, those surveys do not reflect the basin's historical pattern of early season use (Figure 4-90a). In contrast, waterfowl surveys from the early 1970's indicate that most bird use occurred prior to November (Figure 4-90b). The Working Group decided to integrate these migration data from different time periods for use in the 2006 Plan. Although this "integrated" curve assumes high early season use of Tulare Basin, it also recognizes the need to support large numbers of waterfowl during the hunting season (Figure 4-90c). This integrated migration curve was used to establish duck population objectives by time period for the basin.

Population objectives for wintering waterfowl are presented in Figures 4-91 and 4-92. Duck population objectives are highest for late September and late December based on the integrated migration curve (Figure 4-90c). Dark goose population objectives peak during February, while there are no population objectives for white geese. No further results are presented for dark geese, because relatively few of these birds use the basin. Seasonal wetlands are assumed to provide all or most of the foraging habitat in Tulare Basin (Table 4-45; but see below). The JV assumes that food production in the basin is only 75% of other basins because a lack of water for summer irrigation of seasonal wetlands may reduce seed production.

The energetic model predicts that food supplies for ducks in Tulare Basin would be depleted by late January if duck populations are at NAWMP goals and duck use of the basin follows the integrated migration curve (Figure 4-93). Duck populations are not currently at NAWMP goals nor do ducks currently use the basin in a way consistent with the integrated curve of Figure 4-90c. However, the model indicates that habitat conditions in the basin are inadequate for achieving the seasonal pattern of bird use that the Working Group recommends, when duck populations are at NAWMP goals (i.e., traditional early season use and large numbers of birds during winter to maintain good hunting opportunities). Finally, the model result depicted in Figure 4-93 assumes that water is available to flood all 20,212 acres of seasonal wetlands that currently exist in the basin, and that flooding schedules follow that of Figure 4-9c.



Canada geese
Photo: USFWS

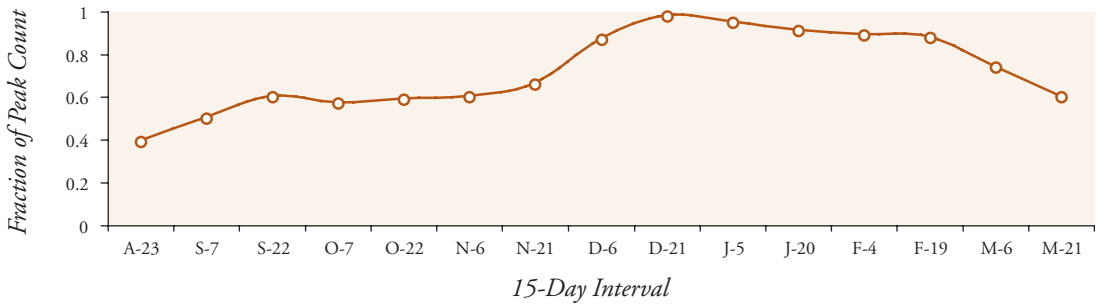


Figure 4-90 (a). Migration chronology of ducks in Tulare Basin as determined from waterfowl surveys conducted in 1998 and 1999.

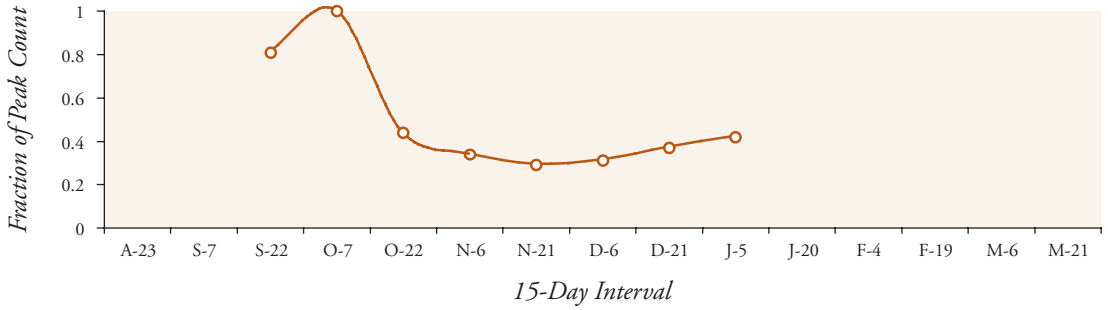


Figure 4-90 (b). Migration chronology of ducks in Tulare Basin as determined from waterfowl surveys conducted in 1973.

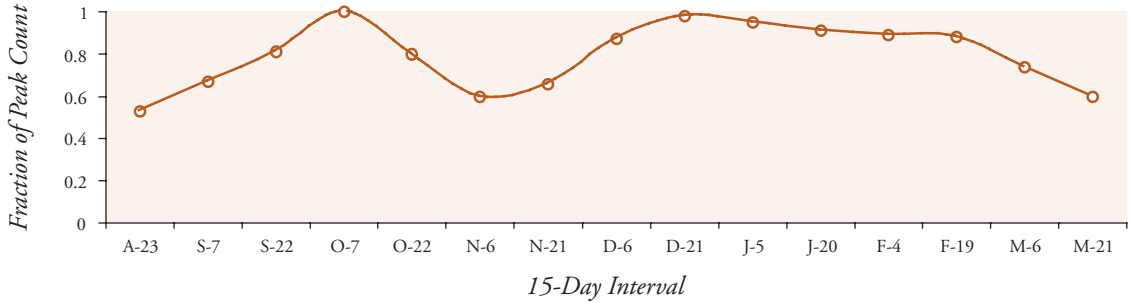


Figure 4-90c. Migration chronology of ducks in Tulare Basin that results from combining waterfowl surveys from 1998-1999 with surveys conducted in 1973.

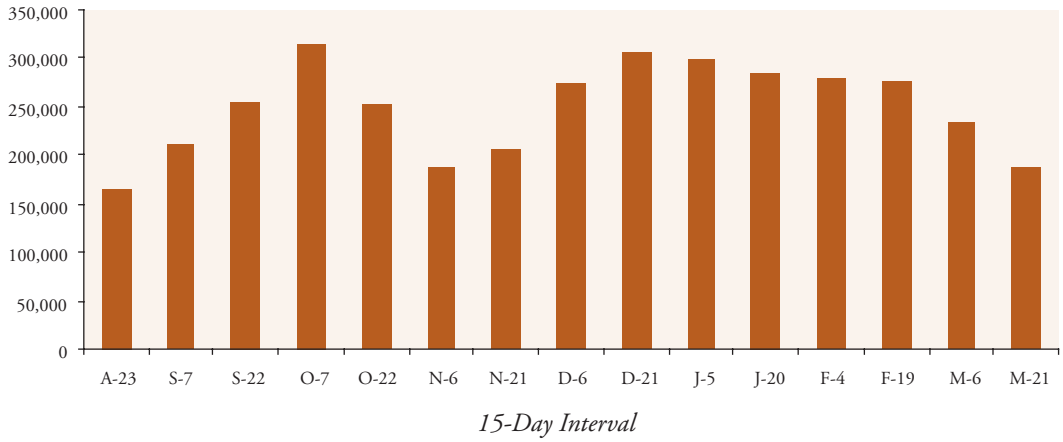


Figure 4-91. Population objectives by 15-day intervals for ducks in Tulare Basin.

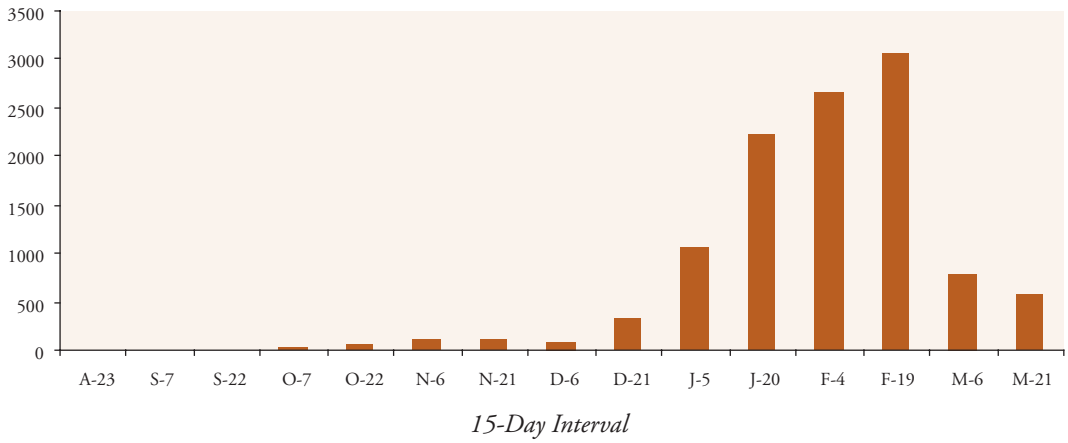


Figure 4-92. Population objectives by 15-day intervals for dark geese in Tulare Basin.

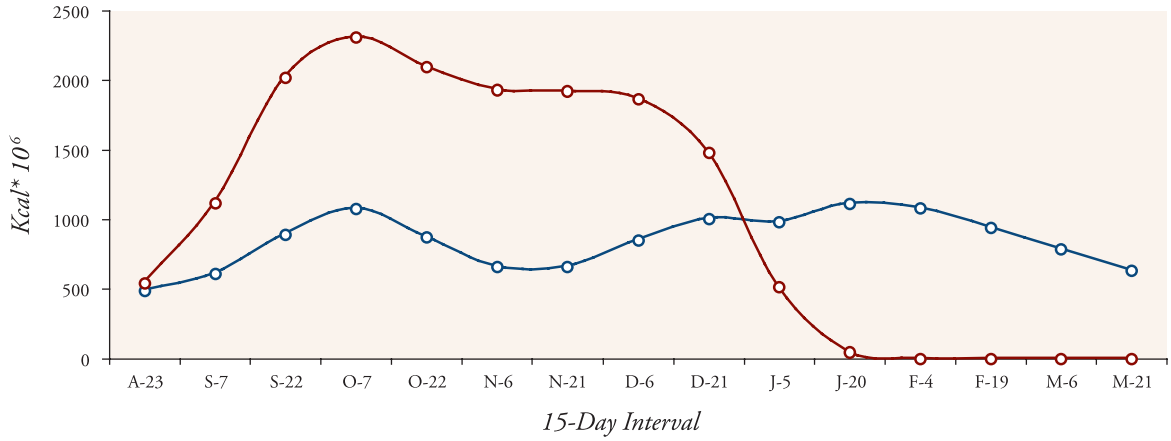


Figure 4-93. Population energy demand (blue) vs. food energy supply (red) for ducks in Tulare Basin when duck populations are at NAWMP goals.

Conservation Objectives

Wetland Restoration

The amount of seasonal wetlands required to meet duck energy needs in Tulare Basin is estimated at 39,212 acres. This estimate assumes that duck populations are at NAWMP goals, and that Figure 4-90c represents seasonal bird use of the basin. There are currently 20,212 acres of seasonal wetlands in the basin leaving a wetland restoration goal of 19,000 acres.

Seasonal Wetland Enhancement

The annual enhancement objective for existing seasonal wetlands in Tulare Basin is 1,684 acres/year. Wetland enhancement objectives will increase to 3,268 acres/year when seasonal wetland restoration objectives are met for the basin (Table 4-46).

Water Supplies for Seasonal Wetland Management

Annual management of seasonal wetlands in Tulare Basin will require 205,861 acre-feet of water when seasonal wetland restoration objectives in the basin have been met. These annual water requirements are further broken down by time period to reflect flooding schedules and summer irrigation needs (Table 4-47).

Agricultural Enhancement

No agricultural enhancement objective currently exists for Tulare Basin. An agricultural enhancement objective may be developed, pending an assessment of the foraging value of pre-irrigated fields in the basin and an assessment of landowner interest in developing pre-irrigation practices that are beneficial to waterfowl.

Agricultural Easements for Maintaining Waterfowl Foods

No agricultural easements of this type are currently proposed for Tulare Basin.

Agricultural Easements to Buffer Urban Growth

Growth projections for Tulare Basin indicate that little residential and urban development will occur near existing wetlands (Figure 4-94). As a result, no agricultural easements to buffer growth are proposed for the basin.

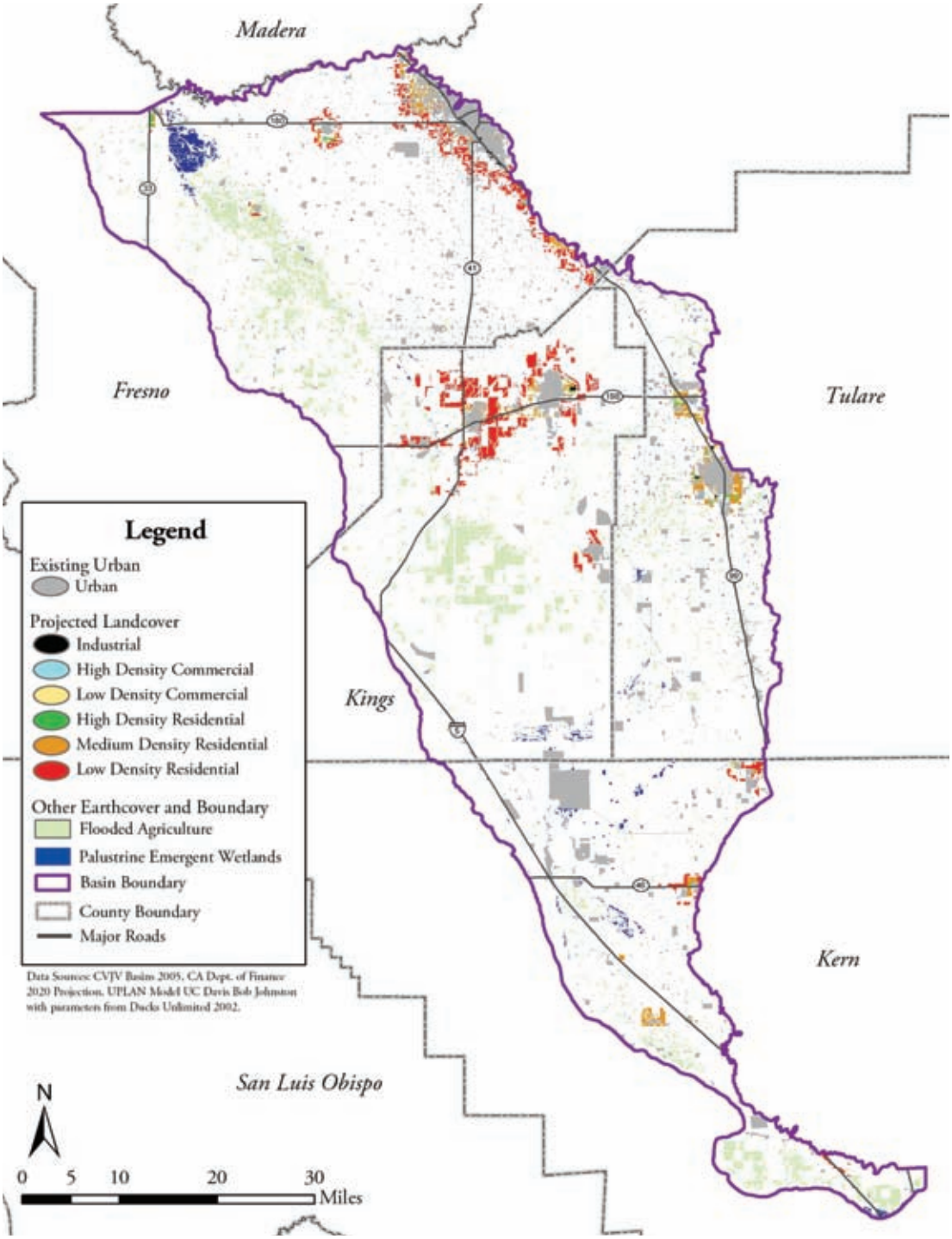


Figure 4-94. Projected growth in Tulare Basin to 2020.

Conservation Objective Priorities

Conservation objectives for Tulare Basin are summarized in Table 4-48. The information used to prioritize conservation objectives is presented in Figure 4-95. Food supplies are less than 75% of duck needs and were therefore rated low. Habitat protection in the basin is moderate, as is progress in meeting wetland needs (20,212 acres present vs. 39,212 acres needed or 52%). Human population growth is categorized as high for the basin and is expected to exceed two million people. However, most of this growth will occur some distance from existing wetland habitats. Loss of irrigated farmland is rated as high; however a further assessment of the role of agriculture for ducks in the basin is needed before the effects of farmland loss can be evaluated.

Wetland restoration is a priority for Tulare Basin. The assessment of food energy supplies vs. food energy demands for ducks in the basin assumes that all wetlands, both existing and those to be restored, receive adequate water supplies. However, members of the Working Group currently believe that many existing wetlands are not flooded during fall and winter because of a lack of reliable and affordable water supplies. It is critical to recognize that the total seasonal wetland acreage need for the basin (39,212 acres) assumes that all these wetlands receive adequate water consistent with the flooding schedules for seasonal wetlands in the basin (Figure 4-9c). If wetland restoration objectives are met for the basin, but water is not available for these habitats, then duck population objectives for the basin will not be realized.

Table 4-48. Conservation objectives for wintering waterfowl in Tulare Basin.

Wetland Restoration (Acres)	*Wetland Enhancement (Acres)*	*Water Supplies (Acre Feet)*	*Agricultural Enhancement (Acres)*	*Type I Agricultural Easements*	*Type II Agricultural Easements*
19,000	3,2698[a]	205,861[b]	None	None	None

[a] *Annual enhancement objective when the wetland restoration objective is met.*
[b] *Annual water supply need when the wetland restoration objective is met.*

Current Food Supplies	*Level of Habitat Protection*	*Progress in Meeting Wetland Needs*	*Population Growth*	*Loss of Irrigated Farmland*	*Conservation Objective Priorities*
High	High	High	High	High	Wetland Restoration
Moderate	Moderate	Moderate	Moderate	Moderate	
Low	Low	Low	Low	Low	
	Very Low	Very Low	Very Low		

Figure 4-95. Information used to prioritize conservation objectives for Tulare Basin.

Summary

Conservation objectives are summarized for each basin and for the entire Central Valley in Table 4-49. Wetland restoration remains a key conservation objective for most basins, with a total wetland restoration need of 104,000 acres. Figure 4-96 shows progress in meeting seasonal wetland restoration objectives in the Central Valley. Annual wetland enhancement objectives will exceed 23,000 acres when wetland restoration objectives are met for the Central Valley. Annual water needs for managing seasonal wetlands in the Central Valley will exceed 1.4 million acre-feet when wetland restoration objectives are met. Although some of this water is now guaranteed under the Central Valley Project Improvement Act of 1992, the JV will face significant challenges in helping secure reliable and affordable sources of water as human populations continue to increase in the Central Valley (Chapter 10). Agricultural enhancement objectives are currently exceeded for all basins, as most rice producers now use winter flooding to decompose straw. However, agricultural easements to maintain waterfowl food supplies and buffer existing wetlands from urban development may become increasingly important in basins where large increases in human populations are predicted.



Wood ducks
Photo: Brian Gilmore

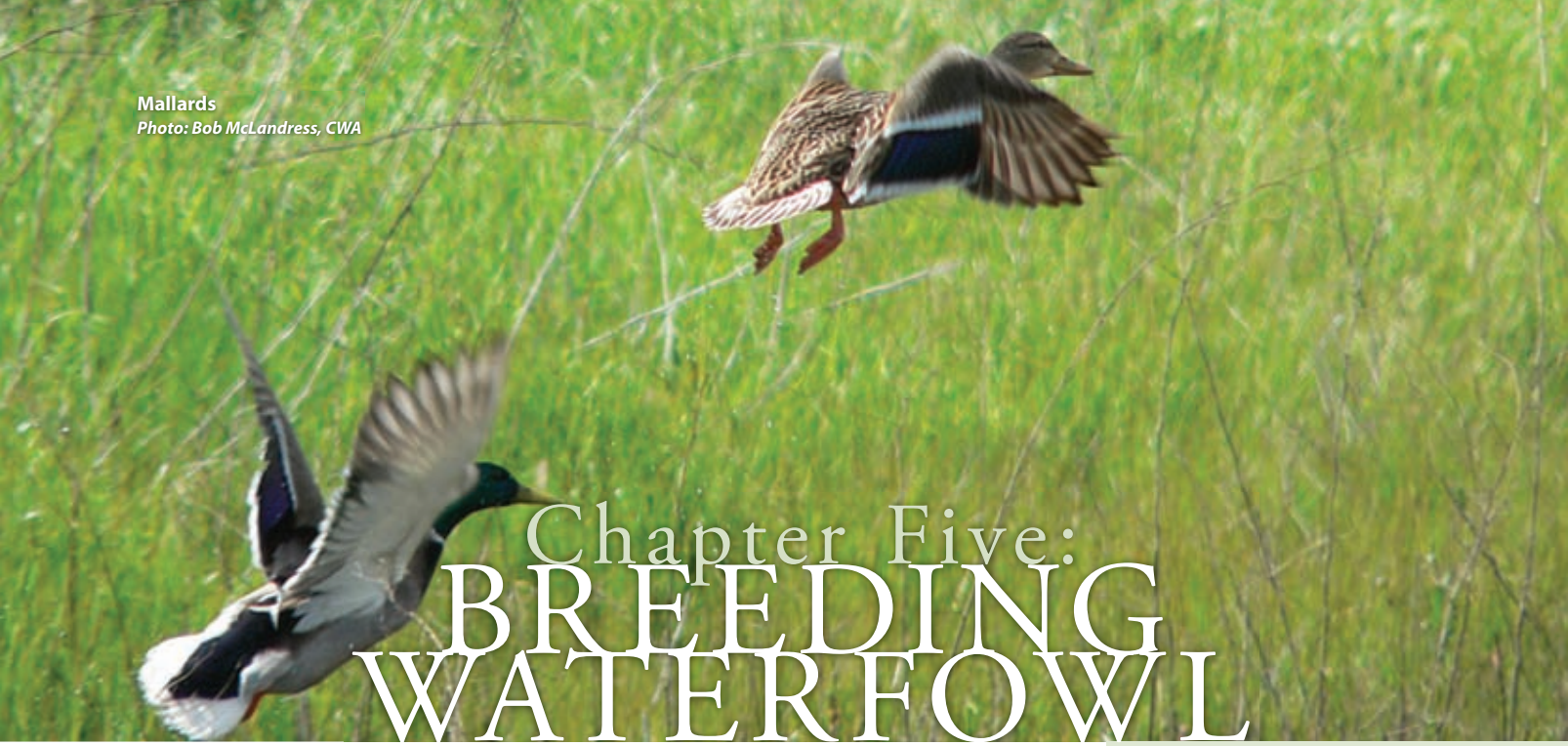
Table 4-49. Conservation objectives for wintering waterfowl in the Central Valley of California.

Basin	*Wetland Restoration (Acres)*	*Wetland Enhancement (Acres)*[a]	*Water Supplies (AF)*[b]	*Agricultural Enhancement (Acres)*	*Type I Agricultural Easement*[e]	*Type II Agricultural Easement*[f]
American	20,000	1,932	115,890	69,000[c] 50,000[d]	Needed	Needed
Butte	17,000	3,362	225,904	104,000[c] 62,000[d]	Needed	Needed
Colusa	2,000	2,033	121,980	85,000[c] 45,000[d]	None	None
Delta	19,000	2,112	120,408	23,000[c]	Needed	Needed
San Joaquin	20,000	6,751	441,521	0	None	Needed
Sutter	4,000	496	29,755	18,000[c] 10,000[d]	Needed	Needed
Suisun	0	2,686	153,102	0	None	None
Yolo	3,000	963	57,790	8,000[c] 3,000[d]	None	None
Tulare	19,000	3,268	205,861	Undetermined	None	None
Total	104,000	23,603	1,472,211	307,000[c] 170,000[d]		

[a]Annual wetland enhancement objective when wetland restoration objectives are met for a basin. The wetland enhancement objective assumes that wetlands undergo some maintenance or enhancement an average of every 12 years.
[b]Annual acre-feet of water needed to manage seasonal wetlands when wetland restoration objectives are met for a basin.
[c]Agricultural enhancement objectives represent the amount of agricultural habitat needed to meet the needs of ducks and geese when wetland restoration objectives are met for a basin. Enhancement includes fields (rice or corn) that are not deep plowed following harvest or are winter-flooded. Agricultural enhancement in most basins include only rice, however, corn is an important habitat type in the Delta and Yolo Basins. Agricultural enhancement objectives are currently met for all basins.
[d]Acres of the agricultural objective that must be flooded to meet duck needs (e.g., a minimum of 50,000 acres of the American Basin's total agricultural enhancement objective of 69,000 acres must be flooded).
[e]Agricultural easements to maintain waterfowl food sources on agricultural lands.
[f]Agricultural easements to buffer wetlands from the impacts of residential and urban growth.



Figure 4-96. Progress in meeting seasonal wetland restoration objectives in the Central Valley.



Mallards
Photo: Bob McLandress, CWA

Chapter Five: BREEDING WATERFOWL

This chapter discusses the habitat needs and associated conservation efforts for breeding waterfowl in the Central Valley. Mallards *(Anas platyrhynchos)* comprise 80% of the breeding waterfowl in the valley and a significant amount of biological information is available for this species. As a result, recommendations for breeding waterfowl are largely based on the JV's understanding of mallard breeding ecology.

Introduction

Although conservation planning for waterfowl in the Central Valley has largely focused on meeting the needs of wintering birds, significant numbers of ducks also breed in the valley. Habitat needs of breeding ducks differ substantially from that of wintering ducks and include the use of different wetland types and the need for upland nesting cover. As a result, the 2006 Plan has developed distinct conservation strategies for breeding waterfowl.

Locally produced ducks now comprise up to 20% of the total duck harvest in California with most of those birds being mallards. As a result, local mallard production has become increasingly important to hunter success. Most private wetland owners in the Central Valley manage their land with the purpose of hunting waterfowl. These private wetland owners provide nearly seventy percent of all wetland habitats and incur substantial costs in doing so. Providing a reasonable level of hunter success is critical to this continued private investment in wetlands. The JV's efforts to increase the size and success of breeding waterfowl populations can contribute to this goal.

The 1990 Plan identified a breeding population objective of 490,000 ducks, of which 300,000 were mallards. These objectives were based on a goal of producing a local fall flight of one million birds. However, breeding populations of waterfowl can vary considerably from one year to the next in response to environmental factors (i.e., rainfall) that effect

"California's Central Valley is unique among waterfowl wintering grounds in North America in that it also provides habitat for healthy breeding populations of several duck species. The challenges of providing for the life requisites of local nesting as well as wintering waterfowl require innovative approaches and a variety of wetland and upland habitat management techniques unlike anywhere else."

Robert McLandress, Ph.D.
President
California Waterfowl Association

breeding habitat conditions. Population objectives for breeding waterfowl in the 2006 Plan have been modified to accommodate annual variation in breeding habitat conditions. Specifically, the JV's breeding waterfowl objective is to "maintain, enhance, and restore sufficient habitats to increase mallard populations by 25% over the range of variation observed from 1992-2002." During this period, the Central Valley estimate of breeding mallards ranged from 186,000 to 389,000 (D. Yparraguirre, California Department of Fish and Game, personal communication). Meeting the 2006 objective would result in mallard populations ranging between 232,000 and 486,000 birds. Population objectives for wintering waterfowl are usually translated into quantifiable estimates of habitat need, as was the case in Chapter 4 (e.g., acres of foraging habitat). However, there is no clear link between population objectives for breeding waterfowl and the amount of habitat needed to support some range of breeding birds. One alternative for establishing habitat programs for breeding waterfowl in the Central Valley is the approach used in the U.S. Prairie Pothole Region (PPR). See Appendix 5-1. Breeding waterfowl objectives were established for the PPR in the 1986 North American Waterfowl Management Plan. However, planning efforts in the PPR have largely focused on identifying what vital rates limit breeding duck numbers and developing habitat programs to address these limitations. The JV defines vital rates as population parameters that potentially limit the growth of duck populations (Table 5-1). For example, nest success is believed to limit duck populations across much of the PPR and conservation efforts have focused on restoring and protecting upland cover. This approach assumes that population objectives for breeding waterfowl in the PPR will be met if the biological factors that limit duck numbers are identified and addressed.

Conservation planning for breeding waterfowl in the 2006 Plan is conceptually based on planning efforts for waterfowl in the PPR, and is further described in Appendix 5-1. Although planning efforts in the 2006 Plan focus on mallards, several species of ducks breed in the Central Valley including gadwall *(Anas strepera)*, cinnamon teal *(A. cyanoptera)*, ruddy duck *(Oxyura jamaicensis)*, redhead *(Aythya Americana)*, and wood duck *(Aix sponsa)*. Habitat needs of these species during the breeding season differ from mallards and may be addressed in future planning efforts. The remainder of this chapter is divided into 2 sections: (1) a review of planning information available for breeding mallards in the Central Valley; and (2) conservation objectives for breeding mallards in the Central Valley.

A Review of Planning Information Available for Breeding Mallards in the Central Valley

Habitat programs in the PPR address the biological factors that most limit duck numbers. Moreover, it is recognized that different conservation strategies are needed for different landscapes, and that habitat programs for breeding waterfowl should not be pursued in all areas.

Table 5-1. Vital rates that may limit the growth of duck populations including mallards that breed in the Central Valley of California.

Vital Rate	*Definition*
Breeding Incidence	Percent of females that initiate at least one nest attempt
Mean Clutch Size	Average number of eggs laid per nest
Nest Success	Percent of nest hatching one or more eggs
Egg Success	Percent of eggs that hatch in successful nests
Re-nesting Intensity	Probability that females will re-nest after the loss of a nest, and how this probability changes with successive nest attempts
Duckling Survival	Percent of hatched ducklings that successfully fledge
Breeding Survival	Survival of females during the breeding season
Non-Breeding Survival	Survival of females during the non-breeding season
Annual Survival[a]	Annual survival of females

[a]*Annual survival is the product of survival during the breeding season and survival outside of the breeding season.*

Implementing targeted habitat programs to efficiently increase duck populations is also a goal of the JV. However, all the information needed to duplicate the PPR planning effort is not yet available for the Central Valley. As a result, the JV reviewed: (1) vital rate information that is available for Central Valley breeding mallards; (2) habitat programs that address specific vital rates; and (3) available information that can be used to develop spatial planning tools for the Central Valley.

Vital Rate Information for Central Valley Mallards

Vital rate information is available for breeding mallards in the Central Valley from several published and unpublished sources (Table 5-2). Results of these studies are briefly summarized below.

Table 5-2. Vital rates estimates available for mallards breeding in the Central Valley of California.

Breeding Incidence				
Estimate	Age[b]	Year	Basin(s)	Source
0.692[a]	SY	2004	Colusa	Oldenburger 2005
0.755[a]	ASY	2004	Colusa	Oldenburger 2005
0.932[a]	SY	2005	Colusa	Oldenburger 2005
0.948[a]	ASY	2005	Colusa	Oldenburger 2005
Clutch Size				
Estimate	Age	Year(s)	Basin	Source
7.828	SY	1985-2003	Suisun	CWA, unpublished data
8.974	ASY	1985-2003	Suisun	CWA, unpublished data
Egg Survival				
0.82		1985-2003	Suisun Marsh	CWA, unpublished data
0.68		1995-2001	Yolo	CWA, unpublished data
0.69		2002-2004	Colusa & Yolo	CWA, unpublished data
Re nesting Intensity				
Estimate	Age	Year	Basin	Source
Note: None estmated, but MAX = 3 based on radioed females (Oldenburger, unpublished data)				
Duckling Survival				
Estimate	Age	Year	Basin	Source
0.38		1993	Butte	Yarris 1995
0.35		1994	Butte	Yarris 1995
0.36		1996	San Joaquin	2000–Chouinard
0.18		1997	San Joaquin	2000–Chouinard
Breeding Survival				
Estimate	Age	Year	Basin	Source
0.840[a]	SY	2004-2005	Colusa	Oldenburger 2005
0.909[a]	ASY	2004-2005	Colusa	Oldenburger 2005
Annual Survival				
Estimate	Age	Year	Basin	Source
0.48	HY	1948-1982	*	Reinecker 1990
0.58	AHY	1948-1982	*	Reinecker 1990
0.612	HY	1970-2002	*	Herzog (unpublished data)
0.607	AHY	1970-2002	*	Herzog (unpublished data)

Continued…

Nest Success			
Estimate	Year	Basin(s)	Source
0.617	1985	Suisun Marsh	CWA, unpublished data
0.453	1986	Suisun Marsh	CWA, unpublished data
0.329		Butte & Colusa	McLandress et al. 1996
0.490	1987	Suisun Marsh	CWA, unpublished data
0.228		San Joaquin	McLandress et al. 1996
0.227		Butte & Colusa	McLandress et al. 1996
0.257	1988	Suisun Marsh	CWA, unpublished data
0.504		San Joaquin	McLandress et al. 1996
0.365		Butte & Colusa	McLandress et al. 1996
0.098	1989	Suisun Marsh	CWA, unpublished data
0.373		San Joaquin	McLandress et al. 1996
0.630	1990	Butte & Colusa	CWA, unpublished data
0.426		Suisun Marsh	CWA, unpublished data
0.372		San Joaquin	McLandress et al. 1996
0.250	1991	Butte & Colusa	CWA, unpublished data
0.513		Suisun Marsh	CWA, unpublished data
0.212		San Joaquin	CWA, unpublished data
0.463	1992	Suisun Marsh	CWA, unpublished data
0.285	1993	Suisun Marsh	CWA, unpublished data
0.273	1994	Suisun Marsh	CWA, unpublished data
0.377	1995	Suisun Marsh	CWA, unpublished data
0.570		Yolo	CWA, unpublished data
0.174	1996	San Joaquin	deSzalay et al. 2003
0.225		Suisun Marsh	CWA, unpublished data
0.082	1997	San Joaquin	deSzalay et al. 2003
0.054		Suisun Marsh	CWA, unpublished data
0.068	1998	Suisun Marsh	Ackerman, unpublished data
0.560		Yolo	CWA, unpublished data
0.091	1999	Suisun Marsh	Ackerman, unpublished data
0.333	2000	Suisun Marsh	Ackerman, unpublished data
0.138	2001	Suisun Marsh	CWA, unpublished data
0.220	2002	Colusa & Yolo	CWA, unpublished data
0.145		Suisun Marsh	CWA, unpublished data
0.368	2003	Colusa & Yolo	CWA, unpublished data
0.139		Suisun Marsh	CWA, unpublished data
0.271	2004	Colusa & Yolo	CWA, unpublished data
0.068		Delta	CWA, unpublished data
0.031		Colusa	CWA, unpublished data
0.426	2005	Colusa & Yolo	CWA, unpublished data

[a] *Preliminary analysis*
[b] *Age: HY (hatch year); AHY (after hatch year); SY (second year); ASY (after second year)*

Breeding Incidence

Estimates of breeding incidence are limited to a single study in the Colusa basin (Table 5-2). While less than 80% of all females initiated nests in the first year of the study, over 90% of all marked females were known to nest in the study's second year (Table 5-2). Similar studies in the prairies and elsewhere have reported breeding incidence > 90% (Hoekman 1992). Lower breeding incidence is

plausible for mallards in the Central Valley as most seasonal wetlands are drained prior to the breeding season, which greatly reduces wetland availability for breeding pairs. Density dependant factors (e.g., spacing behavior of breeding pairs) may prevent some females from breeding in areas where bird densities are high and wetlands are few. Additional spring wetland habitat in these areas may result in increased breeding incidence.

Nest Success

Nest success in the Central Valley appears to be high relative to other populations of mallards in North American. Twenty-nine of thirty-nine studies have reported nest success >15% (Table 5-2). Some nest success estimates for the Central Valley are site-specific (e.g., winter wheat, rice-set aside lands, or refuges and wildlife areas). These site-specific estimates may not reflect nest success at the population level if birds using these habitats experience abnormally high success. However, a recent study of mallards that were marked prior to the breeding season estimated 35% nest success (S. Oldenburger, unpublished data). This study does provide an unbiased estimate of nest success, and suggests that nest success estimates from earlier site-specific studies may be representative of nest success at the population level.

Duckling Survival

Duckling survival estimates that are available for mallards in North American typically range between 35% and 45% (Hoekman et al. 2002) though estimates from the Central Valley generally fall within the low end of this range. There is some indication that early-hatched ducklings in portions of the Central Valley may experience low survival rates (G. Yarris, California Waterfowl Association, personal communication). Ducklings that are hatched later in the breeding season often have access to actively growing rice fields that provide an abundance of emergent cover. However, early-hatched ducklings may have to rely solely on a limited numbers of wetlands. Although it is difficult to generalize the importance of duckling survival to overall mallard population growth, low duckling survival could be limiting mallard numbers in some areas of the valley.

Female Survival Rates

Breeding survival rates for female mallards in the Central Valley have varied between 0.84 and 0.909 (Table 5-2), which is generally higher than that reported for prairie breeding birds (Devries et al. 2003). Annual survival rates of adult and juvenile female mallards banded in the Central Valley are similar to those reported for the prairies (Table 5-2). Although female survival rates are not believed to limit mallard numbers on the prairies, it is not possible at this time to reach any conclusion about the role of female survival in limiting mallard populations in the valley. On-going research indicates that female survival during molt may be low in some Klamath Basin habitats, where a large portion (>60%; Yarris et al. 1994) of the valley population goes to molt, but data from other molting areas are lacking and population impacts have not been determined.

Demographic Modeling

Research efforts over the past two decades have provided valuable information on mallard vital rates in the Central Valley. However, it would be inappropriate to use this information in demographic models designed to identify what factors limit population growth. The vital rate estimates available for Central Valley mallards were obtained over different time periods, and from different regions (e.g., Sacramento vs. San Joaquin Valley). An ongoing study of breeding mallards in the Colusa Basin is providing vital rate estimates that are needed for demographic modeling (Oldenburger et al. 2005). This research is an important step in identifying factors that limit mallard populations in the Valley.

Habitat Programs That Address Specific Vital Rates

The use of targeted habitat prescriptions has been successful in addressing limiting factors for breeding waterfowl in a variety of areas across North America. Although the vital rate(s) that limit mallard populations in the Central Valley are relatively unknown, we do have some understanding of what habitat programs can be used to improve them. The following information can be used to develop preliminary conservation programs for mallards breeding in the Central Valley.

Nest Success

Studies of nesting waterfowl in the Central Valley indicate that set-aside agricultural fields planted with a cover crop can support large numbers of mallards and promote high nest success (Loughman et al. 1991). If nest success does limit mallard populations, then programs that provide landowner incentives to set aside agricultural land (e.g., Conservation Reserve Enhancement Program [CREP]) may be effective in addressing this limiting factor.



Mallard nest
Photo: Bob McLandress, CWA

Duckling Survival

Duckling survival may be heavily dependent on food availability, especially in the period immediately after hatch (Sedinger 1992). Reverse-cycle wetlands (i.e., wetlands flooded from spring through late summer) provide greater densities of invertebrates in May than do seasonal or permanent wetlands in the Central Valley (deSzalay et al. 2003). Most mallard ducklings hatch in May when they rely heavily on aquatic invertebrates. If duckling survival does limit mallard populations in the Central Valley, increasing the acres of reverse-cycle wetlands may be an effective tool for increasing duckling food supplies and ultimately survival.

Spatial Planning Tools for Breeding Mallards in the Central Valley

At a minimum, spatial planning tools developed for the Central Valley should include: (1) the spatial distribution of breeding mallards throughout the Central Valley; (2) the spatial distribution of wetland and rice habitats used by breeding mallards; and (3) the spatial distribution of potential nesting cover. In some cases (e.g., the PPR), the spatial distribution of wetlands and breeding waterfowl may be highly correlated. Information on the distribution of breeding mallards, wetlands, and nesting cover is available for the entire Central Valley and is summarized below.

Distribution of Breeding Mallards

Biologists with the California Department of Fish and Game (CDFG) annually conduct surveys of breeding waterfowl in the Central Valley. These surveys were initiated in 1992, and include 43 transects that are orientated northeast to southwest. Transects are included in all nine of the valley's drainage basins. To better understand the distribution of breeding mallards throughout the Central Valley, mallard counts were averaged for each transect between 1992 and 2002. A comparison of these transects revealed substantial differences in mallard densities among basins. For example, mallard densities in the Colusa and Suisun Marsh Basins are high relative to densities in the Tulare Basin (Figure 5-1). Information on mallard densities between 1992 and 2002 was used to categorize mallard breeding densities in each basin as high, medium, or low (Figure 5-2).

Distribution of Wetlands for Breeding Waterfowl

Managed wetlands in the Central Valley are categorized as seasonal or semi-permanent. Most wetlands used by breeding mallards in the valley are assumed to be semi-permanent because seasonal wetlands are typically drained prior to the breeding season. Semi-permanent wetlands are defined as wetlands that are flooded from early fall through late July or August. Total managed wetlands in the valley are estimated at 205,554 acres (see Chapter 3), and the distribution of these wetlands is depicted in Figure 5-3. Although 85%-90% of these wetlands are seasonal, it is assumed that the distribution of total managed wetlands in Figure 5-3 reflects the distribution of semi-permanent wetlands as well. Differences in the distribution of semi-permanent wetland acres among basins are depicted in Figure 5-4.

Surveys of breeding waterfowl in 2003 used GPS technology to plot mallard distribution along transect routes. As a result, it is possible to associate mallard densities with landscape characteristics and to sub-divide transects that cross drainage basin boundaries. For example, mallard densities within and among transects may differ in response to differences in wetland acres along transect routes. A very preliminary analysis of mallard pair locations during the 2003 survey indicates that pair densities were higher in basins having greater amounts of semi-permanent wetlands.[1]

[1]Regression of mallard pair densities and acres of semi-permanent wetland habitat within a basin suggests a linear relationship with an r2 value of 0.85 (K. Petrik, Ducks Unlimited, Inc., personal communication). This relationship is only based on results from five drainage basins because 2003 mallard locations are still being processed. However, mallard breeding densities do appear to be positively associated with wetland densities, as is the case in the PPR.

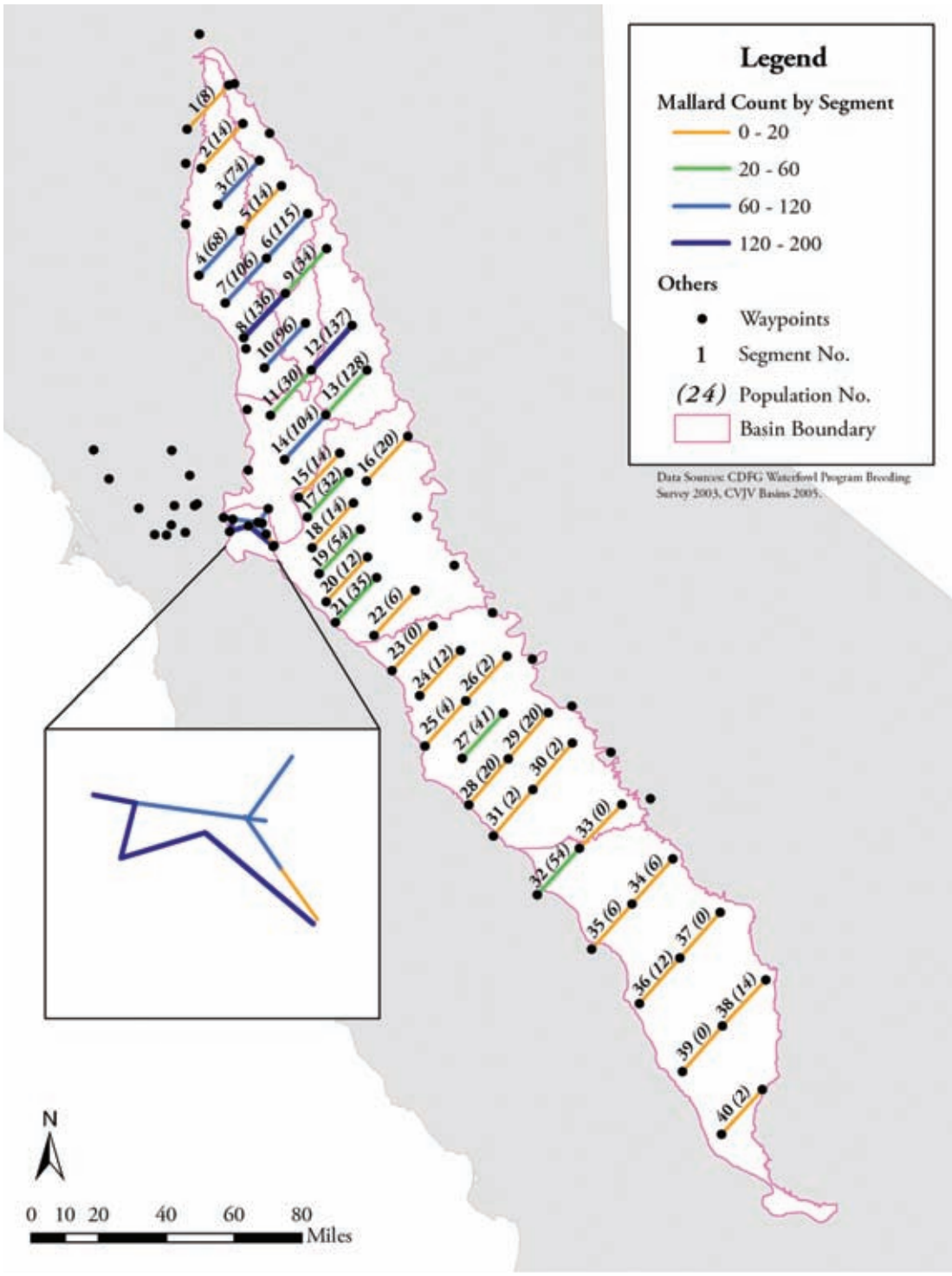


Figure 5-1. Aerial survey transects for breeding waterfowl in the Central Valley.

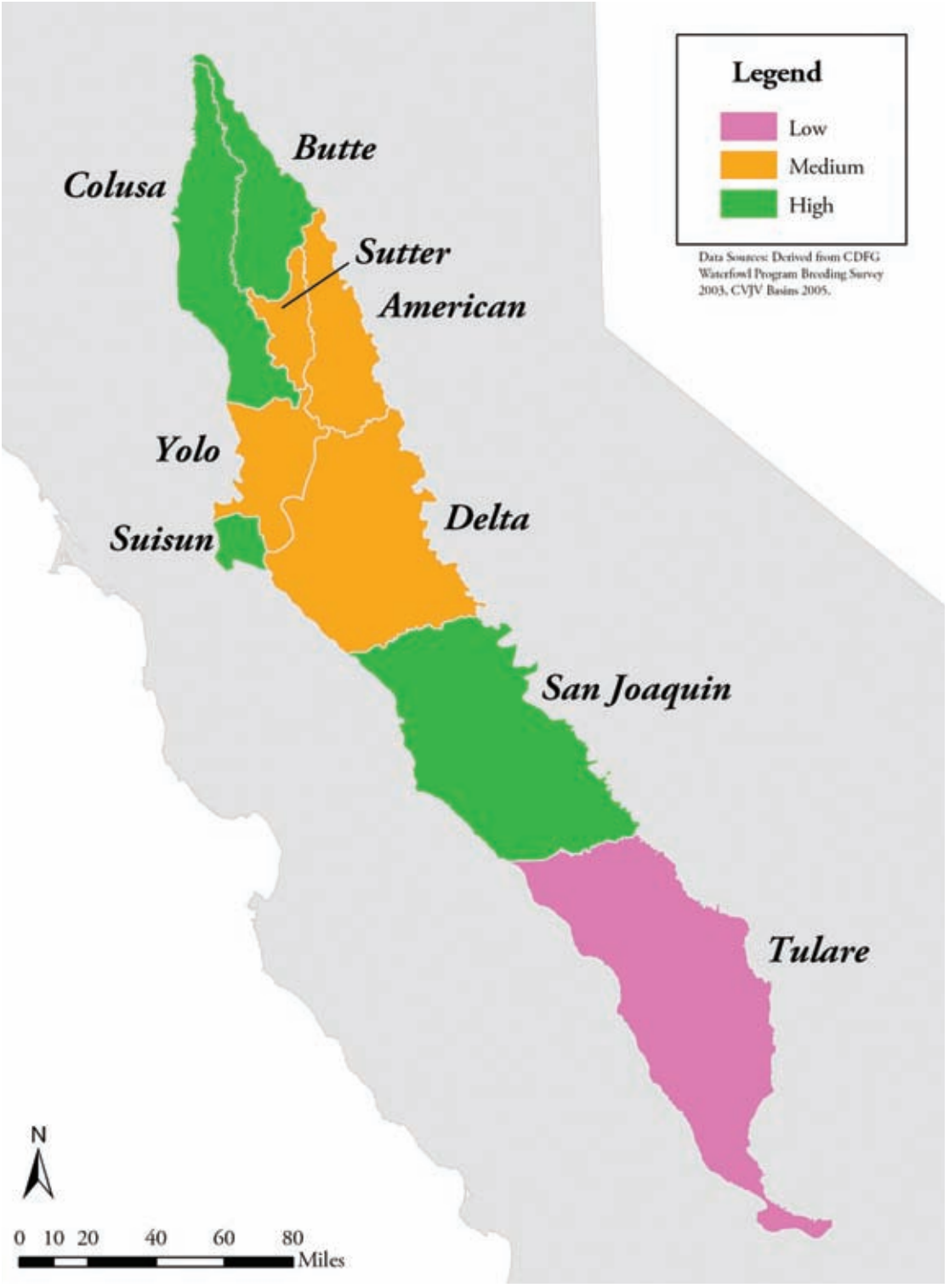


Figure 5-2. Relative densities of breeding mallards among basins.



Figure 5-3. Wetland distribution in the Central Valley.



Figure 5-4. Acres of semi-permanent wetlands (breeding wetlands) by basin.

Distribution of Rice

Rice fields provide habitat for both breeding mallard pairs and ducklings during the brood rearing period (April through August). The distribution of existing rice land is depicted in Figure 5-5.

Distribution of Potential Nesting Cover

Potential waterfowl nesting cover in the Central Valley includes grain and hay crops, native vegetation, and pasture (Loughman et al. 1991). The distribution of these three cover types was mapped using data from the California Department of Water Resources for areas of the valley with less than four degrees of slope (Figure 5-6). This slope constraint was applied to potential nesting habitat to exclude areas of the valley that are unlikely to be used by breeding mallards. Grain and hay crops, native vegetation, and pasture were then combined to depict the total amount of available nesting cover (Figure 5-7).

Combining Data Layers

Figure 5-8 reflects the spatial distribution of managed wetlands and upland nesting cover throughout the Central Valley. These layers were subsequently combined with the distribution of planted rice to depict all the major habitats used by breeding mallards in the Central Valley (Figure 5-9). Although these spatial data provide a first step in developing conservation objectives for breeding mallards, it remains unclear how well these data depict the habitat resources that are available to breeding birds (e.g., To what extent do nesting birds make use of pasture in the Central Valley?). Understanding the spatial data that are needed for breeding waterfowl would contribute significantly to future conservation planning efforts.

Conservation Objectives for Breeding Mallards in the Central Valley

Possible conservation objectives for breeding waterfowl in the Central Valley may include: (1) increasing the acreage of semi-permanent wetlands (wetlands used by breeding waterfowl) by restoring semi-permanent wetlands or managing existing seasonal wetlands as semi-permanent habitats; (2) protection of existing semi-permanent wetlands; (3) restoration of upland nesting cover; and (4) protection of existing nesting cover. Conservation programs to restore or protect semi-permanent wetlands increase the amount of habitat for breeding mallard pairs, and for brood-rearing females. This may result in higher densities of breeding birds and in greater duckling survival. Similarly, conservation programs to restore or protect upland nesting cover may lead to increases in nest success.

Protecting existing unprotected wetlands will be a minor conservation objective for breeding mallards, because most wetlands are already under easement or are publicly owned (Chapter 2). However, restoring semi-permanent wetlands and providing incentives for landowners to maintain restored and existing wetlands in a semi-permanent condition may be an important conservation objective in some basins. Water costs for these wetlands are high and management of emergent vegetation is expensive. As a result, many landowners are reluctant to maintain semi-permanent wetlands. Private lands programs that have traditionally paid landowners to maintain wetland habitats (e.g., CDFG's California Waterfowl Habitat Program and the USDA Waterbank Program) would be crucial to this conservation objective.

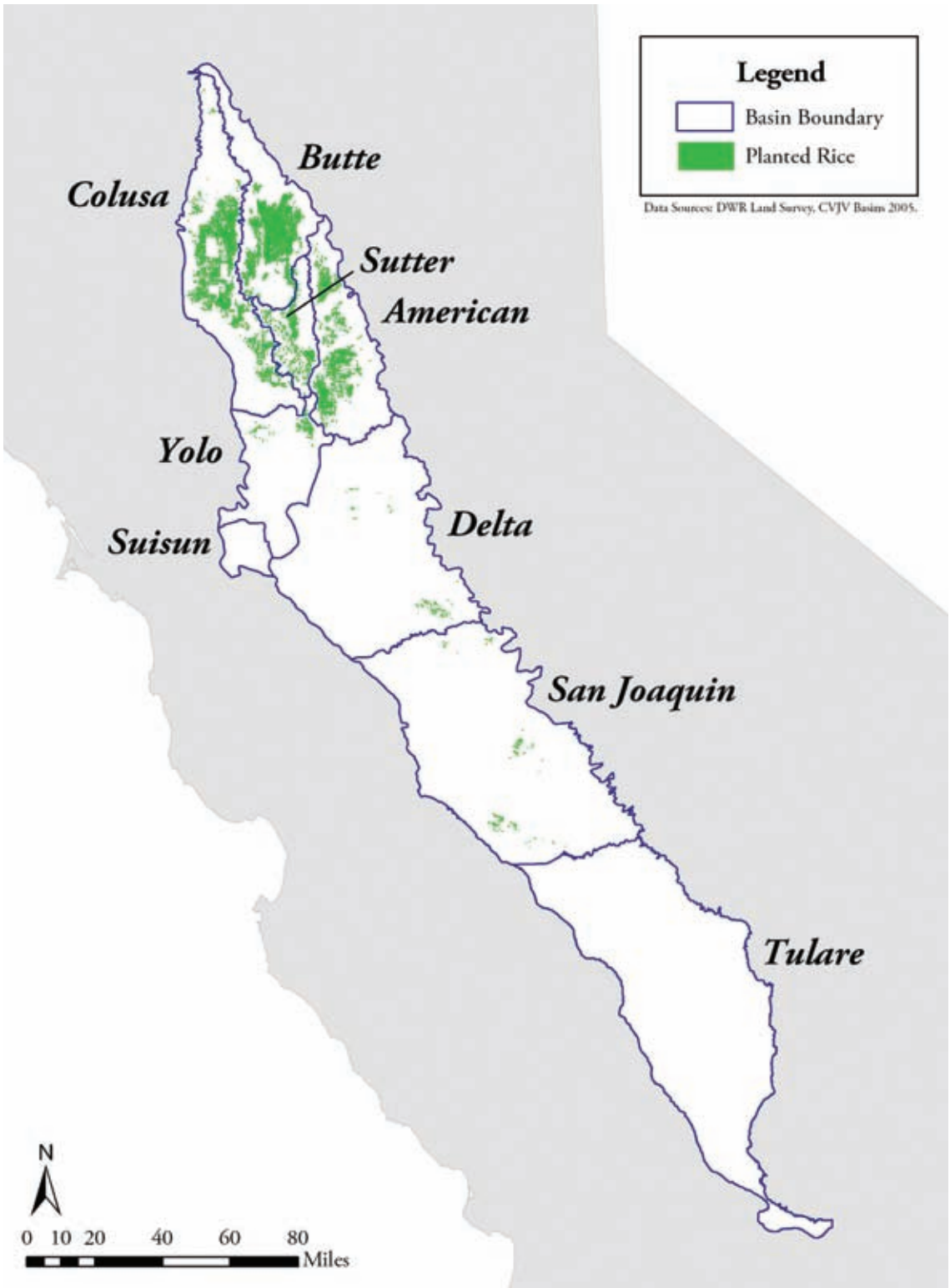


Figure 5-5. Distribution of planted rice in the Central Valley.

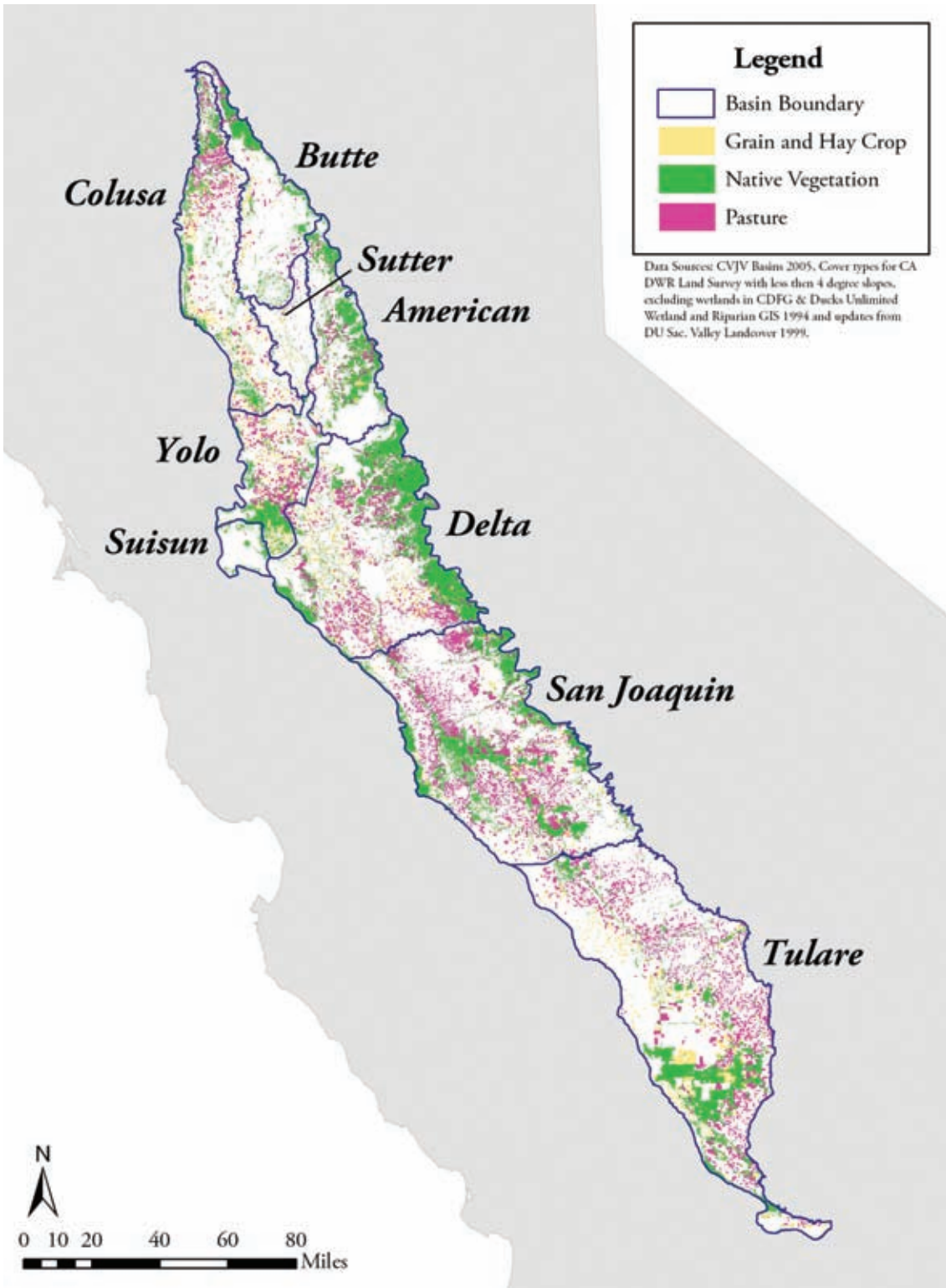


Figure 5-6. Distribution of potential nesting cover types in the Central Valley.



Figure 5-7. Distribution of potential nesting cover in the Central Valley.

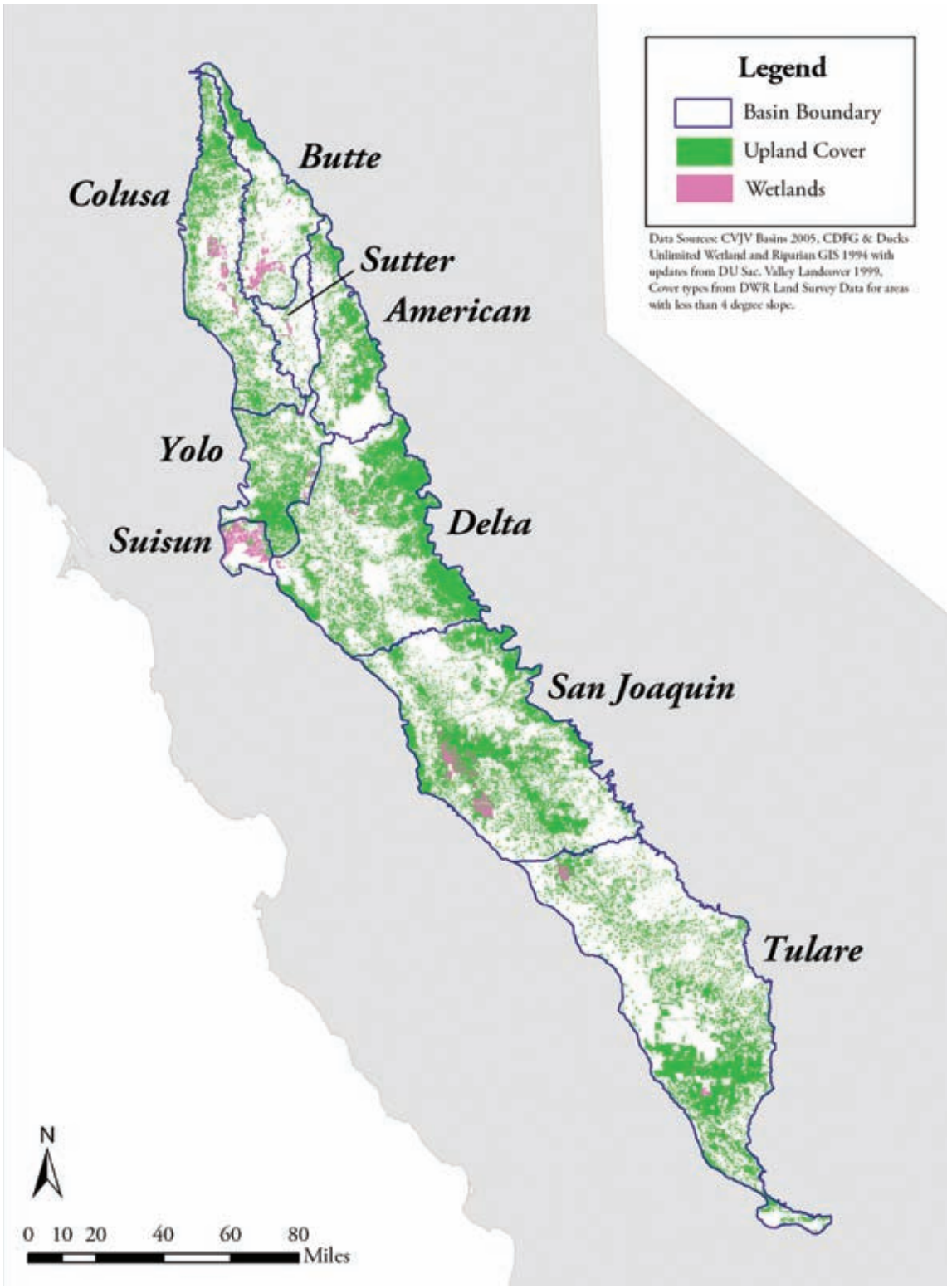


Figure 5-8. Distribution of wetlands and upland cover in the Central Valley.

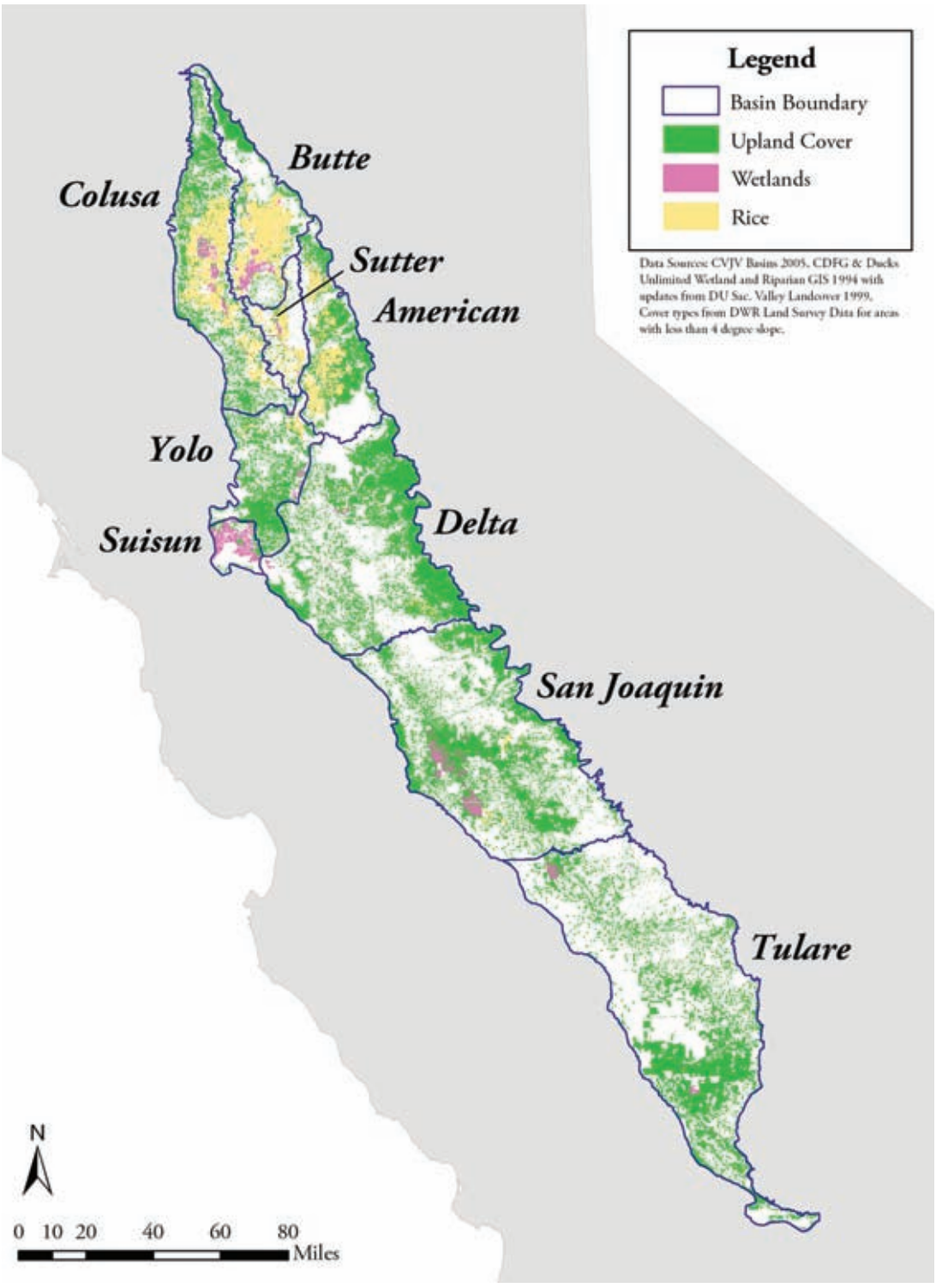


Figure 5-9. Distribution of potential upland cover, rice, and wetlands.

Protecting nesting cover is unlikely to be a conservation objective for breeding mallards. Conservation programs to protect nesting habitat in the Central Valley would rely on farmland easements to protect existing cover, especially in areas where grains, hay land, and pasture provide the majority of nesting habitat. In the PPR, agricultural easements are inexpensive and nesting densities on these protected uplands are typically high. As a result, large numbers of birds are benefited at low costs. However, easement costs in the Central Valley would likely be too high, while nesting densities on these properties may be too low to justify the expense of a permanent easement. Accordingly, upland programs for nesting mallards are likely to focus on restoring upland cover in areas where breeding densities are high but the availability of nesting cover is low. These restoration programs will have to offer economic incentives that are competitive with commodity markets and Farm Bill Programs. In addition, they are likely to be short term in nature (e.g., 3-5 years) with farmers having an option to leave the program after the contract expires. The Sacramento Valley CREP pilot project, for example, provides landowners with an economic incentive to convert agricultural lands back to native cover for ten-year periods. If the CREP is delivered in areas where breeding densities are high it may benefit large numbers of birds at reasonable costs. The USDA Conservation Security Program is another new and well-funded program that could provide similar benefits for nesting waterfowl.

Based on available information, increasing and maintaining the amount of semi-permanent wetland habitat and expanding nesting cover in key areas appears to be the most appropriate conservation objectives for breeding mallards in the Central Valley. Moreover, the spatial distribution of existing wetland and upland resources can identify where these conservation objectives are best applied on the landscape.

Although the JV does not yet know what vital rates limit mallard populations in the Central Valley, it can make informed decisions about the types of programs to deliver for breeding mallards. In order to do so, the JV identified landscape types that may require different management prescriptions for breeding mallards. These landscapes were differentiated using three characteristics: (1) existing semi-permanent wetlands; (2) existing upland cover; and (3) existing planted rice. Within a landscape, each of these habitat components is categorized as high or low, where high and low categories reflect relative differences among landscapes. These categories result in eight classes of landscapes that may be encountered by breeding mallards (e.g., high availability of wetlands, high availability of upland cover, low availability of rice). The JV then developed a decision matrix that identified the appropriate conservation objective(s) for each landscape class (Figure 5-10). These eight conservation objectives - landscape class associations are described below.

Conservation Objective—Landscape Class Associations

Low Wetlands, Low Rice, Low Upland Cover

Increases in semi-permanent wetlands and upland cover are recommended for these landscapes. The lack of rice, wetlands, and nesting cover in these landscapes makes them a low priority for breeding habitat programs, at least in the short term. Existing mallard densities are likely to be low in these areas, as is reproductive success. Increasing the size and success of breeding mallard populations in these landscapes is not likely to be cost effective compared to landscapes where at least some habitat components are in place.

Low Wetlands, High Rice, Low Uplands

Increases in upland cover and semi-permanent wetlands are recommended for these landscapes. Increases in upland cover within rice growing areas may increase the nest success of mallards that rely on rice fields for pair habitat. Increases in semi-permanent wetlands may increase early season duckling survival, as they provide brood habitat at a time when rice does not yet provide adequate cover.

Low Wetlands, Low Rice, High Uplands

Increasing semi-permanent wetlands should be a conservation objective priority for these landscapes. Increases in wetland habitat should attract more birds to these landscapes and allow the birds to exploit large tracts of upland cover. This recommendation is dependant on these landscapes having areas that are suitable for wetland restoration.

Low Wetlands, High Rice, High Uplands

Increasing semi-permanent wetlands should be a conservation objective priority for these landscapes, as they may support large numbers of breeding mallards that experience high nest success. However, the absence of semi-permanent wetlands may result in low early-season brood survival.

High Wetlands, Low Rice, Low Uplands

Increases in upland cover are recommended for these landscapes, as this habitat may support high densities of breeding mallards that are limited by low nest success.

High Wetlands, High Rice, Low Uplands

Increasing upland cover in these landscapes should be a priority conservation objective. These landscapes likely support high densities of breeding mallards that may benefit significantly from additional nesting cover. Increasing semi-permanent wetlands could represent a secondary conservation objective as it may increase breeding incidence and duckling survival.

High Wetlands, High Rice, High Uplands

Increasing semi-permanent wetlands within these landscapes should be a conservation objective priority. These areas may support large numbers of breeding mallards that enjoy high reproductive success. Providing more wetland habitat in these landscapes may increase mallard densities, and allow additional birds to exploit existing upland and brood rearing resources.

High Wetlands, Low Rice, High Uplands

Increasing semi-permanent wetlands within these landscapes should be a conservation objective priority. These areas may support large numbers of breeding mallards that enjoy high reproductive success. Providing more wetland habitat in these landscapes may increase mallard densities, and allow additional birds to exploit existing upland and brood rearing resources.

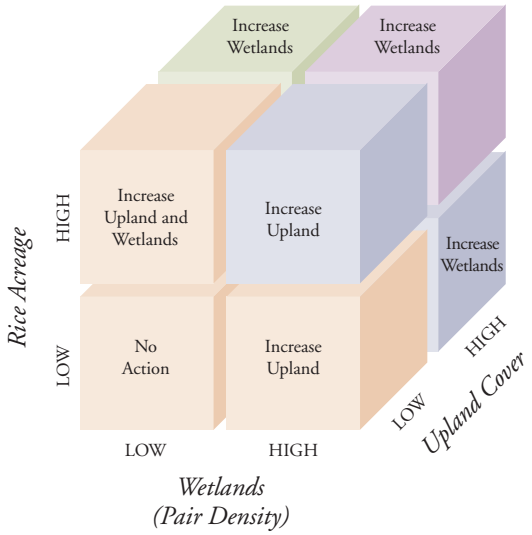


Figure 5-10. Decision matrix for breeding mallards in the Central Valley.

The remainder of this chapter reviews the spatial distribution of wetland, rice, and upland habitat in each basin. Although these data help distinguish the different landscape types in a basin, they are not sufficiently developed to allow site specific recommendations on what habitat programs to pursue for breeding mallards. For example, the Geographic Information System data in the PPR are sufficiently developed to identify habitat prescriptions at the four square mile scale. In the short term, decisions on what programs to deliver for breeding mallards in the Central Valley will require site by site assessment of existing habitat conditions using on the ground information and/or improved spatial data.

Basin Conservation Objectives

Although existing spatial data is inappropriate for identifying site specific management prescriptions, it can be used to broadly distinguish different landscape types and to suggest what habitat programs are suited to those landscapes. Figures 5-11 through 5-17 depict areas of each basin where habitat programs may be most beneficial to breeding waterfowl.

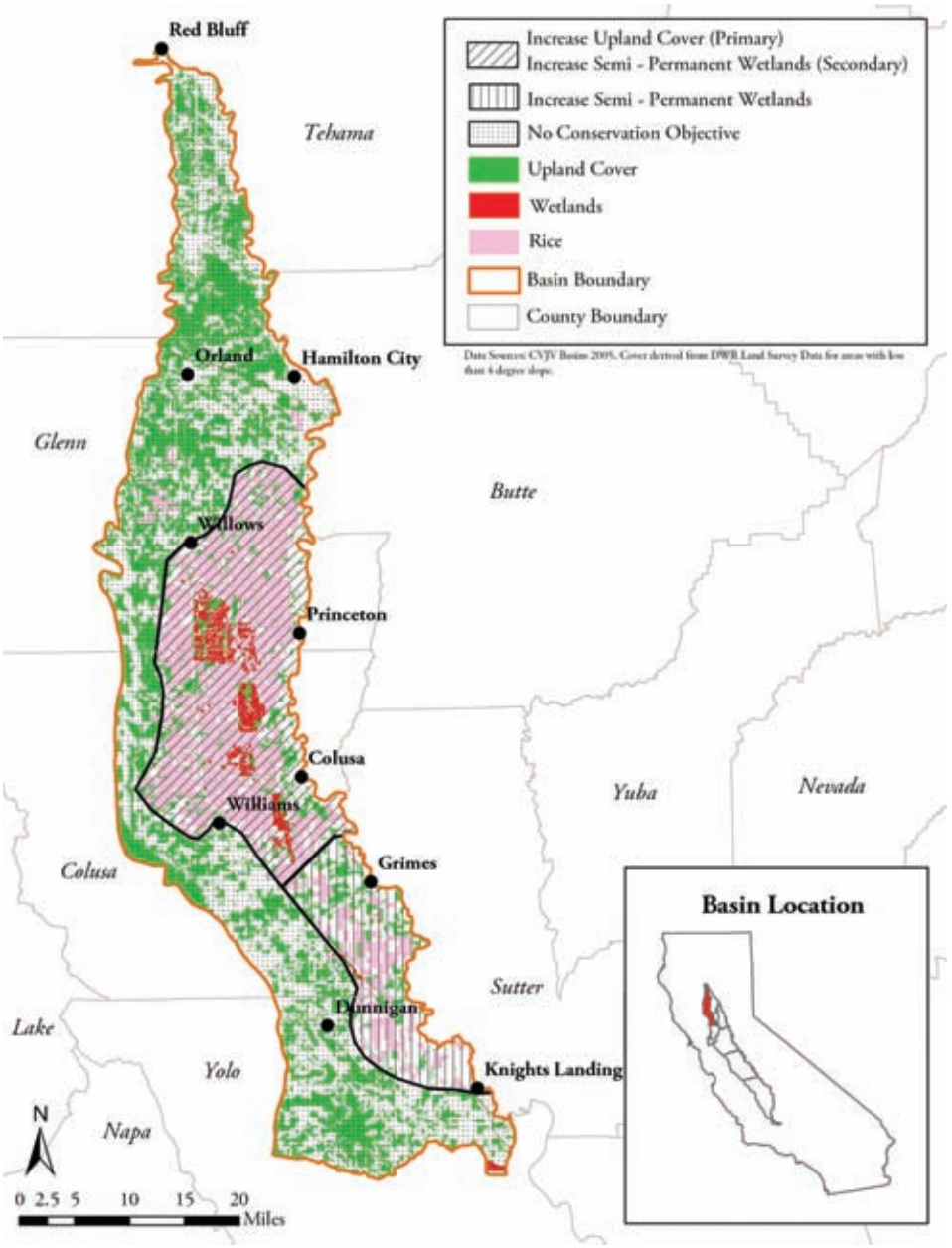


Figure 5-11. Conservation objectives for breeding mallards in Colusa Basin.

Colusa Basin

The distribution of upland, wetland, and rice habitats in the Colusa Basin is depicted in Figure 5-11. The portion of the basin that lies north of Willows is characterized by an abundance of potential upland cover, as is the entire western edge of the basin. Increasing semi-permanent wetlands may be appropriate for at least portions of this landscape. Most wetland and rice habitat in the basin lies between Willows and Williams. However, upland habitat is generally lacking in this landscape. The restoration of upland cover may benefit breeding waterfowl in areas adjacent to these rice-wetland complexes. Increasing semi-permanent wetlands may also benefit breeding waterfowl as bird densities may already be high in this landscape, and increases in wetland habitat could increase breeding incidence and duckling survival.

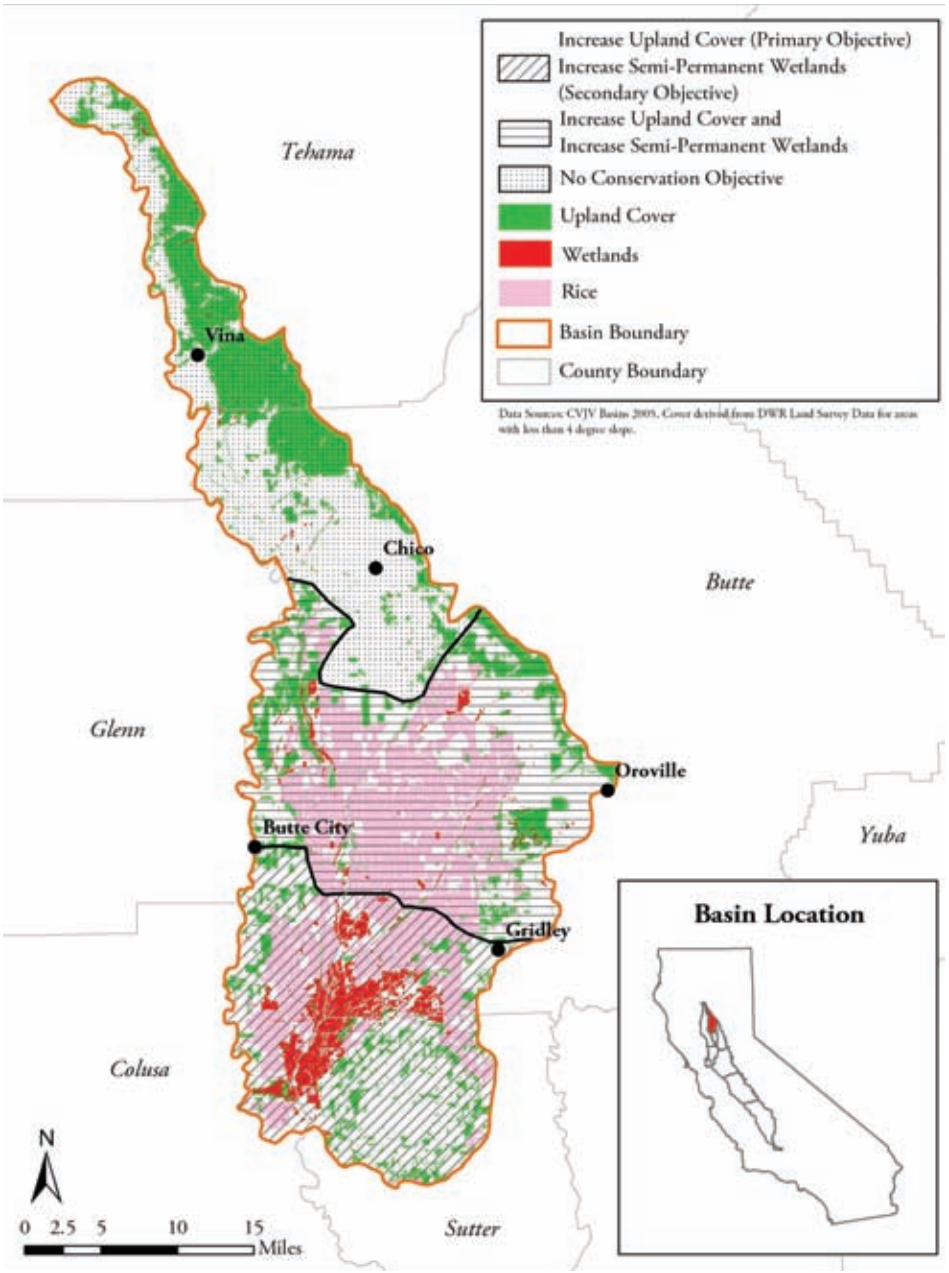


Figure 5-12. Conservation objectives for breeding mallards in Butte Basin.

Butte Basin

The distribution of upland, wetland, and rice habitats in the Butte Basin is presented in Figure 5-12. The portion of the basin that lies north of Chico is characterized by an abundance of upland cover. Increasing semi-permanent wetlands may be appropriate for at least portions of this landscape. South of Butte City and north of the Sutter Buttes is a landscape characterized by high amounts of wetlands and rice. However, upland habitat is lacking in this landscape and restoration of upland cover may benefit breeding waterfowl. Increasing semi-permanent wetlands may also benefit breeding waterfowl as bird densities may already be high in this landscape, and increases in wetland habitat could increase breeding incidence and duckling survival. North of the Butte City-Gridley line is a landscape with high amounts of rice, but low amounts of both wetlands and uplands. Conservation objectives for this landscape could include an increase in both semi-permanent wetlands and upland habitat.

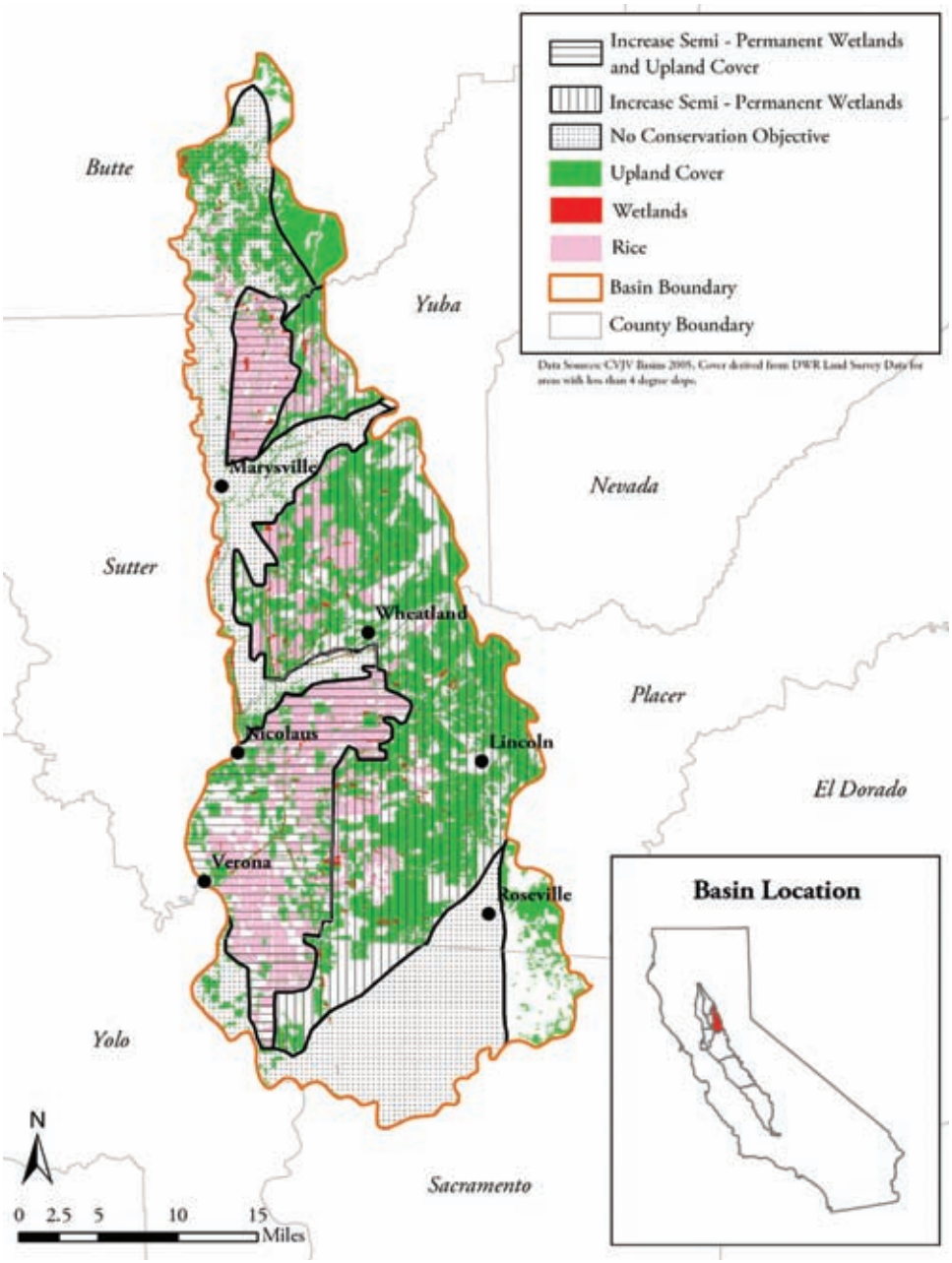


Figure 5-13. Conservation objectives for breeding mallards in American Basin.

American Basin

The distribution of upland, wetland, and rice habitats in the American Basin is presented in Figure 5-13. Large acreages of rice and upland habitat, but few wetlands characterize much of the eastern and central landscapes of the basin. Increases in semi-permanent wetlands may benefit breeding waterfowl in these areas. High amounts of rice occur in the north and southwest portions of the basin. However, these landscapes contain low amounts of both wetland and upland habitat. Increases in semi-permanent wetlands and upland cover may provide the greatest benefits to breeding waterfowl in these areas.

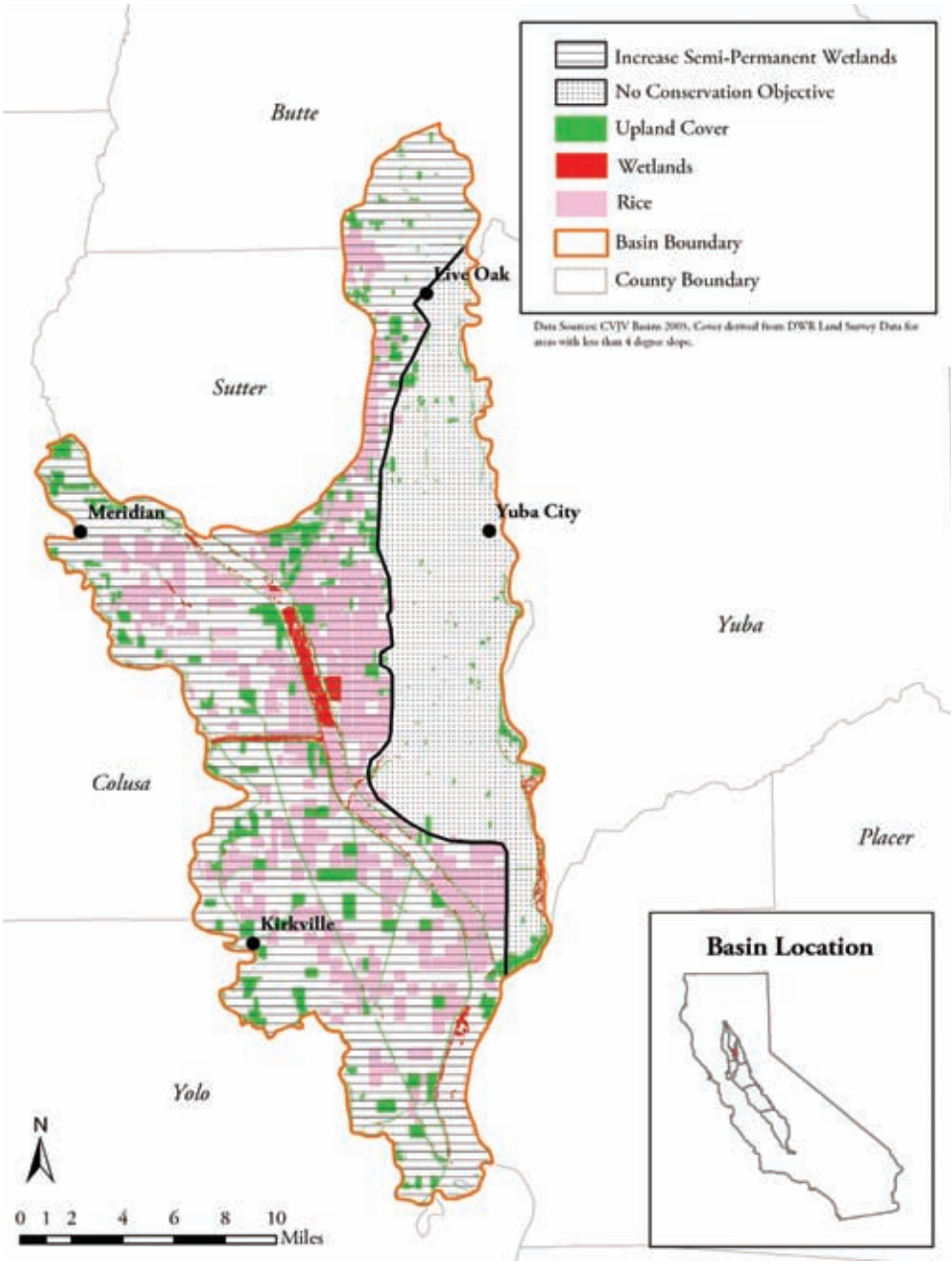


Figure 5-14. Conservation objectives for breeding mallards in Sutter Basin.

Sutter Basin

The distribution of upland, wetland, and rice habitats in the Sutter Basin is presented in Figure 5-14. Rice occurs in large amounts throughout the western half of the basin, though wetlands are limited and largely restricted to the Sutter Bypass. Although some upland cover occurs throughout western parts of the basin, it is scattered and present in small amounts. Increases in semi-permanent wetlands and upland cover may benefit breeding waterfowl throughout the western half of the basin.

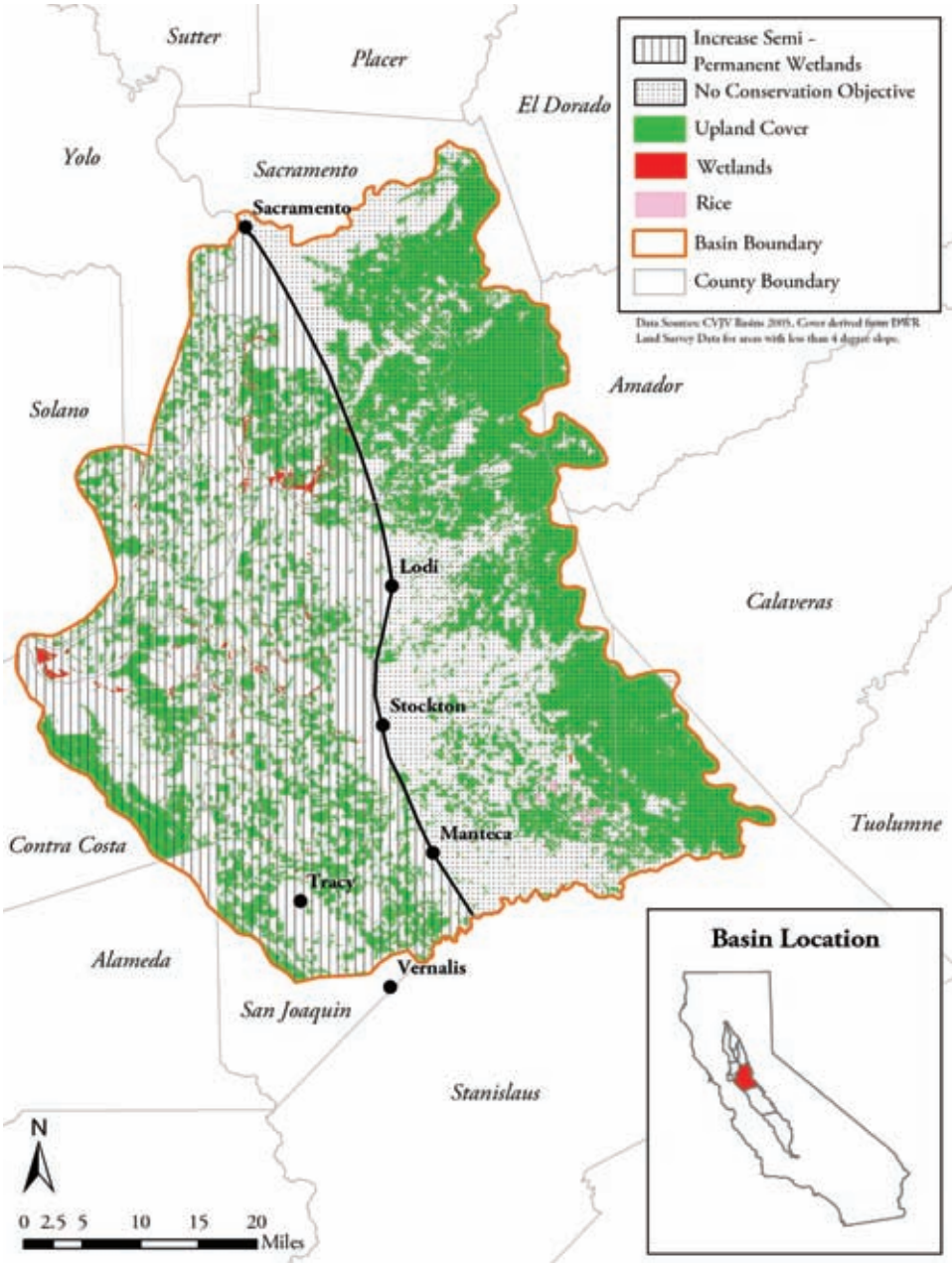


Figure 5-15. Conservation objectives for breeding mallards in Delta Basin.

Delta Basin

The distribution of upland and wetland habitats in the Delta Basin is presented in Figure 5-15. Rice acreage in the basin totals less than 1,500 acres. Upland cover is high throughout the eastern half of the basin. Increases in semi-permanent wetlands may be appropriate for at least portions of this landscape. Upland cover is also high in the western half of the basin, though wetland abundance is generally low. Increases in semi-permanent wetlands may benefit breeding mallards in this landscape as well.

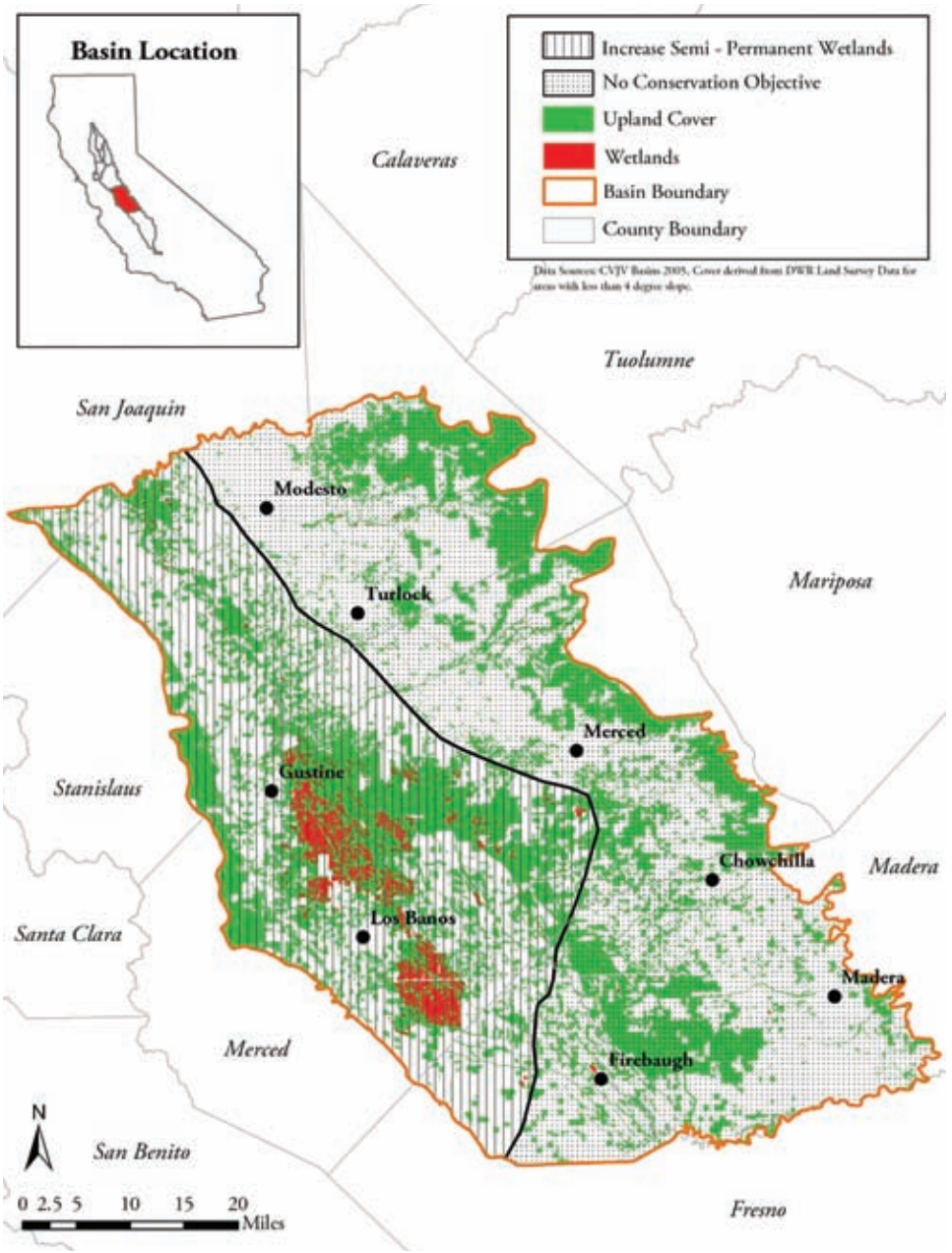


Figure 5-16. Conservation objectives for breeding mallards in San Joaquin Basin.

San Joaquin Basin

The distribution of upland and wetland habitat in the San Joaquin Basin is presented in Figure 5-16. Although there is some rice grown in the basin it occurs in low amounts. Upland cover is high west of Modesto, Merced, Chowchilla, and Firebaugh. Increases in semi-permanent wetlands may be appropriate for at least portions of this landscape.

The remainder of the basin is characterized by high amounts of upland cover and large wetland complexes (i.e., West Grasslands). Increases in semi-permanent wetlands in these wetland-upland complexes may benefit breeding mallards (Figure 5-21).

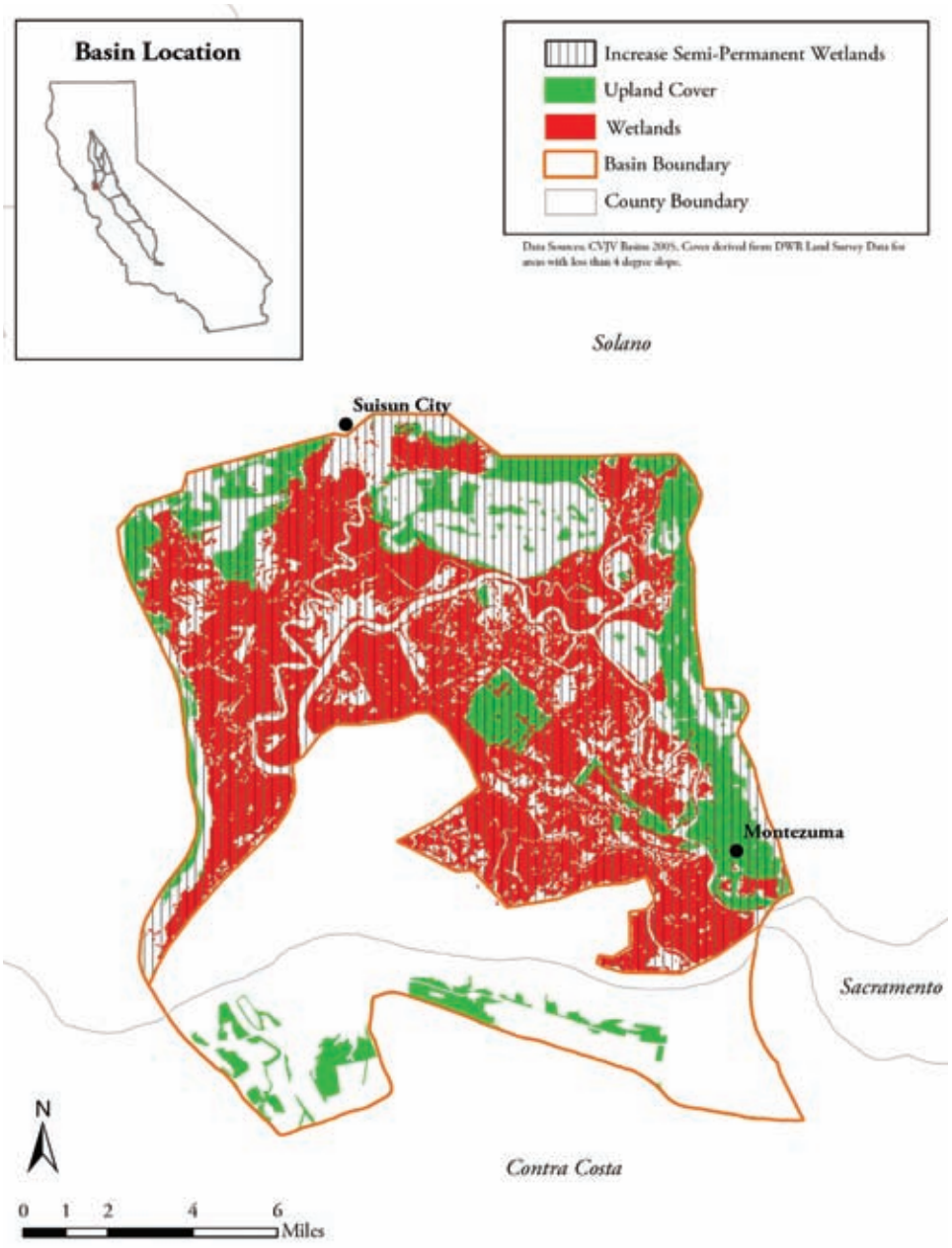


Figure 5-17. Conservation objectives for breeding mallards in Suisun Marsh Basin.

Suisun Marsh Basin

The distribution of upland and wetland habitats in the Suisun Marsh Basin is presented in Figure 5-17. No rice is grown in this basin. The entire landscape of the Suisun Marsh is characterized by high amounts of upland cover and wetland habitat. As a result, increasing the amount of semi-permanent wetlands within the basin is likely to provide the greatest benefits to breeding mallards.

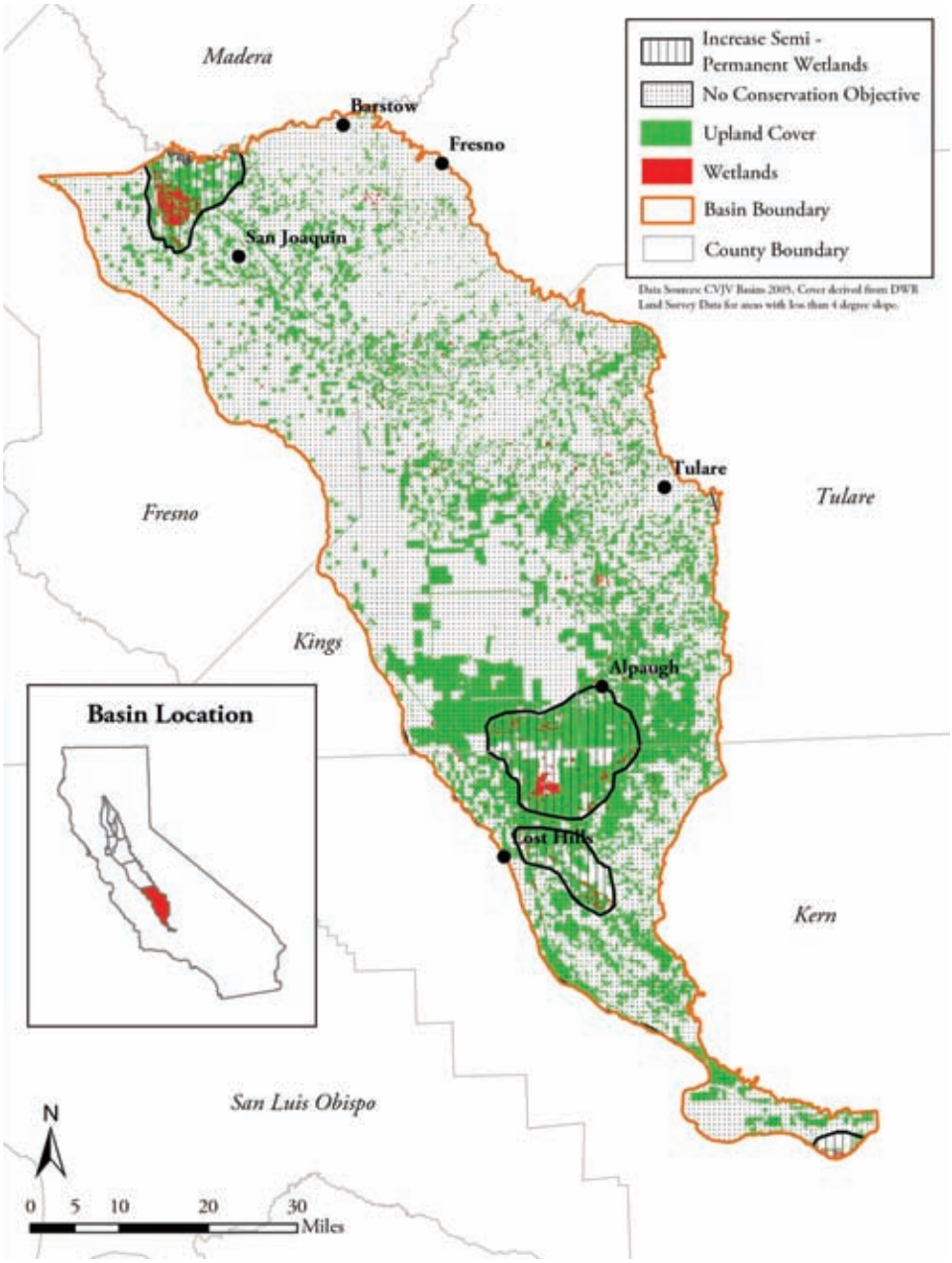


Figure 5-18. Conservation objectives for breeding mallards in Tulare Basin.

Tulare Basin

The distribution of upland and wetland habitats in the Tulare Basin is presented in Figure 5-18. No rice is grown in this basin. Significant amounts of cover occur in the north-central and southeastern parts of the basin, and increasing semi-permanent wetlands in these areas may benefit breeding mallards.

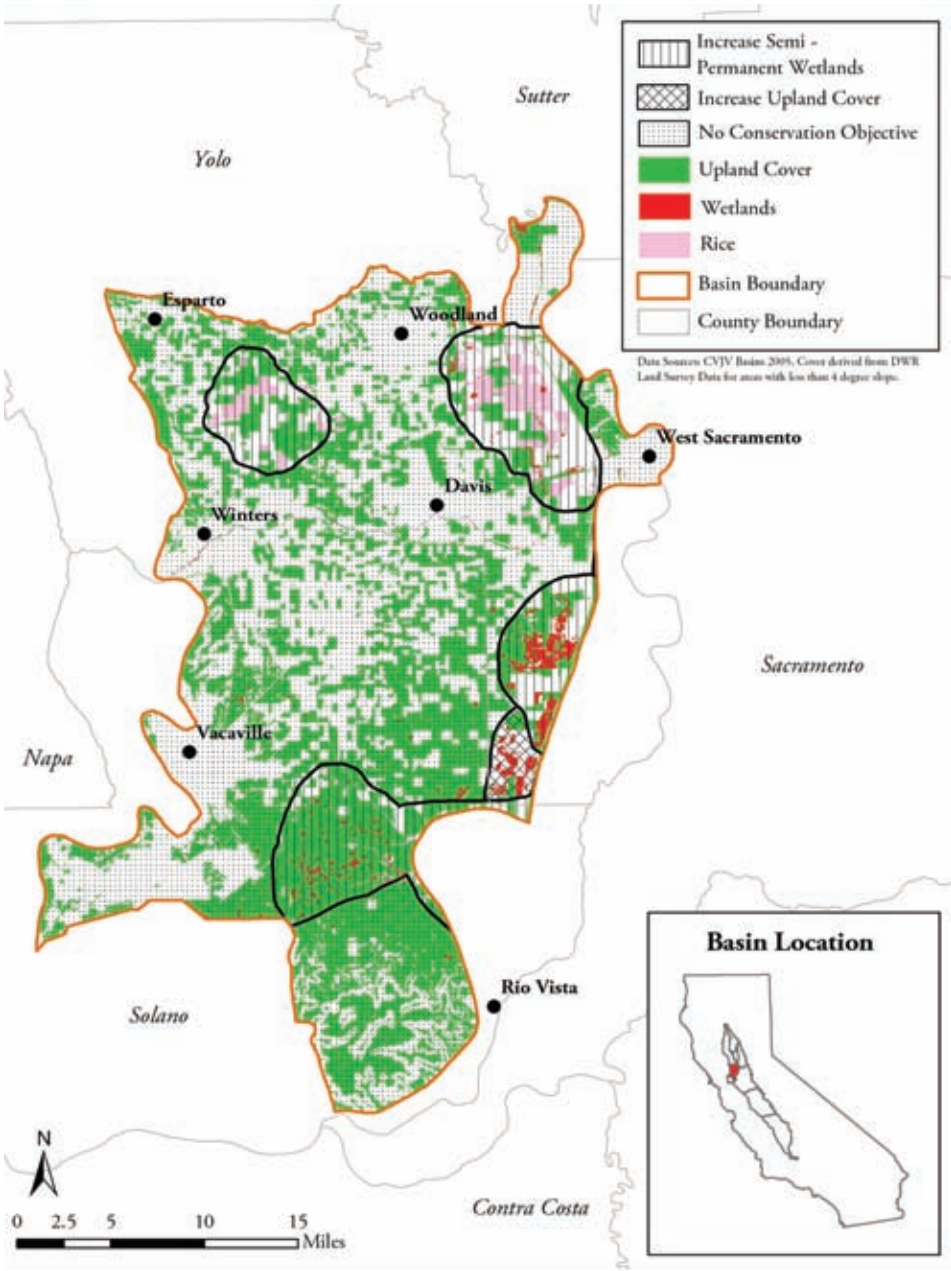


Figure 5-19. Conservation objectives for breeding mallards in Yolo Basin.

Yolo Basin

The distribution of upland, wetland, and rice habitats in Yolo Basin is presented in Figure 5-19. Most wetlands occur in one of three distinct blocks on the eastern edge of the Basin, and south of the Davis - West Sacramento line. The two most northern of these wetland blocks are interspersed with large areas of upland cover. Increasing semi-permanent wetlands within this landscape may benefit breeding mallards. The wetland complex south of this landscape is not interspersed with large amounts of upland cover, and restoring upland habitat, in conjunction with efforts to increase semi-permanent wetlands, may be appropriate (Figure 5-19).

Southeast of Vacaville is a series of small wetlands that are adjacent to large amounts of upland cover. Increasing semi-permanent habitat within this wetland complex could benefit breeding mallards by allowing larger number of birds to exploit this existing upland cover. Rice is grown in the northeast and northwest corners of the basin. Although some upland cover is associated with both of these rice complexes, wetland habitats are generally lacking. Increasing semi-permanent wetlands in each of these areas may increase mallard breeding densities, and may increase early season duckling survival.

Summary

The 2006 Plan represents a further step in developing conservation objectives for breeding waterfowl in the Central Valley. Future efforts would benefit from a better understanding of what limits population growth of breeding mallards, and how these limiting factors vary geographically within the Valley. Finally, improved spatial data that depicts the habitat resources available to breeding ducks should permit JV partners to refine the delivery of conservation programs for breeding waterfowl beyond that presented here.

Appendix 5-1

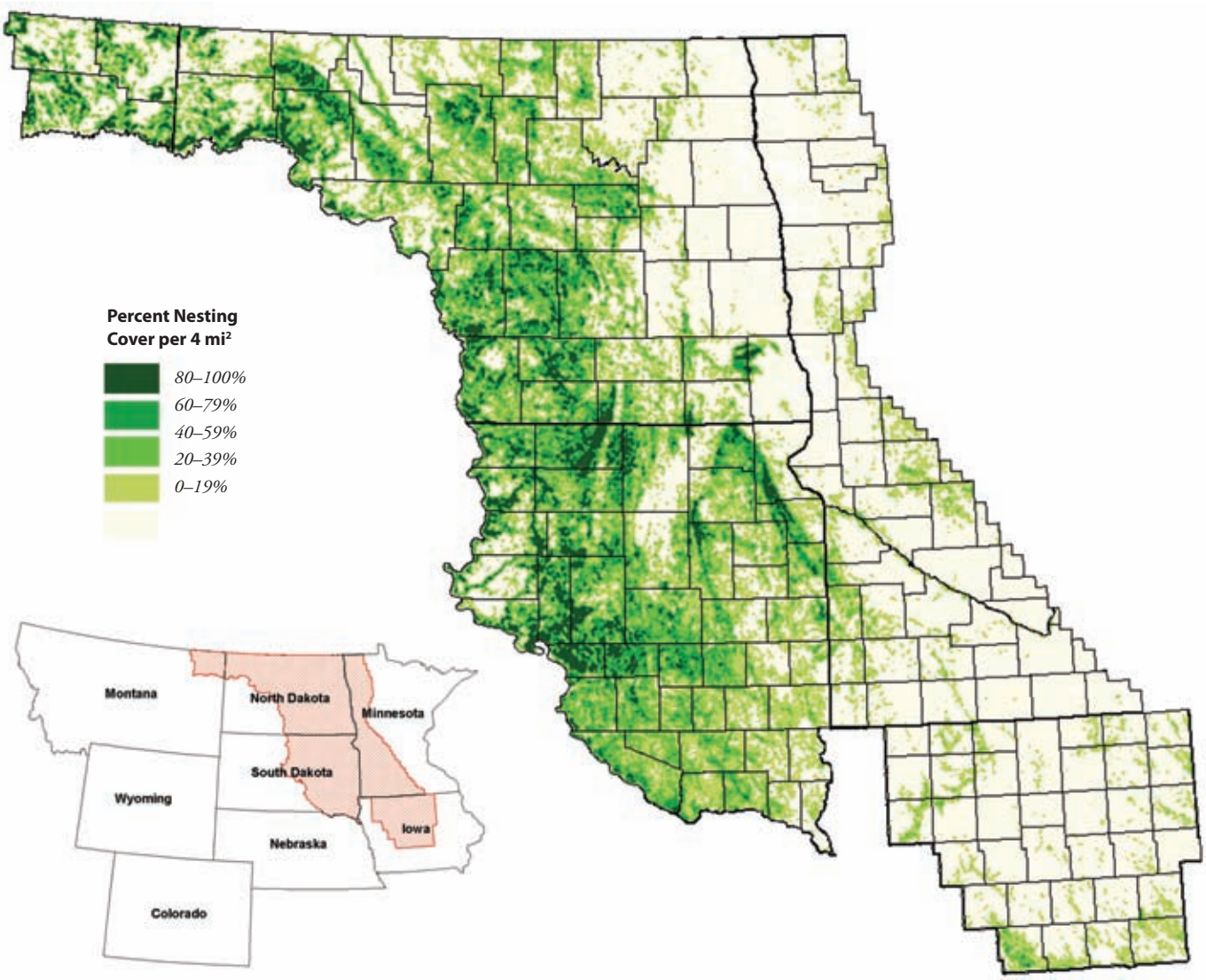
A Review of Conservation Planning for Breeding Waterfowl in the U.S. Prairie Pothole Region

Conservation planning for breeding mallards in the Central Valley should result in habitat programs that increase the size and success of breeding duck populations in a cost effective manner. One option is to develop demographic models that identify the vital rates that limit population growth (e.g., Hoekman et al. 2002). These models require vital rate estimates that are representative of mallard populations breeding in the Central Valley (Table 5-1). In some cases, mallard populations may vary in terms of what vital rates limit population growth. For example, nest success might limit populations in the Suisun Marsh but not the Tulare Basin.

Demographic models alone cannot be used to target site-specific habitat efforts. Spatial planning tools that include information on breeding waterfowl densities and the distribution of wetland and upland habitats can be combined with demographic modeling to identify specific areas for acquisition, restoration, or enhancement of breeding habitat.

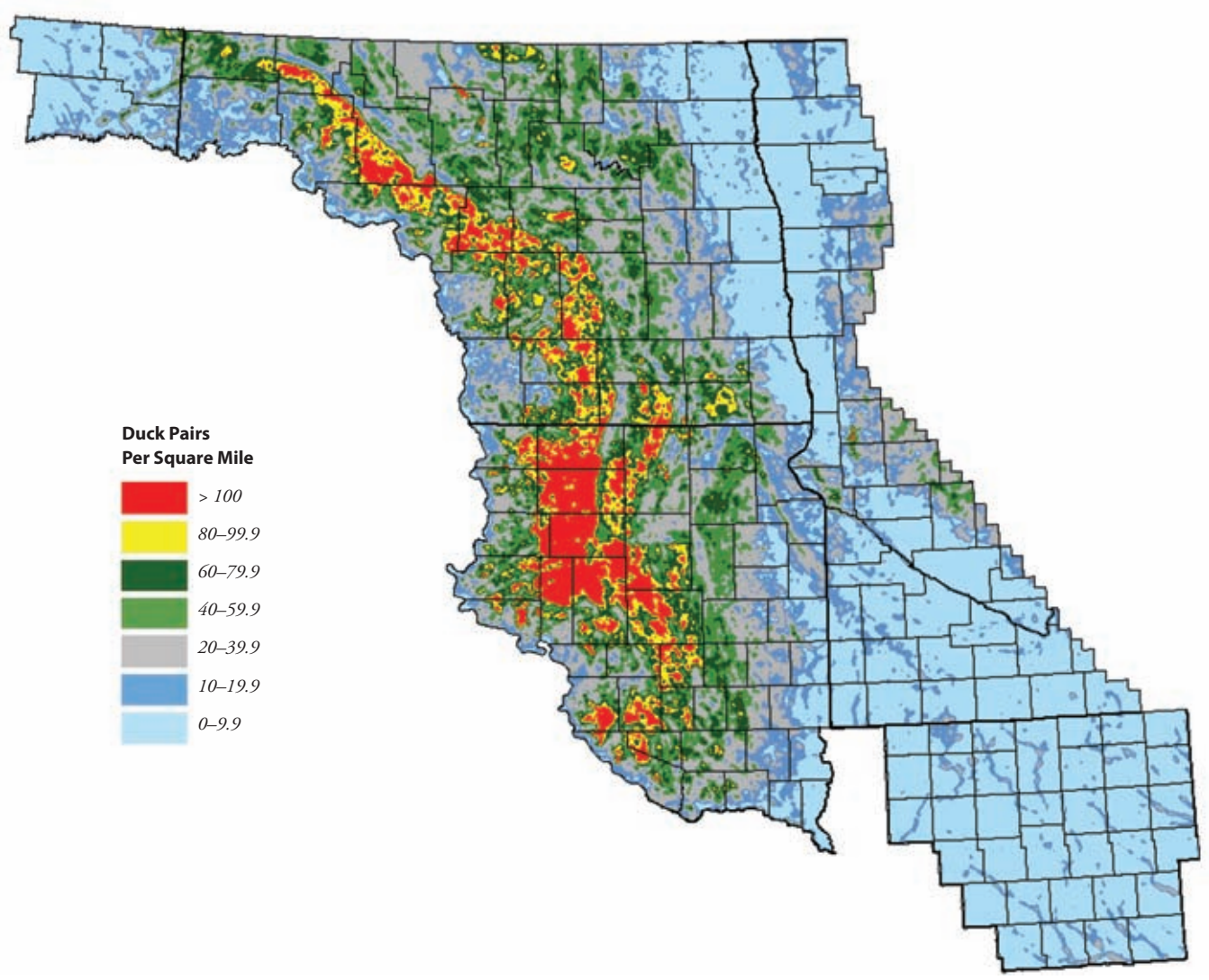
Conservation planning for breeding waterfowl in the U.S. portion of the Prairie Pothole Region (PPR) provides one example where demographic models are combined with spatial planning tools to develop site-specific habitat prescriptions for breeding waterfowl. Demographic modeling indicates that prairie waterfowl are most limited by nest success (Hoekman et al. 2002). As a result, habitat efforts to restore or protect upland nesting habitat are given priority in the PPR. To help guide these programs, perennial nesting cover was mapped for much of the PPR (Figure 5-20). The distribution of perennial cover was combined with information on breeding waterfowl densities (Figure 5-21) to develop a spatial planning tool that helped address the problem of low nest success (Figure 5-22). The red areas depicted in Figure 5-22 are regions where duck densities are high, and greater than 40% of the landscape is grassland. Conservation programs in these areas focus on protecting existing habitats because waterfowl numbers are high and upland cover is already sufficient to grow duck populations. Areas that have low bird densities and low amounts of grassland are designated in beige and include much of the eastern portion of the PPR. These areas are a low conservation priority because the resources needed to restore these areas for breeding waterfowl are currently too great. In between the extremes of red and beige are landscapes that require different conservation strategies. For example, areas that are depicted in green have high wetland densities but only moderate amounts of grassland (i.e., < 40% cover). Within these landscapes, grassland restoration is an important conservation objective, as increases in upland cover should result in increased nest success.

The planning approach described for the PPR is only one example of how habitat programs could be targeted for breeding waterfowl in the Central Valley. There are an ever increasing number of sophisticated species-habitat modeling approaches that could be used to develop spatially explicit species-habitat models for identifying priority areas and conservation needs.



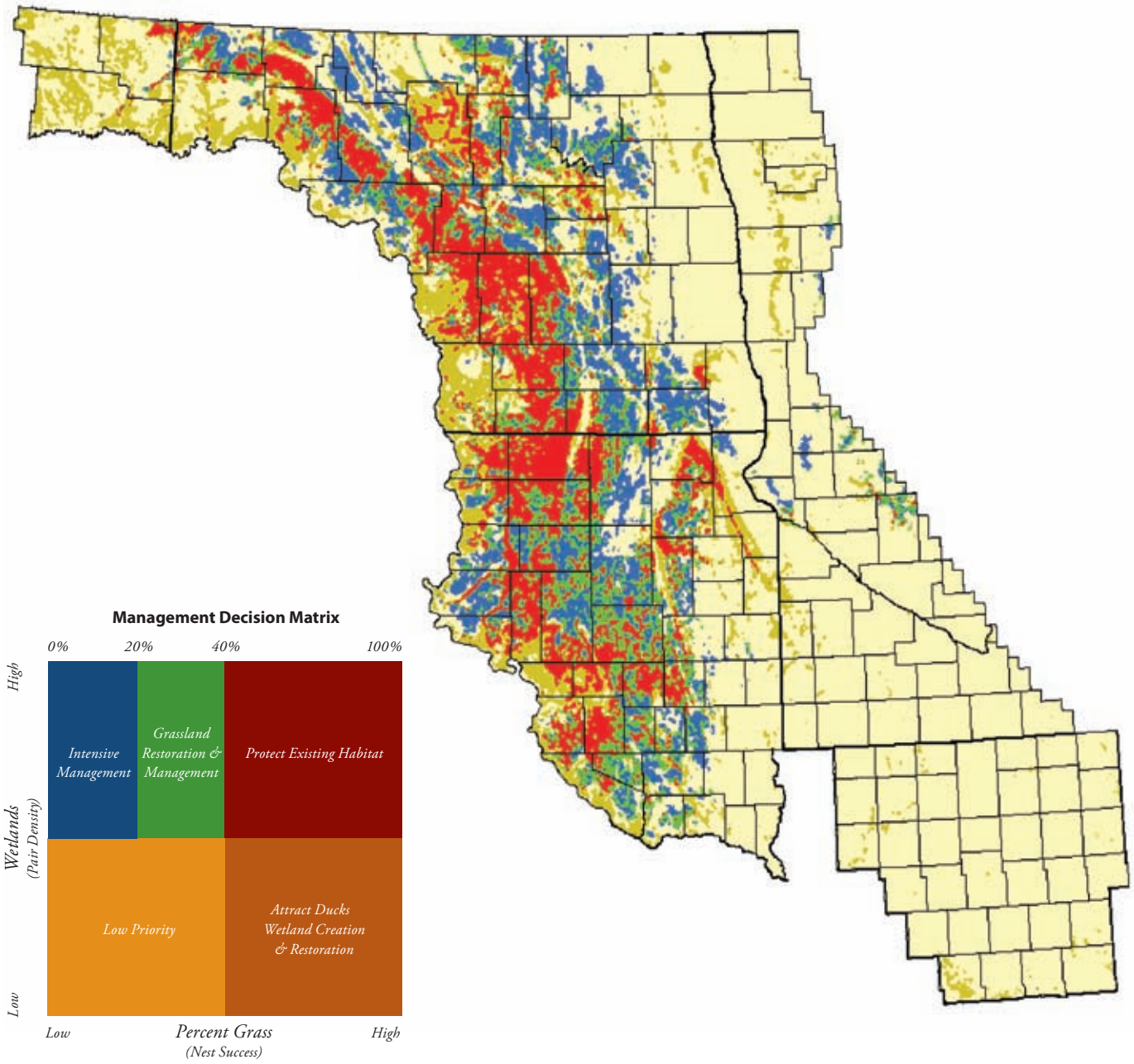
Data source: U.S. Fish and Wildlife Service/Ducks Unlimited, Inc.

Figure 5-20. Perennial nesting cover in the U.S. Prairie Pothole Region.



Data source: U.S. Fish and Wildlife Service/Ducks Unlimited, Inc.

Figure 5-21. Breeding waterfowl densities in the U.S. Prairie Pothole Region.



Data source: U.S. Fish and Wildlife Service/Ducks Unlimited, Inc.

Figure 5-22. Spatial planning tool for breeding waterfowl in the Prairie Pothole Region.



Shorebirds
Photo: Dave Feliz, CDFG

Chapter Six: WINTERING SHOREBIRDS

This chapter addresses the needs of wintering shorebirds, herein defined as non-breeding shorebirds that occupy the Central Valley between July and May, each year. The chapter is divided into five sections: (1) Need and approach; (2) Biological inputs used in the TRUEMET model; (3) Overall assessment of habitat conditions in the Central Valley; (4) Methods for establishing conservation objectives for wintering shorebirds; and (5) Conservation objectives for wintering shorebirds within planning regions.

"In western North America, the Central Valley supports more shorebirds than any other inland site in the winter and spring, and in the fall, it is second only to Utah's Great Salt Lake."

Catherine Hickey
Shorebird Conservation Coordinator
PRBO Conservation Science

Need and Approach

The Central Valley of California's wintering shorebird populations are among the largest of any inland site in western North America. The Manomet Center's Western Hemisphere Shorebird Reserve Network (WHSRN) has designated the Grasslands Ecological Area of the San Joaquin Basin and the ricelands and wetlands of the Sacramento Valley as sites of international importance to shorebirds. The Central Valley also provides critical wintering habitat for two species of shorebirds that have recently been proposed as Bird Species of Special Concern in California, the mountain plover *(Charadrius montanus)* and the snowy plover *(Charadrius alexandrinus)* (Hickey et al. 2003).

The 2006 Plan assumes that food is the primary need of shorebirds during migration and winter, and providing adequate foraging habitat at appropriate water depths will enhance survival outside of the breeding season. Conservation planning for wintering shorebirds in the Mississippi Alluvial Valley has also emphasized foraging habitat (Loesch et al. 2000). The TRUEMET food energy model (introduced in Chapter 4) was used to establish habitat objectives for wintering waterfowl, and has also been used for wintering shorebirds in the Central Valley. Figure 6-1 depicts this basic model. Shorebird energy needs are a product of population objectives

and the daily energy requirement of an individual shorebird, while food supplies are a product of habitat acres and the amount of food provided by each acre. Foraging habitat is assumed to be adequate when food supplies equal shorebird energy needs.

The food energy approach adopted for shorebirds in the 2006 Plan is based on the TRUEMET model. The model calculates population energy demand and population energy supplies for specific time periods, and can incorporate effects like flooding and de-watering (drawdown) schedules to account for temporal variation in habitat availability. The model was used to estimate shorebird habitat needs and to develop conservation objectives for wintering shorebirds for each Shorebird Planning Region. Additional information on the TRUEMET model is provided in Chapter 4.

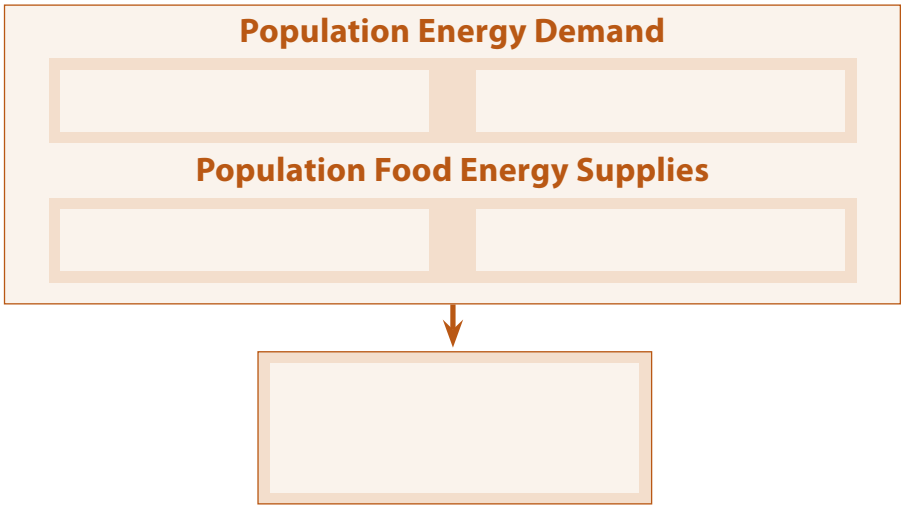


Figure 6-1. Basic energy model used to assess the availability of foraging habitat relative to shorebird need.

Biological Inputs Used in the TRUEMET Model

Four categories of biological inputs were used in the TRUEMET model: (1) population objectives; (2) daily energy requirements; (3) habitat acreage; and (4) habitat foraging values. This section describes how these inputs were derived, and it details many of the assumptions made for wintering shorebirds in the 2006 Plan.

Population Objectives

Unlike waterfowl, no process of stepping down continental population goals for wintering shorebirds has been established under the U.S. Shorebird Conservation Plan. Instead, population objectives were developed from Central Valley-wide surveys of wintering shorebirds that were conducted between April and August 1992 to 1994 (Shuford et al. 1998).

Average shorebird counts between 1992 and 1994 were available for August, November, January, and April (Table 6-1). However, wintering shorebirds rely on Central Valley habitats from July through early May. In addition, shorebird survey results do not equate to population objectives because of missed birds and/or depressed shorebird numbers during the years that surveys were conducted. The JV's Shorebird Working Group adjusted survey results upward when establishing population objectives and developed objectives for months outside the survey periods, based on their understanding of shorebird migration. Shorebird population objectives by 15-day intervals between July 1 and May 10 are presented for the entire Central Valley in Table 6-2.

Table 6-1. Average shorebird counts in the Central Valley from 1992-1994 (from Shuford et al. 1998).

Month	*Count*
August	134,000
November	211,000
January	303,000
April	335,000

Table 6-2. Non-breeding shorebird population objectives for the Central Valley.

Interval	*Population Objective*
J-7 (July 1-July 15)	50,000
J-22 (July 16-July 31)	50,000
A-8 (Aug 1-Aug 16)	200,000
A-23 (Aug 17-Aug 31)	200,000
S-7 (Sept 1-Sept 15)	200,000
S-22 (Sept 16-Sept 30)	200,000
O-7 (Oct 1-Oct 15)	250,000
O-22 (Oct 16-Oct 30)	250,000
N-6 (Oct 31-Nov 14)	400,000
N-21 (Nov 15-Nov 29)	400,000
D-6 (Nov 30-Dec 14)	400,000
D-21 (Dec 15-Dec 29)	400,000
J-5 (Dec 30-Jan 13)	400,000
J-20 (Jan 14-Jan 28)	400,000
F-4 (Jan 29-Feb 12)	400,000
F-19 (Feb 13-Feb 27)	400,000
M-6 (Feb 28-Mar 14)	450,000
M-21 (Mar 15-Mar 29)	450,000
A-5 (Mar 30-Apr 13)	600,000
A-20 (Apr 14-Apr 28)	600,000
M-4 (Apr 29-May 10)	50,000

Planning Regions

Where possible, conservation objectives for bird groups included in the 2006 Plan were established at the basin scale. However, several basins were combined into two planning regions: (1) Sacramento Valley (SV) consisting of Colusa, Butte, American, and Sutter Basins; and (2) Delta, consisting of Yolo and Delta Basins. The Suisun Marsh was not included, as counts do not exist for this region. However, the Suisun Marsh does provide valuable habitat for wintering shorebirds, and the following conservation actions identified in the *Southern Pacific Shorebird Conservation Plan* may benefit this bird group: (1) incorporate shorebird habitat components in tidal marsh restorations; (2) increase tidal circulation and water quality in marshes to enhance invertebrate productivity and shorebird foraging areas; (3) manage vegetation in some ponds to provide expanses of open habitat; and (4) create one to six inch water depths in some ponds. (Hickey et al. 2003). The San Joaquin and Tulare Basins were maintained as separate planning regions (Figure 6-2). These planning regions reflect the scale at which shorebird population information is available.



Figure 6-2. Planning regions for wintering shorebirds in the Central Valley.

It was necessary to distribute shorebird population objectives for the entire Central Valley among the four planning regions in Figure 6-2. However, shorebird surveys conducted in August, November, January, and April 1992 to 1994 indicate that shorebird distribution in the Central Valley varies seasonally. For example, 50% of all shorebirds counted in August were observed in the Tulare Basin, while only 10% of all shorebirds were seen in Tulare Basin during January surveys (Table 6-3).

Table 6-3. Distribution of wintering shorebirds in the Central Valley by region and time period (from Shuford et al. 1998).

Region	*August*[a]	*November*[a]	*January*[a]	*April*[a]
SV Planning Region	0.35	0.38	0.45	0.39
Delta Planning Region	0.075	0.12	0.17	0.03
San Joaquin Basin	0.075	0.32	0.28	0.41
Tulare Basin	0.50	0.18	0.10	0.17

[a]*Fraction of all shorebirds present in the Central Valley.*

To develop population objectives for each of the four planning regions by 15-day periods, the JV assumed that shorebird surveys conducted in August, November, January, and April corresponded to 15-day intervals as follows: (1) shorebird surveys conducted in August correspond to the distribution of shorebirds between July 1 and October 31; (2) shorebird surveys conducted in November correspond to the distribution of shorebirds between November 1 and December 31; (3) shorebird surveys conducted in January correspond to the distribution of shorebirds between January 1 and March 31; and (4) shorebird surveys conducted in April correspond to the distribution of shorebirds between April 1 and May 12.

This information on temporal changes in shorebird distribution was combined with population objectives for the entire Central Valley to generate population objectives by 15-day periods for each of the four planning regions. These population objectives are presented later when establishing conservation objectives for each region.

Daily Energy Requirements for Individual Birds

Shorebird energy needs are assumed to be dependant on body mass, and equations exist to calculate food energy needs using body mass estimates. Shorebird populations in the Central Valley include several species. Because species composition of these populations varies seasonally, a weighted body mass was calculated for each of the four survey periods (August, November, January, April 1992-1994; Table 6-4). These weighted body mass estimates were then applied to the appropriate 15-day period. The following equation was used to estimate the daily energy requirements (DER) of an individual shorebird in each 15-day period (kj/day):

DER (kj) = 912 (Body Mass (kg)) 0.704 where kj's were converted to kcal's by dividing by 4.18. Finally, the DER estimated for shorebirds from this equation was increased by 33% for all 15-day intervals between March 1 and May 12 to account for increased energy needs associated with fat deposition prior to spring migration.

Table 6-4. Weighted body mass for shorebirds in the Central Valley in each of the four survey periods.

Survey Period	*Weighted Body Mass (g)*
August	126
November	102
January	96
April	82

Habitat Acreages

Shorebirds in the Central Valley currently rely on a variety of habitats to meet their food energy needs, including evaporation and sewage ponds (Shuford et al. 1998). However, the use of evaporation and sewage ponds may expose shorebirds to concentrated contaminants like selenium, or increase the probability of disease transmission (Hickey et al. 2003). As a result, only "desirable" habitat types were considered in the 2006 Plan when establishing habitat objectives for shorebirds. These include: (1) managed seasonal wetlands; (2) managed semi-permanent wetlands; and (3) harvested rice fields that are intentionally flooded to provide wildlife benefits and/or promote straw decomposition.

Table 6-5. Acres of managed wetlands and intentionally flooded rice in the Central Valley.

Habitat Type	*Acres*
Seasonal Wetland	179,232
Semi-permanent Wetland	26,322
Flooded Rice	354,633

Table 6-5 provides a summary of wetland and agricultural habitats in the Central Valley (information on how these estimates were derived was presented in Chapter 3). Foraging ecology studies indicate that shorebirds require water depths <10 cm (~4 inches) deep (Safran et al. 1997). However, wetland and agricultural habitat estimates for the Central Valley are not stratified by depth. Consequently, Table 6-5 only represents the amount of habitat that is potentially available to shorebirds if all these acres were managed at depths <10 cm. In reality, only a small fraction of these acres may meet these depth requirements, as management efforts

for waterfowl usually result in depths greater than 10 cm. Within the 2006 Plan, habitat objectives for wintering shorebirds assume that 100% of these habitats are maintained <10 cm deep.

Comparing shorebird habitat objectives to estimates of existing wetland and agricultural acres may provide some insight into whether shorebird needs are being met. For example, shorebird food needs are more likely to be met where shorebird habitat objectives are small compared to the acres of existing wetland or rice habitat. This issue is explored further in this chapter when assessing current conditions for wintering shorebirds throughout the Central Valley.

In addition to water depth, temporal variation in habitat availability can strongly influence available food supplies. To better understand the availability of shorebird foraging habitat. Flooding and drawdown schedules were developed for public and privately managed wetlands in the Central Valley (Figure 6-3), as well as for flooding of rice habitat during the post harvest season (Figure 6-4). Flooding and drawdown schedules were also developed for each of the four shorebird planning regions.

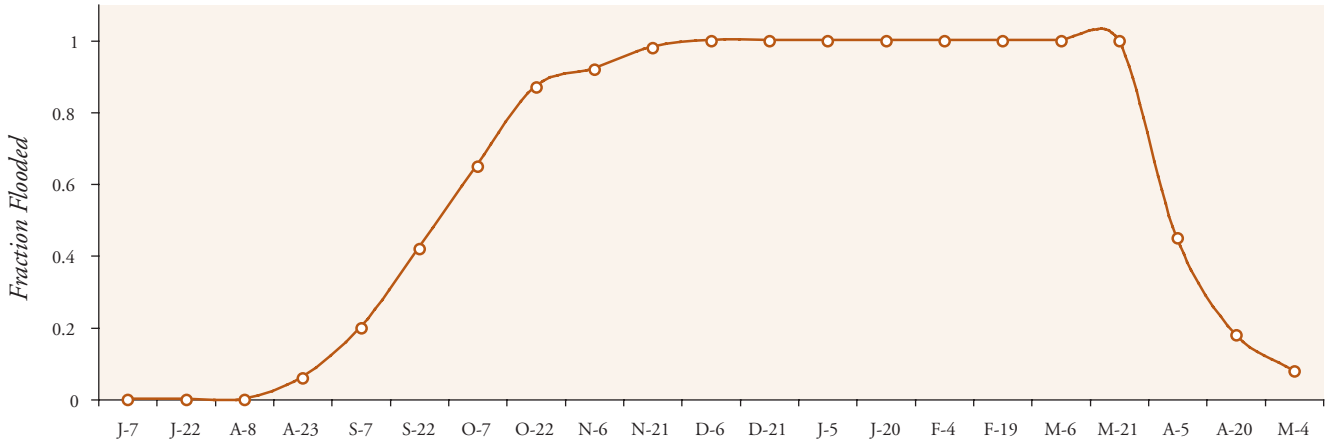


Figure 6-3. Flooding and draw down schedules for managed seasonal wetlands in the Central Valley (private and public wetlands combined).

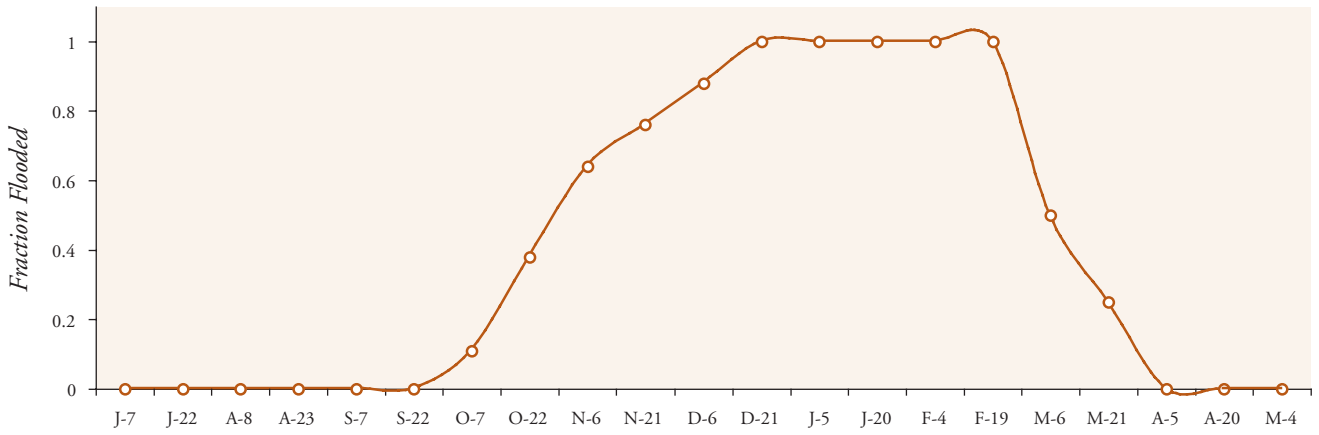


Figure 6-4. Flooding and draw down schedules for winter flooded rice in the Central Valley.

Habitat Foraging Values

The food energy approach used to estimate shorebird habitat needs in the 2006 Plan requires estimates of invertebrate biomass on a per area basis (e.g., lbs. per acre). Although numerous studies have characterized invertebrate communities in Central Valley wetlands and flooded rice fields, no estimates of invertebrate biomass exist for these habitats. Shorebird habitat in the Mississippi Alluvial Valley (MAV) is assumed to provide 20 kg/ha (~18 lbs./acre) of invertebrate biomass (Loesch et al. 2000). This estimate was adopted for planning purposes in the Central Valley, and was applied to managed wetlands and to rice fields that are winter flooded.

Using measures of invertebrate biomass from outside the Central Valley adds another level of uncertainty to the JVs estimates of shorebird habitat needs. The assumption that managed wetlands and rice habitat provide 20 kg/ha of invertebrate biomass also assumes that invertebrate food resources are non-renewable in response to shorebird foraging. In reality, invertebrate biomass is likely influenced by seasonal changes in invertebrate growth rates, reproduction, and the effects of shorebird foraging. For example, invertebrate biomass may increase through time, though this increase may be partially constrained by the effects of shorebird foraging. Assuming a static value of 20 kg/ha does not reflect the complexity of invertebrate food resources. Therefore, future efforts to understand temporal changes in invertebrate biomass would add greatly to the JV's understanding of shorebird habitat needs.

Overall Assessment of Current Habitat Conditions in the Central Valley

Habitat conditions for wintering shorebirds were first evaluated for the entire Central Valley. Flooding schedules and flooding depths strongly influence shorebird food supplies, and the JV began its assessment of habitat conditions by comparing shorebird population objectives and water management practices in key habitats.

Seasonal Wetlands

Figure 6-5 depicts the relationship between overall shorebird population objectives for the Central Valley, and the availability of managed seasonal wetlands. Although significant numbers of shorebirds are present in July and early August, flooding of seasonal wetlands does not begin until mid-August. Flooding of seasonal wetlands is complete by late November, with water maintained in these habitats generally through the end of March. Shorebird populations are highest in March and April, when most seasonal wetlands are being drawn down (Figure 6-6). Although peak populations of shorebirds correspond to drawdown of seasonal wetlands in March and April, these drawdowns may result in increased foraging habitat. Drawdowns typically increase the area of shallow water habitat available to shorebirds, at least in the short term. Drawdowns of seasonal wetlands in spring (e.g., April) in the Grasslands did not result in higher shorebird use of these habitats (Taft et al. 2002). However, drawdown of seasonal wetlands in winter (e.g., December) resulted in significant increases in shorebird use (Taft et al. 2002). The lack of shorebird response to spring drawdowns may reflect an overall abundance of shallow water habitat, as seasonal wetlands are being dewatered throughout the Central Valley. In contrast, shorebird response to experimental winter drawdowns indicates that shallow water habitat is limited during this period because most seasonal wetlands are fully flooded (Taft et al. 2002).

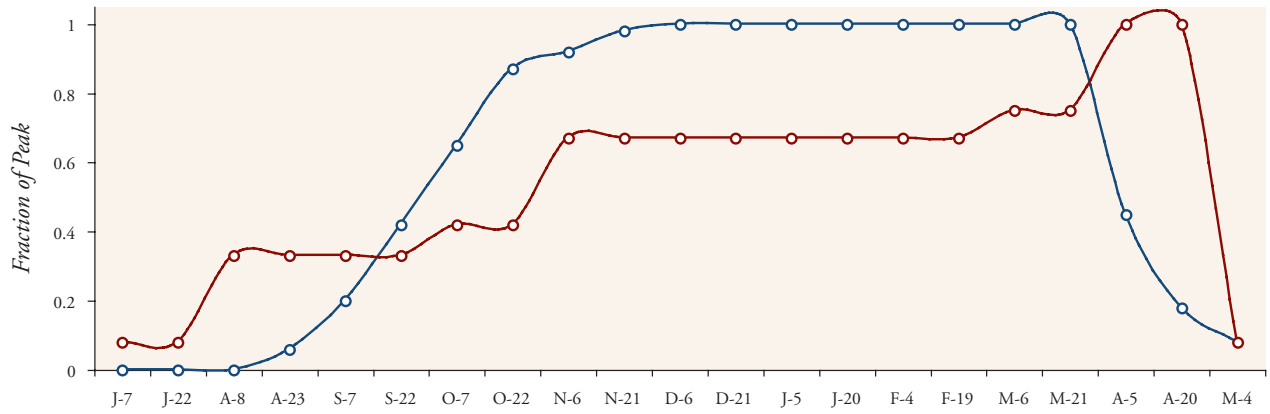


Figure 6-5. Shorebird population objectives (red) vs. flooding schedules for managed seasonal wetlands (blue) for the Central Valley. Shorebird population objectives are expressed as the fraction of peak population; wetlands are expressed as the fraction of seasonal wetlands that are flooded.

Semi-Permanent Wetlands

Although most wetlands in the Central Valley are managed on a seasonal basis, over 26,000 acres of semi-permanent wetlands also exist (Table 6-5). Semi-permanent wetlands are typically flooded in early fall, with drawdowns occurring during the first half of July. Although semi-permanent wetlands may provide little shorebird habitat for much of the year because of deep flooding, these habitats may be critical to shorebirds during July. Drawdown of semi-permanent wetlands in July could provide shallow water habitat that helps meet shorebird needs at a time when few alternative habitats exist.

Winter Flooded Rice

Figure 6-6 depicts the relationship between shorebird population objectives and the availability of winter flooded rice fields. Flooding schedules for harvest rice indicate that this habitat provides few shorebird food resources prior to mid-October. Winter flooding of rice fields peaks in mid-winter with most fields drained by late March or early April (Figure 6-7). Mean water depths in flooded rice fields range between 15-20 cm from November through January, but decline thereafter to less than 10 cm in February and March (Elphick 1998). Although winter flooded rice fields provide little shorebird habitat during peak populations in April, declining water depths from January to March may provide an abundance of foraging habitat during the late winter period (Shuford et al. 1998).

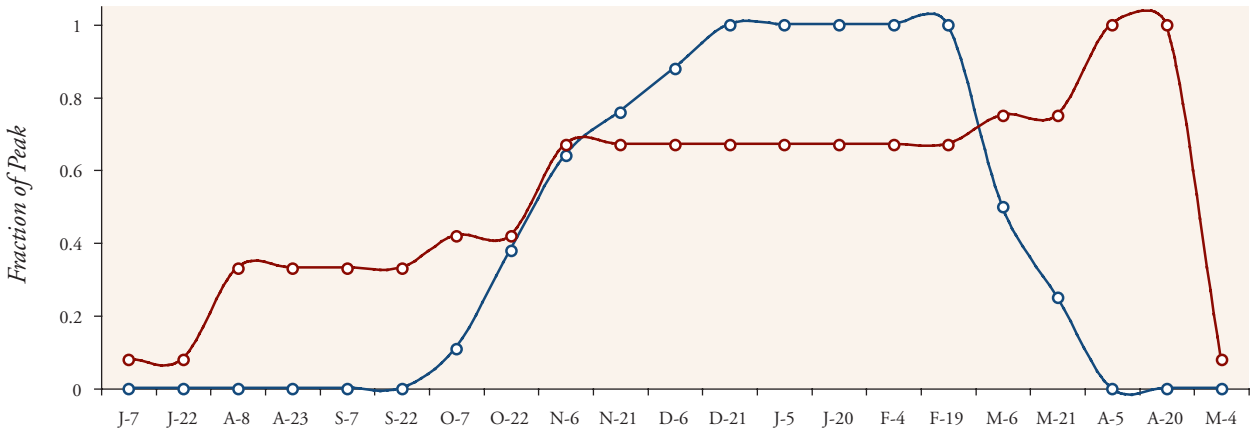


Figure 6-6. Shorebird population objectives for the Central Valley (red) vs. flooding schedules for winter flooded rice (blue).

In general, flooding schedules for managed wetlands and for winter flooded rice are more consistent with the needs of waterfowl than shorebirds in the Central Valley. Migration chronology of wintering waterfowl in the Central Valley corresponds well with flooding schedules for seasonal wetlands and with the availability of winter flooded rice (Figure 6-7). In contrast, shorebirds occur in significant numbers during July and August when important wetland and agricultural habitats have yet to be flooded.

Although shorebird planning efforts in the Central Valley benefit from reliable estimates of habitat acres and flooding schedules, no effort was made to evaluate the current relationship between food energy needs and food energy supplies using TRUEMET, as was done for wintering waterfowl. This supply-demand analysis would be meaningless without a better understanding of how habitats are stratified by foraging depth. To provide some insight into current habitat conditions, the JV determined the fraction of existing wetland and agricultural resources that must be <10 cm deep to meet shorebird needs. This measure is called the required depth ratio and is described later in Chapter 6.

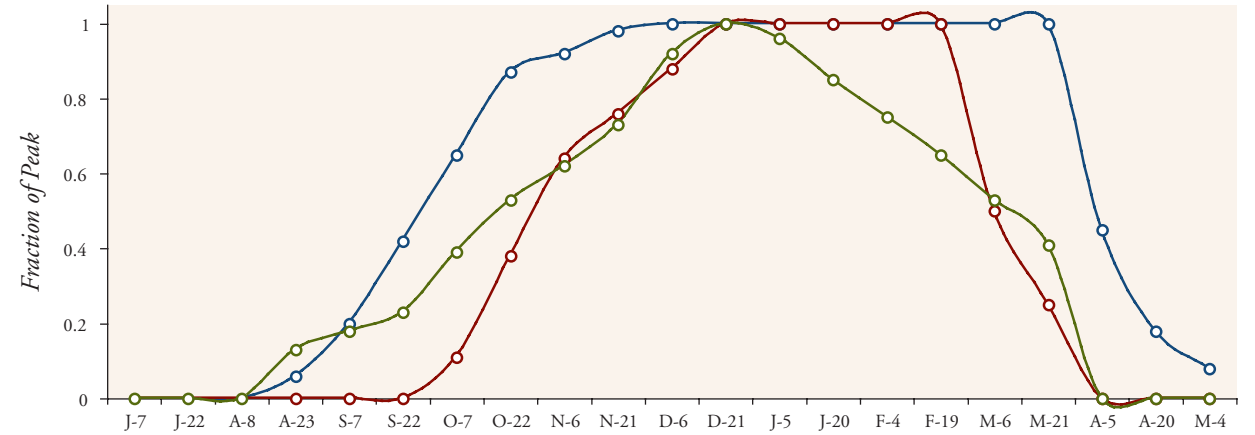


Figure 6-7. Shorebird population objectives (red) vs. flooding schedules for managed seasonal wetlands (blue) and rice (green). Shorebird population objectives are expressed as the fraction of peak population; wetlands and rice are expressed as the fraction of these habitats that are flooded.

Methods for Establishing Conservation Objectives for Wintering Shorebirds

The JV's assessment of habitat conditions in the Central Valley suggests that shorebird needs may be met by: (1) managing wetlands and agricultural habitats to provide foraging depths <10 cm; and (2) adjusting flooding and draw down schedules of wetlands to meet the needs of wintering shorebirds, especially during July and August. These conclusions are important because they provide the types of conservation objectives that should be established for shorebirds in each of the four planning regions.

Three conservation objectives were identified for wintering shorebirds: 1) Management of existing seasonal and semi-permanent wetlands to provide foraging depths < 10 cm. This includes changes in traditional flooding schedules. Existing wetlands are defined as wetlands that may be restored to meet habitat objectives for non-breeding waterfowl; 2) Securing additional water supplies that may be needed for changes in seasonal wetland flooding schedules; and 3) Management of agricultural habitats to provide foraging depths < 10 cm.

Prior to the 2006 Plan, the JV Technical Committee imposed a constraint that at least 50% of shorebird energy needs must be met from wetlands in each planning region. This decision was made because changing agricultural markets are beyond the control of the JV, and seeking a balance between agricultural and wetland habitat is warranted. However, Central Valley agriculture provides little or no shorebird benefits prior to early October (Figure 6-6). Drawdown of winter flooded rice fields in March also requires shorebirds to rely exclusively on wetland habitats during April and early May. As a result, the wetland constraint was modified so that wetlands are required to meet 100% of shorebird needs in all 15-day intervals between July 1 and October 1, and all 15-day intervals between March 30 and May 10.

The same approach was used to establish conservation objectives for shorebirds in each planning region. Shorebird population objectives between July and May were first compared to seasonal changes in habitat availability. Seasonal changes in shorebird foraging habitat are largely dependent on water management practices in wetlands and winter flooded agricultural lands. Understanding how these practices meet or do not meet shorebird needs is essential to developing effective conservation objectives for this bird group.

Next, shorebird food energy needs in each 15-day interval were estimated using the TRUEMET model. Food energy needs were a function of population objectives for that 15-day interval, and the daily energy requirement of a single bird. TRUEMET was then used to convert these food energy needs into an equivalent amount of foraging habitat for each 15-day interval. This overall foraging habitat need was then stepped down to the appropriate conservation objective(s). The methods for establishing shorebird conservation objectives are described below.

Management of Existing Seasonal and Semi-permanent Wetlands

To determine how much seasonal and semi-permanent wetland habitat must be managed at depths <10 cm in depth, the JV recognized four distinct flooding periods; summer, fall, spring, and winter. Conservation objectives for these managed wetlands were broken down by flooding period because water management practices within these flooding periods differ. These differences are likely to influence the availability of habitat <10 cm in depth. The four flooding periods are described as follows:

Description of Flooding Periods

Summer Flooding Period (July 1–August 16)

Historically, snow runoff provided huge lacustrine wetlands in the Tulare Basin, and evaporation of wetlands in the Delta Planning Region and the Butte Sink and Colusa Trough areas of the Sacramento Valley Planning Region provided shorebird habitat during July and August. Today, this period is characterized by an absence of seasonal wetlands, as flooding of these habitats does not begin until after mid-August. Semi-permanent wetlands are typically drawn down during July, with most assumed to be dry by mid-July. However, some wetlands may contain water through July if drawdowns are delayed until mid-month. Semi-permanent wetlands can provide shorebird habitat during these July drawdowns because water depths decline at this time. The JV assumes that semi-permanent wetlands provide no shorebird habitat outside of this July drawdown period, as water depths generally exceed 10 cm.

Fall Flooding Period (August 17–November 29)

Historically, this was the driest period in the Central Valley, resulting in fewer wetlands available to shorebirds. Exposure of shallow habitats would have occurred in Tulare Basin, and flooding of seasonal wetlands could have occurred in October and November. This period is characterized by flooding of seasonal wetlands. Beginning in mid-August, seasonal wetlands on public and private wetlands are flooded throughout the Central Valley. This flooding is mostly complete by late November, though there is some variation among shorebird planning regions. The availability of shorebird habitat during this period is likely characterized by large temporal and spatial variation. For example, water depths <10 cm may be abundant during the initial phases of flooding. This would be true for both individual wetlands, and for the entire shorebird-planning region. As fall progresses and many of these seasonal wetlands are fully flooded, the availability of foraging habitat <10 cm deep may decline.

Although the JV assumes that seasonal wetlands provide 20 kg/ha of invertebrates, it is unclear how invertebrate availability changes through the Fall Flooding Period. For example, there may be a significant lag between when water is applied to seasonal wetlands and when invertebrate populations reach levels that are beneficial to shorebirds. Future efforts to understand how invertebrate communities and biomass change, relative to the date of flooding, will help refine the JV's estimates of shorebird needs during the Fall Flooding Period.

Winter Flooding Period (November 30–March 29)

Historically, this period would have provided the greatest abundance of shallow habitat throughout the Central Valley. Today, this period is characterized by maximum availability of seasonal wetlands as most habitats are flooded by mid-November with water levels maintained through late March (Figure 6-3). Although water levels fluctuate during this period, the temporal and spatial variation in water levels that characterized the Fall Flooding Period may be diminished. Shorebirds during the Winter Flooding Period period may face a more stable wetland environment, as changing water levels are less likely compared to the Fall Flooding Period. However, this may ultimately result in fewer acres flooded to <10 cm in depth, especially during the early portion of this period.

Spring Flooding Period (April 1–May 12)

Historically, many floodplain wetlands would be drying during this period. Today, this period is characterized by the drawdown of seasonal wetlands (Figure 6-3). These drawdowns likely increase the area of shallow water habitat for shorebirds, especially if most seasonal wetlands were managed at depths greater than 10 cm. Many of the public and private seasonal wetlands are managed for April and early May drawdowns to maximize moist soil plant germination.

Hypothetical Shorebird Planning Region

The method for determining how much seasonal and semi-permanent wetland habitat must be managed at depths <10 cm is described using a hypothetical shorebird-planning region. Habitat resources and water management schedules for this planning region are presented in Table 6-6, while shorebird foraging habitat needs are presented for each 15-day interval in Table 6-7.

Table 6-6. Habitat resources and associated flooding schedules for a hypothetical shorebird planning region.

Interval	*Seasonal Wetlands (Acres)*	*Semi Perm. Wetlands (Acres)*	*Winter Flooded Rice (Acres)*
J-7 (July 1-July 15)	0	2000	0
J-22 (July 16-July 31)	0	0	0
A-8 (Aug 1-Aug 16)	0	0	0
A-23 (Aug 17-Aug 23)	600	0	0
S-7 (Sept 1-Sept 15)	2,000	120	0
S-22 (Sept 16-Sept 30)	4,200	400	0
O-7 (Oct 1-Oct 15)	6,500	840	2,200
O-22 (Oct 16-Oct 30)	8,700	1,300	7,600
N-6 (Oct 31-Nov 14)	9,200	1,740	12,800
N-21 (Nov 15-Nov 29)	10,000	1,840	15,200
D-6 (Nov 30-Dec 14)	10,000	2,000	17,600
D-21 (Dec 15-Dec 29)	10,000	2,000	20,000
J-5 (Dec 30-Jan 13)	10,000	2,000	20,000
J-20 (Jan 14-Jan 28)	10,000	2,000	20,000
F-4 (Jan 29-Feb 12)	10,000	2,000	20,000
F-19 (Feb 13-Feb 27)	10,000	2,000	20,000
M-6 (Feb 28-Mar 14)	10,000	2,000	10,000
M-21 (Mar 15-Mar 29)	10,000	2,000	5,000
A-5 (Mar 30-Apr 13)	10,000	2,000	0
A-20 (Apr 14-Apr 28)	3,150	2,000	0
M-4 (Apr 29-May 10)	1,300	2,000	0



Long-billed dowitcher
Photo: Brian Gilmore

To provide some insight into whether wetlands currently satisfy shorebird energy requirements, the JV estimated a "required depth ratio" for all time intervals in all flooding periods. This ratio reflects the fraction of existing seasonal or semi-permanent wetlands that must be <10 cm in depth to meet shorebird needs. These depth ratios may provide some basis for future monitoring and evaluation. For example, water depths periodically measured in seasonal wetlands can be compared to these depth ratios to determine if adequate shallow water habitat is being provided.

Table 6-7. Habitat needs of non-breeding shorebirds in a hypothetical planning region.

Interval	*Habitat Needs (acres)*[a]
J-7 (July 1-July 15)	100
J-22 (July 16-July 31)	100
A-8 (Aug 1-Aug 16)	150
A-23 (Aug 17-Aug 23)	300
S-7 (Sept 1-Sept 15)	300
S-22 (Sept 16-Sept 30)	300
O-7 (Oct 1-Oct 15)	500
O-22 (Oct 16-Oct 30)	500
N-6 (Oct 31-Nov 14)	600
N-21 (Nov 15-Nov 29)	600
D-6 (Nov 30-Dec 14)	100
D-21 (Dec 15-Dec 29)	100
J-5 (Dec 30-Jan 13)	100
J-20 (Jan 14-Jan 28)	100
F-4 (Jan 29-Feb 12)	200
F-19 (Feb 13-Feb 27)	200
M-6 (Feb 28-Mar 14)	200
M-21 (Mar 15-Mar 29)	200
A-5 (Mar 30-Apr 13)	500
A-20 (Apr 14-Apr 28)	500
M-4 (Apr 29-May 10)	500
Total	**6,150**

[a]*Habitat acres that have not been subject to food depletion as a result of prior shorebird foraging.*

Summer Flooding Period for the Hypothetical Planning Region

Shorebirds require 100 acres of wetland habitat <10 cm deep in both the July 7 and July 22 intervals, with habitat needs increasing to 150 acres during the August 8 interval (Table 6-7). All habitat requirements during the Summer Flooding Period must be met from managed wetlands, as no winter flooded rice is available.

Providing 100 acres of shallowly flooded habitat would meet shorebird needs in the July 7 interval. However, simply maintaining the same 100 acres would not meet shorebirds needs in the July 22 interval, because food resources in these 100 acres are depleted by July 15 (the 2006 Plan assumes that invertebrate populations are not self-renewing). Meeting shorebird needs for the entire month of July requires that 100 acres of wetlands be provided on July 1, with an additional 100 acres to be provided on or before July 16. In theory, the 100 acres of wetland habitat needed in the July 22 interval can be provided at any date between July 1 and July 16. For example, 200 acres flooded on July 1 would meet shorebird needs for the entire month.

Semi-permanent wetlands may provide the best opportunity to meet shorebird needs during July. Most semi-permanent wetlands are drawn down during the first part of July, which may result in significant habitat <10 cm deep. The planning region contains 2,000 acres of semi-permanent wetlands (Table 6-6). If all wetlands are drawn down by mid-July, the required depth ratio for these semi-permanent habitats is 5% (i.e., 100 of the 2,000 acres must provide water depths <10 cm). If all 2,000 acres of semi-permanent wetlands are dry by mid-July, no opportunity exists to meet shorebird needs in the July 22 interval using these wetlands. Seasonal wetlands could be flooded to meet habitat needs during the second half of July. However, it may be better to delay the drawdown of some semi-permanent wetlands to meet shorebird needs in the July 22 interval.

Although habitat needs of shorebirds in the July 22 interval may be met through delayed drawdown of semi-permanent wetlands, it is assumed that habitat needs in the August 8 interval (150 acres) must be met by flooding seasonal wetlands. Flooding of seasonal wetlands in this hypothetical shorebird region has not occurred prior to mid-August; so providing 150 acres of seasonal wetlands in the August 8 interval represents a management effort directed solely at shorebird needs. However, this involves early flooding of only 1.5% of the existing seasonal wetland base (150/10,000).

Fall Flooding Period for the Hypothetical Planning Region

Habitat needs for shorebirds in the Fall Flooding Period (August 17-November 29) range from 300 acres in August and September, to 600 acres for the November 21 interval (Table 6-7). Although this hypothetical shorebird region contains 20,000 acres of winter flooded rice, none of this agricultural habitat is available prior to the October 7 interval (October 1-15). As a result, shorebird needs must be met entirely from seasonal wetland habitats in the August and September intervals.

Seasonal wetland habitat objectives for shorebirds in the Fall Flooding Period are provided in Table 6-8. Seasonal wetland objectives prior to October are equivalent to the overall habitat needs of shorebirds, as most winter flooding of rice has yet to begin. Beginning in October, seasonal wetland objectives decline to 50% of overall habitat needs (Table 6-7), as rice becomes available and is assumed to meet half of shorebird energy requirements.

Although the summed seasonal wetland objective of 2,000 acres is staggered over seven 15-day intervals, it is possible to meet this overall habitat objective in a shorter period of time. For example, seasonal wetland objectives for shorebirds could be met in the Fall Flooding Period by providing 2,000 acres during the August 23 interval and maintaining these acres at a depth <10 cm through the end of November (Figure 6-8).

Seasonal wetlands become increasingly available from August through November, as these habitats are flooded prior to the hunting season. This increase in seasonal wetlands is reflected in the required depth ratio of shorebird habitat. Two thirds of all seasonal wetland acres that are flooded by the August 23 interval must be <10 cm deep if shorebird habitat needs are to be met in this 15-day interval. However, the depth ratio declines in later intervals as seasonal wetlands become increasingly abundant and fewer of these acres must be <10 cm to meet shorebird needs (Figure 6-9). The required depth ratio for intervals in the Fall Flooding Period is calculated as the cumulative objective for seasonal wetlands, divided by the acres of seasonal wetlands that are flooded. The cumulative seasonal wetland objective includes any objectives from previous flooding periods. In Table 6-8, 4,200 acres of seasonal wetlands are flooded by the September 22 interval. Twenty five percent of these acres must have provided water depths <10 cm through this interval. This is equivalent to about 1,050 acres of shallow water habitat. Note that this 1050-acre objective must be appropriately staggered between the August 23 and September 22 intervals if shorebirds needs are to be met for all intervals (i.e., the required depth ratios must be met for the earlier intervals as well).

Table 6-8. Seasonal wetland objectives (acres) for shorebirds in the Fall Flooding Period of a hypothetical planning region.

Interval	*SW Interval Objective*	*Cumulative[a] SW Objective*	*Flooded[b] SWs*	*Required Depth[c] Ratio (%)*
A-23 (Aug 17-Aug 23)	300	450	600	67
S-7 (Sept 1-Sept 15)	300	750	2,000	38
S-22 (Sept 16-Sept 30)	300	1,050	4,200	25
O-7 (Oct 1-Oct 15)	250	1,300	6,500	20
O-22 (Oct 16-Oct 30)	250	1,550	8,700	18
N-6 (Oct 31-Nov 14)	300	1,850	9,200	20
N-21 (Nov 15-Nov 29)	300	2,150	10,000	22
Total	**2,000**	**2,150**		

SW – Seasonal Wetland.
[a]Includes SW objectives from previous flooding periods.
[b]Flooded SWs reflect flooding schedules within a shorebird planning region.
[c]Cumulative SW Objective/Flooded SWs.

Table 6-9. Seasonal wetland objectives (acres) for shorebirds in the Winter Flooding Period of a hypothetical planning region.

Interval	*SW Interval Objective*	*Cumulative[a] SW Objective*	*Flooded[b] SWs*	*Required Depth[c] Ratio (%)*
D-6 (Nov 30-Dec 14)	50	2,200	10,000	22
D-21 (Dec 15-Dec 29)	50	2,300	10,000	23
J-5 (Dec 30-Jan 13)	50	2,350	10,000	24
J-20 (Jan 14-Jan28)	50	2,400	10,000	24
F-4 (Jan 29-Feb 12)	100	2,500	10,000	25
F-19 (Feb 13-Feb 27)	100	2,600	10,000	26
M-6 (Feb 28-Mar 14)	100	2,700	10,000	27
M-21 (Mar 15-Mar 29)	100	2,800	10,000	28
Total	**600**	**2,800**		

SW – Seasonal Wetland.
[a]Includes SW objectives from previous flooding periods.
[b]Flooded SWs reflect flooding schedules within a shorebird planning region.
[c]Cumulative SW Objective/Flooded SWs.

Winter Flooding Period for the Hypothetical Planning Region

Overall habitat needs for shorebirds in the Winter Flooding Period (November 30-March 29) range from 100 acres in December and January, to 200 acres in February and March (Table 6-7). Seasonal wetland objectives for shorebird populations in the Winter Flooding Period are provided in Table 6-9. These wetland objectives are equivalent to 50% of the interval habitat needs, as winter flooded rice is assumed to meet half of all shorebird energy requirements. Seasonal wetland objectives are also summed from one interval to the next to provide a total seasonal wetland objective between December and March. Although the summed seasonal wetland objective is staggered over several 15-day intervals, it is possible to front-end this overall habitat objective. For example, seasonal wetland objectives for shorebirds could be met in the Winter Flooding Period by providing 600 acres during the December 6 interval and maintaining these acres at a depth <10 cm through the end of March (Figure 6-10).

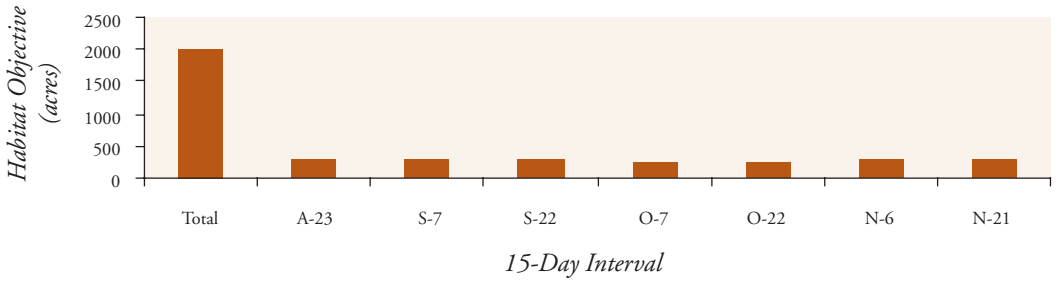


Figure 6-8. Seasonal wetland objectives for shorebirds in the Fall Flooding Period by 15-day intervals for a hypothetical planning region.

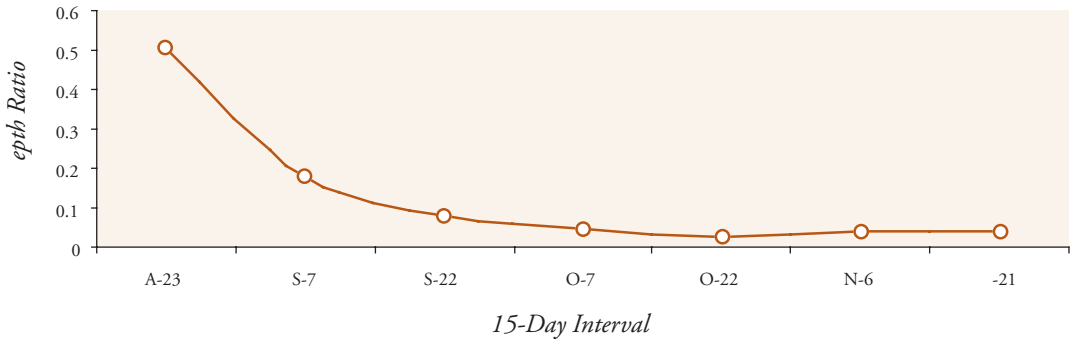


Figure 6-9. Changes in the depth ratio for shorebirds in the Fall Flooding Period. The fraction of potential shorebird habitat (seasonal wetlands) that must be <10 cm deep declines from August through November.

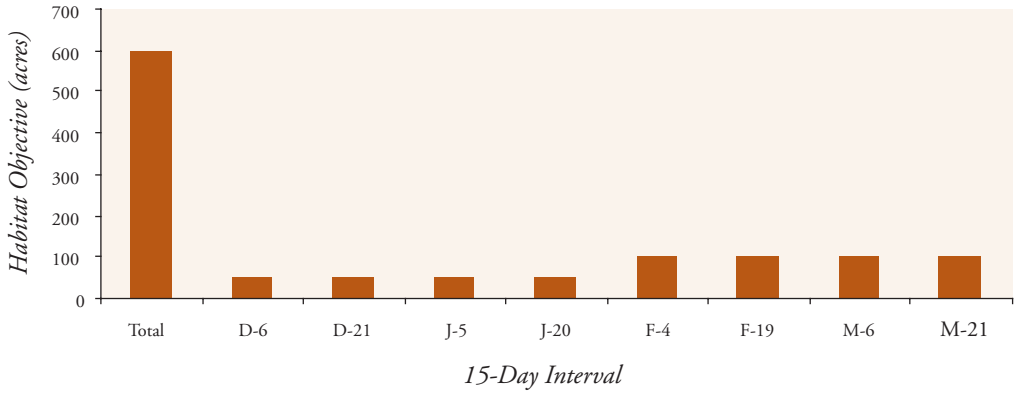


Figure 6-10. Seasonal wetland objectives for shorebirds in the Winter Flooding Period by 15-day intervals for a hypothetical planning region.

The required depth ratio increases from December through March (Table 6-9). For the Winter Flooding Period, the depth ratio is calculated as the summed seasonal wetland objective for a given interval divided by the potential seasonal wetland habitat at the beginning of the Winter Flooding Period (i.e., the December 6 interval). The required depth ratio increases through winter, as no new wetlands are being flooded and shorebirds deplete food resources on seasonal wetland acres that are managed below 10 cm in depth (Figure 6-11). Wetland managers could respond to this increase in required depth ratios by reducing water depths in some wetlands that are traditionally managed for waterfowl.

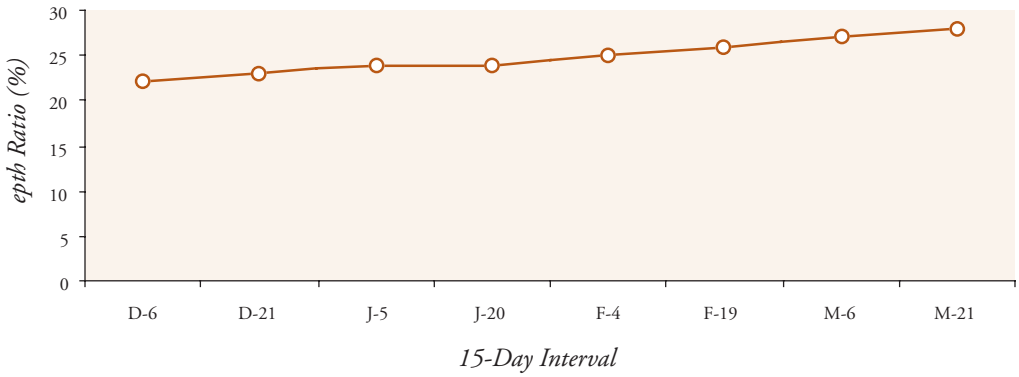


Figure 6-11. Changes in the required depth ratio for seasonal wetlands in the Winter Flooding Period for a hypothetical planning region.

Spring Flooding Period for the Hypothetical Planning Region

Overall, habitat needs for shorebirds in the Spring Flooding Period (March 30-May 12) range from 500 acres in each of the April intervals, to 300 acres in the May 4 interval (Table 6-7). Seasonal wetland objectives for shorebirds in each 15-day interval of the Spring Flooding Period are provided in Table 6-10. These wetland objectives are equivalent to the overall habitat needs of shorebirds, as winter flooded rice has been drained prior to the growing season. Seasonal wetland objectives are also summed from one interval to the next to provide a total seasonal wetland objective for April and May. Although the summed seasonal wetland objective is staggered over three 15-day intervals, it is possible to front-end this overall habitat objective. For example, seasonal wetland objectives could be met in the spring period by providing 1,300 acres at the beginning of the April 5 interval and maintaining these acres at a depth <10 cm until mid-May (Figure 6-12). Required depth ratios were not calculated for intervals in the Spring Flooding Period because of the uncertainty introduced by drawdowns of wetlands during this time. The drawdown of seasonal wetlands may result in an abundance of shorebird habitat during the Spring Flooding Period (Taft et al. 2002). Finally, the ending cumulative objective of 4,100 acres suggests that forty one percent (4,100/10,000) of all seasonal wetlands in this hypothetical planning region must be managed for shorebirds for at least some time during the wintering period. Estimating what fraction of wetlands must be managed for shorebirds may be a useful exercise (i.e., depth ratios). However, it bears repeating that such estimates are compromised by a lack of knowledge on invertebrate communities within these habitats, and how these communities respond to shorebird foraging.

Table 6-10. Seasonal wetland objectives (acres) for shorebirds in the Spring Flooding Period of a hypothetical planning region.

Interval	*SW Interval Objective*	*Cumulative SW[a] Objective*	*Flooded SWs[b]*
A-5 (Mar 30-Apr 13)	500	3,300	10,000
A-20 (Apr 14-Apr 28)	500	3,800	3,150
M-4 (Apr 29-May 10)	300	4,100	1,300
Total	**1,300**	**4,100**	

SW – Seasonal Wetland.
[a]Includes SW objectives from previous flooding periods.
[b]Flooded SWs reflect flooding schedules within a shorebird planning region.

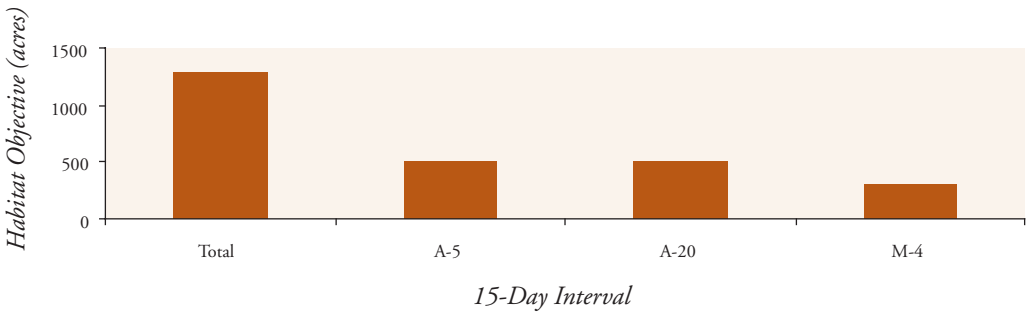


Figure 6-12. Seasonal wetland objectives for shorebirds in the Spring Flooding Period by 15-day intervals for a hypothetical planning region.

Water Supplies for Wetland Management for the Hypothetical Planning Region

Water supplies needed to manage seasonal wetlands for wintering waterfowl were estimated in Chapter 4. The assumption here is that shorebird needs can be met in the context of meeting waterfowl needs provided that adequate amounts of wetland habitat are managed at depths <10 cm. As a result, water supply estimates that are specific to shorebirds are not needed for the period when seasonal wetlands are traditionally flooded in the Central Valley (i.e., beginning in mid-August). However, shorebirds rely on the Central Valley prior to when seasonal wetlands are traditionally flooded (i.e., July and early August), and flooding of wetlands in this period may be needed to meet shorebird needs. As a result, the water needs (acre-feet) associated with providing seasonal wetlands prior to conventional flooding dates was estimated. These estimates were based on wetland acre needs of shorebirds outside of conventional flooding dates (e.g., July and early August). The acre-feet estimate of water needed to flood these wetlands was based on annual wetland water requirements from the 2000 *Central Valley Wetland Water Supply Investigations, CVPIA 3406 (d)(6)(A,B), A Report to Congress* (U.S. Fish & Wildlife Service 2000).

Meeting shorebird needs in the hypothetical planning region required flooding 150 acres of seasonal wetlands in the August 8 interval. Conventional flooding schedules indicate that seasonal wetlands receive about 1 acre-foot of water during the second half of August and 2-acre feet of water in September (Figure 6-13). However, these water requirements are geared towards waterfowl and may provide water depths that are less than optimal for shorebirds. The JV tentatively assumes that providing shorebird habitat outside of the conventional flooding schedules requires 2 acre-feet per acre. For example, providing 150 acres of seasonal wetlands in the August 8 interval would require 300 acre-feet of water. This water requirement is above and beyond the water needed to manage seasonal wetlands in a conventional manner (i.e., where flooding does not begin before mid to late August).

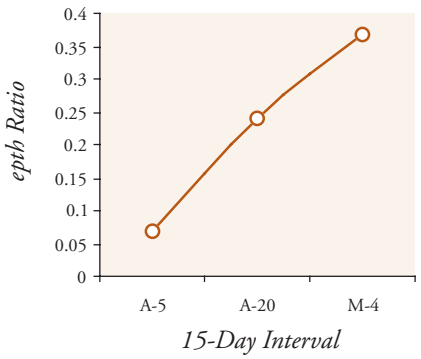


Figure 6-13. Changes in the seasonal wetland depth ratio for shorebirds during the Spring Flooding Period.

Agricultural Enhancement

Harvested rice fields that are winter flooded in the Central Valley can provide important shorebird habitat during the wintering period. Similar to wintering waterfowl, winter flooded rice may provide up to 50% of the food energy needs of shorebirds. However, winter flooded rice is only available from early October through late March (Figure 6-4). As a result, wetlands must meet 100% of shorebird needs in all 15-day intervals between July 1 and October 1, and March 30 and May 10.

The methods for determining how much winter flooded rice must be managed at depths <10 cm is described using the hypothetical shorebird region in Table 6-6. The planning region contains 20,000 acres of winter flooded rice. Flooding of this rice begins in early October, with drawdown complete by the end of March (Figure 6-4).

Overall, habitat needs for shorebirds between October 1 and March 29 range from a high of 600 acres in November, to a low of 100 acres in the December and January intervals (Table 6-7). Agricultural enhancement objectives (i.e., flooded rice) for shorebirds between October and March are presented in Table 6-11. The agricultural objectives are equivalent to 50% of the interval habitat needs, as seasonal wetlands are assumed to meet half of all shorebird energy requirements. Agricultural enhancement objectives are also summed from one interval to the next to provide a total rice objective between early October and the end of March. Although the

summed agricultural objective of 1,700 acres is staggered over several 15-day intervals, it is possible to front-end this overall habitat objective. For example, the agricultural enhancement objective could be met by providing 1,700 acres of winter flooded rice in early October and maintaining these acres at a depth <10 cm through the end of March (Figure 6-14). The required depth ratio remains relatively steady for winter flooded rice between October and March (Figure 6-15). This is largely the result of interval rice objectives being small relative to the amount of flooded rice that is available.

Table 6-11. Rice habitat objectives (acres) for shorebirds between early October and the end of March in a hypothetical planning region.

Interval	*Rice Interval Objective*	*Cumulative Rice Objective*	*Flooded[a] Rice*	*Required[b] Depth Ratio (%)*
O-7 (Oct 1-Oct 15)	250	250	2,200	11
O-22 (Oct 16-Oct 30)	250	500	7,600	7
N-6 (Oct 31-Nov 14)	300	800	12,800	6
N-21 (Nov 15-Nov 29)	300	1,100	15,200	7
D-6 (Nov 30-Dec 14)	50	1,150	1,7600	7
D-21 (Dec 15-Dec 29)	50	1,200	20,000	6
J-5 (Dec 30-Jan 13)	50	1,250	20,000	6
J-20 (Jan 14-Jan 28)	50	1,300	20,000	7
F-4 (Jan 29-Feb 12)	100	1,400	20,000	7
F-19 (Feb 13-Feb 27)	100	1,500	20,000	8
M-6 (Feb 28-Mar 14)	100	1,600	10,000	
M-21 (Mar 15-Mar 29)	100	1,700	5,000	
Total	**1,700**	**1,700**		

[a] *Flooded Rice reflects post-harvest flooding schedules for rice.*
[b] *Cumulative Rice Objective/Flooded Rice.*

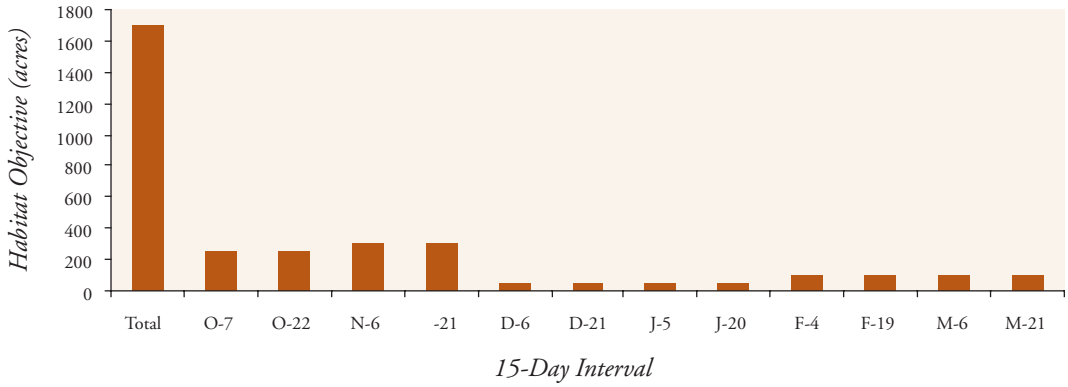


Figure 6-14. Rice habitat objectives for shorebirds by 15-day intervals for a hypothetical planning region.

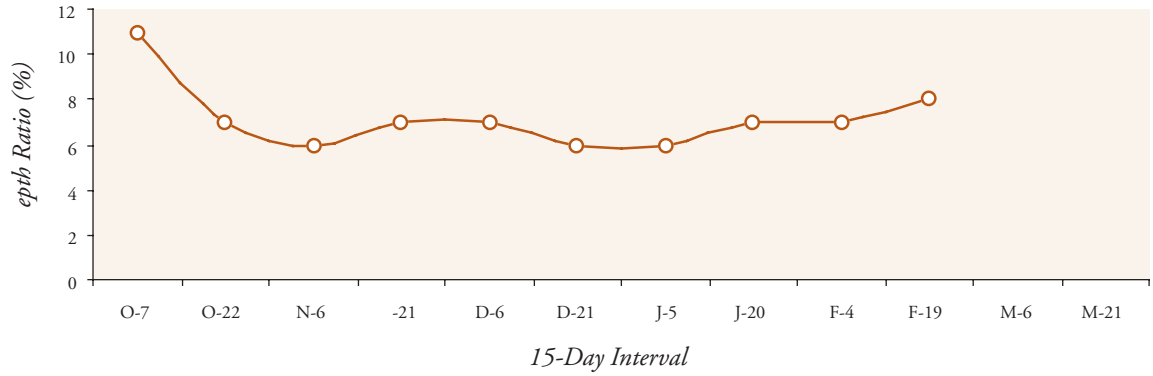


Figure 6-15. Changes in the required depth ratio for rice habitat between October and March.

Summary

Conservation objectives for managed seasonal and semi-permanent wetlands, water supplies, and agricultural enhancement are summarized for the hypothetical shorebird-planning region in Table 6-12.

Table 6-12. Conservation objectives for non-breeding shorebirds in a hypothetical planning region.

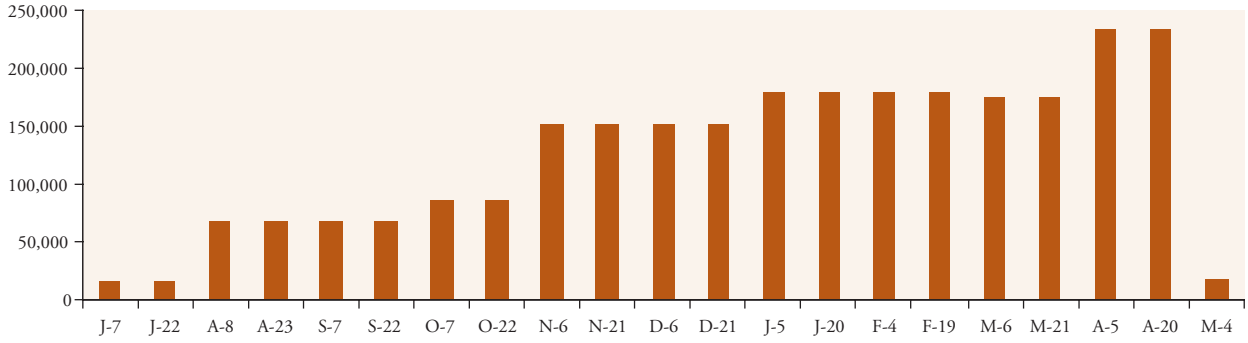
Interval	*Seasonal Wetlands (Acres)*	*Semi Perm. Wetlands (Acres)*	*Water (Acre Feet)*	*Winter Flooded Rice (Acres)*
J-7 (July 1-July 15)	0	100	0	0
J-22 (July 16-July 31)	0	100	0	0
A-8 (Aug 1-Aug 16)	150	0	300	0
A-23 (Aug 17-Aug 23)	300	0	0	0
S-7 (Sept 1-Sept 15)	300	0	0	0
S-22 (Sept 16-Sept 30)	300	0	0	0
O-7 (Oct 1-Oct 15)	250	0	0	250
O-22 (Oct 16-Oct 30)	250	0	0	250
N-6 (Oct 31-Nov 14)	300	0	0	300
N-21 (Nov 15-Nov 29)	300	0	0	300
D-6 (Nov 30-Dec 14)	50	0	0	50
D-21 (Dec 15-Dec 29)	50	0	0	50
J-5 (Dec 30-Jan 13)	50	0	0	50
J-20 (Jan 14-Jan 28)	50	0	0	50
F-4 (Jan 29-Feb 12)	100	0	0	100
F-19 (Feb 13-Feb 27)	100	0	0	100
M-6 (Feb 28-Mar 14)	100	0	0	100
M-21 (Mar 15-Mar 29)	100	0	0	100
A-5 (Mar 30-Apr 13)	500	0	0	0
A-20 (Apr 14-Apr 28)	500	0	0	0
M-4 (Apr 29-May 10)	300	0	0	0
Total	**4,050**	**200**	**300**	**1,700**

Conservation Objectives for Wintering Shorebirds Within Planning Regions

Sacramento Valley Planning Region

Current Conditions

Population objectives for migrating and wintering shorebirds in the Sacramento Valley Planning Region (Colusa, Butte, American, and Sutter Basins) are presented in Figure 6-16. Population objectives are the highest for April, with shorebird numbers reaching a minimum in July. Winter flooded rice provides the majority of foraging habitat potentially available to shorebirds, though seasonal wetlands exceed 50,000 acres (Table 6-13).



July 7	July 22	Aug. 8	Aug. 23	Sept.-7	Sept. 22	Oct. 7	Oct. 22	Nov. 6	Nov. 21	Dec. 6	Dec. 21	Jan. 5	Jan. 20	Feb. 4	Feb. 19	Mar. 6	Mar. 21	Apr. 5	Apr. 20	May 4
17,500	17,500	70,000	70,000	70,000	70,000	87,500	87,500	152,000	152,000	152,000	152,000	180,000	180,000	180,000	180,000	175,500	175,500	234,000	234,000	19,500

Figure 6-16. Shorebird population objectives (acres) for the Sacramento Valley Planning Region.

Figure 6-17 depicts the relationship between shorebird population objectives and the availability of seasonally flooded wetlands and winter flooded rice. Semi-permanent wetlands are assumed to provide shorebird habitat from July 1 to July 15 when they are typically drawn down and more likely to provide foraging habitat <10 cm in depth.

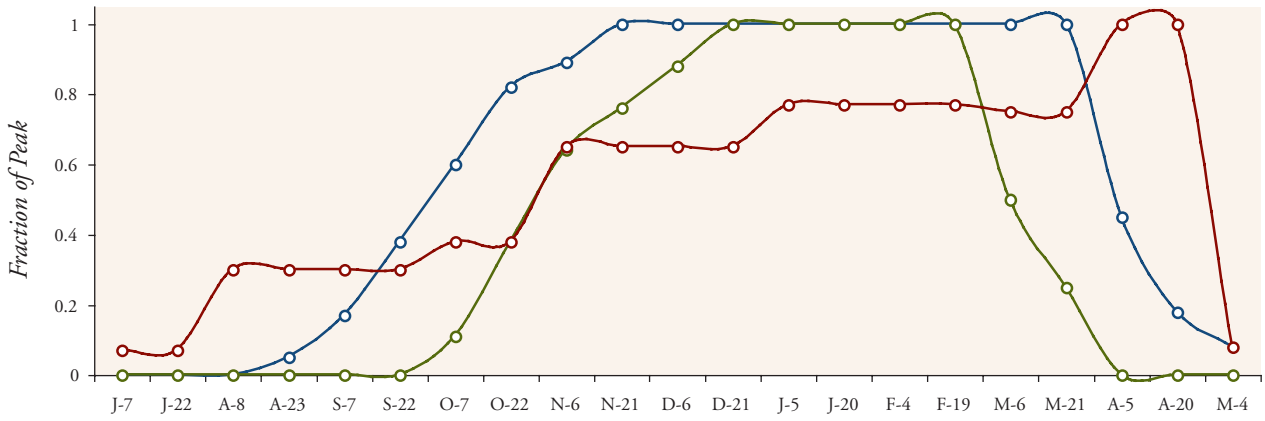


Figure 6-17. Shorebird population objectives (red) vs. flooding schedules for managed seasonal wetlands (blue) and rice (green) for the Sacramento Valley Planning Region. Shorebird population objectives are expressed as the fraction of peak population; wetlands and rice are expressed as the fraction of these habitats that are flooded.

Seasonal wetlands provide no habitat prior to the August 23 interval when flooding of these wetlands in the SV Planning Region typically begins. However, drawdown of semi-permanent wetlands in early July provides some foraging habitat between July 1 and July 15. Increases in the amount of seasonal wetlands track increases in shorebird numbers from late August to early December. Shorebird numbers increase during April when seasonal wetlands are being drawn down and the amount of foraging habitat <10 cm deep is likely increasing.

Winter flooded rice provides no foraging habitat prior to the October 7 interval. Although rice provides large amounts of potential habitat from late October through late March, these habitats are largely dry by the time shorebird numbers peak in April.

Table 6-13. Acres of managed wetlands and intentionally flooded rice in the Sacramento Valley Planning Region.

Seasonal Wetland	*Semi Perm. Wetland*	*Winter Flooded Rice*
50,868	8,968	346,606

Table 6-14. Habitat objectives for shorebirds in the Sacramento Valley Planning Region during the Summer Flooding Period.

Interval	*Habitat Objective (Acres)*
J-7 (July 1-July 15)	396
J-22 (July 16-July 31)	423
A-8 (Aug 1-Aug 16)	1,584

Table 6-15. Overall habitat needs for shorebirds in the Sacramento Planning Region during the Fall Flooding Period.

Interval	*Habitat Objective (Acres)*
A-23 (Aug 17-Aug 31)	1,584
S-7 (Sept 1-Sept 15)	1,584
S-22 (Sept 16-Sept 30)	1,584
O-7 (Oct 1-Oct 15)	1,980
O-22 (Oct 16-Oct 30)	1,980
N-6 (Oct 31-Nov 14)	2,965
N-21 (Nov 15-Nov 29)	2,965
Total	**14,642**

Management of Existing Seasonal and Semi-Permanent Wetlands

Summer Flooding Period (July 1–August 16)

Shorebirds require 396 acres of foraging habitat <10 cm deep in the July 7 interval, with habitat needs increasing to 423 acres and 1,584 acres in the July 22 and August 8 intervals respectively (Table 6-14). All habitat requirements during the Summer Flooding Period must be met from managed wetlands, as no winter flooded rice is available.

Semi-permanent wetlands may provide the best opportunity to meet shorebird needs in July. The SV Planning Region contains nearly 9,000 acres of semi-permanent wetlands (Table 6-13). If all these wetlands are drawn down between July 1 and July 15, the required depth ratio for these semi-permanent habitats is 4% (i.e., 396 of the 8,968 acres must provide water depths <10 cm to meet shorebird needs in the July 7 interval). Semi-permanent public wetlands alone (3,562 acres) can meet shorebird needs in the July 7 interval if only 11% of these habitats provide suitable water depths during drawdown. If all 8,968 acres of semi-permanent wetlands are drawn down by mid-July, no opportunity exists to meet shorebird needs in the July 22 interval using these habitats. Delaying the drawn down of some semi-permanent wetlands until late July could help provide the 423 acres of habitat needed by shorebirds in the July 22 interval.

Population energy demand estimates for shorebirds indicate that 1,584 acres of wetland habitat are required during the August 8 interval. There are currently no seasonal wetlands flooded in the SV Planning Region during the first two weeks of August, and all semi-permanent wetlands are assumed to be dry by this time. The 1,584 acres of wetlands needed by shorebirds during this interval could be met through early flooding of seasonal wetlands. These 1,584 acres represent 3% of existing seasonal wetlands in the SV Planning Region, and 13% of all public seasonal wetlands.

Fall Flooding Period (August 17–November 29)

Habitat needs for shorebirds in the Fall Flooding Period range from 1,584 acres in each of the August and September intervals, to nearly 3,000 acres in each of the November intervals (Table 6-15). Although the SV Planning Region has over 350,000 acres of winter flooded rice, none of this agricultural habitat is available prior to the October 7 interval. As a result, shorebird needs must be met entirely from seasonal wetland habitats in the August and September intervals. Beginning in October, seasonal wetland objectives decline to 50% of interval habitat needs as rice is assumed to meet half of all shorebird needs (Table 6-16).

Table 6-16. Seasonal wetland objectives (acres) for shorebirds in the Sacramento Valley Planning Region during the Fall Flooding Period.

Interval	*SW Interval Objective*	*Cumulative SW[a] Objective*	*Flooded SWs[b]*	*Required Depth[c] Ratio (%)*
A-23 (Aug 17-Aug 31)	1,584	3,168	2,543	>100
S-7 (Sept 1-Sept 15)	1,584	4,752	8,648	55
S-22 (Sept 16-Sept 30)	1,584	6,336	19,330	33
O-7 (Oct 1-Oct 15)	990	7,326	30,521	24
O-22 (Oct 16-Oct 30)	990	8,316	41,712	20
N-6 (Oct 31-Nov 14)	1,483	9,799	45,273	22
N-21 (Nov 15-Nov 29)	1,483	11,282	50,868	22
Total	**9,698**			

SW – Seasonal Wetland.
[a]Includes SW objectives from previous flooding periods.
[b]Flooded SWs reflect flooding schedules within a shorebird planning region.
[c]Cumulative SW Objective/Flooded SWs.

Although the total seasonal wetland objective of 9,698 acres is staggered over seven 15-day intervals, it is possible to meet this overall habitat objective in a shorter period of time. For example, seasonal wetland objectives for shorebirds could be met in the Fall Flooding Period by providing 9,698 acres during the August 23 interval and maintaining these acres at a depth <10 cm through the end of November (Figure 6-18).

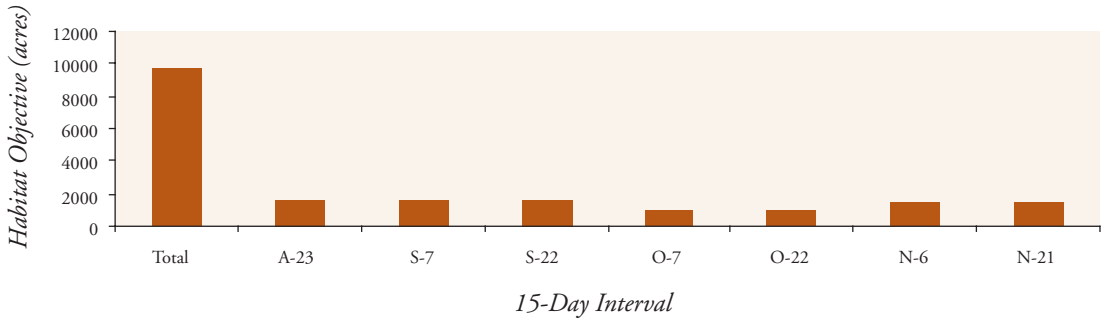


Figure 6-18. Seasonal wetland objectives for shorebirds in the Fall Flooding Period by 15-day intervals for the Sacramento Valley Planning Region.

Seasonal wetlands become increasingly available from August through November as these habitats are flooded prior to the hunting season. This increase in seasonal wetlands is reflected in the required depth ratio, which declines from August through October (Figure 6-19).

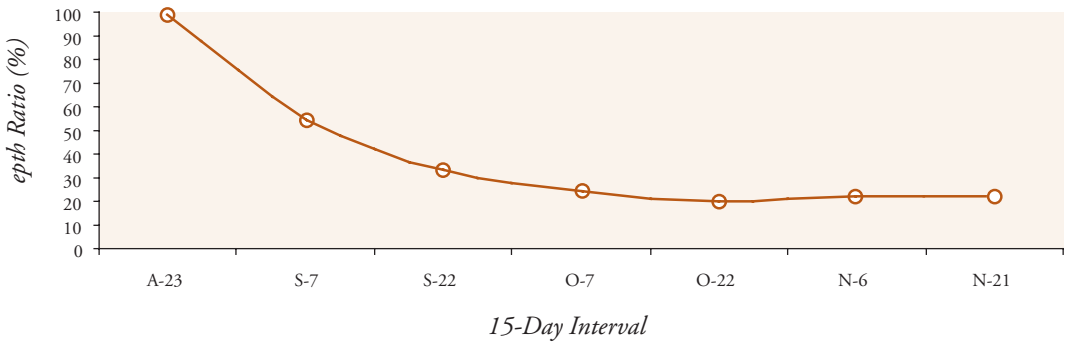


Figure 6-19. Changes in the required depth ratio for seasonal wetlands in the Fall Flooding Period for the Sacramento Valley Planning Region.



Common snipe
Photo: Dave Feliz, CDFG

Table 6-17. Overall habitat needs for shorebirds during the Winter Flooding Period.

Interval	*Habitat Objective (Acres)*
D-6 (Nov 30-Dec 14)	2,965
D-21 (Dec 15-Dec 29)	2,965
J-5 (Dec 30-Jan 13)	3,367
J-20 (Jan 14-Jan 28)	3,367
F-4 (Jan 29-Feb 12)	3,367
F-19 (Feb 13-Feb 27)	3,367
M-6 (Feb 28-Mar 14)	3,918
M-21 (Mar 15-Mar 29)	3,918
Total	**27,234**

Winter Flooding Period (November 30–March 29)

Habitat needs for shorebirds in the Winter Flooding Period range from nearly 3,000 acres in the December intervals, to over 3,900 acres in March intervals (Table 6-17). Fifty percent of these habitat needs must be met from seasonal wetlands, with the balance being provided by winter flooded rice (Table 6-18). The overall seasonal wetland objective for the Winter Flooding Period is 13,260 acres. Although this wetland objective is staggered over several 15-day intervals, it is possible to meet this conservation objective in ashorter period of time. For example, seasonal wetland objectives for shorebirds could be met in the Winter Flooding Period by providing 13,620 acres during the December 6 interval and maintaining these acres at a depth <10 cm through the end of March (Figure 6-20). As expected, the required depth ratio increases through the Winter Flooding Period, as no new wetlands are being flooded and shorebirds deplete food resources on seasonal wetland acres that are managed <10 cm in depth (Figure 6-21).

Table 6-18. Seasonal wetland objectives (acres) for shorebirds in the Sacramento Valley Planning Region during the Winter Flooding Period.

Interval	*SW Interval Objective*	*Cumulative SW[a] Objective*	*Flooded[b] SWs*	*Required Depth[c] Ratio (%)*
D-6 (Nov 30-Dec 14)	1,483	12,765	50,868	25
D-21 (Dec 15-Dec 29)	1,483	14,248	50,868	28
J-5 (Dec 30-Jan 13)	1,684	15,932	50,868	31
J-20 (Jan 14-Jan 28)	1,684	17,616	50,868	35
F-4 (Jan 29-Feb 12)	1,684	19,300	50,868	38
F-19 (Feb 13-Feb 27)	1,684	20,984	50,868	41
M-6 (Feb 28-Mar 14)	1,959	22,943	50,868	45
M-21 (Mar 15-Mar 29)	1,959	24,902	50,868	49
Total	**13,620**	**24,902**		

SW – Seasonal Wetland.
[a]Includes SW objectives from previous flooding periods.
[b]Flooded SWs reflect flooding schedules within a shorebird planning region.
[c]Cumulative SW Objective/Flooded SWs.

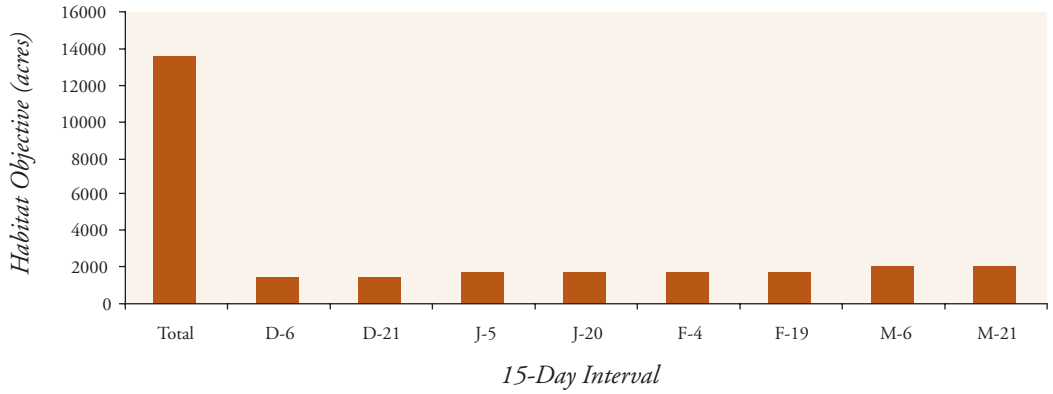


Figure 6-20. Seasonal wetland objectives for shorebirds in the Winter Flooding Period by 15-day intervals for the Sacramento Valley Planning Region.

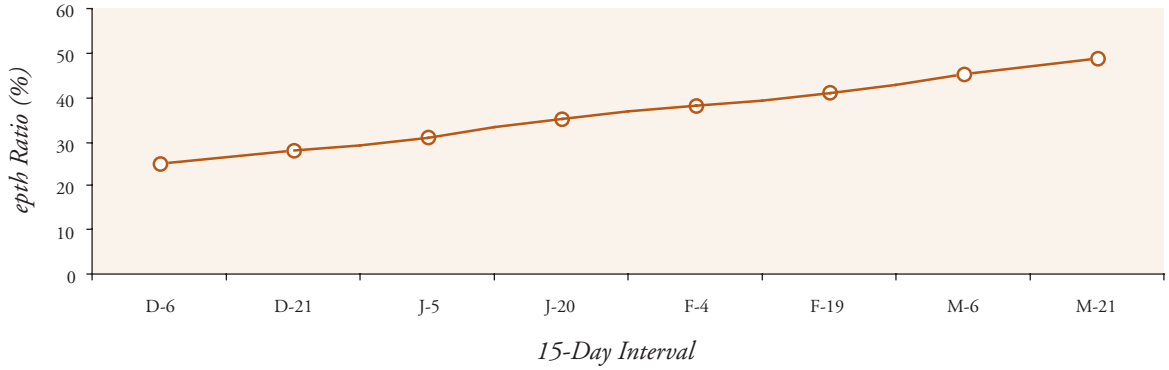


Figure 6-21. Changes in the required depth ratio for seasonal wetlands in the Winter Flooding Period for the Sacramento Valley Planning Region.

Spring Flooding Period (March 30–May 12)

Habitat needs for shorebirds in the Spring Flooding Period range from over 5,000 acres in each of the April intervals to less than 400 acres in May. Shorebird needs must be met exclusively by seasonal wetlands as rice fields are assumed to be dry by this time (Table 6-19). The summed seasonal wetland objective for the Spring Flooding Period is nearly 11,000 acres, with most of these acres needed in the April intervals (Figure 6-22).

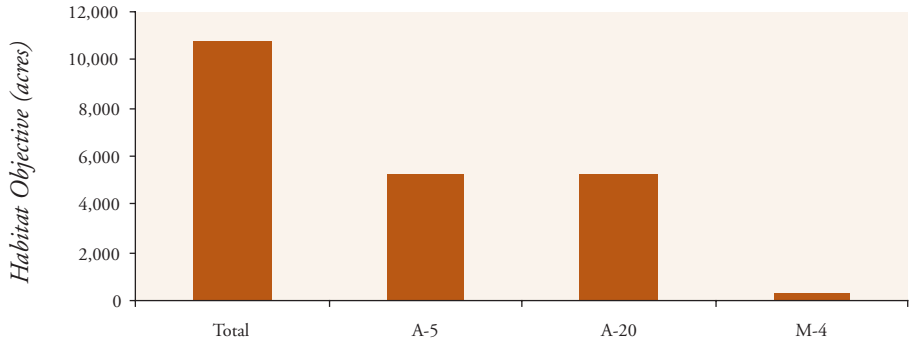


Figure 6-22. Seasonal wetland objectives for shorebirds in the Spring Flooding Period by 15-day intervals for the Sacramento Valley Planning Region.

Table 6-19. Seasonal wetland objectives (acres) for shorebirds in the Sacramento Valley Planning Region during the Spring Flooding Period.

Interval	*SW Interval Objective*	*Cumulative SW [a] Objective*	*Flooded SW [b] Habitat*
A-5 (Mar 30-Apr 13)	5,223	30,125	50,868
A-20 (Apr 14-Apr 28)	5,223	35,348	16,023
M-4 (Apr 29-May 10)	348	35,696	6,612
Total	**10,794**	**35,696**	

SW – Seasonal Wetland.
[a]Includes SW objectives from previous flooding periods.
[b]Flooded SWs reflect flooding schedules within a shorebird planning region.

Water Supplies for Wetland Management

Additional water supplies that are needed for shorebirds are based on seasonal wetland needs in the August 8 interval (see earlier description for establishing water supply objectives). Seasonal wetland objectives for shorebirds in the SV Planning Region during the August 8 interval are estimated at 1,584 acres. This equates to a water supply need of 3,168 acre-feet.

Agricultural Enhancement

Habitat objectives for flooded rice in the SV Planning Region range from just under 1,000 acres in the October intervals, to nearly 2,000 acres throughout March (Table 6-20). Although the summed agricultural enhancement objective is staggered over several 15-day intervals, it is possible to front-end this objective. For example, rice habitat objectives could be met by providing 18,566 acres during the October 7 interval and maintaining these acres at a depth <10 cm through the end of March (Figure 6-23). The required depth ratio for rice habitat is low for all time intervals, which reflects the large amount of rice acreage that is available relative to shorebird needs in the SV Planning Region (Figure 6-24).

Table 6-20. Rice habitat objectives (acres) for shorebirds between early October and the end of March in the Sacramento Valley Planning Region.

Interval	*Rice Interval Objective*	*Cumulative Rice Objective*	*Flooded Rice[a]*	*Required Depth[b] Ratio (%)*
O-7 (Oct 1-Oct 15)	990	990	38,123	3
O-22 (Oct 16-Oct 30)	990	1,980	131,171	2
N-6 (Oct 31-Nov 14)	1,483	3,463	221,828	2
N-21 (Nov 15-Nov 29)	1,483	4,946	263,421	2
D-6 (Nov 30-Dec 14)	1,483	6,429	305,013	2
D-21 (Dec 15-Dec 29)	1,483	7,912	346,606	2
J-5 (Dec 30-Jan 13)	1,684	9,596	346,606	3
J-20 (Jan 14-Jan 28)	1,684	11,280	346,606	3
F-4 (Jan 29-Feb 12)	1,684	12,964	346,606	4
F-19 (Feb 13-Feb 27)	1,684	14,648	346,606	4
M-6 (Feb 28-Mar 14)	1,959	16,607	346,606	5
M-21 (Mar 15-Mar 29)	1,959	18,566	346,606	5
Total	**18,566**	**18,566**	**346,606**	

[a]Flooded Rice reflects post-harvest flooding schedules of rice.
[b]Cumulative Rice Objective/Flooded Rice.



Greater yellowlegs
Photo: Dave Feliz, CDFG

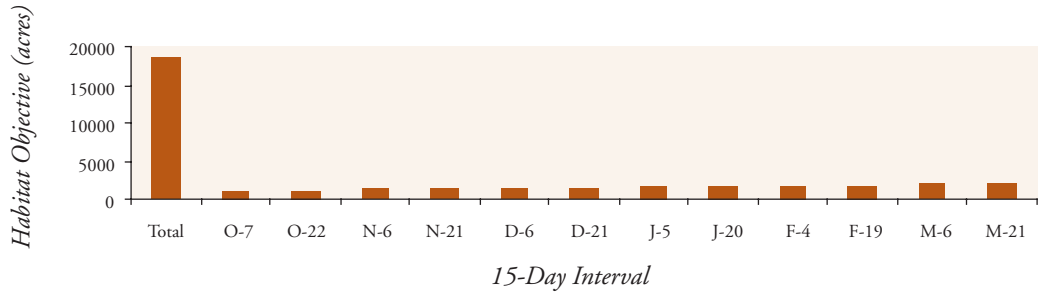


Figure 6-23. Rice habitat objectives for shorebirds by 15-day intervals for the Sacramento Valley Planning Region.

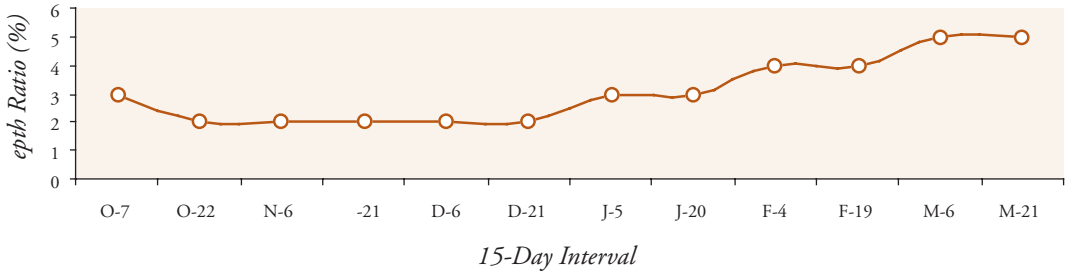


Figure 6-24. Changes in the required depth ratio for rice habitat in the Sacramento Valley Planning Region.

Summary

Conservation objectives for managed seasonal and semi-permanent wetlands, water supplies, and agricultural enhancement are summarized for the SV Planning Region in Table 6-21. Seventy percent of the seasonal wetlands present in the SV Planning Region (35,696/50,868) must provide foraging depths <10 cm during some portion of the wintering period if seasonal wetland objectives for shorebirds are to be met. This seems unlikely given the current emphasis on waterfowl habitat management. In contrast, only 5% of existing rice habitat (18,566/346,606) must provide suitable foraging depths during some portion of the wintering period to meet agricultural enhancement objectives for the SV Planning Region. In all likelihood, this objective is already being exceeded. Shorebirds in the SV Planning Region may be getting the majority of their food resources from these rice habitats, given that they total almost 350,000 acres.



Least sandpiper
Photo: Dave Feliz, CDFG

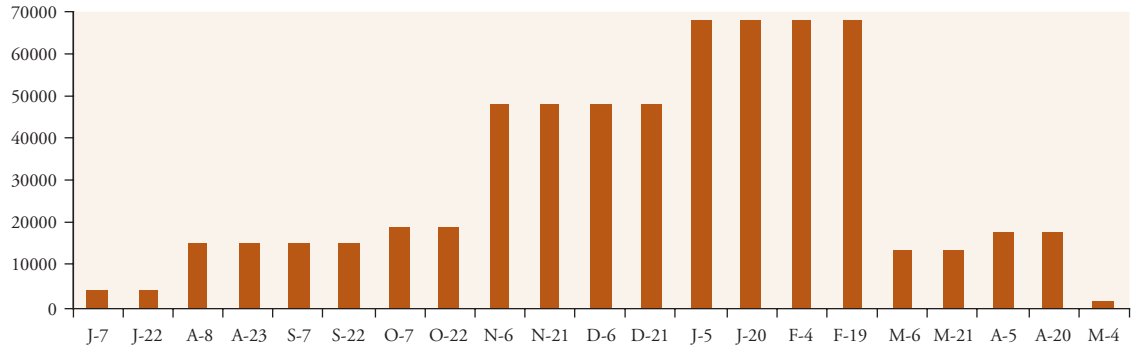
Table 6-21. Conservation Objectives for non-breeding shorebirds in the Sacramento Valley Planning Region.

Interval	*Seasonal Wetlands (Acres)*	*Semi Perm. Wetlands (Acres)*	*Water (Acre Feet)*	*Winter Flooded Rice (Acres)*
J-7 (July 1-July 15)	0	396	0	0
J-22 (July 16-July 31)	0	423	0	0
A-8 (Aug 1-Aug 16)	1,584	0	1,584	0
A-23 (Aug 17-Aug 31)	1,584	0	0	0
S-7 (Sept 1-Sept 15)	1,584	0	0	0
S-22 (Sept 16-Sept 30)	1,584	0	0	0
O-7 (Oct 1-Oct 15)	990	0	0	990
O-22 (Oct 16-Oct 30)	990	0	0	990
N-6 (Oct 31-Nov 14)	1,483	0	0	1,483
N-21 (Nov 15-Nov 29)	1,483	0	0	1,483
D-6 (Nov 30-Dec 14)	1,483	0	0	1,483
D-21 (Dec 15-Dec 29)	1,483	0	0	1,483
J-5 (Dec 30-Jan 13)	1,684	0	0	1,684
J-20 (Jan 14-Jan 28)	1,684	0	0	1,684
F-4 (Jan 29-Feb 12)	1,684	0	0	1,684
F-19 (Feb 13-Feb 27)	1,684	0	0	1,684
M-6 (Feb 28-Mar 14)	1,959	0	0	1,959
M-21 (Mar 15-Mar 29)	1,959	0	0	1,959
A-5 (Mar 30-Apr 13)	5,223	0	0	0
A-20 (Apr 14-Apr 28)	5,223	0	0	0
M-4 (Apr 29-May 10)	348	0	0	0
Total	**35,696**	**819**	**1584**	**18,566**

Delta Planning Region

Current Conditions

Population objectives for migrating and wintering shorebirds in the Delta Planning Region are presented in Figure 6-25. Population objectives are highest for January and February, with shorebird numbers reaching a minimum in July. Seasonal wetlands provide the majority of foraging habitat available to shorebirds (Table 6-22).



July 7	July 22	Aug. 8	Aug. 23	Sept. 7	Sept. 22	Oct. 7	Oct. 22	Nov. 6	Nov. 21	Dec. 6	Dec. 21	Jan. 5	Jan. 20	Feb. 4	Feb. 19	Mar. 6	Mar. 21	Apr. 5	Apr. 20	May 4
3,750	3,750	15,000	15,000	15,000	15,000	18,750	18,750	48,000	48,000	48,000	48,000	68,000	68,000	68,000	68,000	13,500	13,500	18,000	18,000	1,500

Figure 6-25. Shorebird population objectives (acres) for the Delta Planning Region.

Table 6-22. Foraging habitats (acres) available to wintering shorebirds in the Delta Planning Region.

Seasonal Wetland	*Semi Permanent Wetland*	*Winter Flooded Rice*
14,907	2,633	8,027

Figure 6-26 depicts the relationship between shorebird population objectives and the availability of seasonally flooded wetlands and winter flooded rice. Semi-permanent wetlands are assumed to provide shorebird habitat from July 1 to July 15 when they are typically drawn down and likely to provide foraging habitat <10 cm in depth. Seasonal wetlands provide no habitat prior to the August 23 interval when flooding of these wetlands in the Delta Planning Region typically begins. However, drawdown of semi-permanent wetlands in early July likely provides some foraging habitat between July 1 and July 15. Increases in the amount of seasonal wetlands generally track increases in shorebird numbers in this region from late August through February. Although declines in shorebird numbers correspond to a decline in seasonal wetland acres between late March and May, the amount of foraging habitat is likely increasing during this period as drawdowns increase the numbers of acres <10 cm in depth. (Figure 6-26). Winter flooded rice provides no foraging habitat prior to the October 7 interval. However, rice provides large amounts of potential habitat from November through March when shorebird populations in this region reach their peak.

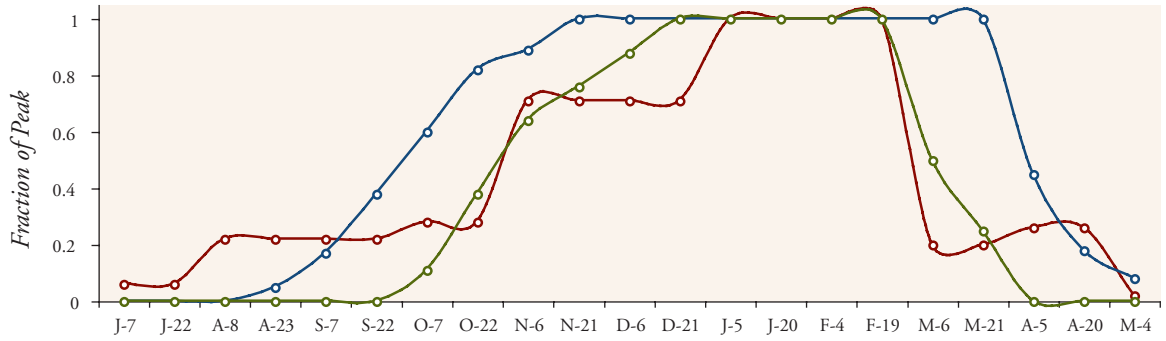


Figure 6-26. Shorebird population objectives (red) vs. flooding schedules for managed seasonal wetlands (blue) and rice (green) for the Delta Planning Region. Shorebird population objectives are expressed as the fraction of peak population; wetlands and rice are expressed as the fraction of these habitats that are flooded.

Management of Existing Seasonal and Semi-Permanent Wetlands

Summer Flooding Period (July 1–August 15)

Shorebirds require 85 acres of foraging habitat in both the July 7 and July 22 intervals, with habitat needs increasing to 340 acres in the August 8 interval (Table 6-23). All habitat requirements during the Summer Flooding Period must be met from managed wetlands, as no winter flooded rice is available.

Table 6-23. Habitat objectives for shorebirds in the Delta Planning Region during the Summer Flooding Period.

Interval	*Habitat Objective (Acres)*
J-7 (July 1-July 15)	85
J-22 (July 16-July 31)	85
A-8 (Aug 1-Aug 16)	340
Total	510

Semi-permanent wetlands may provide the best opportunity to meet shorebird needs in July. The Delta Planning Region contains over 2,600 acres of semi-permanent wetlands. If all these wetlands are drawn down between July 1 and July 15, the required depth ratio for these semi-permanent habitats is 3% (i.e., 85 of the 2,633 acres must provide water depths <10 cm to meet shorebird needs in the July 7 interval). Semi-permanent public wetlands alone (945 acres) can meet shorebird needs in the July 7 interval if 9% of these habitats provide suitable water depths during drawdown. If all 8,968 acres of semi-permanent wetlands are drawn down by mid-July, no opportunity exists to meet shorebird needs in the July 22 interval using these habitats. Delaying the drawn down of some semi-permanent wetlands until late July could help meet the 85 acres of habitat needed by shorebirds in the July 22 interval.

Population energy demand estimates for shorebirds indicate that 340 acres of wetland habitat are required during the August 8 interval. There are currently no seasonal wetlands flooded in the region during the first two weeks of August, and all semi-permanent wetlands are assumed to be dry by this time. The 340 acres of wetlands needed by shorebirds during this interval could be met through early flooding of seasonal wetlands. These 340 acres represent 2% of existing seasonal wetlands in the region, and 6% of all public seasonal wetlands.

Fall Flooding Period (August 17–November 29)

Habitat needs of shorebirds in the Fall Flooding Period range from 340 acres in the August and September intervals, to nearly 1,300 acres in the January and February intervals (Table 6-24).

Table 6-24. Overall habitat needs for shorebirds in the Delta Planning Region during the Fall Flooding Period.

Interval	*Habitat Objective (Acres)*
A-23 (Aug 17-Aug 31)	340
S-7 (Sept 1-Sept 15)	340
S-22 (Sept 16-Sept 30)	340
O-7 (Oct 1-Oct 15)	424
O-22 (Oct 16-Oct 30)	424
N-6 (Oct 31-Nov 14)	936
N-21 (Nov 15-Nov 29)	936
Total	**3,740**

Because winter flooded rice is unavailable prior to October, shorebird needs must be met entirely from seasonal wetland habitats in the August and September intervals. Beginning in October, seasonal wetland objectives decline to 50% of interval habitat needs, as rice is assumed to meet half of all shorebird needs (Table 6-25).

Table 6-25. Seasonal wetland objectives (acres) for shorebirds in the Delta Planning Region during the Fall Flooding Period.

Interval	*SW Interval Objective*	*Cumulative SW[a] Objective*	*Flooded SWs[b]*	*Required Depth[c] Ratio*
A-23 (Aug 17-Aug 31)	340	680	745	91
S-7 (Sept 1-Sept 15)	340	1,020	2,534	40
S-22 (Sept 16-Sept 30)	340	1,360	5,665	24
O-7 (Oct 1-Oct 15)	212	1,572	8,944	18
O-22 (Oct 16-Oct 30)	212	1,784	12,224	15
N-6 (Oct 31-Nov 14)	468	2,252	13,268	17
N-21 (Nov 15-Nov 29)	468	2,720	14,907	18
Total	**2,380**			

SW – Seasonal Wetland.
[a]Includes SW objectives from previous flooding periods.
[b]Flooded SWs reflect flooding schedules within a shorebird planning region.
[c]Cumulative SW Objective/Flooded SWs.

Although the total seasonal wetland objective of 2,380 acres is staggered over seven 15-day intervals, it is possible to front-end this overall habitat objective. For example, seasonal wetland objectives for shorebirds could be met in the Fall Flooding Period by providing 2,380 acres during the August 23 interval and maintaining these acres at a depth <10 cm through the end of November (Figure 6-27).

Seasonal wetlands become increasingly available from August through November, as these habitats are flooded prior to the hunting season. This increase in seasonal wetlands is reflected in the required depth ratio, which declines from August through October (Figure 6-28).

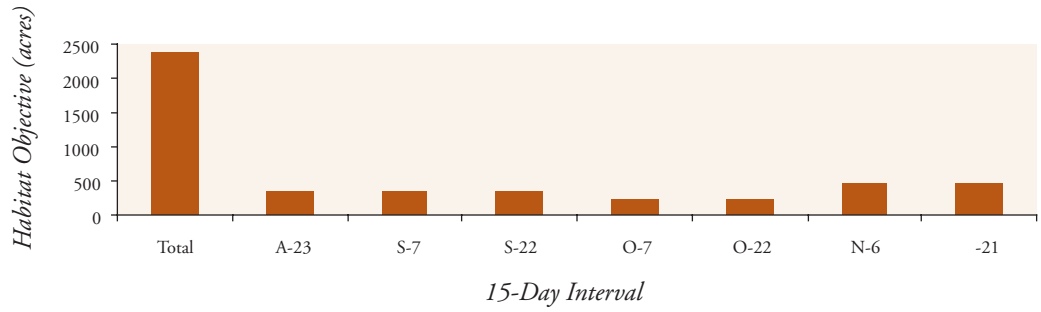


Figure 6-27. Seasonal wetland objectives for shorebirds in the Fall Flooding Period by 15-day intervals for the Delta Planning Region.

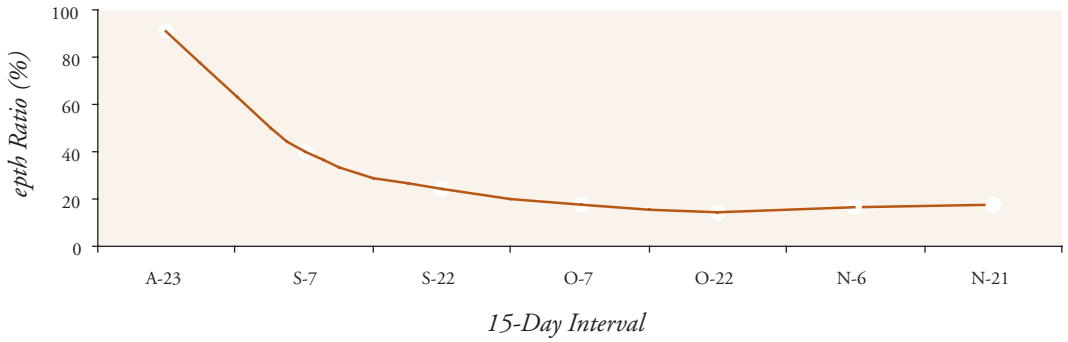


Figure 6-28. Changes in the required depth ratio for seasonal wetlands in the Fall Flooding Period for the Delta Planning Region.

Winter Flooding Period (November 30–March 29)

Habitat needs for shorebirds in the Winter Flooding Period range from nearly 1,300 acres in the December intervals, to 300 acres in March intervals (Table 6-26). Fifty percent of these habitat needs must be met from seasonal wetlands, with the balance being provided by winter flooded rice (Table 6-27). The overall seasonal wetland objective for the Winter Flooding Period is 3,782 acres. Although this wetland objective is staggered over several 15-day intervals, it is possible to front-end this conservation objective. For example, seasonal wetland objectives for shorebirds could be met in the Winter Flooding Period by providing 3,782 acres during the December 6 interval and maintaining these acres at a depth <10 cm through the end of March (Figure 6-29).

As expected, the required depth ratio increases through the Winter Flooding Period as no new wetlands are being flooded and shorebirds deplete food resources on seasonal wetland acres that are managed <10 cm in depth (Figure 6-30).

Table 6-26. Overall habitat needs for shorebirds in the Delta Planning Region during the Winter Flooding Period.

Interval	*Habitat Objective (Acres)*
D-6 (Nov 30-Dec 14)	936
D-21 (Dec 15-Dec 29)	936
J-5 (Dec 30-Jan 13)	1,272
J-20 (Jan 14-Jan 28)	1,272
F-4 (Jan 29-Feb 12)	1,272
F-19 (Feb 13-Feb 27)	1,272
M-6 (Feb 28-Mar 14)	301
M-21 (Mar 15-Mar 29)	301
Total	**7,562**

Table 6-27. Seasonal wetland objectives (acres) for shorebirds in the Delta Planning Region during the Winter Flooding Period.

Interval	*SW Interval Objective*	*Cumulative SW[a] Objective*	*Flooded[b] SWs*	*Required Depth[c] Ratio*
D-6 (Nov 30-Dec 14)	468	3,188	14,907	21
D-21 (Dec 15-Dec 29)	468	3,656	14,907	25
J-5 (Dec 30-Jan 13)	636	4,292	14,907	29
J-20 (Jan 14-Jan 28)	636	4,928	14,907	33
F-4 (Jan 29-Feb 12)	636	5,564	14,907	37
F-19 (Feb 13-Feb 27)	636	6,200	14,907	42
M-6 (Feb 28-Mar 14)	151	6,351	14,907	43
M-21 (Mar 15-Mar 29)	151	6,502	14,907	44
Total	**3,782**	**6,502**	**14,907**	

SW – Seasonal Wetland.
[a]Includes SW objectives from previous flooding periods.
[b]Flooded SWs reflect flooding schedules within a shorebird planning region.
[c]Cumulative SW Objective/Flooded SWs.

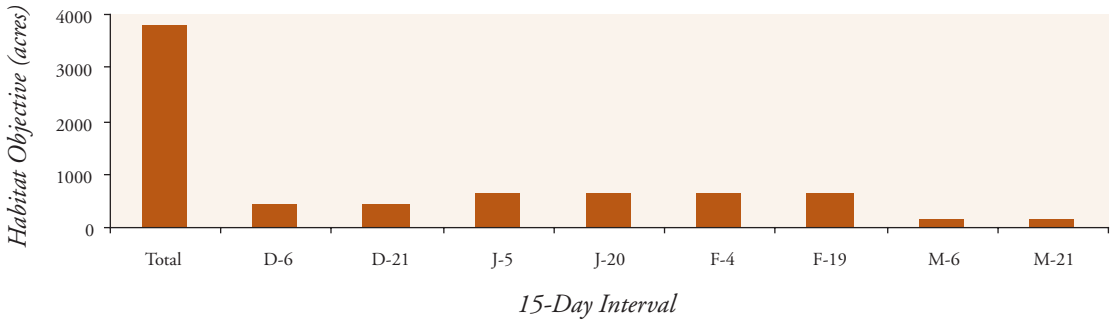


Figure 6-29. Seasonal wetland objectives for shorebirds in the Winter Flooding Period by 15-day intervals for the Delta Planning Region.

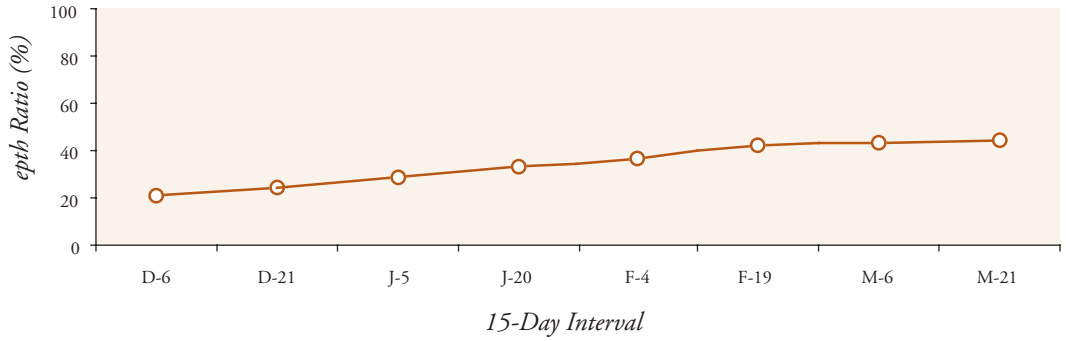


Figure 6-30. Changes in the required depth ratio for seasonal wetlands in the Winter Flooding Period for the Delta Planning Region.

Spring Flooding Period (March 30–May 12)

Habitat needs for shorebirds in the Spring Flooding Period range from 402 acres in each of the April intervals, to 28 acres in May. Shorebird needs must be met exclusively by seasonal wetlands as rice fields are assumed to be dry by this time (Table 6-28). The summed seasonal wetland objective for the Spring Flooding Period is nearly 832 acres, with most of these acres needed in the April intervals (Figure 6-31).

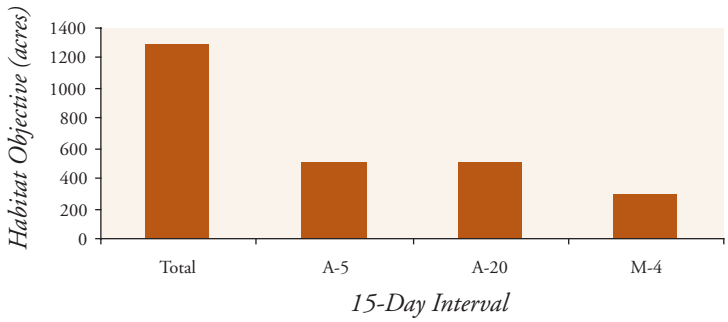


Figure 6-31. Seasonal wetland objectives for shorebirds in the Delta Planning Region during the Spring Flooding Period by 15-day intervals.

Water Supplies for Wetland Management

Additional water supplies that are needed for shorebirds are based on seasonal wetland needs in the August 8 interval (see earlier description for establishing water supply objectives). Seasonal wetland objectives for shorebirds in the Delta Planning Region during the August 8 interval are estimated at 340 acres. This equates to a water supply need of 680 acre-feet.

Table 6-28. Seasonal wetland objectives (acres) for shorebirds in the Delta Planning Region during the Spring Flooding Period.

Interval	*SW Interval Objective*	*Cumulative SW Objective*	*Flooded SWs*
A-5 (Mar 30-Apr 13)	402	6,904	14,907
A-20 (Apr 14-Apr 28)	402	7,306	4,696
M-4 (Apr 29-May 10)	28	7,334	1,938
Total	**832**	**7,334**	

Agricultural Enhancement

Habitat objectives for flooded rice in the Delta Planning Region range from just under 1,000 acres in the October intervals, to nearly 2,000 acres throughout March (Table 6-29). Although the total agricultural enhancement objective is staggered over several 15-day intervals, it is possible to front-end this objective. For example, rice habitat objectives could be met by providing 5,142 acres during the October 7 interval and maintaining these acres at a depth <10 cm through the end of March (Figure 6-32). The required depth ratio for rice habitat increases from October through March, and reflects the relatively small amount of rice grown in the region (Figure 6-33).

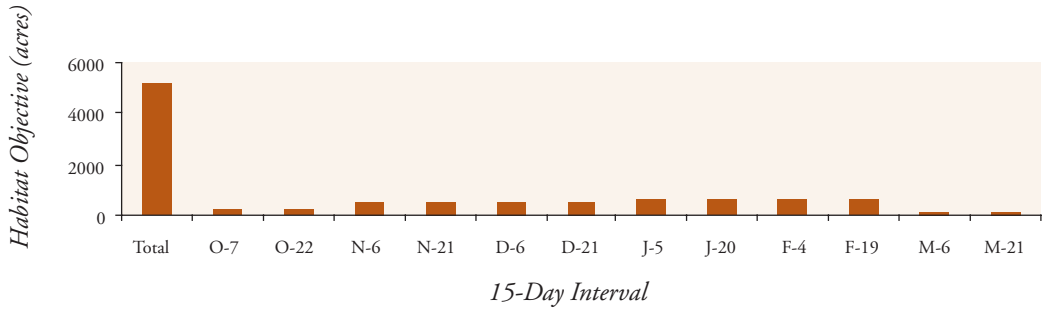


Figure 6-32. Rice habitat objectives for shorebirds by 15-day intervals in the Delta Planning Region.

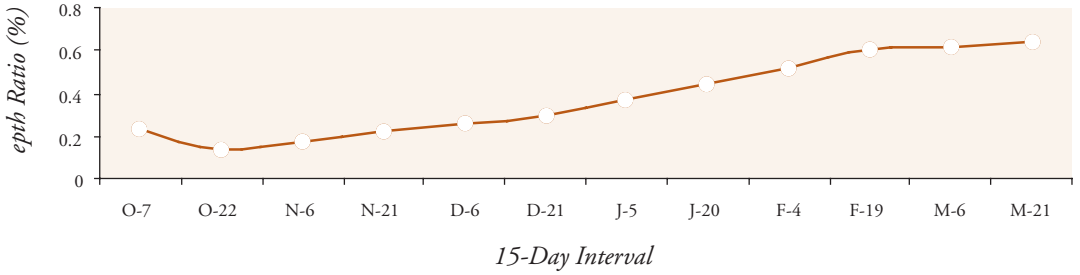


Figure 6-33. Changes in the required depth ratio for rice habitat in the Delta Planning Region.



Black-necked stilts in rice
Photo: Dave Feliz, CDFG

Table 6-29. Rice habitat objectives (acres) for shorebirds between early October and the end of March in the Delta Planning Region.

Interval	*Rice Interval Objective*	*Cumulative Rice Objective*	*Flooded[a] Rice*	*Required Depth[b] Ratio*
O-7 (Oct 1-Oct 15)	212	212	883	24
O-22 (Oct 16-Oct 30)	212	424	3,050	14
N-6 (Oct 31-Nov 14)	468	892	5,137	17
N-21 (Nov 15-Nov 29)	468	1,360	6,100	22
D-6 (Nov 30-Dec 14)	468	1,828	7,064	26
D-21 (Dec 15-Dec 29)	468	2,296	8,027	29
J-5 (Dec 30-Jan 13)	636	2,932	8,027	37
J-20 (Jan 14-Jan 28)	636	3,568	8,027	44
F-4 (Jan 29-Feb 12)	636	4,204	8,027	52
F-19 (Feb 13-Feb 27)	636	4,840	8,027	60
M-6 (Feb 28-Mar 14)	151	4,991	8,027	62
M-21 (Mar 15-Mar 29)	151	5,142	8,027	64
Total	**5,142**	**5,142**	**8,027**	

[a] *Flooded Rice reflects post-harvest flooding schedules of rice.*
[b] *Cumulative Rice Objective/Flooded Rice.*

Summary

Conservation objectives for managed seasonal and semi-permanent wetlands, water supplies, and agricultural enhancement are summarized for the Delta Planning Region in Table 6-30. Nearly 50% of the seasonal wetlands present in this region (7,334/14,907 acres) must provide foraging depths <10 cm during some portion of the wintering period if seasonal wetland objectives for shorebirds are to be met. This figure is even higher for rice, where 64% of all winter flooded rice (5,142/8,027 acres) must provide suitable foraging depths during some portion of the wintering period to meet agricultural enhancement objectives for this region.

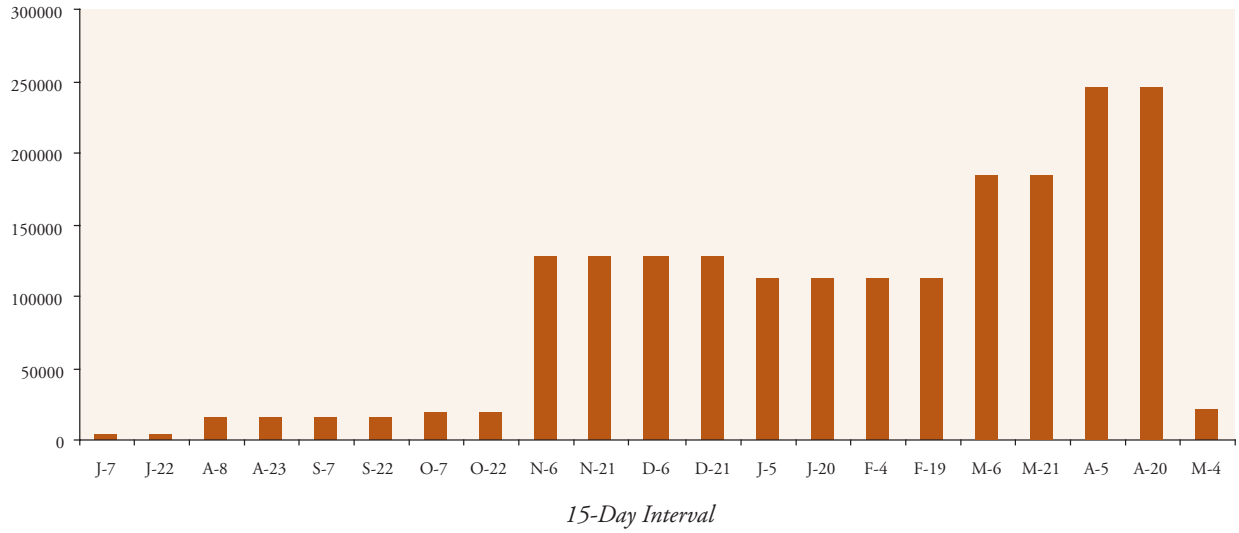
Table 6-30. Conservation Objectives for non-breeding shorebirds in the Delta Planning Region.

Interval	*Seasonal Wetlands (Acres)*	*Semi Perm. Wetlands (Acres)*	*Water (Acre Feet)*	*Winter Flooded Rice (Acres)*
J-7 (July 1-July 15)	0	85	0	0
J-22 (July 16-July 31)	0	85	0	0
A-8 (Aug 1-Aug 16)	340	0	680	0
A-23 (Aug 17-Aug 31)	340	0	0	0
S-7 (Sept 1-Sept 15)	340	0	0	0
S-22 (Sept 16-Sept 30)	340	0	0	0
O-7 (Oct 1-Oct 15)	212	0	0	212
O-22 (Oct 16-Oct 30)	212	0	0	212
N-6 (Oct 31-Nov 14)	468	0	0	468
N-21 (Nov 15-Nov 29)	468	0	0	468
D-6 (Nov 30-Dec 14)	468	0	0	468
D-21 (Dec 15-Dec 29)	468	0	0	468
J-5 (Dec 30-Jan 13)	636	0	0	636
J-20 (Jan 14-Jan 28)	636	0	0	636
F-4 (Jan 29-Feb 12)	636	0	0	636
F-19 (Feb 13-Feb 27)	636	0	0	636
M-6 (Feb 28-Mar 14)	151	0	0	151
M-21 (Mar 15-Mar 29)	151	0	0	151
A-5 (Mar 30-Apr 13)	402	0	0	0
A-20 (Apr 14-Apr 28)	402		0	0
M-4 (Apr 29-May 10)	28		0	0
Total	**7,334**	**170**	**680**	**5,142**

San Joaquin Basin

Current Conditions

Population objectives for migrating and wintering shorebirds in the San Joaquin Basin are presented in Figure 6-34. Population objectives are highest in April, with shorebird numbers reaching a minimum in July. Seasonal wetlands provide the majority of foraging habitat, as no winter flooded rice is available in the basin (Table 6-31).



July 7	July 22	Aug. 8	Aug. 23	Sept. 7	Sept. 22	Oct. 7	Oct. 22	Nov. 6	Nov. 21	Dec. 6	Dec. 21	Jan. 5	Jan. 20	Feb. 4	Feb. 19	Mar. 6	Mar. 21	Apr. 5	Apr. 20	May 4
3,750	3,750	15,000	15,000	15,000	15,000	18,750	18,750	128,000	128,000	128,000	128,000	112,000	112,000	112,000	112,000	184,500	184,500	246,000	246,000	20,500

Figure 6-34. Shorebird population objectives for the San Joaquin Basin.

Table 6-31. Foraging habitats (acres) available to wintering shorebirds in San Joaquin Basin.

Seasonal Wetland	*Semi Permanent Wetland*	*Winter Flooded Rice*
61,013	6,779	0

Figure 6-35 depicts the relationship between shorebird population objectives and the availability of seasonally flooded wetlands. Semi-permanent wetlands are assumed to provide shorebird habitat from July 1 to July 15 when they are typically drawn down and likely to provide foraging habitat <10 cm in depth. Seasonal wetlands provide no habitat prior to the August 23 interval when flooding of these wetlands in the San Joaquin Basin typically begins. However, drawdown of semi-permanent wetlands in early July likely provides some foraging habitat between July 1 and July 15. Increases in the amount of seasonal wetlands track increases in shorebird numbers from late August to early November. Shorebird numbers increase during April, when seasonal wetlands are being drawn down and the amount of foraging habitat <10 cm deep is likely increasing.

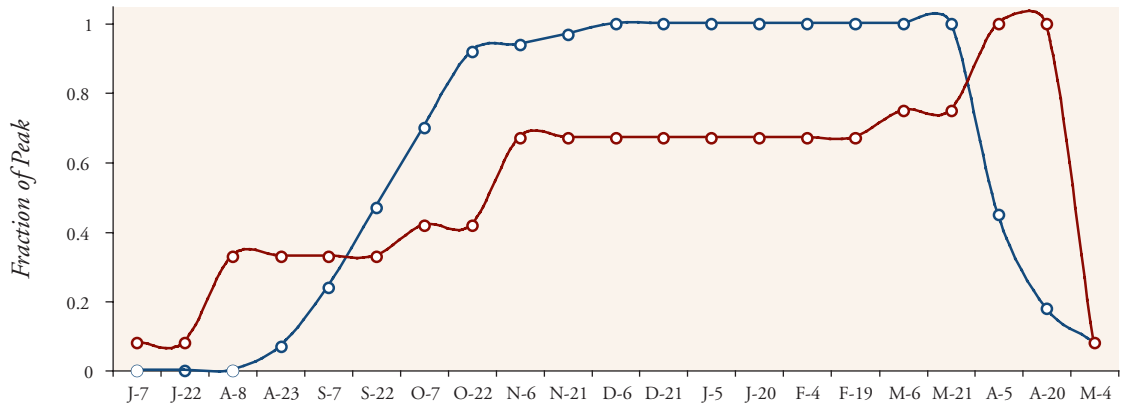


Figure 6-35. Shorebird population objectives (red) vs. flooding schedules for managed seasonal wetlands (blue) for the San Joaquin Basin. Shorebird population objectives are expressed as the fraction of peak population; wetlands are expressed as the fraction of seasonal wetlands that are flooded.

Management of Existing Seasonal and Semi-Permanent Wetlands

Summer Flooding Period (July 1–August 15)

Table 6-32. Habitat objectives for shorebirds in San Joaquin Basin during the Summer Flooding Period.

Interval	*Habitat Objective (Acres)*
J-7 (July 1-July 15)	85
J-22 (July 16-July 31)	90
A-8 (Aug 1-Aug 16)	340
Total	505

Shorebirds require less than 100 acres of foraging habitat in both the July intervals, with habitat needs increasing to 340 acres in the August 8 interval (Table 6-32). Semi-permanent wetlands provide the best opportunity to meet shorebird needs in July. The San Joaquin Basin contains nearly 6,800 acres of semi-permanent wetlands, of which 1,573 acres are publicly owned (Table 6-31). If all semi-permanent wetlands are drawn down between July 1 and July 15, only 1% of these acres must provide water depths <10 cm deep to meet shorebird needs in the July 7 interval. Semi-permanent public wetlands alone can meet shorebird needs in the July 7 interval even if only 5% of these habitats provide suitable water depths during drawdown. If all semi-permanent wetlands are drawn down by mid-July, there is no opportunity for these habitats to meet shorebird needs in the July 22 interval. Delaying the drawdown of some of these habitats until late July could help meet shorebird needs in the July 22 interval.

Shorebirds require 340 acres of foraging habitat in the August 8 interval. There are currently no seasonal wetlands flooded in the San Joaquin Basin during the first two weeks of August, and all semi-permanent wetlands are assumed to be dry. The 340 acres needed by shorebirds could be met through early flooding of seasonal wetlands. These 340 acres represent less than 0.1% of existing seasonal wetlands in the basin.

Fall Flooding Period (August 17–November 29)

Habitat needs for shorebirds in the Fall Flooding Period range from 340 acres in the September intervals, to nearly 2,500 acres in November (Table 6-33). Shorebird needs in the Fall Flooding Period must be met exclusively from seasonal wetlands, as no winter flooded rice is available.

Table 6-33. Seasonal wetland objectives (acres) for shorebirds in San Joaquin Basin during the Fall Flooding Period.

Interval	*SW Interval Objective*	*Cumulative SW[a] Objective*	*Flooded SWs[b]*	*Required[c] Depth Ratio*
A-23 (Aug 17-Aug 31)	340	680	4,271	16
S-7 (Sept 1-Sept 15)	340	1,020	14,643	7
S-22 (Sept 16-Sept 30)	340	1,360	28,676	5
O-7 (Oct 1-Oct 15)	424	1,784	42,709	4
O-22 (Oct 16-Oct 30)	424	2,208	56,132	4
N-6 (Oct 31-Nov 14)	2,497	4,705	56,132	8
N-21 (Nov 15-Nov 29)	2,497	7,202	59,183	12
Total	6,862	7,202		

SW – Seasonal Wetland.
[a]Includes SW objectives from previous flooding periods.
[b]Flooded SWs reflect flooding schedules within a shorebird planning region.
[c]Cumulative SW Objective/Flooded SWs.

Although the summed seasonal wetland objective of 6,862 acres is staggered over seven 15-day intervals, it is possible to front-end this overall habitat objective. For example, seasonal wetland objectives for shorebirds could be met in the Fall Flooding Period by providing 6,862 acres during the August 23 interval and maintaining these acres at a depth <10 cm through the end of November (Figure 6-36).

Seasonal wetlands become increasingly available from August through November as these habitats are flooded prior to the hunting season. This increase in seasonal wetlands is reflected in the required depth ratio, which declines from August through October (Figure 6-37).

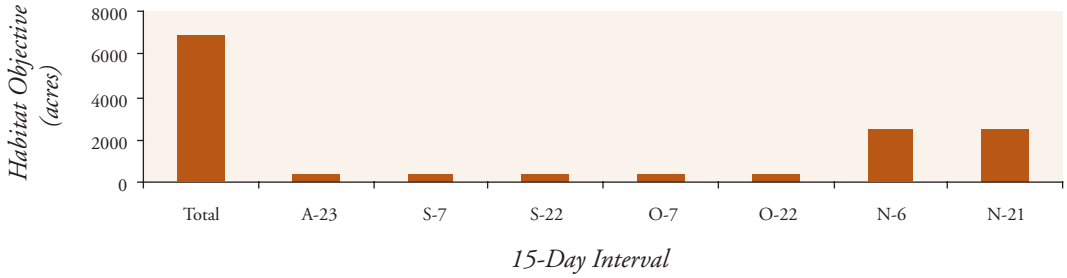


Figure 6-36. Seasonal wetland objectives for shorebirds in the Fall Flooding Period by 15-day intervals for the San Joaquin Basin.

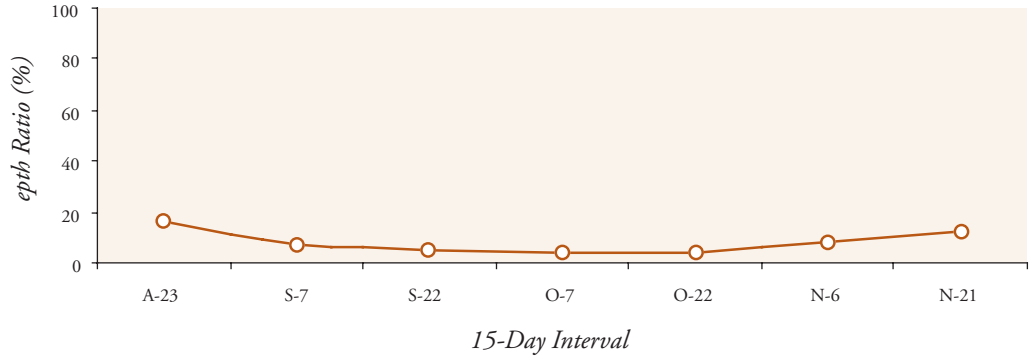


Figure 6-37. Changes in the required depth ratio for seasonal wetlands in the Fall Flooding Period for the San Joaquin Basin.

Winter Flooding Period (November 30–March 29)

Habitat needs for shorebirds in the Winter Flooding Period range from nearly 2,100 acres in the January and February intervals, to over 4,100 acres in both March intervals. All of these habitat needs must be met from seasonal wetlands, as no winter flooded rice is available (Table 6-34).

Table 6-34. Seasonal wetland objectives (acres) for shorebirds in San Joaquin Basin during the Winter Flooding Period.

Interval	*SW Interval Objective*	*Cumulative SW[a] Objective*	*Flooded SWs[b]*	*Required Depth[c] Ratio (%)*
D-6 (Nov 30-Dec 14)	2,497	9,669	61,013	16
D-21 (Dec 15-Dec 29)	2,497	12,166	61,013	20
J-5 (Dec 30-Jan 13)	2,095	14,261	61,013	23
J-20 (Jan 14-Jan 28)	2,095	16,356	61,013	27
F-4 (Jan 29-Feb 12)	2,095	18,451	61,013	30
F-19 (Feb 13-Feb 27)	2,095	20,546	61,013	33
M-6 (Feb 28-Mar 14)	4,118	24,664	61,013	40
M-21 (Mar 15-Mar 29)	4,118	28,782	61,013	47
Total	**21,610**	**28,782**	**61,013**	

SW – Seasonal Wetland.
[a]Includes SW objectives from previous flooding periods.
[b]Flooded SWs reflect flooding schedules within a shorebird planning region.
[c]Cumulative SW Objective/Flooded SWs.

The overall seasonal wetland objective for the Winter Flooding Period is 21,610 acres. Although this wetland objective is staggered over several 15-day intervals, it is possible to front-end this conservation objective. For example, seasonal wetland objectives for shorebirds could be met in the Winter Flooding Period by providing 21,610 acres during the December 6 interval and maintaining these acres at a depth <10 cm through the end of March (Figure 6-38).

As expected, the required depth ratio increases through the Winter Flooding Period as no new wetlands are being flooded and shorebirds deplete food resources on seasonal wetland acres that are managed <10 cm in depth (Figure 6-39).

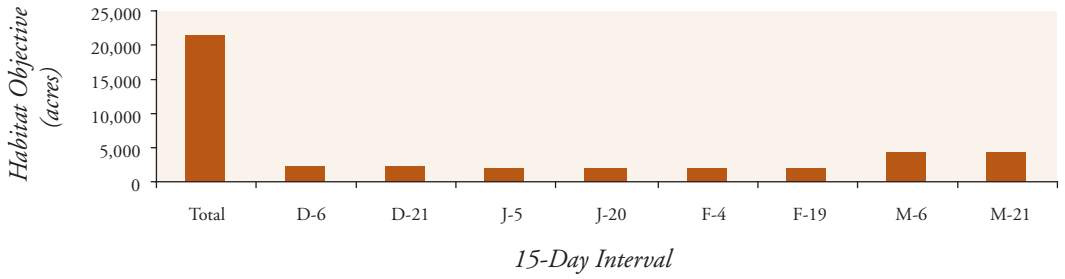


Figure 6-38. Seasonal wetland objectives for shorebirds in the Winter Flooding Period by 15-day intervals for the San Joaquin Basin.

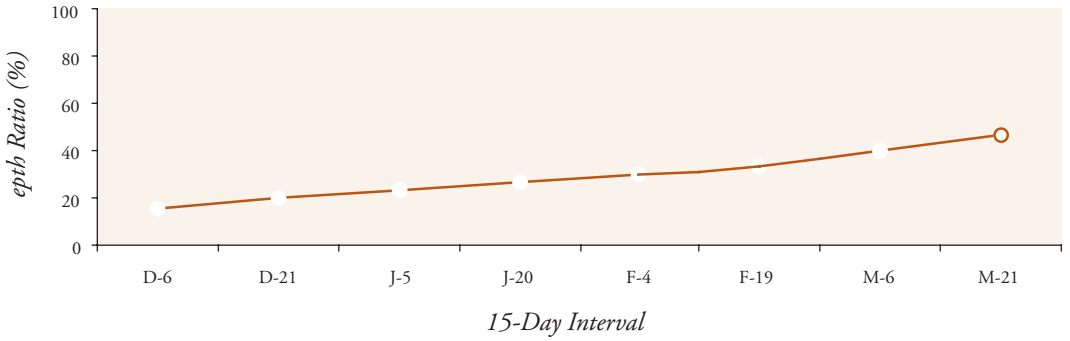


Figure 6-39. Changes in the required depth ratio for seasonal wetlands in the Winter Flooding Period for the San Joaquin Basin.

Spring Flooding Period (March 30–May 12)

Habitat needs for shorebirds in the Spring Flooding Period range from nearly 5,500 acres in each of the April intervals, to 366 acres in May (Table 6-35). The summed seasonal wetland objective for this period is 11,348 acres, with over 95% of these acres needed in the April intervals (Figure 6-40).

Table 6-35. Seasonal wetland objectives (acres) for shorebirds in San Joaquin Basin during the Spring Flooding Period.

Interval	*SW Interval Objective*	*Cumulative SW[a] Objective*	*Flooded SW[b] Habitat*
A-5 (Mar 30-Apr 13)	5,491	34,273	61,013
A-20 (Apr 14-Apr 28)	5,491	39,764	19,219
M-4 (Apr 29-May 10)	366	40,130	7,932
Total	**11,348**	**40,130**	

SW – Seasonal Wetland.
[a]Includes SW objectives from previous flooding periods.
[b]Flooded SWs reflect flooding schedules within a shorebird planning region.

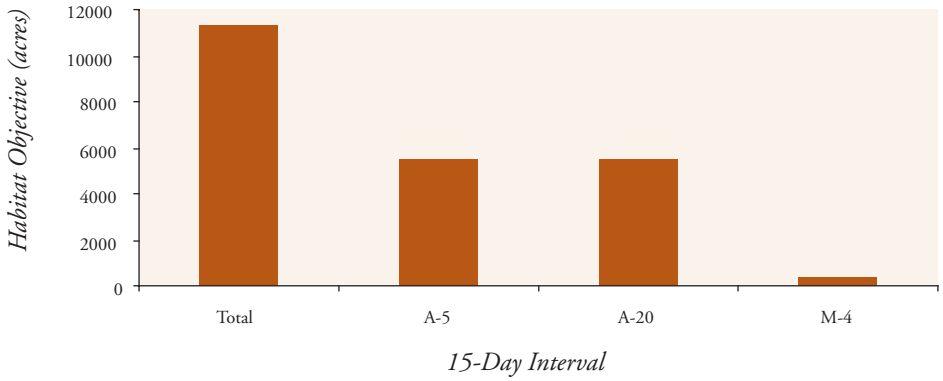


Figure 6-40. Seasonal wetland objectives for shorebirds in San Joaquin Basin during the Spring Flooding Period by 15-day intervals.

Water Supplies for Wetland Management

Additional water supplies that are needed for shorebirds are based on seasonal wetland needs in the August 8 interval (see earlier description for establishing water supply objectives). Seasonal wetland objectives for shorebirds in the San Joaquin Basin during the August 8 interval are estimated at 340 acres. This equates to a water supply need of 680 acre-feet.

Summary

Conservation objectives for managed seasonal and semi-permanent wetlands are summarized for the San Joaquin Basin in Table 6-36. Nearly 66% of the seasonal wetlands present in this planning region (40,130/61,013 acres) must provide foraging depths <10 cm during some portion of the wintering period if seasonal wetland objectives for shorebirds are to be met.

Table 6-36. Conservation Objectives for non-breeding shorebirds in San Joaquin Basin.

Interval	*Seasonal Wetlands (Acres)*	*Semi Perm. Wetlands (Acres)*	*Water (Acre Feet)*
J-7 (July 1-July 15)	0	85	0
J-22 (July 16-July 31)	0	90	0
A-8 (Aug 1-Aug 16)	340	0	680
A-23 (Aug 17-Aug 31)	340	0	0
S-7 (Sept 1-Sept 15)	340	0	0
S-22 (Sept 16-Sept 30)	340	0	0
O-7 (Oct 1-Oct 15)	424	0	0
O-22 (Oct 16-Oct 30)	424	0	0
N-6 (Oct 31-Nov 14)	2,497	0	0
N-21 (Nov 15-Nov 29)	2,497	0	0
D-6 (Nov 30-Dec 14)	2,497	0	0
D-21 (Dec 15-Dec 29)	2,497	0	0
J-5 (Dec 30-Jan 13)	2,095	0	0
J-20 (Jan 14-Jan 28)	2,095	0	0
F-4 (Jan 29-Feb 12)	2,095	0	0
F-19 (Feb 13-Feb 27)	2,095	0	0
M-6 (Feb 28-Mar 14)	4,118	0	0
M-21 (Mar 15-Mar 29)	4,118	0	0
A-5 (Mar 30-Apr 13)	5,491	0	0
A-20 (Apr 14-Apr 28)	5,491	0	0
M-4 (Apr 29-May 10)	366		0
Total	40,130	175	680

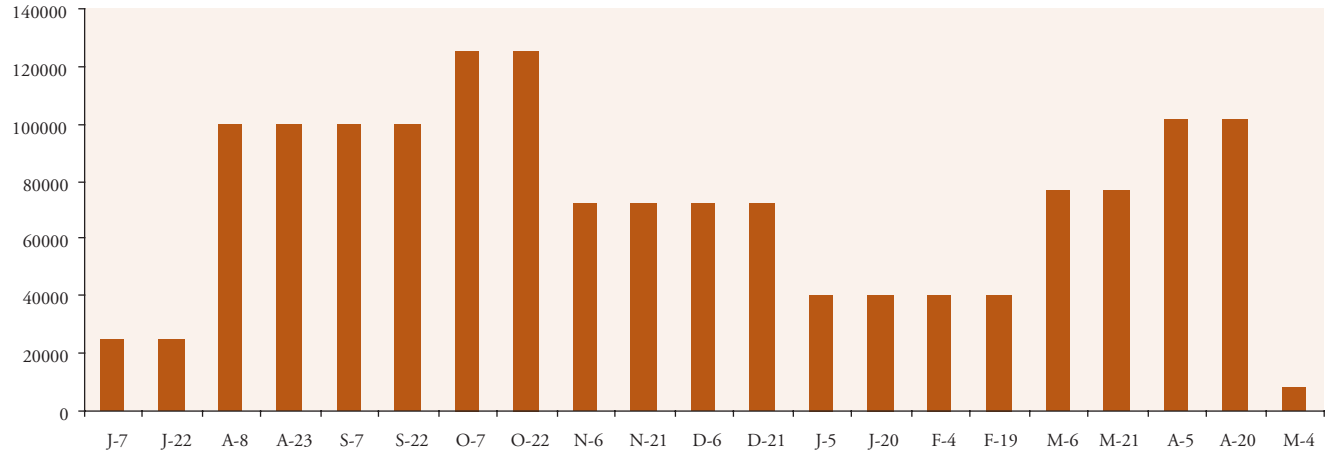
Tulare Basin

Current Conditions

Population objectives for migrating and wintering shorebirds in the Tulare Basin are presented in Figure 6-41. Population objectives are highest in April, with shorebird numbers reaching a minimum in July. Seasonal wetlands provide the majority of foraging habitat, as no winter flooded rice is available in this planning region (Table 6-37).

Table 6-37. Foraging habitats (acres) available to wintering shorebirds in the Tulare Basin.

Seasonal Wetland	*Semi Permanent Wetland*	*Winter Flooded Rice*
20,212	2,245	0



July 7	July 22	Aug. 8	Aug. 23	Sept.7	Sept. 22	Oct.7	Oct. 22	Nov. 6	Nov. 21	Dec. 6	Dec. 21	Jan. 5	Jan. 20	Feb. 4	Feb. 19	Mar. 6	Mar. 21	Apr. 5	Apr. 20	May 4
25,000	25,000	100,000	100,000	100,000	100,000	125,000	125,000	72,000	72,000	72,000	72,000	40,000	40,000	40,000	40,000	76,500	76,500	102,000	102,000	8,500

Figure 6-41. Shorebird population objectives (acres) for the Tulare Basin.

Figure 6-42 depicts the relationship between shorebird population objectives and the availability of seasonally flooded wetlands. Semi-permanent wetlands are assumed to provide shorebird habitat from July 1 to July 15, when they are typically drawn down and likely to provide foraging habitat <10 cm in depth. Seasonal wetlands provide no habitat prior to the August 23 interval, when flooding of these wetlands in the Tulare Basin typically begins. However, drawdown of semi-permanent wetlands in early July likely provides some foraging habitat between July 1 and July 15. Increases in the amount of seasonal wetlands track increases in shorebird numbers from late August through October. However, shorebird populations are high in early and mid-August when no seasonal wetlands are available. Shorebirds in the basin currently rely on sub-optimal habitats like evaporation ponds in August (Shuford et al. 1998), which probably reflects the lack of flooded seasonal wetlands. Shorebird numbers in the basin increase again during April when seasonal wetlands are being drawn down and the amount of foraging habitat <10 cm deep is likely increasing.

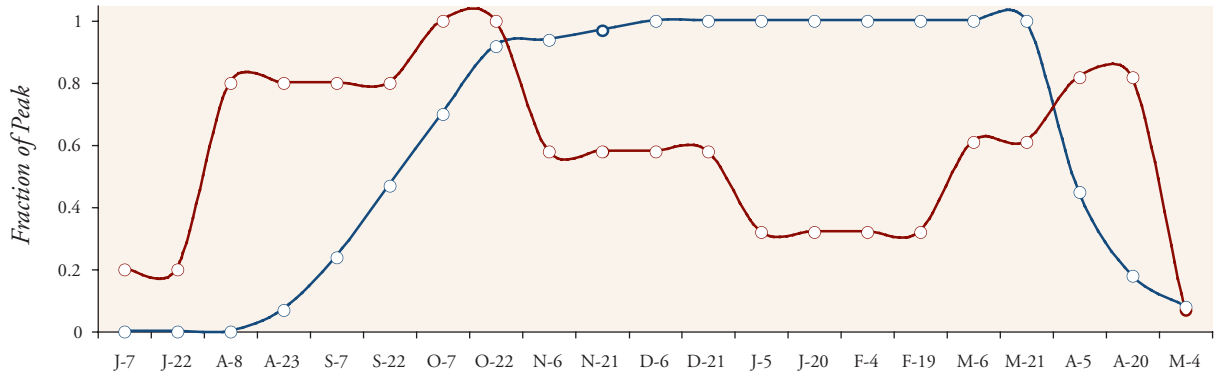


Figure 6-42. Shorebird population objectives (red) vs. flooding schedules for managed seasonal wetlands (blue) for the Tulare Basin. Shorebird population objectives are expressed as the fraction of peak population; wetlands are expressed as the fraction of seasonal wetlands that are flooded.

Management of Existing Seasonal and Semi-Permanent Wetlands

Summer Flooding Period (July 1–August 16)

Shorebirds require approximately 600 acres of foraging habitat in both the July intervals, with habitat needs increasing to nearly 2,300 acres in the August 8 interval (Table 6-38). Semi-permanent wetlands provide some opportunity to meet shorebird needs in July. The Tulare Basin contains nearly 2,250 acres of semi-permanent wetlands, of which 746 acres are publicly owned (Table 6-37). If all semi-permanent wetlands are drawn down between July 1 and July 15, twenty-five percent of these acres must maintain water depths <10 cm deep to meet shorebird needs in the July 7 interval. Semi-permanent public wetlands alone can meet shorebird needs in the July 7 interval if 76% of these habitats provide suitable water depths during drawdown. If all semi-permanent wetlands are drawn down by mid-July, there is no opportunity for these habitats to meet shorebird needs in the July 22 interval. Delaying the drawdown of some of these habitats until late July could help meet shorebird needs in the July 22 interval.

Table 6-38. Habitat objectives for shorebirds in Tulare Basin during the Summer Flooding Period.

Interval	*Habitat Objective (Acres)*
J-7 (July 1-July 15)	566
J-22 (July 16-July 31)	604
A-8 (Aug 1-Aug 16)	2,263
Total	**3,433**

Shorebirds require 2,263 acres of foraging habitat in the August 8 interval. There are currently no seasonal wetlands flooded in the Tulare Basin during the first two weeks of August, and all semi-permanent wetlands are assumed to be dry. The 2,263 acres needed by shorebirds could be met through early flooding of seasonal wetlands. However these 2,263 acres represent over 10% of existing seasonal wetlands in the basin, and finding water supplies for this early flooding may be difficult.

Fall Flooding Period (August 17–November 29)

Habitat needs for shorebirds in the Fall Flooding Period range from over 2,800 acres in the October intervals, to 1,400 acres in November (Table 6-39). Shorebird needs in this period must be met exclusively from seasonal wetlands, as no winter flooded rice is available in basin.

Table 6-39. Seasonal wetland objectives (acres) for shorebirds in Tulare Basin during the Fall Flooding Period.

Interval	*SW Interval Objective*	*Cumulative[a] SW Objective*	*Flooded SWs[b]*	*Required[c] Depth Ratio*
A-23 (Aug 17-Aug 31)	2,263	4,526	1,415	>100
S-7 (Sept 1-Sept 15)	2,263	6,789	4,851	>100
S-22 (Sept 16-Sept 30)	2,263	9,052	9,500	95
O-7 (Oct 1-Oct 15)	2,829	11,881	14,148	84
O-22 (Oct 16-Oct 30)	2,829	14,710	18,595	79
N-6 (Oct 31-Nov 14)	1,404	16,114	18,999	85
N-21 (Nov 15-Nov 29)	1,404	17,518	19,606	89
Total	**15,255**	**17,518**		

SW – Seasonal Wetland.
[a]Includes SW objectives from previous flooding periods.
[b]Flooded SWs reflect flooding schedules within a shorebird planning region.
[c]Cumulative SW Objective/Flooded SWs.

The total seasonal wetland objective for Tulare Basin in the Fall Flooding Period is 15,255 acres (Figure 6-43). It is unlikely that this objective is currently met for shorebirds. Although the Tulare Basin contains over 20,000 acres of seasonal wetlands, almost all of these habitats would have to provide foraging depths <10 cm to fully meet shorebird needs. This is reflected in the required depth ratio, which exceeds or approaches 1.0 in each 15-day interval of the Fall Flooding Period (Figure 6-44).

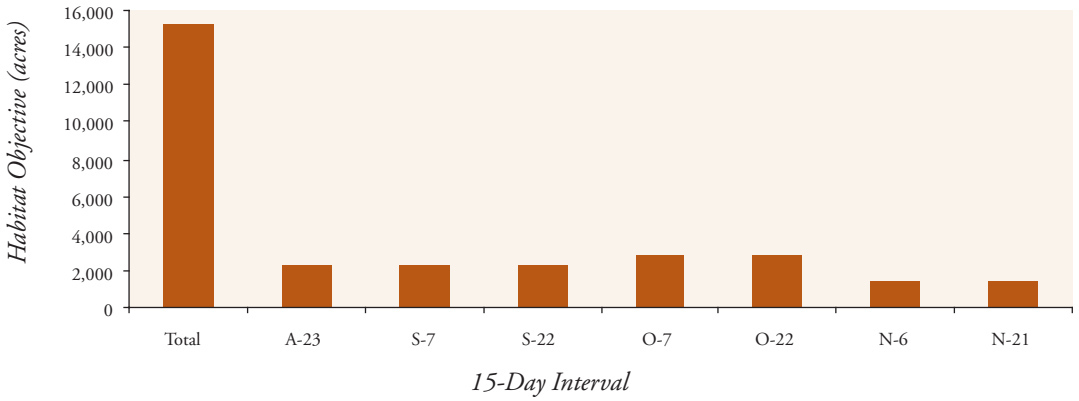


Figure 6-43. Seasonal wetland objectives for shorebirds in the Fall Flooding Period by 15-day intervals for the Tulare Basin.

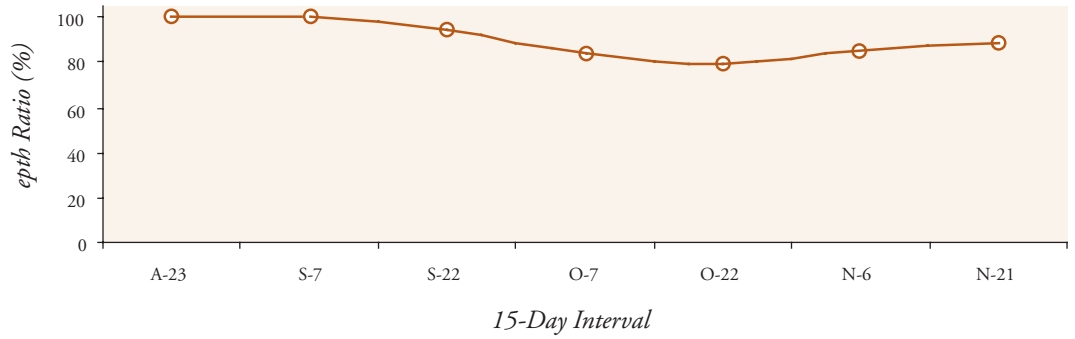


Figure 6-44. Changes in the required depth ratio for seasonal wetlands in the Fall Flooding Period for the Tulare Basin.

Winter Flooding Period (November 30–March 29)

Habitat needs for shorebirds in the Winter Flooding Period range from nearly 750 acres in the January and February intervals, to over 1,700 acres in both March intervals (Table 6-40). The overall seasonal wetland objective for the Winter Flooding Period is 9,216 acres (Figure 6-45). As expected, the required depth ratio remains high through the Winter Flooding Period, as no new wetlands are being flooded and shorebirds deplete food resources on seasonal wetland acres that are managed <10 cm in depth (Figure 6-46).

Table 6-40. Seasonal wetland objectives (acres) for shorebirds in Tulare Basin during the Winter Flooding Period.

Interval	*SW Interval Objective*	*Cumulativea SW Objective*	*Flooded SW s[b]*	*Required Depth[c] Ratio (%)*
D-6 (Nov 30-Dec 14)	1,404	18,922	20,212	94
D-21 (Dec 15-Dec 29)	1,404	20,326	20,212	>100
J-5 (Dec 30-Jan 13)	748	21,074	20,212	>100
J-20 (Jan 14-Jan 28)	748	21,822	20,212	>100
F-4 (Jan 29-Feb 12)	748	22,570	20,212	>100
F-19 (Feb 13-Feb 27)	748	23,318	20,212	>100
M-6 (Feb 28-Mar 14)	1,708	25,026	20,212	>100
M-21 (Mar 15-Mar 29)	1,708	26,734	20,212	>100
Total	**9,216**	**26,734**	**20,212**	

SW – Seasonal Wetland.
[a]Includes SW objectives from previous flooding periods.
[b]Flooded SW's reflect flooding schedules within a shorebird planning region.
[c]Cumulative SW Objective/Flooded SW's

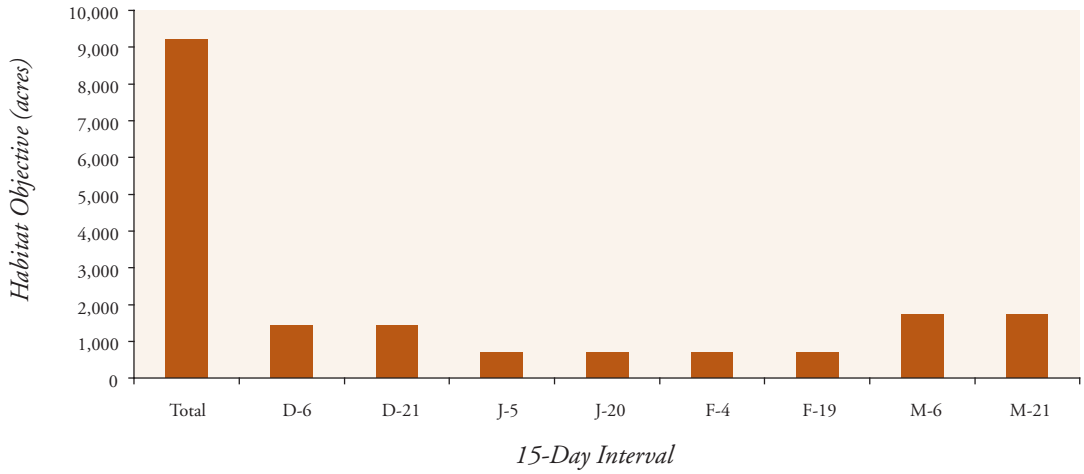


Figure 6-45. Seasonal wetland objectives for shorebirds in the Winter Flooding Period by 15-day intervals for the Tulare Basin.

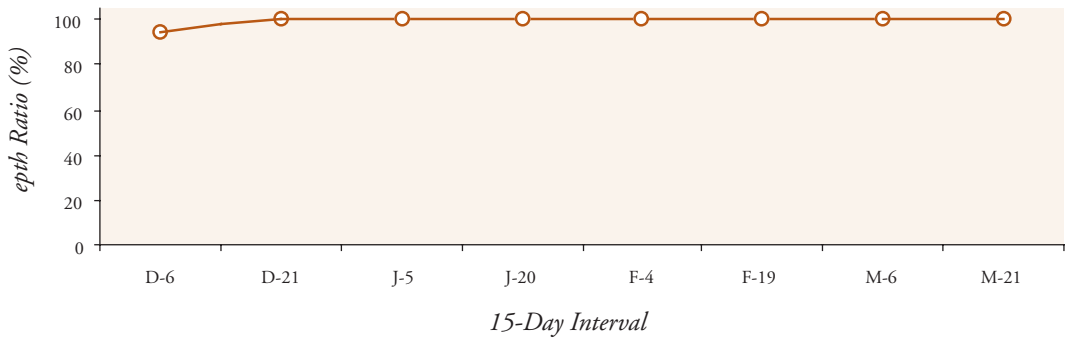


Figure 6-46. Changes in the required depth ratio for seasonal wetlands in the Winter Flooding Period for the Tulare Basin.

Spring Flooding Period (March 30–May 12)

Habitat needs for shorebirds in the Spring Flooding Period range from nearly 2,300 acres in each of the April intervals, to 152 acres in May (Table 6-41). The summed seasonal wetland objective for the Spring Flooding Period is 4,706 acres, with over 95% of these acres needed in the April intervals (Figure 6-47).

Table 6-41. Seasonal wetland objectives (acres) for shorebirds in Tulare Basin during the Spring Flooding Period.

Interval	*SW Interval Objective*	*Cumulative SW[a] Objective*	*Flooded SW[b] Habitat*
A-5 (Mar 30-Apr 13)	2,277	29,011	20,212
A-20 (Apr 14-Apr 28)	2,277	31,288	6,367
M-4 (Apr 29-May 10)	152	31,440	2,628
Total	**4,706**	**31,440**	

SW – Seasonal Wetland.
[a]Includes SW objectives from previous flooding periods.
[b]Flooded SW's reflect flooding schedules within a shorebird planning region.

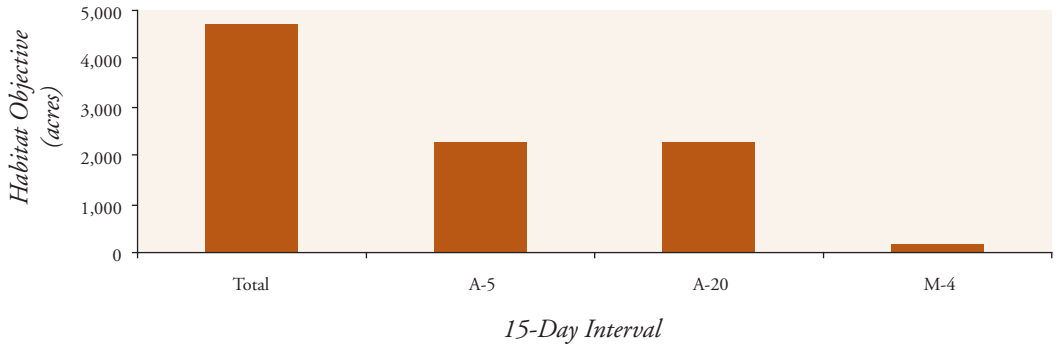


Figure 6-47. Seasonal wetland objectives for shorebirds in Tulare Basin during the Spring Flooding Period by 15-day intervals.

Water Supplies for Wetland Management

Additional water supplies that are needed for shorebirds are based on seasonal wetland needs in the August 8 interval (see earlier description for establishing water supply objectives). Seasonal wetland objectives for shorebirds in the Tulare Basin during the August 8 interval are estimated at 2,263 acres. This equates to a water supply need of 4,526 acre-feet.

Summary

Conservation objectives for managed seasonal and semi-permanent wetlands are summarized for the Tulare Basin in Table 6-42. Seasonal wetland objectives for shorebirds cannot be met even if all currently available habitat provides foraging depths <10 cm during some portion of the wintering period. This obviously does not occur in the Tulare Basin, which may explain the reliance of shorebirds on sub-optimal habitats within this basin.

Table 6-42. Conservation objectives for non-breeding shorebirds in Tulare Basin.

Interval	*Seasonal Wetlands (Acres)*	*Semi Perm. Wetlands (Acres)*	*Water (Acre Feet)*
J-7 (July 1-July 15)	0	566	0
J-22 (July 16-July 31)	0	604	0
A-8 (Aug 1-Aug 16)	2,263	0	4,526
A-23 (Aug 17-Aug 31)	2,263	0	0
S-7 (Sept 1-Sept 15)	2,263	0	0
S-22 (Sept 16-Sept 30)	2,263	0	0
O-7 (Oct 1-Oct 15)	2,829	0	0
O-22 (Oct 16-Oct 30)	2,,829	0	0
N-6 (Oct 31-Nov 14)	1,404	0	0
N-21 (Nov 15-Nov 29)	1,404	0	0
D-6 (Nov 30-Dec 14)	1,404	0	0
D-21 (Dec 15-Dec 29)	1,404	0	0
J-5 (Dec 30-Jan 13)	748	0	0
J-20 (Jan 14-Jan 28)	748	0	0
F-4 (Jan 29-Feb 12)	748	0	0
F-19 (Feb 13-Feb 27)	748	0	0
M-6 (Feb 28-Mar 14)	1,708	0	0
M-21 (Mar 15-Mar 29)	1,708	0	0
A-5 (Mar 30-Apr 13)	2,277	0	0
A-20 (Apr 14-Apr 28)	2,277	0	0
M-4 (Apr 29-May 10)	152		0
Total	**31,440**	**1,170**	**4,526**



Dunlin
Photo: Brian Gilmore

Summary

Acre objectives for seasonal wetlands, semi-permanent wetlands, and winter flooded rice are summarized for the entire Central Valley in Tables 6-43 through 6-45. Habitat objectives for shorebirds are strongly dependant on the estimates of invertebrate biomass adopted for wetland and agricultural habitats. Unfortunately, invertebrate biomass estimates do not exist for Central Valley habitats. As a result, the JV had to rely on biomass estimates obtained from other regions of the United States. More importantly, the JV assumed that invertebrate food sources are not renewable in the face of shorebird foraging. In reality, invertebrate populations and biomass may grow or remain stable despite the effects of shorebird foraging (i.e., invertebrate food resources are not depleted in the way seed resources are). If invertebrate populations are wholly or partially renewable, then shorebird habitat objectives may be overestimated. Future efforts to document seasonal changes in invertebrate biomass within the Central Valley should allow the JV to refine these habitat objectives.



Long-billed dowitchers
Photo: Brian Gilmore

Table 6-43. Seasonal wetlands objectives (acres) for shorebirds in the Central Valley.

Interval	*NSV*	*Delta Planning Region*	*San Joaquin Basin*	*Tulare Basin*	*Total*
J-7 (July 1-July 15)	0	0	0	0	0
J-22 (July 16-July 31)	0	0	0	0	0
A-8 (Aug 1-Aug 16)	1,584	340	340	2,263	4,527
A-23 (Aug 17-Aug 31)	1,584	340	340	2,263	4,527
S-7 (Sept 1-Sept 15)	1,584	340	340	2,263	4,527
S-22 (Sept 16-Sept 30)	1,584	340	340	2,263	4,527
O-7 (Oct 1-Oct 15)	990	212	424	2,829	4,455
O-22 (Oct 16-Oct 30)	990	212	424	2,829	4,455
N-6 (Oct 31-Nov 14)	1,483	468	2,497	1,404	5,852
N-21 (Nov 15-Nov 29)	1,483	468	2,497	1,404	5,852
D-6 (Nov 30-Dec 14)	1,483	468	2,497	1,404	5,852
D-21 (Dec 15-Dec 29)	1,483	468	2,497	1,404	5,852
J-5 (Dec 30-Jan 13)	1,684	636	2,095	748	5,163
J-20 (Jan 14-Jan 28)	1,684	636	2,095	748	5,163
F-4 (Jan 29-Feb 12)	1,684	636	2,095	748	5,163
F-19 (Feb 13-Feb 27)	1,684	636	2,095	748	5,163
M-6 (Feb 28-Mar 14)	1,959	151	4118	1,708	7,936
M-21 (Mar 15-Mar 29)	1,959	151	4,118	1,708	7,936
A-5 (Mar 30-Apr 13)	5,223	402	5,491	2,277	13,393
A-20 (Apr 14-Apr 28)	5,223	402	5,491	2,277	13,393
M-4 (Apr 29-May 10)	348	28	366	152	894
Total	**35,696**	**7,334**	**40,130**	**31,440**	**114,600**

Table 6-44. Semi-permanent wetland objectives (acres) for shorebirds in the Central Valley.

Interval	*NSV*	*Delta Planning Region*	*San Joaquin Basin*	*Tulare Basin*	*Total*
J-7 (July 1-July 15)	396	85	85	566	1,132
J-22 (July 16-July 31)	423	85	90	604	1,202
Total	**819**	**170**	**175**	**1,170**	**2,334**

Table 6-45. Winter Flooded Rice objectives (acres) for shorebirds in the Central Valley.

Interval	*NSV*	*Delta Planning Region*	*San Joaquin Basin*	*Tulare Basin*	*Total*
J-7 (July 1-July 15)	0	0	0	0	0
J-22 (July 16-July 31)	0	0	0	0	0
A-8 (Aug 1-Aug 16)	0	0	0	0	0
A-23 (Aug 17-Aug 31)	0	0	0	0	0
S-7 (Sept 1-Sept 15)	0	0	0	0	0
S-22 (Sept 16-Sept 30)	0	0	0	0	0
O-7 (Oct 1-Oct 15)	990	212	0	0	2,192
O-22 (Oct 16-Oct 30)	990	212	0	0	1,202
N-6 (Oct 31-Nov 14)	1,483	468	0	0	1,951
N-21 (Nov 15-Nov 29)	1,483	468	0	0	1,951
D-6 (Nov 30-Dec 14)	1,483	468	0	0	1,951
D-21 (Dec 15-Dec 29)	1,483	468	0	0	1,951
J-5 (Dec 30-Jan 13)	1,684	636	0	0	2,320
J-20 (Jan 14-Jan 28)	1,684	636	0	0	2,320
F-4 (Jan 29-Feb 12)	1,684	636	0	0	2,320
F-19 (Feb 13-Feb 27)	1,684	636	0	0	2,320
M-6 (Feb 28-Mar 14)	1,959	151	0	0	2,110
M-21 (Mar 15-Mar 29)	1,959	151	0	0	2,110
A-5 (Mar 30-Apr 13)	0	0	0	0	0
A-20 (Apr 14-Apr 28)	0	0	0	0	0
M-4 (Apr 29-May 10)	0	0	0	0	0
Total	**18,566**	**5,142**	**0**	**0**	**23,708**

Although shorebird habitat objectives may be conservative, regional differences in habitat objectives and required depth ratios help suggest where the JV should focus its efforts for shorebirds both temporally and spatially. During the Summer Flooding Period (July 1–August 16), shorebird habitat needs in the July intervals may be met through staggered drawdowns of semi-permanent wetlands. Within the SV, Delta, and San Joaquin Basin Planning Regions, only a small percent of existing semi-permanent wetlands must provide habitat <10 cm in depth. It seems likely that shorebird needs are either being met in these regions, or can be met with minor management adjustments. In contrast, a much higher percent of semi-permanent wetlands in the Tulare Basin must provide foraging depths <10 cm during the July drawdowns to meet shorebird needs. Tulare Basin also differs from the other three planning regions during the first half of August (August 8 interval). Over 10% of the existing seasonal wetlands would need to be flooded early to meet shorebird needs during this period. This objective may be especially challenging given the high cost of water in the basin. In contrast, less than 3% of the seasonal wetlands in the SV, Delta, and San Joaquin Basin Planning Regions need to be flooded during the first half of August. The Tulare Basin contains 50% of all shorebirds in the Central Valley during the Summer Flooding Period, and faces unique conservation challenges. As a result, it represents the JVs highest regional priority during this period.

Although shorebird populations in the Tulare Basin decline in the second half of the Fall Flooding Period, the region remains a priority during this time. Required depth ratios in the SV, Delta, and San Joaquin Basin Planning Regions remain relatively low during the Fall Flooding Period. The lower the required depth ratio, the more likely that shorebird habitat needs are being met. In contrast, required depth ratios in the Tulare Basin during the Fall Flooding Period were near or at 100% for all 2-week time intervals.

Required depth ratios increased in the SV, Delta, and San Joaquin Basin Planning Regions during the Winter Flooding Period, and remained near or at 100% for the Tulare Basin. It seems likely that shorebirds may have increasing difficulty in meeting their food energy needs during the Winter Flooding Period as wetlands become fully flooded and the availability of shallow water habitat declines. Drawdown of seasonal wetlands during winter resulted in significant increases in shorebird use, which supports this assumption (Taft et al. 2002).

The Delta Planning Region, San Joaquin Basin, and Tulare Basin are considered priority regions for additional habitat conservation to meet shorebird needs during the Winter Flooding Period. Although required depth ratios in the SV Planning Region were similar to other regions, the abundance of rice habitat in the SV Planning Region makes it more likely that shorebird needs are being met in this region.

Finally, no priority regions were identified for the Spring Flooding Period. Most seasonal wetlands are being drawn down during this period, which may create an abundance of shallow water habitat that exceeds shorebird needs (Taft et al. 2002).



Black-necked stilts
Photo: Sacramento Bee/Chris Crewell

Chapter Seven: BREEDING SHOREBIRDS

This chapter addresses the needs of seven species of shorebirds that breed within the Central Valley.

"The Central Valley supports thousands of nesting shorebird species such as black-necked stilt, American avocet, and killdeer, as well as populations of snowy plover. These populations are important on both a statewide and regional scale."

Glenn Olson
Executive Director
Audubon California

Introduction

Among the shorebirds breeding within the Central Valley, only the killdeer *(Charadrius vociferous)*, the black-necked stilt *(Himantopus mexicanus)*, and the American avocet *(Recurvirostra americana)* are widespread, numerous, and nest in a variety of wetland, agricultural, and water treatment or storage habitats. Because of their widespread distribution and available survey information, black-necked stilts *(stilts)* and American avocets *(avocets)* form the basis for breeding shorebird habitat objectives in the 2005 Plan. Four other shorebird species also breed in the Central Valley including snowy plover *(Charadrius alexandrinus)*, spotted sandpiper *(Actitis macularia)*, Wilson's snipe *(Gallinago delicata)*, and Wilson's phalarope *(Phalaropus tricolor)*. Although there are no breeding population estimates for these species, future surveys could lay the foundation for additional habitat objectives specific to these shorebird species.

Historical Overview of Central Valley Breeding Shorebird Habitat

Prior to European settlement, the Central Valley contained extensive shallow-water wetland habitat that varied both seasonally and annually depending on the amount of flooding from winter rains and spring runoff. These shallow-water wetlands were highly productive, and when they persisted into spring and summer, provided important habitat for many species of breeding waterbirds, and shorebirds (Shuford et al. 2001). By the mid-1900s, breeding populations of stilts and avocets in California had been reduced commensurate with the loss of interior marshlands (Grinnell and Miller 1944). The loss of breeding habitat for stilts and avocets in the Central Valley was partially offset by the creation of salt ponds in the San Francisco Bay estuary, where nesting populations of both species increased early in the 1900s (Gill 1977).



Killdeer
Photo: Dave Feliz, CDFG

In addition to habitat loss, breeding shorebirds in the Central Valley are often exposed to poor or toxic water conditions, because they frequently rely on evaporation and sewage ponds for breeding habitat. In the 1980s, agricultural drain water in the San Joaquin Valley containing high levels of salts and trace elements was delivered to wetlands to provide wildlife habitat and to agricultural evaporation ponds for disposal. This contamination resulted in bioaccumulation of selenium sufficient to harm reproduction of shorebirds, including stilts and avocets (Ohlendorf et al. 1987, 1993; Skorupa and Ohlendorf 1991.

In wetlands, exposure to selenium has been reduced by filling over areas which contained highest concentrations of this element or by providing uncontaminated water for wetland management. Evaporation ponds are now managed to reduce contamination risk to wildlife by: (1) filling some ponds; (2) hazing birds or physically altering ponds to make them less attractive; and (3) creating nearby uncontaminated wetlands as alternative habitat (Moore et al. 1990, Steele and Bradford 1991, Bradford 1992). Despite steady declines in selenium levels, concentrations in some species still exceed those known to impair reproduction (Paveglio et al. 1992, 1997; Hothem and Welsh 1994*a,b*). Monitoring is ongoing to determine shorebird and other bird response to these management actions. (R. Hansen, Hansen's Biological Consulting, unpublished data).

Habitat needs for wintering shorebirds were established using a forage-based model that directly linked population objectives to habitat goals (Chapter 6). However, there is no clear link between population objectives for breeding shorebirds and the amount of habitat needed to support breeding birds. The approach used here establishes five-year habitat objectives that reflect the pace of JV accomplishments in recent years. Five years is the amount of time expected between the 2006 Plan and the next Implementation Plan update. It is important that JV partners recognize that this is a short-term objective that reflects the practical realities of habitat delivery in the Central Valley. Habitat objectives for breeding shorebirds may increase in future plan updates, as a better understanding of the link between population objectives and habitat needs of breeding shorebirds is gained. The remainder of this chapter is divided into two sections: (1) a short review of planning information available for breeding shorebirds in the Central Valley; and (2) conservation objectives for breeding shorebirds in the Central Valley.

A Review of Planning Information Available for Breeding Shorebirds in the Central Valley

The JV used four planning regions within the Central Valley to evaluate breeding shorebird needs and to establish conservation objectives for this bird group: (1) Sacramento Valley, consisting of Colusa, Butte, American, and Sutter Basins; (2) Delta, consisting of Yolo and Delta Basins; (3) San Joaquin Basin; and (4) Tulare Basin. The Suisun Basin was not included, as counts do not exist for this region. However, the Suisun Marsh does provide valuable habitat for breeding shorebirds, and the following conservation actions identified in the *Southern Pacific Shorebird Conservation Plan* may benefit this bird group: (1) maintain or increase current breeding populations of killdeer, black-necked stilt, and American avocet by restoring, enhancing or creating nesting habitat; (2) incorporate shorebird habitat components in tidal marsh restorations; (3) increase tidal circulation and water quality in marshes to enhance invertebrate productivity and shorebird foraging areas; (4) time water drawdowns in managed marshes to correspond with the peak of spring shorebird migration from mid-April to mid-May; (5) manage vegetation in some ponds to provide expanses of open habitat; and (6) increase nesting habitat for black-necked stilt and American avocet in managed marshes through the strategic placement of islands. (PRBO 2003).

Four factors were considered when establishing conservation objectives for breeding shorebirds in the Central Valley: (1) historic patterns of habitat loss; (2) current distribution of breeding shorebirds among planning regions; (3) an estimate of the habitat resources currently available to breeding shorebirds in each planning region; and (4) annual rates of wetland restoration in the Central Valley. Annual wetland restoration rates provide a basis for identifying how much conservation work might be accomplished on behalf of breeding shorebirds in the next five years, while factors one through three provide the basis for distributing this objective in a biologically meaningful way.

Historic Habitat Loss

Although 95% of the Central Valley's wetlands are now gone, loss of shorebird habitat has been particularly high in the Tulare Basin. Prior to European settlement, Tulare Lake represented the largest freshwater body west of the Mississippi River (Johnson et al. 1993, Thelander and Crabtree 1994). Tulare Basin also contained several smaller lakes (Buena Vista, Goose, Kern), that together provided 260,000 acres of seasonal wetlands and over 250,000 acres of semi-permanent marshes (Griggs et al. 1992).

In 2001, the California State University, Chico began to develop a set of historic natural vegetation maps for the Central Valley of California that identify major changes in the valley due in part to hydrologic alterations associated with the Central Valley Project (1945) and the California State Water Project (1973). Preliminary analysis from the *Central Valley Historic Mapping Project* indicates that 96% of the historic wetland and aquatic habitats of the Tulare Basin were lost prior to 1995, and that the loss of these habitat types in the other planning regions of the Central Valley, has ranged between 55% and 87% (http://www.gic.csuchico.edu/historic).

Hydrologic factors varied significantly among basins of the Central Valley, resulting in regional differences in the amount of summer wetland habitat. Despite suffering disproportionately high rates of wetland loss, the Tulare Basin likely contained an abundance of summer wetland habitat relative to other areas of the valley. Because Tulare Basin was a terminal basin, it retained water well into summer, since most water moved slowly out of the basin via evaporation. The timing of flood events was another important factor in producing regional differences in summer wetland habitat. Rainfall induced floods (Dec-Mar) predominated in the Sacramento Valley Planning Region, whereas prolonged snowmelt floods (Apr-June) were the norm in the San Joaquin Valley, particularly in the Tulare Basin (The Bay Institute 1998). Various accounts indicate that Tulare Basin wetland habitats supported large numbers of breeding birds, including pelicans, cormorants, waterfowl, shorebirds, and terns.

Current Shorebird Distribution

Surveys were conducted throughout the Central Valley in 2003 to determine distribution, abundance, and habitat use of breeding stilts and avocets. These two species form the basis for breeding shorebird habitat objectives in the 2006 Plan. The 2003 survey estimated 29,600 stilts and 10,550 avocets in the entire Central Valley, exclusive of Suisun Marsh (Shuford et al. 2004). The distribution of these two species among habitat types and planning regions of the Central Valley is presented in Tables 7-1 and 7-2.

Sixty-four percent of all breeding shorebirds (stilts and avocets combined) were observed in the Sacramento Valley Planning Region, with 32% of all birds counted in the Tulare Basin. Less than 5% were observed in the Delta Planning Region and the San Joaquin Basin. Seventy-four percent of all stilts were observed in the Sacramento Valley Planning Region, with most others (23%) observed in the Tulare Basin. The Delta Planning Region and the San Joaquin Basin each contained less than 3% of all breeding stilts (Table 7-1). Unlike stilts, most avocets (57%) were counted in the Tulare Basin. The Sacramento Valley Planning Region contained 36% of all breeding avocets, while the combined counts from the San Joaquin and Tulare Basins made up less than 8% of all birds (Table 7-2).

The distribution of breeding shorebirds among habitat types also differed by planning region. Ninety-eight percent of all stilts in the Sacramento Valley Planning Region were observed in rice fields and only one percent in managed wetlands. In contrast, thirty-five percent of all stilts in the Tulare Basin were counted in managed wetlands (Table 7-1). Avocets displayed similar geographic variation in their use of habitat types. Nearly 93% of all avocets in the Sacramento Valley Planning Region were observed in rice fields, with less than 4% occurring in managed wetlands. In contrast, nearly half of all avocets in the Tulare Basin were observed in managed wetlands (Table 7-2).

Table 7-1. Numbers (%) of breeding black-necked stilts in various habitat types by planning regions of the Central Valley in 2003 (from Shuford et al. 2004).

	Sacramento Valley	*Delta*	*San Joaquin Basin*	*Tulare Basin*	*Central Valley Total*
Managed wetlands	219 (1.0)	4 (2.5)	307 (44.2)	2,441 (35.3)	2,971 (10.0)
Sewage ponds	133 (0.6)	33 (20.6)	274 (39.4)	1,329 (19.2)	1,769 (6.0)
Rice fields	21,412 (98.1)	72 (45.0)	26 (3.7)	0 (0.0)	21,510 (72.7)
Water storage facilities	42 (0.2)	0 (0.0)	2 (0.3)	820 (11.8)	864 (2.9)
Miscellaneous	21 (0.1)	51 (31.9)	86 (12.4)	202 (2.9)	360 (1.2)
Evaporation ponds	0 (0.0)	0 (0.0)	0 (0.0)	1,170 (16.9)	1,170 (4.0)
Agricultural canals	0 (0.0)	0 (0.0)	0 (0.0)	958 (13.8)	958 (3.2)
Total of all habitat types	**21,827**	**160**	**695**	**6,920**	**29,602**

Table 7-2. Numbers (%) of breeding American avocets in various habitat types by planning regions of the Central Valley in 2003 (From Shuford et al. 2004).

	Sacramento Valley	*Delta*	*San Joaquin Basin*	*Tulare Basin*	*Central Valley Total*
Sewage ponds	121 (3.2)	12 (13.8)	217 (29.6)	614 (10.3)	964 (9.1)
Rice fields	3,469 (92.6)	27 (31.0)	15 (2.0)	0 (0.0)	3,511 (33.3)
Water storage facilities	11 (0.3)	0 (0.0)	1 (0.1)	192 (3.2)	204 (1.9)
Miscellaneous	6 (0.2)	45 (51.7)	104 (14.2)	55 (0.9)	210 (2.0)
Evaporation ponds	0 (0.0)	0 (0.0)	0 (0.0)	1,538 (25.7)	1,538 (14.6)
Agricultural canals	0 (0.0)	0 (0.0)	0 (0.0)	694 (11.6)	694 (6.6)
Total of all habitat types	**3744**	**87**	**732**	**5,983**	**10,546**

Stilts and avocets were more evenly distributed among habitat types in the Tulare Basin than in any other planning region of the Central Valley. Five habitats in the Tulare Basin held >10% of all stilts or avocets. The Tulare Basin was the only planning region where agricultural evaporation ponds, canals ditches, and water storage facilities (water recharge ponds, storm water storage ponds, and reservoirs) supported large numbers of stilts and avocets. The proportion of shorebirds in managed wetlands in the Tulare Basin, and to a lesser degree in the Central Valley as a whole, was weighted heavily by large numbers of stilts and avocets counted in a single compensation wetland in the Tulare Basin that was supplied by saline water from an adjacent agricultural evaporation basin.

Overall, shorebirds in some parts of the Central Valley (e.g., Tulare Basin) rely heavily on habitats that serve the production, water conveyance, storage, treatment, or disposal needs of agriculture, municipalities, or industry. The use of some of these habitats may expose shorebirds to toxic substances. Therefore, reliance on some of these artificial environments is risky as future management practices may serve human efficiencies and economies, but reduce benefits to wildlife. This highlights the need to restore and enhance sufficient summer wetland habitat to meet the needs of breeding shorebirds, and other migratory and resident wildlife.

Existing Habitats

Acres of managed semi-permanent wetlands and planted rice are presented for each of the four planning regions in Table 7-3. These acre estimates are intended to provide an index to the amount of habitat now available to breeding shorebirds in each of these four planning regions. However, the JV recognizes that Table 7-3 does not include all habitat types (e.g., water storage habitats), nor does it distinguish between semi-permanent wetlands that are managed consistent with shorebird needs vs. semi-permanent habitats that are not managed with shorebird needs in mind. Still, the habitat estimates presented in Table 7-3 provide some insight to regional differences in the resources available to breeding shorebirds.

Table 7-3. Existing breeding shorebird habitats (acres) in the Central Valley.

Planning region	*Semi-permanent wetlands*	*Planted rice*
Sacramento Valley	10,488	491,146
Delta	1,121	1,399
San Joaquin Basin	6,779	10,000
Tulare Basin	2,245	0

Half of all semi-permanent wetlands in the four shorebird planning regions occur in the Sacramento Valley Planning Region, with most of the remaining wetlands located in the San Joaquin Basin. Only about ten percent of all semi-permanent wetlands occur in the Tulare Basin, despite this region's importance to breeding shorebirds. Finally, about 5% of all managed wetlands are located in the Delta Planning Region, where breeding shorebird numbers are low relative to other areas of the Central Valley (Table 7-3).

Annual Rates of Wetland Restoration in the Central Valley

Annual tracking of JV accomplishments indicates that wetland restoration in the Central Valley averages about 6,000 acres per year. Between 10% and 15% of these wetlands are managed as semi-permanent wetlands, depending on the basin (U.S. Fish and Wildlife Service 2000). Assuming an average value of 12.5%, approximately 750 acres of semi-permanent wetlands are annually restored in the Central Valley.

Conservation Objectives for Breeding Shorebirds



American avocet
Photo: Brian Gilmore

Although Central Valley shorebirds breed in a variety of habitats (Shuford et al. 2004), there is general agreement that conservation efforts should focus on providing summer wetland habitat (semi-permanent wetlands) that is managed to prevent widespread establishment of robust emergent plant communities. As a result, conservation objectives for breeding shorebirds in the 2006 Plan are limited to: (1) the establishment of semi-permanent wetland objectives (acres) in each of the four planning regions; and (2) the annual water needs of these wetlands. It is assumed that these wetlands will be managed consistent with the needs of breeding shorebirds, including control of robust emergent vegetation, provision of unvegetated nesting islands, provision of shallow foraging habitat for adults and young, and, where appropriate, employing methods to control predation of nests and young (see Shuford et al. 2004 for more specific management recommendations).

Recent surveys of breeding shorebirds in the Central Valley indicate that most birds breed in the Sacramento Valley Planning Region and the Tulare Basin. Of the 40,000 stilts and avocets observed in the 2003 breeding survey, nearly 64% occurred in the Sacramento Valley Planning Region. Tulare Basin accounted for 32% of this total (Tables 7-1 and 7-2). Although both these planning regions are important to breeding shorebirds, they differ in terms of historic habitat loss and existing habitat resources. Loss of historic shorebird breeding habitat appears to be especially high in the Tulare Basin with the loss of terminal lake systems to agriculture. Moreover, Tulare Basin has considerably less summer wetland habitat than occurs in the Sacramento Valley Planning Region. These differences in existing habitat resources are compounded by the difficulty in acquiring water for summer wetland habitat in Tulare Basin because of high costs and low availability.

Wetland Restoration

The conservation objective is to restore 7,500 acres of semi-permanent wetlands over the next five years (Table 7-4). Restoration of semi-permanent wetlands in the Central Valley has averaged about 750 acres per year in recent years. This objective is a two-fold increase over current rates of restoration, and was apportioned among the four planning regions based on the current distribution of breeding shorebirds, historic patterns of wetland loss, and existing wetland resources. While believed to be realistic, this objective will require a substantial effort on the part of JV partners to deliver over the next five years.

Wetland Water Requirements

Annual water needs for semi-permanent wetlands are estimated to average 6.5 acre-feet per acre (U.S. Fish and Wildlife Service 2000). Table 7-5 identifies the annual wetland water needs to meet breeding shorebird requirements based on five year habitat objectives for each planning region.

Summary

Overall, meeting the five-year habitat objectives for breeding shorebirds in the Central Valley requires an additional 7,500 acres of semi-permanent habitat to be distributed as described in Table 7-4. Longer-term habitat objectives for breeding shorebird populations will be developed over the next several years by the JV, and will be reflected in future revisions of the 2006 Plan. It is assumed that these acres will be managed in a way that is consistent with breeding shorebird needs (see Shuford et al. 2004 for specific habitat management recommendations). The forthcoming JV monitoring and evaluation plan should outline an approach to monitor the suitability of semi-permanent wetland habitat for breeding shorebirds and population response to habitat increases. In addition, it may suggest monitoring needs for breeding shorebird species not included in this chapter, and an approach to produce additional habitat objectives for those species.

Table 7-4. Five-year wetland restoration objectives for breeding shorebirds in the Central Valley.

Planning region	*5 year acre objective*
Tulare Basin	4,435
Total	**7,500**

Table 7-5. Annual wetland water needs (acre-feet) to meet 5-year breeding shorebird habitat objectives.

Planning region	*Annual acre feet Need*
Sacramento Valley	5,688
Delta	5,688
San Joaquin Basin	8,548
Tulare Basin	28,828
Total	**48,752**



Ibis
Photo: Bob McLandress, CWA

Chapter Eight: WATERBIRDS

This chapter addresses conservation needs within the Central Valley for waterbirds, a large and diverse group that includes seabirds, coastal waterbirds, wading birds and marshbirds that rely on aquatic habitats.

Introduction

The Central Valley provides habitat for thirty-eight species of waterbirds. The North American Waterbird Conservation Plan (NAWCP; Kushlan et al. 2002) provides a continental framework for the conservation and management of 23 families of North American waterbirds. Version 1 of the NAWCP concentrates on colonial nesting species with future versions of the plan to address solitary-nesting waterbirds. The NAWCP outlines four goals with associated strategies and desired results for waterbirds: (1) species and population; (2) habitat; (3) education and information; and (4) coordination and information. The NAWCP also relegates responsibility to regional step-down conservation plans for the development of specific conservation goals at regional scales. In the absence of a completed regional bird conservation plan, this 2005 Plan incorporates appropriate recommendations from the NAWCP Species and Population and Habitat Goals into the JV planning process. This is the first organized effort to explicitly link goals and strategies outlined in the NAWCP with the goals and objectives of the JV. The remainder of this chapter is divided into three sections: (1) approach used to develop conservation objectives for waterbirds; (2) selecting focal species; and (3) conservation objectives for waterbirds.

"Degradation of Central Valley wetlands undoubtedly collapsed waterbird populations. Recent seasonal wetland and riparian restoration efforts have resulted in an expansion of breeding colonial waterbird nesting. Among species that have made dramatic recoveries are breeding white-faced ibis and wintering great blue heron. However, several other species (least bittern, black tern, and black rail) remain at low levels, and demand further habitat conservation efforts."

Frederic Reid, Ph.D.
Director of Conservation Planning
Ducks Unlimited, Inc.

Approach Used to Develop Conservation Objectives for Waterbirds

Version 1 of the NAWCP provides quantitative information for colonial nesting species, the majority of which are long-legged waders and seabirds. The lack of continental and regional population goals and population baseline data on size and distribution is the greatest obstacle to developing population-based habitat goals and objectives. The U.S. Fish and Wildlife Service (USFWS) is currently developing a waterbird conservation plan for Bird Conservation Region (BCR) 32, Coastal California, which wholly encompasses the Central Valley (U.S. NABCI Committee 2000). This plan will establish long term conservation goals and objectives for waterbirds and will provide a basis for establishing long term goals for the next JV implementation plan update. This chapter develops short term (5-year) conservation objectives that include a combination of quantitative habitat objectives and qualitative habitat conservation recommendations to benefit a range of waterbird species that breed and/or winter within the Central Valley. Specifically, this chapter: (1) identifies focal species that serve as an "umbrella" for similar species; (2) identifies factors believed to be limiting their populations; and (3) develops conservation strategies to counter these limiting factors.

Selecting Focal Species



Snowy egret
Photo: Brian Gilmore

The JV selected focal species by reviewing the NAWCP and other documents to determine the distribution of all waterbird species within the JV and subsequently evaluated the current level of conservation concern for these species. Focal species that best serve as "umbrella" species for the family or group of waterbirds that they represent, and that would most likely benefit from JV conservation actions, were selected from this list. This chapter includes a brief overview of the habitat needs and associations of each focal species.

Distribution of Waterbirds in the JV

The NAWCP summarizes available population data for 210 species of North American waterbirds. It also lists the distribution and classification of waterbirds (breeding, wintering, migratory, pelagic) for 52 BCRs and Pelagic Bird Conservation Regions. The JV used range maps from Zeiner et al. (1990) to determine which species found in BCR 32 occur within the boundaries of the JV during summer and/or winter. Because information on waterbirds is lacking at the basin level, the JV combined some basins to form four waterbird planning regions similar to the shorebird planning region units described in chapters 6 and 7 (Figure 8-1). The Sacramento Valley Planning Region includes the Butte, Colusa, Sutter, and American Basins. The Delta Planning Region includes the Yolo and Delta Basins and the Suisun Marsh. The San Joaquin and Tulare basins stand alone as their own planning regions. Thirty-eight species representing eight families of waterbirds occur within the JV (Table 8-1). Twenty-seven of those species winter within one or more planning regions, and 25 occur in one or more planning regions during the breeding season.



Figure 8-1. Waterbird planning regions of the Central Valley Joint Venture.

Table 8-1. Breeding[1] and wintering[2] distribution of waterbirds among waterbird planning regions.

	Sacramento Valley	*Delta*	*San Joaquin*	*Tulare*
Eared grebe	W	B, W	W	B, W
Western grebe	B, W	W	B, W	B, W
Clark's grebe	B, W	W	B, W	B, W
Pied-billed grebe	B, W	B, W	B, W	B, W
American white pelican	W	W	W	W
Double-crested cormorant	B, W	W	W	B, W
Snowy egret	B, W	B, W	B, W	W
Black-crowned night heron	B, W	B, W	B, W	B, W
Green-backed heron	B, W	B, W	B, W	B, W
Great blue heron	B, W	B, W	B, W	B, W
Great egret	B, W	B, W	B, W	B, W
Cattle egret	B,W			
Least bittern	B	B	B	
American bittern	B, W	B, W	B, W	B, W
White-faced ibis	B, W		B, W	B, W
California gull	W	B, W	B, W	B, W
Forster's tern	B	B	B	B
Black tern	B	B	B	B
Bonaparte's gull		W		
Thayer's gull	W	B, W	B, W	
Herring gull	W	W	W	W
Glaucous-winged gull	W	W	W	
Ring-billed gull	W	B, W	B, W	B, W
Mew gull	W	W		
Black rail	B	B, W		
Virginia rail	B, W	B, W	B, W	B, W
Sora rail	B, W	B, W	B, W	B, W
Common moorhen	B, W	B, W	B, W	B, W
American coot	B, W	B, W	B, W	B, W
Sandhill crane	W	W	W	W

1. B = breeding 2. W = wintering

Conservation Status of Waterbirds

The status of waterbird species is tracked in a variety of ways. The NAWCP lists categories of conservation concern for each species as highly imperiled, high concern, moderate concern, low concern, or not currently at risk. The California Department of Fish and Game maintains a list of California Bird Species of Special Concern, and the USFWS periodically publishes a list of Birds of Conservation Concern. The most recent edition of this publication highlights birds of conservation priority at three geographic scales, including the BCR level (U.S. Fish and Wildlife Service 2002). The JV reviewed the status of waterbird species from each of these lists to determine their continental and regional conservation status (Table 8-2).

Table 8-2. Conservation status of selected waterbirds among various bird conservation plans.

Focal Species	*NAWCP*	*BSSC*	*BCC*
Western grebe	moderate		
Snowy egret	high		
Least bittern	n/a	x	
White-faced ibis	low		
Black tern	moderate	x	
Black rail	n/a		x
Sandhill crane	n/a	x	

NAWCP = North American Waterbird Conservation Plan.
BSSC = California bird species of special concern.
BCC = USFWS Birds of Conservation Concern (USFWS 2002).

Identifying Focal Species

To facilitate planning and implementation of conservation programs, the JV used a modification of Lamback's (1997) technique to identify focal species that are representative of groups of species found in the Central Valley. Species were selected from each family, if they met the following criteria: (1) listed as Highly Imperiled or of High Concern in the NAWCP; *or* (2) listed as of Moderate Concern in the NAWCP *and* California Bird Species of Special Concern; *and/or* listed as a USFWS Bird of Conservation Concern. Using this process, the JV identified seven focal species representing six families spanning a range of wetland or riparian conditions: Western grebe (*Aechmophorus occidentalis*); snowy egret (*Egretta thula*); least bittern (*Ixobrychus exilis*); white-faced ibis (*Plegadis chihi*); black tern (*Chlidonias niger*); black rail (*Laterallus jamaicensis*); and Sandhill crane (*Grus Canadensis*). White-faced ibis was included because of the species' visibility as important wetland wildlife to land managers, biologists, and the general public. Western grebes are ranked as "moderate" by the NAWCP, but have few secure breeding opportunities in California. However, they were identified as a focal species because of the recent attention to their conservation needs (Ivey 2004).

Limiting Factors for Waterbird Focal Species

Recognizing the extent of wetland habitat loss in the Central Valley, habitat quantity and quality are assumed to be limiting factors during key life cycle events. Thus, the protection, restoration and/or enhancement of wintering and/or breeding habitat will benefit waterbird populations. The NAWCP evaluated the conservation status of waterbirds based on six factors: (1) population trend; (2) population size; (3) threats to breeding; (4) threats to non-breeding; (5) breeding distribution; and (6) non-breeding distribution. Each of these factors received a score from 1 to 5, in increasing order of severity. The JV examined these factors to help determine those that are potentially limiting to focal species. The term "threats" includes actual threats to populations, as well as declining population status or other vulnerabilities such as small population size and limited distribution. Factors receiving a score of "4" or higher were considered significant threats (Table 8-3). Principal threats were categorized as breeding, non-breeding or both in order to make assumptions concerning the best conservation strategies. For example, western grebes and snowy egrets face significant threats in both breeding and wintering seasons. Black terns face threats during the breeding season.

Table 8-3. North American Waterbird Conservation Plan level of conservation threats to focal waterbird species.

Focal Species	*Population Trend*	*Population Size*	*Threats To Breeding*	*Threats To Non Breeding*	*Breeding Distribution*	*Non Breeding Distribution*
Western grebe	3	2	4	4	3	3
Snowy egret	4	2	4	3	3	4
Least bittern	n/a	n/a	n/a	n/a	n/a	n/a
White-faced ibis	2	2	4	3	3	4
Black tern	3	2	4	3	2	2
Black rail	n/a	n/a	n/a	n/a	n/a	n/a
Sandhill crane	n/a	n/a	n/a	n/a	n/a	n/a

Population size, breeding distribution, and non-breeding distribution are based on quantitative information. Population trend, threats to breeding population, and threats to non-breeding population are based on qualitative information. All factors are scaled from 1-5, with 5 indicating the greatest vulnerability. Least bitterns, black rails, and Sandhill cranes are not covered in Version 1 of the NAWCP. Others sources (cited in text) are used to determine conservation threats.

Conservation Objectives for Waterbirds

Without population goals on which to base habitat objectives, the JV's approach was to identify factors believed to be limiting populations, and to target conservation strategies that counter these limiting factors. The JV used a two-step process to develop conservation objectives. First, biologists developed quantitative (i.e., acre) habitat objectives for each of five principal waterbird habitats and distributed them among each waterbird planning region. Secondly, they provided qualitative focal species conservation recommendations.

Habitat Objectives and Distribution

Principal waterbird habitats in the Central Valley include both "natural" habitats like seasonal wetlands, semi-permanent and permanent wetlands, and riparian habitat as well as agricultural habitats like rice, other cropland and irrigated pasture. Table 8-6 details the recommended distribution of habitats and associated focal species among waterbird planning basins. Conservation objectives are general in nature (i.e., acres of semi-permanent wetlands) and do not account for micro-habitat needs or specific best management practices for focal species. The JV's approach for establishing conservation varies by habitat as described below. For some habitats, acreage objectives were developed based on a 25-33% increase over current rates of restoration. These objectives are believed to be realistic, but will require a substantial effort on the part of JV partners to deliver over the next five years. In general, objectives for natural habitats (i.e., wetlands, riparian) are for new habitat while agricultural habitat objectives seek to maintain current conditions. Table 8-4 provides a quick reference to habitat associations, and Table 8-5 summarizes conservation objectives for waterbirds.

Table 8-4. Seasonal habitat use by focal waterbird species in the Central Valley of California.

Habitat	*Breeding*	*Non Breeding*
Seasonal Wetlands		Snowy egret, White-faced ibis, Sandhill crane
Permanent/ Semi-permanent Wetlands	Western grebe, Black tern, Black rail, White-faced ibis, Least bittern	Black rail, Snowy egret, White-faced ibis
Riparian	Snowy egret	Snowy egret

Table 8-5. Five-year conservation objectives for breeding and non-breeding waterbirds in the Central Valley of California.

Waterbird Planning Region	*Seasonal Wetlands (Acres)*	*Semi Perm Wetlands (Acres)*	*Rice (Acres)*	*Riparian (Acres)*
Sacramento Valley	43,000[1]	1,000	276,000[1]	2,800
Delta	22,000[1]	1,000	31,000[1]	1,100
San Joaquin	20,000[1]	1,500		1,000
Tulare	19,000[1]	1,500		100
Total	**104,000[1]**	**5,000**	**307,000[1]**	**5,000**

[1]*Acre needs are not additive to those reported in Chapter 4 for wintering waterfowl.*

Seasonal Wetlands

Seasonal wetlands provide important habitat for non-breeding snowy egrets, white-faced ibis, and associated waterbirds. Habitat objectives for wintering waterfowl include restoration of 104,000 acres of seasonal wetlands. The JV assumes that these seasonal wetlands will provide the range of micro-habitats needed by a range of waterbirds and that resource competition between waterbirds and waterfowl using seasonal wetlands is negligible. Therefore, no additional habitat objectives for seasonal wetlands are proposed.

Semi-permanent Wetlands

The objective of 5,000 acres of restored semi-permanent wetlands was established to benefit breeding black rails, black terns, white-faced ibis, western grebe, and least bittern; and non-breeding snowy egrets and white-faced ibis. For habitat tracking purposes, semi-permanent and permanent wetlands have been combined, and are hereafter referred to as semi-permanent wetlands. Collectively, these wetlands currently comprise 15% of the total wetland base in the Sacramento Valley and Delta Planning Regions, and 10% of the wetland base in the San Joaquin and Tulare Basins. Waterbird habitat objectives have been adjusted to increase the apparent relative shortfall in semi-permanent wetlands in the two southernmost regions. The objective of 5,000 acres represents a 33% increase over current rates of restoration for semi-permanent wetlands, to include 1,000 acres in both the Sacramento Valley and Delta Planning Regions and 1,500 acres in both the San Joaquin and Tulare Basins.

Rice

Rice fields provide important habitat for breeding black terns and white-faced ibis and for wintering white-faced ibis and Sandhill cranes. Habitat objectives for wintering waterfowl include enhancement of 170,000 acres of rice by winter flooding. Similar to seasonal wetlands, negligible resource competition is assumed between these waterbirds and wintering waterfowl. Therefore, no additional habitat objectives for rice are proposed.

Cropland and Irrigated Pasture

Irrigated cereal grains, alfalfa, and pasture provide the primary foraging habitat for wintering Sandhill cranes in the Central Valley. Foraging habitat is threatened by a number of factors including urbanization, conversion to orchards and vineyards, and other changing agricultural practices. These habitats are especially at risk in the Delta Planning Region, an area of traditionally high use by wintering Sandhill cranes, and the region where estimates of irrigated cropland loss (18.3% by 2040) and human population growth (> 2 million by 2040) are highest. Sandhill cranes show high site fidelity to roost sites and are slow to colonize new roosting areas. Therefore, conservation objectives for cropland and irrigated pasture include the acquisition of agricultural easements on suitable foraging sites within three miles of nocturnal roost sites (Littlefield and Ivey 2000).



Native pasture, Folsom
Photo: Dale Garrison, USFWS

Riparian

Restoration of riparian habitat, especially in proximity to foraging areas is a high priority need for breeding and non-breeding snowy egrets and associated species. The objective of restoring 5,000 acres of riparian habitat represents a 25% increase over current rates of restoration. Most of the remaining riparian habitat and a large percentage of restored riparian habitat occur in the Sacramento Valley and Delta Planning Regions. Because the San Joaquin and Tulare Basins collectively comprise about 18% of the existing riparian habitat in the Central Valley, the JV adjusted habitat objectives to attempt to make up for the apparent shortfall in the southern Central Valley by allotting acreage objectives as follows: Sacramento Valley-1,000 acres, Delta-1,000 acres, San Joaquin-1,500 acres, Tulare-1,500 acres.

Focal Species Conservation Recommendations

Some conservation practices are applicable to many focal species. For example, favorable water management regimes are critical for successful breeding of most waterbirds. Waterbird survival and productivity can be increased by stabilizing water levels during the nesting season to protect nests from flooding, and by implementing the appropriate timing of drawdown in semi-permanent wetlands. Information below provides conservation recommendations specific to individual focal species. Project managers are considered best equipped to make decisions regarding site-specific application of practices geared towards specific focal species. An overview of habitat requirements and conservation actions for each focal species is provided to assist planners and managers in their efforts to integrate waterbirds with other conservation programs. Table 8-6 summarizes conservation needs of focal species. Many other species receive benefits from conservation actions undertaken for focal species, though no attempt was made to compile a list of all such species. When appropriate, specific birds of conservation interest [i.e., tricolored blackbird *(Agelaius tricolor)]* or species that are taxonomically similar (i.e., Clark's grebe, western grebe) that may receive benefits are mentioned.

Table 8-6. Summary of conservation needs of focal waterbird species of the Central Valley Joint Venture.

Focal Species	*Conservation Need*	*Planning Regions*
Western grebe	Stabilize water levels during breeding; protect nesting areas from disturbance.	Sacramento Valley
Snowy egret	Restoration and enhancement of riparian habitat in proximity to riceland and wetland complexes.	All
Least bittern	Enhancement and restoration of dense emergent (primarily cattail) permanent and semi-permanent wetlands.	Sacramento Valley, Delta, San Joaquin
White-faced ibis	Enhancement and restoration of permanent and semi-permanent wetlands and securing water for established nest colony sites.	Sacramento Valley, Tulare
Black tern	Protection, restoration and enhancement of large permanent/semi-permanent wetlands or wetland complexes with short to medium height vegetation [12-20 ha. (~30-50 acres) Min.].	All
Black rail	Protection, restoration and enhancement of permanent/semi-permanent wetlands and similar protection and restoration of upland habitats for escape cover during flood events.	Delta, Sacramento Valley
Sandhill crane	Protection, restoration and enhancement of seasonal wetlands in proximity to foraging habitat, esp. rice, cereal grains, irrigated pasture and alfalfa. Protection of roosts and nearby foraging habitat.	All

Western grebe

Western grebes nest colonially on floating vegetation in or near sparse emergent habitat, usually hardstem bulrush, adjacent to open water. During winter, open water in the Central Valley serves as resting and foraging habitat for these birds. Recommended conservation activities for breeding birds include reducing water fluctuations and protecting nesting areas from disturbance. Specific conservation actions for this species at the Thermolito Afterbay, below Lake Oroville, (and for other sites in California) are described in Ivey (2004). Clark's grebes will also benefit from conservation activities implemented for western grebes.

Snowy egret

Snowy egrets nest colonially in riparian habitats with dense woody vegetation, as well as in permanent and semi-permanent wetlands with dense emergent vegetation (Zeiner et al. 1990, Parsons and Master 2000). Ideal nesting sites offer nearby foraging habitat, therefore restoration and enhancement of riparian habitat in proximity to riceland and wetland complexes is the primary conservation need. Snowy egrets associate with other colonial wading bird species during breeding and foraging activities (Parsons and Master 2000). Specific objectives include the restoration of 5,000 acres of riparian habitat distributed among the following waterbird planning regions: Sacramento Valley-2,800 acres; Delta-1,100 acres; San Joaquin-1,000 acres, Tulare-100 acres. These regional goals are based on the proportion of potential restorable riparian habitat among the four planning regions.

Least bittern

Least bitterns differ from other members of the heron family found in the Central Valley as they rarely nest or perch in trees (Zeiner et al. 1990), preferring instead to breed in dense emergent cattail marsh. Conservation of this habitat type is the primary conservation need for least bitterns in the in the Central Valley. Both least and American bitterns are generally solitary nesters and interaction between the two species while feeding or nesting is rare. American bitterns generally prefer slightly less densely vegetated and somewhat shallower wetlands for breeding and foraging (Gibbs et al. 1992) but will also nest in uplands (M. Wolder, United States Fish & Wildlife Service, personal communication). Though each species prefers different microhabitats, both are commonly found within the same wetlands, and actions benefiting least bitterns should also benefit American bitterns.

White-faced ibis

White-faced ibis breed colonially in shallow permanent and semi-permanent wetlands in the Central Valley, often nesting in "islands" of emergent vegetation (Ryder and Manry 1994). They forage in flooded rice fields, flooded or partially flooded pastures, and cropland, especially alfalfa at all times of the year (Ryder and Manry 1994). During winter, white-faced ibis forage in seasonal wetlands and roost in both semi-permanent and seasonal wetlands. Enhancement and restoration of permanent and semi-permanent wetlands is a priority conservation action for white-faced ibis. Obtaining reliable water for established colonial nesting sites is an important conservation strategy for this species (Ryder and Manry 1994). Enhancing emergent growth in permanent or semi-permanent wetlands adjacent to rice or irrigated alfalfa may benefit tricolored blackbirds as well.[1]



White-faced ibis
Photo: Dale Garrison, USFWS

Black tern

Black terns breed widely in the Sacramento Valley almost exclusively in rice fields, and locally in rice fields in Merced and northern Fresno counties within the San Joaquin Basin. They rarely breed elsewhere and if so, mainly in ephemeral habitat (D. Shuford, personal communication). Breeding habitat use is different in the Central Valley than in much of the range, where they nest in permanent and semi-permanent wetlands (Shuford et al. 2001). Black terns are somewhat area sensitive during the breeding season, selecting wetlands or wetland complexes with a minimum size of 12-20 ha (~30-50 acres). Top conservation actions for black terns include protecting and restoring wetland habitat, and adapting wetland management practices to integrate optimal black tern habitat with the needs of other wetland dependent birds (Shuford 1999).

Black rail

Black rails breed and winter in higher parts of tidal marshes, freshwater marshes, and wet meadows within portions of the Delta Planning Region. Recent discoveries of black rails in Butte, Yuba, and Nevada counties may provide conservation opportunities in small wetland areas along the base of the foothills in the Butte and American Basins. Black rails will utilize habitats with shallower water regimes than other rails, and will tolerate some degree of flooding, provided that suitable upland escape cover is available during flood events (Eddleman et al. 1994). Conservation needs include protection, restoration, and enhancement of wetlands in the Delta Planning Region, and similar protection and restoration of upland habitats that serve as vital escape cover during flood events.

[1]Tricolored blackbirds are a high profile, priority species at state and federal levels, and are the focus of conservation efforts supported by many JV partners. The white-faced ibis is considered a suitable umbrella species for this species in wetland habitats, as they overlap in their nesting requirements, and to some extent in foraging habitat as well. Tricolored blackbirds nest in the same emergent marshes as white-faced ibis, and forage in adjacent rice fields and irrigated alfalfa. Although tricolored blackbirds are not a focal species in this plan, the JV is a partner in the conservation of this species and will work to implement conservation measures on public and private lands as they are more fully developed.



Lesser Sandhill cranes
Photo: Dale Garrison, USFWS

Sandhill crane

Sandhill cranes populating the Central Valley include both the greater Sandhill crane (G.c. tabida) and lesser Sandhill crane (G.c. canadensis). The greater Sandhill crane is listed as threatened under the California Endangered Species Act, while the lesser Sandhill crane is considered a Bird Species of Conservation Concern by the State of California. Both greater and lesser Sandhill cranes roost in shallow seasonal wetlands and forage in cropland and irrigated pasture (Tacha et al. 1994). Conservation of key roosting wetlands and protection and enhancement of irrigated cropland for foraging habitat are the greatest conservation needs for Sandhill cranes in the JV (Tacha et al. 1992, Littlefield and Ivey 2000). Suitable foraging habitats include a variety of crop types. Grain fields are of foremost importance as they provide a ready source of high-energy carbohydrates (rice, corn, wheat, barley, oats, rye, sorghum, buckwheat, etc). Legume crops (e.g., beans, peas) irrigated pasture, alfalfa and seasonal wetlands also provide foraging habitat and are sources of proteins which can be limited in grain crops. Lesser Sandhill cranes are particularly attracted to alfalfa fields. Due to the reliance on agricultural lands for foraging habitat, agricultural easement focus areas are recommended for each waterbird planning region. The JVs Agricultural Wildlife Enhancement Committee should place particular emphasis on the northeast Delta and Cosumnes River/Stone Lakes National Wildlife Refuge portions of the Delta Planning Region. Ivey (2005; also see Littlefield and Ivey 2000) provides specific conservation and management information for Sandhill cranes in each waterbird planning region.



Sacramento Regional County Sanitation District s Bufferlands
Photo: Brian Gilmore

Chapter Nine: BREEDING RIPARIAN SONGBIRDS

This chapter provides quantified population and habitat objectives for riparian songbirds in the Central Valley, and is based on a suite of focal bird species that breed primarily in riparian habitat.

"California's semi-arid Central Valley harbors the largest rivers in the state, areas that are vitally important to riparian birds and a multitude of other species. These rivers are to the health of the larger watershed what arteries are to the human body. When degraded, the entire system is put at risk, but when rehabilitated, a richness of life is conserved."

Gregory Golet, Ph.D.
Senior Ecologist
The Nature Conservancy

Introduction

Over 225 species of birds, mammals, reptiles, and amphibians depend on California's riparian habitats. The Central Valley provides essential breeding and wintering habitat, migration stopover areas, and corridors of dispersal for riparian-associated songbirds (Cogswell 1962, Gaines 1977, Humple and Geupel 2002, Flannery et al. 2004, Fleskes et al. 2005). Sixty-two species of songbirds have regularly bred in Central Valley riparian areas over the last 13 years (PRBO Conservation Science unpublished; see Ballard et al. 2003 for criteria used). Riparian vegetation is vital to the quality of in-stream habitat. It significantly promotes the aquatic food chain by providing shade, food, and nutrients, (Jensen et al. 1993) thus providing food resources for migratory songbirds as well.

While riparian habitat makes up less than 0.5% of California's total land area (approximately 360,000 acres; CDF 2002), decades of research indicate that riparian habitat supports ecosystem integrity and function across landscapes (Sands 1977, Katibah 1984, Faber 2004, RHJV 2004). Over 98% of riparian habitat in the Central Valley has been lost or severely degraded in the past 150 years (Smith 1977, Katibah 1984). Riparian habitat loss may be the most important cause of population declines among songbird species in western North America (DeSante and George 1994), including the decline and extirpation of many riparian species formerly common in the Central Valley.

Riparian habitats are transitional areas between terrestrial and aquatic ecosystems. In the Central Valley and lower foothills of the Cascade, Sierra Nevada, and Coast ranges, these habitats occur along streams, ranging from swift rapids and waterfalls of steep canyons to slow moving water in floodplains of the Central Valley floor. Riparian vegetation is structurally complex and may contain a canopy, subcanopy, and understory layers. Dominant trees include valley oak, cottonwood, California sycamore, box elder, and Oregon ash. Shrub layer plants include willows, wild grape, wild rose, California blackberry, blue elderberry, poison oak, and buttonbush. The herbaceous layer is diverse.

Broad-scale interest in songbird conservation began in December of 1990 with the advent of Partners in Flight (PIF). PIF is a voluntary international coalition formed in response to growing concerns about declining populations of neotropical migrants across North America. Its expanded mission now includes all songbirds and seeks to help species at risk, keep common birds common, and promote voluntary partnerships on behalf of birds, habitat, and the public. Recently, PIF synthesized a continental perspective on conservation priorities with *The North American Land Bird Conservation Plan* (Rich et al. 2004). Species, habitat, geographic priorities and global population estimates for all songbirds in North America north of Mexico are included in the plan. Population size estimates are important conservation tools and innovative approaches to population estimates for songbirds have been developed by Rosenberg and Blancher (in press); a similar approach is used here. Survey data from the North American Breeding Bird Survey (Robbins et al. 1986) were used to derive estimated global populations (Rich et al. 2004) and regional population estimates (Rosenberg and Blancher in press, Bart in press). The use of this approach will allow future investigations to compare how population estimates presented in this chapter contribute to continental objectives presented by Rich et al. (2004) and future regional objectives [e.g., by Bird Conservation Region (BCR); U.S. NABCI Committee 2000].

This chapter presents populations objectives based on a suite of focal bird species that primarily breed in riparian habitat. The suite of species presented here is unique among many multi-specie planning efforts, in that it does not focus only on species with threatened and endangered status. Instead species were chosen whose requirements define different spatial attributes, habitat characteristics (e.g., young willows vs. old cottonwoods) and management regimes believed to be representative of a healthy riparian system (Chase and Geupel 2005). Furthermore, thanks to coordinated efforts of many individuals and agencies under the auspices of Partners in Flight, highly standardize methods for collecting data on landbirds (Ralph et al. 1993) have resulted in a wealth of current and comparable information across the Central Valley and the state. (http://www.prbo.org/calpif/htmldocs/riparian.html [Ballard et al. 2003]). This current and repeatable information provides the scientific foundation for the development of biological objectives that guide effective conservation efforts (Pashley and Geupel 2003, Elliot et al. 2003).

The remainder of this chapter is divided into three sections: (1) Use of focal species to establish conservation objectives for breeding riparian songbirds; (2) Methods for setting conservation objectives for breeding riparian songbirds; and (3) Conservation objectives for breeding riparian songbirds in the Central Valley.

Use of Focal Species to Establish Conservation Objectives for Breeding Riparian Songbirds

Basic biological data are not available for all species of riparian-dependent songbirds. Therefore, conservation planners frequently develop management and planning objectives using a single or subset of species, commonly called "focal species," for which biologists have better information, and that represent critical ecosystem and habitat elements. Biological knowledge about these species then guides habitat restoration, enhancement, protection, and evaluation. Biologists assume that the implementation of these recommendations should maintain overall biodiversity (Chase and Geupel 2005). This approach is considered by many conservation biologists as valuable, providing assumptions underlying the choice of focal species that are stated explicitly and subjected to scientific testing (Soulé 1995, Caro and O'Doherty 1999, Poiani et al. 2001, Lindenmayer et al. 2002).

Focal species may be used to guide several components of conservation planning: (1) the selection and design of protected areas or a reserve system; (2) habitat restoration and management; and (3) population monitoring, both of population trends over time and effects of management actions. Planning areas for protection involves selecting which sites should be considered and determining their configuration on the landscape. Thus, the distribution and ecological needs of one or more focal species may be useful in site selection and reserve configuration (Margules and Pressey 2000). However, to ensure the persistence of species, conservation planners must also identify effective forms of habitat restoration and active habitat management to maintain desired conditions. One way to accomplish this is to design restoration and management to benefit multiple focal species. Monitoring is also an essential component of conservation planning, especially when management takes place in an adaptive manner.

Focal species are frequently selected on the basis of their regulatory status (e.g., threatened or endangered), largely because these species have the strongest legal protection. However, species at risk are not necessarily the most effective focal species, due in part to the inability to collect sufficient data to statistically measure population response (Franklin 1994). Several relatively common species (i.e., abundant and widely distributed) are also included as focal species in order to promote greater scientific rigor in statistical design and analysis and to allow conservation actions to be evaluated.

The Riparian Bird Conservation Plan (RBCP; RHJV 2004), a collaborative effort of the Riparian Habitat Joint Venture and California Partners in Flight, was developed to guide riparian conservation in California and provides a critical link between science and habitat management (Golet 2001). It relies on the biological needs of seventeen species that were selected by a consensus of ornithologists based on criteria described below. These species collectively depend on various stages of vegetative succession and/or critical ecosystem elements found in riparian systems (Geupel and Elliott 2001, Golet 2001, RHJV 2004; Figure 9-1). Each species has a detailed, species account summarizing information on conservation needs and management recommendations on the California Partners in Flight web site (http://www.prbo.org/calpif/htmldocs/riparian.html). To produce the *Riparian Bird Conservation Plan* (RBCP; RHJV 2004), species account authors and other resource managers synthesized the recommendations made in the individual species accounts to develop habitat-based recommendations that will influence multiple species. An example is the recommendation to restore and manage riparian forests to increase the volume and diversity of understory. These recommendations may reduce brown-headed cowbird parasitism rates, and provide nest substrate for declining species.



Figure 9-1. Preferred nesting substrates of selected songbird species breeding in California riparian habitat illustrating the diversity of vegetation and structure utilized (RHJV 2004).

Of the seventeen species presented in the RBCP, the JV selected seven focal species to develop its riparian conservation objectives. Six of the seven species (song sparrow [*Melospiza melodia*], yellow-breasted chat [*Icteria virens*], black-headed grosbeak [*Pheucticus melanocephalus*], common yellowthroat [*Geothlypis trichas*], yellow warbler [*Dendroica petechia*], and western yellow-billed cuckoo [*Coccyzus americanus*]) were selected based on the approach used by Chase and Geupel (2005). The seventh species, spotted towhee (*Pipilo maculatus*) was included for a variety of reasons that are discussed in the text below.

Suitable focal species meet at least one of the following criteria:

- Use riparian habitat as a principal breeding habitat in most basins throughout the Central Valley.
- Warrant special management status, or have experienced reduction in breeding range or populations in the Central Valley.
- Are useful for monitoring effects of management actions because they are:

  Abundant in riparian habitats throughout the Central Valley or basin (i.e., provide adequate sample sizes for statistically valid analyses).

  Amenable to monitoring (e.g., nests can be found and adults are tolerant of researcher disturbance).

  Indicate quick, strong and/or consistent responses to habitat management or restoration.

The following species descriptions are based upon RBCP species accounts (http://www.prbo.org/calpif/htmldocs/riparian.html) and new information presented later in this chapter.

Song sparrow

The estimated current populations of song sparrows in riparian habitat of the American, Butte, Sutter, Colusa, and Yolo Basins are exceptionally low (< 1000 pairs per basin). Creating suitable habitat (emergent dense understory) within and adjacent to riparian zones for this species should be a high priority in these basins. Populations of song sparrows in the Delta, San Joaquin, and Tulare Basins are much more abundant. In these basins song sparrows are generally found in newly restored riparian sites within two years of restoration.

Yellow-breasted chat

Although once common throughout the Central Valley, the yellow-breasted chat (a California Species of Special Concern) has declined considerably in recent years. Central Valley populations appear highest in American, Butte, Colusa, Sutter and Yolo Basins. Only the Butte Basin has a current population estimate of more than 1,000 individuals. This species prefers low, extremely dense riparian thickets. Thus, projects that focus on restoring woody shrubs–especially large patches of native blackberry—in the riparian forest understory should facilitate recovery of this species in these basins and possibly in the Delta Basin along the Cosumnes and Mokelumne rivers.

Black-headed grosbeak

Black-headed grosbeaks are relatively common throughout the American, Butte, Colusa, Sutter and Yolo Basins. Highest densities of existing populations occur in the Butte and Colusa basins, where appropriate conservation actions may significantly increase populations. In contrast, populations within Delta, San Joaquin, and Tulare Basins occur in much lower densities and are not likely to respond as well to conservation actions. Black-headed Grosbeaks are excellent indicators of a healthy riparian forest sub-canopy and will respond significantly to restoration within 5 years (Figure 9-2, Gardali et al. in press).

Common yellowthroat

Although this species may be locally common, its overall population size remains low throughout the year in the Central Valley. Common yellowthroats prefer the ecotone between wetland habitats and riparian forest edges. This species may respond rapidly to restoration (normally within 2 years) and may increase with conservation efforts targeted near existing populations in the Colusa, Delta, and San Joaquin Basins.

Yellow warbler

Yellow warbler (a California Species of Special Concern) populations are exceedingly low and have been extirpated in most basins of the Central Valley. Recent re-colonization of a few pairs along the main stem of the Sacramento River (in Butte Basin) and a new and increasing population (14 pairs in 2004) within the San Joaquin River National Wildlife Refuge (in San Joaquin Basin; Wood et al. 2005) suggest that the species may be returning to historical breeding sites in the Central Valley. A short-term goal should be to establish a minimum of 100 pairs each in the American, Butte, Colusa, Sutter, Delta, and San Joaquin Basins. They have been known to respond quickly to restoration in riparian forest understory through fencing or planting, and in areas managed for dense willow cover near water (Wood et al. 2001, Krueper et al. 2003).

Western yellow-billed cuckoo

The current western yellow-billed cuckoo population is about 60 to 100 pairs statewide (Halterman et al. 2001), with the only increase recorded in the western United States occurring in the Sacramento Valley (Halterman et al. 2003). This increase is likely an artifact of new sampling methodologies and the recent discovery that the species will nest in restored riparian habitat as young as

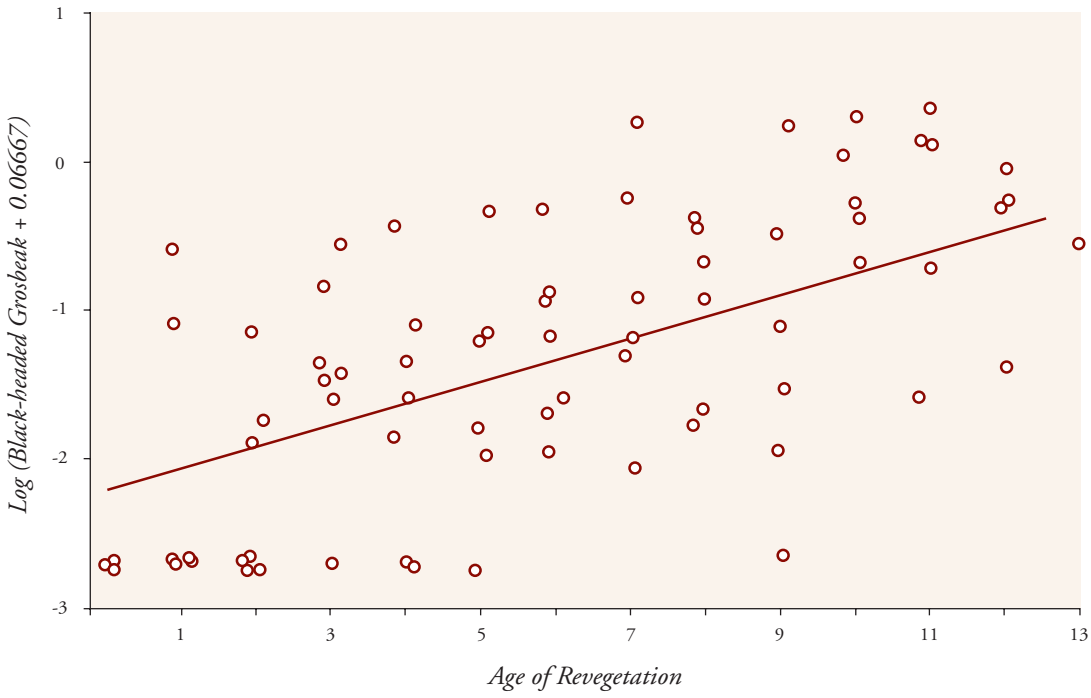


Figure 9-2. Black-headed grosbeak trend in response to age of restoration on the Sacramento River. Trend (%) = 15.72, 95% CI = 9.12 - 22.73. $P < 0.0001$, R2 = 0.65. (from Gardali et al. 2006).

eight years old (Small et al. 1999). Considering the number of acres that have been restored in the Butte and Colusa Basins (including the Sacramento River), populations may continue to increase. The RBCP recommends restoring habitat in 25 locations to support 625 pairs (25 pairs per location). Simulation modeling indicates that populations of less than 10 pairs have a high probability of being ephemeral (RHJV 2004). At least 25 pairs in a subpopulation and corridors to other subpopulations may prevent local extirpations. Since territory size for a pair averages 20 to 25 hectares[1] (a minimum of 10 hectares), the optimal goal for each population is to protect and restore habitat in minimum 20-hectare patches that collectively total 500 hectares within a watershed or stream section. Yellow-billed cuckoos have used willow-cottonwood habitat of any age with high humidity and a habitat breadth of 325 feet (100 m) (Gaines and Laymon 1984). Nesting groves at the South Fork Kern River are characterized by higher canopy closure, higher foliage volume, intermediate basal area, and intermediate tree height when compared to random sites with less than 40% canopy closure are unsuitable, those with 40%-65% are marginal to suitable, and those with greater than 65% are optimal (Laymon 1998).

[1]*Hectares are used as a unit of area measurement in this chapter, since most riparian research is reported in metric units. One hectare equals 2.47 acres.*

Spotted towhee

Although regularly found in habitats other than riparian, the spotted towhee *(Pipilo maculatus)* was included due to its common and wide spread occurrence in the Central Valley riparian habitats and its usefulness for monitoring the effects of management actions (Nur 2004). The spotted towhee occurs in relatively high densities in all basins and is an indicator of vigorous ground cover, which is associated with regular flooding events.

Quantifiable population objectives for other riparian species that are known to have (or have had) significant breeding populations in the Central Valley (for example, spotted sandpiper, bank swallow, tree swallow, and blue grosbeak) are lacking because current information on population size is not available or surveys are limited. However current management recommendations for these species are described thoroughly in the RBCP species accounts (http://www.prbo.org/calpif/htmldocs/riparian.html).

Methods for Setting Conservation Objectives for Breeding Riparian Songbirds

Acreage objectives should be derived from estimates of habitat needed to achieve population goals. However, simply achieving acreage objectives does not guarantee that population goals will be met. Surrounding landscape factors also determine whether bird populations respond. Seemingly "suitable" habitat for many riparian species (e.g., yellow-billed cuckoo, yellow warbler and song sparrow) remains unoccupied in many areas of the Central Valley. Thus, the use of numerical population targets provides a useful index of potential change in habitat quality within a dynamic environment where natural and human-mediated disturbances can alter habitat quality quickly (Donovan et al. 2000).

Most songbirds are territorial during their breeding seasons. Thus, data collected from the breeding season are more reliable than data collected during other times of the year. Standardized methods for monitoring abundance (point counts), population size, and density (spot-maps), are established across California (Ralph et al. 1993, Ballard et al. 2003). Thus simple population estimates can be derived by multiplying appropriate estimates (birds per acre) by the area of current available habitat, as mapped by the best available GIS vegetation layers. Population targets may be derived by multiplying an appropriate target density by the area of potentially restorable habitat, also based on GIS-based historic habitat layers.

There are several potential sources of variation associated with this method. The density estimate is influenced by observer bias during surveys, detection probability, differences in habitat quality across sites, annual variation, intrinsic variation in bird habitat selection, and other factors. Therefore a sample variance around each density estimate was calculated.

Population objectives based on monitoring data were developed for six species that commonly breed in the riparian areas of the Central Valley (see above). The method to develop population objectives for the state threatened yellow-billed cuckoo differed from other species due to its small population size and low rate of survey detections. For this species, minimum management goals for populations in each basin were developed using population simulation models (Halterman et al. 2001; RHJV 2004).

These population objectives helped to develop and prioritize riparian habitat objectives for eight of the nine basins in the Central Valley: American, Butte, Colusa, Sutter, Yolo, Delta, San Joaquin, and Tulare. Sufficient data to develop population objectives for riparian species in the Suisun Marsh are lacking.

Inputs Used for Setting Conservation Objectives

Several sources of information serve as inputs for setting habitat objectives for riparian songbirds: (1) existing and restorable riparian habitat; (2) population estimates and targets; (3) recommended values of nest success; (4) species distribution and richness; and (5) annual rates of riparian restoration.

Information on existing and restorable riparian habitat identifies on a regional scale where future restoration projects can have the greatest impact. This information is also the basis for developing population targets and quantifying conservation objectives by basin.

Recommended values of nest success, and species distribution and richness provide a measure of relative habitat quality, and help to determine which conservation actions will have the most impact.

Estimated annual rates of riparian restoration help to develop realistic habitat objectives. A combination of these inputs provides each basin with an importance rank for riparian birds (Table 9-1). This section describes how these factors and rankings were derived and outlines the assumptions made for riparian songbirds in the Central Valley.

Table 9-1. Current and potentially restorable riparian habitat and number of bird point count stations per basin.

Basin	*Valley*	*Current Riparian Acres*	*Potentially Restorable Riparian Acres*	*Total Riparian Acres*	*Proportion of Restorable Riparian Area Currently with Riparian habitat*	*Number of Riparian Point Count Stations*
American Basin	Sacramento	16,364	82,757	99,121	0.20	191
Butte Basin	Sacramento	32,535	143,230	175,765	0.23	146
Colusa Basin	Sacramento	19,708	207,149	226,857	0.10	202
Sutter Basin	Sacramento	3,641	79,378	83,019	0.05	51
Yolo Basin	Sacramento	3,569	68,394	71,963	0.05	121
Delta Basin	San Joaquin	14,840	132,548	147,388	0.11	97
San Joaquin Basin	San Joaquin	12,249	188,394	200,643	0.07	175
Tulare Lake Basin	San Joaquin	7,195	15,835	23,030	0.45	42
Central Valley Totals		**110,100**	**917,687**	**1,027,786**	**0.12**	**662**

[1]JV derived species density estimates in basins with fewer than 30 stations using point count data from the entire respective valley (Sacramento or San Joaquin). These point count sample sizes are 365 and 314, respectively.

Existing and Potentially Restorable Riparian Habitat

Several GIS data sources were combined to produce a single representation of Central Valley riparian habitat (Figure 9-3). The 31-meter grid layer was derived by combining the areas mapped as riparian habitat by one of the following five partially overlapping data sources:

a. California Department of Fish and Game's (CDFG) Central Valley Wetlands layer (from Landsat and Spot images taken from 1986 to 1993)
b. California Department of Water Resources' (DWR) land use layers (developed from 1986 to 1999);
c. California State University's (Chico campus), riparian mapping for the Sacramento River, prepared for the California Bay-Delta Authority, DWR, U.S. Bureau of Reclamation, and CDFG (from aerial photos of varying scale, taken between 1991 and 1998);
d. DWR's riparian vegetation of the San Joaquin River for the San Joaquin River Riparian Habitat Restoration Program (from 1998 aerial photos); and
e. Jones & Stokes' riparian vegetation mapping for Placer County (based on 2002 aerial photos).

Merging all areas classified as riparian habitat by at least one of these layers likely represents a liberal estimate of current riparian forest and shrub habitat.

The amount of potentially restorable riparian habitat possible in each basin was estimated using historic vegetation map layers compiled by the Bay Institute's Sierra to the Sea mapping project (TBI 1998). This GIS layer, derived from multiple sources represents the historical extent of Central Valley riparian forests and the extent of soil types that likely supported riparian forest before 1800. All habitat types with potential for restoration, including agricultural fields, were totaled as potential riparian habitat. Areas that have been developed and/or urbanized were assumed to be permanently lost as riparian habitat and were excluded from acreage calculations.


Common yellowthroat
Photo: Partners in Flight

For planning purposes, the JV assumed that 110,010 acres of riparian habitat remains in the Central Valley (Table 9-1) based on the GIS data described above. Sutter, Yolo and San Joaquin basins have the least, while American, Butte, and Colusa Basins have the most riparian habitat remaining. These results should be interpreted with caution, as most of this habitat is highly degraded and disconnected from the floodplain. Low species richness (Figure 9-4), poor vital rates, and low abundance of songbirds at many remnant sites reflect the loss of riparian habitat integrity.

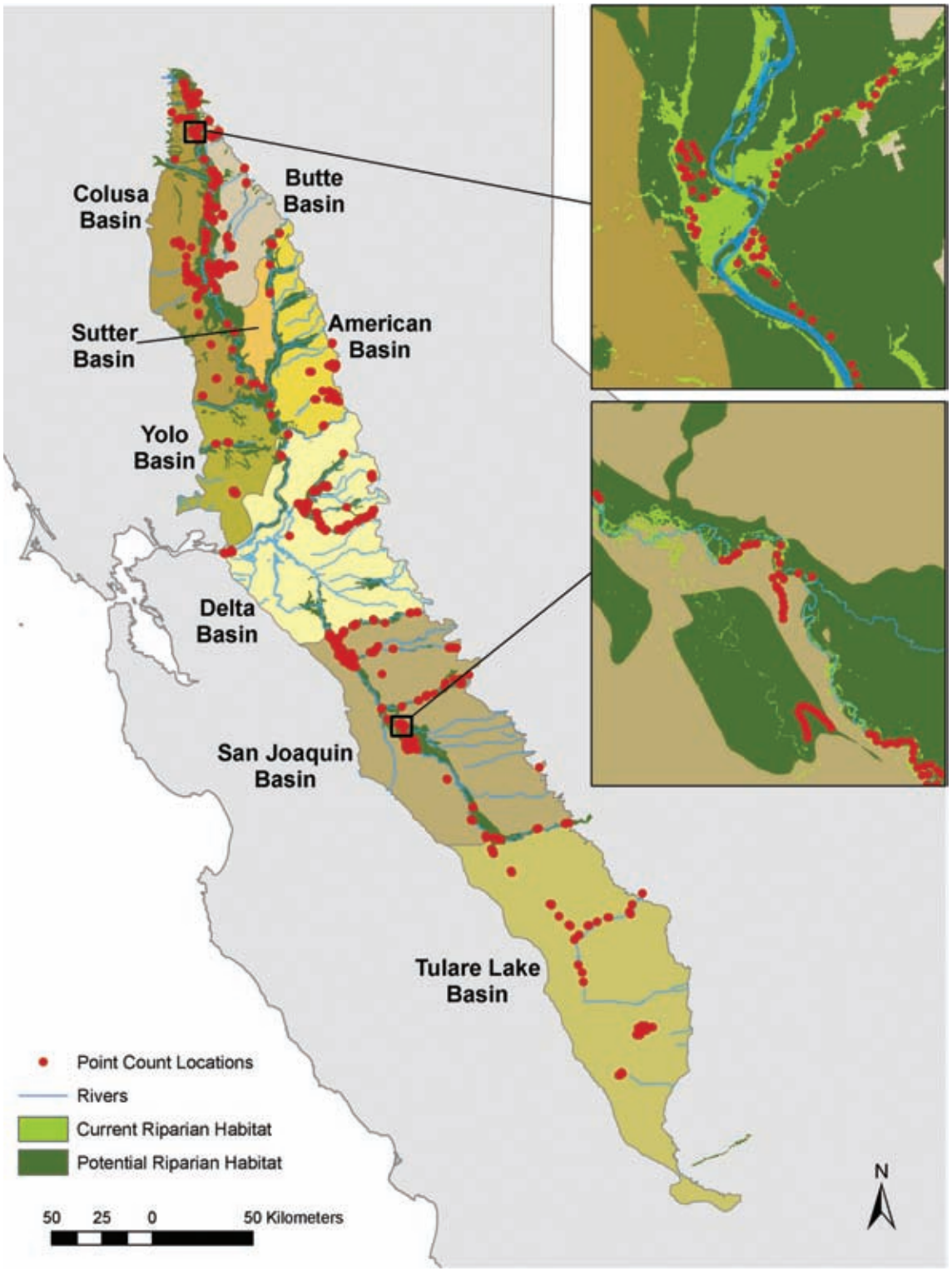


Figure 9-3. Existing and potentially restorable riparian habitat within the Central Valley.

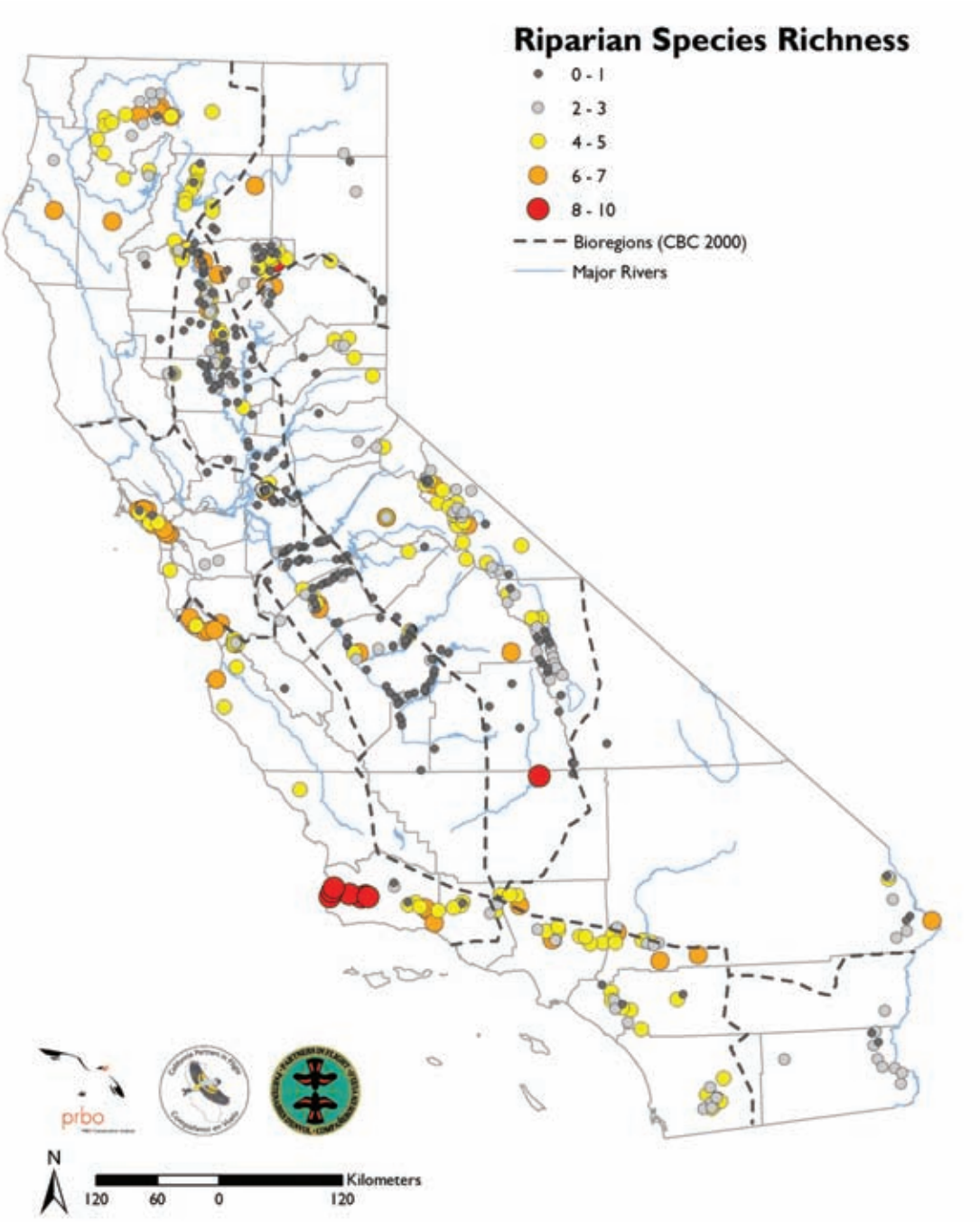


Figure 9-4. Species richness indices for riparian songbirds at sites with standardized bird monitoring in California (from RHJV 2004).

Population Estimates and Targets

Population objectives are an estimate of potential population size or "targets." Methods used to develop objectives for each focal species are described below.

Table 9-2. Detectability coefficients derived from sites where point counts overlaid spot-mapping plots ('double sampling') Values = point count-derived birds per hectare divided by # of spot-map-derived birds per hectare.

Species	*Value*
Song sparrow	1.33
Spotted towhee	1.55
Yellow-breasted chat	2.93
Black-headed grosbeak	1.06
Common yellowthroat	1.17

The current population size of each focal species ("population estimates") was estimated by multiplying basin-specific estimates of bird density by basin-specific estimates of current riparian habitat acres. Density estimates were based on point count surveys conducted between 1994 and 2003 (Small et al. 1999, Gardali et al. 2004). Initial point count-level densities were calculated by dividing the number of detections within 50 meters by the area of the 50-meter radius circle (0.785 hectares). To account for detectability differences across species, these point-count level estimates were then multiplied by species-specific detectability coefficients derived by comparing more accurate, but spatially limited, spot-map data with overlapping point count data (Table 9-2). Mean adjusted densities (± standard error) were calculated for each the five basins with sufficient point count stations (n>30); overall means for the entire Sacramento and San Joaquin valleys were used to estimate densities in basins with fewer than 30 point count stations.

The potential population size of each focal species ("population target") was estimated using a similar approach as for current populations, but using historic vegetation layers rather than current vegetation layers. Estimates of potentially restorable habitat in each basin were based on historic vegetation map layers corrected for habitat permanently lost to urban development (Table 9-1).

If sufficient, data from basin-specific or valley-specific point count surveys were used to estimate potential densities; otherwise (for song sparrows and yellow warblers), spot-map densities from a reference study site with good quality habitat (Cosumnes and Clear Creek, respectively) were used instead. To develop population targets, potential density estimates were based on the 75th percentile of the survey data instead of the mean (used for current density estimates). Use of the 75th percentile assumed that future densities would more appropriately be based on high quality, rather than currently degraded, riparian habitat, and assumed that high densities equate to high quality habitat (Bock and Jones 2004). As with current density estimates, detectability coefficients (Table 9-2) provided target populations, as in the following formula:

Target population = (potential habitat x potential density), where potential habitat is current habitat plus restorable habitat and density is corrected by an appropriate detectability coefficient.

Figures 9-5 to 9-8 represent potential population change in each basin if all potential habitat was restored. Certain basins have higher potential for specific species (e.g., black-headed grosbeaks in the Colusa Basin).

The process to develop population objectives for the state threatened yellow-billed cuckoo differed from other species due to its exceptionally low current population size and difficult sampling methodology. Instead, a minimum management goal for populations in each basin was established (Table 9-3).

Table 9-3. Minimum management goals for subpopulations, pairs, and reforestation of suitable habitat, based on 40 hectares per pair, for western yellow-billed cuckoos. (from RHJV 2004).

Locality	*Subpopulations*	*Number of Pairs*	*Current Suitable (hectares)*	*Reforestation Suitable (hectares)*
Sacramento River	6	150	2,370	3,700
Feather River	1	25	240	770
Stanislaus River	1	25	240	770
Cosumnes River	1	25	0	1,010
Merced River	1	25	0	1,010
Kings River	1	25	0	1,010
Mendota	1	25	0	1,010
Total	**12**	**300**	**2850**	**9,280**

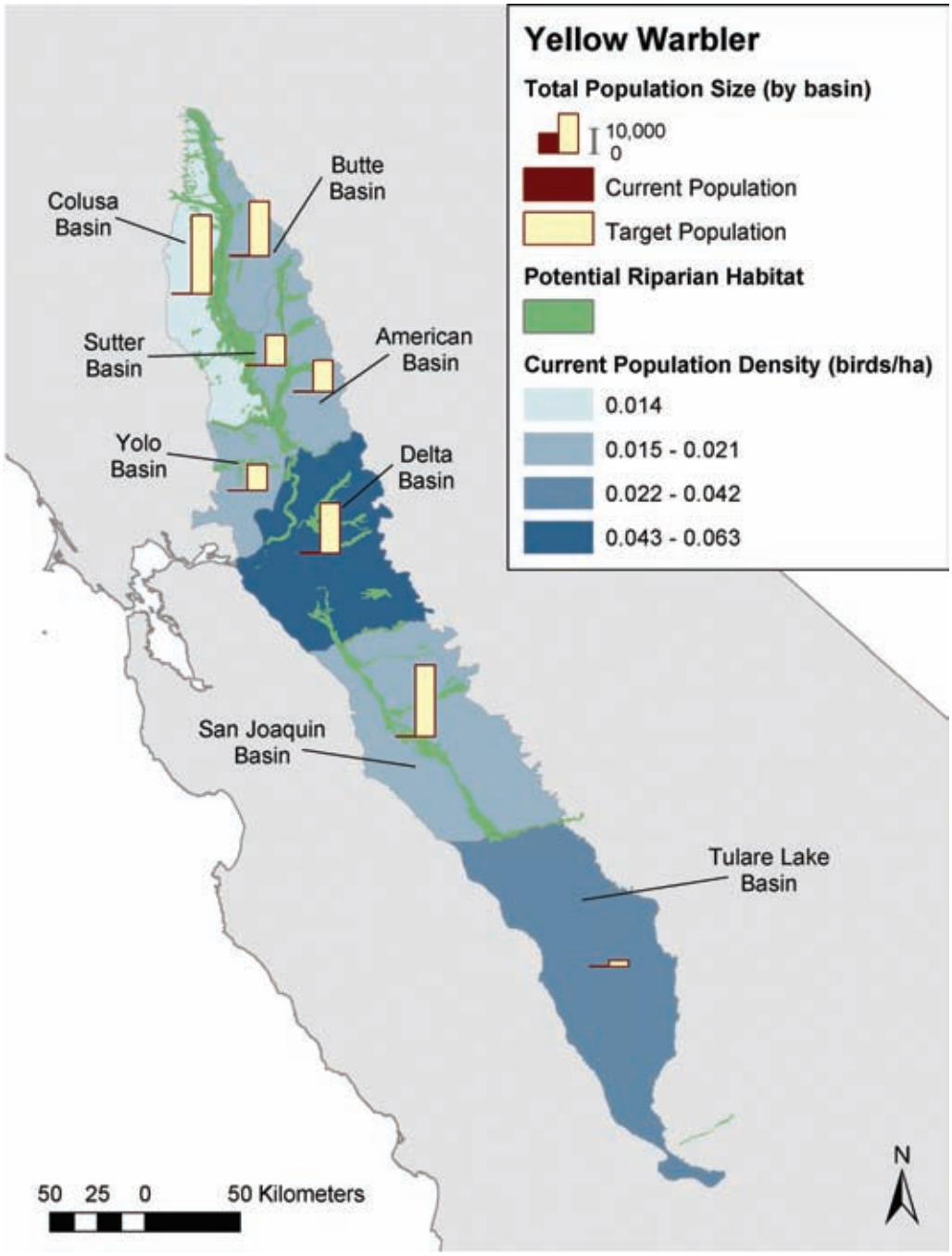


Figure 9-5. Yellow warbler current populations and targets.

Recommended Values of Nest Success

Population growth models require measures of survival and productivity as inputs. These are often referred to as vital rates. A critical vital rate in modeling population growth (lambda) is nest success. By including a nest success objective, the persistence of a population can be gauged, thereby providing a link between population size and habitat condition (Martin 1995, Sherry and Holmes 2000). Bird density may be a misleading indicator of habitat quality (Van Horne 1983 but see Bock and Jones 2004). Thus, setting target values for specific demographic parameters (primarily nest success and adult survivorship) will provide a more meaningful biological objective and thereby ensure better habitat quality and a higher probability of conservation success. Reproductive success and adult survival are key parameters used in population models (Pulliam 1988, Faaborg 2002).

To determine whether a population is growing or declining, the value of population change (lambda) generated from the following equation needs to be greater than one:

Lambda = Adult survival + ([number of nestlings/successful nest] x nest success x number of nest attempts x juvenile survival)/2.[1]

Estimates for nest success and adult survivorship for the spotted towhee and black-headed grosbeak are based on data from the Sacramento Valley (Geupel et al. 1997, Small et al. 1999, Gardali and Nur 2006). Nest success estimates for song sparrows are based on Central Valley data and over 20 years of data from coastal California (Chase and Geupel 2005). Other values for nest success are presented in Table 9-4.

For song sparrows in the Central Valley, nest success has ranged from 5% to 28%, with an average of 16%. This suggests that at most locations in the Central Valley, song sparrows are not producing enough young to keep up with annual mortality and will likely continue to decline in the absence of immigration. To achieve lambda of over 1.0, nest success would need to be at least 27%, thus 25-30% is the recommended value of nest success for song sparrows (Table 9-4). Recommended values for black-headed grosbeaks and spotted towhees are also presented in Table 9-4. With more ongoing demographic monitoring throughout the Central Valley (in the form of nest monitoring and constant-effort mist netting), data for more species will likely be available in the near future (Gardali et al. 2004).

Table 9-4. Observed Mayfield (1975) estimates of survival by planning regions and recommend values of nest success and adult survivorship as determined by source-sink (lambda) models.

	OBSERVED NEST SUCCESS				
Species	*Sacramento Valley*	*Delta*	*San Joaquin Valley*	*Recommended nest success*	*Recommended adult survival*[5]
Yellow warbler	0.32[1]		–	–	–
Common yellowthroat	–		0.63[3]	–	–
Spotted towhee	0.28[2], 0.05[1]		0.43[3]	0.25 to 0.35	0.50 to 0.60
Song sparrow	–	0.28[4]	0.58[3]	0.25 to 0.30	0.50 to 0.60
Black-headed grosbeak	0.27[2], 0.33[1]		–	0.50 to 0.60	0.60 to 0.70

[1]Wood et al. 2001 (Clear Creek), [2]Small et al. 1999 (lower Sacramento River), [3]Haff et al. 2001 (Consumes River)
[4]Hammond and Geupel 2000 (Cosumnes River), [5]Gardali and Nur 2006.

Species Distribution and Richness

The occurrence and persistence of a high diversity of focal species provides an indication of high quality habitat and restoration success (Chase and Geupel 2005, Gardali et al. in press, Dobkin et al. 1998). Restoring riparian habitat near existing sites of high species richness should increase the potential for species recolonization. Data on the number of sites with relatively high focal species richness for each basin were examined to help prioritize conservation efforts among basins.

Annual Rates of Riparian Restoration and Enhancement in the Central Valley

Riparian habitat restoration in the Central Valley generally involves planting trees and shrubs in areas where riparian forests have been cleared for agricultural production. The modification of the Central Valley's natural hydrology makes riparian re-establishment very difficult in many areas because natural flooding has been reduced substantially by flood control dams, bank stabilization rip-rap projects, and diversion of natural stream flows for irrigated agriculture. Irrigation, weed control, and maintenance of irrigation infrastructure usually are required for up to three years after initial plantings in order for restoration efforts to be successful. This can be viewed as a form of enhancement. While the JV has not developed separate enhancement goals for riparian habitat, restoration objectives and associated costs presented here include three years of post planting enhancement.

In order to develop habitat objectives that are challenging but realistic, current costs and annual rates of riparian restoration for the Central Valley were examined. Estimates range from $500 to $5,000 per acre for restoring riparian habitat on the valley floor, which commonly entails vegetative plantings and/or restoration by reconnecting the flood plain. Current estimates from groups actively engaged in restoration and enhancement indicate 1,500 to 2,000 acres could be restored and enhanced annually for the next 5 years (7,500-10,000 acres total).

[1]If the other values are held constant based on actual observed values (from monitoring data in the Central Valley and coast) the value lambda is less than 1; 0.60 (adult survival) + (2.82 (number of nestlings) x 16% (mean of observed estimates of nest success) x 2.20 (number of nest attempts) x 0.40 (juvenile survival)) / 2 = 0.79 (Lambda).

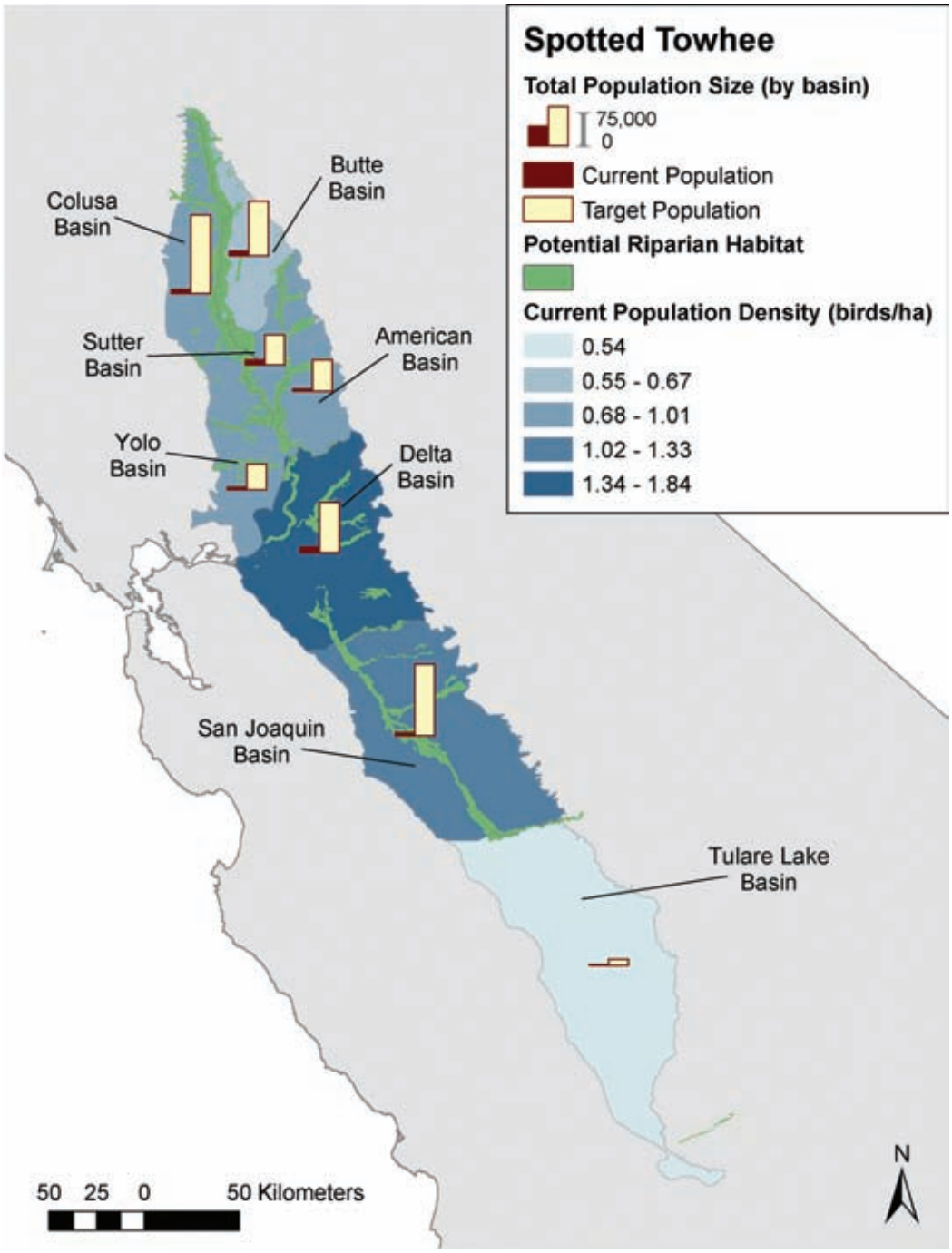


Figure 9-6. Spotted towhee current populations and targets.

Conservation Objectives for Breeding Riparian Songbirds in the Central Valley

Riparian Habitat Objectives

Population targets are based upon total potential habitat, and are considered long term targets. It is unrealistic to expect these targets to be reached in the short term, therefore 5-year objectives for restoration of riparian habitat were developed.



Yellow-breasted chat
Photo: Steve Zach

Table 9-5. Five-year riparian restoration and enhancement objectives for breeding riparian songbirds in the Central Valley.[1]

Planning Region	*Five year Acre Objectives*
Tulare Basin	200
Total	**8,700**

[1]*Sources include The Nature Conservancy, River Partners, Wildlife Conservation Board, U.S. Fish and Wildlife Service, Natural Resources Conservation Service and San Joaquin RCD.*

This plan calls for restoring 8,700 acres of riparian habitat for breeding riparian songbirds in the Central Valley over the next 5 years, which is within the 7,500-10,000 acre range of what could be restored and enhanced annually. Conservation objectives for breeding riparian songbirds are listed in Table 9-5. The Delta Basin is further broken down into objectives for the Mokulumne and Consumnes Rivers. The Sacramento Valley has an objective of 4,500 acres, which has been partitioned among its five basins based on the proportion of restorable habitat. Table 9-5 identifies conservation objectives for riparian songbirds by basin.

Population Targets for Focal Species

Tables 9-6 through 9-11 provide population targets for focal species by basin. The difference in bar heights in Figures 9-5 to 9-8 provides an indication of potential change in population in each basin, if all potentially restorable habitat was restored. Certain basins have higher potential for specific species (e.g., black-headed grosbeaks in Colusa Basin).

Table 9-6. Current and potential population densities and population targets for song sparrow.

Basin	*Current Birds/Ha (± SE)*[1]	*Current Population Size (± SE)*	*Target Birds/Acre*[2]	*Target Population Size*
American Basin	0.0493 (± 0.0115)	327 (± 76)	0.40	33,170
Butte Basin	0.0520 (± 0.0216)	685 (± 285)	0.40	57,408
Colusa Basin	0.0299 (± 0.0142)	239 (± 113)	0.40	83,027
Sutter Basin	0.0493 (± 0.0115)	73 (± 17)	0.40	31,816
Yolo Basin	0.0493 (± 0.0115)	71 (±17)	0.40	27,413
Delta Basin	0.7377 (± 0.0764)	4,432 (± 459)	0.68	90,690
San Joaquin Basin	1.161 (± 0.088)	5,757 (± 438)	0.68	128,901
Tulare Lake Basin	1.166 (± 0.196)	3,396 (± 572)	0.68	10,835

[1]*Current density estimates were based on PRBO point count data. If a basin contained fewer than 30 point count stations, estimates were derived from all stations in the respective valley (Sacramento or San Joaquin).*

[2]*Target densities were based on the 75th percentile value of all point counts in each valley, adjusted by a detectability coefficient.*

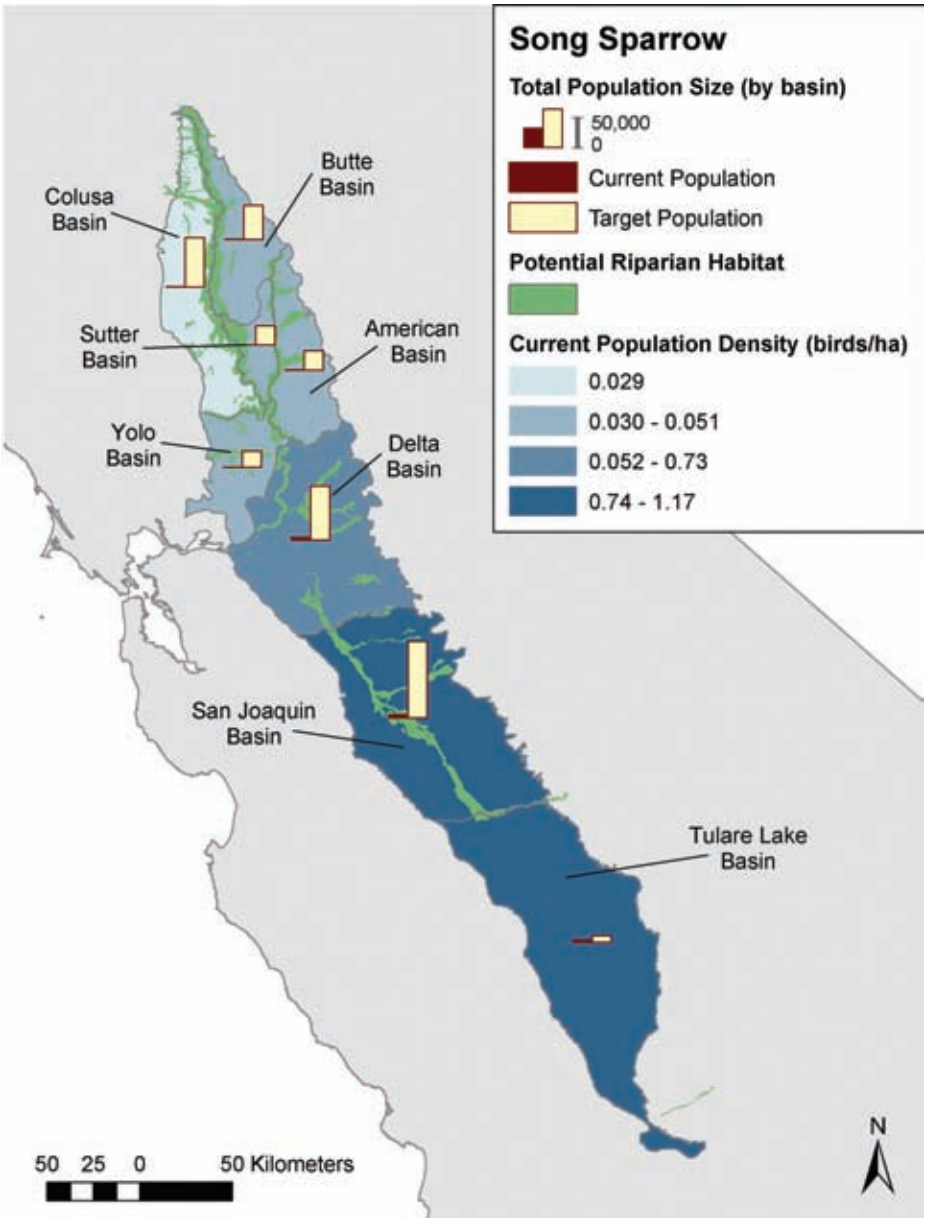


Figure 9-7. Song sparrow current populations and targets.

Table 9-7. Current and potential population densities and population targets for yellow-breasted chat.

Basin	*Current Birds/Ha (± SE)*[1]	*Current Riparian Acres*	*Current Population Size (± SE)*	*Target Birds/Acre*[2]	*Restorable Riparian Acres*	*Target Population Size*
American Basin	0.1377 (± 0.0096)	16,364	912 (± 64)	0.38	82,757	31,160
Butte Basin	0.2104 (± 0.0222)	32,535	2,771 (± 292)	0.38	143,230	53,929
Colusa Basin	0.0465 (± 0.0054)	19,708	371 (± 43)	0.38	207,149	77,995
Sutter Basin	0.1377 (± 0.0096)	3,641	203 (± 14)	0.38	79,378	29,887
Yolo Basin	0.1377 (± 0.0096)	3,569	199 (± 14)	0.38	68,394	25,752
Delta Basin	0.0055 (± 0.0019)	14,840	33 (± 11)	0.21	132,548	28,441
San Joaquin Basin	0.00	12,249	0	0.21	188,394	40,425
Tulare Lake Basin	0.00	7,195	0	0.21	15,835	3,398

[1]*Current density estimates were based on PRBO point count data. If a basin contained fewer than 30 point count stations, estimates were derived from all stations in the respective valley (Sacramento or San Joaquin).*

[2]*Target densities were based on the 75th percentile value of all point counts in each valley, adjusted by a detectability coefficient.*

Table 9-8. Current and potential population densities and population targets for black-headed grosbeak.

Basin	Current Birds/Ha (± SE)[1]	Current Riparian Acres	Current Population Size (± SE)	Target Birds/Acre[2]	Restorable Riparian Acres	Target Population Size
American Basin	0.5956 (± 0.0395)	16,364	3,946 (± 262)	0.54	82,757	44,897
Butte Basin	0.5452 (± 0.0699)	32,535	7,181 (± 920)	0.54	143,230	77,704
Colusa Basin	0.6905 (± 0.0554)	19,708	5,509 (± 442)	0.54	207,149	112,380
Sutter Basin	0.5956 (± 0.0395)	3,641	878 (± 58)	0.54	79,378	43,064
Yolo Basin	0.5956 (± 0.0395)	3,569	861 (± 57)	0.54	68,394	37,105
Delta Basin	0.2442 (± 0.0411)	14,840	1,467 (± 247)	0.15	132,548	20,392
San Joaquin Basin	0.1485 (± 0.0282)	12,249	736 (± 140)	0.15	188,394	28,984
Tulare Lake Basin	0.1921 (± 0.0820)	7,195	560 (± 239)	0.15	15,835	2,436

[1]Current density estimates were based on PRBO point count data. If a basin contained fewer than 30 point count stations, estimates were derived from all stations in the respective valley (Sacramento or San Joaquin).
[2]Target densities were based on the 75th percentile value of all point counts in each valley, adjusted by a detectability coefficient.

Table 9-9. Current and potential population densities and population targets for common yellowthroat.

Basin	Current Birds/Ha (± SE)[1]	Current Riparian Acres	Current Population Size (± SE)	Target Birds/Acre[2]	Restorable Riparian Acres	Target Population Size
American Basin	0.1338 (± 0.0173)	16,364	866 (± 115)	0.10	82,757	8,376
Butte Basin	0.1340 (± 0.0316)	32,535	1,765 (± 416)	0.10	143,230	14,497
Colusa Basin	0.1766 (± 0.0266)	19,708	1,409 (± 212)	0.10	207,149	20,967
Sutter Basin	0.1338 (± 0.0173)	3,641	197 (± 25)	0.10	79,378	8,034
Yolo Basin	0.1338 (± 0.0173)	3,569	193 (± 25)	0.10	68,394	6,923
Delta Basin	0.1815 (± 0.0300)	14,840	1,090 (± 181)	0.20	132,548	26,832
San Joaquin Basin	0.0910 (± 0.0201)	12,249	451 (± 100)	0.20	188,394	38,137
Tulare Lake Basin	0.00	7,195	0	0.20	15,835	3,206

[1]Current density estimates were based on PRBO point count data. If a basin contained fewer than 30 point count stations, estimates were derived from all stations in the respective valley (Sacramento or San Joaquin).
[2]Target densities were based on the 75th percentile value of all point counts in each valley, adjusted by a detectability coefficient.

Table 9-10. Current and potential population densities and population targets for yellow warbler.

Basin	Current Birds/Ha (± SE)[1]	Current Riparian Acres	Current Population Size (± SE)	Target Birds/acre[2]	Restorable Riparian Acres	Target Population Size
American Basin	0.0208 (± 0.0103)	16,364	138 (± 68)	0.13	82,757	10,758
Butte Basin	0.0185 (± 0.0176)	32,535	244 (± 231)	0.13	143,230	18,620
Colusa Basin	0.0147 (± 0.0095)	19,708	117 (± 76)	0.13	207,149	26,929
Sutter Basin	0.0208 (± 0.0103)	3,641	31 (± 15)	0.13	79,378	10,319
Yolo Basin	0.0208 (± 0.0103)	3,569	31 (± 15)	0.13	68,394	8,891
Delta Basin	0.0627 (± 0.0693)	14,840	377 (± 417)	0.13	132,548	17,231
San Joaquin Basin	0.0218 (± 0.0163)	12,249	108 (± 81)	0.13	188,394	24,491
Tulare Lake Basin	0.042 (± 0.0671)	7,195	122 (± 196)	0.13	15,835	2,059

[1]Current density estimates are derived from PRBO point count surveys, If a basin contained fewer than 30 point count stations, estimates were derived from all stations in the respective valley (Sacramento or San Joaquin).
[2]Target densities were based on spot-map densities from Clear Creek study plots, which are outside CVJV basins.

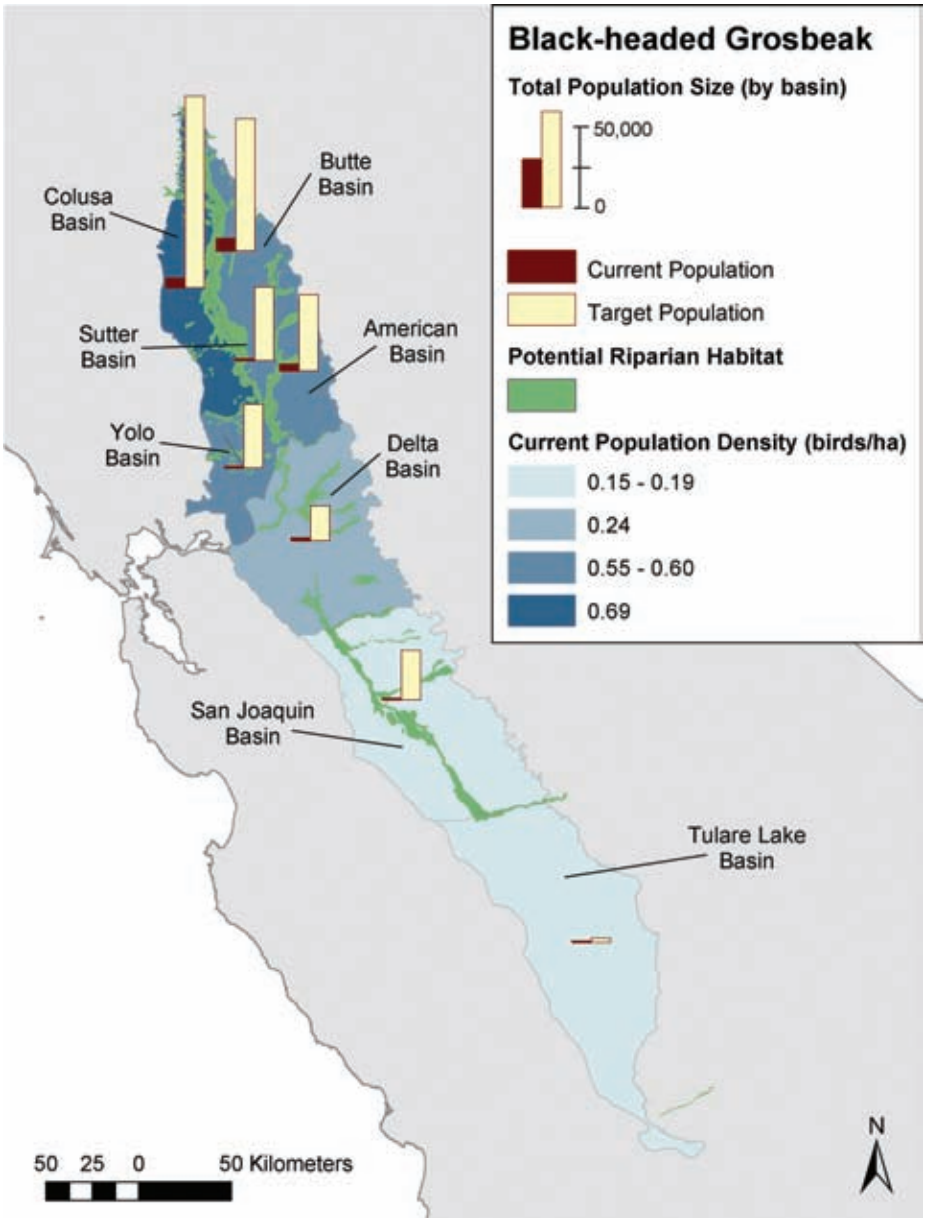


Figure 9-8. Black-headed grosbeak current populations and targets.

Table 9-11. Current and potential population densities and population targets for spotted towhee.

Basin	*Current Birds/Ha (± SE)*[1]	*Current Riparian Acres*	*Current Population Size (± SE)*	*Target Birds/Acre*[2]	*Restorable Riparian Acres*	*Target Population Size*
American Basin	0.7999 (± 0.0342)	16,364	5,299 (± 227)	0.78	82,757	64,330
Butte Basin	0.6779 (± 0.0552)	32,535	8,929 (± 727)	0.78	143,230	111,337
Colusa Basin	1.019 (± 0.0509)	19,708	8,129 (± 406)	0.78	207,149	161,023
Sutter Basin	0.7999 (± 0.0342)	3,641	10,536 (± 451)	0.78	79,378	61,703
Yolo Basin	0.7999 (± 0.0342)	3,569	6,382 (± 273)	0.78	68,394	53,165
Delta Basin	1.837 (± 0.1038)	14,840	11,037 (± 624)	0.78	132,548	103,033
San Joaquin Basin	1.337 (± 0.0787)	12,249	6,629 (± 390)	0.78	188,394	146,444
Tulare Basin	0.5486 (± 0.1088)	7,195	1,598 (± 317)	0.78	15,835	12,309

[1]*Current density estimates were based on PRBO point count data. If a basin contained fewer than 30 point count stations, estimates were derived from all stations in the respective valley (Sacramento or San Joaquin).*

[2]*Target densities were based on the 75th percentile value of all point counts in each valley, adjusted by a detectability coefficient.*

Conservation Priorities for Breeding Riparian Songbirds

Prioritization of habitat restoration work by basin is subjective and can vary depending on goals of the conservation action and opportunities on the ground. Basins were ranked according to six different criteria, with highest rank corresponding to the lowest score. Using this method, the Butte, Colusa, and San Joaquin Basins, ranked respectively are the most important basins in the conservation of riparian songbirds in the Central Valley. Table 9-12 ranks basins in order of importance to riparian birds based on a variety of factors.

By comparing amounts of acreage to be restored in specific projects and multiplying those acreages by current population densities, proposals may be evaluated and ranked on their contribution to overall basin population targets established for each species (or a suite of species). For example, Table 9-13 identifies a ranking system for North American Wetland Conservation Act grant proposals submitted in the spring 2003 grant cycle. This system provides a quantitative way to rank projects based on their potential to influence riparian songbird populations.

Table 9-12. Basins ranked in order of importance to riparian birds based on inputs for setting conservation objectives.

Basin	*Current Riparian Acres*	*Restorable Riparian Acres*	*Proportion of current to restorable*	*Nest Success (4 = no data)*	*Number of Sites with focal species richness > 4 5 (# of sites)*	*Current Focal Species Distribution (# of species)*	*Overall Basin Rank (total score)*
American	3	5	3	4	5 (1)	6 (7)	4 (21)
Butte	1	3	2	4	3 (4)	1 (12)	1 (14)
Colusa	2	1	5	3	2 (8)	2 (11)	2 (15)
Sutter	8	6	7	4	6 (0)	5 (8)	7 (36)
Yolo	7	7	7	4	6 (0)	6 (7)	8 (37)
Delta	4	4	4	2	4 (4)	4 (9)	5 (22)
San Joaquin	5	2	6	1	1 (9)	3 (10)	3 (18)
Tulare	6	8	1	4	6 (0)	7 (6)	6 (32)

Table 9-13. Comparison of NAWCA proposals submitted spring 2003, based on contribution to riparian songbird targets.

CVJV NAWCA Proposals	*Basin*	*Riparian Habitat Goal (acres)*	*Proposed amount of riparian to be restored/ enhanced (acres)*	*Projected Increase of 6 focal species (in total # of individuals)*	*Contribution to population target for 6 focal species (%)*	*Projected increase in total number of Yellow Warbler*	*Contribution to Yellow Warbler population target (%)*
Proposal # 1	Colusa	207,149	5,000	19,711	1.8	615	1.7
Proposal # 2	San Joaquin	188,394	2,628	12,402	1.3	323	1.3
Proposal # 3	San Joaquin	188,394	1,878	8,863	0.9	231	1.0

Summary of Conservation Objectives by Basin

The RBCP contains specific information on factors (e.g., plant species) that positively influence the occurrence of focal riparian bird species. It provides multi-species management recommendations for protection, restoration, and enhancement. The RBCP provides a wealth of current information to guide songbird habitat conservation efforts and should be consulted as an authoritative reference for detailed restoration planning.

American Basin – The American Basin currently has 16,364 acres of riparian habitat and approximately 83,000 acres of restorable habitat. The five-year restoration objective for the American Basin is 675 acres. Current and target bird population and density data for focal species are provided in Tables 9-6 through 9-12.

Butte Basin – The Butte Basin currently has 132,535 acres of riparian habitat and approximately 143,000 acres of restorable habitat. The five-year restoration objective for the Butte Basin is 1,125 acres. Current and target bird population and density data for focal species are provided in Tables 9-9 through 9-14.

Colusa Basin – The Colusa Basin currently has 19,708 acres of riparian habitat and approximately 207,000 acres of restorable habitat. The five-year restoration objective for the Colusa Basin is 1,350 acres. Current and target bird population and density data for focal species are provided in Tables 9-9 through 9-14.

Sutter Basin – The Sutter Basin currently has 3,641 acres of riparian habitat and approximately 79,000 acres of restorable habitat. The five-year restoration objective for the Sutter Basin is 675 acres. Current and target bird population and density data for focal species are provided in Tables 9-9 through 9-14.

Yolo Basin – The Yolo Basin currently has 3,569 acres of riparian habitat and approximately 68,000 acres of restorable habitat. The five-year restoration objective for the Yolo Basin is 675 acres. Current and target bird population and density data for focal species are provided in Tables 9-9 through 9-14.

Delta Basin – The Delta Basin currently has 14,840 acres of riparian habitat and approximately 132,548 acres of restorable habitat. The five-year restoration objective for the Delta Basin is 1,500 acres with 900 acres along the Mokulmne River and 600 acres along the Cosumnes River. Current and target bird population and density data for focal species are provided in Tables 9-9 through 9-14.



Song sparrow
Photo: Brian Gilmore

San Joaquin Basin – The San Joaquin Basin currently has 12,249 acres of riparian habitat and approximately 188,000 acres of restorable habitat. The five-year restoration objective for the San Joaquin Basin is 2,500 acres. Current and target bird population and density data for focal species are provided in Tables 9-9 through 9-14.

Tulare Basin – The Tulare Basin currently has 7,195 acres of riparian habitat and approximately 15,000 acres of restorable habitat. The five-year restoration objective for the Tulare Basin is 200 acres. Current and target bird population and density data for focal species are provided in Tables 9-9 through 9-14.



Snow geese at Sutter National Wildlife Refuge
Photo: Ducks Unlimited

Chapter Ten: WETLAND WATER SUPPLIES

This chapter outlines the requirements for Central Valley managed wetland water supplies and the current conditions in the valley for obtaining water supplies to meet objectives stated in the 2006 Plan. The chapter also summarizes the history of wetland water supplies in the valley, the significant changes to supplies over time, and the most current and pressing water-related issues within each of the valley's nine basins.

Introduction

Ensuring reliable and affordable water supplies for wetland management may be the Central Valley Joint Venture's (JV) greatest challenge. Since publication of the 1990 Central Valley Habitat Joint Venture Implementation Plan (1990 Plan; Central Valley Habitat Joint Venture 1990), human demand for water in the Central Valley has increased at an alarming rate. At the same time, complex factors have caused the reduction of available water supplies for many wetlands. These include in-stream dedication for threatened and endangered fish species, human population growth, and urbanization. The economic and political competition for water has become intense, and the cost of water in some basins has risen 400% since 1993 (D. Garrison, U.S. Fish and Wildlife Service, personal communication). Stakeholders with competing agricultural, urban, and environmental interests are lobbying on many fronts for reallocation of existing supplies.

Water shortages in California currently approach 1.6 million acre-feet in an average water year and 5.1 million acre-feet in drought years. This deficit is expected to increase to 2.4 million acre-feet in average years and to 6.2 million acre-feet in drought years by 2020 (California Department of Water Resources 1998).

The challenge facing both private and public wetland managers in the Central Valley is two-fold: (1) increasing the reliability of water sources for wetland management; and (2) ensuring that funds for water supplies cover the increasing costs of water in an increasingly

"Although the 2006 Plan provides an estimate of the water needed to meet integrated bird habitat objectives, the current and future availability of wetland water supplies remains unclear. Site specific investigations are needed to evaluate wetland water supplies, both for existing wetlands and for wetlands that will be restored to meet bird habitat objectives."

Dale Garrison
Refuge Water Supply Coordinator
U.S. Fish and Wildlife Service

competitive water market. Many private wetland managers rely on water supplies that are reduced in below-average water years, depend on return flows from agriculture, and/or are part of low-priority contracts with water purveyors. Increasing the reliability of these water sources is a priority for the JV, but water reliability does not guarantee long-term affordability. Wetland managers who continue to have access to reliable water supplies may ultimately be unable to afford water as prices increase. This chapter identifies JV efforts needed to secure reliable and accessible water supplies for Central Valley wetlands.

This chapter has three sections: (1) the history of Central Valley wetland water supplies; (2) water supplies needed to meet integrated bird habitat objectives; and (3) water issues and proposed actions.

The History of Central Valley Wetland Water Supplies

Historical Overview

The loss of wetlands in the Central Valley since the 1850s has been well documented by a variety of publications and reports. Surveys in the 1850s estimated there to be over four million acres of wetlands in the valley. The resulting influx of immigrants into California following the discovery of gold, initiated the changes that led to the conversion of over 90% of Central Valley wetlands. Human settlement increased the need to control annual flooding of the major valley river systems to protect developing cities, homesteads and associated infrastructure. As flood control levees were built to tame the rivers, agricultural lands expanded, and dams were constructed to provide additional flood control and water storage for expanding urban, industrial, and agricultural needs. As the population of California increased, so did this demand for agricultural products and other services. By the 1950s, expanding agricultural development had decreased Central Valley wetlands to an estimated 290,000 acres (Central Valley Habitat Joint Venture 1990).

The continued decline of Central Valley wetlands occurred between 1950 and 1970. Water supplies for managed wetlands during this period were not secure. Most managed wetlands depended upon agricultural irrigation return flows, low-priority water contracts, or non-binding agreements with water districts. Some of those historic agreements continue to this day. Examples include wetlands in the Butte Sink area that receive fall and winter water via a 1922 agreement with Western Canal Company and Pacific Gas & Electric Company; the Sacramento, Delevan, and Colusa National Wildlife Refuges (NWR), which receive water through agreements with Glenn-Colusa Irrigation District; and the Gray Lodge Wildlife Area (WA), which receives a portion of its water needs from the Biggs-West Gridley Water District for lands allocated "Class 1" Feather River settlement water. Another example involves the Grassland Mutual Water Association, which filed suit against the Department of the Interior after losing San Joaquin River supplies when the Friant Dam Project began diverting flows from the San Joaquin River for agriculture and municipal and industrial uses in the Tulare Basin. A settlement provided 50,000 acre-feet of water (if and when available) for wetlands within the Grassland Water District (GWD) during the fall and winter months. The California Department of Fish and Game (CDFG) also negotiated agreements with the U.S. Bureau of Reclamation (USBR) and various local water districts for many of its wildlife areas. With few exceptions, these contracts and agreements provided water supplies on an "if and when available basis," with supplies being severely reduced, or eliminated, during drought years. This situation continued during the 1970s until a severe drought during the latter part of the decade greatly reduced wetland water supplies and, in some instances, eliminated all wetland water deliveries.

Wetland Water Supply Studies

The combination of drought and poor wetland water supply reliability resulted in significant impacts to wetland habitat and waterbird populations, and in particular, wintering waterfowl. By the end of the decade, political pressure from concerned landowners and wildlife agencies resulted in publication of the *Total Water Management Study for the Central Valley Basin of California* (U.S. Bureau of Reclamation unpublished report). This study included Working Document No. 12, "Fish and Wildlife Problems, Opportunities, and Solutions" (U.S. Bureau of Reclamation 1978), a survey of major fish and wildlife problems and improvement opportunities within the geographical area encompassed by the Central Valley Project (CVP)[1]. As a result of the study's findings, the USBR initiated the *Central Valley Fish and Wildlife Management Study of 1979* (U.S. Bureau of Reclamation 1979). The goal of the study was the development of a comprehensive baseline of Central Valley fish and wildlife resources and to recommend specific solutions to water related issues.

[1] *The Central Valley Project is a federal water project initially authorized in 1935 as a long-term plan to utilize water in California's Central Valley. The original goals of the project were flood control, improved transportation of water, and the development of water supplies for industrial, municipal, and agricultural use. Fish and wildlife needs were eventually added as goals, with the CVPIA furthering this objective through the allocation of CVP water supplies for specific fish and wildlife purposes.*

These studies continued into the early 1980s and resulted in a report that addressed waterfowl and wetland habitat, *Central Valley Fish and Wildlife Management Study: Refuge Water Supply, Central Valley Hydrologic Basin, California 1986* (U.S. Bureau of Reclamation 1986). This study served as the basis for the *Report on Refuge Water Supply Investigations, Central Valley Hydrologic Basin, California* (1989 Report; U.S. Department of Interior 1989).

As these investigations progressed, other actions were underway that would significantly affect Central Valley wetlands. The *North American Waterfowl Management Plan* (U.S. Fish and Wildlife Service 1986), an international treaty between the United States and Canada, was signed in 1986 and identified the Central Valley as one of the six priority habitat areas for North American waterfowl. The JV was subsequently formed in 1988, and based upon the findings of the 1989 Report, one of the objectives stated in the 1990 Plan was to secure firm, reliable water supplies for publicly-owned Central Valley wetlands and the privately managed wetlands located within the Grassland Resource Conservation District (GRCD) and elsewhere in the valley.

The Central Valley Project Improvement Act

CVPIA Mandates Water for Wetlands

Efforts to secure reliable and accessible sources of water started with ecologically sound estimates of wetland water needs for optimal habitat management and were identified as Level 4 water supplies in the 1989 Report. Due to an investment in the legislative process by JV partners, provisions were made in the 1992 Central Valley Project Improvement Act (CVPIA) Title 34 of Public Law 103-575 Section 3406 (d)(1-5) to meet this need. This law authorized water supplies for those wetland areas covered by the 1989 Report and the San Joaquin Basin Action Plan (Action Plan; U.S. Bureau of Reclamation et a l. 1989), a plan developed to mitigate for the habitat losses resulting from the Kesterson NWR selenium contamination of the 1980s, and to implement the objectives of the JV.

Another specific provision of the CVPIA, 3406 (d)(6)(A,B), required the investigation of water and conveyance needs for private wetlands not covered by the provisions of CVPIA 3406 (d)(1-5) of the act. The *Central Valley Wetlands Water Supply Investigations, CVPIA 3406 (d)(6)(A,B), A Report to Congress* (Water Report; U.S. Fish and Wildlife Service 2000) was produced as a result. Central Valley water suppliers were interviewed and their comments incorporated into the Water Report. Most expressed concern over the long-term shortages of water supplies resulting from a statewide lack of new water development (e.g., groundwater banking, new reservoirs, and new conveyance infrastructure); a reduction of Colorado River water supplies; and increasing urban and environmental demands that reduce supplies for agricultural and other uses. Although most suppliers face no legal obstructions to providing wetland water, many admitted that agriculture would have priority if water shortages develop.

The CVPIA statutorily obligates the Secretary of Interior to consult with the JV in matters involving wetland water acquisition and delivery. Considering this obligation, the JV maintains a unique responsibility to consider water supply issues related to the implementation of this 2006 Plan by participating in forums where water issues and policies are being discussed, to assure that policy makers address wetland water needs.

To date, the CVPIA is one of the most important legislative actions taken to protect and restore Central Valley wetland habitat, and has laid the foundation for many significant and beneficial conservation activities in subsequent years. Since 1992, delivery of water supplies of adequate quality and quantity to certain NWRs, WAs, and the private wetlands of the GRCD through CVPIA has improved wetland habitat quality and benefited many wetland-dependent wildlife populations, including waterfowl, shorebirds, colonial waterbirds, and several threatened and endangered species. These benefits have been documented in annual reports to Congress and in a variety of studies and reports conducted by the U.S. Fish and Wildlife Service (USFWS) and CDFG, which are summarized here:

- A 300% increase in waterfowl food production within the GRCD;
- An 89% reduction in avian disease outbreaks on the Sacramento NWR Complex since 1992;
- A 49% increase in fall shorebird use Central Valley-wide;
- An increase in bird use days on private lands in the San Joaquin Valley from 38,000 to 115,000; during the first year of CVPIA implementation, and today, the San Joaquin Valley hosts 500,000 to 1 million birds each year;
- A 50% increase in the number of heron and egret rookeries in the San Joaquin Valley;
- A 61% increase in visitor use on the Sacramento NWR Complex between 1992 and 2006;
- Increases in threatened or endangered species (western pond turtles, tricolored blackbirds, and giant garter snakes);

- Marked increases in white-faced ibis and Sandhill cranes (e.g., white-faced ibis populations increased from 100 birds in 1991 to 15,000 in 2002 at the Sutter NWR);
- The Agricultural Waterfowl Incentive Program, CVPIA 3406 (b)(22), funded the flooding of an average of 40,000 acres of agricultural lands each winter between 1997 and 2003, providing a substantial portion of the annual waterfowl energetic need within the Pacific Flyway during that time.

These habitat improvements have led to research studies by universities, government agencies, and non-governmental conservation organizations such as the California Waterfowl Association; Ducks Unlimited, Inc.; PRBO Conservation Science; University of California, Davis; United States Geological Survey's Biological Research Division, Dixon Field Station; and others.

Several long-term water conveyance/supply contracts and agreements were negotiated during the 1990s that increase the reliability of CVPIA water supplies being delivered for the next 25 years. These contracts and agreements called for the establishment of an Interagency Refuge Water Management Team (Team). Comprised of USBR, USFWS, CDFG, and the GRCD, the Team meets regularly, collaborating on the acquisition and allocation of incremental water supplies necessary for wetlands to operate at full habitat development levels (Level 4) and other wetland water related issues.

CVPIA Mandate Falls Short of Realization

The CVPIA mandated delivery of historic water supplies (Level 2 supplies) and two-thirds of the full water supply requirements for lands identified in the Action Plan from the CVP. In addition, Level 4 water supplies were to be acquired through purchase from willing sellers and provided in 10% increments per year until 2002, when full water supply requirements were authorized. These full water levels have not been achieved, due in large part to state and federal budget shortages, inconsistency in the timing of water deliveries, and increases in the cost of blocks of water made available annually from willing sellers on the open market (also known as "spot market"). Budgetary constraints within USBR's annual CVPIA Restoration Fund and the state's inability to cover their 25% cost-share mandate, required by CVPIA, have restricted the amount of Level 4 water supplies that can be acquired each year. These budget shortfalls also have inhibited the ability to complete the construction of conveyance facilities necessary to deliver water to refuge boundaries. In some cases, conveyance facilities to provide water delivery to the property boundary are still awaiting construction, and in the case of the Action Plan lands, wetland restoration has still not been completed. Some wetland areas still lack sufficient infrastructure to beneficially use their incremental Level 4 water supplies, even if delivered to the property boundary.

Water costs have escalated as water acquisitions to meet CVPIA, CALFED, urban, and agricultural needs have influenced sharp increases in spot market prices, further stressing limited budgets. USBR is currently studying the potential of increasing groundwater usage on CVPIA wetlands to offset both funding and supply limitations.

Water Supplies Needed to Meet Integrated Bird Habitat Objectives

The 2006 Plan addresses the habitat needs of six bird groups. To increase the efficiency of bird conservation in the Central Valley, the habitat needs of these bird groups were integrated at the basin scale where possible. Chapter 11 (Summary Chapter) provides a full description of these integrated habitat objectives and how they were obtained. The water needs associated with these integrated objectives are presented here.

Estimated annual water supplies needed to properly manage state, federal and GRCD seasonal and semi-permanent wetlands for each basin were identified in the 1989 Report and the Interagency Coordinated Program (ICP) task force report, *An Interagency Coordinated Program for Wetland Water Use Planning: Central Valley, California* (ICP Report; U.S. Bureau of Reclamation et al. 1998). These annual water needs, as well as the amount of water needed for winter-flooded agricultural habitat, are described in Table 10-1.

The water needs that are associated with integrated bird objectives are a function of the amount of existing habitat, as well as the amount of additional habitat that must be restored to fully meet bird needs in the Central Valley. Table 10-2 presents the annual water needs that are associated with existing wetland habitats in the Central Valley, based on acre-feet per acre requirements identified in Table 10-1.

Table 10-1. Annual water requirements (acre-feet per acre) by habitat type and basin.

Basin	*Seasonal Wetlands[a] (acre feet/acre)*	*Semi Permanent[a] Wetlands (acre-feet/acre)*	*Winter Flooded[b] Agriculture (acre-feet/acre)*
American	5.0	7.4	2.5
Butte	5.6	7.4	2.5
Colusa	5.0	7.4	2.5
Sutter	5.0	7.4	2.5
Yolo	5.0	7.4	2.5
Delta	4.75	7.4	2.5
Suisun	4.75	7.4	0
San Joaquin	5.45	7.4	0
Tulare	5.25	8.0	0

[a] *U.S. Fish and Wildlife Service 2000; U.S. Bureau of Reclamation et al., 1998.*
[b] *Dale Garrison, U.S. Fish and Wildlife Service, personal communication.*

CVPIA Level II supplies currently total 422,252 acre-feet or 37% of annual water needs of existing wetlands. Full Level 4 supplies total 555, 515 acre-feet, or 49% of existing wetland need (the reliability of Level 4 deliveries is directly related to annual spot market water costs, water availability, and Restoration Fund revenue levels for that year).

Beyond CVPIA Level 2 and 4 supplies, the reliability of water supplies needed to meet the full 1,129,151 acre-feet need of these wetlands remains largely unknown. Table 10-3 presents the annual water needs of additional seasonal and semi-permanent wetlands (new wetlands) that must be restored to achieve integrated habitat objectives for bird groups included in the 2006 Plan. These represent new water needs above and beyond the water being supplied to existing wetlands. Finally, Table 10-4 presents the combined water requirements of existing wetlands and wetlands that must be restored to fully meet integrated habitat objectives for the Central Valley. This overall estimate also includes the water needed for winter-flooding of agricultural habitats that must be maintained even when wetland objectives are fully met. Although this overall estimate of about 2.3 million acre-feet includes "new" water that is needed for wetlands yet to be restored, much of this water need is currently being met on existing wetland and agricultural habitats. However, the long-term reliability of these supplies remains uncertain.

Table 10-2. Total annual water needs for existing wetland habitats in the Central Valley.

Basin	*Seasonal Wetlands (acres)*	*Seasonal Wetland Water Needs (acre feet)*	*Semi Permanent Wetlands (acres)*	*Semi-Permanent Wetland Water Needs (acre feet)*	*Total Water Needs (acre feet)*
American	3,187	15,935	562	4,159	20,094
Butte	23,340	130,704	4,119	30,481	161,185
Colusa	22,390	111,950	3,951	29,237	141,187
Sutter	1,951	9,755	344	2,546	12,301
Yolo	8,558	42,790	1,512	11,189	53,979
Delta	6,349	30,158	1,121	8,295	38,453
Suisun	32,232	153,102	5,688	42,091	195,193
San Joaquin	61,013	332,521	6,779	50,165	382,686
Tulare	20,212	106,113	2,245	17,960	124,073
Total	**179,232**	**933,028**	**26,321**	**196,123**	**1,129,151**

Table 10-3. Total annual water needs for additional wetland habitats that must be restored to fully meet integrated bird habitat objectives.

Basin	Seasonal Wetlands (acres)	Seasonal Wetland Water Needs (acre feet)	Semi Permanent Wetlands (acres)	Semi-Permanent Wetland Water Needs (acre feet)	Total Water Needs (acre feet)
American	20,396	101,980	425	3,145	105,125
Butte	17,396	97,418	425	3,145	100,563
Colusa	2,396	11,980	425	3,145	15,125
Sutter	4,396	21,980	425	3,145	25,125
Yolo	3,170	15,850	508	3,759	19,609
Delta	19,170	91,058	1,208	8,939	99,997
Suisun	0	0	333	2,464	2,464
San Joaquin	20,340	110,853	2,815	20,831	131,684
Tulare	21,263	111,631	5,935	47,480	159,111
Total	**108,527**	**562,750**	**12,500**	**96,053**	**658,803**

Table 10-4. Total annual water needs for wetland and winter-flooded agricultural habitats in the Central Valley when integrated bird habitat objectives are met.

Basin	Seasonal Wetlands (acre feet)[a]	Semi Permanent Wetlands (acre feet)[b]	Agricultural Winter Flooding (acre-feet)[c]	Total Water (acre feet)[d]
American	117,915	7,304	125,000	250,219
Butte	228,122	33,626	155,000	416,748
Colusa	123,930	32,382	112,500	268,812
Sutter	31,735	5,691	25,000	62,426
Yolo	58,640	14,948	7,500	81,088
Delta	121,215	17,234	72,500[e]	210,949
Suisun	153,102	44,555	0	197,657
San Joaquin	443,374	70,996	0	514,370
Tulare	217,744	65,440	0	283,184
Total	**1,495,777**	**292,176**	**497,500**	**2,285,453**

[a] *Annual water needs for managed seasonal wetlands (public and private) when seasonal wetland objectives are met for the Central Valley.*
[b] *Annual water needs for managed semi-permanent wetlands (public and private) when semi-permanent wetland objectives are met for the Central Valley.*
[c] *Annual water needs for winter-flooded agriculture (predominantly rice) when seasonal wetland objectives are met for the Central Valley.*
[d] *Sum of seasonal wetland, semi-permanent wetland, and winter-flooded agriculture water needs.*
[e] *Although there is not a winter-flooding objective for the Delta Basin, this figure represents current estimates of winter-flooded corn in the basin.*

Although the 2006 Plan provides an estimate of the water needed to meet integrated bird habitat objectives, the current and future availability of wetland water supplies remains unclear. Site specific investigations are needed to evaluate wetland water supplies, both for existing wetlands and for wetlands that will be restored to meet bird habitat objectives. This is a key information need for all basins in the Central Valley, and will be critical as JV partners attempt to secure reliable and affordable water supplies for all of the region's wetlands.

Water Issues and Proposed Actions

Current Issues and Challenges

Water Supplies for New Wetlands

Since the passage of CVPIA, additional wetlands have been added to NWRs and WAs that also need to be addressed, as well as the water supply needs of private wetlands within key basins. They include: Llano Seco Unit of the Sacramento River NWR, San Joaquin River NWR, Stone Lakes NWR, Butte Sink NWR, Upper Butte Basin WA, private wetlands within the Tulare Basin, and others. They contribute to the JV wetland restoration objective and utilize water supplies that were authorized when these properties were acquired. However, in many instances after the acquisition, the agencies lacked the funding to pay for the pumping, and/or conveyance of water supplies for these newly purchased wetlands.

Likewise, additions to San Joaquin Valley WAs such as North Grasslands and Volta WAs have varying reliability of supplies. For example, the Gadwall Unit addition to the North Grasslands WA falls within the GRCD and is entitled to CVPIA authorized water supplies, while recent additions to the Volta WA do not currently appear to have access to adequate water supplies.

Spotlight on Tulare Basin Wetlands

Interest in restoring historic wetland habitat conditions within the Tulare Basin has greatly increased since the passage of the CVPIA. While private wetlands within this area did not directly benefit from provisions of the CVPIA, the vast improvements that have resulted in other wetland basins that receive CVPIA water supplies has sparked renewed discussion at regional, state and federal levels in the Tulare Basin. A major initiative has resulted from these discussions, focusing on a combination of factors that could result in significant habitat restoration within the Tulare Basin.

These factors include:

- Historic wetland areas and soil types;
- Availability of water supplies, including cooperation from overlying agricultural water agencies and conjunctive use of available water resources for multiple purposes (including flood control);
- Cooperating private landowners who maintain interest in the re-establishment of wetlands on their property or willingness to protect the wildlife values of their property through state or federal ownership or conservation easements;
- Conjunctive use of existing and restored natural landscapes to provide endangered species benefits as well as wetland benefits;
- A high degree of cooperation among state and federal agencies, conservation organizations, and the agricultural community, with varying missions and authorizations.

High annual variation in runoff from the west slope of the Sierra Nevada into the southern San Joaquin Valley causes the Tulare Basin to experience the greatest fluctuation in water supplies in the Central Valley. For example, the annual runoff from the Kaweah River (a tributary to the Tulare Lake) over the past 100 years of record has ranged from approximately 93,000 acre-feet in 1977 to over 1.4 million acre-feet in 1983. Such vast fluctuations call for a strategy that takes into account this highly variable hydrology and establishes flexible wetland restoration goals within the region.

The Tulare Basin is the heart of some of the most intensively farmed and agriculturally productive lands in the world. It is also one of the fastest growing regions in California. There is no “silver bullet” strategy for finding more water for wetlands in Tulare Basin as may have been the case with implementation of the CVPIA elsewhere in the Central Valley. The basin suffers from chronic water shortages, and the impacts of having its imported water supplies significantly reduced, as a result of new laws or regulations, have not been resolved. It is facing significant new water demands for river and fishery habitat restoration and, due to its proximity to urban Southern California, has the potential to become a new source of water to meet the increasing water needs of that region. Only now are the existing and future wetlands needs of the Tulare Basin getting serious consideration in state and federal water and environmental forums.

Water Management Programs and Policies Affecting Wetland Water Supplies

Along with increases in wetland acreage in the Central Valley during the past decade, various activities have occurred that have the serious potential to impact the quantity and quality of water supplies to many wetland areas throughout the valley.

Federal Programs and Actions

The U.S. Department of Agriculture, through the Natural Resources Conservation Service, has restored privately-owned wetlands throughout the Central Valley through the Wetlands Reserve Program. Most of these restored wetlands utilize water supplies that were available to the landowner prior to restoration. In many instances, reliability of these water supplies is unknown, yet must be clarified as part of an overall re-evaluation of wetland water supplies for the Central Valley.

The Department of the Interior's decision to decrease the amount of Colorado River supplies for Southern California has also affected water supplies in the Central Valley. This decision initiated the search for additional municipal and industrial water supplies by the Metropolitan Water District (MWD), which supplies water to the Los Angeles and San Diego metropolitan areas. MWD has become very active in locating and acquiring water supply options, both north and south of the Sacramento San Joaquin River Delta (Delta), to help meet anticipated future demands for its service area. Typically, urban water users can pay prices that are an order of magnitude greater than can be afforded by government agencies, conservation organizations, and private landowners, resulting in the unintended consequence of "out-bidding" wetland managers.

Endangered Species Act decisions have also affected agricultural water supplies that must be diverted and pumped south of the Delta. Reduced pumping from the Delta to protect listed fish species has decreased water supplies previously available to CVP and State Water Project districts. These decreased supplies have generated an energetic water transfer program between agricultural water districts in the San Joaquin Valley. These transfers have greatly increased the demand for surplus water supplies that become available in certain years. As the demand has increased, so has the cost of acquiring these limited water supplies. These increased costs have placed additional burdens on limited public funding available to acquire necessary water supplies for private and public wetlands.

CALFED Program

Approximately half of California's surface water flows through the Delta. Half of this water is diverted for urban, agricultural and environmental use. Remaining water is discharged into the Pacific Ocean through the San Francisco Bay (Bay). The Bay-Delta ecosystem is affected by these water diversions, and courts have intervened to assure that adequate freshwater supplies enter the system. State and federal agencies are working with local water districts and other stakeholders to improve conditions in the Bay-Delta, while continuing efforts to meet California's diverse water needs. These efforts are intended to be coordinated through the CALFED Program, which was initiated following the 1994 interagency Bay-Delta Accord. The program focuses on water quality standards, coordination of State Water Project and CVP operations; and long-term solutions to problems in the Bay-Delta Estuary.

CALFED, along with several CVPIA programs and various court decisions have brought about changes in water management programs throughout the Central Valley. CALFED includes water programs that could result in less water for wetlands in some areas, while potentially increasing wetland water supplies elsewhere in the Central Valley. A major CALFED program is the Environmental Water Account (EWA). The EWA was established to replenish water supplies required for management of federally threatened or endangered fish and to improve water quality in the Delta. The water needed for increasing water transfers, the EWA, and the Vernalis Adaptive Management Plan, a plan to meet flow objectives for migrating salmon within the San Joaquin River Basin (EA Engineering, Science, and Technology 1999) have all contributed to increased competition for limited environmental water supplies.

Regional Water Quality Standards

Wetland water quality issues are affected by various Regional Water Quality Control Board (RWQCB) programs and standards. Water quality supply issues are quickly becoming more important as regulations regarding outflow from agriculture and managed wetlands increase, and wetland managers are being held accountable for discharge from their properties, regardless of its source of origin. RWQCBs are developing and adopting programs which regulate managed wetland drainage through waivers to Waste Discharge Requirements, such as the Central Valley RWQCB's Irrigated Lands Conditional Waiver Program, and development of load restrictions, including total maximum daily loads (TMDLs) of mercury, salt and boron. As discharge restrictions increase, source water quality becomes more of a concern in order to meet new restrictions.

Water Use Planning Efforts

State and federal agencies have responded to increasing concerns by wetland managers regarding water supplies. CDFG's Lands Committee examines water availability and potential use as part of its review of potential land acquisitions. The USFWS conducts a similar review prior to land acquisition that is more comprehensive than has been the case in the past. The ICP task force was established in 1998 and consists of the USFWS, USBR, GRCD, and CDFG, advised in the development of the ICP Report, a document examining water use and providing a process for the identification of effective water regimes for Central Valley wetlands.

Many agricultural and urban water districts have completed water conservation plans to comply with USBR contract requirements. The USFWS, CDFG, and GWD have completed water management plans for those NWRs, WAs, and GRCD lands with authorized CVPIA wetland water supplies. These planning efforts are designed to improve water use efficiency and conservation efforts to the benefit of all water users.

Future Issues and Challenges

Securing firm, reliable water supplies for managed wetlands in the Central Valley will become even more challenging in the future. Demand for limited water supplies will increase with continued population growth in California, and wetlands will compete for a legitimate allocation to meet wetland dependent resource needs. Wetland habitats cannot properly function without access to year-round water supplies to meet management objectives. Thus, issues and challenges that are faced today will continue and become more important as additional issues arise in future years.

Some of the most significant barriers to acquiring future water supplies for Central Valley wetlands include:

- Delta export and pumping constraints;
- Increasing competition to purchase limited water supplies;
- Increasing regulation of managed wetland water discharge;
- Capacity limitations of existing water delivery systems;
- Balance between supply and demand;
- Cost of acquiring annual and long-term water supplies;
- Current and future, state, federal, and private budget shortfalls that impact acquisition efforts;
- The State of California's ability to meet their 25% cost-share obligations under the CVPIA;
- Unreliable quality and quantity of groundwater supplies;
- Increased groundwater pumping costs;
- Annual and long-term water transfers that may adversely affect managed wetlands and fish and wildlife resources.

Water Issues by Basin

Current and future water issues affecting managed wetlands vary among basins in the Central Valley, and many of them are outlined here.

Butte Basin

- Reliance upon groundwater at Gray Lodge WA as part of Level 4 water supplies;
- A shift from optimal wetland management to the implementation of best management practices, in order to comply with vector control regulations;
- Insufficient infrastructure to deliver Level 2 and Level 4 water supplies to Gray Lodge WA;
- Ensuring that water supplies are attached to the property when protecting managed wetland habitat.

Colusa Basin

- Potential competition for water between post-harvested rice and managed wetlands, particularly during drought years;
- Timing of water use on shared conveyance systems;
- Quality issues related to surface water delivery and discharge at Sutter, Colusa, and Sacramento NWRs (e.g., boron and mercury);
- Equitable sharing of monitoring costs by those participating in water quality coalitions;

- Potential increased groundwater use (e.g., Delevan NWR);
- A shift from optimal wetland management to the implementation of best management practices, in order to comply with vector control regulations;
- Management impacts resulting from re-route of the Colusa Drain;
- Transfer of permanent water rights to out of basin agricultural and urban users (potential adverse impact to wetlands and Level 4 water supplies associated with long-term out-of-basin water transfers);
- Ensuring that water supplies are attached to the property when protecting managed wetland habitat.

Sutter Basin

- Current conveyance system at Sutter NWR is insufficient to convey Level 4 water supplies;
- Timing of water on shared conveyance systems;
- Improving the facilitation of intra-basin and inter-basin water transfers among state and federally managed wetlands;
- A shift from optimal wetland management to the implementation of best management practices, in order to comply with vector control regulations;
- Ensuring that water supplies are attached to the property when protecting managed wetland habitat.

Yolo Basin

- Competing water use and loss of habitat due to urban growth in and around the city of Woodland;
- Increased regulatory requirements on managed wetland areas as a result of new mercury TMDL standards;
- Increasing competition for water between agricultural and habitat interests due to conveyance capacity limitations (e.g., Toe Drain and Putah Creek) at Yolo Bypass WA;
- Ensuring that water supplies are attached to the property when protecting managed wetland habitat.

American Basin

- Competing water use and loss of habitat (e.g., ricelands) due to urban growth in and around the cities of Yuba City and Marysville;
- Need for more protection of open space (e.g., agricultural easements);
- No current reliable supply of water for most managed wetlands within the basin;
- Ensuring that water supplies are attached to the property when protecting managed wetland habitat.

Delta Basin

- Balancing endangered species (e.g., Delta smelt) recovery needs with wetland water supply needs;
- Saltwater intrusion into fresh water wetland habitat;
- Challenges in maintaining existing levee system;
- Increased regulatory requirements on managed wetland areas within the basin as a result of new mercury TMDL standards;
- Competing water use and loss of habitat due to urban growth in and around the primary zone of the Delta.

Suisun Basin

- Maintenance of existing salinity standards established to sustain a brackish water marsh capable of producing high-quality forage and habitat conditions suitable for waterfowl and other wetland related wildlife;
- Negative impacts to wetland water quality and habitat conditions due to potential reduction of Delta outflows and increases in state and federal water project deliveries;
- Maintenance and improvement of 220 miles of exterior levee for the protection and enhancement of diked wetland habitats and the protection of Delta water quality;
- Lack of a maintenance program to protect and support publicly and privately managed wetland resources;
- Increased stress on the levee system and the threat to diked managed wetlands due to predicted rise in sea level;
- Potential localized salinity variations due to planned tidal restoration of diked areas, and associated negative impacts to adjacent waterfowl habitat management areas;

- Increases in salinity resulting in a decrease in the life expectancy of existing water management infrastructure, and a reduction of diversity and productivity in diked wetlands;
- Concerns over water quality constituents in the marsh including, but not limited to, polychlorinated biphenyls, polycyclic aromatic hydrocarbons, organophosphate pesticides, methyl mercury, dissolved oxygen, organic matter, and heavy metals.

San Joaquin Basin

- Lack of sufficient above ground water storage dedicated to environmental purposes;
- Groundwater issues including access, poor water quality, overdraft, and subsidence.;
- Rapid urbanization in the region is likely to shift surface water use from agricultural to urban uses;
- Lack of pumping and conveyance capacity in the existing system to transport water south through the Delta to San Joaquin Basin wetlands;
- Low priority for conveyance of Level 4 water supplies through state and federal pumping facilities in the Delta;
- Lack of conveyance system to receive Level 2 or Level 4 water supplies at East Bear Creek unit of San Luis NWR;
- Stricter RWQCB standards for wetland discharges into the San Joaquin River. (e.g., boron, mercury, salinity, dissolved oxygen and selenium);
- Federal budget shortages for CVPIA water supplies due to increased competition for Restoration Fund dollars and increased costs of purchasing annual spot market water;
- Increasing water costs, especially during periods of drought;
- Lack of willing sellers of affordable long-term water rights;
- Timing of water use on shared conveyance systems;
- Degraded water quality from use of agricultural tail-water or poor quality groundwater;
- Inability of wetland managers to plan their yearly water use due to sporadic water purchases throughout any given year;
- Lack of year round conveyance affected by the current condition of Mendota Dam affects conveyance ability to deliver Level 4 water supplies to Mendota WA and reduces conveyance capacity for the GWD;
- Ensuring that water supplies are attached to the property when protecting managed wetland habitat.

Tulare Basin

- Groundwater issues including: lack of access, poor water quality, overdraft, and subsidence;
- Lack of a conveyance system to deliver Level 4 water supplies to Pixley NWR;
- Potential impacts to water quality, habitat, and wildlife from the introduction of municipal sludge onto agricultural lands adjacent to wetland habitat;
- Continued reliance upon purchasing spot market water;
- Increasing water costs, especially during periods of drought;
- Federal budget shortages for CVPIA water supplies due to increased competition for Restoration Fund dollars;
- Degraded water quality from using agricultural tail-water or poor quality groundwater;
- Dependence upon coordinating water management with adjacent landowners in order to effectively de-water Kern NWR;
- Inability of wetland managers to plan their yearly water use due to sporadic water purchases throughout any given year;
- Lack of reliable water supplies and inadequate conveyance systems to deliver water to the private wetlands within the basin;
- Ensuring that water supplies are attached to the property when protecting managed wetland habitat.

Recommended Actions and Strategies to Secure Wetland Water Supplies

Additional water supplies may be developed through expanded storage in existing reservoirs, groundwater banking, new water storage facilities, and coastal and Central Valley desalination plants. The JV partners can play a role in exploring these options and should consider implementation of the following strategies aimed at increasing future wetland water supplies and improving wetland water supply reliability.

- Establish and fund one or more positions that would be responsible for working with relevant agencies, NGO's and water entities, to collaborate and cooperate on realistically resolving wetland water supply needs (including matters involving wetland water quality), assuring that wetland needs are integrated into regional, state and federal water discussions. The position(s) would track water transfers that may have impacts on wetland water supplies, as well as monitor water quality issues that could effect JV wetland restoration and enhancement objectives;

- Work closely with agencies and organizations conducting wetland restoration to ensure reliable water supplies are accessible to target properties;
- Seek additional state and federal funding to acquire and develop wetland water supplies, maintaining fulfillment of long-term CVPIA Level 4 water supplies as a top priority;
- Establish a public outreach program to educate the public and public officials of: (1) the benefits derived from CVPIA wetland water supplies; (2) the need to develop new sources of supply to meet the objectives of this Plan.

Summary

Since publication of the 1990 Plan, Central Valley water demands have dramatically increased. Competition for water has become intense, and the cost of obtaining wetland water supplies in some basins has risen by nearly 400%. Agricultural, urban and environmental stakeholders are aggressively lobbying on many fronts for reallocation of existing water supplies. The 2006 Plan outlines a new strategy for the conservation of migratory birds and their habitats in a rapidly changing socio-political environment. Much of this strategy is dependent upon available and affordable water supplies. It is therefore essential for JV partners to participate in the many forums where water issues are being addressed to assure that wetland water needs are fully considered. Moreover, JV partners will need to carefully consider availability of water supplies when planning habitat acquisition, restoration and enhancement activities associated with the implementation of the 2006 Plan.



Gray Lodge Wildlife Area water control structure
Photo: Ducks Unlimited



White-faced ibis
Photo: Carley Sweet, TRC Essex

Chapter Eleven: SUMMARY

This chapter collates conservation objectives by habitat, and by basin or regional planning unit, for all bird groups addressed in this Plan. Table 11-1 lists these objectives by habitat type.

Table 11-1. Central Valley-wide conservation objectives and strategies combined across all bird groups for all basins.

Central Valley wide Objectives by Habitat Type		
Habitat type	Strategy	**Objective**
Seasonal wetlands	Protection	Protect all unprotected wetlands with fee or conservation easements
Seasonal wetlands	Restoration	108,527 acres
Seasonal wetlands	Enhancement	23,884 acres annually[a]
Semi-permanent wetlands	Restoration	12,500 acres
Riparian areas	Restoration	10,000 acres
Rice cropland	Enhancement[b]	170,000 acres
Waterfowl-friendly agricultural crops	Enhancement	307,000 acres

[a]Annual enhancement needs when restoration goals have been met.
[b]Post-harvest (winter flooding) of rice cropland.
[c]Type I agricultural easements: easements that protect waterfowl food sources, focused in American, Butte, and Sutter Basins.
[d]Type II agricultural easements: easements that buffer existing wetlands from urban and residential development, focused in American, Butte, Sutter, Delta, and San Joaquin Basins.

"New habitat objectives for the four major bird initiatives identified in this Implementation Plan will direct the JV's future activities, and are based upon the very best available science. The JV partners must work more effectively than ever to implement essential conservation measures in the face of extraordinary growth, and associated competition for land and water resources in the Central Valley. The JV has accomplished much. Our future success will depend upon the continued strength of our partnership, diverse funding programs, and a widely recognized need to protect, enhance and restore internationally important wetland, riparian, and agricultural resources."

Bob Shaffer
Coordinator
Central Valley Joint Venture

Introduction

This Plan addresses the habitat needs of six bird groups including: (1) wintering waterfowl; (2) breeding waterfowl; (3) wintering shorebirds; (4) breeding shorebirds; (5) waterbirds; and (6) riparian songbirds. This chapter provides a summary of the conservation objectives associated with each of these bird groups. Where possible, conservation objectives for all bird groups are then integrated at the basin scale to improve the efficiency of all-bird conservation in the Central Valley. The cost of meeting these conservation objectives is also estimated. Finally the ability of existing conservation programs to meet integrated bird conservation objectives for the Central Valley is reviewed, and the need for additional programs is assessed. This chapter is divided into four sections: (1) conservation objectives by bird group; (2) integrating bird conservation objectives; (3) estimated costs of meeting integrated bird conservation objectives; and (4) conservation delivery options.

Conservation Objectives by Bird Group

Conservation objectives for wintering waterfowl, breeding waterfowl, and riparian songbirds were established for each of the nine Central Valley's basins. However, some basins were combined into larger planning regions when establishing conservation objectives for wintering shorebirds, breeding shorebirds, and waterbirds. The need to combine basins was largely driven by the lack of information available for these bird groups at the basin scale.

Two broad planning regions that contained multiple basins are recognized in this Plan: (1) the Sacramento Valley Planning Region; and (2) the Delta Planning Region. For wintering shorebirds and waterbirds, the Sacramento Valley Planning Region includes the American, Butte, Colusa, and Sutter Basins. For breeding shorebirds, the Sacramento Valley Planning Region includes these four basins and the Yolo Basin (Table 11-2). For wintering shorebirds, the Delta Planning Region includes the Yolo and Delta Basins, while the Delta Planning Region for waterbirds includes these two basins and Suisun Basin. Conservation objectives were established for all bird groups in the San Joaquin and Tulare Basins (Table 11-2).

Table 11-2. Scale at which conservation objectives were established for each bird group.

Basin	*Wintering Waterfowl*	*Breeding Waterfowl*	*Wintering Shorebirds*	*Breeding Shorebirds*	*Waterbirds*	*Riparian Songbirds*
American[ab]	•	•	•	•	•	•
Butte[ab]	•	•				•
Colusa[ab]	•	•				•
Sutter[ab]	•	•				•
Yolo[bcd]	•	•	•		•	•
Delta[cd]	•	•		•		•
Suisun[d]	•	•	NC	NC		NC
San Joaquin	•	•	•	•	•	•
Tulare	•	•	•	•	•	•

[a]*Basins included in the Sacramento Valley Planning Region for wintering shorebirds and waterbirds.*
[b]*Basins included in the Sacramento Planning Region for breeding shorebirds.*
[c]*Basins included in the Delta Planning Region for wintering shorebirds.*
[d]*Basins included in the Delta Planning Region for waterbirds.*
NC – No conservation objectives.

Wintering Waterfowl

Wintering waterfowl includes migrating and wintering ducks and geese that rely on Central Valley habitats between August and March. Seasonal wetland restoration objectives total 104,000 acres for the Central Valley and vary widely among basins (Table 11-3). Proper water management is critical to producing large amounts of food in seasonal wetlands. However, water control structures, levees, and ditch networks used to manage water levels must be periodically repaired or enhanced to maintain or improve food production. The JV assumes that managed seasonal wetlands need some form of enhancement on average every twelve years. As a result, wetland enhancement objectives are expressed perpetually as one-twelfth of the total wetland acres. Annual wetland enhancement objectives for the Central Valley total 23,603 acres when wetland restoration objectives have been met (Table 11-3).

The agricultural enhancement objective for wintering waterfowl is divided into two sub-objectives: (1) waterfowl-friendly agriculture, and (2) winter-flooded rice. Waterfowl-friendly agriculture includes: winter-flooded rice; rice that is not deep plowed following harvest and remains dry; corn that is winter-flooded; and corn that is not deep plowed following harvest and remains dry. Most waterfowl-friendly agriculture consists of rice habitat, except in the Delta Basin where corn is prevalent. Habitat objectives for waterfowl-friendly agriculture are 307,000 acres. Habitat objectives for winter flooded rice are 170,000 acres. (Table 11-3). The need for agriculture easements that protect waterfowl food sources (Type I) was identified for the American, Butte, and Sutter Basins. The need for agricultural easements that buffer existing wetlands from urban and residential development (Type II) was identified for the American, Butte, Sutter, Delta, and San Joaquin Basins (Table 11-3).

Table 11-3. Conservation objectives for wintering waterfowl in the Central Valley.

Basin	*Seasonal Wetland Restoration (acres)*	*Seasonal Wetland Enhancement (acres)*	*Waterfowl friendly Agriculture (acres)*[a]	*Winter Flooded Rice (acres)*[b]	*Type I*[c] *Easements*	*Type II*[d] *Easements*
American	20,000	1,932	69,000	50,000	Needed	Needed
Butte	17,000	3,362	104,000	62,000	Needed	Needed
Colusa	2,000	2,033	85,000	45,000		
Sutter	4,000	496	18,000	10,000	Needed	Needed
Yolo	3,000	963	8,000	3,000		
Delta	19,000	2,112	23,000	0		Needed
Suisun	0	2,686	0	0		
San Joaquin	20,000	6,751	0	0		Needed
Tulare	19,000	3,268	0	0		
Total	**104,000**	**23,603**	**307,000**	**170,000**		

[a] *Waterfowl-friendly agriculture is defined as the amount of winter flooded rice plus rice and corn acres that are not flooded and are not deep plowed following harvest.*
[b] *The amount of harvested rice that must be flooded to meet wintering duck needs when wetland restoration objectives are met for the Central Valley.*
[c] *Agricultural easements that maintain waterfowl food resources on agricultural lands.*
[d] *Agricultural easements that buffer existing wetlands from urban and residential development.*

Breeding Waterfowl

Most waterfowl that breed in the Central Valley are mallards, therefore, recommendations for breeding waterfowl in this Plan focus on this species. However, habitat acre objectives were not established for breeding waterfowl in this Plan, rather, general recommendations were made to increase semi-permanent wetlands and/or upland cover to improve the success of breeding waterfowl populations. These recommendations were based on an assessment of existing landscape conditions. In general, this Plan calls for increases in semi-permanent wetlands and upland cover in the northern basins of the Central Valley. Increases in semi-permanent wetlands are recommended for the remaining basins (Table 11-4). Specific areas of each basin where increases in semi-permanent wetlands and/or upland cover are suggested were identified in Chapter 5.

Table 11-4. Conservation objectives for breeding waterfowl in the Central Valley.

Basin	*Semi Permanent Wetlands*	*Semi Permanent Wetland & Upland Cover*
American		Increase
Butte		Increase
Colusa		Increase
Sutter		Increase
Yolo		Increase
Suisun	Increase	
Delta	Increase	
San Joaquin	Increase	
Tulare	Increase	

Wintering Shorebirds

Wintering shorebirds include migrating and wintering birds that rely on the Central Valley between July and May. Habitat objectives for wintering shorebirds were established for seasonal wetlands, semi-permanent wetlands, and winter-flooded rice (Table 11-5). Seasonal wetland restoration objectives are high throughout the Central Valley and represent the amount of seasonal wetland habitat that must be managed at depths <10 cm (~4 inches) to meet shorebird needs. Although seasonal wetlands are not available in July, most semi-permanent wetlands are being drawn down during this month. Draining these wetlands can create favorable foraging conditions for shorebirds as water levels are reduced. Acre objectives for semi-permanent wetlands represent the amount of shallow water habitat that must be provided by these habitats during the July drawn down period. Finally, winter-flooded rice is available to shorebirds between October and March in the Sacramento and Delta Planning Regions. Acre objectives for winter-flooded rice represent the amount of flooded agricultural habitat <10 cm in depth that is needed for wintering shorebirds.

Table 11-5. Conservation objectives for wintering shorebirds in the Central Valley.

Basin	*Seasonal Wetlands*	*Semi-Permanent Wetlands*	*Winter Flooded Rice*
American[a]	35,696	819	18,566
Butte[a]			
Colusa[a]			
Sutter[a]			
Yolo[b]	7,334	170	5,142c
Delta[b]			
Suisun	NC	NC	NC
San Joaquin	40,130	175	0
Tulare	31,440	1,170	0
Total	**114,600**	**2,334**	**23,708**

[a]*Basins included in the Sacramento Planning Region for wintering shorebirds.*
[b]*Basins included in the Delta Planning Region for breeding shorebirds.*
[c]*Winter-flooded corn may substitute for winter-flooded rice in the Delta Planning Region.*
NC – No conservation objective.

Breeding Shorebirds

The 2006 Plan recommends a 7,500 acre increase in semi-permanent wetlands for breeding shorebirds over the next five years (Table 11-6). This is considered a short term objective that will be updated in future JV implementation plans, as more information on breeding shorebird habitat needs is developed. The need for increases in semi-permanent wetlands is highest in the San Joaquin and Tulare Basins, and reflects the optimum distribution of breeding shorebirds in the Central Valley.

Table 11-6. Conservation objectives for breeding shorebirds in the Central Valley.

Basin	*Semi Permanent Wetlands*
Tulare	4,435
Total	**7,500**

[a]Basins included in the breeding shorebird Sacramento Valley Planning Region.

Waterbirds

The 2006 Plan recommends a 5,000 acre increase in semi-permanent wetlands and riparian habitat for waterbirds over the next five years (Table 11-7). This is considered a short term objective that will be updated in future JV implementation plans, as more information on waterbird habitat needs is developed. Semi-permanent wetland and riparian habitat objectives were distributed to increase the relative shortfall of these habitats in the two southernmost regions.

Table 11-7. Conservation objectives for waterbirds in the Central Valley.

Basin	*Semi-Permanent Wetlands*	*Riparian Habitat*
American[a]		
Butte[a]	1,000	1,000
Colusa[a]		
Sutter[a]		
Yolo[b]		
Delta[b]	1,000	1,000
Suisun[b]		
San Joaquin	1,500	1,500
Tulare	1,500	1,500
Total	**5,000**	**5,000**

[a]Basins included in the Sacramento Planning Region for waterbirds.
[b]Basins included in the Delta Planning Region for waterbirds.

Riparian Songbirds

The 2006 Plan recommends an 8,700 acre increase in riparian habitat for songbirds over the next five years (Table 11-8). This is considered a short term objective that will be updated in future JV implementation plans, as more information on riparian songbird habitat needs is developed. Habitat objectives are distributed based generally on the potential for restoring riparian habitat within basins.

Table 11-8. Conservation objectives for riparian songbirds in the Central Valley.

Basin	*Riparian Habitat*
Tulare	200
Total	**8,700**

Integrating Bird Conservation Objectives

Conservation objectives for each bird group included in this Plan were developed separately (Chapters 4 through 9). However, the habitat needs of different bird groups frequently overlap. Meeting habitat objectives for one bird group may partially or wholly meet the needs of other bird species, and identifying these areas of overlap may increase the efficiency of all-bird conservation. The JV identified eight conservation objectives that collectively meet the needs of bird groups included in this Plan; (1) restoration of seasonal wetlands; (2) enhancement of seasonal wetlands; (3) restoration of semi-permanent wetlands: (4) restoration of riparian habitat; (5) winter flooding of harvested rice; (6) maintenance of waterfowl-friendly agriculture which includes winter-flooded rice, and non-flooded rice and corn fields that are not deep plowed following harvest; (7) acquisition of easements that maintain agricultural food sources; and 8) acquisition of agricultural easements that buffer existing wetlands from residential growth and development.

The JV used the following process to integrate bird needs for each of these eight conservation objectives. First, all bird groups associated with a conservation objective were identified. For example, objectives for winter-flooded rice were established for wintering waterfowl and wintering shorebirds, but not for the other four bird groups. Secondly, the bird group with the largest acre objective was identified in each basin or planning region as in the following example. The winter-flooded rice objective for wintering shorebirds in the Sacramento Planning Region is 18,566 acres (Table 11-5). Winter-flooded rice objectives for waterfowl in basins included in this shorebird planning region total 167,000 acres (Table 11-3). Finally, the JV assessed whether meeting the larger acre objective of one bird group would meet the needs of other bird groups. For example, within the 167,000 acre waterfowl objective are there enough acres managed at depths that are suitable for shorebirds? If the answer is yes, then flooded rice objectives for wintering waterfowl and wintering shorebirds may completely overlap in the Sacramento Valley Planning Region. If the answer is no, then flooded rice objectives for shorebirds may be partially or wholly additive to those for waterfowl. (Obtaining better information on water depths in rice fields prior to the next implementation plan update will allow the JV to better address this issue).

Seasonal Wetland Restoration

Acre objectives for seasonal wetlands were established for wintering waterfowl and wintering shorebirds. For waterfowl, acre objectives were established for all nine basins. For shorebirds, acre objectives were established for the Sacramento Valley and Delta Planning Regions and for the Suisun, San Joaquin, and Tulare Basins (Table 11-5). Wetland restoration objectives for waterfowl represent new wetland acres. Where possible, seasonal wetland objectives for shorebirds will be met through management of existing wetlands and management of seasonal wetlands that are restored for wintering waterfowl. However, seasonal wetland flooding schedules are not always consistent with shorebird needs (Chapter 6). Most or all seasonal wetlands in the Central Valley are flooded after mid-August (defined as conventional flooding). However, wetland objectives for wintering shorebirds include seasonal wetlands that are flooded prior to this mid-August date (defined as early flooding). Seasonal wetland objectives for shorebirds in this early flooding period are considered additive to those for waterfowl, while wetland objectives for waterfowl and shorebirds in the conventional flooding period are assumed to overlap.

Sacramento Valley Planning Region

Seasonal wetland objectives for wintering shorebirds in the Sacramento Valley Planning Region total nearly 36,000 acres during the conventional flooding period and nearly 1,600 acres during the early flooding period. Seasonal wetland restoration objectives for waterfowl in Sacramento Valley Planning Region basins total 43,000 acres (Table 11-9). There are currently 51,000 acres of seasonal wetlands in this region (Table 3-1). This figure increases to 94,000 acres if wetland objectives for waterfowl are met. However, shorebirds require 1,584 acres of seasonal wetlands prior to mid-August, when most or all of these habitats are dry (Table 11-9). Thus, 38% of seasonal wetland acres in the Sacramento Valley Planning Region basins (36,000/94,000) should be managed at depths consistent with shorebird needs, and nearly 1,600 of these acres should be provided in the early flooding period (Table 11-9). These early-flooded acres are considered additive to seasonal wetland objectives for waterfowl, while seasonal wetland objectives for waterfowl and shorebirds in the conventional flooding period are assumed to overlap.

Delta Planning Region

Seasonal wetland objectives for wintering shorebirds in the Delta Planning Region total 6,994 acres in the conventional flooding period and 340 acres in the early flooding period. Seasonal wetland objectives for waterfowl in the Delta Planning Region basins total 22,000 acres (Table 11-9). There are currently 15,000 acres of seasonal wetlands in the Delta Planning Region basins (Table 3-1). This figure increases to 37,000 acres if wetland objectives for waterfowl are met. Thus, 20% of seasonal wetlands in these basins (7,300 / 37,000) should be managed <10 cm in depth and 340 of these acres should be provided in the early flooding period. These early-flooded acres are considered additive to seasonal wetland objectives for waterfowl, while wetland objectives for waterfowl and shorebirds in the conventional flooding period are assumed to overlap (Table 11-9).

San Joaquin Basin

Wintering shorebirds in the San Joaquin Basin require over 40,000 acres of seasonal wetland habitat as no winter-flooded rice is available. Three hundred and forty acres must be provided during the early flooding period. Seasonal wetland objectives for wintering waterfowl total 20,000 acres (Table 11-9). There are now 61,000 acres of seasonal wetlands in the San Joaquin Basin (Table 3-1). This figure would increase to 81,000 acres if seasonal wetland objectives are met for waterfowl. Overall nearly 50% of seasonal wetlands in the San Joaquin Basin should be managed at depths that meet shorebird needs, with 340 of these acres provided in the early flooding period (Table 11-9).

Tulare Basin

Wintering shorebirds in Tulare Basin require over 31,000 acres of seasonal wetland habitat. Nearly 2,300 acres must be provided in the early flooding period (Table 11-9). Seasonal wetland objectives for wintering waterfowl total 19,000 acres. Seasonal wetlands now total 20,212 in the Tulare Basin and meeting wetland restoration objectives for wintering waterfowl will increase this figure to nearly 40,000 acres. Over 75% of these acres would have to be managed <10 cm deep to meet shorebird needs, with 2,300 of these acres provided in the early flooding period. These early-flooded acres are considered additive to seasonal wetland objectives for waterfowl, while wetland objectives for waterfowl and shorebirds in the conventional flooding period are assumed to overlap (Table 11-9).

Table 11-9. Integrated seasonal wetland objectives (acres) for wintering waterfowl and wintering shorebirds in the Central Valley.

Basin	*Wintering Waterfowl*[c]	*Wintering Shorebirds Conventional Flooding*[d]	*Wintering Shorebirds Early Flooding*[e]	*Basin Totals*[f]
American[a]	20,000	34,112	1,584	20,396
Butte[a]	17,000			17,396
Colusa[a]	2,000			2,396
Sutter[a]	4,000			4,396
Yolo[b]	3,000	6,994	340	3,170
Delta[b]	19,000			19,170
Suisun	0	NC	NC	0
San Joaquin	20,000	39,790	340	20,340
Tulare	19,000	29,177	2,263	21,263
Total	**104,000**	**110,073**	**4,527**	**108,527**

[a] *Basins included in the Sacramento Planning Region for wintering shorebirds.*
[b] *Basins included in the Delta Planning Region for breeding shorebirds.*
[c] *Seasonal wetland restoration objectives for wintering waterfowl. These represent new wetland acres to be added to the landscape.*
[d] *Seasonal wetland objectives for wintering shorebirds in the conventional flooding period (flooded after mid-August). The JV assumes that seasonal wetland objectives for shorebirds in this flooding period can be met through management of existing wetlands and wetlands that are restored for wintering waterfowl.*
[e] *Seasonal wetland objectives for wintering shorebirds in the early flooding period (flooded prior to mid-August). The JV assumes that seasonal wetland objectives for shorebirds in this flooding period are additive to that of waterfowl.*
[f] *Integrated seasonal wetland objectives equal the sum of waterfowl objectives and shorebird objectives in the early flooding period. Seasonal wetland objectives for shorebirds in the early flooding period are distributed equally among basins included in a shorebird planning region when integrating objectives for the two bird groups. (e.g. the 1584 acre objective in the Sacramento Valley Planning Region is distributed equally among the four basins included in the region).*
NC – No conservation objective.



Butte basin
Photo: Bob McLandress

Seasonal Wetland Enhancement

Water control structures, levees, and ditch networks used to manage seasonal wetlands must be periodically repaired or enhanced to maintain the quality of these habitats. The JV assumes that managed seasonal wetlands need some form of enhancement on average every twelve years. As a result, wetland enhancement objectives are expressed perpetually as one-twelfth of the total wetland acres. Table 11-10 lists: (1) the amount of seasonal wetland habitat that will be present in the Central Valley when integrated seasonal wetland objectives are met for wintering waterfowl; and (2) wintering shorebirds, and the annual wetland enhancement objectives that are associated with this seasonal wetland base.

Table 11-10. Integrated seasonal wetland enhancement objectives for wintering waterfowl and wintering shorebirds in the Central Valley.

Basin	*Seasonal Wetlands[a] (acres)*	*Annual Seasonal Wetland[b] Enhancement Objectives (acres/year)*
American	23,583	1,957
Butte	40,736	3,381
Colusa	24,786	2,057
Sutter	6,347	527
Yolo	11,728	973
Delta	25,519	2,118
Suisun	32,232	2,675
San Joaquin	81,353	6,752
Tulare	41,475	3,442
Total	**287,759**	**23,884**

[a]Seasonal wetlands that are present in a basin when integrated seasonal wetland objectives are met for wintering waterfowl and wintering shorebirds.
[b]Annual seasonal wetland enhancement objectives assume that all seasonal wetlands need some form of enhancement on average every twelve years.

Semi-Permanent Wetlands

Acre objectives for semi-permanent wetlands were established for wintering shorebirds, breeding shorebirds, and waterbirds (Table 11-11). The JV assumes that semi-permanent wetland objectives for wintering shorebirds will be met through management of existing wetlands (Chapter 6). In contrast, semi-permanent wetland objectives for breeding shorebirds and waterbirds represent new wetland acres. Semi-permanent wetlands managed for breeding shorebirds are typically more open and contain less emergent vegetation that wetlands used by waterbirds (see Chapter 7 and Chapter 8). As a result, the JV assumes that semi-permanent wetland objectives for breeding shorebirds and waterbirds are additive (Table 11-11).

Although increases in semi-permanent wetlands were recommended for breeding waterfowl, these increases were not quantified (Table 11-4). Semi-permanent wetland objectives for breeding shorebirds and waterbirds total 12,500 acres. This represents a nearly fifty-percent increase in the 26,000 acres of semi-permanent wetlands now available in the Central Valley. Meeting this 12,500 acre objective would substantially improve habitat conditions for breeding waterfowl throughout the Central Valley, and is consistent with the general objective of increasing semi-permanent wetlands in each basin (Table 11-11).

Table 11-11. Integrated semi-permanent wetland objectives for breeding waterfowl, wintering shorebirds, breeding shorebirds, and waterbirds in the Central Valley.

Basin	*Breeding Waterfowl*	*Wintering[e] Shorebirds (acres)*	*Breeding Shorebirds[f] (acres)*	*Waterbirds[g] (acres)*	*Basin[h] Totals (acres)*
American[ab]	Increase	819	875	1,000	425
Butte[ab]	Increase				425
Colusa[ab]	Increase				425
Sutter[ab]	Increase				425
Yolo[bcd]	Increase	170		1,000	508
Delta[cd]	Increase		875		1,208
Suisun[d]	Increase	NC	NC		333
San Joaquin	Increase	175	1,315	1,500	2,815
Tulare	Increase	1,170	4,435	1,500	5,935
Total		**2,334**	**7,500**	**5,000**	**12,500**

[a] *Basins included in the Sacramento Valley Planning Region for wintering shorebirds and waterbirds.*
[b] *Basins included in the Sacramento Valley Planning Region for breeding shorebirds.*
[c] *Basins included in the Delta Planning Region for wintering shorebirds.*
[d] *Basins included in the Delta Planning Region for waterbirds.*
[e] *JV assumes that semi-permanent wetland objectives for wintering shorebirds will be met through management of existing wetlands.*
[f] *Semi-permanent wetland objectives for breeding shorebirds represent new wetland acres to be added to the landscape.*
[g] *Semi-permanent wetland objectives for waterbirds represent new wetland acres to be added to the landscape.*
[h] *Sum of the semi-permanent wetland objectives for breeding shorebirds and waterbirds. Semi-permanent wetland objectives for a planning region are divided equally among the basins included in a planning region.*
NC – No conservation objective.

Riparian Habitat

Acre objectives for riparian habitat were established for riparian songbirds and waterbirds. The JV assumed that these bird groups require similar types of riparian vegetation. For songbirds, acre objectives were established for all basins except Suisun Basin. For waterbirds, riparian habitat objectives were established for the Sacramento Valley, the Delta Planning Region, and the San Joaquin and Tulare Basins (Table 11-2). Riparian habitat objectives for waterbirds in the Sacramento Valley total 1,000 acres, while objectives for songbirds in Sacramento Valley basins total 3,825 acres (Table 11-12). Riparian objectives for waterbirds in the Delta Planning Region total 1,000 acres, while objectives for riparian songbirds in Delta Planning Region equal 2,175 acres (Table 11-12). The riparian habitat objective for waterbirds is 1,500 acres in the San Joaquin Basin and 1,500 acres in the Tulare Basin, while riparian objectives for songbirds in the San Joaquin and Tulare Basins equal 2500 acres and 200 acres respectively (Table 11-12).

Meeting riparian objectives for waterbirds will meet riparian objectives for songbirds in the Tulare Basin, whereas meeting riparian objectives for songbirds will meet riparian objectives for waterbirds in the remaining basins. As a result, the JV assumed that riparian habitat objectives for these two bird groups completely overlap.

Winter Flooded Rice

Acre objectives for winter-flooded rice were established for wintering waterfowl and wintering shorebirds. For waterfowl, acre objectives were established for five basins: American, Butte, Colusa, Sutter, and Yolo (Table 11-13). For shorebirds, acre objectives were established for the Sacramento Valley and Delta Planning Regions (Table 11-13). Winter-flooded rice objectives for shorebirds in the Sacramento Valley Planning Region total 18,566 acres, while winter-flooded rice objectives for waterfowl in these basins total 167,000 acres (Table 11-13). The winter-flooded rice objective for shorebirds in the Delta Planning Region is 5,142 acres, while the flooded rice objective for waterfowl in these basins is 3,000 acres (Table 11-13).

Table 11-12. Integrated riparian habitat objectives for songbirds and waterbirds in the Central Valley.

Basin	*Riparian Songbirds (acres)*	*Waterbirds (acres)*	*Basin Totals (acres)*
American[a]	675	1,000	675
Butte[a]	1,125		1,125
Colusa[a]	1,350		1,350
Sutter[a]	675		675
Yolo[b]	675	1,000	675
Delta[b]	1,500		1,500
Suisun[b]	0		0
San Joaquin	2,500	1,500	2,500
Tulare	200	1,500	1,500
Total	**8,700**	**5,000**	**10,000**

[a]*Basins included in the Sacramento Valley planning region for waterbirds*
[b]*Basins included in the Delta planning region for waterbirds*

Table 11-13. Integrated winter-flooded rice objectives for wintering waterfowl and wintering shorebirds in the Central Valley.

Basin	*Wintering Waterfowl (acres)*	*Wintering Shorebirds (acres)*	*Basin Totals[c] (acres)*
American[a]	50,000	18,566	50,000
Butte[a]	62,000		62,000
Colusa[a]	45,000		45,000
Sutter[a]	10,000		10,000
Yolo[b]	3,000	5,142	3,000
Delta[b]	0		0
Suisun	0	NC	0
San Joaquin	0	0	0
Tulare	0	0	0
Total	170,000	23,708	170,000

[a]*Basins included in the Sacramento Valley Planning Region for wintering shorebirds.*
[b]*Basins included in the Delta Planning Region for wintering shorebirds.*
[c]*Integrated winter-flooded rice objectives for wintering waterfowl and wintering shorebirds.*

Flooded rice objectives for waterfowl in Sacramento Valley basins exceed rice objectives for shorebirds by over 148,000 acres (167,000-18,566). Approximately eleven percent of the 167,000 acre waterfowl objective must be managed at depths <10 cm to meet shorebird needs (167,000 / 18,566). Average water depths have been measured for rice fields in the Central Valley (Elphick 1998). Water depths averaged 20 to 25 cm (~8-10 inches) in November and December, and <10 cm from January through March (Elphick 1998). These depth estimates indicate that winter-flooded rice objectives for shorebirds in the Sacramento Valley Planning Region can be addressed by meeting the larger waterfowl objective. Most of the 167,000 acres of flooded rice needed by waterfowl would be available to shorebirds from January through March. Although average water depths are higher during November and December, many rice fields are still being flooded during this period (Figure 4-8). This early season flooding should provide enough shallow water habitat for shorebirds as only a small fraction of rice field habitat must be <10 cm. As a result, flooded rice objectives for wintering waterfowl and wintering shorebirds in the Sacramento Valley Planning Region and its associated basins are assumed to completely overlap in this Plan.

Flooded rice objectives for wintering shorebirds in the Delta Planning Region actually exceed flooded rice objectives for waterfowl in the Yolo and Delta Basins (5,142 acres vs. 3,000 acres; Table 11-13). However, winter flooding objectives for these two bird groups in the Delta Planning Region basins are still assumed to overlap. Although little rice is grown in the Delta Basin, private landowners flood over 29,000 acres of harvested corn (Table 3-5). The JV assumes that flooded corn and flooded rice are equally capable of meeting shorebird needs. Thus, winter flooding objectives for shorebirds in the Delta Planning Region can be partly or entirely met through shallow flooding of harvested cornfields.



Yolo Wildlife Area
Photo: Dave Feliz, CDFG

Waterfowl-friendly Rice and Corn

Waterfowl-friendly rice and corn includes rice fields that are intentionally flooded after harvest and rice and corn fields that are not deep plowed following harvest but which remain dry. Most of the acres associated with this objective are rice acres. Acre objectives for waterfowl-friendly rice and corn were only established for wintering waterfowl (Table 11-3). As a result, no integration of this conservation objective is necessary.

Agricultural Easements

The need for Type I and Type II agricultural easements was identified for wintering waterfowl and waterbirds (primarily sandhill cranes). For waterfowl, the need for Type I agricultural easements was identified for American, Butte, and Sutter Basins. For waterbirds, the need for Type I easements was identified for the Delta Basin (Table 11-14). As a result, the need for Type I easements is completely additive for these two bird groups. The need for Type II easements for waterfowl was identified for American, Butte, Sutter, Delta, and San Joaquin Basins, while waterbirds need Type II easements in the Delta Basin (Table 11-15). Thus, wintering waterfowl and waterbirds only overlap in their need for Type II agricultural easements in the Delta Basin.

Table 11-14. Integrated Type I agricultural easements for wintering waterfowl and waterbirds in the Central Valley.

Basin	*Wintering Waterfowl*	*Waterbirds (Sandhill cranes)*	*Integrated Basin Needs*
American	Needed		Needed
Butte	Needed		Needed
Colusa			
Sutter	Needed		Needed
Yolo			
Delta		Needed	Needed
Suisun			
San Joaquin			
Tulare			

Table 11-15. Integrated Type II agricultural easements for wintering waterfowl and waterbirds in the Central Valley.

Basin	*Wintering Waterfowl*	*Waterbirds (Sandhill cranes)*	*Integrated Basin Needs*
American	Needed		Needed
Butte	Needed		Needed
Colusa			
Sutter	Needed		Needed
Yolo			
Delta	Needed	Needed	Needed
Suisun			
San Joaquin	Needed		Needed
Tulare			

Summary of Integrated Conservation Objectives

Integrated Wetland Objectives

Integrated bird conservation objectives for wetland habitats in the Central Valley are presented in Table 11-16.

Table 11-16. Integrated bird conservation objectives for wetland habitats in the Central Valley.

Basin	*Seasonal Wetland Restoration (acres)*	*Seasonal Wetland Enhancement (acres/year)*	*Semi Permanent Wetland Restoration (acres)*	*Riparian Restoration (acres)*
American	20,396	1,957	425	675
Butte	17,396	3,381	425	1,125
Colusa	2,396	2,057	425	1,350
Sutter	4,396	527	425	675
Yolo	3,170	973	508	675
Delta	19,170	2,118	1,208	1,500
Suisun	0	2,675	333	0
San Joaquin	20,340	6,752	2,815	2,500
Tulare	21,263	3,442	5,935	1,500
Total	108,527	23,884	12,500	10,000

Integrated Agricultural Objectives

Integrated bird conservation objectives for agricultural habitats in the Central Valley are presented in Table 11-17.

Table 11-17. Integrated bird conservation objectives for agricultural habitats in the Central Valley

Basin	*Winter Flooded Rice (acres)*[a]	*Waterfowl friendly Agriculture*[b]	*Type I Agricultural Easements*[c]	*Type II Agricultural Easements*[d]
American	50,000	69,000	Needed	Needed
Butte	62,000	104,000	Needed	Needed
Colusa	45,000	85,000		
Sutter	10,000	18,000	Needed	Needed
Yolo	3,000	8,000		
Delta	0	23,000		Needed
Suisun	0	0		
San Joaquin	0	0		Needed
Tulare	0	0		
Total	**170,000**	**307,000**		

[a] *The amount of harvested rice that must be flooded to meet wintering duck and wintering shorebird needs when wetland restoration objectives are met for the Central Valley.*
[b] *Waterfowl-friendly agriculture is defined as the amount of winter flooded rice plus rice and corn acres that are not flooded and are not deep plowed following harvest.*
[c] *Agricultural easements that maintain waterfowl food resources on agricultural lands.*
[d] *Agricultural easements that buffer existing wetlands from urban and residential development.*

Integrated Annual Water Needs

Table 11-18. Total annual water needs for wetland and winter-flooded agricultural habitats in the Central Valley when integrated bird habitat objectives are met.

Basin	*Seasonal Wetland Water Needs (acre feet)*[a]	*Semi Permanent Wetland Water Needs (acre feet)* [b]	*Agricultural Winter FloodingcNeeds (acre feet)*[c]	*Total Water Needs (acre feet)* [d]
American	117,915	7,304	125,000	250,219
Butte	228,122	33,626	155,000	416,748
Colusa	123,930	32,382	112,500	268,812
Sutter	31,735	5,691	25,000	62,426
Yolo	58,640	14,948	7,500	81,088
Delta	121,215	17,234	72,500	210,949
Suisun	153,102	44,555	0	197,657
San Joaquin	443,374	70,996	0	514,370
Tulare	217,744	65,440	0	283,184
Total	**1,495,777**	**292,176**	**497,500**	**2,285,453**

[a]*Annual water needs for managed seasonal wetlands (public and private) when seasonal wetland objectives are met for the Central Valley.*
[b]*Annual water needs for managed semi-permanent wetlands (public and private) when semi-permanent wetland objectives are met for the Central Valley.*
[c]*Annual water needs for winter-flooded agriculture (predominantly rice) when seasonal wetland objectives are met for the Central Valley.*
[d]*Sum of seasonal wetland, semi-permanent wetland, and winter-flooded agriculture water needs.*

Table 11-18 presents total annual water needs for seasonal wetlands, semi-permanent wetlands, and winter-flooded agriculture, when integrated bird habitat objectives are met for the Central Valley. Annual water requirements used to estimate total water needs are presented by habitat type and basin in Table 11-19. Total water for seasonal wetlands includes the water needs for existing wetlands, and the water needed when seasonal wetland restoration objectives are met. Total water needs for semi-permanent wetlands also includes water needs of existing wetlands, and the water needed when semi-permanent wetland restoration objectives are met. Finally, water needs for winter-flooded agriculture reflects the amount of winter flooding that must be maintained in the Central Valley even when wetland restoration objectives have been met.

Table 11-19. Annual water requirements (acre-feet per acre) by habitat type and basin.

Basin	*Seasonal Wetlands*[a]	*Semi Permanent*[a] *Wetlands*	*Winter Flooded*[b] *Agriculture*
American	5.0	7.4	2.5
Butte	5.6	7.4	2.5
Colusa	5.0	7.4	2.5
Sutter	5.0	7.4	2.5
Yolo	5.0	7.4	2.5
Delta	4.75	7.4	2.5
Suisun	4.75	7.4	0
San Joaquin	5.45	7.4	0
Tulare	5.25	8.0	0

[a]*Water requirements from Central Valley Wetlands Water Supply Investigations Final Report 2000.*
[b]*Dale Garrison, USFWS personal communication.*

Securing long-term water supplies for managed wetlands in the valley will be a significant challenge for the JV. The CVPIA statutorily obligates the Secretary of Interior to consult with the JV in matters involving wetland water acquisition and delivery. Consid ering this obligation, the JV maintains a unique responsibility to consider CVPIA and other water supply issues related to the implementation of this 2006 Plan by participating in various forums where wetland water supplies can be affected.

Estimated Costs of Meeting Integrated Bird Conservation Objectives

The cost of delivering conservation programs in the Central Valley varies widely. As a result, dollar estimates for meeting integrated bird objectives are generalized in this Plan and are subject to change. The purpose in providing these costs is to broadly outline the challenges faced by JV partners in meeting the goals of this plan, and not provide rigorous cost projections.



Kern National Wildlife Refuge
Photo: Dale Garrison, USFWS

Cost estimates used in the 2006 Plan were provided by public and private entities that deliver conservation programs in the Central Valley. Where possible, these costs are comprehensive. For example, costs associated with wetland restoration include the cost of the actual restoration (e.g. costs of levee construction), staff costs associated with a typical project (e.g. design and permitting), and easement costs paid to a landowner.

The costs of meeting wetland and riparian restoration objectives identified in the 2006 Plan are presented in Table 11-20. Seasonal wetland and semi-permanent wetland restoration objectives were combined as restoration costs were assumed to be similar. It is important to note that semi-permanent wetland objectives in this Plan are considered five year objectives that are likely to increase in future JV Plan updates.

The costs associated with wetland enhancement were not estimated in the 2006 Plan, as these expenses vary widely by project. Similarly, the cost of acquiring reliable water supplies to meet wetland and winter-flooded rice needs was not estimated as these costs can vary widely among years. Finally, the JV did not forecast the potential costs of Type I and Type II agricultural easements as acre targets have not been established for these conservation objectives.

Table 11-20. Estimated costs of meeting wetland and riparian restoration objectives for the Central Valley.

Basin	*Wetland Restoration Objectives (acres)*[a]	*Total Wetland Restoration Costs*[b]	*Riparian Restoration Objectives (acres)*	*Total Riparian Restoration Costs*[c]	*Total Costs*[d]
American	20,821	$62,463,000	675	$3,375,000	$65,838,000
Butte	17,821	$53,463,000	1,125	$5,625,000	$59,088,000
Colusa	2,821	$8,463,000	1,350	$6,750,000	$15,213,000
Sutter	4,821	$14,463,000	675	$3,375,000	$17,838,000
Yolo	3,678	$11,034,000	675	$3,375,000	$14,409,000
Delta	20,378	$61,134,000	1,500	$7,500,000	$68,634,000
Suisun	333	$999,000	0	$0	$999,000
San Joaquin	23,155	$69,465,000	2,500	$12,500,000	$81,965,000
Tulare	27,198	$81,594,000	1,500	$7,500,000	$89,094,000
Total	**121,027**	**$363,078,000**	**10,000**	**$50,000,000**	**$413,078,000**

[a] *Includes seasonal and semi-permanent wetland restoration objectives.*
[b] *Wetland restoration costs estimated at $3,000/acre.*
[c] *Riparian restoration costs estimated at $5,000/acre*
[d] *Sum of wetland and riparian restoration costs.*

Conservation Delivery Options

The JV has made great strides towards meeting conservation objectives set forth in the 1990 Plan. This success has been due to the efforts of many partners and a wide range of habitat programs. Some programs, such as California Wildlife Conservation Board's Inland Wetlands Conservation Program and California Department of Fish and Game's California Waterfowl Habitat Program, were developed in response to and for the purpose of implementing the stated objectives of the 1990 Plan. As the 2006 Plan has greatly expanded the JV's objectives to include multiple bird groups and habitat types, a comprehensive assessment of existing programs to deliver these objectives is needed. This assessment will evaluate the capability of current programs to deliver JV objectives, provide recommendations for adjusting existing programs, and identify new programs to deliver the 2006 Plan's objectives over the next 5 years.

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Exhibit D



North American Waterfowl Management Plan 2012:

People Conserving Waterfowl and Wetlands

North American Waterfowl Management Plan

Plan nord-américain de gestion de la sauvagine

Plan de Manejo de Aves Acuáticas Norteamérica

Cover photos:

Top: Green Winged Teal Pair – Ducks Unlimited Canada
Bottom: Big-Hay Bittern Landscape, Alberta – Ducks Unlimited Canada

Ministerial Signature Page



The 2012 *North American Waterfowl Management Plan – People Conserving Waterfowl and Wetlands* presents a bold renewed vision for the future, grounded in 25 years of implementation of the 1986 North American Waterfowl Management Plan. Since its creation, the Plan has achieved wetlands and waterfowl conservation successes by adopting a partner-based model that has been broadly acclaimed and widely emulated.

Building on a remarkable legacy of coordinated public-private strategies for managing waterfowl, our three countries have embarked on an ambitious journey to achieve a new conservation vision. Extensive public consultations have confirmed that we need to pursue abundant and resilient waterfowl populations and sustainable landscapes, through management decisions based on strong biological foundations. This Plan focuses more than ever on expanding an engaged community of users and supporters. This includes hunters and a non-hunting public, both committed to conservation and valuing waterfowl and their habitat as essential characteristics of the North American landscape. Citizens of our three countries ascribe increasing value to the broad suite of ecological values associated with wetlands and other important waterfowl habitats. They place their trust in science-based management that ensures sustainable populations of waterfowl. This Plan responds to the changing needs of our evolving societies while respecting and recommitting to the rich traditions that have been ours since before the founding of our nations.

North America has an astonishing diversity and abundance of waterfowl. This Plan is intended to secure that legacy for current and future generations. As stated in the Plan itself, we are proud to pursue together the simple but powerful vision of "People conserving waterfowl and wetlands."

Secretary of the Interior United States	Minister of the Environment Canada	Secretary of the Environment and Natural Resources Mexico

Background Image: Canvasback – Ducks Unlimited Canada



Le *Plan nord-américain de gestion de la sauvagine de 2012 – Protéger la sauvagine et les terres humides* – offre une vision renouvelée pour le futur, fondée sur l'application depuis 25 ans du Plan nord-américain de gestion de la sauvagine, lancé en 1986. Depuis sa création, le plan a permis la conservation de terres humides et de la sauvagine grâce à la mise en œuvre d'un modèle de partenariat largement reconnu et imité à grande échelle.

Forts de ce remarquable héritage de stratégies harmonisées entre les secteurs public et privé pour la gestion de la sauvagine, nos trois pays se lancent dans un programme de grande envergure, motivés par une vision renouvelée de la conservation. D'importantes consultations publiques ont confirmé que nous devrons maintenir des populations abondantes et résilientes de sauvagine au sein de paysages durables, grâce à des décisions de gestion qui reposent sur de solides fondements biologiques. Ce plan vise comme jamais auparavant à accroître la communauté d'utilisateurs et de sympathisants engagés. Cela comprend les chasseurs et le public non chasseur, engagés envers la conservation et qui reconnaissent dans la sauvagine et ses habitats des caractéristiques essentielles du paysage nord-américain. Les citoyens de nos trois pays accordent de plus en plus d'importance au grand nombre de valeurs écologiques associées aux terres humides et aux autres principaux habitats de la sauvagine. Ils ont confiance dans la gestion scientifique qui garantit des populations durables de sauvagine. Ce plan répond aux besoins évolutifs de nos sociétés, tout en respectant et en renouvelant son engagement envers les riches traditions sur lesquelles furent forgés nos pays.

L'Amérique du Nord possède des populations abondantes d'une grande diversité de sauvagine. Ce plan vise à préserver cet héritage pour les générations d'aujourd'hui et de demain. Nous sommes fiers de défendre ensemble cette vision simple, mais puissante, comme l'indique le titre du plan, pour « protéger la sauvagine et les terres humides ».

Secrétaire de l'intérieur États-Unis	Ministre de l'Environnement Canada	Secrétaire de l'Environnement et des Ressources naturelles Mexique

Background Image: Wetlands of the Clearwater Wetlands and Wildlife Corridor Project – Jason Hollinger, The Land Conservancy of B.C.



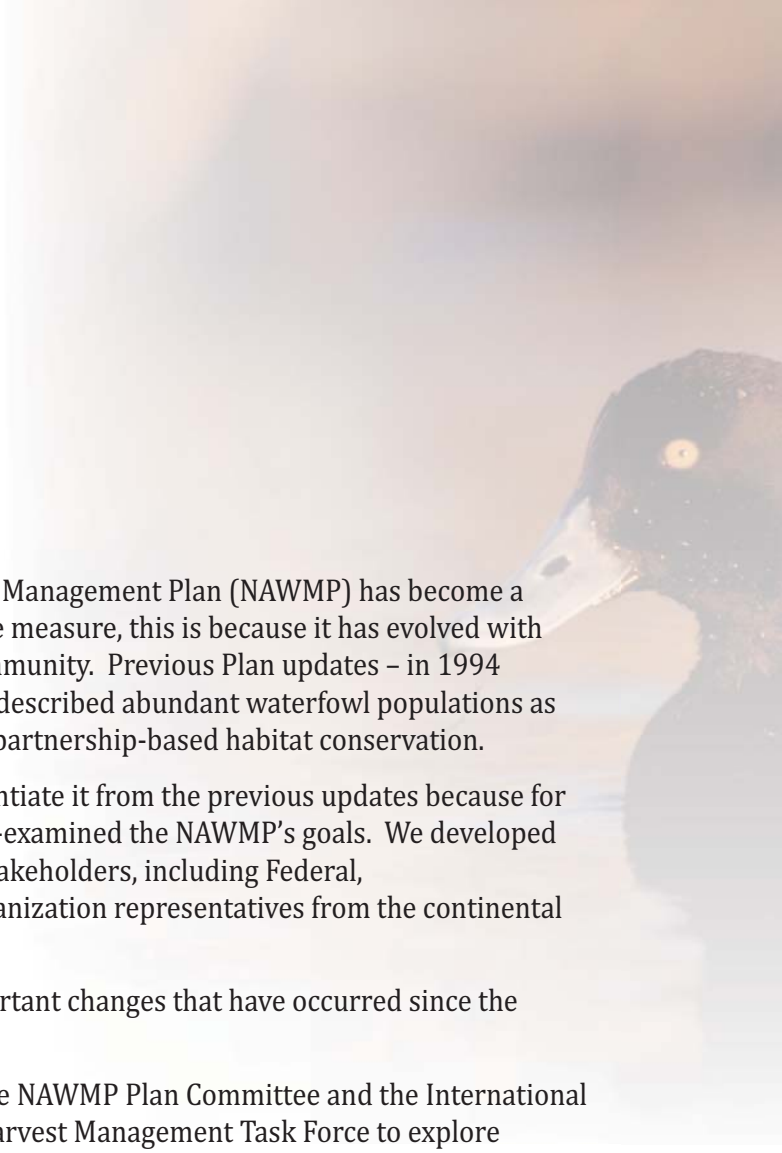
El documento *2012 North American Waterfowl Management Plan – People Conserving Waterfowl and Wetlands* (plan norteamericano de manejo de las aves acuáticas de 2012, conservación de las aves acuáticas y humedales) presenta una visión fuertemente renovada para el futuro, basada en los 25 años de aplicación del Plan de Manejo de Aves Acuáticas de Norteamérica publicado en 1986. Desde su creación, el Plan ha tenido un gran éxito en implementar la conservación de humedales y aves acuáticas (patos, gansos y cisnes) mediante la adopción de un modelo basado en alianzas que ha sido bien acogido en general y ampliamente emulado.

Nuestros tres países se han basado en una extraordinaria herencia de estrategias coordinadas entre el sector público y el privado para la gestión de las aves acuáticas y han emprendido un ambicioso periplo para lograr una nueva visión de la conservación. Las amplias consultas públicas han confirmado que debemos seguir luchando para obtenar poblaciones de aves acuáticas abundantes y resistentes y paisajes sostenibles mediante decisiones de manejo basadas en argumentos biológicos fuertes. El Plan se centra más que nunca en la ampliación de una comunidad comprometida de usuarios y seguidores. Ello incluye tanto a los cazadores como esos que no cazan comprometidos a la conservación y que valoran las aves acuáticas y sus hábitats como características esenciales del paisaje norteamericano. Los ciudadanos de los tres países atribuyen cada vez más importancia a la amplia serie de valores ecológicos asociados con los humedales y otros hábitats importantes de las aves acuáticas. También confían en una gestión científica que para hacer posible la existencia de poblaciones sostenibles de aves acuáticas. Este Plan responde a las necesidades cambiantes de nuestras sociedades que se encuentran en periodo de evolución siempre respetando y renovando el compromiso a las ricas tradiciones sobre las cuales fueron fundadas nuestras repúblicas.

América del Norte cuenta con una sorprendente variedad y abundancia de aves acuáticas. Este Plan está destinado a proteger este legado para la generación actual al mismo que las próximas generaciones. Como se indica en el mismo Plan, nos sentimos orgullosos de seguir luchando juntos por una visión sencilla pero poderosa para la conservación de las aves acuáticas y de los humedales.

Secretario de Interior Estados Unidos	Ministro de Medio Ambiente Canadá	Secretario de Medio Ambiente y Recursos Naturales México

Preface



Over its first 25 years, the North American Waterfowl Management Plan (NAWMP) has become a model for international wildlife conservation. In large measure, this is because it has evolved with engagement of the broad waterfowl conservation community. Previous Plan updates – in 1994 (when Mexico became a signatory), 1998 and 2004 – described abundant waterfowl populations as the Plan's ultimate goal, pursued through large-scale partnership-based habitat conservation.

This 2012 Plan renewal is termed a *revision* to differentiate it from the previous updates because for the first time since its inception, we fundamentally re-examined the NAWMP's goals. We developed renewed goals through extensive consultation with stakeholders, including Federal, Provincial/Territorial, State and non-government organization representatives from the continental waterfowl management community.

This revision was needed in light of a number of important changes that have occurred since the previous update in 2004.

First, in 2005, a Joint Task Group was appointed by the NAWMP Plan Committee and the International Association of Fish and Wildlife Agencies' Adaptive Harvest Management Task Force to explore options for reconciling the use of NAWMP population objectives for harvest and habitat management. This group concluded that the separate objectives for waterfowl populations and their habitats must be formally integrated to ensure that they support rather than act against each other. Second, from 2005 through 2007, a comprehensive assessment of the NAWMP highlighted the need to evaluate and learn from the outcomes of plan-directed conservation actions. Finally, the 2008 North American Waterfowl Policy Summit – a gathering of over 190 individuals representing the international waterfowl management community – recommended that the next update of the Plan be used to further the formal integration of harvest and habitat management, and continue seeking ways to also incorporate society's desires for users and supporters of waterfowl and wetlands habitat.

These policy advances – on top of the rising challenges presented by a changing climate, social changes, the effects on land use decisions of global economic pressures, and fiscal restraint faced by agencies – have aligned to set the new strategic directions for the 2012 NAWMP Revision. This revised Plan recognizes our successes, outlines the major current and future challenges facing waterfowl conservation, and presents new strategic directions for the immediate future. More detailed recommendations for actions are in the accompanying NAWMP Action Plan.

Background Image: Lesser Scaup – Ducks Unlimited Canada

This revision also pursues formal integration of objectives for waterfowl populations, habitat conservation, and societal needs and desires. The roadmap to achieve this renewed vision is not fully defined. The pathway will be better illuminated in the next phase with the Action Plan and, critically, by the efforts of the waterfowl conservation community to implement the general guidance offered here. Successful delivery will depend on the power of the NAWMP partnership's combined mandates. Opportunities abound for all new and existing partners to focus efforts where they have the greatest responsibility and the ability to affect the conservation outcomes envisioned in the Plan.

NAWMP Plan Committee Co-Chairs



Alberta Lakes, British Columbia – Ducks Unlimited Canada

Préface

Au cours de ses 25 premières années d'existence, le Plan nord-américain de gestion de la sauvagine (PNAGS) s'est imposé sur la scène internationale comme un modèle de conservation de la faune. Cela est dû en bonne partie à son évolution et à un engagement à grande échelle dans la conservation de la sauvagine. Les mises à jour antérieures du plan – celle de 1994 avec l'adhésion du Mexique, puis celles de 1998 et de 2004 – avaient comme principal objectif de décrire l'abondance des populations de sauvagine grâce à un programme de conservation à grande échelle conjoint de ses habitats.
Le renouvellement de 2012 du plan se veut une *révision* par rapport aux mises à jour précédentes, car pour la première fois de son histoire, on en révise les objectifs fondamentaux. Nous avons revu ses objectifs grâce à une consultation élargie des intervenants, notamment auprès des organismes fédéraux, provinciaux, territoriaux et non gouvernementaux et auprès des États membres de la communauté vouée à la gestion continentale de la sauvagine.



Buffalo Lake Landscape, Alberta

Cette révision s'imposait à la lumière du nombre de changements importants survenus depuis la dernière mise à jour, en 2004.

En premier lieu, en 2005, le Comité du PNAGS ainsi que le groupe de travail sur la gestion adaptative des prises de l'Association internationale des agences du poisson et de la faune sauvage ont mis sur pied un groupe de travail conjoint chargé d'évaluer les possibilités d'adapter les objectifs du PNAGS en matière de populations à la gestion des prises et des habitats. Le groupe a conclu que des objectifs distincts concernant les populations de sauvagine et leurs habitats doivent être officiellement intégrés afin qu'ils se complètent au lieu de se faire obstacle. En deuxième lieu, de 2005 à 2007, une évaluation exhaustive du PNAGS a mis en lumière la nécessité d'évaluer les mesures de conservation soutenues par le plan et de bénéficier de leurs résultats. En dernier lieu, le sommet nord-américain sur les politiques concernant la sauvagine, un rendez-vous regroupant plus de 190 représentants des communautés internationales vouées à la gestion de la sauvagine, a recommandé que la prochaine



mise à jour du plan soit utilisée pour faire avancer l'intégration formelle de la gestion des récoltes et des habitats, ainsi que pour l'intégration des désirs et des besoins de notre société en ce qui concerne les habitats humides, y compris ceux des chasseurs de sauvagine.

En plus des nouveaux défis que posent les changements climatiques et sociaux, des répercussions des décisions liées à l'utilisation des terres découlant des pressions de l'économie mondiale et des restrictions budgétaires auxquelles font face les organismes, les évolutions de cette politique ont donné naissance à de nouvelles orientations stratégiques sous-jacentes à la révision de 2012 du PNAGS. Le plan révisé prend en considération les réussites à ce jour, souligne les principaux défis actuels et à venir dans la conservation de la sauvagine, et présente de nouvelles orientations stratégiques pour l'avenir immédiat. Des directives plus détaillées figurent dans le plan d'action ci-joint du PNAGS.

Cette révision permet également d'intégrer en bonne et due forme les objectifs touchant les populations de sauvagine, la conservation de leur habitat ainsi que les aspirations et besoins sociétaux. La feuille de route de cette vision renouvelée n'est pas pleinement définie. Le plan d'action et, ce qui est essentiel, les efforts de la communauté vouée à la conservation de la sauvagine visant la mise en œuvre des recommandations contenues dans ce dernier permettront de mieux en éclairer le parcours. Sa réussite dépendra de l'efficacité des mandats combinés des partenariats créés en vertu du PNAGS. Les partenaires, nouveaux comme existants, auront maintes occasions de concentrer leurs efforts dans les créneaux où ils exercent la plus grande responsabilité et compétence susceptibles d'avoir une incidence sur les résultats de conservation envisagés dans le plan.

Co-présidents du Comité du PNAGS

Background Image: Summer on the Prairies – Ducks Unlimited Canada

Prólogo



Durante los primeros 25 años, el Plan Norteamericano de Manejo de las Aves Acuáticas se ha convertióo en un modelo para la conservación de la fauna al nivel internacional. Esto se debe en gran medida a que el Plan ha evolucionado con la participación de la amplia comunidad que se ocupa de la conservación de las aves acuáticas. En las versiones anteriores del Plan – 1994 (cuando México se convirtió en país signatorio), 1998 y 2004 – se describían las abundantes poblaciones de aves acuáticas como objetivo final que se intentaba lograr mediante la conservación de grandes hábitats basado en un sistema de alianzas.

El Plan de 2012 se califica como una *revisión* para diferenciarlo de las versiones anteriores porque, por primera vez desde su creación, hemos vuelto a examinar fundamentalmente, sus objetivos. Hemos elaborado nuevos objetivos mediante amplias consultas con las partes interesadas, tal como los representantes de gobiernos federales, provinciales, territoriales y estatales y organizaciones no gubernamentales de la comunidad encargadas del manejo de las aves acuáticas en el continente norteamericano.

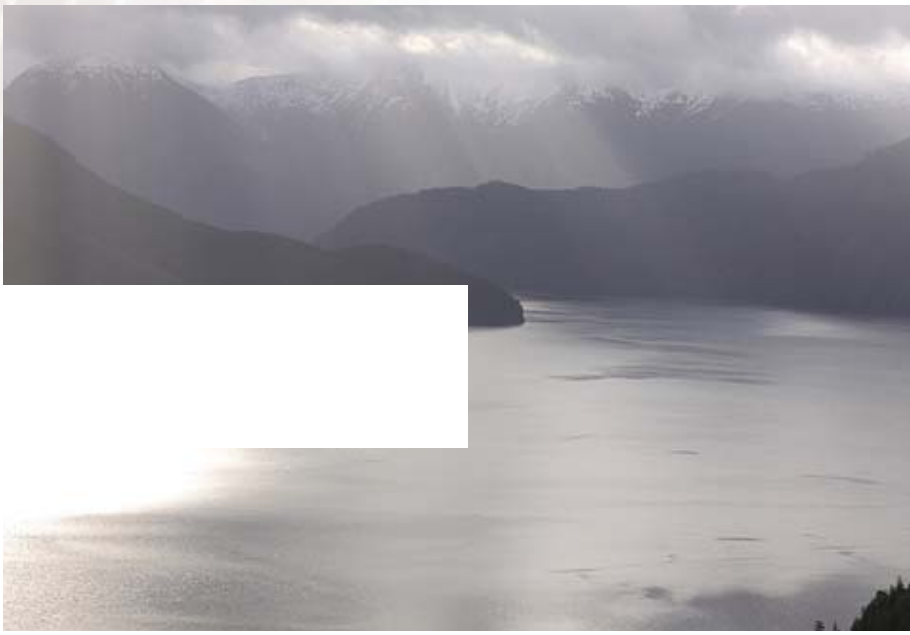
Esta revisión fué necesaria debido al gran número de cambios que se han producido desde la versión de 2004.

En primer lugar, en 2005, el Comité del Plan y el grupo de trabajo para la gestión adaptativa de las cosechas de la International Association of Fish and Wildlife Agencies nombraron un grupo de trabajo. Esto grupo fue apuntado para explorar las opciones que servirían para reconciliar el uso de los objetivos del Plan con para la gestión de las cosechas y los hábitats. Este grupo llegó a la conclusión de que los objetivos para las poblacionales para las aves acuáticas y sus hábitats deben integrarse oficialmente con el fin de apoyarse mutuamente en vez de entrar en conflicto. En segundo lugar, una evaluación exhaustiva del Plan tuvo lugar entre 2005 y 2007 y manifestó la necesidad de evaluar y aprender, basado en los resultados de las medidas de conservación específicas del Plan. Por último, la cumbre norteamericana de 2008 en materia de políticas sobre las aves acuáticas, en la que participaron más de 190 representantes de la comunidad internacional encargados de el manejo de aves acuáticas, aconsejó que la siguiente actualización del Plan se utilizara para fomentar la integración de la gestión de la caza y de los hábitats y de seguir buscando formas de incorporar las prioridades societales de los usuarios y defensores de las aves acuáticas y de los humedales.

Background Image: Arctic banding of White-fronted Geese – Kiel Drake

Estos avances en materia de políticas, además de los nuevos retos que plantean los cambios climáticos y sociales, los efectos de la presión económica mundial en las decisiones sobre el uso de recursos naturales y las restricciones presupuestarias que sufren los organismos, se han orientado para establecer la dirección estratégica para la revisión del Plan de 2012. Esta revisión reconoce nuestros éxitos, señala los principales retos actuales y futuros a los que se enfrenta la conservación de las aves acuáticas y presenta nuevas orientaciones estratégicas para el futuro inmediato. En el plan de acción que acompañaran el Plan se encontrarán recomendaciones más precisas.

En esta revisión también se trata de lograr una integración oficial de los objetivos poblacionales de aves acuáticas, la conservación de los hábitats y las necesidades y deseos societales. La ruta para lograr esta visión renovada aún no se ha definido totalmente. El camino a seguir irá apareciendo en la etapa que sigue, con la elaboración del plan de acción y, fundamentalmente, con los esfuerzos de la comunidad encargada de la conservación de las aves acuáticas para implementar las orientaciones generales que se presentan aquí. El éxito dependerá de la fuerza que tengan los mandatos combinados de las alianzas que surjirán del Plan. Hay aplias oportunidades para que los socios nuevos y existentes enfoquen sus esfuerzos en los ámbitos donde tengan mayores responsabilidades y capacidad para influir los resultados de conservación previstos en el Plan.



Rain and clouds – Andre Breault, CWS Vancouver

Copresidentes del Comité del Plan Norteamericano de Manejo de las Aves Acuáticas

Executive Summary

Twenty-six years ago, the waterfowl management community began implementing a visionary initiative to conserve continental waterfowl populations and habitat – the North American Waterfowl Management Plan (NAWMP or Plan). This scientific approach to waterfowl habitat restoration and protection created a new, partnership-based model for conservation that has been broadly acclaimed and widely emulated. In the intervening years, NAWMP partners have conserved and restored 15.7 million acres (63,000 square kilometers) of wetlands, grasslands and other key habitats for ducks, geese and swans shared by Canada, the United States and Mexico. Many waterfowl populations are now substantially larger than they were 26 years ago.

But new threats to waterfowl and their habitats stand to undermine NAWMP successes. Unprecedented new challenges that create competition for land, water and funding must be addressed. Conservation programs must become more adaptable, efficient and relevant to a society that is increasingly disconnected from the natural world. In order to achieve the NAWMP vision in today's environment, this Plan sets forth three overarching goals for waterfowl conservation:

Goal 1: Abundant and resilient waterfowl populations to support hunting and other uses without imperiling habitat.

Goal 2: Wetlands and related habitats sufficient to sustain waterfowl populations at desired levels, while providing places to recreate and ecological services that benefit society.

Goal 3: Growing numbers of waterfowl hunters, other conservationists and citizens who enjoy and actively support waterfowl and wetlands conservation.

Two of these goals, dealing with populations and habitat, have always been foundational to the NAWMP. The third goal, focused on people, is new insofar as being an explicit part of this Plan. It underscores the importance of people to the success of waterfowl conservation, and is born out of concern for the ongoing loss of waterfowl hunters, the opportunity presented by growing numbers of people who pursue waterfowl with cameras and binoculars, and a recognition that the NAWMP can succeed only if waterfowl conservation is relevant to broader societal issues.

Background Image: Le Barachois of Hope Town in Chaleur Bay, Québec – Christine Lepage, CWS Quebec Region



Missouri Coteau Landscape, Saskatchewan

Securing the gains made over the past quarter century and going beyond to attain NAWMP objectives will be difficult given the profoundly changing economic, social and ecological circumstances of the day. Of paramount importance is the need for waterfowl conservation to gain greater standing with the general public. This Plan recommends strategic investments that provide people an opportunity to reconnect with nature through waterfowl. It also recommends dedicated efforts to quantify and communicate to the public the numerous environmental benefits associated with waterfowl habitat conservation. These include attenuation of floods, enhanced water quality, groundwater recharge, and numerous other ecological goods and services. To inform these strategies, NAWMP partners should rely on social and economic research to complement existing biological and ecological knowledge.

Progress toward achieving these NAWMP goals should start with an acknowledgement and embrace of change, and with the recognition that waterfowl management must become more adaptable. Not only should managers periodically question whether they are "doing things right" and "doing the right things", they should also re-examine existing institutions and the processes used to deliver conservation. Enhancing programmatic efficiency and effectiveness will be key. Currently, objectives for populations (including harvest management) and habitat conservation are independently derived and not coherent, and the goals for "people" are vague and poorly informed. Yet waterfowl management is a tightly linked enterprise: habitat programs sustain healthy waterfowl populations, which in turn provide hunting and other recreational opportunities; people who participate in those activities help fund conservation and encourage policies in support of habitat programs. North America needs an integrated system of waterfowl management that consists of common objectives that reflect the interrelated nature of the enterprise. This includes system models that link objectives and ensure coherence; monitoring programs that track progress towards objectives and enable learning; and institutional structures and processes that facilitate integration and adaptation.

In summary, waterfowl population management and waterfowl habitat conservation have evolved into distinct institutions that lack coherent, interrelated objectives. Neither institution has formulated explicit objectives for people, nor has either developed a level of adaptability that matches today's pace of environmental and social change. Given the decline in waterfowl hunters and their associated support, there is a desire to recruit new hunters, increase the efficiency of existing programs, and enhance public support for conservation. Accordingly, this Plan provides seven recommendations:

1. ***Develop, revise or reaffirm NAWMP objectives*** so that all facets of North American waterfowl management share a common benchmark;
2. ***Integrate waterfowl management*** to ensure programs are complementary, inform resource investments, and allow managers to understand and weigh tradeoffs among potential actions;
3. ***Increase adaptive capacity*** so structured learning expands as part of the culture of waterfowl management and program effectiveness increases;
4. ***Build support for waterfowl conservation*** by reconnecting people with nature through waterfowl, and by highlighting the environmental benefits associated with waterfowl habitat conservation;
5. ***Establish a Human Dimensions Working Group*** to support development of objectives for people and ensure those actions are informed by science;
6. ***Focus resources on important landscapes*** that have the greatest influence on waterfowl populations and those who hunt and view waterfowl;
7. ***Adapt harvest management strategies*** to support attainment of NAWMP objectives.

Work on these recommendations should begin immediately, because waterfowl populations and their habitats are facing threats that demand quick action and new approaches. The waterfowl management community has a long record of successes and a reputation for forging new frontiers in conservation. Many noteworthy accomplishments have been motivated by crisis and a call to action. This NAWMP represents a new call to action that, when carried out, will position waterfowl conservation for the challenging decades that lie ahead.



Waterfowl at Chincoteague National Wildlife Refuge in Virgina – U.S Fish & Wildlife Service

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Background Image: Mallard brood – Ducks Unlimited Canada

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National Overviews

Canada

On a misty spring morning, surf scoters can be seen flying north in a small skein just a couple of meters above the cold ocean waters of the Bay of Fundy. In western Canada, thousands of kilometers away, a mallard sets down in a prairie slough after a long night of flying. For Canadians these images represent the return of spring, heralding a natural rebirth across the country as millions of ducks, geese, and swans make their way north and move over the vast expanses of our land to their summer homes.

These ducks live and raise their young in environments that have been modified and will continue to feel the impact of people as extensive agricultural areas continue to produce our food, and as Canada's boreal forest and northern regions produce more as yet undeveloped resources. Nevertheless, when managed with the principles of conservation, the land can provide economic benefits through forestry, mining, and agriculture while it continues to sustain waterfowl. Additionally, the wealth of a nation is directly connected to the quantity and quality of its environment and its inherent "natural capital." Natural capital and its derived ecological goods and services are important parts of Canadian thinking. This is the central thrust of Canadian environmental policy: sustaining natural values while achieving human well-being and economic progress.

For example, in 2010, during the International Year of Biodiversity, Canada celebrated the protection of more than 100 million hectares of land – nearly 10 percent of Canada's land mass – and 3 million hectares of ocean, through investments in the Natural Areas Conservation Program, the North American Waterfowl Management Plan, and other initiatives.

This Canadian commitment reflects a desire to protect present and future environments in a way that is integrated with sustainable economic activity and accommodates the yet-to-be known influences of a changing climate. This commitment will be particularly focused on Canada's vast boreal and arctic ecosystems. By concentrating on waterfowl and wetlands conservation in working landscapes, Canadian Joint Ventures advance bird conservation in partnership with landowners, municipalities, and the agriculture, forestry, and energy sectors. The habitat and international species Joint Ventures, established in Canada under the North American Waterfowl Management Plan, have become leaders in such approaches. In doing so, they support an environmental agenda that is well-connected with local and national economies, thus gaining allies for nature.

Background Image: Surf Scooters in flight – Tim Bowman, USFWS



Trumpeter Swans and other waterfowl at Marsh Lake, Yukon – Jim Hawkings, CWS Whitehorse

When the ducks are old enough to fly and hunting seasons begin along the migratory flyways, the take of birds is coordinated amongst our three great countries so that populations remain robust. Coordination implies a concept of co-management, which applies to habitat stewardship as well as harvest management and the consideration of societal desires. In Canada, waterfowl are an important food source for Aboriginal peoples, who play a growing role as managers and stewards of the environment. In some areas, mostly in northern regions, land claim governments and wildlife management boards have been established to co-manage wildlife and habitat management programs in their areas. Eider ducks and brant geese are typical harvested species in those parts of Canada where the northern wildlife management boards operate. Effective co-management of these species must necessarily include other nations such as Russia and Greenland — areas that are beyond the reach but within the spirit and intent of the North American Waterfowl Management Plan.

This North American Waterfowl Management Plan Revision calls for integrated management across our three countries in order to surmount the escalating challenges of the 21st century. It reaffirms our steadfast commitment to maintain healthy populations of wild birds and to sustain and even augment diverse and resilient habitats. Lastly, it places great importance on the incorporation of Canadians' desires for natural values while achieving human well-being and economic progress. Canada has already achieved much in this regard and is prepared and enthusiastic to support the goals of this Plan, which benefits not only waterfowl but a healthy Canadian society.

United States

The seasonal ebb and flow of waterfowl is one of the most complex and compelling dramas in the natural world. Driven by a genetic memory millions of years in the making, these birds embark twice each year on long-distance journeys between their breeding areas and wintering grounds. Their travels traverse mountains, deserts, prairies, forests and oceans throughout the northern hemisphere, linking the countries, peoples, and ecosystems they visit. The conservation and management of animals capable of such impressive mobility requires strong federal leadership to foster effective partnerships among the many nations, states, provinces, tribes, organizations and individuals that are woven together by the flight paths of these remarkable species.

The U.S. Fish and Wildlife Service (Service) is the principal agency charged with protecting and enhancing the populations and habitats of migratory birds that spend all or part of their lives in the United States. Accordingly, the North American Waterfowl Management Plan (Plan) will continue to be a major focus for Service efforts. Cooperation and coordination with partners and stakeholders is essential to successfully protect and conserve waterfowl and to ensure that hunters, birders, aboriginal groups and the public can continue to enjoy these winged marvels in the great outdoors. State wildlife agencies, tribal organizations and subsistence users play special roles by working with the Service to co-manage waterfowl harvest. These and other partners, including other government agencies, conservation organizations, private industry, landowners, and managers at every scale, must be included in Plan activities to achieve its goals.

For more than a century, conservationists have endeavored to sustain abundant waterfowl populations. These efforts have resulted, for example, in the creation of more than 590 national wildlife refuges and wetland management districts in the United States that have set aside more than 150 million acres as havens for waterfowl and other birds. Spurred by hunters, the U.S. Fish and Wildlife Service created the Federal Migratory Bird Hunting and Conservation Stamp ("Duck Stamp") in 1934 to provide a revenue stream to be used specifically to acquire and protect wetlands for waterfowl and other wetland-dependent wildlife. To date it has helped protect some 6 million acres. And beginning in 1955, Canadian and U.S. partners developed what is today the longest operating and most comprehensive survey of animal abundance in the world, the Waterfowl Breeding Population and Habitat Survey. These annual surveys determine the status of North America's waterfowl populations and to this day play a significant role in guiding the decisions of waterfowl managers throughout North America.

The North American Wetlands Conservation Act (NAWCA), now the premier partnership-based habitat conservation effort on the continent, was enacted to support goals of the 1986 Plan with strategic investments in North America's most vital wetland ecosystems. Grants made through NAWCA have helped thousands of public-private partnerships to protect and improve the health and integrity of wetlands, providing critical habitat for waterfowl and other wetland species in the United States, Canada, and Mexico. Through these accomplishments, the Service and its partners have established a legacy of conservation leadership that endures into the 21st century.

Despite these significant accomplishments, we confront a host of new challenges to the future of waterfowl. Our society faces a more complex set of environmental and management problems – occurring across the entire ranges of waterfowl – as a result of increasingly evident socioeconomic and ecological system changes. Future conservation success will only be possible if we acknowledge and embrace these changes, recognizing that waterfowl management must become more adaptable. Achieving an integrated approach to waterfowl management that fosters coherence among population, habitat, and human objectives is paramount. Ultimately, the future of waterfowl conservation will depend on public support for striking the right balance between conservation actions and socioeconomic priorities.

To surmount the escalating challenges of the 21st century and meet public expectations for waterfowl conservation and management, a clear and well-defined approach is needed to guide our collective actions. This Plan articulates a clear vision to move forward in a comprehensive, science-driven approach to waterfowl conservation that coordinates and integrates efforts across North America. We must continue to work with other countries, public and private organizations, and individuals to attain the Plan's vision and secure a bright future for waterfowl. The American people expect and deserve nothing less.

Mexico

The coastal and interior wetlands of Mexico provide important habitats during the winter for a significant portion of the migratory waterfowl population in North America, as well as numerous resident and endemic species of plants and animals. Mexico is committed to achieving long-term conservation of these important habitats.

Wetlands and waterfowl are resources of great ecological, cultural, and economic importance. Consequently, Mexico has signed several commitments and international cooperative agreements to improve and foster the conservation and management of waterfowl and their habitat. The North American Waterfowl Management Plan (NAWMP) is one of the most relevant and effective programs in Mexico. Based on these and other legal and political instruments, the Mexican Government has supported and implemented short, medium, and long-term programs and projects throughout the country.

Since the inception of the NAWMP in 1986, Mexico has been actively involved in its design and operation. Mexico was initially an "invitee", but since 1994 has been a full partner in NAWMP, playing a proactive role in the conservation of wintering areas for populations of waterfowl and resident species, identifying priority habitats and promoting the implementation of sustainable habitat and harvest management practices. However, the task is large and there remains much to be done.

In 2000, the Mexican Congress passed a law for the conservation and sustainable use of wildlife. This law and its associated policies promote both the habitat and species approach to conservation, paying particular attention to sustainable use, management of habitat and populations, and development of specific recovery programs for species or groups of priority species, including waterfowl. These approaches aim to maintain and promote the restoration of the diversity and integrity of the environment, as well as increase the well-being of the inhabitants of the country.

In recent years, the Dirección General de Vida Silvestre of SEMARNAT has established several forums, committees and advisory bodies to improve and promote communication and public participation in the development of specific programs for conservation, management, and recovery, and to provide technical advice for decision-making. Work to implement the North American Waterfowl Management Plan takes place primarily through Mexico's "Strategy for the Conservation, Management and Sustainable Use of Waterfowl and their habitats in Mexico," which serves as a national instrument of public policy guiding the conservation and management of waterfowl populations and their habitats as a joint undertaking by government and society. On-the-ground efforts are facilitated through the Units for Management and Conservation of Wildlife, which integrate conservation and socio-economic interests at the local level and focus on habitat conservation and education.



The wetlands on Marion Creek Benchlands, Columbia Valley – Nature Conservancy of Canada

Implementation is supported by the application of funds from the U.S.'s North American Wetlands Conservation Act, which has contributed about $2.5 million per year. During the period from 2003-2011, Mexico implemented 102 projects, distributed among 31 States, that help conserve priority wetlands.

Mexico's efforts tend toward holistic, ecosystem-focused conservation, with explicit recognition of, and objectives for, waterfowl and other waterbirds of regional importance. To further develop the national capacity for waterbird and wetland conservation, Mexico is an active participant in the conservation of the birds of North America through agreements such as the North American Bird Conservation Initiative, the Ramsar Convention on Wetlands, the Trilateral Committee (Canada/Mexico/United States) for the Conservation and Sustainable Use of Wildlife and Ecosystems, and the North American Commission for Environmental Cooperation Biodiversity Conservation Strategy.

Acknowledgements

This Revision of the North American Waterfowl Management Plan reflects broad input from the waterfowl management community obtained during 15 consultation workshops held in Canada, the United States and Mexico in 2009-2011. Additional public review and comment on an initial draft further honed the concepts, goals, and objectives now embodied in this Plan. The North American Waterfowl Management Plan Committee gratefully acknowledges all who contributed their ideas, time, and support during the consultation and writing process.

The individuals listed below served on one or more of the writing team, revision steering committee or the revision technical committee, and deserve special recognition. Jim Ringelman chaired the writing team and provided the main coordination link to the steering committee and the technical team. His steady attention to all elements of this effort was essential to completion of the Plan revision. Dave Case and Ginny Wallace ably coordinated the consultation workshops. Paul Schmidt, who retired as U.S. co-chair of the Plan Committee during work on this Plan, was a strong advocate of this initiative and helped support the work of the teams involved.

Mike Anderson
Ken Babcock
Doug Bliss
Scott Boomer
Dave Case
Bob Clark
Jorge Coppen
Kathy Dickson
John Eadie
David Goad
Dale Humburg
Fred Johnson
Mike Johnson
Mark Koneff
Seth Mott
Andy Raedeke
Jim Ringelman
Dean Smith
Greg Soulliere
Steve Williams

Background Image: Aerial view of Commune Baie-du-Febvre after restoration – Quebec Ministry of Natural Resources and Wildlife

The Future of Waterfowl

The annual migration of millions of waterfowl inspires us to reflect on the abundance of nature, the passage of time, and far away destinations. Using cues only partly understood by science, this feathered stream of life flows with the seasons over the same routes traversed by a thousand generations of their species. Were they a landscape instead of living organisms, waterfowl would surely be a national park, because the way they connect us with nature is just as powerful. Waterfowlers know this connection well. For most hunters, their time in the blind is as much about the sights and sounds of the marsh as it is about birds in the bag. Likewise, waterfowl at the city park offer a valuable interlude with nature that is increasingly important in a society distracted by too much multi-tasking and too little contact with the natural world.

Beyond connecting people with nature, waterfowl also gauge the well-being of the environment. As species that derive much of their food from wetlands, the presence and abundance of waterfowl are indicative of the health of those aquatic systems. But waterfowl use many terrestrial systems as well, nesting in grasslands, forests, tundra and rocky islets offshore. They graze on plants, glean waste grain, and feed on invertebrates and fish. Similarly, waterfowl depend upon a variety of essential migration and overwintering habitats – ranging from agricultural landscapes to flooded woodlands and coastal estuaries, from arctic to tropical climes. Loss or deterioration of these habitats affects waterfowl settling patterns, reproductive success, body condition and survival rates – warning signs that alert us to degradation of the land upon which all life depends. Fortunately, the opposite is also true: numerous ecological benefits are derived from conserving and restoring habitat for waterfowl. Sustained biodiversity, improved water quality, moderation of flooding events and carbon sequestration are just a few of the broad societal benefits derived from waterfowl habitat conservation.

Beyond connecting people with nature, waterfowl also gauge the well-being of the environment.

For nearly 80 years, hunters – who have an obvious and direct stake in ensuring healthy waterfowl populations – have helped fund conservation and voiced their concerns to policymakers. Elected representatives have likewise shown their support through progressive legislation like the U.S. North American Wetlands Conservation Act (NAWCA[1]). In 2000, Mexico adopted the revised General Law on Wildlife, which recognized the value of biological diversity and ensured that resource use was sustainable and beneficial to local people. Canada has achieved conservation of waterfowl habitat through the North American Wetlands Council of Canada, which seeks to influence policies,

1 A list of acronyms is provided in Appendix D.

Background Image: American Wigeon – Jared Hobbs

regulations, and legislation to conserve and restore Canada's wetlands and wetland fauna. In addition to the funding provided by the sale of hunting licenses and excise taxes on arms and ammunition, several U.S. states now dedicate a portion of general sales tax or lottery fund revenue to wildlife and wetlands conservation programs.

As waterfowl management enters a new era with potentially fewer hunters and increased fiscal restraint, how will it be possible to sustain the support necessary to secure the future of waterfowl? How can the waterfowl management enterprise adapt to societal and environmental changes that are occurring at an accelerating rate? In short, how can waterfowl conservation and management be adapted for success in the future?

Fortunately, waterfowl management is well-positioned to meet these challenges. The waterfowl conservation legacy is built upon a foundation of habitat restoration and protection on federal, provincial, state, and private landholdings and easements. Management actions and policy efforts are informed by the best available science, longstanding monitoring systems, and habitat programs delivered by experienced and dedicated people. Institutions – government wildlife agencies, Flyway Councils, Joint Ventures, universities and research centers – are established and effective.

However, to meet the challenges of the future, waterfowl management must become more adaptable, more efficient, and more relevant to the lives of the general populace, many of whom may be unaware of waterfowl conservation but are deeply concerned about clean water, flooding, and the health and quality of their environment.

In undertaking this renewal of the North American Waterfowl Management Plan (NAWMP or Plan), primary stakeholders were asked to consider and re-establish the fundamental goals of waterfowl management – something that has not been done in a quarter-century. To achieve broad consensus, the consultation process leading up to this Plan engaged a cross-section of the professional waterfowl management community, including a broad sampling of federal, state and provincial agencies, non-government organizations, and other partners. Fifteen consultation workshops in three countries, along with input received through other avenues, produced a rich source of ideas that form the foundation of this Plan.[2] From these consultations, strong consensus emerged on three fundamental goals for waterfowl management:

Goal 1: Abundant and resilient waterfowl populations to support hunting and other uses without imperiling habitat.

Goal 2: Wetlands and related habitats sufficient to sustain waterfowl populations at desired levels, while providing places to recreate and ecological services that benefit society.

Goal 3: Growing numbers of waterfowl hunters, other conservationists, and citizens who enjoy and actively support waterfowl and wetlands conservation.

Sustaining the continent's rich waterfowl fauna has been an enduring conservation mission for over a century and the focus of the NAWMP for the last 26 years. That mission continues, but now the NAWMP is being expanded to include three goals that span the entire management enterprise. Goal 1 recognizes that abundance is just one facet of population management. Waterfowl populations must

2 A detailed description of the NAWMP workshops in the United States and Canada can be found in the report "Stakeholder Consultation Process Results: North American Waterfowl Management Plan Revision", by D.J. Case and Associates, April 2011. http://www.nawmprevision.org/

also be resilient to environmental perturbation, yet not so abundant that they degrade their habitats and those of other species, or provoke public concerns. The goal for habitat management, though focused on resources needed by waterfowl, explicitly recognizes the societal values related to recreation and environmental benefits associated with waterfowl habitat. The newest goal of the Plan explicitly addresses the needs, desires and involvement of people.

But why have a goal for people in a waterfowl plan? If people – hunters, viewers, and the public at large – are critical to the future of waterfowl management, it is not enough to assume that successful habitat programs and healthy waterfowl populations are sufficient to satisfy human desires and elicit support for conservation. The needs and desires of people must be clearly understood and explicitly addressed. This important distinction – being a focus of management actions versus simply a recipient of management outcomes – is intended to motivate the waterfowl community to expand its understanding of waterfowl hunters, viewers, and the public through human dimensions research, and empower managers to establish and act on human objectives in concert with habitat and population programs.

Clearly, each of the three goals of this Plan has intrinsic value, but they are also strongly inter-related.[3] Healthy populations are a requisite for hunting seasons and other forms of waterfowl-related recreation. Without wetlands and other vital waterfowl habitats, healthy populations cannot exist. In the absence of funding and advocacy provided by conservation-minded people, habitat programs would be greatly diminished. Thus, actions undertaken on behalf of one goal will affect the attainment of other goals. In such a tightly linked system, it is essential to acknowledge people as an essential component of the triad. This inter-connectedness also requires that management programs be integrated in order to balance tradeoffs among goals and manage efficiently.



Wetland, Quebec – Christine Lepage, CWS Quebec Region

The interconnections between people, habitat and populations is perhaps no more apparent than with Aboriginal peoples. Plan partners should continue to seek ways to include Tribes, First Nations, Inuit and Métis in activities and decisions, and take advantage of the unique perspectives, values and contributions (like traditional ecological knowledge) that they can bring to waterfowl conservation. Designation of significant protected areas in the Western Boreal Forest is one recent example of the valuable role of First Nations' people.

3 See Appendix C, which describes the goal valuation exercise conducted during the NAWMP consultations and the linkages among the goals.



Mallard drake – Erwin and Peggy Bauer, U.S Fish & Wildlife Service

This Plan will consider three key, strategic issues related to "how" the waterfowl management community can achieve the three NAWMP goals. These issues — relevance, adaptability and efficiency — are considerations that will help shape and focus management actions. They should also prompt a re-evaluation of how resources are allocated and how existing institutions might be modified to position them for the future. A companion "NAWMP Action Plan" is being developed to provide additional guidance and offer more detailed, technical direction on elements needed to implement this Plan.

In summary, waterfowl management must continue to improve and evolve because today's economic, social and ecological changes create great challenges and uncertainty. Accordingly, this document is not so much a prescriptive "plan" as it is a vision for the future of waterfowl management. This Plan defines challenges and begins to identify actions that should be pursued over the next decade and beyond to meet those challenges. In the end, this revision of the Plan is truly that — an effort to "re-vision" the fundamental goals and objectives of waterfowl management, the programs and the linkages within management systems, and the institutional structures and support that will sustain waterfowl populations, hunting, viewing, wetlands and associated public values for decades to come.

Principles of the North American Waterfowl Management Plan

The following principles, several carried forward since the inception of the NAWMP in 1986, should guide all actions undertaken in support of the Plan:

1. Waterfowl are among North America's most observed and highly valued natural resources.[4]
2. Waterfowl management is a complex enterprise involving multiple governments, people, waterfowl populations, wetlands and other habitats. These elements are highly inter-dependent and should be managed in a coherent, integrated manner.[5]
3. Resident and endemic species also are important components of each nation's waterfowl resource and deserve conservation emphasis from within the jurisdictions where they occur.
4. Managed harvest of the waterfowl resource is desirable and consistent with its conservation.
5. Maintenance of abundant waterfowl populations is dependent on protection, restoration and management of habitat and the support of people who use and value these resources.[6]
6. Primary vehicles for accomplishing Plan objectives will include partnerships within and among three key waterfowl management arenas: habitat conservation, population management, and resource users.[7]
7. Long-term protection, restoration, and management of waterfowl habitats requires that Plan partners collaborate with conservation and community efforts in the development of conservation, economic, and social policies and programs that sustain the ecological health of landscapes.
8. Sound science and knowledge is the foundation for planning, implementing and evaluating the NAWMP programs.
9. Programs that manage waterfowl populations, habitats and recreational users should embrace and employ adaptive management. Making progress toward Plan goals requires an unwavering commitment to support essential monitoring and assessment activities.[8]
10. Waterfowl should be managed consistent with the North American Model of Wildlife Conservation.[9]

4 U.S. Department of the Interior, Fish and Wildlife Service, and U.S. Department of Commerce, U.S. Census Bureau. 2006 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation.
5 New for 2012.
6 Newly expanded to include people.
7 Newly expanded to include more than Joint Ventures.
8 Newly expanded to include more than biology and conservation programs.
9 New for 2012. The elements of this Model are (1) wildlife is a public resource, (2) markets for game shall be eliminated, (3) allocation of wildlife by law, (4) wildlife shall be killed only for legitimate purposes, (5) wildlife are an international resource, (6) wildlife policy shall be science-based, and (7) hunting opportunity shall be afforded to all citizens.

Background Image: Buffalo Lake moraine, Alberta – Ducks Unlimited Canada

Building on the Conservation Legacy

Historically, the greatest successes in waterfowl management were motivated by crisis. Widespread drought and declining waterfowl populations during the 1930s led to the creation of the U.S. Migratory Bird Hunting and Conservation Stamp ("Duck Stamp") and related investments in habitat conservation. Important non-government waterfowl conservation organizations were founded during the same decade, and set to work on both domestic habitat programs and internationally funded habitat projects in Canada. The Canadian Wildlife Habitat Conservation Stamp was introduced in 1985. It is administered by the Canadian Wildlife Service with the funds transferred to Wildlife Habitat Canada.

In the 1980s, drought, poor nesting cover, and declining duck populations prompted a bold response from the waterfowl management community – the establishment of the NAWMP. International agreement over shared objectives and a vision for public-private partnerships evolved into Joint Ventures. This regional partnership-based approach to conservation has been widely emulated and universally acclaimed. The Joint Ventures in existence today encompass most of North America, and have expanded in geography and broadened their taxonomic focus to include all birds. Joint Ventures have developed decision-support tools that are now essential for biological planning and evaluation, and their habitat delivery programs are the backbone of the NAWMP. Plan partners have invested more than $4 billion (USD) in the protection and restoration of 15.7 million acres (63,000 square kilometers) of wetlands and associated habitats, have helped shape land-use, agricultural and other public policies critical to sustaining continental waterfowl populations, and have supported science critical for adapting actions along the way.

Similarly, waterfowl population management has a long history of success. Concern over dwindling bird populations during the first part of the 20th century prompted international attention, visionary international treaties and national legislation for the conservation of this shared resource. Migratory pathways that transcend national boundaries motivated the formation of the Flyway System. These efforts led to the development of an institutional framework for working together on management, scientific and public policy issues. In Canada, national harvest regulations have been in effect since 1917, and management mechanisms appropriate to Canada have developed, particularly in the later half of the 20th century. Despite differences in national governance systems, Canada and the United States have worked together within the Flyway System, particularly for gathering and sharing technical information. Mexico has joined Canada and the United States on tri-national committees and cross-border Joint Ventures, and manages domestically through geographically-based partnerships in Units for Management for the Conservation of Wildlife.

Background Image: A satellite transmitter attached to an American Black Duck – Jacob Bowman, University of Delaware

Decades of scientific and administrative efforts to ensure the sustainability of waterfowl harvest culminated in the mid-1990s with the implementation of Adaptive Harvest Management (AHM) in the United States, providing a more objective-driven, science-based, transparent process for population and harvest management. First focused on mid-continent mallards, this approach is being extended to other species, and the principles underlying AHM continue to shape advancements in both the science and institutional processes of harvest management.

Waterfowl hunters provide significant funding for habitat acquisition and management. In the United States, sales of Duck Stamps have generated more than $750 million, which has been used to help purchase or lease over 5.3 million acres of waterfowl habitat. Similarly, the Canadian Wildlife Habitat Conservation Stamp program has invested over $60 million in conservation programs and leveraged several times that amount from other sources. Revenue from state license sales and excise taxes on arms and ammunition raise millions more for conservation annually.

The broad economic benefits derived from waterfowl hunting are also significant. Trip and equipment-related hunting expenses generated over $2.3 billion in total economic output in 2006[10]. Waterfowl hunters have been strong advocates for conservation policies and general appropriations to fund conservation programs, and also manage considerable waterfowl habitat on private land. Without hunters, the fate of wildlife habitat would be in jeopardy.

Building on the NAWMP Foundations

Many of the issues and challenges presented in the 1986 NAWMP and subsequent updates are still relevant today, although the social backdrop has shifted and our knowledge of waterfowl biology and management has increased. This Plan will not reiterate the species accounts presented in the 1986 NAWMP and subsequent updates, but rather refers readers to those documents should they desire that information. Similarly, the important themes highlighted in the NAWMP updates – expanding the multi-national commitment to waterfowl conservation, conservation of whole landscapes, broader partnerships, and strengthening our biological foundation – are still relevant and, in fact, have become the accepted framework for our enterprise. This Plan builds on these important works by considering contemporary challenges, identifying high-level tactical solutions, and offering a vision for the future that addresses important strategic issues. More specific recommendations for implementation will be presented in a companion report, the NAWMP Action Plan.

Passage of the NAWCA by the U.S. Congress in 1989 created a vital funding source and a mechanism for leveraging public and private matching funds for wetland conservation in Canada, Mexico and the United States. In fact, the NAWCA was intended specifically as a funding mechanism for the NAWMP's wetland conservation programs. U.S. waterfowl hunters are the main participants in waterfowl/wetland conservation organizations that have provided 25 percent of the funding ($431 million) to support the NAWMP in Canada, and the political support necessary to sustain the U.S. federal contribution of an additional 24 percent ($422 million) over this same period. The most significant advances in habitat conservation under the NAWMP can be traced to the NAWCA and the financial support it provided and leveraged.

10 Carver, E. 2008. Economic Impact of Waterfowl Hunting in the United States. Addendum to the 2006 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation. U.S. Fish and Wildlife Service Report 2006-2. 13pp.

Other conservation achievements can be tied to policies and programs supported by the general public and not directly targeted to waterfowl. In the United States, the Clean Water Act has protected many wetlands through regulation. Another U.S. policy initiative, the Farm Bill, enacted programs such as the Conservation Reserve Program (CRP) and the Wetlands Reserve Program (WRP) that have restored large expanses of grasslands and wetlands, and contributed significantly toward reaching NAWMP goals. Similarly, the Agricultural Policy Framework in Canada enhanced awareness of environmental issues through the Environmental Farm Planning initiative, and created incentives for restoring wetlands and converting cultivated uplands to permanent cover through the National Farm Stewardship and Greencover Canada programs. Collectively, the Agricultural Policy Framework in Canada and the U.S. Farm Bill have funded and incentivized the conservation of millions of acres of waterfowl habitat.

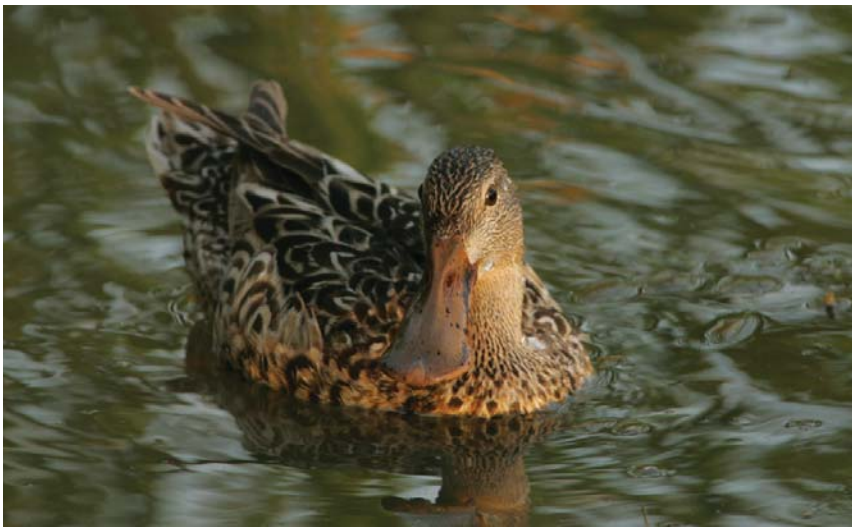
Running through the history of waterfowl management has been a reliance on science-based management, backed by monitoring programs for both habitat and populations. An ever-increasing knowledge base extends from basic life histories of waterfowl to the influence of landscape features on population demography. Strategic habitat conservation has advanced through the application of systems and species models (specifically for priority species such as mallards, black ducks and northern pintails) that predict waterfowl population responses based on measures of landscape metrics. Spatial databases that are displayed and manipulated using geographic information systems (GIS) have dramatically improved the ability of managers to target programs for maximum effectiveness.



Canadian Coast Guard helicopter – Christine Lepage, CWS Quebec Region

Responding to the expressed or perceived desires of waterfowl hunters has always been an important consideration for harvest and population management programs. Many harvest management decisions intended to benefit hunters have been driven more by professional judgment than by objective assessments of hunter attitudes and desires. That model is changing with advances in structured social science ("human dimensions") research and implementation of hunter surveys at the state and national levels.

In contrast, comparatively few resources have been directed at understanding the needs and desires of those who engage waterfowl with cameras and binoculars. It has generally been assumed that the needs of this constituency would be met if managers provided habitat and populations in numbers needed to satisfy hunters. The number of people who make a dedicated effort to view waterfowl is now ten times the number of waterfowl hunters, and their numbers continue to grow. This phenomenon creates an opportunity to increase support for conservation as well as a responsibility to ensure the needs of this growing clientele are being addressed.



Northern Shoveler – Steve Hillebrand, U.S Fish & Wildlife Service

In the United States, waterfowl conservation has ridden, by and large, on the coattails of waterfowl hunters, who have been the strongest advocates for conservation policies and large financial contributors to waterfowl conservation. In Canada and Mexico, citizens interested in wetlands and their environmental benefits are also gradually becoming advocates for wetland conservation. It has generally been assumed that these hunter-citizen supporters, backed by the good work of NAWMP partners and the "obvious merits" of waterfowl and wetlands conservation, would continue to sustain the waterfowl management enterprise and carry the day with policymakers and appropriators. This Plan questions that assumption.

Given the legacy of waterfowl management accomplishments, why is it necessary to revise the NAWMP and reconsider the way business is done? First, in the wake of a global economic downturn there has been an erosion of conservation policy and program support that threatens the foundation of waterfowl conservation and management. Second, waterfowl populations and their habitats are facing unprecedented threats, and current levels of conservation are unsustainable without reversing trends of hunter decline and garnering more support from a broader constituency. Third, the magnitude and pace of ecological and social change requires more adaptive institutions, planning, and management. Finally, given the interconnected nature of the system itself and the threats posed to waterfowl, wetlands and waterfowling traditions, it is essential that a more integrated approach is taken to most efficiently and effectively accomplish Plan goals.

Confronting the Challenges



Adapting to Global Trends

The world is vastly different than it was 26 years ago, and large scale environmental, social, political, and economic changes are occurring at an accelerating rate. Since the original NAWMP, the world's population has increased 40 percent – from 5 billion to 7 billion people – and is expected to increase by a similar magnitude over the next decade. The internet and digital technology, which now form the backbone of communication and information flow, did not exist in 1986. Globalization was just beginning to be a topic of conversation, the Cold War shaped international affairs, and climate change had not yet captured public discourse. Even though waterfowl conservation has made significant advances during the past century, much of the waterfowl management enterprise is being pursued under more-or-less the same model that evolved with the advent of the NAWMP and the NAWCA more than a quarter-century ago. Since that time we have experienced:

- Global forces of supply and demand for food, fiber, and biofuels that affect the availability of land for conservation. As well, there is less local control over production systems, land use and the economy that affects both conservation programs and the economics and policies of land use.
- Ecological change, including the very large human impact on ecosystems that are vital to waterfowl throughout their annual cycle. For some species of concern like scaup, black ducks and northern pintails, there is evidence that habitat carrying capacity has been substantially reduced on a continental scale.
- Climate change, which is particularly troublesome because its effects are inherently long-term and large-scale, yet unpredictable. For ducks, hydrological changes in prairie wetlands may have profound implications, as might changes in prairie agriculture. In other regions, water-level changes in the Great Lakes, sea-level rise with increasing erosion of coastal marshes, and changes in the ecology of permafrost ponds in the North will impact waterfowl habitats.
- Social and demographic change, including the continuing urbanization of North America, which is creating generations of citizens who are increasingly disconnected from the outdoors and wildlife.

Background Image: Saskatchewan Environment Minister Dustin Duncan and several members of the Saskatchewan NAWMP Partnership celebrated the NAWMP 25th Anniversary project dedication of the Kehiew habitat conservation property in the Missouri Coteau – Ducks Unlimited Canada

- Increased energy consumption, which has led to new policies that drive increases in domestic production. Oil, gas and coal developments are disrupting boreal, arctic, coastal and even prairie ecosystems, and other landscape alterations are mounting as society seeks alternatives via wind energy developments, hydroelectric projects, and biofuel production.
- A succession of financial crises that have resulted in substantial cutbacks in government programs and reduced philanthropic donations to causes like waterfowl conservation. Investing is becoming more parochial, which makes it challenging to address the needs of a migratory resource where the most strategic investments may lie in sparsely populated regions of the continent.

Some of these changes induce "non-stationarity" – a situation wherein the environment is undergoing a directional change, as opposed to conditions varying around an average state. Few, if any, current management models account for non-stationarity. If past patterns (e.g., wet/dry cycles) are no longer useful for predicting future conditions, management decisions will be made with much greater uncertainty. Clearly, for waterfowl management to survive and thrive in the next decades, managers should be able to better understand the effects of these large-scale trends on the business of waterfowl management and conservation, and adapt accordingly.

Addressing Population and Habitat Threats

Although the NAWMP community can point to many outstanding successes, the future of ducks, geese and swans is not yet secure. Arctic-nesting waterfowl are encountering an ever-warmer environment in which coastlines are eroding, ponds are draining from melting permafrost, food availability may no longer coincide with peak periods of need, and there is an increasing amount of human activity in this formerly unaffected landscape. The effects of climate change, which are already affecting geese and ducks breeding at high latitudes and in some coastal areas, will soon affect waterfowl throughout their range. Farther south, the extraction of fossil fuels, minerals and timber has and will continue to transform the vast boreal forest from a largely intact ecosystem to a fragmented landscape. Working with industries and Aboriginal people of the North, progress has been made either restricting or improving the practices of extractive industry in some critical areas. Nonetheless, world demand for fossil fuels and minerals continues to increase, which will invariably put greater pressure on northern landscapes.

A recent succession of wet years throughout much of the Prairie Pothole Region has caused mid-continent duck populations to boom, boosting the populations of some species to record highs. Yet their breeding habitat is being irreversibly degraded by wetland drainage and conversion of grassland to cropland. This will inevitably lead to a population decline when drier conditions return. The depth of that decline, given substantial habitat loss, cannot be predicted. What is predictable is that an increasing demand for food and ethanol-based biofuel, along with advances in crop genetics, will continue to drive the conversion of critical wetland and grassland habitat. New farming technology will transform heretofore untillable prairie into cropland, and advancements in the use of inexpensive, plastic drainage tile will pose new threats to prairie wetland communities across the agricultural Midwest and southern Canada. Meanwhile, enrollment in U.S. Department of Agriculture-sponsored conservation initiatives like WRP and CRP is declining due to reduced funding for those programs, and because the compensation offered to landowners cannot compete with contemporary cropland rental rates.

Waterfowl migration and wintering habitats, many of which have already lost the vast majority of their wetlands, are being further threatened by invasive plant species, degraded water quality and diminished water supplies. The food and energy demands of non-breeding waterfowl are often met by the seasonal availability of agricultural foods – a resource with an uncertain future dependent on supply-and-demand, farming technology and irrigation water. Few areas have sufficient food and habitat secured in perpetuity. Waterfowl managers are justifiably concerned with achieving long-term securement of migration and wintering habitat, particularly given the extremely high costs of conservation in some areas. Sea-level rise, salt water intrusion, nutrient loading, coastal erosion, offshore and tidal energy developments and increased urbanization – acting alone or in combination – are rapidly degrading important coastal habitats.

In other regions of North America, and certainly for some species, it is clear that much work remains to be done. Among the species reported from the Western ("Traditional") Survey Area (see map, Appendix A), both scaup and northern pintail have been below their NAWMP population objectives for decades, and show no evidence of a substantial rebound even under favorable habitat conditions. Prairie and Parkland populations of American wigeon have not responded as well as other dabbling ducks to improved habitat conditions. Populations of eiders, scoters and other sea ducks in all survey areas are also of significant concern. These species are difficult to survey, little is known about their demography, and available indices suggest they are in general decline. The opposite is true for some goose species, notably snow geese. Despite a deep understanding of their biology and aggressive actions to reduce their populations, snow goose numbers continue to grow. The damage they inflict on the arctic coastal plain – and other species who share this ecosystem – increases in geographic extent every year. Canada geese, as well, are nearing or have exceeded socially acceptable population sizes in some areas.

Many issues affecting waterfowl populations and their habitats are unprecedented, and can be addressed only through additional research and novel conservation programs. However, of equal or even greater significance are social and ecological changes that affect the ability of managers to conserve the waterfowl resource, cope with global trends, and ensure that approaches to management are effective and efficient.

Sustaining Waterfowl Conservation

A landscape approach to conservation is at the very foundation of the NAWMP. Embodied in this approach is the recognition that conservation goals can only be achieved with broad public support and by influencing land use decisions over extensive areas of the continent. Most of these areas are "working lands" owned by individuals, families and corporations. While some conservation outcomes are achieved through regulations and policies, others result from collaborations that lead to voluntary actions. Support from the public and participation by landowners hinges on striking the right balance between conservation outcomes and the socioeconomic drivers that influence land use decisions. That balance is always shifting, depending on the relative value placed on conservation versus other drivers.

Ultimately, the balance point depends heavily on peoples' connection to waterfowl and the natural world – a connection that is rapidly eroding. This "disconnect" from the outdoors has been cited as the greatest challenge facing the conservation community. It undermines the motivation to preserve wildlife and wild places, and causes the public to undervalue the goods and services provided by a

healthy environment. This has implications for policy decisions, financial support, and the willingness of landowners to participate in conservation programs.

> "The biggest single threat to conservation in America is the growing disconnect of our people with the outdoors."
>
> Ken Salazar, U.S. Secretary of the Interior

Segments of society differ in their connection to the outdoors and wildlife. Hunters tend to have a close emotional connection and have played an integral part of waterfowl and wetland conservation for nearly a century. The 1986 NAWMP was intended to provide waterfowl populations to meet the recreational demand of 2.2 million hunters, along with millions of viewers. At the time, waterfowl and hunter numbers were both plummeting, and it was generally assumed that the loss of habitat was largely responsible for the decline in waterfowl populations, and that associated conservative hunting regulations and reduced bird abundance triggered a loss of waterfowl hunters (Fig. 1). Accordingly, many believed that restoring habitat would reverse the trends in both waterfowl and hunter numbers. However, when populations of waterfowl increased in the 1990s and harvest regulations were liberalized, unexpectedly, the number of hunters did not rebound (Fig. 1).

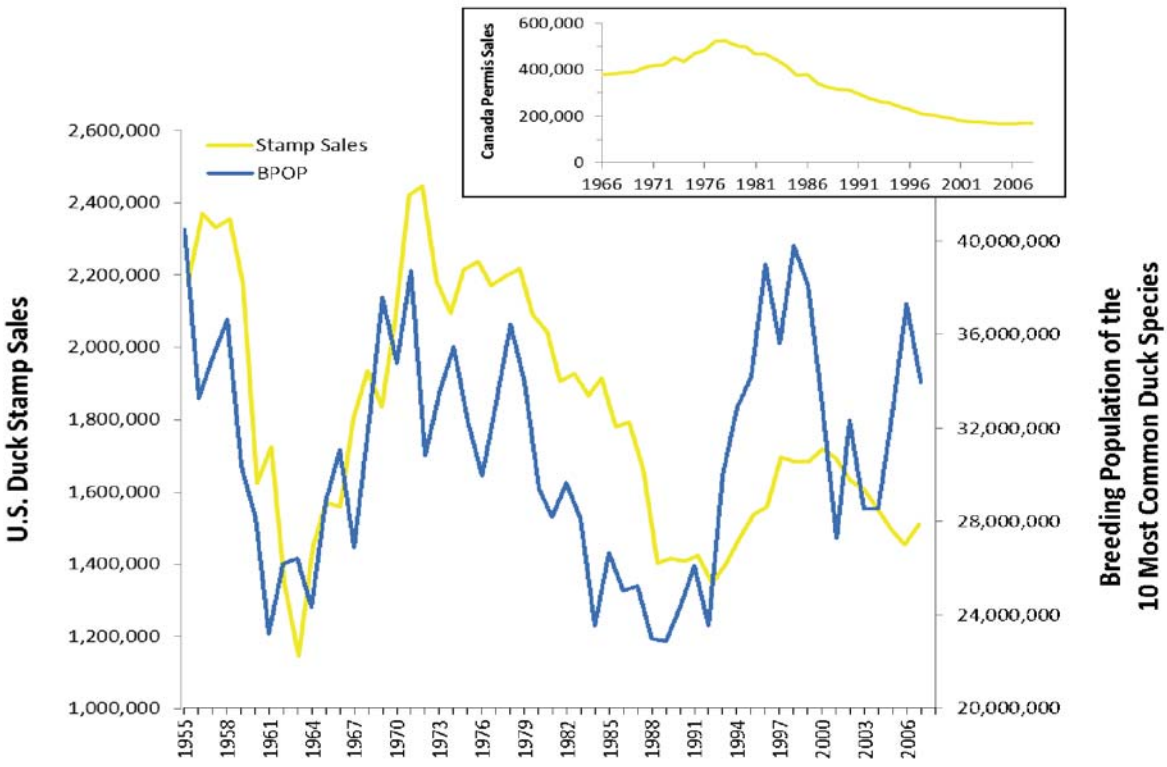


Figure 1. U.S. Duck Stamp sales and breeding population size of the 10 principal duck species from 1955-2008. Inset reflects Canada Migratory Game Bird Hunting Permit sales from 1966-2008. Stamp sales (an index of duck hunter numbers) were closely correlated with duck population size until the mid-1990s, after which stamp sales did not rebound commensurate with populations. The loss of Canadian waterfowl hunters is even greater than in the United States, with permit sales declining from over 500,000 in 1979 to fewer than 180,000 in 2008. Sources: U.S. Fish and Wildlife Service and Canadian Wildlife Service.

It is now apparent that the old paradigm – abundant waterfowl and liberal regulations will result in more hunters – no longer applies. Habitat management and harvest regulations have been ineffective at reversing the general decline of this important stakeholder group. The decline in hunter numbers continues despite abundant waterfowl populations and over a decade of unprecedented hunting opportunity. U.S. waterfowl hunters have decreased 27 percent since the 1970s, and continue to decline. Canadian waterfowl hunter numbers decreased 55 percent during the same period, though their numbers appear to have stabilized. Many managers question how the current model of waterfowl conservation can be sustained if waterfowl hunter numbers continue to decline.

In contrast to the declining trend in hunter numbers, interest in viewing waterfowl is popular and increasing. In 2006, 15 million people in the United States traveled a mile or more from home to view waterfowl. Seventy-seven percent of those people reported observing waterfowl, making them the most watched group of birds.[11] Some of these individuals purchase federal duck stamps to benefit conservation or have an entrance pass for national wildlife refuges, and also belong to one or more non-profit organizations that help fund conservation programs. Greater snow geese (and Canada geese) staging in Québec provide some $27 million in economic benefits derived from hunting, bird-watching and ecotourism activities.[12] The challenge is to direct more of the funds generated from waterfowl-related recreation towards conservation programs. Given their growing numbers, many believe this group of outdoor enthusiasts has the potential to be another cornerstone of waterfowl conservation.

Ultimately, the future of waterfowl and their habitats will be determined by the priorities established by society. Competing demands for resources and policies that reflect societal values will determine funding for conservation, regulatory frameworks, and the fate of wetlands and other habitats critical to waterfowl. For waterfowl conservation to rank as a priority, there must either be an emotional attachment to the birds and associated recreation pursuits, or pragmatic reasons to retain waterfowl habitat because of the multiple benefits provided to society. While hunters and viewers carry the emotional attachment, pragmatic justifications may gain greater favor with the general public. These include benefits such as reduction in flooding, groundwater recharge and improvement in water quality. Until recently, little effort was made to connect waterfowl conservation to other environmental issues of broader public concern. Public policies have been enacted to help secure environmental and other societal benefits, but these were set in place largely independent of waterfowl objectives, and some have been weakened in recent decades.

Ultimately, the future of waterfowl and their habitats will be determined by the priorities established by society.

11 Carver, E. 2009. Birding in the United States: A demographic and economic analysis. U.S. Fish and Wildlife Service Report 2006-4.

12 Groupe Conseil Génivar Inc. 2005. Etude des impacts socio-économiques : La sauvagine en migration dans le Québec méridional, particulièrement la Grande Oie des neiges et la bernache du Canada. Environment Canada, 63pp.

For instance, so-called "geographically isolated wetlands" – among the most valuable habitats for waterfowl – have recently lost protection under the U.S. Clean Water Act, and provincial laws regulating wetland drainage in Canada have been progressing very slowly. The Swampbuster provision of the U.S. Farm Bill still offers meaningful protection for wetlands, but the motivation for compliance will be reduced if USDA commodity programs are scaled back. Appropriations for some foundational programs – most notably NAWCA – are also in jeopardy. In Canada, the deficit reduction exercises occurring in the federal, provincial and territorial governments will affect future investments in the NAWMP. The ramifications for waterfowl conservation will be significant.



Northern Pintail Pair

These and other challenges make it clear that continuing with the status quo – focusing solely on waterfowl habitat conservation and population management – will not be enough to achieve the NAWMP goals and sustain habitat gains for the long term. New approaches and a new vision will be needed to address the changing social landscape and its influence on participation in hunting, viewing, and conservation. Such an expansion of vision is not without precedent. Previous generations expanded the focus of waterfowl management from regulating harvest and ending market hunting to providing refuges and protecting other habitats. Similarly, the original NAWMP expanded the focus from protecting fragmented habitats on public lands to restoring system processes at the landscape scale through broad partnerships. Through each expansion of waterfowl management, the community has engaged a broader constituency, incorporated information from more diverse scientific disciplines, and developed novel and successful approaches to conservation.

A New Vision of Waterfowl Management

Relevancy: Strengthening the Emotional and Pragmatic Ties to Waterfowl and Wetlands

To achieve increased public support, conservation of waterfowl and their habitats must compete successfully against other pressing societal issues. Creating a greater emotional attachment to waterfowl and appealing to people's pragmatic sense are complementary objectives that should increase the public stature of waterfowl conservation. Several strategies to achieve these objectives, described in greater detail below, are fundamental to the future of the NAWMP and are reflected in a vision of the future that includes:

- People connected to the outdoors and committed to conserving natural areas and abundant waterfowl populations;
- Sufficient waterfowl numbers and habitat to sustain populations and support waterfowl-related recreation;
- Healthy wetland ecosystems that sustain natural functions (e.g., water quality, flood control, carbon storage) that benefit people and wildlife;
- Continued financial support from public and private sources for conserving waterfowl and their habitats;
- Political support for effective and complementary conservation policies; and
- A thriving tradition and culture of waterfowl hunting that is supported by North American society.

In brief, the vision of the NAWMP is: ***"People Conserving Waterfowl and Wetlands."***

A Growing and Supportive Core of Waterfowl Hunters

The vision of the NAWMP is: *"People Conserving Waterfowl and Wetlands"*

The continuing loss of waterfowl hunters is an emotional and practical concern for waterfowl managers. Many in the waterfowl community consider waterfowling to be a treasured legacy that connects people with the outdoors in a most intimate way, and believe that the loss of the waterfowling tradition would extinguish an important cultural link with nature. From this perspective, the waterfowling tradition and conservation represent two dimensions of a singular experience – one that begins with the interactions with waterfowl and others out in the marsh, and

Background Image: Looking across McPhee Meadows to the Puntledge River – Rupert Wong, Nature Conservancy of Canada

ends with efforts to pass on the legacy of waterfowling through dedicated efforts to conserve wetlands, waterfowl, and the tradition of waterfowl hunting. New hunters must be recruited to the sport, and a higher percentage of existing hunters retained, or the tradition of waterfowling is in jeopardy. This will require an enhanced understanding of the factors that bear on hunter recruitment and retention. Fortunately, human dimensions research can help shed light on these issues.

The NAWMP's vision of the future includes a growing and engaged community of waterfowlers committed to conservation and perpetuating hunting traditions. It includes waterfowl managers making informed decisions that help recruit and retain hunters while minimizing impediments to participation, enhancing satisfaction, and safeguarding the waterfowl resource. It also includes the non-hunting public, which accepts waterfowl hunting as part of the North American culture, recognizes the environmental benefits derived from habitat conservation, and places trust in the science-based management that ensures sustainable populations of waterfowl.

An Engaged Conservation Community Inspired by Waterfowl and Wetlands

The millions of people in Canada, Mexico and the United States who pursue waterfowl with camera and binoculars are an important segment of the conservation community. Some have advocated for progressive policies, created wildlife sanctuaries and contributed to conservation organizations. Others have been less engaged, and increasing their support for waterfowl conservation will be vital to the future. Education will be important because some are simply unaware of the threat that habitat loss – often at distant locations – poses to the quality of their recreational experience. Communicating that linkage and appealing for support will be important to the future of waterfowl conservation because the number of waterfowl "users" is growing in number and influence.

Another challenge is the geographic disconnect between people and waterfowl. Over 82 percent of U.S. citizens live in cities and suburbs, just slightly more than the percentage of urban dwellers in Canada (80 percent) and Mexico (77 percent).[13] Traditionally, the NAWMP has focused on directing resources to habitats most important in the annual life cycle events of waterfowl. That focus should remain but consideration should also be given to initiatives that allow those removed from connections with abundant wetlands and waterfowl – especially youth – to experience waterfowl in natural settings.

While initially counterintuitive to population and habitat managers, modest, strategic investments in metropolitan waterfowl habitat might pay large dividends when difficult policy and funding decisions are put to a vote. As most biologists know, many waterfowl species adapt to urban/suburban environments, sometimes losing their wild characteristics. These birds are often demeaned as "park ducks" or "city geese", and some managers have spent considerable time dealing with nuisance waterfowl complaints. But how many managers appreciate that waterfowl in a metropolitan environment, a situation that can cause challenges, is also an experience that enriches the lives of average citizens – those who do not complain about fouled fairways and overgrazed greens? As part of the vision of the NAWMP, consideration should also be given to investments that allow an increasingly metropolitan populace to personally experience the beauty of waterfowl. Like all management actions under the NAWMP, these programs too should be subject to testing and adaptive modification over time.

13 Source: CIA World Factbook.

A Supportive Public

Publicly-funded programs and progressive public policies have always been profoundly important to waterfowl conservation. In this era of increasing fiscal restraint, it is imperative that the waterfowl management community work to encourage conservation as a priority with the general public. At a time when people are increasingly disconnected from nature, support for funding and policies will not be won based solely on the beauty of the birds or the joys of waterfowl recreation, but on the relevance of conservation to the quality of life of everyone. Strategic investments in science, education, and communications and marketing will be critical.

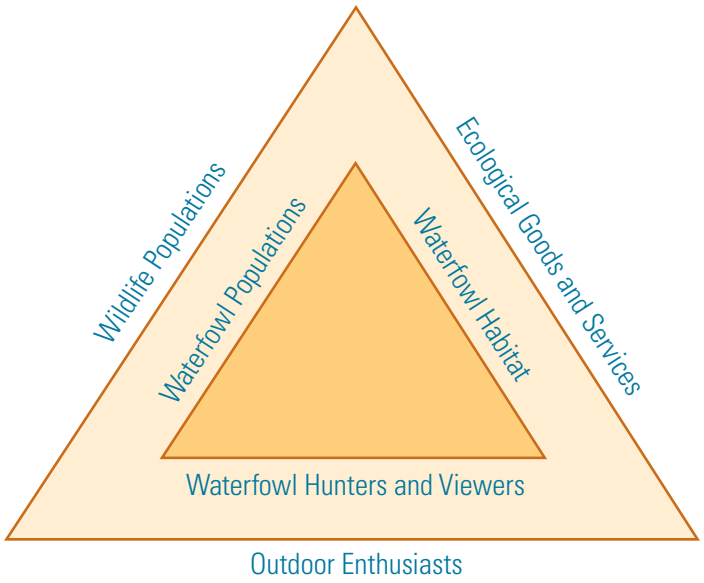


Figure 2. Conceptual diagram of the relationship between the NAWMP values and other societal benefits. The NAWMP is focused on values depicted on the axes of the inner triangle, but there is growing awareness of – and obvious connectivity to – the broader values and outcomes depicted in the outer triangle.

Conceptually, the three goals for waterfowl management are subsets of larger, associated benefits to society (Fig. 2). For example, enhancing waterfowl populations also benefits a broad suite of other wildlife species. Retaining, restoring and managing waterfowl habitat provides other ecological goods and services. Finally, the habitat provided for waterfowl also offers "habitat" and recreational areas for outdoor enthusiasts. Economists term these benefits "natural capital," defined as the stock of natural resources, environmental and ecosystem resources, and land.[14] Many – if not most – habitat projects conducted in the name of waterfowl conservation enhance natural capital (Table 1).

One "service" provided by the conservation of waterfowl habitat, not appreciated until recently, is associated with public health – particularly the well-being of children. A phenomenon termed "nature deficit disorder"[15] has commanded the attention of conservationists throughout North America. Initiatives to promote hunting and fishing and to "get people outdoors," have been initiated by several organizations and agencies. Waterfowl can play an important role in these efforts. Creating and managing waterfowl habitat for public health purposes, while not the paradigm for contemporary waterfowl management, is another subtle way for waterfowl conservation to become more relevant to the public.

14 Olewiler, N. 2004. The Value of Natural Capital in Settled Areas of Canada. Published by Ducks Unlimited Canada and the Nature Conservancy of Canada. 36 pp.

15 Louv, R. 2005. Last child in the woods: saving our children from nature-deficit disorder. Workman Publishing, New York, NY.

As new information on the environmental benefits of waterfowl conservation becomes available, it will be imperative to communicate the findings in a way that educates and motivates the public. The waterfowl community has not been particularly effective at such messaging, and this is yet another example of where human dimension and marketing research can be applied within waterfowl management. What environmental issues are most important to the public? How does waterfowl conservation affect those issues? What messages resonate, and how can those messages be delivered effectively in a way that is easily understood? What media should convey these messages? These key questions are relevant to waterfowl management in the new millennia.

Strengthening the connection between waterfowl management and ecological benefits should not change the waterfowl focus of management programs and priorities. Consistent with the new goals, management still should be aimed at maintaining healthy populations, conserving habitat, and addressing the needs and desires of those who make greatest use of the waterfowl resource (inner triangle, Fig. 2).

Table 1. Examples of ecosystem services and functions provided by wetlands and other waterfowl habitat (from Olewiler, N. 2004. The Value of Natural Capital in Settled Areas of Canada. Published by Ducks Unlimited Canada and the Nature Conservancy of Canada. 36 pp.)

Ecosystem Service	Ecosystem Function	Examples of Services
Water supply	Storage and retention of water	Water storage by wetlands, watersheds and aquifers
Water stabilization	Stabilization of hydrological flows	Moderation of flood events; supply water for agriculture and industry
Nutrient cycling	Storage, internal cycling and processing of nutrients	Nitrogen fixation, nutrient absorption and cycling
Habitat	Habitat for resident and migratory species	Nurseries, migratory bird habitat, regional habitat for locally harvested species
Genetic resources	Sources for unique biological materials and products	Medicine, products for materials, genes for plant resistance, ornamental species
Recreation	Provides opportunities for recreation	Ecotourism, hunting, fishing, boating
Cultural	Opportunities for non-commercial uses	Aesthetic, artistic, education, spiritual, scientific
Waste treatment	Recovery of mobile nutrients and removal of excess nutrients and compounds	Waste treatment, pollution control, detoxification
Climate stabilization	Regulation of global temperature, precipitation and other climate processes	Greenhouse gas sequestration, cloud formation
Erosion and sediment control	Retention of soil	Prevent soil loss by runoff, wind and other processes

Productive Collaborations

Fostered in part by the success of the NAWMP Joint Ventures, numerous new initiatives now exist to facilitate conservation delivery for birds and other wildlife. Equivalent national plans for conservation of landbirds, shorebirds, waterbirds and seabirds have been established, and guide geographically-based management plans and actions in every U.S. state (State Wildlife Action Plans), Canadian Bird Conservation Regions, and Mexican UMA-based Management Plans. Many of these initiatives have priorities and programs that overlap considerably with the mission of the NAWMP. Joint Ventures continue to explore opportunities afforded by partnering with these initiatives, as evidenced by their expansion from a waterfowl to an "all bird" focus.

In addition to conservation partnerships, opportunities to collaborate on landscape-scale research initiatives now present themselves. The U.S. Department of the Interior established Landscape Conservation Cooperatives (LCCs) that include priority landscapes for the NAWMP Joint Ventures. Initially focused on understanding the effects of climate change on ecosystems, LCCs have expanded their mandate to consider other large-scale, environmental stressors, and should provide scientific results broadly applicable to regional conservation decisions. LCCs represent a significant opportunity for collaboration on topics of mutual interest to the NAWMP and the broader conservation community.

Adaptation: Responding to a Rapidly Changing Ecological and Social Landscape

A hallmark of North American waterfowl management has been the continual improvement of management programs. An ongoing quest for a better way of doing business has motivated the management community to invest in original research, or synthesize existing data, to inform waterfowl management. For example, the NAWMP Assessment[16] (Assessment) reviewed Joint Venture conservation programs and offered numerous, specific recommendations for improving the effectiveness and efficiency of Plan activities. The Joint Ventures rose to this challenge and in many respects adjusted their programs as recommended. The advent of formal decision-support models and related monitoring programs has greatly enhanced the ways in which management decisions are made. In harvest management, the U.S. Supplemental Environmental Impact Statement on hunting of waterfowl – under review at the time of this writing – is undertaking a thorough re-examination of harvest management.

At the same time, the Canadian Wildlife Service is evaluating redundancies and gaps in its population monitoring program as well as the process for establishing hunting regulations. The U.S. National Duck Hunter Survey, conducted in late 2005, was the first to ask hunters in every state their perceptions and preferences on duck hunting and waterfowl management. Some Canadian provincial governments have asked hunters those questions as well. The results of these efforts shed light on the question of whether managers are "doing things right" insofar as program delivery.

16 Paulin, D. et al. 2007. North American Waterfowl Management Plan continental progress assessment. Final Report. Unpublished report. 98pp http://nawmprevision.org/sites/default/files/2007ContinentalAssessment.pdf



Long-billed Curlew – Jared Hobbs

In addition to considering the effectiveness of existing conservation work, managers frequently re-assess their programmatic investments by asking "are we doing the right things and in the right places?" Such re-assessment may be catalyzed by significant new information, the invention of new planning tools, or external forces that place new pressures on populations or habitats. For example, when new research revealed low duck nest survival in fragmented prairie landscapes with little upland cover, managers shifted resources to securing larger tracts of grasslands through conservation easements. Coincidental with this biological finding was the advent of GIS software that greatly enhances spatial targeting of conservation programs, leading to expanded work in some geographic areas and reduced emphasis in others. Finally, policy changes for the better (e.g., advent of the U.S. Conservation Reserve Program) or for the worse (e.g., loss of protection for isolated wetlands under the U.S. Clean Water Act) have prompted administrators to re-align staffing and financial resources to capitalize on opportunities or respond to new threats.

There have been periods in the history of waterfowl management when the community enacted significant changes by adopting new value systems, embracing new paradigms, and realigning the governance and institutions that guide waterfowl management. The very beginnings of waterfowl conservation in North America witnessed a fundamental transformation – from regarding waterfowl as a market-based commodity to a public trust. Subsequently, landscape-scale conservation in the United States was transformed by the creation of the National Wildlife Refuge System. Collaborative harvest management was transformed through the Flyway System. Non-government conservation organizations like Ducks Unlimited were founded, bringing with them new expertise and private funding for conservation. The NAWMP and formation of the Joint Ventures encouraged and transformed partnership-based, landscape-level conservation. More than anything else, the willingness of the waterfowl management community to consider and implement these fundamental changes is what sets it apart from many other endeavors in wildlife management.

The waterfowl community once again finds itself at this most significant stage in the learning cycle, asking "do we have the governance right?" To adapt and move forward, it will be necessary to reconsider management frameworks and institutional structures, particularly as the elements of waterfowl management become integrated and human objectives are explicitly incorporated into decision-making processes.

Adaptive Management: "Learning While Doing"

Traditionally, waterfowl researchers have attempted to resolve key uncertainties using a hypothesis-testing framework. Results of such research have led to a deeper understanding of waterfowl ecology and have led managers to improve management techniques and more effectively target conservation efforts. However, given the myriad and rapid changes described above, managers are increasingly forced to make decisions in the face of considerable uncertainty. In such a situation, an "adaptive management" framework – a structured, iterative process of planning, implementation and evaluation – is a preferred approach as advocated in the 2004 NAWMP Update.

> To adapt and move forward, it will be necessary to reconsider management frameworks and institutional structures, particularly as the elements of waterfowl management become integrated and human objectives are explicitly incorporated into decision-making processes.

To manage adaptively and make effective conservation decisions, waterfowl managers and stakeholders should be able to articulate clear goals and quantifiable objectives; predict the biological outcomes of management actions; design and implement monitoring procedures to measure those outcomes; and compare outcomes with the original predictions and objectives. Knowledge gained during one cycle is then used to adjust future planning and implementation in the next cycle.

Despite the obvious applicability of the adaptive management approach, there are only a few examples of it being employed in waterfowl management. This may be due, in part, to a longstanding tradition of avoiding risk, even when taking some risk is the only way to learn and reduce uncertainty.

Given that waterfowl management has been slow to embrace adaptive management, what could be done to encourage more widespread use of this approach? Six points are crucial:[17]

1. *Learning should be a performance element for both managers and decision makers.* Systematically reducing uncertainty should become a priority of waterfowl managers.
2. *Encourage controlled risk-taking in the face of uncertainty.* The focus on risk-aversion should shift to openness to experimentation and systematic learning.
3. *Treat adaptive management rigorously and formally.* Adaptive approaches involve more than simply muddling through. They establish a deliberative and purposeful process through which questions are framed, alternative hypotheses are proposed and implementation is designed to enhance learning opportunities. Results then are critically evaluated, and, if appropriate, subsequent actions and policies are revised and applied, again in such a manner as to enhance the continuing process of learning.
4. *Leadership and clarity of vision is essential.* The ability to excite, motivate, and sustain organizational commitment to adaptive management requires people who lead, not just manage.

17 Cited/adapted from: Stankey, G. H. 2002. Adaptive management at regional scales: Breakthrough innovation or mission impossible? A report on an American experience. Agriculture for the Australian Environment. 159-177.

5. *Monitoring and assessment programs are critical.* Without such programs, adaptive management cannot succeed.

6. *Organizations should be integrated, not compartmentalized.* An adaptive approach for all components of the waterfowl management enterprise should permeate organizational thinking and behavior.

A waterfowl management community that embraces and practices adaptive management is a visionary element of the NAWMP. This was articulated in the 1998 Update and elaborated in the 2004 Update and the 2006 Assessment, but has yet to be fully realized.

Efficiency and Effectiveness: An Integrated System of Waterfowl Management

North American waterfowl management is an inter-related enterprise involving people who advocate for beneficial public policies and help fund conservation programs. These policies and programs protect and restore habitat, resulting in waterfowl populations that can sustain an annual harvest while providing other societal benefits. Yet North American waterfowl management does not explicitly integrate population, habitat, and human objectives. For example, it is unclear whether, or to what extent, harvest should be regulated to help achieve NAWMP waterfowl population objectives. Conversely, the models used in Adaptive Harvest Management do not directly incorporate the habitat accomplishments of the NAWMP partners, in particular the habitat conditions in the United States. Finally, hunting regulations are not set with regard to any explicit objectives for participation in hunting and viewing. Lacking clear objectives for hunting, viewing and other waterfowl-related recreation, habitat managers have no objective or systematic way to balance their programs in consideration of multiple, competing desires of people and the resource needs of the birds.

Given how the different institutions of waterfowl management have evolved, it is understandable that these and other coordination issues have emerged. Coherent, interrelated objectives would enhance efficiency and the ability to adapt programs in response to changes in ecological systems and society. Shared objectives are a necessary first step in ensuring that management programs are aligned and work in a complementary fashion.

> Coherent objectives would enhance efficiency and the ability to adapt programs in response to changes in ecological systems and society.

A vision for integrated waterfowl management has begun to emerge. The Joint Task Group[18] (JTG) recommended a technical framework for specifying and evaluating the implications of common objectives for harvest and habitat management. Concurrently, the first comprehensive assessment of the NAWMP[16] offered parallel recommendations. One major obstacle, identified at the Future of Waterfowl Management Workshop,[19] is that no institution exists to oversee integrated decision-making. This barrier still needs to be addressed.

18 Anderson, M.G. et al. 2007. Report from the Joint Task Group for clarifying North American Waterfowl Management Plan population objectives and their use in harvest management. Unpublished report. 57pp. http://nawmprevision.org/sites/default/files/jtg_final_report.pdf

19 Case, D., and S. Sanders. 2008. The future of waterfowl management workshop: Framing future decisions for linking harvest, habitat and human dimensions. Summary report 10-9-08. 64pp. http://www.nawmprevision.org/sites/default/files/future_of_waterfowl_mgt_workshop_final_report.pdf

An important task for the waterfowl community is to develop a more fully integrated system to guide management programs and achieve the objectives under each of the NAWMP's three goals. Focused on social as well as ecological matters, a coherent management system would feature the familiar elements of an informed decision process – explicit objectives, coherent system models, targeted and focused monitoring programs, and institutional processes to adapt to new information. Such a system will require:

- *Quantifiable objectives.* The three new goals of the NAWMP provide the context for developing explicit objectives that are measurable and provide unambiguous guidance to decision makers. It will be essential to explicitly acknowledge potential trade-offs among these objectives. Managers should develop a feasible suite of actions, carefully considering and subsequently evaluating how those actions affect the attainment of each of the objectives adopted by the management community.
- *System models that link objectives and ensure coherence across scales.* An integrated management framework will require thoughtful development of models that predict outcomes of management actions. Some underlying models will be well-informed with empirical data, while others may have to be more conceptual. An enterprise as vast as the conservation and management of North America's landscapes, waterfowl populations, and user/supporter groups involves numerous decision problems at multiple temporal, geographic, and jurisdictional scales. Decisions cannot be guided by one overarching model; rather, an inter-related set of decision-support models will be needed to enable managers to allocate resources efficiently to achieve their objectives.
- *Targeted monitoring programs that track progress toward objectives and facilitate learning and adaptation.* Monitoring efforts should focus on the key parameters most useful for resolving decision problems, and on metrics that are most useful for detecting changes in ecological systems and societal trends that bear on waterfowl management. Effective monitoring will be vital to enable comparison of the model predictions with observed outcomes. This will enable learning and adaptation, and tracking of progress towards objectives at various scales. Some monitoring efforts may inform multiple decisions and, thus, won't necessarily result in greater management costs.
- *Institutional processes and structures that facilitate integration and adaptation.* Ultimately, the development of a more fully-integrated management system will depend on institutional processes and structures that facilitate integration across management streams and objectives. This will require an organizational culture and processes that support creativity, flexibility, justified risk-taking, and a focus on learning. In general, the form of institutions and coordinating processes should evolve to allow the functions of the developing system to work smoothly and efficiently. Sometimes, however, it may be necessary for institutional change to precede development of a new framework, in order to create the necessary environment for change.

A coherent framework should help guide the allocation of human and financial resources in waterfowl management. Such decisions typically are made at multiple scales – local, regional, state and provincial, national and international – and this Plan aims to develop the means to inform those decisions at all levels. Developing this framework will position waterfowl management for the future and ensure that the goals of the NAWMP are realized.

Objectives for Populations, Habitat and People



Estuary – Andre Breault, CWS Vancouver

An integrated system for waterfowl management should help ensure that individual objectives are not developed in isolation from each other, but are set in the context of helping to achieve all objectives. Nonetheless, unique attributes with respect to individual population, habitat, and people objectives should also be considered. These are offered here as a complement to the vision for integrated waterfowl management.

Many waterfowl species undergo substantial annual fluctuations in population size consistent with their life history strategies and reflective of natural variability in habitat conditions. For example, over the 56 years that mid-continent, breeding waterfowl surveys have been conducted, the aggregate index for the ten most common species surveyed has experienced four major "spikes" and three notable "troughs" in abundance (Fig. 1). The difference between the spikes and troughs in the aggregate index approaches 75 percent. This pattern of population size variation was less obvious when the 1986 NAWMP was developed, but it bears consideration now as new population objectives are formulated.

Given the natural variation in waterfowl populations, numeric population objectives might be better framed as a range within which a species' population is considered "at objective level". NAWMP objectives could seek to maintain waterfowl populations within this range. Management actions would be triggered when a population trend approaches the boundaries or exceeds an objective range.

Habitat conditions are, in many cases, more dynamic than waterfowl populations. Even the substantial work of NAWMP partners can be overwhelmed by the variation inherent in many natural systems. Moreover, degradation of important habitats can occur at a rate faster than habitat is being restored and secured by the NAWMP partners. These conditions require reliable tracking systems that capture habitat accomplishments and complementary monitoring systems that gauge the net change in important landscape features. Such tracking and monitoring systems are essential to understanding the status and trends in waterfowl carrying capacity and in assessing progress toward NAWMP goals. Developing sample-based systems to track such changes was a strong recommendation from the 2007 NAWMP Assessment, and is one that should be addressed by the management community.



Planting tree cuttings in the Central Valley JV – U.S Fish & Wildlife Service

Given the global trends that will influence future land use, waterfowl habitat objectives should be developed with careful consideration for the cost of maintaining habitat features and the long-term security of the habitat. Habitat objectives that emphasize permanent protection of naturally-functioning systems will likely be more sustainable than objectives achieved through intensive use of human and natural resources. Objectives should be less reliant on habitat that may be lost when economic drivers change (e.g., agricultural land use) and more dependent on natural habitat secured through cost-effective means like conservation easements or public policy.

Human objectives will span a range from a relatively narrow segment of society (e.g., waterfowl hunters) to the public at large. Within the populace are individuals with multiple motivations for their behavior. These motivations will not all be complementary, and difficult trade-offs will be necessary. Satisfying one user group might occasionally disadvantage another. Moreover, human objectives are not all about "users;" they should also encompass a broader population of "supporters" of both favorable environmental policies and funding.

Recommendations

These recommendations include both tactical and strategic approaches that should be the focus of the first phase of NAWMP implementation from 2012-2016. They are derived from several sources already referenced, including the NAWMP consultation workshops, comments received on earlier drafts of this Plan, the NAWMP Assessment, the Joint Task Group Report, and the Future of Waterfowl Management Workshop. The 2012 NAWMP Action Plan (in preparation) provides more specific direction and identifies important steps under each of the headings that follow.

Develop, Revise or Reaffirm NAWMP Objectives

Objectives for Waterfowl Populations

For the last 26 years, the NAWMP population objectives have not only inspired action but also played a vital role in conservation planning. As an important early step in the development of an integrated management system, new NAWMP population objectives should be developed in a manner reflecting the natural variation in populations and habitat features (especially wetlands). These should also be coherent with objectives for people. For example, waterfowl population objectives could be established as a range within which populations are deemed to be at objective levels. Criteria could be established to evaluate population trends on a periodic basis, and management actions in response to significant population increases or decreases could be devised and agreed upon as part of the planning process, well ahead of when management actions may be warranted.

While new population objectives are being formulated, the management community has expressed a strong desire to retain the current objectives. Those objectives have been reproduced in Appendix A. A few of those objectives have been changed as a result of new knowledge gained since the 2004 NAWMP Update. For example, work supported by the Species Joint Ventures and flyways led to new objectives for black ducks, some species of sea ducks, and populations of Canada geese. Updated population status information is also presented.

Objectives for Habitat

Prior to establishing new (or re-affirming existing) habitat objectives, the waterfowl habitat management community – in particular the Joint Ventures – should inventory their habitat base and assess the degree to which critical resources may be at risk from future socioeconomic drivers. This includes dependence on agriculture for providing food and habitat, requirements for water that may be subject to change under unsustainable allocation systems, and issues of directional change in

Background Image: Snow Geese – Molly Giles, Pennsylvania Game Commission

ecological systems (e.g., sea level rise, a warming climate) that could threaten critical habitats. Planning should be undertaken to mitigate potential future losses and help design habitat programs that ensure perpetual security of habitat values.

As has been normal practice, population and associated habitat objectives for Joint Ventures should be stepped down from continental objectives in recognition of how each Joint Venture contributes to the overall goal. Joint Ventures should ensure reliable tracking systems exist to document habitat accomplishments, and devise monitoring systems that track net change in critical landscape features. Metrics of net change should be collected at intervals within which significant change is anticipated to occur.

The global trends impacting society and the NAWMP often manifest themselves in the form of large-scale habitat (landscape) stressors. Examples include land-use changes resulting from agricultural practices, energy extraction, and climate change. As noted earlier, some of these stressors induce directional change in ecosystems that may confound or even invalidate the models used to manage waterfowl populations and harvest. Understanding these stressors and associated non-stationarity in the system is critical to making informed management decisions.

Insofar as LCCs are concerned with understanding these same stressors and system dynamics, the waterfowl management community should continue to collaborate with LCCs on research topics of mutual interest. Such collaboration carries mutual benefits: the scientific expertise and resources within LCCs are value-added to Joint Ventures, and the management and technical experience within the waterfowl management community can aid LCCs in understanding how stressors will impact waterfowl species and conservation investments.



Steep mountains – Andre Breault, CWS Vancouver

Objectives for People

The importance of stakeholder values and support to waterfowl management and conservation has long been recognized and was directly acknowledged in the original NAWMP. The 1986 Plan assumed that waterfowl population size was a major factor driving hunter participation and viewing and, furthermore, that hunter numbers would rebound with abundant waterfowl. Today, we recognize that a focus only on waterfowl populations will not be sufficient to sustain hunting, and that the relationship between waterfowl populations and viewer participation is uncertain. Plan partners will need to translate the third NAWMP goal pertaining to public use into measurable objectives, not only for sustaining waterfowl hunting traditions but for building broader public support for waterfowl conservation efforts across the continent.

Integrate Waterfowl Management

The waterfowl management community should proceed with the development of an integrated system of waterfowl management. This will be a challenging task from both a technical and process perspective. Two process challenges, both central to the quest for integration, must be overcome.

First, assuming that a technical decision framework can be developed that informs trade-offs among multiple objectives, it needs to be determined how multiple objectives for waterfowl management will be established (i.e., by what ***social process*** should this be accomplished). Here, the term "social process" is used to broaden the discussion beyond purely technical matters. One option is to rely on existing institutions and processes to achieve coherent adaptive actions. An alternative is to establish an entity with a new, overarching facilitation or coordination function.

Second, when a set of coherent objectives is established, again from a ***process*** point of view, a procedure needs to be established to monitor progress toward achieving the expanded NAWMP objectives and adapt actions in light of those results. It should be determined who will "oversee" the expanded set of objectives. If it is multiple institutions, they should develop the means to coordinate actions in pursuit of those objectives and monitor performance metrics.

One significant challenge is that no existing entity possesses clear responsibility for the interrelated decision problems that should be defined and addressed in an integrated system. There is no single institution to determine who will participate in the development of objectives, what stakeholders will be consulted, what technical resources will be committed to the task, and – ultimately – who will make the relevant decisions, monitor progress, and adapt the system in the future as required. The waterfowl management community should resolve these issues with due respect for the long-standing institutions and processes already in existence.

One significant challenge is that no existing entity possesses clear responsibility for the interrelated decision problems that should be defined and addressed in an integrated system.

As an initial step to maintain momentum for achieving greater coherence and integration of waterfowl management, the NAWMP Plan Committee (PC) should assume an interim facilitation role. The PC's federal Co-Chairs will appoint an Interim Integration Committee (IIC) to promote the coherent management of North American waterfowl populations and harvest, habitat conservation, and the growth of associated users and conservation supporters. The IIC will report to the Plan Committee and focus on technical assessments and solutions; process and institutional matters; and leadership and marketing related to integration. Technical work will be pursued jointly with established harvest, habitat and human-dimension working groups. Terms of reference for the IIC will be included in the NAWMP 2012 Action Plan.

The management community should create a more permanent focal point for reaching consensus around integrated objectives, and provide a forum for review of monitoring and assessment data informing progress toward the Plan's multiple goals and objectives. Warranted changes in program direction, emphasis, or monitoring/assessment should be identified as they emerge, and appropriate agencies urged to act in a unified manner.

When explicit objectives have been set and a linked decision framework and monitoring systems developed, the three federal governments that have over-arching management authority for migratory birds and treaty responsibilities should consider comprehensive, long-term changes in processes and/or institutions to ensure future success of integrated waterfowl management. This should include a review of progress in understanding functional linkages and the dynamics of the interacting human, avian and habitat systems that are being managed, and the waterfowl management community's effectiveness, efficiency and responsiveness to change. Further ideas on this process will be offered in the companion Action Plan (in preparation).

Increase Adaptive Capacity

The waterfowl management community should embrace adaptive management as the standard approach for making management decisions in the face of uncertainty, while continuing to improve management performance. Consistent with the "vision for adaptive management" presented earlier in this Plan, incentives to encourage adaptive management should be implemented and impediments removed. This reiterates earlier recommendations from NAWMP updates in 1998, 2004 and the 2007 NAWMP Assessment. Advice from recent reviews of adaptive management performance is offered elsewhere in this Plan. Additionally, the waterfowl management community must invest resources in adaptive management monitoring and assessment as integral elements of management programs.

As part of implementing adaptive management, there also should be an established process for institutional review and change. Ideally, institutions evolve to enable management systems to function more efficiently and lead the way toward a better approach to doing business. This Plan is intended to prompt the management community to actively consider appropriate institutional changes that would facilitate adaptive management, and to enable the development of an integrated system of management and increase relevancy. In particular, waterfowl management structures should match the breadth of decision problems that will arise under integrated management, and bureaucracies should have the capacity to coordinate the integration of elements of all three goals into their management actions.

Build Support for Waterfowl Conservation

Waterfowl are large, colorful species that can be observed in rural, suburban, and even urban environments. This is undoubtedly why they are among the most commonly viewed groups of birds. Their attractiveness and widespread distribution provide an opportunity to re-connect people with nature, and the waterfowl conservation community should consider opportunities and venues for facilitating this interaction. This could take the form of modest wetland developments in strategic locations, interpretive trails within existing wetland complexes, promotion of existing and future urban national wildlife refuges, or organized waterfowl birding trips. The objective of these investments would be to build a general appreciation for waterfowl and educate the public on waterfowl conservation issues and habitat .

In a parallel effort, the science community should begin to compile a comprehensive review of the environmental and societal benefits of protecting, managing, and restoring waterfowl habitat. These benefits may be specific to Joint Venture areas or more universally relevant at a continental scale. Where critical information is lacking, strategic investments in research and monitoring should be made. Joint Ventures should assume the lead in communicating the regional benefits of waterfowl conservation to the general public and to policymakers, whereas the NAWMP Plan Committee should play a role in disseminating information through updates of the recent "NAWMP value proposition" document and other avenues. These communication and marketing efforts should be purposeful, sustained and institutionalized within the waterfowl management community. Further, just as the environmental and societal benefits are informed by science, so too should human dimensions research inform communication and marketing strategies.



Ruddy Duck Pair

Establish a Human Dimensions Working Group

The HDWG should be supported by and report to an established institution, in anticipation of it becoming part of the foundation of contemporary waterfowl management. The charge of the HDWG should be clear and unambiguous. This group should assume the lead in establishing objectives for people, strategies for recruiting and retaining waterfowl hunters, engaging conservationists and concerned citizens, and developing an understanding of how waterfowl conservation intersects with issues of concern to the general populace.

Participants for the HDWG should include technical experts from academia or other institutions, as well as public agencies. In addition, marketing expertise from the private sector should be engaged, as appropriate, to advise on how to best communicate messages to selected audiences. It is imperative that conservation and public marketing actions be monitored and evaluated so management programs directed at people can be refined and adapted. Draft Terms of Reference for an HDWG exist, currently under the umbrella of the National Flyway Council, and focused largely on hunter recruitment and retention issues. This nascent group should embrace a broader mandate and develop an initial multi-year work plan in light of this NAWMP revision and in communication with the Plan Committee.

Focus Resources on Important Landscapes

The 1986 NAWMP and subsequent updates emphasized the need to focus conservation resources in areas most important to waterfowl demography. Certain regions of North America have always stood out as being critical. For instance, the grasslands and wetlands of the Prairie Pothole Region are clearly a top priority. The NAWMP Assessment and other plans call for more resources to be directed to this region of the continent. The Northern Boreal Forest is another key breeding area where NAWMP partners may be able to influence land use decisions over a vast landscape. Work has already started in the western portion of the boreal forest. The heavily used habitats of the Gulf Coast, the Mississippi Alluvial Valley, and the Central Valley of California are migration and wintering areas that deserve continuing attention if NAWMP goals are to be met.

Other important areas have lower waterfowl densities but nonetheless deserve management attention. These represent important regions for several NAWMP priority species, some of which are never found in high densities. The core breeding range for black ducks in Canada's eastern boreal forest is one significant example. Moreover, for many sea ducks – in particular scoters, long-tailed ducks and king eiders – the core breeding range is found in the vast reaches of taiga and tundra where birds nest at very low densities.

An updated map depicting areas of greatest continental importance to North American Waterfowl (Appendix B) is provided as further guidance to the management community. The NAWMP Science Support Team (NSST), who coordinated map development, cautions Plan partners regarding use of this image in ranking the relative importance of conservation projects. However, the NSST has also committed to develop map tools suitable to guide conservation delivery. Using the experience gained in the current mapping exercise, this work should identify significant areas at multiple spatial scales, based on several criteria. Although estimates of regional population abundance would be one key measure, consideration may also be given to the distribution and abundance of waterfowl hunters, wildlife viewers, and other potential outdoor recreationists; relative abundance of public lands; distribution of waterfowl species of greatest concern; and relative risk of habitat loss or conversion. Ultimately, a more sophisticated mapping approach is needed to inform conservation priorities for achieving the three fundamental goals of this Plan.



Wetland, Quebec – Christine Lepage, CWS Quebec Region

Adapt Harvest Management Strategies

The 1986 NAWMP advocated for stable harvest regulations with minimum annual adjustments, asserting that such a system would sufficiently safeguard waterfowl populations, offer adequate recreational opportunities, and allow more time to "be directed toward such important waterfowl activities as habitat protection, management, and improvement." This recommendation largely characterizes the approach to harvest management in Canada, where hunter numbers and harvest rates are relatively low. In the United States, greater hunter numbers, greater concern over potential effects of harvest on waterfowl populations, and dissatisfaction with a contentious regulatory process led to the development of a regulatory system known as Adaptive Harvest Management (AHM).

By all measures AHM – which was first implemented in 1995 – has been a tremendous success. Based on the principles of adaptive resource management, AHM has provided insights into duck population dynamics and management controllability. It has also reduced the contentiousness in the regulations process, safeguarded duck populations and offered substantial hunting opportunity. Indeed, the success of the AHM approach has led to an ongoing proliferation of model-based harvest strategies for other species of ducks and, in some cases, stocks of ducks of the same species.

Unfortunately, the development of each new harvest strategy requires a substantial investment of time and technical expertise, as well as added monitoring and assessment capacity. During the consultation phase of this NAWMP revision, many in the waterfowl management community questioned whether the incremental gain in hunting opportunity resulting from new harvest strategies was worth the investment of time and resources. There was further concern that the associated regulatory complexity may actually discourage hunter recruitment and retention. Hence, there is renewed interest in the waterfowl management community in considering regulations that are "simpler" in the same sense, and for the same reasons, as articulated in the 1986 NAWMP. In advocating for a thoughtful re-examination of U.S. harvest strategies, the management community has also re-affirmed a strong commitment to retaining the many desirable attributes of AHM: an objective-driven, informed and adaptive decision process that safeguards waterfowl populations and minimizes contentiousness in the regulations setting process.

The development of an integrated system of waterfowl management will necessitate a reconsideration of harvest management strategies in the context of achieving the three NAWMP goals. As waterfowl population, habitat, and user objectives are clarified, revised or developed, harvest strategies may also need to change in order to pursue multiple explicit objectives. One critical need, described under recommendation one, is to revise and/or clarify the interpretation of waterfowl population objectives as well as the role of harvest management in attaining population objectives. Substantial effort will also be required to develop objectives for users (i.e., hunters and non-consumptive), which is largely a value-based exercise.

Decisions about modifications of the regulatory process or packages should, in the long term, negotiate tradeoffs among complexity, harvest opportunity, hunter satisfaction, and management risk. Management risk has traditionally focused on the implications of regulatory change to waterfowl populations. More recently, managers have become concerned that new regulations (or continuation of the status quo) may increase the risk of further declines in hunter numbers. However, limited data exist to evaluate hypotheses regarding effects of regulations on user satisfaction or participation. Research is needed to assess risk and more explicitly quantify these and other tradeoffs.

Moving Forward

Partners in the North American Waterfowl Management Plan have achieved much in the quarter-century since 1986. The Joint Ventures have made great strides in identifying the habitat needs of the continent's waterfowl populations and securing a significant portion of that capacity for the future. The NSST is active in supporting the Plan and is making important contributions to the biological foundations of the NAWMP. This is a proven path for conservation success. Conservation at landscape scales that is supported by broad partnerships and guided by sound science has achieved more than the Plan's founders could have imagined. The Flyways and Harvest Management Working Group have made great strides to better understand the role harvest plays in waterfowl population dynamics and initiating dialogue to more explicitly consider the relationship between harvest management and participation in hunting.

There is much to celebrate about these accomplishments, yet many challenges remain. Today's world is fundamentally different than when the Plan was conceived in the early 1980s. Some of the historic problems have been addressed, but numerous new ecological, social, and economic trends and challenges have emerged. The waterfowl management community has also concluded that it is time to manage populations, habitats, users and supporters in a more holistic and integrated fashion. This raises important new considerations for how decisions are made and institutions function. Hence, this revision of the Plan marks a more fundamental change in direction than any of the previous three NAWMP Updates.

With this NAWMP, the Plan community reiterates its commitment to waterfowl conservation in all its dimensions and sets a course to meet future challenges by becoming more adaptable, more efficient, and more relevant. The adaptive processes advocated here offer a path to success, even in the face of complex ecological and social uncertainties. The NAWMP recognizes the central role of science, in many dimensions, in guiding Plan actions. The community has embraced a set of interdependent goals for populations, habitat and people that describes the universe of waterfowl management. Working together, Plan partners focused on habitat, population, and people will have the opportunity to identify address multiple objectives in the most efficient and effective manner possible. It is now time to expand the focus of waterfowl management to address the needs of hunters and viewers, while demonstrating the values of waterfowl and waterfowl habitat to society. The years ahead will be filled with challenges, opportunities and difficult decisions. Nevertheless, the work of thousands of waterfowl conservationists over the last century has positioned the waterfowl community to evolve and succeed yet again.

North America was endowed with the greatest diversity and abundance of waterfowl on earth. The NAWMP is intended to steward and secure that legacy for current and future generations. ***"People conserving waterfowl and wetlands"*** is a powerful but simple vision in a complex world. The connections are undeniable; the importance of success, essential. It is up to the waterfowl management community to make it happen.

Background Image: Homathko East Central Coast – Andre Breault, CWS Vancouver

Appendix A

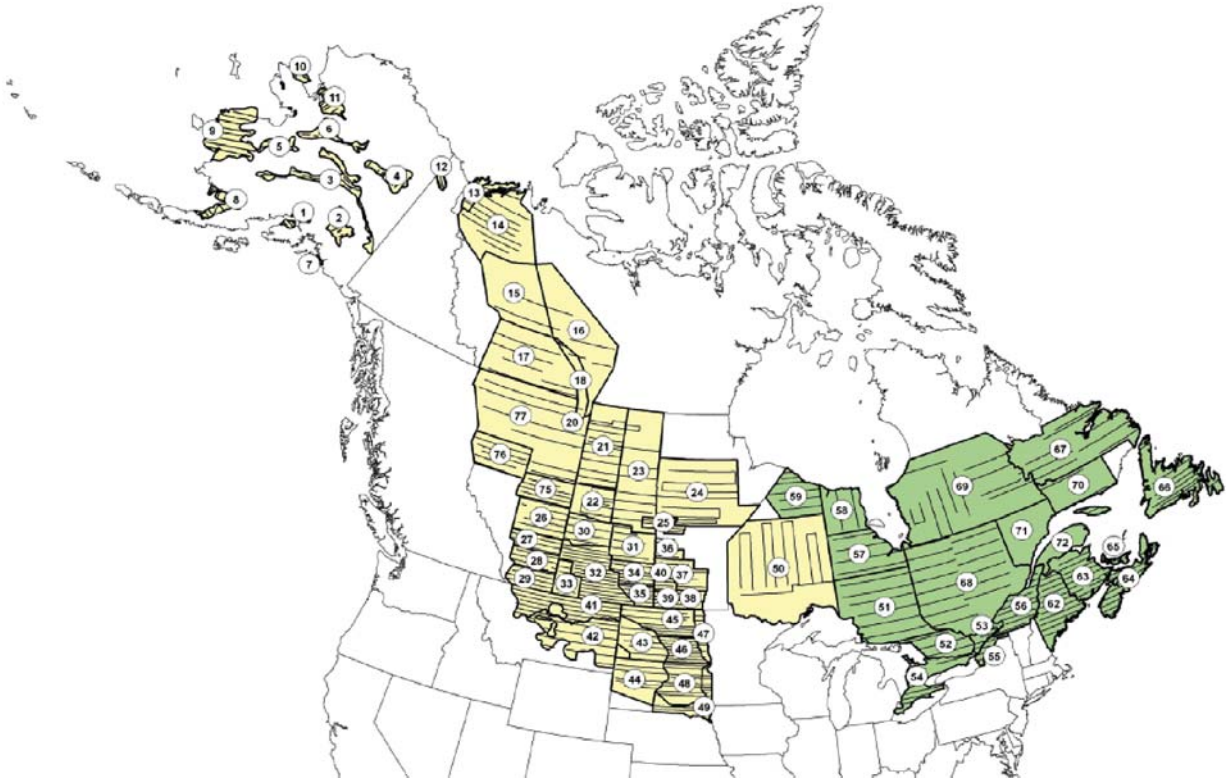
North American Waterfowl Population Status and Interim Abundance Objectives

NAWMP population objectives have been a foundational component of this continental conservation plan and a focus to help guide the activities of Plan partners, particularly within the Joint Ventures. Developing a more integrated waterfowl management system will require future population objectives to be framed with the perspective of achieving multiple goals. For example, the waterfowl management community should consider population sizes necessary to achieve desired levels of recreation but within the context of the habitat needed and potentially available to sustain the birds. Informing new population objectives in this way will be a necessary, early step in the development of an integrated management system. However, until such analyses occur, the population objectives established in the original 1986 NAWMP and subsequent updates should continue to guide waterfowl management. Those interim objectives are provided here, along with current population estimates.

Population objectives serve three primary purposes in conservation planning: 1) they provide a biological target and plan foundation, 2) they function as a performance measure for assessing conservation accomplishments, and 3) they operate as a communication and marketing tool to demonstrate the need for conservation. The currency of population objectives has typically been abundance, but abundance can be coupled with other demographic parameters such as density or a vital rate. In the past, limited biological information restricted expression of the NAWMP objectives to population size. Ongoing and future work by the waterfowl conservation community may result in different expressions of waterfowl population objectives, particularly as waterfowl scientists move toward use of annual cycle models in objective setting.

Population abundance objectives for 10 common duck species breeding in the Western ("Traditional") Survey Area (TSA; Appendix A, Figure 1) were included in the 1986 NAWMP. These objectives are based on 1970s abundances, and the objective of a "traditional" distribution of waterfowl during various life-cycle periods. The Eastern Survey Area (ESA; Figure 1) provides primary breeding habitat to several sea duck species, plus it encompasses the breeding range of American black ducks and a number of goose populations. This area and other annually monitored smaller regions represent the "Other Surveyed Areas" in Table 1. Population objectives for some additional duck species occurring outside the TSA were included in this category. Estimates of population abundance within the TSA, Other Surveyed Areas, and some unsurveyed regions were pooled to generate continental population estimates for all duck species (Table 1).

Population status for North American geese (Table 2) and swans (Table 3) are also provided. Abundance objectives are based largely on species-specific Flyway population plans. Most population objectives have not changed from the 2004 Plan, but they too will be assessed as multiple NAWMP goals are integrated.



Appendix A, Figure 1. Strata and transects of the Waterfowl Breeding Population and Habitat Survey. Yellow shading depicts the Western ("Traditional") Survey Area; green shading denotes the Eastern Survey Area. Surveys conducted by Canadian federal, provincial, and territorial governments are not shown.

Table 1. Breeding duck population estimates (2002-2011 mean) and objectives for North America (1,000s of ducks).

Species/Subspecies/Subpopulation[b]	Population size[a] (objectives where established)		
	Continental	Traditional Survey Area[c,d]	Other Survey Areas
Mallard	11,900	7,910 (8,200)	2,350
Mexican duck[e]	56	Not Applicable	Not Applicable
Northern pintail	3,780	2,960 (5,600)	220
American black duck	1,200	36	884 (830[f])
Mottled duck	260	Not Applicable	230
Florida subspecies[e]	60	Not Applicable	59 (42)
Western Gulf Coast subspecies	200	Not Applicable	172 (106[g])
Gadwall	3,650	2,770 (1,500)	220
American wigeon	2,780	2,350 (3,000)	67
Green-winged teal	4,380	2,790 (1,900)	550
Blue-winged and cinnamon teal	7,690	6,030 (4,700)	320
Blue-winged teal	7,390	Not Differentiated	230
Cinnamon teal	300	Not Differentiated	90
Northern shoveler	4,260	3,720 (2,000)	74
Hawaiian duck[e,h]	2.5	Not Applicable	2.5 (5)
Laysan duck[e,h]	0.5	Not Applicable	0.5 (10.5)
White-cheeked pintail[e]	1.4	Not Applicable	1.4
Wood duck	4,600	Not Applicable	670
Eastern population	4,400	Not Applicable	660
Western population	200	Not Applicable	7
Muscovy duck[e]	30	Not Applicable	Not Applicable
Whistling ducks	220	Not Applicable	Not Applicable
Fulvous whistling duck	Unknown	Not Applicable	Not Applicable
Black-bellied whistling duck	Unknown	Not Applicable	Not Applicable
West Indian whistling duck[e]	0.1	Not Applicable	0.1
Redhead	1,310	880 (640)	25
Canvasback	690	620 (540)	6
Scaup	4,900	3,760 (6,300)	330
Lesser scaup	4,100	3,160[i]	13
Greater scaup	800	610[i]	62
Ring-necked duck	2,060	1,130	720
Ruddy duck	1,242	630	33
West Indian subspecies[e]	1.5	Not Applicable	1.5
Continental subspecies	1,240	630	33
Masked duck[e]	6	Not Applicable	Not Applicable
Harlequin duck	254	Not Applicable	25
Eastern population	4	Not Applicable	2 (3[j])
Western population	250	Not Applicable	25
Long-tailed duck	1,000	170	100
Eiders	1,700	18	160
King eider	600	Not Differentiated	150
Eastern population	200	Not Differentiated	Not Applicable
Western population	400	Not Differentiated	150

Species/Subspecies/Subpopulation[b]	Population size[a] (objectives where established)		
	Continental	Traditional Survey Area[c,d]	Other Survey Areas
Common eider	1,100	Not Differentiated	9
American subspecies	300	Not Differentiated	100 (165[k])
Northern subspecies[e]	550	Not Differentiated	180 (400[j])
Hudson Bay subspecies[e]	260	Not Differentiated	260 (275[j])
Pacific subspecies	150	Not Differentiated	9
Steller's eider[e]	1	Not Differentiated	1
Spectacled eider[e]	17	Not Differentiated	6
Scoters	1,600	1,060	140
Black scoter	500	Not Differentiated	11
Pacific population	200	Not Differentiated	160 (160)
Atlantic population	300	Not Differentiated	110[l]
Surf scoter	700	Not Differentiated	120
White-winged scoter	400	Not Differentiated	13
Goldeneyes	1,480	710	740
Common goldeneye	1,200	Not Differentiated	290
Barrow's goldeneye	260	Not Differentiated	32
Eastern population	7.5	Not Differentiated	7.4 (7.5[j])
Western population	250	Not Differentiated	25
Bufflehead	1,670	1,140	120
Mergansers	2,700	790	730
Hooded merganser	1,100	Not Differentiated	220
Red-breasted merganser	400	Not Differentiated	19
Common merganser	1,200	Not Differentiated	280

a Traditional Survey Area estimates were derived from the Waterfowl Breeding Population and Habitat Survey (WBPHS), strata 1-18, 20-50, 75-77. Other Survey Areas estimates were derived from some combination of WBPHS strata (51-57, 62-69), the Breeding Waterfowl Plot Survey also conducted in eastern Canada, and concurrent state, provincial, or regional breeding waterfowl surveys in British Columbia, California, Connecticut, Delaware, Florida, Louisiana, Maryland, Massachusetts, Michigan, Minnesota, Nebraska, New Hampshire, New Jersey, New York, Oregon, Pennsylvania, Rhode Island, Utah, Vermont, Virginia, Washington, and Wisconsin. In cases where a survey was not completed every year, or when data were unavailable, mean estimates were computed using available estimates for that time period. Continental estimates include the surveyed area estimates as well as rough estimates of populations outside of surveyed areas based on harvest derivation studies, expert opinion, winter survey data, or special purpose research surveys. Continental estimates for species such as the muscovy duck, whistling ducks, masked duck, and many sea ducks are based on few data and are particularly speculative.

b Sub-populations are identified distinctly when there is significant evidence for allopatry. Races are also distinguished according to current taxonomic classification and refer to genetically distinct sub-species. The taxonomic delineation presented in this table is intended to aid in development of regional habitat conservation strategies and is not intended to supersede other international agreements regarding the appropriate organizational level for species management.

c Duck objectives in the Traditional Survey Area are based on the WBPHS strata 1-18, 20-50, 75-77 and represent average population estimates from 1970-1979.

d "Not differentiated" indicates the survey protocol does not enable discrimination to a particular taxonomic level. "Not applicable" indicates the species, race, or sub-population is not recorded in the WBPHS Traditional Survey Area or in surveys represented by the Other Survey Areas category.

e Not shared among two or more signatory nations. Management is the responsibility of that nation whose boundary coincides with the range of the species, sub-population, or race.

f The American black duck population objective was developed from predictions of a model relating Mid-winter Waterfowl Survey counts to population estimates derived from the WBPHS Eastern Survey Area (USFWS strata 51, 52, 63, 64, 66, 67, 68, 70-72). Note: Objective is not directly comparable to the black duck population estimate for Other Survey Areas since the Other Survey Areas estimate encompasses a wider region with survey strata not included in the black duck objective.

g Objective currently based on the mid-winter index for Texas, Louisiana, Mississippi, and Alabama, with an index of at least 70,000 in LA and 35,000 in TX. This index is not directly comparable with the Other Survey Areas estimate presented which is based on a range-wide breeding population survey.

h Hawaiian and Laysan ducks are monitored by the Annual Hawaiian Waterbird Survey.

i Estimate of lesser scaup in the Traditional Survey Area was computed from nontundra WBPHS strata 1-7, 12, 14-18, 20-50, 75-77. Estimate of greater scaup in the Traditional Survey Area was computed from tundra strata 8-11 and 13. These should be considered only crude estimates since some mixing of lesser and greater scaup occurs in tundra and northern boreal strata.

j Population objective based on winter index. Note: Objective for the northern subspecies of common eider is 400,000 (Canada only, where survey established) and for the Hudson Bay subspecies of common eider is 275,000-300,000.

k Population objective is breeding pairs.

l Population estimate based on molting male index.

Table 2. Objectives and estimates for North American goose populations.

Species and populations	Objective[a]	Mean population size[b] (2002-2011)
Canada and cackling goose		
Atlantic	250,000[c]	171,000
Atlantic Flyway resident	700,000	1,070,100
North Atlantic	Not yet established	56,000
Southern James Bay	50,000[d]	78,100
Mississippi Valley	255,000[d]	320,900
Mississippi Flyway giant	1,182,000[d]	1,481,200
Eastern Prairie	75,000[d]	150,600
Western Prairie and Great Plains	285,000[e]	545,800
Tall Grass Prairie	250,000[e]	471,300
Short Grass Prairie	150,000[e]	215,700
Hi-Line	80,000[e]	266,600
Rocky Mountain	117,100	154,900
Pacific	Not yet established	No estimate
Lesser	Not yet established	No estimate
Dusky	Avoid ESA[f] listing	10,900
Cackling	250,000[g]	224,800
Aleutian	40,000[e]	102,500
Vancouver	Not yet established	No estimate
Taverner's	Not yet established	No estimate
Snow goose[h]		
Greater	500,000	923,800
Mid-continent lesser	1,500,000[e]	2,628,400
Western Central Flyway lesser	110,000[e]	170,300
Wrangel Island lesser	120,000	140,000[i]
Western Arctic lesser	200,000	608,000
Ross's goose	100,000	>1,000,000[i]
White-fronted goose		
Mid-continent	600,000[g]	660,500
Tule	10,000[e]	7,500
Pacific	300,000[g]	513,200
Brant		
Atlantic	150,000[e]	149,800
Pacific	150,000[e]	127,700
Western High Arctic	12,000[e]	8,700
Eastern High Arctic[j]	Not yet established	29,000[i]
Emperor goose[j]	150,000	69,100
Hawaiian goose[j]	2,800	1,900

a Population objective is total spring population unless otherwise indicated.

b Incomplete survey years were excluded from the computation of population mean. Where no estimates are available for 2002-2011, the most recent estimate is presented.

c Objective is breeding pair index, partitioned to 225,000 pairs in the Ungava Region and 25,000 pairs in boreal Québec.

d Population objective is total winter population. Note: Objective for Mid-continent lesser snow goose is a range from 1,000,000 - 1,500,000.

e Endangered Species Act (ESA) (United States).

f Population objective is total autumn population.

g Lesser snow goose population estimates include some Ross' geese

h Population estimate provided by the Arctic Goose Joint Venture

i Not shared among two or more signatory nations. Management is the responsibility of the nation which encompasses the range of the population, sub-population, or race.

Table 3. Objectives and estimates for North American swan populations.

Species and populations	Objective	Mean population size (2002-2011)
Tundra swan[a]		
Eastern population	80,000	99,680
Western population	60,000	87,370
Trumpeter swan[b]		
Pacific Coast population	25,000	26,790
Rocky Mountain population[c]	None	9,626
Interior population	2,000	9,809

a Objective is total winter population. Mean population size is based on annual winter surveys.

b Objective is total autumn population. Population census and surveys conducted spring through fall across species range, at 5-year intervals. Mean population size is based on 2010 census and survey results.

c U.S. portion of breeding population was 676; objective for U.S. segment is 718. There is no population objective established for Canadian portion of breeding population.

Appendix B

Areas of Greatest Continental Significance to North American Ducks, Geese, and Swans for the 2012 NAWMP Revision

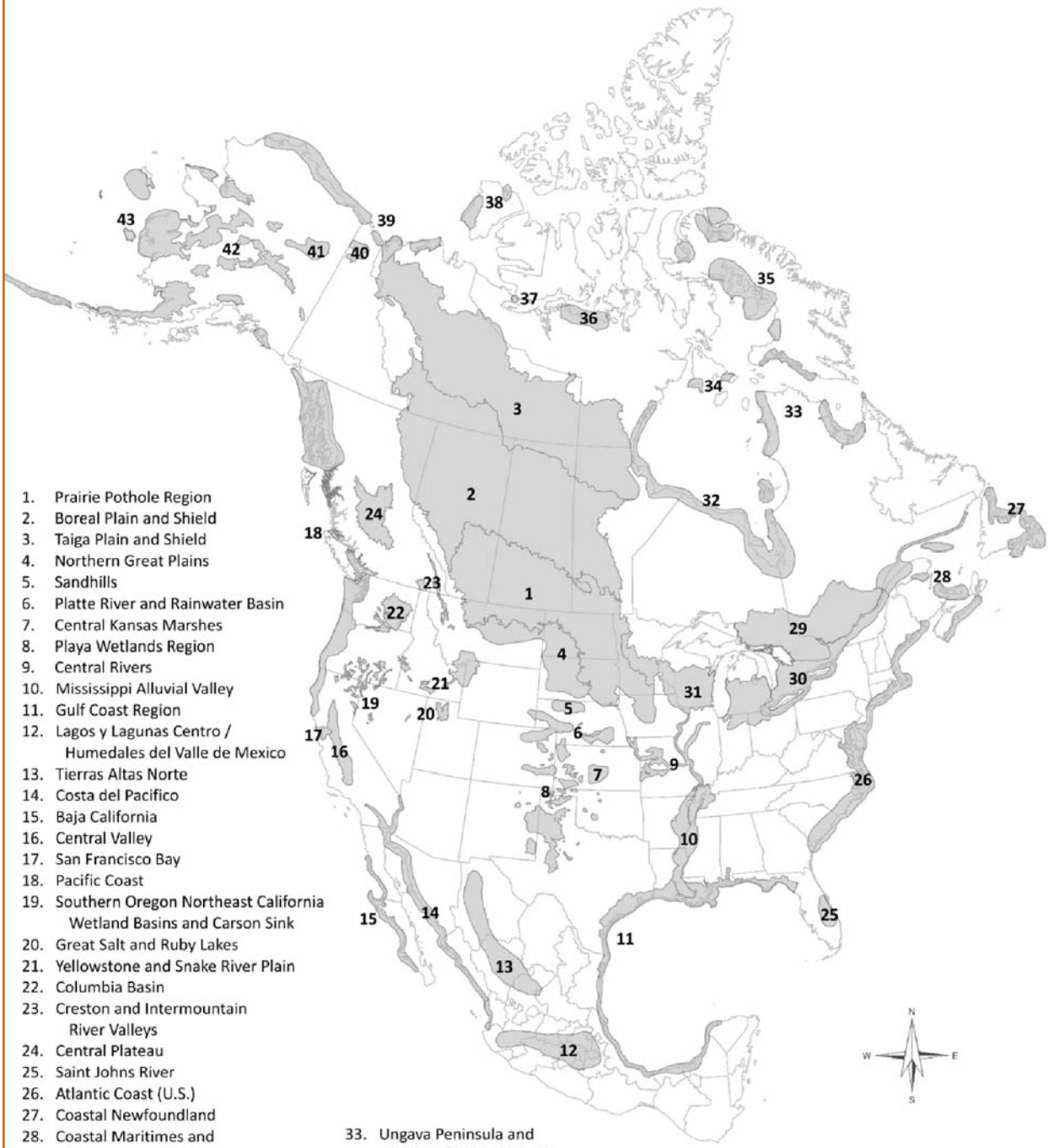
This revised map of areas most significant to North American waterfowl is a refinement of the image depicted in the 2004 NAWMP Update. It was prepared by the NAWMP Science Support Team (NSST) based on information provided by Joint Venture Coordinators, Joint Venture Science Coordinators, and NSST members. Entities proposing new areas or boundary adjustments were asked to provide rationale for why an area should be deemed continentally significant. Such information included the period(s) of the annual cycle during which an area was of particular importance, the percentage of a species' population supported by a given area during that annual cycle period, and/or the percentage of total North American waterfowl occurring in a given area during some period of the annual cycle.

Objective decision criteria for assessing "significance" to continental waterfowl populations were difficult to establish. For example, comparing the relative importance of smaller areas with high waterfowl densities to larger areas with abundant waterfowl at low densities was problematic. These comparisons became increasingly difficult when made among different periods of the annual cycle. Moreover, the quantity and reliability of population survey data varied among regions and proposals. In addition, some areas were identified as critical to a single species of high concern whereas others were deemed important because they were used by numerous species. Certain arid locations provide high value to waterfowl, but those values are inconsistent among years because of a highly variable environment (e.g., playa wetlands). Finally, the NSST recognized that additional areas of North America attract large numbers of waterfowl or species of concern but were not currently considered of great significance at the continental scale. In the future, some of these areas may be included (and others removed) as new information is used for map development.

In total, 40 adjustments were made to the 2004 map. Many were relatively minor boundary adjustments, but some changes were more substantial and included the following:

- Expansion of areas on Baffin Island, Newfoundland and coastal Quebec (key nesting, molting, and wintering areas for sea ducks)
- Removal of sites along coastal Labrador and the Canadian Pacific Coast (new evidence suggests other sites are more important for molting and wintering sea ducks)
- Addition of the "Central Rivers" and "Platte River" regions in the central United States (key migration areas for ducks and geese using the Mississippi and Central flyways)
- Addition of the "Prairie Hardwood Transition" (significant breeding, migration, and increasing wintering importance for ducks and Canada geese)
- Addition of Taiga Plain and Shield and expansion of Boreal Plain and Shield in north-central Canada (important breeding areas for several duck species, including sea ducks)
- Addition of high-density duck, goose and swan breeding areas in interior Alaska.
- Reconfiguration of the "Playa Wetlands Region" to reflect areas of highest wetland density and importance to non-breeding ducks and geese

Appendix B, Figure 1. Areas of greatest continental significance to North American ducks, geese, and swans



Appendix C

The 2010-2011 NAWMP Consultation Process: The "Valuing Objectives" Exercise

The consultation process included two rounds of stakeholder workshops in the United States and Canada and a related single event in Mexico. Participants included waterfowl managers, biologists, and administrators charged with waterfowl population management and habitat conservation. Consultations with federal, state, provincial and non-government organizations were held in late 2010 through February 2011[2].

During the first round of workshops, participants were asked to identify the goals (termed "fundamental objectives" in the workshops) of waterfowl management, and to develop hierarchies that identified step-down objectives necessary to achieve the goals. In most cases, the resulting diagrams depicted an interconnected system wherein goals were identified for both their intrinsic value and their utility for achieving another goal. In discussions, many participants asserted that the goals of waterfowl management are inextricably linked and cannot be pursued in isolation.

To help quantify the intrinsic value of each goal and the extent and nature of the linkages, an exercise was conducted in Round 2 workshops asking participants (N=91) first to allocate 100 points of "value" among four goals:

1. Perpetuate waterfowl hunting.
2. Sustain opportunities for the public to view and enjoy waterfowl and waterfowl landscapes.
3. Maintain healthy waterfowl populations in North America at levels sufficient to fulfill human desires and in harmony with the ecosystems on which waterfowl depend.
4. Conserve landscapes capable of sustaining waterfowl populations at levels sufficient to satisfy human desires in perpetuity.

Having done so, participants were then asked to allocate some portion of each goal's value to pre-designated linkages among goals (keeping the sum constant at 100 points). In effect, stakeholders were asked to specify the extent to which they valued each goal in its own right (intrinsic value), plus the goal's value relative to the degree it helped accomplish another goal (utility value). The results of this exercise are diagrammed below.

The figure depicts a linked system reflecting hierarchy diagrams and concepts gleaned from the consultation workshops; two initial goals, waterfowl hunting and waterfowl viewing/enjoyment, were subsequently combined into a single human use goal (#3 above) after this exercise, and the values for each of these and their linkages have therefore been summed in the figure here. Points in boxes represent the average values assigned to each goal and linkage by workshop participants. Sums of value points for each goal, both fundamental and those allocated to the utility flowing from one to another, are depicted in the summary box (e.g. Conserve Landscapes = 13 + 15 (A) + 11 (C) = 39).

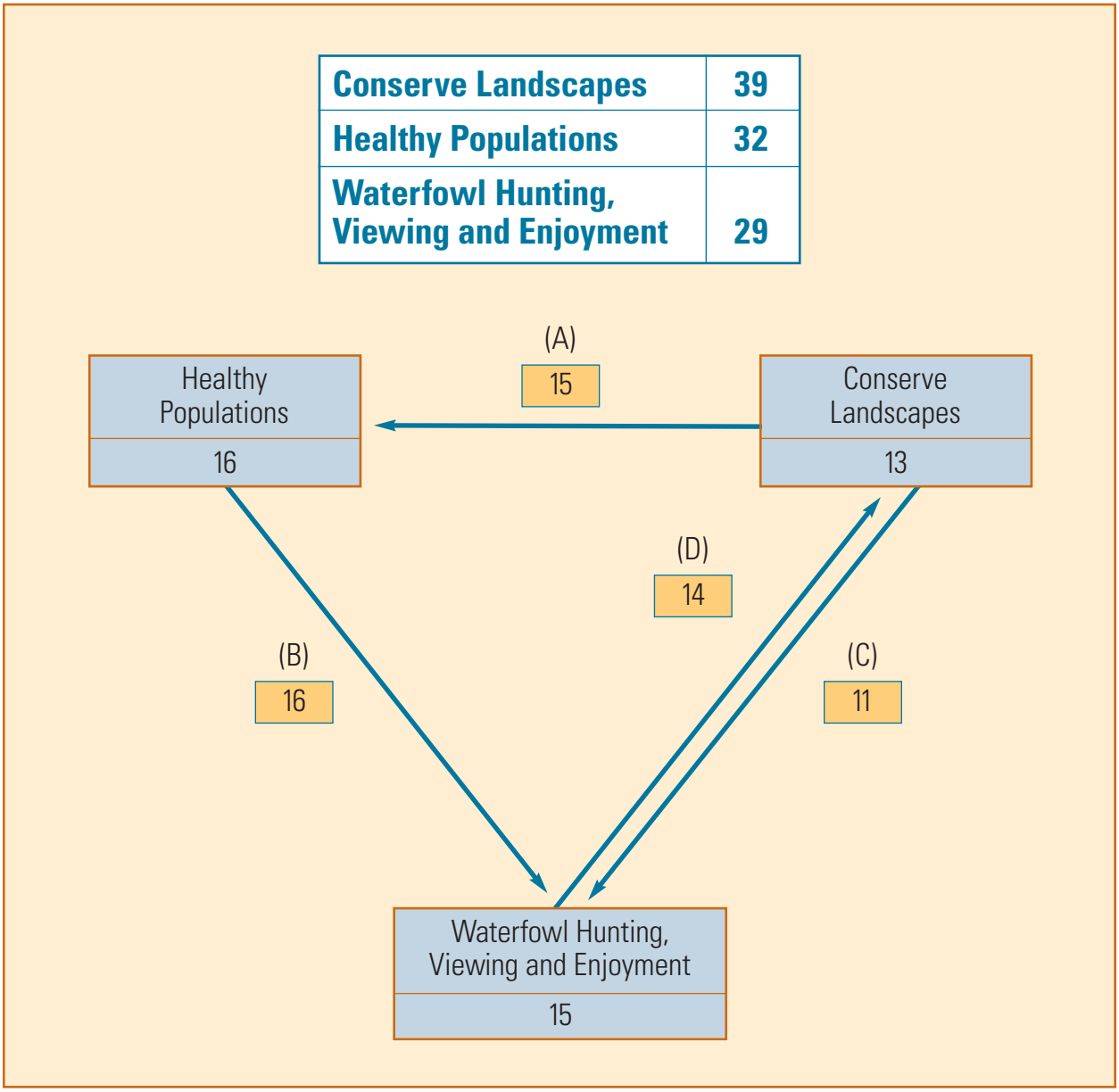
The utilities, reflected by arrows, convey the following relationships:

"A" represents the value that landscape conservation makes to healthy populations.

"B" reflects the value that healthy populations play in perpetuating waterfowl hunting, viewing and enjoyment.

"C" represents the value of conserving landscapes in helping to perpetuate waterfowl hunting, viewing and enjoyment.

"D" represents the role that waterfowl hunting, viewing and enjoyment play in helping conserve landscapes.



The results of this analysis were informative on several levels. Clearly, for many stakeholders, goals were not truly "fundamental" as characterized by independence of one another. Indeed, individual goals and the linkages between goals were weighted similarly when participant values were pooled. Similar intrinsic value was associated with "healthy populations" of waterfowl, with only slightly less value associated with "landscape conservation" and "waterfowl hunting and viewing." Yet the values associated with the linkages among goals were often almost as large as those associated with the fundamental goals themselves. Moreover, there is a marked directionality in these linkages.

For many stakeholders, conserving landscapes not only serves to provide places for people to hunt and enjoy the outdoors, but also is essential to sustain waterfowl populations at desired levels. Similarly, stakeholders view abundant and resilient waterfowl populations as a worthy fundamental goal, but also as a means to allow and sustain human use of the waterfowl resource. Closing the loop, waterfowl hunting and enjoyment is viewed as a desirable fundamental goal, but stakeholders equally recognize that this goal plays a key role in generating support and funding to conserve landscapes. While some stakeholders initially questioned the need for a more integrated framework for North American waterfowl management, this analysis was surprising for many participants in revealing their own beliefs about the strong linkages within the waterfowl management enterprise.

With nearly equal intrinsic values, it is important that the waterfowl management community devote adequate resources to addressing each goal and their sub-components. Moreover, the clear implication of strong linkages ***among*** goals is that the waterfowl management enterprise is absolutely dependent on achieving all three goals. Put another way, a failure to achieve any goal will have serious ramifications for success of the entire waterfowl management enterprise.

Appendix D

Acronyms Used in this Plan

AHM	Adaptive Harvest Management
AP	NAWMP Revision Action Plan
CRP	Conservation Reserve Program
CWS	Canadian Wildlife Service
EC	Environment Canada
ESA	Eastern Survey Area
GIS	Geographic Information Systems
HD	Human Dimensions
HDWG	Human Dimensions Working Group
HMWG	Harvest Management Working Group (formerly AHMWG – Adaptive Harvest Management Working Group)
ISC	Integration Steering Committee
ITT	Integration Technical Team
JTG	Joint Task Group
LCC	Landscape Conservation Cooperative
NAWCA	North American Wetlands Conservation Act
NAWCC	North American Wetlands Conservation Council
NAWMP	North American Waterfowl Management Plan
NGO	Non-government Organization
NSST	NAWMP Science Support Team
PC	NAWMP Plan Committee
RSC	Revision Steering Committee
SEMARNAT	Secretaria de Medio Ambiente Y Recursos Naturales, Mexico

TSA	Traditional Survey Area
USDA	U.S. Department of Agriculture
U.S. SEIS	U.S. Supplemental Environmental Impact Statement
USFWS	United States Fish and Wildlife Service
WMI	Wildlife Management Institute
WRP	Wetlands Reserve Program

Exhibit E

THE WILDLIFE SOCIETY

Leaders in Wildlife Science, Management and Conservation

POLICY BRIEF

Migratory Bird Treaty Act

In the early 20th century, many North American bird populations experienced rapid declines as a result of unregulated market hunting driven by high-demand for wild bird products in food and fashion. In an effort to reverse these trends, the United States and Great Britain (representing Canada) signed the Convention for the Protection of Migratory Birds in 1916.[1] Congress then passed the Migratory Bird Treaty Act (MBTA) in 1918 to implement the provisions of the convention, thus protecting native migratory birds in the U.S.

Methods

MBTA allows the United States to give effect to promises made in international treaties for the protection of migratory birds by serving as an authorizing device for implementing and amending regulations in the U.S. deemed necessary to protect migratory birds covered by the treaties.

The U.S. Fish & Wildlife Service (USFWS) is responsible for administering MBTA. USFWS can add or remove species from the list of protected migratory birds based on new taxonomy and/or new evidence of occurrence in the U.S.[2]

MBTA makes it "unlawful at any time, by any means or in any manner, to pursue, hunt, take, capture, kill, [or] sell…any migratory bird [or] any part, nest, or egg of any such bird," except as otherwise permitted by a valid permit. Permit exceptions exist for activities such as scientific collection, Native American ceremonies, and falconry.

MBTA also identifies certain migratory game birds for which the Secretary of Interior may establish hunting seasons. While MBTA lists approximately 170 game bird species, typically less than 60 of those species are hunted each year. For hunted species, USFWS promulgates annual regulations that establish a framework within which states can set hunting seasons. Since 1995, USFWS has adopted a concept known as Adaptive Harvest Management (AHM) for setting annual hunting regulations. AHM uses an iterative process to identify optimal harvest strategies based on environmental conditions and monitoring data that compares predicted and subsequently observed population sizes to enhance management performance.

Results

Since the original 1916 Convention with Great Britain/Canada, the U.S. has entered into similar agreements with Mexico in 1936, Japan in 1972, and the Soviet Union in 1976 (now Russia) for the protection of migratory birds. These treaties have led to protections for over 1,000 bird species through MBTA.[2]

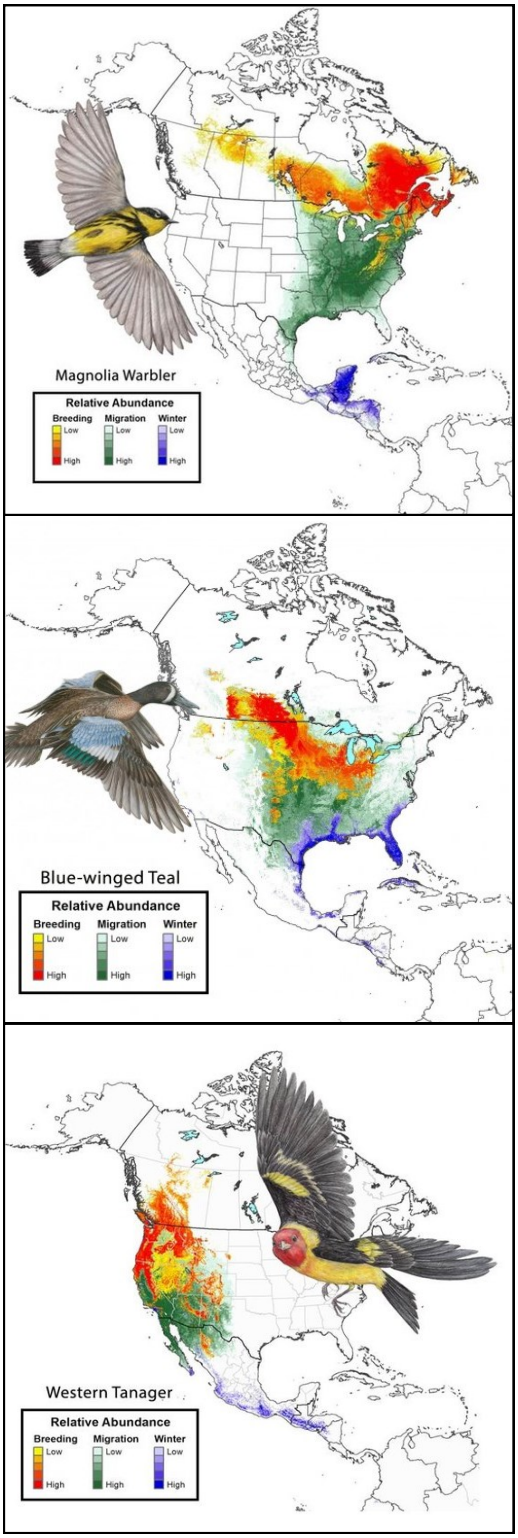
Discussion

Now nearly a century-old, MBTA is one of the nation's oldest and most significant environmental laws. Despite its age, however, MBTA still suffers from statutory ambiguity and unpredictable enforcement. Courts vary widely in how they interpret liability under the Act, and with no opportunity for individuals to bring a lawsuit under MBTA, USFWS has broad discretion in how they choose to enforce MBTA penalties.

Moreover, birds continue to face significant threats from the emergence of relatively new hazards—including feral cats, habitat loss/degredation, collisions with human structures, and agrochemicals—further raising questions as to the scope of MBTA and how it should be used to achieve migratory bird conservation in the 21st century.

Implications for Wildlife Professionals

While questions remain as to the applicability of MBTA in addressing modern threats to migratory birds, it remains an effective tool for regulating migratory bird hunting and controlling the illegal take of native bird species. Protections for birds provided under MBTA empower and enable wildlife professionals to sustainably manage both migratory and non-migratory native bird populations and their habitats.



Bird migration is the seasonal movement of a species from their breeding ranges to their wintering grounds—a trip that can span thousands of miles each year. MBTA plays a key role in protecting birds throughout their annual migration. (Credit: NABCI)

Migratory Bird Treaty Act: Spotlight



An eastern willet at the Nantucket National Wildlife Refuge, MA (Credit: Amanda Boyd, USFWS)

Eastern Willet Recovery[3]

In the late 19th and early 20th century, the eastern willet (*Tringa semipalmata*) was virtually eliminated along the northeast coast of the U.S. as a result of high-demand for both their eggs and meat. Following the passage of MBTA in 1918, the willet became a protected species, which outlawed the hunting, take, and sale of willets and their eggs or parts. This protection enabled the population to gradually recover. Eventually, the eastern willet reappeared in states along the east coast, arriving first to New Jersey in the 1950s and finally to New Hampshire in the 1980s. Today, in a testament to the effectiveness of MBTA in protecting migratory birds, the eastern willet now fully occupies its historic coastal range.

Wind Energy and MBTA[4,5]

In 2013, Duke Energy Renewables became the first corporation criminally convicted of unpermitted avian takings under MBTA. The corporation was involved in the death of 14 golden eagles and 149 other protected birds at two wind projects in Wyoming from 2009 to 2013. According to court rulings, the corporation failed to make all reasonable efforts to build the projects in a way that would avoid the risk of avian deaths by collision with turbine blades, despite prior warnings from USFWS. Currently, permitting under MBTA is only available for activities directed at migratory birds, thus there's no way for a developer to proactively avoid liability for an incidental take of a protected bird species. In May 2015, USFWS published a Notice of Intent to evaluate the potential environmental impacts of a proposal to authorize incidental take of migratory birds under MBTA—particularly in regards to some industry sectors including wind energy.



Golden eagle (Credit: Tony Hisgett, Flickr)



2016 State of North America's Birds Report (Credit: NABCI)

State of the Birds Report[6]

The State of North America's Birds Report was created by the North American Bird Conservation Initiative (NABCI), of which The Wildlife Society is a member. NABCI, created in 1999, is a tri-national effort of the United States, Canada, and Mexico to protect, restore, and enhance populations and habitats of North America's birds. The 2016 State of the Birds Report indicates that over one-third of all North America's bird species (432 of the 1,154 species) are in urgent need of conservation action. The report also depicts several conservation success stories for bird species, emphasizing the need to build on these successes and base policy decisions in sound science. MBTA plays a key role in integrating science into conservation action through an internationally coordinated management framework.

1. The Audubon Society. 2015. The Evolution of the Migratory Bird Treaty Act. <https://www.audubon.org/news/the-evolution-migratory-bird-treaty-act>. Accessed 26 August 2015.
2. Fish and Wildlife Service. 2013. 50 CFR Parts 10 and 21 General Provisions; Revised List of Migratory Birds; Final Rule. Federal Register, Washington, D.C., USA.
3. Smith, J. 2009. Conservation Success Story. Smithsonian Migratory Bird Center. <http://nationalzoo.si.edu/scbi/migratorybirds/featured_birds/?id=308>. Accessed 14 Oct 2014.
4. Department of Justice, Office of Public Affairs. 2013. Utility Company Sentenced in Wyoming for Killing Protected Birds at Wind Projects. <http://www.justice.gov/opa/pr/utility-company-sentenced-wyoming-killing-protected-birds-wind-projects>. Accessed 14 Oct 2014.
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6. North American Bird Conservation Initiative. 2016. The State of North America's Birds 2016. <http://www.stateofthebirds.org/2016/wp-content/uploads/2016/05/SoNAB-ENGLISH-web.pdf>. Accessed 18 April 2017.

The Wildlife Society 425 Barlow Place, Suite 200, Bethesda, MD 20814 policy@wildlife.org

Updated: July 2017

Exhibit F

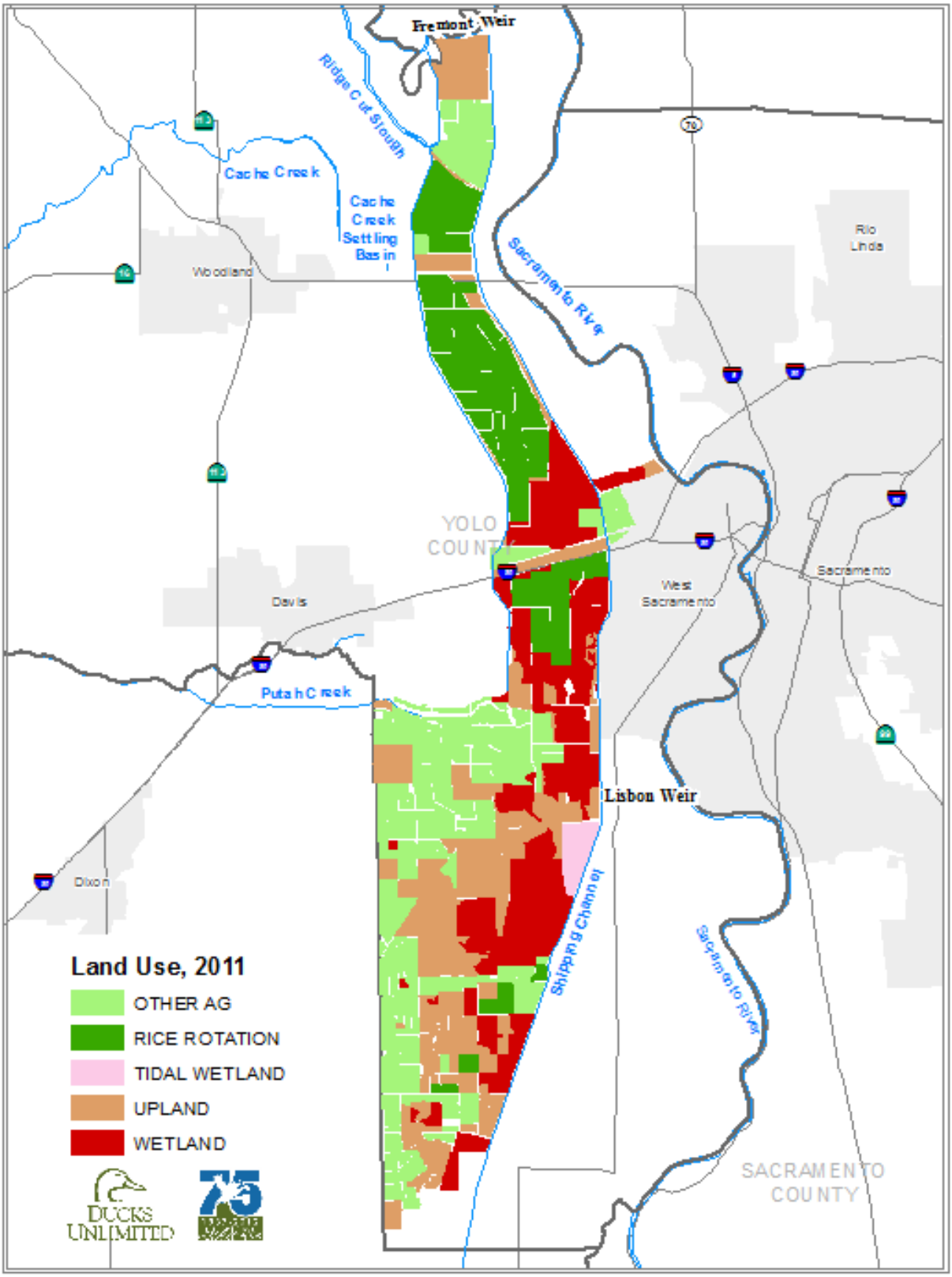


Figure 6. Updated wetland base in the Yolo Bypass, 2011

Exhibit G

NORTH AMERICAN WETLANDS CONSERVATION ACT

[Public Law 101–233, Approved Dec. 13, 1989, 103 Stat. 1968]

[As Amended Through P.L. 111–149, Enacted March 25, 2010]

AN ACT To conserve North American wetland ecosystems and waterfowl and the other migratory birds and fish and wildlife that depend upon such habitats.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. [16 U.S.C. 4401 note] SHORT TITLE.

This Act may be cited as the "North American Wetlands Conservation Act".

SEC. 2. [16 U.S.C. 4401] FINDINGS AND STATEMENT OF PURPOSE.

(a) FINDINGS.—The Congress finds and declares that—

(1) the maintenance of healthy populations of migratory birds in North America is dependent on the protection, restoration, and management of wetland ecosystems and associated habitats in Canada, as well as in the United States and Mexico;

(2) wetland ecosystems provide essential and significant habitat for fish, shellfish, and other wildlife of commercial, recreational, scientific, and aesthetic values;

(3) almost 35 per centum of all rare, threatened, and endangered species of animals are dependent on wetland ecosystems;

(4) wetland ecosystems provide substantial flood and storm control values and can obviate the need for expensive manmade control measures;

(5) wetland ecosystems make a significant contribution to water availability and quality, recharging ground water, filtering surface runoff, and providing waste treatment;

(6) wetland ecosystems provide aquatic areas important for recreational and aesthetic purposes;

(7) more than 50 per centum of the original wetlands in the United States alone have been lost;

(8) wetlands destruction, loss of nesting cover, and degradation of migration and wintering habitat have contributed to long-term downward trends in populations of migratory bird species such as pintails, American bitterns, and black ducks;

(9) the migratory bird treaty obligations of the United States with Canada, Mexico, and other countries require protection of wetlands that are used by migratory birds for breeding, wintering, or migration and are needed to achieve and to maintain optimun population levels, distributions, and patterns of migration;

(10) the 1988 amendments to the Fish and Wildlife Conservation Act of 1980 require the Secretary of the Interior to identify conservation measures to assure that nongame migratory bird species do not reach the point at which measures of the Endangered Species Act of 1973 are necessary;

(11) protection of migratory birds and their habitats requires long-term planning and the close cooperation and coordination of management activities by Canada, Mexico, and the United States within the framework of the 1916 and 1936 Migratory Bird Conventions and the Convention on Nature Protection and Wildlife Preservation in the Western Hemisphere;

(12) the North American Waterfowl Management Plan, signed in 1986 by the Minister of Environment for Canada and the Secretary of the Interior for the United States and in 1994 by the Secretary of Sedesol for Mexico, provides a framework for maintaining and restoring an adequate habitat base to ensure perpetuation of populations of North American waterfowl and other migratory bird species;

(13) a tripartite agreement signed in March 1988, by the Director General for Ecological Conservation of Natural Resources of Mexico, the Director of the Canadian Wildlife Service, and the Director of the United States Fish and Wildlife Service, provides for expanded cooperative efforts in Mexico to conserve wetlands for migratory birds that spend the winter there;

(14) the long-term conservation of migratory birds and habitat for these species will require the coordinated action of governments, private organizations, landowners, and other citizens; and

(15) the treaty obligations of the United States under the Convention on Wetlands of International Importance especially as waterfowl habitat requires promotion of conservation and wise use of wetlands.

(b) PURPOSE.—The purposes of this Act are to encourage partnership among public agencies and other interests—

(1) to protect, enhance, restore, and manage an appropriate distribution and diversity of wetland ecosystems and habitats associated with wetland ecosystems and other fish and wildlife in North America;

(2) to maintain current or improved distributions of wetland associated migratory bird populations; and

(3) to sustain an abundance of waterfowl and other wetland associated migratory birds consistent with the goals of the North American Waterfowl Management Plan, the United States Shorebird Conservation Plan, the North American Waterbird Conservation Plan, the Partners In Flight Conservation Plans, and the international obligations contained in the migratory bird treaties and conventions and other agreements with Canada, Mexico, and other countries.

SEC. 3. [16 U.S.C. 4402] DEFINITIONS.

For the purposes of this Act:

(1) The term "Agreement" means the Tripartite Agreement signed in March 1988, by the Director General for Ecological Conservation of Natural Resources of Mexico, the Director of the Canadian Wildlife Service, and the Director of the United States Fish and Wildlife Service.

(2) The term "appropriate Committees" means the Committee on Environment and Public Works of the United States Senate and the Committee on Resources of the House of Representatives.

(3) The term "flyway" means the four administrative units used by the United States Fish and Wildlife Service and the States in the management of waterfowl populations.

(4) The term "Migratory Bird Conservation Commission" means that commission established by section 2 of the Migratory Bird Conservation Act (16 U.S.C. 715a).

(5) The term "migratory birds" means all wild birds native to North America that are in an unconfined state and that are protected under the Migratory Bird Treaty Act, including ducks, geese, and swans of the family Anatidae, species listed as threatened or endangered under the Endangered Species Act of 1973 (16 U.S.C. 1531 et seq.), and species defined as nongame under the Fish and Wildlife Conservation Act of 1980 (16 U.S.C. 2901–2912).

(6) The term "Plan" means the North American Waterfowl Management Plan signed by the Minister of the Environment for Canada and the Secretary of the Interior for the United States in May 1986, and by the Secretary of Sedesol for Mexico in 1994, and subsequent dates.

(7) The term "Secretary" means the Secretary of the Interior.

(8) The term "State" means the State fish and wildlife agency, which shall be construed to mean any department, or any division of any department of another name, of a State that is empowered under its laws to exercise the functions ordinarily exercised by a State fish and wildlife agency.

(9) The term "wetlands conservation project" means—

(A) the obtaining of a real property interest in lands or waters, including water rights, of a wetland ecosystem and associated habitat if the obtaining of such interest is subject to terms and conditions that will ensure that the real property will be administered for the long-term conservation of such lands and waters and the migratory birds and other fish and wildlife dependent thereon;

(B) the restoration, management, or enhancement of wetland ecosystems and associated habitat for migratory birds and other fish and wildlife species if such restoration, management, or enhancement is conducted on lands and waters that are administered for the long-term conservation of such lands and waters and the migratory birds and other fish and wildlife dependent thereon; and

(C) in the case of projects undertaken in Mexico, includes technical training and development of infrastructure neessary for the conservation and management of

wetlands and studies on the sustainable use of wetland resources.

SEC. 4. [16 U.S.C. 4403] ESTABLISHMENT OF NORTH AMERICAN WETLANDS CONSERVATION COUNCIL.

(a) COUNCIL MEMBERSHIP.—(1) There shall be established a North American Wetlands Conservation Council (hereinafter in this Act referred to as the "Council") which shall consist of nine members who may not receive compensation as members of the Council. Of the Council members—

(A) one shall be the Director of the United States Fish and Wildlife Service, who shall be the responsible Federal official for ensuring Council compliance with the National Environmental Policy Act of 1969 (42 U.S.C. 4321 et seq.) [1];

(B) one shall be the Secretary of the Board of the National Fish and Wildlife Foundation appointed pursuant to section 3(g)(2)(B) of the National Fish and Wildlife Foundation Establishment Act (16 U.S.C. 3702);

(C) four shall be individuals who shall be appointed by the Secretary, who shall reside in different flyways and who shall each be a Director of the State fish and wildlife agency; and

(D) three shall be individuals who shall be appointed by the Secretary and who shall each represent a different charitable and nonprofit organization which is actively participating in carrying out wetlands conservation projects under this Act, the Plan, or the Agreement.

The provisions of Public Law 92–463, as amended, shall not apply to the Council.

(2) The Secretary shall appoint an alternate member of the Council who shall be knowledgeable and experienced in matters relating to fish, wildlife, and wetlands conservation and who shall perform the duties of a Council member appointed under subsection (a)(1)(C) or subsection (a)(1)(D) of this section—

(A) until a vacancy referred to in subsection (b)(4) of this section is filled; or

(B) in the event of the anticipated absence of such a member from any meeting of the Council.

(b) APPOINTMENT AND TERMS.—(1) Except as provided in paragraphs (2) and (3), the term of office of a member of the Council appointed under subsections (a)(1)(C) and (a)(1)(D) of this section is three years.

(2) Of the Council members first appointed under subsection (a)(1)(C) of this section after the date of enactment of this Act, one shall be appointed for a term of one year, one shall be appointed for a term of two years, and two shall be appointed for a term of three years.

(3) Of the Council members first appointed under subsection (a)(1)(D) of this section after the date of enactment of this Act, one shall be appointed for a term of one year, one shall be appointed

[1] The amendment made by section 112(1) of Public Law 101–593 (104 Stat. 2962) to insert ", who shall be the responsible Federal official for ensuring Council compliance with the National Environmental Policy Act of 1969 (42 U.S.C. 4321 et seq.)" after "Service" and before the period was inserted after "Service" and before the semicolon to reflect the probable intent of Congress.

for a term of two years, and one shall be appointed for a term of three years.

(4) Whenever a vacancy occurs among members of the Council appointed under subsection (a)(1)(C) or subsection (a)(1)(D) of this section, the Secretary shall appoint an individual in accordance with either such subsection to fill that vacancy for the remainder of the applicable term.

(c) EX OFFICIO COUNCIL MEMBERS.—The Secretary is authorized and encouraged to include as ex officio nonvoting members of the Council representatives of—

(1) the Federal, provincial, territorial, or State government agencies of Canada and Mexico, which are participating actively in carrying out one or more wetlands conservation projects under this Act, the Plan, or the Agreement;

(2) the Environmental Protection Agency and other appropriate Federal agencies, in addition to the United States Fish and Wildlife Service, which are participating actively in carrying out one or more wetlands conservation projects under this Act, the Plan, or the Agreement; and

(3) nonprofit charitable organizations and Native American interests, including tribal organizations, which are participating actively in one or more wetlands conservation projects under this Act, the Plan, or the Agreement.

(d) CHAIRMAN.—The Chairman shall be elected by the Council from its members for a three-year term, except that the first elected Chairman may serve a term of less than three years.

(e) QUORUM.—A majority of the current membership of the Council shall constitute a quorum for the transaction of business.

(f) MEETINGS.—The Council shall meet at the call of the Chairman at least once a year. Council meetings shall be open to the public, and the Chairman shall take appropriate steps to provide adequate notice to the public of the time and place of such meetings. If a Council member appointed under subsection (a)(1)(C) or (a)(1)(D) of this section misses three consecutive regularly scheduled meetings, the Secretary may remove that individual in accordance with subsection (b)(4).

(g) COORDINATOR.—The Director of the United States Fish and Wildlife Service shall appoint an individual who shall serve at the pleasure of the Director and—

(1) who shall be educated and experienced in the principles of fish, wildlife, and wetlands conservation;

(2) who shall be responsible, with assistance from the United States Fish and Wildlife Service, for facilitating consideration of wetlands conservation projects by the Council and otherwise assisting the Council in carrying out its responsibilities under this Act; and

(3) who shall be compensated with the funds available under section 8(a)(1) for administering this Act.

SEC. 5. [16 U.S.C. 4404] APPROVAL OF WETLANDS CONSERVATION PROJECTS.

(a) CONSIDERATION BY THE COUNCIL.—The Council shall recommend wetlands conservation projects to the Migratory Bird Conservation Commission based on consideration of—

(1) the extent to which the wetlands conservation project fulfills the purposes of this Act, the Plan, or the Agreement;

(2) the availability of sufficient non-Federal moneys to carry out any wetlands conservation project and to match Federal contributions in accordance with the requirements of section 8(b) of this Act;

(3) the extent to which any wetlands conservation project represents a partnership among public agencies and private entities;

(4) the consistency of any wetlands conservation project in the United States with the National Wetlands Priority Conservation Plan developed under section 301 of the Emergency Wetlands Resources Act (16 U.S.C. 3921);

(5) the extent to which any wetlands conservation project would aid the conservation of migratory nongame birds, other fish and wildlife and species that are listed, or are candidates to be listed, as threatened and endangered under the Endangered Species Act of 1973 (16 U.S.C. 1531 et seq.);

(6) the substantiality of the character and design of the wetlands conservation project; and

(7) the recommendations of any partnerships among public agencies and private entities in Canada, Mexico, or the United States which are participating actively in carrying out one or more wetlands conservation projects under this Act, the Plan, or the Agreement.

(b) RECOMMENDATIONS TO THE MIGRATORY BIRD CONSERVATION COMMISSION.—The Council shall submit to the Migratory Bird Conservation Commission each year a description, including estimated costs, of the wetlands conservation projects which the Council has considered under subsection (a) of this section and which it recommends, in order of priority, that the Migratory Bird Conservation Commission approve for Federal funding under this Act and section 3(b) of the Act of September 2, 1937 (16 U.S.C. 669b(b)), as amended by this Act. Solely for the purpose of the National Environmental Policy Act of 1969 (42 U.S.C. 4321 et seq.), recommendations by the Council for carrying out wetlands conservation projects under section 6(a) of this Act shall be considered Federal actions requiring the preparation of environmental assessments or, where appropriate, environmental impact statements.

(c) COUNCIL PROCEDURES.—The Council shall establish practices and procedures for the carrying out of its functions under subsections (a) and (b) of this section. The procedures shall include requirements that—

(1) a quorum of the Council must be present before any business may be transacted; and

(2) no recommendations referred to in subsection (b) of this section may be adopted by the Council except by the vote of two-thirds of all members present and voting.

(d) COUNCIL REPRESENTATION ON MIGRATORY BIRD CONSERVATION COMMISSION.—The Chairman of the Council shall select 2 Council members of the United States citizenship to serve with the Chairman as ex officio members of the Migratory Bird Conservation Commission for the purposes of considering and voting upon wetlands conservation projects recommended by the Council.

(e) APPROVAL OF COUNCIL RECOMMENDATIONS BY THE MIGRATORY BIRD CONSERVATION COMMISSION.—The Migratory Bird Convention Commission, along with the two members of the Council referred to in subsection (d) of this section, shall approve, reject or reorder the priority of any wetlands conservation projects recommended by the Council based on, to the greatest extent practicable, the criteria of subsection (a) of this section. If the Migratory Bird Conservation Commission approves any wetlands conservation project, Federal funding shall be made available under this Act and section 3(b) of the Act of September 2, 1937 (16 U.S.C. 669b(b)), as amended by this Act. If the Migratory Bird Conservation Commission rejects or reorders the priority of any wetlands conservation project recommended by the Council, the Migratory Bird Conservation Commission shall provide the Council and the appropriate Committees with a written statement explaining its rationale for the rejection or the priority modification.

(f) NOTIFICATION OF APPROPRIATE COMMITTEES.—The Migratory Bird Conservation Commission shall submit annually to the appropriate Committees a report including a list and description of the wetlands conservation projects approved by the Migratory Bird Conservation Commission for Federal funding under subsection (e) of this section in order of priority; the amounts and sources of Federal and non-Federal funding for such projects; a justification for the approval of such projects and the order of priority for funding such projects; a list and description of the wetlands conservation projects which the Council recommended, in order of priority that the Migratory Bird Conservation Commission approve for Federal funding; and a justification for any rejection or re-ordering of the priority of wetlands conservation projects recommended by the Council that was based on factors other than the criteria of section 5(a) of this Act.

SEC. 6. [16 U.S.C. 4405] CONDITIONS RELATING TO WETLANDS CONSERVATION PROJECTS.

(a) PROJECTS IN THE UNITED STATES.—(1) Subject to the allocation requirements of section 8(a)(2) and the limitations on Federal contributions under section 8(b) of this Act, the Secretary shall assist in carrying out wetlands conservation projects in the United States, which have been approved by the Migratory Bird Conservation Commission, with the Federal funds made available under this Act and section 3(b) of the Act of September 2, 1937 (16 U.S.C. 669b(b)), as amended by this Act.

(2) Except as provided in paragraph (3), any lands or waters or interests therein acquired in whole or in part by the Secretary with the Federal funds made available under this Act and section 3(b) of the Act of September 2, 1937 (16 U.S.C. 669b(b)), as amended by this Act, to carry out wetlands conservation projects shall be included in the National Wildlife Refuge System.

(3) In lieu of including in the National Wildlife Refuge System any lands or waters or interests therein acquired under this Act, the Secretary may, with the concurrence of the Migratory Bird Conservation Commission, grant or otherwise provide the Federal funds made available under this Act and section 3(b) of the Act of September 2, 1937 (16 U.S.C. 669b(b)), as amended by this Act or convey any real property interest acquired in whole or in part with

such funds without cost to a State or to another public agency or other entity upon a finding by the Secretary that the real property interests should not be included in the National Wildlife Refuge System: *Provided,* That any grant recipient shall have been so identified in the project description accompanying the recommendation from the Council and approved by the Migratory Bird Conservation Commission. The Secretary shall not convey any such interest to a State, another public agency or other entity unless the Secretary determines that such State, agency or other entity is committed to undertake the management of the property being transferred in accordance with the objectives of this Act, and the deed or other instrument of transfer contains provisions for the reversion of title to the property to the United States if such State, agency or other entity fails to manage the property in accordance with the objectives of this Act. Any real property interest conveyed pursuant to this paragraph shall be subject to such terms and conditions that will ensure that the interest will be administered for the long-term conservation and management of the wetland ecosystem and the fish and wildlife dependent thereon.

(b) PROJECTS IN CANADA OR MEXICO.—Subject to the allocation requirements of section 8(a)(1) and the limitations on Federal contributions under section 8(b) of this Act, the Secretary shall grant or otherwise provide the Federal funds made available under this Act and section 3(b) of the Act of September 2, 1937 (16 U.S.C. 669b(b)), as amended by this Act, to public agencies and other entities for the purpose of assisting such entities and individuals in carrying out wetlands conservation projects in Canada or Mexico that have been approved by the Migratory Bird Conservation Commission: *Provided,* That the grant recipient shall have been so identified in the project description accompanying the recommendation from the Council and approved by Migratory Bird Conservation Commission. The Secretary may only grant or otherwise provide Federal funds if the grant is subject to the terms and conditions that will ensure that any real property interest acquired in whole or in part, or enhanced, managed, or restored with such Federal funds will be administered for the long-term conservation and management of such wetland ecosystem and the fish and wildlife dependent thereon. Real property and interests in real property acquired pursuant to this subsection shall not become part of the National Wildlife Refuge System. Acquisitions of real property and interests in real property carried out pursuant to this subsection shall not be subject to any provision of Federal law governing acquisitions of property for inclusion in the National Wildlife Refuge System.

SEC. 7. [16 U.S.C. 4406] AMOUNTS AVAILABLE TO CARRY OUT THIS ACT.

(a) AID IN WILDLIFE RESTORATION.—(1) [Amends section 3 of the Act of September 2, 1937]

(2) [Amends section 4(a) of the Act of September 2, 1937]

(3) The amendments made by this subsection of this Act take effect October 1, 1989.

(b) MIGRATORY BIRD FINES, PENALTIES, FORFEITURES.—The sums received under section 6 of the Migratory Bird Treaty Act (16 U.S.C. 707) as penalties or fines, or from forfeitures of property are

authorized to be appropriated to the Department of the Interior for purposes of allocation under section 8 of this Act. This subsection shall not be construed to require the sale of instrumentalities.

(c) AUTHORIZATION OF APPROPRIATIONS.—In addition to the amounts made available under subsections (a) and (b) of this section, there are authorized to be appropriated to the Department of the Interior for purposes of allocation under section 8 of this Act not to exceed—

(1) $55,000,000 for fiscal year 2003;
(2) $60,000,000 for fiscal year 2004;
(3) $65,000,000 for fiscal year 2005;
(4) $70,000,000 for fiscal year 2006; and
(5) $75,000,000 for each of fiscal years 2008 through 2012.

(d) AVAILABILITY OF FUNDS.—Sums made available under this section shall be available until expended.

SEC. 8. [16 U.S.C. 4407] ALLOCATION OF AMOUNTS AVAILABLE TO CARRY OUT THIS ACT.

(a) ALLOCATIONS.—Of the sums available to the Secretary for any fiscal year under this Act and section 3(b) of the Federal Aid in Wildlife Restoration Act (16 U.S.C. 669b(b)), as amended by this Act—

(1) such percentage of that sum (but at least 30 percent and not more than 60 percent) as is considered appropriate by the Secretary, which can be matched with non-Federal moneys in accordance with the requirements of subsection (b) of this section, less such amount (but not more than 4 percent of such percentage) considered necessary by the Secretary to defray the costs of administering this Act during such fiscal year, shall be allocated by the Secretary to carry out approved wetlands conservation projects in Canada and Mexico in accordance with section 6(b) of this Act; and

(2) the remainder of such sum after paragraph (1) is applied (but at least 40 percent and not more than 70 percent), which can be matched with non-Federal moneys in accordance with the requirements of subsection (b) of this section, shall be allocated by the Secretary to carry out approved wetlands conservation projects in the United States in accordance with section 6(a) of this Act.

(b) COST SHARING.—(1) Except as provided in paragraph (2), as a condition of providing assistance under this Act for any approved wetlands conservation project, the Secretary shall require that the portion of the costs of the project paid with amounts provided by non-Federal United States sources is equal to at least the amount allocated under subsection (a) that is used for the project.

(2) Federal moneys allocated under subsection (a) may be used to pay 100 percent of the costs of such projects located on Federal lands and waters, including the acquisition of inholdings within such lands and waters.

(3) The non-Federal share of the United States contribution to the costs of such projects may not be derived from Federal grant programs. In the case of a project carried out in Canada or Mexico, the non-Federal share of the costs of the project may include cash contributions from non-United States sources that are used to pay costs of the project. In the case of a project carried out in Canada,

funds from Canadian sources may comprise up to 50 percent of the non-Federal share of the costs of the project.

(c) PARTIAL PAYMENTS.—(1) The Secretary may from time to time make payments to carry out approved wetlands conservation projects as such projects progress, but such payments, including previous payments, if any, shall not be more than the Federal pro rata share of any such project in conformity with subsection (b) of this section.

(2) The Secretary may enter into agreements to make payments on an initial portion of an approved wetlands conservation project and to agree to make payments on the remaining Federal share of the costs of such project from subsequent allocations if and when they become available. The liability of the United States under such an agreement is contingent upon the continued availability of funds for the purposes of this Act.

SEC. 9. [16 U.S.C. 4408] RESTORATION, MANAGEMENT, AND PROTECTION OF WETLANDS AND HABITAT FOR MIGRATORY BIRDS ON FEDERAL LANDS.

The head of each Federal agency responsible for acquiring, managing, or disposing of Federal lands and waters shall, to the extent consistent with the mission of such agency and existing statutory authorities, cooperate with the Director of the United States Fish and Wildlife Service to restore, protect, and enhance the wetland ecosystems and other habitats for migratory birds, fish, and wildlife within the lands and waters of each such agency.

SEC. 10. [16 U.S.C. 4409] REPORT TO CONGRESS.

The Secretary shall report to the appropriate Committees on the implementation of this Act. The report shall include—

(1) a biennial assessment of—

(A) the estimated number of acres of wetlands and habitat for waterfowl and other migratory birds that were restored, protected, or enhanced during such two-year period by Federal, State, and local agencies and other entities in the United States, Canada, and Mexico;

(B) trends in the population size and distribution of North American migratory birds;

(C) the status of efforts to establish agreements with nations in the Western Hemisphere pursuant to section 16; and

(D) wetlands conservation projects funded under this Act, listed and identified by type, conservation mechanism (such as acquisition, easement, or lease), location, and duration; and

(2) an annual assessment of the status of wetlands conservation projects, including an accounting of expenditures by Federal, State, and other United States entities, and expenditures by Canadian and Mexican sources to carry out these projects.

SEC. 11. [16 U.S.C. 4410] REVISIONS TO THE PLAN.

The Secretary shall, in 1998 and at five-year intervals thereafter, undertake with the appropriate officials in Canada and Mexico to revise the goals and other elements of the Plan in accordance

with the information required under section 10 and with the other provisions of this Act.

SEC. 12. [16 U.S.C. 4411] RELATIONSHIP TO OTHER AUTHORITIES.

(a) ACQUISITION OF LANDS AND WATERS.—Nothing in this Act affects, alters, or modifies the Secretary's authorities, responsibilities, obligations, or powers to acquire lands or waters or interests therein under any other statute.

(b) MITIGATION.—The Federal funds made available under this Act and section 3(b) of the Act of September 2, 1937 (16 U.S.C. 669b(b)), as amended by this Act, may not be used for fish and wildlife mitigation purposes under the Fish and Wildlife Coordination Act (16 U.S.C. 661 et seq.) or the Water Resources Development Act of 1986, Public Law 99–662 (1986), 100 Stat. 4235.

SEC. 13. ADDITION OF EPA ADMINISTRATOR TO MIGRATORY BIRD CONSERVATION COMMISSION.

[Amends section 2 of the Migratory Bird Conservation Act]

SEC. 14. [16 U.S.C. 4412] LIMITATION ON ASSESSMENTS AGAINST MIGRATORY BIRD CONSERVATION FUND.

Notwithstanding any other provision of law, only those personnel and administrative costs directly related to acquisition of real property shall be levied against the Migratory Bird Conservation Account.

SEC. 15. TECHNICAL AND CONFORMING AMENDMENTS TO THE MIGRATORY BIRD TREATY ACT.

[Amends section 2 of the Migratory Bird Treaty Act]

SEC. 16. OTHER AGREEMENTS.

(a) [16 U.S.C. 4413] The Secretary shall undertake with the appropriate officials of nations in the Western Hemisphere to establish agreements, modeled after the Plan or the Agreement, for the protection of migratory birds identified in section 13(a)(5) of the Fish and Wildlife Conservation Act of 1980 (16 U.S.C. 2912(a)). When any such agreements are reached, the Secretary shall make recommendations to the appropriate Committees on legislation necessary to implement the agreements.

(b) [Amends section 13(a) of the Fish and Wildlife Conservation Act]

SEC. 17. TO EXPAND THE BOGUE CHITTO NATIONAL WILDLIFE REFUGE.

[Amends sections 3(b) and 5(a) of the Act entitled "An Act to establish the Bogue Chitto National Wildlife Refuge" (Public Law 96–288; 94 Stat. 603)]

SEC. 18. WETLANDS ASSESSMENTS.

(a) [Amends section 401(a) of the Emergency Wetlands Resources Act of 1986]

(b) [Amends section 401 of the Emergency Wetlands Resources Act of 1986]

SEC. 19. [16 U.S.C. 4414] ASSESSMENT OF PROGRESS IN WETLANDS CONSERVATION.

Not later than January 31, 1996, the Secretary, in cooperation with the Council, to further the purposes of the Act shall—

(1) develop and implement a strategy to assist in the implementation of this Act in conserving the full complement of North American wetlands systems and species dependent on those systems, that incorporates information existing on the date of the issuance of the strategy in final form on types of wetlands habitats and species dependent on the habitats; and

(2) develop and implement procedures to monitor and evaluate the effectiveness of wetlands conservation projects completed under this Act.

EXHIBIT H

Yolo Basin Foundation Scoping Documents, 2008 – 2014

Attachments: ***[not all following documents attached]***

Yolo Bypass Restoration Concepts and Priority Projects Memo, 3/31/14

Yolo Basin Foundation Comments on Public Draft of the Bay Delta Conservation Plan (BDCP), 7/29/14

Assurances for Value Report Email, 8/28/14

Scoping Comments of Yolo Basin Foundation for the Delta Plan Memo, 1/26/11

Lower Yolo Bypass Planning Forum and Conservation Measures Letter, 5/7/20

A Framework for the Future: Yolo Bypass Management Strategy – Chap. 3: Assurances Sought by Stakeholders for Habitat Enhancement Activities

2013 Yolo Basin Foundation Board Roster

2013 Yolo Bypass Stakeholder Groups

Yolo Basin Foundation Comments on Delta Plan EIR, 2/1/12

Yolo Basin Foundation Bay Delta Conservation Plan Davis Enterprise Op-Ed, 4/26/09

Yolo Basin Foundation Comments on BDCP Habitat Conservation Measure

Yolo Basin Foundation Comments for BDCP Scoping Meeting: Land Use Questions Related to Fremont Weir Modification, 3/18/09

Yolo Basin Foundation Workshop Comments: Delta Vision Strategic Plan of the Delta Vision Blue Ribbon Task Force, 12/5/08

Knaggs Ranch, LLC
Conaway Preservation Group, LLC
David and Alice te Velde Trust
Yolo Basin Foundation

March 31, 2014

David Murillo – Regional Director
Bureau of Reclamation
2800 Cottage Way
Sacramento, CA 95825-1898

RE: Yolo Bypass Restoration Concepts and Priority Projects

Dear Mr. Murillo,

We represent a group of Yolo Bypass landowners and other stakeholders that would be impacted by the restoration work that may occur as a result of the Bureau planning process. We are active participants in the many Bypass planning efforts. We are all interested in proposing and participating in future efforts that will address fisheries, agriculture, managed wetlands, water quality, recreation, and education activities in the Bypass. We are writing you to outline the core concepts that we believe will guide successful restoration activities within the Bypass. This letter also briefly describes two high priority fisheries projects that are excellent candidates for early implementation. Other drainage-related projects are identified in the Yolo Bypass Drainage and Infrastructure Study.

We envision a series of projects with the following characteristics:

- Flood neutral
- Existing land uses
- Defined footprint
- Improved drainage
- Incremental project implementation
- Local governance for long term operations and management
- Adaptive management

Flood neutral: Any restoration actions or structures established in the Yolo Bypass must be flood neutral. There can be no adverse impacts on flood carrying capacity in the Bypass as a result of new structures, changes in drainage, retention of floodwaters, or from changes in vegetation management practices.

Existing land uses: Any proposed restoration activities in the Bypass should retain current land uses, including agriculture and managed habitat. Maintenance of a vibrant and profitable agriculture economy is important for the livelihood of people in Yolo County. Tens of millions of dollars have been invested in creating and improving managed wetlands on thousands of acres of private land in the Bypass and in the Yolo Bypass Wildlife Area. There are thousands of acres of habitat encumbered with long-term state and federal easements.

Managed floodplain with a defined footprint: The Yolo Bypass flood protection role is the highest priority. However, we believe that water on the descending end of the flood hydrograph can be retained to create a shallow, highly productive salmonid rearing habitat during the months of January through early March. This managed floodplain can provide significant biological benefits to listed fish species without adversely affecting flood carrying capacity, agricultural and wetlands management.

Improved drainage: Given the elevation of the lower Bypass relative to river and tidal elevations, flow capacity of the channels that return waters to the river must be evaluated and improved to enhance drainage times. This is especially important in the spring when fields must be prepared for planting of crops and germination of forage and nesting vegetation begins. The Yolo Bypass Drainage and Infrastructure Study describes many potential projects.

Incremental project implementation: Projects that vary in scale are being proposed to address fish habitat needs in the Bypass. We suggest that these projects be evaluated to determine impacts to existing land uses and then prioritized. Projects with broad support could then be initiated in the short term.

Local control of operations and management: Operation of managed flow, water retention, large water delivery and drainage canals, and flood control structures should be coordinated by an organization consisting of public agencies, private property owners and nonprofit organizations. This new entity could be structured similarly to the Lower Putah Creek Coordinating Committee that was created by the Putah Creek Accord. The proposed local entity could appoint a Yolo Bypass Keeper to coordinate operations, maintenance, and restoration activities.

Projects should be maintained as part of a Yolo Bypass-wide drainage and infrastructure system as proposed in the Yolo Bypass Drainage and Infrastructure Study.

Adaptive management: We strongly endorse the adaptive management approach for implementing projects in the Yolo Bypass. As each project comes on line and operations continue, adaptive management will function to ensure that biological impacts within the direct project area and downstream will be carefully monitored and information will be utilized to modify operations to further improve outcomes.

There are many potential early implementation projects. The two we recommend as high priorities are: Upper Tule Canal Fish Passage and Floodplain Habitat Project and the Putah Creek Re-alignment Project.

1. **Upper Tule Canal Fish Passage and Floodplain Habitat Project** will remove migratory obstacles in the upper Tule Canal from just below Fremont Weir downstream to Interstate 5. Rearing of juvenile salmon for improved size and body condition will be managed by utilizing 130 acres of rice land on the Knaggs and te Velde ranches adjacent to the upper Tule Canal for off-channel habitat to extend the duration of shallow flooding after the Fremont Weir stops spilling. Bridge culverts will be upgraded to prevent post-flood stranding of adult sturgeon and salmonids in the upper Tule Canal. These upgraded crossings will be

outfitted with operable screw-gates, which will allow managers to move floodwater on and off of the off-channel floodplain habitat.

2. **Re-alignment of Putah Creek Project** will create approximately 6 miles of new channel from the upstream boundary of the Yolo Bypass Wildlife Area to the tidal habitat adjacent to the Toe Drain. The project will improve salmon passage up Putah Creek to spawning habitat below the Putah Diversion Dam near Winters. The new channel will bypass the Los Rios check dam that creates an obstacle to up-migrating adult and out-migrating young salmon. The re-aligned channel will provide improved shallow floodplain rearing habitat adjacent to the Toe Drain. Yolo Basin Foundation is managing an Ecosystem Restoration Grant from CA Department of Fish and Wildlife (Grant #E11830115) to prepare the CEQA analysis and design/bid documents for the project.

The guidelines and proposed projects described in this letter are the result of discussions among the represented landowners and other stakeholders. We have a long-term, active commitment to ensure productive management of the Bypass to benefit flood control, agriculture, fish and wildlife habitat, education and recreation. We look forward to working collaboratively with the Bureau of Reclamation and other agencies to improve the many uses of the Yolo Bypass.

Sincerely,

John Brennan
Partner
Knaggs Ranch, LLC

David te Velde
Principal
David and Alice te Velde Trust

Robin Kulakow
Executive Director
Yolo Basin Foundation

Kyriakos Tsakopoulos
President & CEO
AKT Development Corporation
On Behalf of
Conaway Ranch Preservation Group, L.L.C.

Enclosure:
Yolo Bypass Land Ownership Map

CC:

Don Saylor - Board of Supervisors, Yolo County
Matt Rexroad – Board of Supervisors, Yolo County
Jim Provenza – Board of Supervisors, Yolo County
Duane Chamberlin – Board of Supervisors, Yolo County
Oscar Villegas - Board of Supervisors, Yolo County
James Gallagher – Board of Supervisors, Sutter County
Bill Emien – Board of Supervisors, Solano County

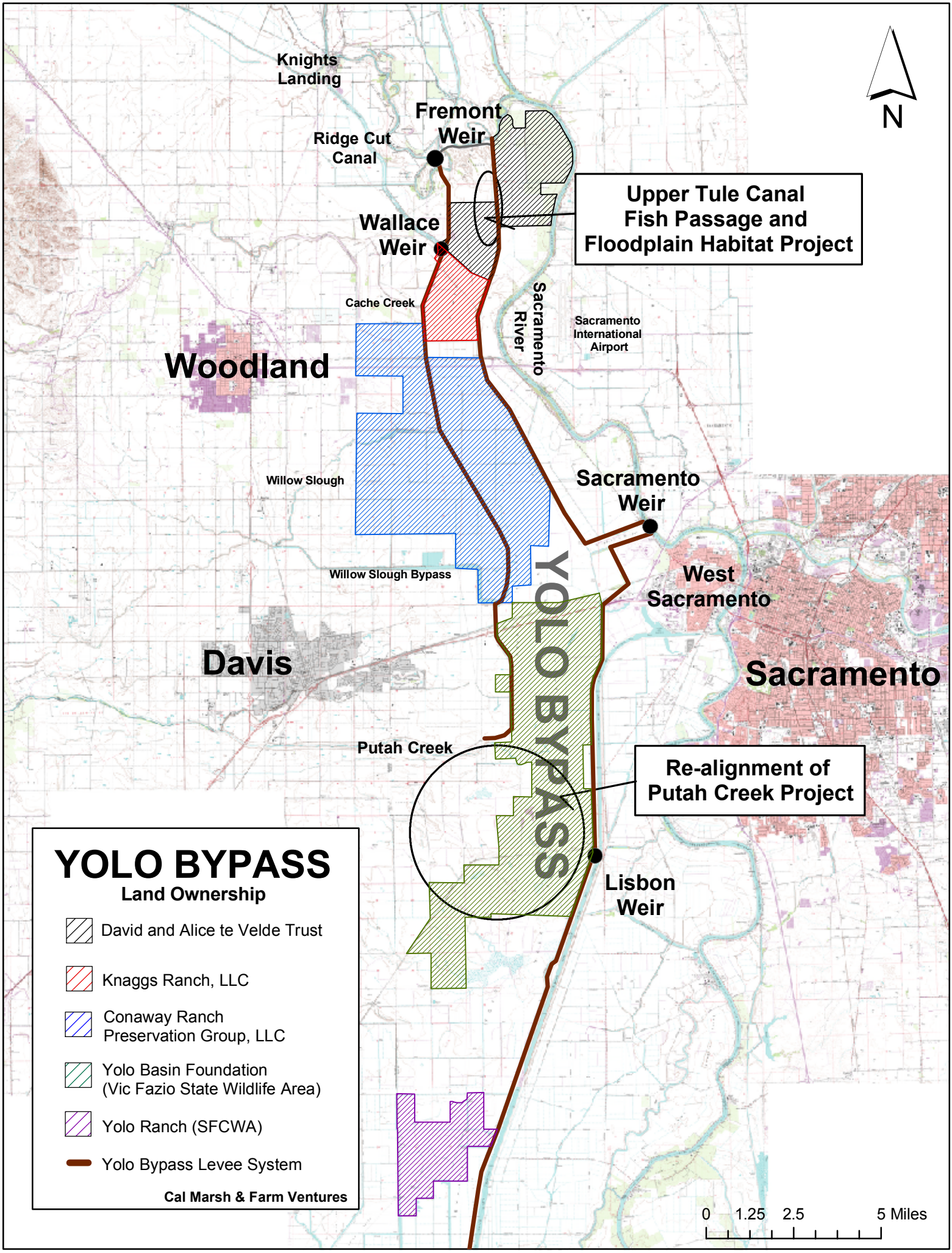
Dan Logue – California State Assembly, District 3
Mariko Yamada – California State Assembly, District 4
Lois Wolk – California State Senate, District 3
Jim Nielsen – California State Senate, District 4
John Garamendi – US Congress
Doug LaMalfa – US Congress

Laura King Moon – California Department of Water Resources
Karen Engstrom – California Department of Water Resources
Ted Sommer – California Department of Water Resources
Karla Nemeth – California Resource Agency
Traci Michel – U.S. Bureau of Reclamation
Charlton H. Bonham – California Department of Fish and Wildlife
Carl Wilcox – California Department of Fish and Wildlife
Maria Rea – National Marie Fisheries Service – NOAA

Jay Punia – Central Valley Flood Protection Board
Len Marino – Central Valley Flood Protection Board
Bill Edgar – Central Valley Flood Protection Board
Emma Suarez – Central Valley Flood Protection Board
Jane Dolan - Central Valley Flood Protection Board
Michael Villines – Central Valley Flood Protection Board
Tim Ramirez – Central Valley Flood Protection Board
Joseph Countryman – Central Valley Flood Protection Board
Clyde Mcdonald – Central Valley Flood Protection Board

Timothy Washburn – Sacramento Area Flood Control Agency
Ric Reinhardt – MBK Engineers
Stein Buer – GEI Consultants, Inc.

Peter Moyle – UC Davis Center for Watershed Sciences
Jeff Thompson – California Trout
Bryce Lundberg – Northern California Water Alliance
Tom Philip – Metropolitan Water District of Southern California
Russell E. Ryan – The Metropolitan Water District of Southern California
Byron Buck – State and Federal Contractors Water Agency
Jason Peltier – Westland Water District
Frances Brewster – Santa Clara Valley Water District
Campbell Ingram – Delta Conservancy
Erik Vink – Delta Protection Commission
Christopher M. Knopp – Delta Stewardship Council
John Cain – American Rivers Conservancy
Richard B. Pool – Pro-Troll
John McManus - Golden Gate Salmon Association
Zeke Grader – Pacific Coast Federation of Fishermen's Associations


Knights Landing
Fremont Weir
Ridge Cut Canal
Upper Tule Canal Fish Passage and Floodplain Habitat Project
Wallace Weir
Cache Creek
Sacramento River
Sacramento International Airport
Woodland
Willow Slough
Sacramento Weir
Willow Slough Bypass
YOLO BYPASS
West Sacramento
Davis
Sacramento
Putah Creek
Re-alignment of Putah Creek Project
Lisbon Weir
N
YOLO BYPASS
Land Ownership
David and Alice te Velde Trust
Knaggs Ranch, LLC
Conaway Ranch Preservation Group, LLC
Yolo Basin Foundation (Vic Fazio State Wildlife Area)
Yolo Ranch (SFCWA)
Yolo Bypass Levee System
Cal Marsh & Farm Ventures
0 1.25 2.5 5 Miles

yolo basin foundation

July 28, 2014

Secretary Jewell
United States Department of the Interior
Bureau of Reclamation
Mid-Pacific Region, Bay-Delta Office
801 I Street, Suite 140
Sacramento, CA 95814-2536

Secretary John Laird
California Natural Resources Agency
1416 Ninth Street, Suite 1311
Sacramento, CA 95814

Re: Comments of Yolo Basin Foundation (YBF)
on the Public Draft of the Bay Delta Conservation Plan (BDCP)

Dear Secretary Jewell and Secretary Laird:

This letter provides comments of the Yolo Basin Foundation (YBF) and its Board of Directors on the BDCP Public Draft. The Yolo Basin Foundation (http://www.yolobasin.org) is a non-profit organization dedicated to the appreciation and stewardship of wetlands and wildlife through education and innovative partnerships. YBF was founded in 1990 as a community-based organization to assist in the establishment of the Yolo Bypass Wildlife Area. We are universally credited with being the driving force behind the partnership that created the Yolo Wildlife Area (YBWA). Our most significant cooperation is with the California Department of Fish & Wildlife, who currently manages the YBWA. Yolo Basin Foundation continues as the communication link between many people and organizations involved in creating wetlands and managing the land in the Yolo Bypass. In recognition of its role as an informed communication and relationship facilitator, the Legislature specifically designated an ongoing governance role (non-voting) for YBF In its Delta Conservancy enabling legislation.

YBF's Comments are intended primarily to correct deficiencies, defects and omissions in the Public Draft that will improve its final version. YBF is particularly concerned to point BDCP consultants and drafters to publically available information developed over many years that may have been overlooked or dismissed. YBF understands that the BDCP is a programmatic level document and that the Resources Agency has committed to involving stakeholders including YBF in the development of project specific plans for actions described in BDCP and specifically Conservation Measure 2, Yolo Bypass Fisheries Enhancement (CM2). Nevertheless, YBF believes that an accurate and informed BDCP programmatic document that fully considers locally derived bottom-up perspectives is an important element of a successful conclusion for the BDCP process.

Thank you for consideration of our views.

Sincerely and respectfully,

PETER BONTADELLI
Board Chair

ROBIN KULAKOW
Executive Director

Comments of Yolo Basin Foundation (YBF) on the Public Draft of the Bay Delta Conservation Plan (BDCP)

Overview of YBF Comments

Review of the thousands of pages of the BDCP has been challenging. Given the volume of BDCP material, the availability of comprehensive Yolo Bypass materials, and the high profile of the Yolo Bypass Wildlife Area, we are puzzled by the superficial description of the habitat values of the Yolo Bypass in general and the Yolo Bypass Wildlife Area (YBWA) in particular, especially in Chapter 2, "*Existing Ecological Conditions*." Chapter 3 *Conservation Strategy* is riddled with inaccuracies, errors, confusion and ambiguity, beginning with the problem that the language describing protected lands in Chapter 3 is ambiguous and very confusing. The effects analysis in Chapter 5, "*Effects Analysis*," is disappointingly and unacceptably vague when the Yolo County agriculture model, Yolo Bypass Wildlife Area Land Management Plan, and waterfowl analysis all provide enough supporting information for a more thorough analysis.

The programmatic level mapping of modeled habitat on conservation lands contains significant errors that could have been more accurate had the readily available local sources published by YBF and Yolo County been consulted (For example, Chapter 3, part 2 maps on modeled habitat on conservation lands). The apparently systematic omission, dismissal and exclusion of the YBF and Yolo County materials would be an abuse of discretion if perpetuated in the final BDCP document. While we concur with much of the programmatic description of CM2, we are concerned that the failures which we describe in more detail below will undercut the efficacy of the CM2 proposal.

YBF comments will focus on descriptions and actions that will directly impact the Yolo Bypass Wildlife Area in Chapters 2, 3 and 5. YBF's comments on specific text in the public draft of BDCP should be read to apply to all substantially similar text appearing in the document. YBF reserves the right to provide additional comments on BDCP as work on it continues.

YBF supports the actions described in the February 25, 2014 letter (attached) from Secretary Laird to the Yolo County Board of Supervisors that commits to flexibility in development of the project level actions to implement CM2 to protect existing land uses. Significantly this letter recognizes that late season flooding is of the greatest concern to Yolo County, which YBF agrees with. The programmatic document should explicitly acknowledge this approach and commitment to the structuring of subsequent project-level activities with full input from local stakeholders.

The Yolo County draft BDCP comment letter is available on the website of the Yolo County Board of Supervisors and was presented in draft form to the Board on July 15, 2014. Please refer to Item 43:http://yoloagenda.yolocounty.org/agenda_publish.cfm?dsp=ag&seq=293 The draft BDCP letter is Attachment B on the website. By reference please include the county letter and attachments including the February 25th letter from Resources Secretary Laird and the Draft Technical Memorandum on Potential Fish Benefits of Yolo Bypass Fish Habitat Proposals.

Yolo Basin Foundation contribution to stakeholder outreach and engagement for BDCP

As a stakeholder with considerable experience in the evolution of land uses in the Yolo Bypass, especially the 16,800-acre Yolo Bypass Wildlife Area, YBF has worked hard to furnish BDCP consultants and agencies with information and experiential resources to assist in informed, reasoned decision-making. YBF appreciates the effort made by the Resources Agency to involve Yolo Bypass stakeholders in the development of Conservation Measure 2, Yolo Bypass Fisheries Enhancement (CM2) through the Yolo Bypass Fisheries Enhancement Planning Team (YBFEPT). YBF has participated fully in the forum created by the YBFEPT. In addition YBF has enhanced stakeholder communication by facilitating numerous Yolo Bypass Working Group[1] meetings that provided an opportunity for dialogue with BDCP staff and the entire Yolo Bypass stakeholder community. YBF has also provided an additional forum to provide additional discussion for agency staff and a wide-ranging group of stakeholders by co-sponsoring the Lower Yolo Bypass Planning Forum with the Delta Protection Commission. YBF has also contributed in furthering stakeholder communication as a member of the Delta Conservancy Board of Directors and the Yolo County Water Resources Association Technical Advisory Committee. YBF board and staff have participated in countless field trips to the Yolo Bypass Wildlife Area and other parts of the Yolo Bypass to assist elected officials, agency staff and water contractors in gaining an on-the-ground understanding of functions of the Bypass and how flood protection, agriculture, managed wetlands and public use are successfully co-existing under current operations.

YBF has also provided valuable information to agency staff and consultants by making the Yolo Bypass Management Strategy (the Strategy) and the Yolo Bypass Wildlife Area Land Management Plan (the Management Plan) easily available at www.yolobasin.org. These documents, developed through inclusive stakeholder processes over many years, address many of issues that BDCP also attempts to address in CM2. They are incorporated by reference in these Comments. The BDCP must take them into account in describing and assessing existing and proposed management regime for *managed* wetlands, which for purposes of the BDCP is defined as a natural community.

[1] The Yolo Basin Foundation initiated the Yolo Bypass Working Group in 1998 under a CALFED Ecosystem Restoration Grant. Participants include landowners (farmers, ranchers, duck hunters), Department of Water Resources, Central Valley Flood Protection Board, CA Department of Fish and Wildlife, US Fish and Wildlife Service, Natural Resources Conservation Service, Dixon and Yolo Resource Conservation Districts, Sacramento Area Flood Control Agency, Yolo County, City of West Sacramento, City of Davis, California Waterfowl Association, Ducks Unlimited, Sacramento Yolo Mosquito Vector Control District, American Rivers and others. The 2000 Governor's Environmental and Economic Leadership Award was presented to YBF in recognition of the Yolo Bypass Working Group for outstanding contributions in the area of environmental restoration and rehabilitation.

YBF and Yolo County collaborate to address the lack of base line data about land use in the Yolo Bypass

Early in the development of the BDCP, YBF voiced concern that plans were being formulated without basic baseline information on existing land uses. We worked with Yolo County staff and the Yolo County Board of Supervisors to address this deficiency. As far as we know this is the first time in the many years of Delta planning that local government and stakeholders pro-actively took on the task of developing, funding and carrying out independent studies with the goal of contributing data and ideas for mutually acceptable outcomes to address Delta issues.

Yolo County is doing an excellent job of providing impressive levels of technical information on important Yolo Bypass stakeholder issues including an agriculture economic assessment tool, infrastructure documentation and proposed solutions to improve drainage and water supply, a waterfowl energetics model, an independent review of fisheries studies, and hydraulic model review and development. YBF worked closely with the County on development of the studies' scope of work and in acquiring data through communication with Yolo Bypass farmers, wetland managers and conservation organizations to assist the study teams in collecting on the ground information from the people who know the Bypass best. The studies make a unique pro-active contribution to the development the data that should inform the completed BDCP. These documents are available on the Delta e-library webpage on the Yolo County website. From the numerous errors and omissions detailed below, it is clear that the BDCP programmatic document fails to take them into account.

Mitigation of effects of CM2 on existing land uses including managed wetlands in the Yolo Bypass is missing

YBF recognizes that the BDCP is a programmatic document. Mitigation of CM2 effects, is not described in this draft of the BDCP, although verbally committed to at meetings by responsible state and federal officials. The BDCP needs to recognize that the existing managed wetlands and their management regimes, and cultivated lands, are currently providing habitat for covered species. Mitigation of impacts to these lands, including existing management practices and regimes, must be specifically and formally acknowledged in the final BDCP document. This includes specifically impacts on existing management practices and routines for *managed* wetlands.

There may be an implied assumption in **Objective MWNC1.1 (Page 3.4-100, Table 3.4.3-5)** that impacts to existing managed wetlands in the Yolo Bypass can be mitigated for by creating new managed wetlands outside the Bypass. The same assumption may be implied for mitigation due to loss of cultivated land in the Bypass. YBF is concerned that there is not enough available acreage either in the plan area or adjacent to it to provide for the large scale mitigation (i.e. creation of new wetlands or protection of cultivated land that will be needed) Therefore, it is important to avoid the situation where existing cultivated land is taken out of production in order to create managed wetlands for mitigation purposes. We all lose if this conflict (trading off existing cultivated land for new managed wetlands) remains unresolved in implementation of CM2, because cultivated land is often habitat for protected species.

There must be a clear set of goals and objectives in the BDCP that commits to **minimizing CM2 impacts to current land uses on existing conservation lands and managed wetlands in the Yolo Bypass** including managed wetlands, grasslands, cultivated land, non-tidal perennial aquatic habitats and public use. It is equally important that impacts to managed wetlands in the Yolo Bypass not be mitigated by purchasing easements on land already owned in fee by the CDFW. This tactic would result in a significant net loss of conservation lands and especially managed wetlands in the Yolo Bypass Wildlife Area.

YBF suggests the following language for two goals and one objective for CM2:

Goal: *Minimize impacts to managed wetlands and cultivated lands in the Yolo Bypass so as to reduce the need for mitigation in or adjacent to the plan area.*

Goal*: No degradation of terrestrial conditions in the Yolo Bypass for covered species and other wetland dependent species.*

Objective: *Implement covered activities so as not to result in degradation of current conditions for covered terrestrial species and other wetland dependent species, and not to result in net loss of managed wetlands.*

Incomplete or Incorrect Description of the Yolo Bypass and Yolo Bypass Wildlife Area.

Chapter 2 – Existing Ecological Conditions;

Comment: Descriptions of managed wetlands in Chapter 5 are inconsistent with descriptions on Pages 2-18, 2-80, 2-95. The description of the managed wetlands in the Yolo Bypass does not adequately describe the multiple habitat benefits. All descriptions of managed wetlands should include the multiple species that benefit from them. Refer to:

The Yolo Bypass Wildlife Area Wildlife Area Land Management Plan (June 2008) Section 5.2.1 Biological Elements states that there are opportunities to manage for nine sub-elements of species guilds that include waterfowl, shorebirds and wading birds, upland game species, raptors, cavity-nesting birds, neo-tropical birds, other water bird species and special-status species. The management is based on Moist Soil Best Management Practices.

Chapter 3 is riddled with errors relating to the Yolo Bypass and the Yolo Bypass Wildlife Area that can be avoided by referring to and utilizing existing management documents and studies.

Chapter 3 *Conservation Strategies* is substantially deficient in its consideration of the Yolo Bypass and the Yolo Bypass Wildlife Area. The chapter's treatment of these lands and land uses – both descriptive and prescriptive -- appears to be built around a pre-conceived solution, large-scale modification of the Fremont Weir, in search of problem that may not exist if the facts are objectively laid out and considered. Chapter 3 of the final document should accurately reflect existing studies, programs, management regimes their legal and statutory bases. The Public Draft does not.

BDCP species accounts document the importance of the combination of rice fields and wetlands to the giant garter snake and other covered species, as well as migratory waterfowl. The state and federal government, acting pursuant to international treaties and statutory programs of equal dignity and authority with the Endangered Species Act (ESA) have, through the Central Valley Joint Venture and other efforts, spent millions of dollars creating wetlands over the past decade or more in the Yolo Bypass to comply with these requirements. YBF is concerned about the potential impacts of CM2 on existing Yolo Bypass wetlands and therefore important terrestrial species habitat, including giant garter snake and migratory waterfowl habitat. These issues are wholly unaddressed in the Public Draft document. The failure to address them in the final document would be an abuse of discretion.

Yolo Bypass is both a Terrestrial Corridor and an Aquatic Corridor whose unique character must recognized and accounted for

The Public Draft fails to acknowledge the role of the Yolo Bypass and Yolo Bypass Wildlife Area as important corridors for both terrestrial and aquatic species. This is a pervasive error in the BDCP document. Examples include:

(1) Page 3.2-25 Table 3.2-3 Landscape Linkages and the following section Page 3.3-8, Objective 1.3.1 and Page 3.3-46 3.3.5.3, lines 24-27, Fish and Wildlife Movement

Comment: The Yolo Bypass provides for linkages for managed wetlands, alkali seasonal wetlands, grasslands, and riparian habitat that provide habitat for covered terrestrial species including giant garter snake, Swainson's hawk, least Bell's vireo, tri-colored blackbirds and white-tailed kites. It also provides a linkage with Cache Creek, Willow Slough Bypass, and Putah Creek.

Question: Why is the Yolo Bypass categorized as solely an aquatic corridor in Table 3.2-3? It would appear that this characterization is at odds with all of the facts.

(2) Page 3.3-8, Objective 1.3.1 states as an objective:

> Protect and improve habitat linkages that allow terrestrial covered and other native species to move between protected habitats within and adjacent to the Plan Area.

Question: Why isn't the Yolo Bypass and the YBWA explicitly acknowledged as a suitable place for Objective 1.3.1?

(3) Chapter 3, pages 3.2-17-18 states:

Section 3.2.4.2.1 Reserve System Assembly Principles, page 3.2-x, Lines 20-21

Maximize connections between reserves and with existing conservation lands in and adjacent to the Plan Area. Where feasible, build off of existing conservation lands and management systems to increase management efficiency, connectivity, and patch size.

Page 3.2-18, lines 18-19

Juxtapose restored habitats with existing habitats to improve and maintain habitat corridors and connectivity among covered species habitats.

Question: Why isn't the Yolo Bypass and the YBWA explicitly acknowledged as meeting these principles and objectives?

(4) Page 3.3-46 3.3.5.3, lines 24-27, Fish and Wildlife Movement states:

> Goal L3 and its associated objectives address protection of fish and wildlife movement within the reserve system. This goal is met for wildlife through acquisition of lands to assemble an interconnected reserve system (CM3 Natural Communities Protection and Restoration) and through enhancement of acquired lands to increase the ability for wildlife to move through these areas.

Question: Why aren't existing conservation lands such as the Yolo Bypass Wildlife Area explicitly included in the interconnected reserve system for Goal L3?

Definition of reserves vs wildlife areas is unclear

Chapter 3 pages 3.2-13-14 Section 3.2.4 Terrestrial Species…, lines 4,5 and 1,2,3 states:

> The terrestrial resources component of the conservation strategy comprises a comprehensive set of actions that protects existing functioning natural communities, restores new areas of specific natural communities, enhances the function of degraded natural communities for covered species habitat, establishes long-term management of geographically distributed reserves, and establishes monitoring and adaptive management to measure and ensure success of the conservation strategy.

Question: How does the Yolo Bypass Wildlife Area (YBWA) fit into the "geographically distributed reserves" system described in line 2?

Question How would O&M on "geographically distributed reserve" lands be funded?

Question How would O&M on "geographically distributed reserves" be coordinated with existing conservation lands including the YBWA?

Answers to these questions should be provided in the final programmatic BDCP document; a failure to do so could undermine project-specific implementation of mitigation measures by affecting timing, extent and inter-relationship of the projects and the existing land uses affected by CM2.

Page 3.2-20 Table 3.2-2 line 12

Question: Is the Yolo Bypass Wildlife Area classified as a Type 2 Conservation Land?

This should be clarified.

Goals and Objectives for managed wetlands are weak and unclear

A. General Comment The Yolo Bypass is the primary focus of CM2. It is already the subject of several comprehensive management plans developed under international treaty and under federal and state laws. The BDCP programmatic document fails to address the following questions, which must be answered in any final document.

Question: How do the goals/objectives for managed wetlands, and impacts on existing management regimes, affect goals/objectives of the Central Valley Joint Venture Management Plan?

Question: How do the goals/objectives for managed wetlands, and impacts on existing management regimes, affect goals/objectives of the Yolo Bypass Wildlife Area Land Management Plan?

Question: How do the goals/objectives for managed wetlands, and impacts on existing management regimes, affect goals/objectives of the North American Wetlands Conservation Act and the long term commitments made by the grantees and cooperators who received millions of dollars in NAWCA grants to create managed wetlands on the Yolo Bypass Wildlife Area and on thousands of acres of privately owned land?

Question: How do the goals/objectives for managed wetlands, and impacts on existing management regimes, affect goals/objectives of the thousands of acres of privately owned land on which millions of dollars in funding through NRCS and USFWS wetlands programs were used?

B. Specific Comments related to weak and unclear goals and objectives statements

YBF's comments regarding weak and unclear goals and objectives, and the facts underpinning goals and objectives statements, applies to numerous sections throughout Chapter 3 including

(1) Page 3.4-100, Table 3.4.3-5.

Examples of Restoration Projects Implemented in and around the Plan Area, Sorted by Primary Natural Community, which states:

> **Objective MWNC1.1: Protect and enhance 8,100 acres of managed wetland, at least 1,500 acres of which are in the Grizzly Island Marsh Complex.**

Question: What does this objective mean? Where would the 6600 acres that are not located in the Grizzly Island Marsh Complex be protected and enhanced? Are any of these 6600 acres of managed wetlands meant to mitigate for losses to managed wetlands in the Yolo Bypass?

Question: Does the BDCP consider Grizzly Island, located in the brackish waters of the San Pablo Bay, to be equivalent to freshwater managed wetlands in the Yolo Bypass and the YBWA?

(2) Page 3.3-51 Table 3.3-2 Expected Extent of Conserved Natural Communities in Plan Area with BDCP Implementation

Managed wetlands protected under BDCP	**8100 acres,**
restored by BDCP	**500 acres,**
Total conserved by BDCP	**8600 acres.**

Question: Do these acreages include wetlands restored by BDCP to mitigate for impacts to managed wetlands in the Yolo Bypass, including the YBWA as a result of CM2 implementation?

(3) Page 3.3-13 states:

Goal MWNC1: Managed wetland that is managed and enhanced to provide suitable

habitat conditions for covered species and native biodiversity.

Comment: The same questions apply to the managed wetlands goals/objects on the following pages starting at 3.3-83 through 3.3-290

Pages 3.3-83-84, Section 3.3.6.9 Managed Wetlands state:

> Goal L2: Ecological processes and conditions that sustain and reestablish natural communities and native species.
> • Objective L2.6: Increase native species diversity and relative cover of native plant species, and reduce the introduction and proliferation of nonnative species.
>
> Goal MWNC1: Managed wetland that is managed and enhanced to provide suitable habitat conditions for covered species.
> • Objective MWNC1.1: Protect and enhance 8,100 acres of managed wetland, at least 1,500 acres of which are in the Grizzly Island Marsh Complex**.**

Comment: This is a particularly weak set of goals and objectives considering that there are thousands of acres of existing managed wetlands that benefit covered species and that will be subject to losses as the result of CM2 activities. The weakness is further compounded by the fact that this same set of goals/objectives is used to meet goals/objectives for recovery of terrestrial species including Swainson's hawks page 3.3-255, lines 12-19; white-tailed kites, page 3.3-277 lines 6-13; and western pond turtles, pages 3.3-289 line 23 and 3.3-290, lines 1-8.

Question: Why are there only 2 objectives related to protecting and enhancing managed wetlands when there are thousands of acres of this natural community in the plan area?

Question: Do these objectives apply to wetlands that are to be restored to mitigate for losses to existing managed wetlands (i.e. CM2 in the Yolo Bypass)?

(4) Giant Garter Snake

Page 3.4-195, Section 3.4.10.2 Implementation, 3.4.10.2.1 Restoration Actions- Non tidal marsh, lines 12-13 state:

> The Implementation Office will create 1,200 acres of non-tidal marsh in three conservation zones. The restored non-tidal marsh will consist of two blocks: 600 acres in Conservation Zone 2 outside the Yolo Bypass.

Questions: Will the 600 acres of non-tidal marsh and associated wetlands to serve as giant garter snake habitat. Will the non-tidal marsh be considered managed wetlands? Will they be part of the Yolo Bypass Wildlife Area?

Questions What giant garter snake population is this action mitigating for?

Questions If the 600 acres takes agricultural land out of production will this loss be mitigated?

No degradation on managed wetlands and cultivated lands in the Yolo Bypass must be a specifically stated goal

Page 3.3-162, lines 17-25 state:

Goal FRCS3: No degradation of aquatic habitat conditions for fall-run/late fall–run Chinook salmon upstream of water facilities.

• Objective FRCS3.1: Implement covered activities so as to not result in a degradation of current habitat conditions for fall-run/late fall–run Chinook salmon (e.g., spawning sites, rearing sites, migration corridors) upstream of the Plan Area.

Objective FRCS3.2 Rationale: See rationale for Objective WRCS3.2 for general rationale for this objective.

Implementing covered activities in a way that will support a wide range of life-history strategies (i.e. early migrants as well as later migrants) without favoring any one particular life-history strategy will ensure that the BDCP contributes to a diversity of conditions that supports greater genetic diversity.

Comment: A similar goal and set of objectives should be written for managed wetlands and cultivated lands already existing in the Yolo Bypass Wildlife Area since there are covered species that use the area. Similar language should be used for covered species benefitting from established conservation lands in the Yolo Bypass. A similar rationale would be appropriate.

For example, the final document should contain this language:

> **Goal**: *Implement covered activities in a way that will support a wide range of life-history strategies without favoring any one particular life-history strategy will ensure that the BDCP contributes to a diversity of conditions that supports greater genetic diversity of both aquatic and terrestrial species.*
>
> **Goal***: No degradation of habitat conditions for terrestrial species benefitting from habitat in the Yolo Bypass.*
>
> **Objective***: Implement covered activities so as to not result in a degradation of current habitat conditions for covered aquatic and terrestrial species.*
>
> **Objective Rationale***: Implementing covered activities in a way that will support a wide range of life-history strategies without favoring any one particular life-history strategy will ensure that the BDCP contributes to a diversity of conditions that supports greater genetic diversity of both aquatic and terrestrial species.*

Figures in Chapter 3 contain errors and rely on old or incorrect data sources.

The Public Draft is riddled with factual errors and omission of available correct data. Examples include:
(1) Figures 3.2-10 through 3.2.11 do not represent the correct habitat on the ground in the Yolo Bypass Wildlife Area. They do not use the more recent maps that are contained in studies that were used for reference in this document. The Ducks Unlimited Waterfowl Analysis and the Yolo County Agriculture Impact Study both have accurate maps that could be used in Figures 3.2-10, 3.2-11 and 3.2-12. Google maps also show up to date habitat in the Yolo Bypass. This must be corrected.

(2) Figure 3.2-10 Managed Wetland Natural Communities

Question: Why were several thousand acres of managed wetlands left off of the south (Tule Ranch) portion of the Yolo Bypass Wildlife Area?

Comment: The managed wetlands that are missing on the map were restored by Ducks Unlimited and California Waterfowl for CDFW, using North American Wetlands Conservation Act grants beginning in 2008. An accurate map can be found in the Ducks Unlimited Waterfowl Analysis. This must b corrected.

(3) Figure 3.2-11 Grassland Natural Communities
Question: Why were several thousand acres of grasslands left off of the south (Tule Ranch) portion of the Yolo Bypass Wildlife Area? This must be corrected.

(4) Figure 3.2-12 Cultivated Lands
Question: Do cultivated lands include managed wetlands and grasslands on the south (Tule Ranch) portion of the Yolo Bypass Wildlife Area?

Comment: Figures 3.2-10-11-12 are confusing. It appears from the document that cultivated lands are overlaying managed wetlands, grasslands, and pasture on the south (Tule Ranch) portion of the Yolo Bypass Wildlife Area. This must be corrected.

Question: What maps, GIS layers or photos were used to map out these 3 communities?

(5) The YBWA is missing in Table 3.4.3-5 under non-tidal wetlands, Page 3.4-100, Table 3.4.3-5. Examples of Restoration Projects Implemented in and around the Plan Area, Sorted by Primary Natural Community

Question: Why isn't the Yolo Bypass Wildlife Area listed under non-tidal wetlands?

Comment: About 7,000 acres of seasonal, semi-permanent and permanent managed wetlands have been restored beginning in 1994.

(6) Page, 5-4-35; 5.4.9 Managed Wetland, Lines 18-19 states:
There are 70,698 acres of managed wetlands in the Plan Area, 71% (49,999 acres) of which

are in Suisun Marsh (Conservation Zone 11), and the remainder of which are distributed throughout the Plan Area in all conservation zones.

Question: How many acres of managed wetlands are in Conservation Zone 2?

(7) Inconsistent descriptions of lands available as habitat for certain ESA-significant species:

Swainson's hawk Page 3.3-255, lines 11-19 state:

Goal MWNC1: Managed wetland that is managed and enhanced to provide suitable habitat conditions for covered species and native biodiversity.

• Objective MWNC1.1: Protect and enhance 8,100 acres of managed wetlands at least 1,500 acres of which are in the Grizzly Island Marsh Complex.

• Objective MWNC1.1 Benefits: Achieving this objective will protect and enhance 8,100 acres of managed seasonal wetlands. In addition to supporting wetland elements resulting from seasonal flooding to support wintering waterfowl, this natural community provides Swainson's hawk foraging habitat and is part of the overall foraging landscape. Managed wetlands include upland grassland components and also dry during the spring and become available to foraging Swainson's hawks as prey species recolonize the field. Protection of this natural community will contribute to the conservation of Swainson's hawk habitat.

White-tailed kite Page 3.3-277, lines 17-13 state:

Goal MWNC1: Managed wetland that is managed and enhanced to provide suitable habitat conditions for covered species and native biodiversity.

• Objective MWNC1.1: Protect and enhance 8,100 acres of managed wetland, at least 1,500 acres of which are in the Grizzly Island Marsh Complex.

Objective MWNC1.1 Benefits: Achieving this objective will protect and enhance 8,100 acres of managed seasonal wetlands. In addition to supporting wetland elements resulting from seasonal flooding to support wintering waterfowl, this natural community provides white-tailed kite foraging habitat and is part of the overall foraging landscape. Managed wetlands include upland grassland components and also dry during the spring and become available to foraging white-tailed kites as prey species recolonize the field. Protection of this natural community will contribute to the conservation of white-tailed kite habitat.

Comment: The descriptions of managed wetlands to benefit Swainson's hawk and white-tailed kites are similar. The description of managed wetlands to be enhance western pond turtle habitat (below) seems to say that managed wetland enhancement will focus on highly degraded areas….. Does this apply to another set of enhanced managed wetlands?

Page 3.3-290, lines 1-7 states:

Objective MWNC1.1 Benefit: Achieving this objective is expected to benefit the western pond turtle by enhancing habitat for the species. Portions of the 8,100 acres of protected and enhanced managed wetlands most likely to benefit the species include permanent water areas that are enhanced for breeding waterfowl (primarily on the 6,600 acres protected specifically for waterfowl) and those upland areas where cover is enhanced in areas that support only bare ground or invasive species prior to enhancement. Protection and enhancement of

managed wetlands to meet this objective will focus on highly degraded areas to provide the greatest possible level of enhancement benefit to the managed wetland natural community and associated native species.

(8) Uncoordinated approach to split-tail habitat outside the Yolo Bypass, as well as channel margins and floodplain terraces.

"The importance of improving channel margins and floodplain terraces relative to the need to flooding the Yolo Bypass for split-tail needs to further be explored. CM2 currently proposes split-tail flooding the Yolo Bypass once every five years if flooding does not occur naturally. This flooding, even if once every five years, could have a significant impact on agriculture and terrestrial species habitat in the Yolo Bypass. If flooding in the Yolo Bypass for split-tail is necessary, flooding should focus on a small area in the lower Yolo Bypass and should not result in upper Bypass inundation unless flooding occurs naturally." (from Yolo Co. draft BDCP comments posted online)

Use of Yolo Bypass to transport water downstream of north Delta Intakes is unclear

Chapter 3, Page 3.2-8, Section 3.2.3.1 Water Facilities, lines 32-33 states:

The conservation measures also include actions to improve flows through the Yolo Bypass floodplain (CM2 Yolo Bypass Fisheries Enhancement), ensure sufficient water for fish transport in the Sacramento River downstream of the north Delta intakes (CM1 Water Facilities and Operation)

Question: Are these flows in addition to the 3,0000 – 6,0000 and up to 8,000 cfs recommended in CM2 for passage of young salmonids through a modified Fremont Weir and onto the floodplain**?**

Descriptions of managed wetlands and public use at the Yolo Bypass Wildlife Area are incomplete

(1) Page 3.4-48, Section 3.4.2.3.2 Yolo Bypass Fisheries Enhancement Plan and EIR/EIS,

Comment: line 18: add public use.
Comment: Line 26-17 add managed wetlands, wildlife viewing, and environmental education.

(2) Compliance of Page 3.4-49,Lines 23-24 state:
Identify applicable BDCP biological objectives, performance goals, and monitoring metrics. Demonstrate plan compatibility with the flood control functions of the Yolo Bypass as well as habitat management, agricultural uses, and waterfowl use and hunting.

Comments: Lines 23-24 Add managed wetlands, non-consumptive public use activities such as wildlife viewing and environmental education.

(3) Page 3.4-53 line 46 ….accommodate other existing land uses (e.g., wildlife, public, recreation, and agricultural use)

Comment: Edit to say (e.g. managed wetlands, agriculture, public uses including hunting, fishing, wildlife viewing, and environmental education)

(4) Page 3.4-54 Operations Scenarios, Line 36 states: management for agriculture, waterfowl, wetlands, and fish.

Comment: Edit to say management for flood control, agriculture, managed wetlands, aquatic habitat and non consumptive public use.

Comment: Include: "Operations will be conducted so as to minimize impacts to flood control, agriculture, managed wetlands and non-consumptive public use."

(5) Page 3.4-53 Component Project 19: Yolo Bypass Modifications to Direct or Restrain Flow.

Comment: Add reference to including projects described in the Yolo Bypass Drainage and Infrastructure Study (2014)

BDCP should implement drainage and water infrastructure improvements identified in Yolo County's 2014 study, *Yolo Bypass Drainage and Water Infrastructure Improvement Study*, to provide greater management flexibility for the Yolo Wildlife Area."

Goals/Objectives for mitigation of impacts to managed wetlands and public use are missing.

(6) Page 3.4-55 , Line 43 states: The reduction in rice production will be offset through restoration or protection of rice land or equivalent-value habitat at a 1:1 ratio.

Question: Why aren't there similar commitments for mitigation for losses associated with Operations Scenarios for the Fremont Weir on other covered species, managed wetlands and public use? The final document should add commitments to mitigate losses to other functions and uses including managed wetlands and non-consumptive public use.

Remove specific dates and acreages relating to operations following Fremont Weir modification from this programmatic document

This is supposed to be a programmatic document. However, in the specific instance of the proposed Fremont Weir modification, project specific directives creep in. They should be removed. Examples include but are not limited to:

(1) Page 3.4-57 Table 3.4.2-1 Potential Operations Pattern for Fremont Weir Gated Channel and other Considerations

Comment: Remove specific flooding dates and acreage amounts associated with CM2 Refer to Secretary Laird's February 25th letter to Yolo County indicating the programmatic CM2 will not dictate the outcome of the project-level planning process." This comment also applies to **Page 3.4-52, Component Project 12 Water Supply Improvement for Yolo Bypass Wildlife Area, lines 19-26, Line 24 subsidy of Yolo Bypass Wildlife Area pumping costs or procurement of additional water from western tributary sources.**

(2) Page 3.4-52, Component Project 12 Water Supply Improvement for Yolo Bypass Wildlife Area, lines 19-26 states:

Line 22: by reducing reverse flows in the Toe Drain
Comment: Delete the above phrase, as this action should be decided through the collaborative process established for project specific projects in the YBFEP.

(3) Line 24 subsidy of Yolo Bypass Wildlife Area pumping costs or procurement of additional water from western tributary sources.
Comment: Substitute other sources in place of western tributary sources.

Funding Reliability is not addressed

Page 3.4-52, Line 25 How will BDCP guarantee that there will be enough funding to organize the YBFEPT as well as mitigation and long term O&M for projects in the Yolo Bypass?

Compliance monitoring of impacts to agricultural lands and managed wetlands

Page 3.4-60 Compliance Monitoring

Comment: Compliance monitoring should be done on commitments made regarding flood control, agriculture, managed wetlands and both consumptive and non-consumptive public use.

YBF will continue to participate

Page 3.4-60, Lines 28-32 YBF plans to continue as an active participation with the implementing entity including but not limited to the YBFEPT. Implementation of CM2 should be done in coordination with the Central Valley Flood Control Plan, Central Valley Joint Venture Management Plan and the Yolo Bypass Wildlife Area Land Management Plan.

Chapter 5 – The Effects Analysis is Incomplete and Flawed, in art because it fails to take account of or respond to recent analyses

YBF is particularly concerned about a superficial and misinformed effects analysis, that appears to be unaware of, or ignore, substantial information about existing uses and management regimes for managed wetlands in the Yolo Bypass. The failure to take this information into account and address the management issues would be an abuse of discretion if it were to be perpetuated into the final version of the BDCP.

Inadequate effects analysis regarding Yolo Bypass lands and operations

The Public Draft states at Page 5.4-36; 5.4.9.1.2 Periodic Inundation Lines 10-15 state:

> Yolo Bypass Operations
> Publicly and privately owned managed wetlands in the Yolo Bypass are primarily managed to provide recreational opportunities for the viewing and hunting of overwintering waterfowl, which are primarily dabbling ducks (95% of waterfowl in the Delta are dabbling ducks). Publicly owned managed wetlands in the bypass also provide viewing opportunities for other migratory bird species, including shorebirds and raptors.

Comment: This is an over simplified, dismissive description that does not use the many sources of information available regarding the potential impacts of CM2 on managed wetlands on public and private conservation land in the Yolo Bypass. It specifically fails to acknowledge educational programs for area primary and secondary schools; research activities for area universities; hiking and wildlife viewing of species such as bats; and agriculture. It ignores the many hours of discussion at the more than 23 meetings of the Yolo Bypass Fisheries Enhancement Planning Team where a majority of the conversations and presentations were about the potential effects of an increase in the frequency and duration of flooding on existing management of managed wetlands due to modifications to the Fremont Weir. The information presented at these meetings can be accessed on the Bay Delta Conservation Plan website: http://baydeltaconservationplan.com/PlanningProcess/BDCP/WorkingGroups/WorkingGroup-YoloBypass.aspx

The following statements are similarly misinformed:

Page 5.4-36, Lines 21-24 state:

> All three types of managed wetlands (seasonal, semipermanent, and permanent) are filled with water in the fall to "hunt" or "shoot" water levels. Water levels on seasonal wetlands are managed to maximize to foraging depths for dabbling ducks. Dabbling ducks can forage at depths no greater than 18 inches and prefer depths less than 10 inches.

Page 5.4-36, Line 22 states:

> "water in the fall to "hunt" or "shoot" water levels."

Comment: This dismissive statement ignores the complexities of modern day ecosystem based wetland management. Language from the *The Yolo Bypass Wildlife Area Land Management Plan (June 2008)* should be included:

Comment: *The Yolo Bypass Wildlife Area Wildlife Area Land Management Plan (June 2008) Section 5.2.1 Biological Elements* states that there are opportunities to manage for nine sub-elements of species guilds that include waterfowl, shorebirds and wading birds, upland game species, raptors, cavity-nesting birds, neotropical birds, other waterbird species and special-status species. The management is based on Moist Soil Best Management Practices.

Section 5.2.4 of the Land Management Plan, Authorized-public Use Element states that opportunities for public uses at the Yolo Bypass Wildlife Area include hunting, angling, walking, vehicle touring for wildlife observation, nature study, and environmental education and interpretation. Over 4,000 K-12 students from 5 counties participate in the Discover the Flyway school program at the Yolo Bypass Wildlife Area.

Comment: The Wildlife Area is closed when the Fremont Weir is spilling. Any flooding that closes the Wildlife Area impacts these students. Wildlife Area closures due to flooding at the Fremont Weir impacts all public uses. A major effect of increased frequency and duration of flooding will be decreased opportunities for all types public use.

The attached document titled "BDCP Conservation Measure" printed on YBF letterhead was prepared in 2008 and submitted to BDCP on several occasions. Six years later, it continues to be a concise summary of YBF's concerns specifically related to the effects of the proposed by CM2 to increase in the frequency and duration of flooding on management of the Wildlife Area. The document outlines the potential effects of CM2 on public use, agriculture, wildlife, public safety, flood control and methyl mercury production. The managed wetlands effects analysis does not address potential impacts related to any of these concerns that have been repeatedly been stated at meetings and in print. The points in the document are stated here:

- **Public use**
  - School Program - ~ 4,000 students annually visit the Wildlife Area as part of the "Discover the Flyway" program. The program attracts students from over 100 schools in 5 counties.
  - Hunting Activity – Over 4,000 hunters utilize the area from throughout northern California. Hunter dollars provide the largest component of the operating budget at Yolo.
  - Wildlife Viewing – It is estimated that 30,000 people a year visit the Wildlife Area to view the large variety and number of birds found throughout the year, primarily during the winter and spring months.
- **Agriculture**
  - Delayed Agricultural Activities – Inability to plant fields until they have dried out enough to begin ground tillage. Delaying this initiation of farming activity severely limits what can be grown here. White rice production will be severely impacted.

  - Forage value of uplands is severely degraded. Invasive weeds prevail, including cocklebur and dock. Conditions would warrant a reduction in grazing lease fees and subsequent reduction in operating funds.
- **Wildlife**
  - Spring nesting is nearly eliminated. Ground nesting birds such as waterfowl, harriers, kites and shorebirds are especially vulnerable to spring flooding.
  - Reduction in rodent numbers results in a reduction in wintering raptor numbers.
- **Public Safety**
  - Uncontrolled flooding in warm weather increases mosquito numbers
  - Established Best Management Practices for wetland management under controlled conditions do not apply. They are the basis for our working relationship with Sac Yolo Mosquito and Vector Control District.
- **Flood Control**
  - Agreed upon vegetation densities will not be manageable with increased spring flooding, which encourages uncontrolled growth of tules, cattails and willows. Water will make the Wildlife Ares non compliant with Army Corps operating agreement.
- **Methyl mercury**
  - Best Management Practices are being developed as part of a TMDL for the Delta, These BMPs may be more difficult to apply with increased flooding. Result could be a net increase in the levels of methyl mercury being transported to the Delta.

Page 5.4-36, Lines 33-36 state:

> Increased water depths will make the more typically flooded portions of the bypass too deep for dabbling ducks. However, areas to the west that are not typically flooded will likely become available, possibly replacing some or all of the lost foraging value depending on the underlying land use type (e.g., corn, rice, pasture).

Comment: This is an incorrect statement based on experience at the Yolo Bypass Wildlife Area. On the Wildlife Area, areas to the west of the toe drain are primarily managed wetlands and rice fields. The managed wetlands already have water in them prior to and throughout the inundation period. Rice fields are flooded for habitat after harvest. They are usually full by late November. So, the shallower edge of toe drain flooding to the west will not replace lost foraging value. It will make managed wetlands and rice fields deeper.

Page 5.4-37, Lines 12-15 state:

> (Ducks Unlimited 2012). Appendix 5.J, *Effects on Natural Communities, Wildlife, and Plants*, provides the method used to estimate periodic inundation effects in the Yolo Bypass. Based on this method, periodic inundation could affect managed wetlands ranging from an estimated 931 acres during a notch flow of 6,000 (B)Table 16 5.4-2) to an estimated 2,612 acres during a notch flow of 4,000 cfs (Table 16 5.4-2).

Question: How was this calculated to show 931 acres during a notch flow of 6,000 cfs compared to 2,612 acres under a lower flow scenario of 4,000 cfs? Wouldn't it make more sense that more acreage would be underwater under the 6,000 cfs flows?

Page 5.4-37, Lines 16-20 state:

> However, BDCP-associated inundation of areas that would not otherwise have been inundated is expected to occur in no more than 30% of all years, since Fremont Weir is expected to overtop the remaining estimated 70% of all years, and during those years notch operations will not typically affect the maximum extent of inundation. In more than half of all years under existing conditions, an area greater than the project-related inundation area already inundates in the bypass.

Comment: This is a speculative statement that over simplifies the complexity of inundation patterns. Based on a presentation to the YBFEPT in June 2014, the TuFlow model estimates are showing an inundation footprint that we believe may be more reliable.

Insufficient discussion of uncertainty

Chapter 5 Effects Analysis
Page 5.3-32, Lines 31-40 state:

> Although there is scientific information collected from the Delta, Yolo Bypass, and Suisun Marsh areas of the Delta that shows evidence of benefits of aquatic habitat restoration (Sommer et al. 2001a, 2001b; Simenstad et al. 2000), as well as results from a number of restoration projects conducted in the Pacific Northwest that focused on juvenile salmon rearing (Miller and Simenstad 1997; Gray et al. 2002; Bottom et al. 2005a, 2005b), a number of areas of uncertainty remain (Brown 2003a, 2003b, 2003c, 2003d; Davis et al. 2003; Orr et al. 2003). Areas of uncertainty include, but are not limited to the following areas:
> The ability of the restored habitat to meet the objectives and expected outcomes, including the time it takes to meet the biological objectives.

Page 5.3-33, Lines 1-8 state:

> The risk that the restored habitat will be colonized by invasive species such as nonnative submerged vegetation, nonnative predatory fish, and/or clams.
> The change in magnitude of predation mortality on covered fish.
> Foodweb responses to habitat restoration actions on both a local and a regional scale.
> The risk of adverse effects resulting from unsuitable changes in water quality and exposure to toxic contaminants.
> The proportion of the covered species population that actively inhabit restored habitats and the change in growth rate, survival, abundance, life-history strategies, and population dynamics.

Comment: The two statements above approach a discussion of uncertainty. But, overall there is insufficient discussion of uncertainty associated with potential fish benefits of Yolo Bypass inundation either in the species accounts or in CM2.

Comment: Exhibit 3 of the Yolo County BDCP comment letter, *Draft Technical Memorandum: Potential Fish Benefits of Yolo Bypass Fish Habitat Proposals,* discusses areas of uncertainty that should be further described including: "1) the number of juvenile salmon that will access the Yolo Bypass through an operable gate in the Fremont Weir, 2) the importance of the Yolo Bypass for juvenile salmon and split-tail habitat relative to other floodplain habitat outside the

BDCP Plan Area; 3) the benefits to juvenile salmon of providing habitat late in the season, since high temperature or other habitat conditions can reduce benefits; 4) the potential for predation: and 5) the number of acres split-tail need to spawn successfully. "

BDCP should also more fully integrate information about potential uncertainties from *Panel Review of the Draft Bay Delta Conservation Plan: Prepared for the Nature Conservancy and American Rivers* (Mount el al. 2013), especially the discussion pages 38-41.

CONCLUSION

Yolo Basin Foundation's Comments raise the following issues which must be addressed as suggested by the Comments in the final BDCP programmatic document.

- YBF supports the actions described in the February 25, 2014 letter (attached) from Secretary Laird to the Yolo County Board of Supervisors that commits to flexibility in development of the project level actions to implement CM2 to protect existing land uses.

- YBF and Yolo County have made significant contributions to making the BDCP process transparent and accessible to local stakeholders. These bottom-up points of view must be acknowledged and addressed.

- YBF and Yolo County have provided information through independent formal studies and analyses addressing a lack of baseline land use data.

- Mitigation of effects of Conservation Measure 2 (CM2), Yolo Bypass Fisheries Enhancement, on existing land uses including managed wetlands in the Yolo Bypass is completely missing.

- The descriptions of the Yolo Bypass and Yolo Bypass Wildlife Area are incomplete and incorrect.

- Chapter 3, Conservation Strategies, is riddled with errors, lack of clarity and weaknesses relating to the Yolo Bypass and the Yolo Bypass Wildlife Area that can be avoided by referring to and utilizing existing management documents and studies.

    - The Yolo Bypass is both a Terrestrial Corridor and an Aquatic Corridor whose unique character must recognized and accounted for.

    - The definition of reserves vs. wildlife areas is unclear.

- Goals and Objectives for managed wetlands are weak and unclear.

- No degradation on managed wetlands and cultivated lands in the Yolo Bypass must be a specifically stated goal.

- Figures in Chapter 3 contain errors and rely on old or incorrect data sources.

- Use of Yolo Bypass to transport water downstream of north Delta Intakes is unclear.

- Descriptions of managed wetlands and public use at the Yolo Bypass Wildlife Area are incomplete.

- Goals/Objectives for mitigation of impacts to managed wetlands and public use are missing.

- Remove specific dates and acreages relating to operations following Fremont Weir modification from this programmatic document

- Funding Reliability is not addressed

- Compliance monitoring of impacts to agricultural lands and managed wetlands is incomplete.

• Chapter 5 – The Effects Analysis is Incomplete and Flawed, in art because it fails to take account of or respond to recent analyses

- Inadequate effects analysis regarding Yolo Bypass lands and operations ignores significant facts of Yolo Bypass activities, contains inaccurate and dismissive assertions about existing activities and operations, and therefore largely mistakes and misapprehends effects.

- There is an inadequate and insufficient discussion of uncertainties relating to water regimes under various hypothecated scenarios.

ATTACHMENT A

LETTER OF SECRETARY LAIRD dated February 25, 2014

To YOLO COUNTY BOARD OF SUPERVISORS

CALIFORNIA natural resources AGENCY

EDMUND G. BROWN JR., Governor
JOHN LAIRD, Secretary for Natural Resources

February 25, 2014

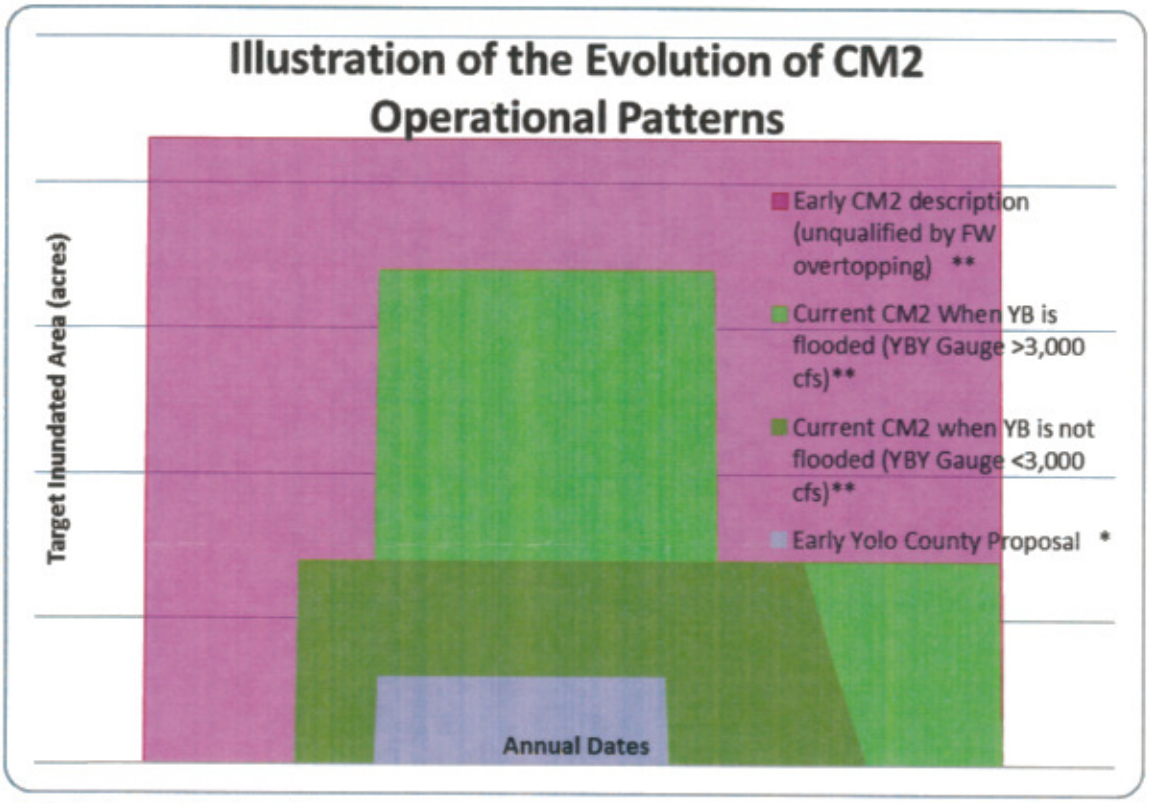
Chair Don Saylor and Members of the Board
Yolo County Board of Supervisors
625 Court Street
Woodland, CA 95695

Dear Chair Saylor and Members of the Board:

I am writing to provide an update on the Bay Delta Conservation Plan (BDCP) Conservation Measure 2 (CM2) and to reassure you the state will continue to coordinate with Yolo County staff and elected officials to refine CM2 to address any further concerns prior to the final BDCP. This update will illustrate how extensively the conservation measure has been modified over the last two years in response to Yolo County requests and concerns. It is the Natural Resources Agency's goal to continue balancing the need of BDCP to enhance habitat for covered species with the existing uses of the Yolo Bypass such as agriculture, waterfowl and other terrestrial species habitat, bird watching, hunting, and other recreation.

The intent of CM2 is to provide high quality rearing habitat to achieve the greatest biological benefit (i.e., 30 days of inundation of 7,000 acres in 70 percent of years). In 2011, DWR established the Yolo Bypass Fishery Enhancement Planning Team (YBFEPT) to develop and refine CM2 in collaboration with the many stakeholders in and near the Yolo Bypass. This planning team has met 23 times since June 2011; Yolo County staff was present at many of these planning team meetings. Over the course of these meetings, revisions to CM2 in response to Yolo County concerns have been incorporated based on ongoing discussions and joint evaluations that have provided an improved appreciation of the design of a project that balances new and existing uses.

Figure 1 below highlights the changes that have occurred related to the CM2 operational patterns as a result of discussions with Yolo County. Figure 1 highlights the differences between the earlier CM2 inundation patterns proposed in the 2010 BDCP Administrative Draft compared to those proposed by Yolo County, in terms of extent and duration of Yolo Bypass inundation. The figure was developed to show the operational range that may be typical of, but not necessarily identical to, actual operational guidelines that will be developed in the course of subsequent project-specific design, planning and environmental documentation. As a result of discussions with Yolo County, the extent and duration of Yolo Bypass inundation described in the Public Draft BDCP is currently somewhere in the middle of these two starting points, though of course that description is subject to further refinement.



* Only in years when Fremont Weir overtopping occurs

** When hydrology allows

It is important to recall that the ranges of amount and timing of flooding in the Yolo Bypass presented in the programmatic CM2 are flexible and do not dictate the outcome of the project-level planning process that will follow. The Department of Water Resources (DWR) will work with the YBFEPT and Yolo County to define operational parameters based on the needs of covered species, seasonal hydrologic conditions, agricultural operations, and other variables yet to be defined; moreover, it is not DWR's intention to make operational parameters for the extent, duration, timing and frequency of flooding events binding.

DWR recognizes that late season flooding in the bypass is of the greatest concern to Yolo County. While late-season flows may be necessary in some years to meet the BDCP biological goals and objectives, the frequency and acreage affected by late flows could be managed well enough such that current land uses in the Yolo Bypass would be largely maintained. Furthermore, BDCP acknowledges the uncertainty associated with the operation of the Yolo Bypass. A reasonable degree of flexibility is also provided, allowing for refinement of the metrics within objectives as the uncertainty is addressed over time. The biological objectives for the BDCP, for example, state "Create a viable alternate migratory path through Yolo Bypass in >70% of years for out-migrating fall-run/late fall-run Chinook salmon juveniles by year 15". Such language allows for flexibility in achieving the objective because the objective does not specify the number of acres or other criteria. Uncertainty will be addressed through the adaptive management and monitoring program of the BDCP, a process in which we expect Yolo County will have a significant level of involvement.

As described in the BDCP, the YBFEP and the YBFEP EIR/S will further refine CM2 during project-level planning. Through this process, the component projects of CM2 will be evaluated and refined with scientific and stakeholder input, including Yolo County. Part of this evaluation will include the development and evaluation of alternatives. These alternatives are expected to vary in ways that include the duration, extent and timing of Bypass inundation. DWR plans to fully engage with Yolo County and its representatives during the development and evaluation of these alternatives to ensure your concerns are heard and a sustainable balance of important land uses is achieved. Furthermore, the state is interested in developing a memorandum of understanding with Yolo County that could address issues related to CM2, such as: 1) funding for county participation in BDCP planning and implementation; 2) mitigation for the loss of farmland and economic impacts; 3) assurances and benefits for the Yolo Bypass Wildlife Area; and 4) other topics as needed.

As proponents of the BDCP, the state expects to develop a governance structure that includes Yolo County as a partner in the planning, environmental review, and operation of CM2. Since there is uncertainty associated with future operations of the gate in the Fremont Weir and other elements of CM2, BDCP will allow a reasonable degree of flexibility and refinement of the metrics within biological objectives as research and monitoring efforts provide new information for consideration by the state and Yolo County, as well as other relevant state and federal agencies. The state will work with Yolo County and other stakeholders to determine the manner, timing and extent of new seasonal floodplain habitat in the Yolo Bypass to achieve a sustainable balance of conservation projects and existing land uses.

Thank you for your participation in the BDCP process. I look forward to continuing to work together to improve the Delta ecosystem and provide a more reliable water supply for California.

Sincerely,

John Laird

John Laird
Secretary for Natural Resources

cc: David Murillo, Mike Connor, Mark Cowin, Chuck Bonham

I hope this letter is just one point in our continued discussions that in good faith work to resolve outstanding issues consistent with all of our goals.

Good, Darryl <dgood@usbr.gov>

assurances for value report

Robin Kulakow <robin@yolobasin.org> Thu, Aug 28, 2014 at 3:32 PM
To: dgood@usbr.gov
Cc: "Michel, Traci" <tmichel@usbr.gov>, M Hardesty <rd2068@cal.net>

Here is the list that Yolo Co. and Yolo Basin Foundation (and YB Working Group) have been using. The Solano assurance list could be added to this.

- **Flood protection afforded by the Yolo Bypass is maintained.** The County cannot accept changes in the Yolo Bypass that increase the level of flood risk to local properties. The design and operation of the Conservation Measure must not have an adverse effect on the flood protection function of the Bypass.

- **Agriculture in the Yolo Bypass is preserved.** Agricultural activities in the Bypass are a significant contributor to the County's agricultural economy, the operation of the Yolo Bypass Wildlife Area, and the flood protection afforded by the Bypass. The Conservation Measure must include appropriate design and operational criteria to avoid jeopardizing agriculture—particularly the cultivation of rice—in the Yolo Bypass.

- **The Yolo Bypass Wildlife Area is protected.** The habitat, recreational, and educational opportunities afforded by the Wildlife Area make it an invaluable asset to Yolo County and the surrounding region. The Conservation Measure should not jeopardize the Wildlife Area operations and public use and, if possible, it should be enhanced and preserved in perpetuity as part of the Bay Delta Conservation Plan ("BDCP").

- **Completion and implementation of the Yolo Natural Heritage Program are assured.** The County and the four cities (Woodland, Davis, West Sacramento, and Winters) have worked for years to complete a local HCP/NCCP through a joint powers authority. This effort is nearing completion and BDCP must not interfere with—and should assist where possible—in the completion and implementation of this effort.

- **Local economic impacts are addressed.** All appropriate steps must be taken to identify and fully mitigate local economic impacts of the Conservation Measure, including but not limited to its effects on County revenues and the agricultural industry. The County should be closely consulted as financial assistance programs or other mitigation measures are developed.

Robin Kulakow
Executive Director
Yolo Basin Foundation
(530)756-7248
www.yolobasin.org

January 26, 2011

Ms. Terry Macaulay
Delta Stewardship Council
980 Ninth Street, Suite 1500
Sacramento, CA 95814

Re: SCOPING COMMENTS OF YOLO BASIN FOUNDATION for the DELTA PLAN

Dear Ms. Macaulay:

Thank you for the opportunity to provide scoping comments for the Delta Plan. Please include the documents in the attached binder as part of this letter. These documents are referred to in the body of the letter and provide additional information and detail in support of the Comments.

The Yolo Bypass is an important part of the landscape, infrastructure and community of the Delta. The Bypass is a 59,000-acre floodway that protects the City of Sacramento and surrounding communities and farmland by diverting Sacramento River flows onto farmland and open space when they reach flood stage. There is a complex mosaic of publicly and privately managed agricultural land and seasonal wetlands that maintain the floodway; contribute to the agricultural economy of Yolo and Solano Counties; sustain essential habitat for birds traveling the Pacific Flyway and endangered flora and fauna; and provide a myriad of public uses including hunting, bird-watching, outdoor education, hiking, research, painting, photography and other recreational activities.

The Yolo Bypass is home to the 16,740-acre Yolo Bypass Wildlife Area (Wildlife Area) owned and managed by the California Department of Fish and Game (Fish and Game). Rice farming, organic tomatoes and rangeland on the Wildlife Area property provide income to farmers and ranchers and fund the operations of the Wildlife Area. Wildlife friendly farming practices provide food and shelter for migratory and resident birds by the tens of thousands. A popular and growing hunting program serves over 4,000 hunters every year.

The Yolo Basin Foundation provides a full complement of educational and outreach programs in partnership with Fish and Game. Monthly field trips, summer bat viewing, a spring vernal pool open house and the California Duck Days wetlands festival provide high quality wildlife viewing, hiking, and educational opportunities for thousands of people every year. The Discover the Flyway program for schools brings over 4,000 K-12 students to the Wildlife Area annually, from over 100 schools in Sacramento, Yolo, Solano, El Dorado and Placer Counties. Painters and photographers visiting the Wildlife

Area pursue their art in growing numbers. Over 100 volunteers contribute 5,000 hours of work to support these programs.

Many regulatory issues affect management of land in the Yolo Bypass. All activities must maintain the flood control function of the Bypass by restricting the growth of tules, cattails, willows, and cottonwoods. Research is underway that will contribute to the development of Best Management Practices to address the Delta methyl mercury TMDL requirements. Farmers and wetland managers must comply with the requirements of the Ag Waiver program. Control of vector-borne diseases is regulated by the Sacramento Mosquito and Vector Control District using innovative Best Management Practices. Each of these projects has been the subject of long-term discussion and planning to develop adaptive management procedures for the Bypass.

There are large sections of privately owned and managed seasonal wetlands that operate as duck hunting clubs. Thousands of acres of land are under federal and state conservation easements. The Natural Resources Conservation Service, US Fish and Wildlife Service, State Department of Water Resources and Fish and Game own these wetland easements. There are also several mitigation banks in the Bypass, for Giant Garter Snakes and Delta Smelt, both endangered species.

All land in the Bypass is subject to flood easements dating back as far as 1916. Levees are maintained by a series of Reclamation Districts. The Department of Water Resources also maintains miles of Yolo Bypass levees. There is concern that the Yolo Bypass does not have the carrying capacity needed to protect property during the largest storm events.

The Delta Plan will join numerous other land management plans guiding land use in the Bypass that are already in place; and others are underway. There are specific wetland restoration and management goals for the Yolo Basin in the Central Valley Joint Venture Management Plan, implementing the North American Waterfowl Management Plan, an international treaty respecting waterfowl migrations along the Pacific Flyway, among other routes. The Yolo Bypass Wildlife Area has an innovative Land Management Plan that was adopted by Fish and Game in 2007. The Yolo Natural Heritage Program (HCP/NCCP) is in the final stages of development by Yolo County. Each wetland conservation easement has an associated wetland management plan. The Central Valley Flood Protection Plan is under development by the Department of Water Resources (DWR) with a 2012 deadline. The Bay Delta Conservation Plan (BDCP) includes far-reaching conservation and water management measures that would profoundly affect land management in the Bypass. Land management in the Bypass has been characterized by years of patient cooperative and collaborative planning represented by these existing plans.

The Yolo Bypass Wildlife Area is a prime example of ecosystem management rather than single species management for a specific special status species. Yolo Bypass agricultural fields and wetlands are home to many special status species. The Yolo Bypass provisions in the Delta Plan should respect and replicate this ecosystem approach.

The following is taken from the Yolo Bypass Wildlife Area Land Management Plan Biological Resources Section 3.5 (www.yolobasin.org):

> Two-hundred-eighty terrestrial vertebrate species are known to use the Yolo Bypass Wildlife Area at some point during their annual life cycles (Appendix G), over 95 of which are known to breed in the Yolo Bypass Wildlife Area. The Yolo Bypass Wildlife Area also provides suitable habitat for 23 additional species that may occur on site but have not yet been observed there. The Yolo Bypass Wildlife Area is also known to support 38 special-status wildlife species (Table 3.5-3), and many more are locally rare or have specialized habitat requirements that the Wildlife Area provides. The Wildlife Area also provides seasonal or permanent aquatic habitat for 44 species of fish, 8 of which are special-status species (Table 3.5-5). Hundreds of invertebrate species also inhabit the Wildlife Area, including five special-status invertebrates (Table 3.5-3). Under the ecosystem management approach, management of the Yolo Bypass Wildlife Area is intended to maximize benefits for the full suite of these species as opposed to management at the single-species level.

For over 20 years the Yolo Basin Foundation has facilitated discussions among the many stakeholders in the Bypass. These discussions continue regularly with the Yolo Bypass Working Group. We encourage Delta planners to use the knowledge gained through many hours of stakeholder meetings. The Yolo Bypass Working Group is a good forum to gather and share information, listen to stakeholder concerns, and develop partnerships. Many successful collaborations have grown out of relationships that began with the Yolo Bypass Working Group.

The Yolo Bypass Working Group has contributed to a series a land management plans, technical studies, and policy discussions. Please refer to the letter to Joe Grindstaff dated July 1, 2010 in the attached binder (Document 1). Also refer to the two documents following the letter: *Timeline of Yolo Bypass Documents* (Document 2) and the *History of Stakeholder Involvement in the Yolo Bypass* (Document 3). <u>The Delta Plan, and its Bypass provisions, should embody the principles of adaptive management reflected in the ongoing discussions of stakeholders such as the Yolo Bypass Working Group.</u>

The Yolo Bypass is a central part of the discussion regarding how to address the decline of native fish populations. There has been a 10-year focus on a proposal to modify the Fremont Weir to improve habitat for these fish, primarily salmon, in the Bypass. Most recently, proponents of the Bay Delta Conservation Plan (BDCP) have spent millions of dollars pursuing a conceptual proposal that would permanently lower the Fremont Weir, to increase the frequency and duration of spring flooding. Some studies have purported to show that shallow flooding of the Bypass may provide habitat for young salmon as they move downstream from their natal creeks. However, such prolonged flooding would have potentially devastating effects on flood-protection, agriculture, habitat and recreational values currently supported by existing plans. These impacts have not been studied.

The BDCP is a recent plan for the Yolo Bypass that does not build or draw upon the many existing plans that maintain the agriculture and seasonal wetlands that support the flood protection function and values. Before the Delta Plan proposes changes to land management in the Yolo Bypass such as the BDCP, there should be a

comprehensive look at the entire Bypass. Any changes to Bypass land uses should respect and embody the ecosystem approach, the current diversity of uses and the collaborative community-based efforts that shape and support them.

The Yolo Bypass does have a role to play in the improvement of native fish habitat. However, the modification of the Fremont Weir is a concept for which the downstream impacts to agriculture and managed wetlands that maintain the primary flood protection role have not been analyzed. The local stakeholders who understand the importance of the diverse land uses in Bypass have not been heard; this is a significant defect in the BDCP process. It is time to address the impacts to the Yolo Bypass that have been overlooked for years during discussions involving selective subsets of stakeholders. The benefits of current uses must be considered fully in any plan that proposes changes to the operation of the Bypass. Please refer to the attached binder beginning with the document: *BDCP Habitat Conservation Measure (FLOO1.1) Modification of Fremont Weir and Spring Inundation of the Yolo Bypass* (Document 4). The Yolo Basin Foundation has provided related comments to the BDCP Steering Committee, Delta Stewardship Council, Delta Vision and the CALFED Ecosystem Restoration Program for over 10 years.

The Yolo Basin Foundation is committed to finding solutions to Delta issues involving the Yolo Bypass. To that end we have been working with a group of Yolo Bypass stakeholders to develop the "Westside Option" as a potential alternative to the modification of the Fremont Weir. Please refer to the conceptual document in the attached binder describing this proposal: *Preliminary Description of a Westside Yolo Bypass Management Option for Rearing Juvenile Salmon* (Document 8). We are working with Yolo County and other stakeholders to develop a scope of work to begin investigating this alternative.

The Yolo Basin Foundation Board of Directors encourages the Delta Plan participants to use the many resources developed through the collaborative efforts of the Yolo Bypass Working Group. We are available to assist with stakeholder outreach as the Plan develops. It is essential that the far-reaching Delta Plan begin with the local community and build upon the many unique partnerships that are working in the Yolo Bypass.

Sincerely,

Betsy Marchand
Board Chair

Robin Kulakow
Executive Director

Lower Yolo Bypass Planning Forum
815 S St. -First Floor, Sacramento, CA 95814 (916)445-2079

May 7, 2010

Undersecretary Karen Scarborough
Resources Agency
Chair, Bay Delta Conservation Plan
1416 Ninth Street
Sacramento, CA 95814

Dear Ms. Scarborough,

Lower Yolo Bypass Planning Forum members continue to seek constructive dialog between Yolo Bypass stakeholders and the Bay Delta Conservation Plan staff and Steering Committee. Forum members are encouraged that the Steering Committee has committed to meeting with Yolo Bypass (Bypass) stakeholders to discuss conservation measures proposed for the Bypass and Cache Slough.

The Delta Protection Commission and the Yolo Basin Foundation are co-sponsors of the *Lower Yolo Bypass Planning Forum* (Planning Forum), a group of 27 member stakeholders including representatives from local Delta governments, state and federal agencies, private managed habitat landowners, local and regional water districts and agencies, reclamation districts, conservation groups, vector control and emergency service providers, and other locally affected interests. This group is funded by the Department of Fish and Game to discuss land and water management in the southern portion of the Bypass and North Delta.

In addition to the Planning Forum, the *Yolo Bypass Working Group* (Working Group), formed in 1997 continues to meet and provide a venue for much of the Bypass. The Planning Forum was formed out of the Working Group in a deliberate effort to address unique challenges in the downstream portion of the Bypass.

The Working Group and the Planning Forum represent an existing, comprehensive set of stakeholders who have been the consistent engaged voices of the Bypass for many years. Working with these individuals is essential. Planning Forum members expect nothing less than full, equivalent participation in a BDCP-specific issues workgroup. The Planning Forum document, "Local Impacts from Habitat Conversion and Delta Infrastructure Projects and Suggested Solutions" (previously submitted to the Steering Committee) should be utilized as a basis for initial discussions of the BDCP-specific issues workgroup. In addition, Working Group and Planning Forum members expect direct, timely, and frequent communication about that process and other BDCP discussions about the Bypass.

For more information on the Planning Forum, please visit www.yolobypass.net. Please also feel free to contact us with any questions.

Sincerely,

Robin Kulakow
Executive Director
Yolo Basin Foundation

Linda Fiack
Executive Director
Delta Protection Commission

cc:

BDCP Steering Committee
BDCP Management Team

Lower Yolo Bypass Planning Forum
Yolo Bypass Conservation Measures

The **Lower Yolo Bypass Planning Forum** (Planning Forum) is proposing the following **Yolo Bypass Conservation Measures** as a set of draft alternatives to the proposed BDCP conservation measure to modify the Fremont Weir to increase the frequency and duration of spring flooding in the Yolo Bypass (Bypass). The proposed actions are based on continuing Yolo Bypass Working Group discussions that began in 1998, when inundation of the Bypass was first brought forward as an aquatic habitat improvement measure. They are presented in the spirit of finding mutually beneficial solutions to the complex statewide water supply and habitat issues facing the Sacramento San Joaquin Delta. This is an evolving proposal that will benefit from additional comment and analysis as it is introduced to the larger community.

This proposed set of conservation measures will contribute significantly towards a multi species plan that benefits both terrestrial and aquatic ecosystems. Bypass stakeholders stand ready to engage BDCP staff to develop such a plan.

As plans for a Bypass Conservation Measure move forward, BDCP should also consider potential impacts to publicly and privately owned/managed lands and services within and adjacent to the Bypass. For actions that are not consistent with this document, the Lower Yolo Bypass Planning Forum developed a list of potential impacts and related solutions in Attachment A entitled, “LOCAL IMPACTS FROM HABITAT CONVERSION AND DELTA INFRASTRUCTURE PROJECTS AND SUGGESTED SOLUTIONS.” A list of Planning Forum members in support of the Conservation Measures is included in Attachment B.

Flood Protection

Flood protection is always the first priority in the Bypass. Notwithstanding agreements between landowners and local, state, or federal agencies within the Bypass itself, it also functions as a critical component of the Sacramento River Flood Control Project (FCP), and provides a direct flood protection benefit to urban and urbanizing areas including (but not limited to) the cities of Woodland, Sacramento, West Sacramento, and Davis.

As habitat creation and conversion projects move forward as a result of BDCP Conservation Measures, the flood protection function of the Bypass must be maintained. Additionally, plans for habitat projects must be designed and implemented in such a way that they do not impede or preclude future modifications of the Bypass necessary to maintain or improve the function of the FCP.

A good example of appropriate projects includes the creation of the Yolo Bypass Wildlife Area. Establishment of the Wildlife Area was pursued only after a commitment was made to manage it as part of the Sacramento Flood Control Project in a way that

would not interfere with the flood control function of the Bypass. This was formalized in a "Local Cooperative Agreement" between the Army Corps of Engineers and the Department of Fish and Game in 1991.

Large modifications of the flood control project require a section 408 permit and must be approved by the Army Corps of Engineers in Washington D.C. Modification of the Fremont Weir would be considered to be a large modification and would also require approval by the Central Valley Flood Protection Board. The approval process for the projects discussed below will face fewer permitting challenges than wholesale changes suggested in BDCP or the Biological Opinion.

Agriculture

The Yolo County Agriculture Commissioner estimates that the Yolo Bypass contributes at least $44 million in annual direct agricultural income to the Yolo County economy. Total effect on the local economy is about $170 million annually. Rice contributes to the operating income on the Yolo Bypass Wildlife Area, while also providing a tremendous food source for migratory waterfowl. On both Conaway Ranch and the Wildlife Area, rice fields are flooded in the fall and winter to provide important waterfowl and shorebird habitat.

Early implementation Fish Habitat Improvement Projects

The "**Five Step Proposal**" created by the implementing agencies of CalFed's Ecosystem Restoration Program should be at the core of any aquatic conservation measure proposed in the Yolo Bypass. These implementing agencies include the California Department of Fish and Game, US Fish and Wildlife Service and National Marine Fisheries Service with assistance from the California Department of Water Resources. These "early implementation projects," were designed in partnership with locally affected stakeholders, are the centerpiece of the Yolo Bypass Integrated Project within the Yolo County Integrated Regional Water Management Plan. The Five Step Proposal would improve upstream salmon and sturgeon passage and create about 4,000 acres of additional spring inundated floodplain habitat. These five steps include:

1. **Putah Creek** – Lower Putah Creek stream realignment and floodplain restoration for Salmon passage improvement and multi-species habitat development on existing public lands. Tidal habitat improvements associated with this project would primarily benefit Splittail. The creek realignment would benefit fall run salmon allowing them to move up Putah Creek prior to the December 1 Los Rio check dam on DFG property. The dam is taken down before the annual fall pulse flow used to attract salmon up the creek. This flow takes place between November 15th and December 15th annually. Total potential inundated floodplain habitat is about 800 acres.
2. **Lisbon Weir** – Modify or replace the weir to improve the agriculture and habitat water control structure for fish, wildlife, and agriculture; reduce maintenance.

3. **Additional multi-species habitat development** – Provide for controlled localized seasonal inundation on more frequent intervals; identify areas of opportunity only on: the Wildlife Area; other existing public lands; and private lands where cooperative agreements with willing land owners will provide mutual benefits. Estimated inundated floodplain habitat is about 3,000 acres
4. **Tule Canal connectivity** – Identify passage impediments (e.g. road crossings and impoundments); work with landowners to develop the best options for improving fish passage while ensuring water diversion capability.
5. **Multi-species fish passage structure**– Investigate the redesign of the existing fish ladder at the Fremont Weir; evaluate the feasibility of constructing a new upstream fish passage structure, operated to ensure continued maintenance of flood capacity; no substantial changes in timing, volume, and/or duration of flow; and minimal disturbance to existing land use and agricultural practices.

Long Term Implementation

A **sixth step** should be added that considers ways to pass juvenile salmon from the river through multiple routes into the Yolo Bypass in a managed scenario to utilize the high productivity of the inundated floodplain. These six measures would improve upstream fish passage and create approximately 6,500 – 10,000 acres of spring floodplain habitat for spawning and rearing of native fishes.

Building a Conservation Strategy from the Ground Up

A Conservation Strategy for the Yolo Bypass should build from these Five Steps which have been locally vetted and integrated into Yolo County conservation efforts. As we integrate the sixth step regarding juvenile salmon, we should utilize existing resources and opportunities while capitalizing on the tremendous on the ground experience of land managers in the Yolo Bypass. We should consider the following factors:

1. Productivity of Existing Land Uses
2. Multiple Conveyance Options
3. Willing Landowners
4. Existing Planning Efforts
5. Local Stakeholder Groups/Non Governmental Organizations

Productivity and Benefits of Existing Land Uses for Wildlife

The current mosaic of agriculture and management wetlands keeps the floodplain clear of dense vegetation that could impede flood flows. The flood plain provides tremendous food resources for birds and fish in the form of seeds and invertebrates. This productivity is most likely a result of the current land uses occurring in the Yolo Bypass. These land uses are dependent upon the existing **infrastructure** used to manage water. This infrastructure could also be utilized to create and manage inundated floodplain habitat for fish. Retaining infrastructure retains the agricultural and habitat value of property, making the possibility of native fish management a palatable option for land owners. The native fish rearing would take place after the field was used for

agricultural production or wetland management. This concept of “double cropping” could be tied to landowner incentive programs.

Multiple Conveyance Options

We should research and model different means of bringing water on and off the flood plain to improve salmon rearing and spawning/rearing habitat for Sacramento Splittail. These flows would also transport increased organic matter to the Delta, increasing general productivity in the Cache Slough area. Each of these options could be implemented in a tiered scenario based on river stage, but must first undergo a thorough technical analysis and subsequent discussions with affected stakeholders. Some possibilities include:

1. Bringing water down the **west side of the Yolo Bypass** to allow land owners to run water (and fish) through flooded wetlands or rice fields in a managed scenario. This may be accomplished through a structure on the west side of the Fremont Weir or through the Knights Landing Ridge Cut Canal. Ultimately, the water and salmon would flow to the Toe Drain or Tule Canal, thence downstream to the Delta. During the appropriate time period, fish laden waters could be delivered through existing managed wetlands to serve as shallow flooded habitat. These fish would then be released into the Toe Drain and sent to the Delta when ponds are drained in the Spring. Flow rates through the wetlands and fields would be managed to avoid exceeding the capacity of the Toe Drain and subsequently flooding property owners downstream.
2. It should be possible to run water from the Sacramento River to the Yolo Bypass just north of Interstate 5. This could be used to inundate land adjacent to the toe drain on the Conaway Ranch.
3. Sacramento River water could possibly be diverted into the Yolo Bypass at a location(s) between the Fremont Weir and the Sacramento Weir for controlled inundation of developed flood plain habitat. Managed diversions should not alter the historic configuration, operation and management criteria of the existing Fremont and Sacramento Weirs.
4. Flows from Putah Creek could be utilized as a water source to flood areas within a created floodplain or adjacent to the toe drain, but there shall be no new required flows beyond the Putah Creek Accord (May, 2000).
5. Water could possibly be made available from the Westside tributaries and drainages (if available) to the Bypass for fish management.
6. The tidal fluctuations of the toe drain south of Lisbon Weir could be used to inundate adjacent low lying areas.
7. It may be necessary to move water off of these inundated areas out of the Bypass to avoid impacts to landowners in the south Bypass. A structure through the east levee could move water into the Deep Water Ship Channel.

Willing Land Owners

There currently exists willing landowners in the Yolo Bypass area who have purchased property for conservation or have proposed projects. Pilot projects should be constructed in order to learn more from these ideas. Examples include:

Private Lands:

- Conaway Ranch – Conaway Preservation Group
- Sacramento River Ranch Project – Wildlands
- Yolo Ranch – Westlands Water District
- Liberty Island Conservation Bank – Wildlands
- Swanston Ranch duck clubs (Must be compatible with Partners for Wildlife Habitat Easements)
- Some duck club owners south of the Yolo Bypass Wildlife Area may be interested.

Public Lands:

- Fremont Weir Wildlife Area – Dept. of Water Resources/ Fish and Game
- Sacramento Bypass Wildlife Area – Dept. of Water Resources/ Fish and Game
- Yolo Bypass Wildlife Area (Putah Creek realignment/ tidal restoration) – Fish and Game

Existing Planning Efforts

Conservation strategies in the Yolo Bypass should work in concert with existing planning efforts including:

- Central Valley Flood Protection Plan
- Yolo Bypass Wildlife Area Land Management Plan
- Land Use and Resource Management Plan for the Primary Zone of the Delta
- Central Valley Joint Venture Implementation Plan
- NCCP/HCP programs underway in Yolo, Solano and adjacent counties
- State and Federal habitat conservation easements (Fish and Game, USFWS, NRCS)
- Putah Creek Action Plan
- Yolo County Integrated Regional Water Management Plan/Yolo Bypass Integrated Project.
- Projects currently being planned for discharge of treated effluent water by Cities of Davis and Woodland for their Water Pollution Control facilities.

Stakeholders/ Non Governmental Organizations

The diverse mix of land uses in the Yolo Bypass is nationally recognized and enjoys tremendous public support in Northern California. The CALFED vision with wildlife habitat being managed in a working landscape while providing tremendous public

educational and recreational opportunities exists in the Yolo Bypass. This is largely a result of the involvement of local stakeholders through participation in the Yolo Bypass Working Group, facilitated by the Yolo Basin Foundation. There are also several other environmental organizations in the area that are actively involved in related projects. These entities should collectively be considered allies and a proven means to forge a broadly supported conservation strategy for the Yolo Bypass.

Larger Aquatic Recovery Efforts

Coordination with larger aquatic recovery efforts to protect and recover species such as Delta smelt, longfin smelt and Sacramento splittail are necessary. This Yolo Bypass Conservation Measure recognizes the need for species recovery, maintains the existing land uses and flood control functions of the Bypass, and recognizes the interests represented in the Lower Yolo Bypass Planning Forum. The Yolo Bypass projects are part of a watershed-wide approach to species recovery that should include (but are not limited to):

- Sacramento River National Wildlife Refuge flood plain habitat efforts
- Current aquatic ecosystem benefits emanating from the Sutter Bypass.

Potential Opportunities of the Proposed Yolo Bypass Conservation Measure

- Protection of valuable agriculture and ranching operations in the Yolo Bypass that contribute in excess of 100 million dollars to the Yolo County economy.
- Procurement of reliable adequate funding source for the management of the Yolo Bypass Wildlife Area and its public use programs, including the construction of a visitor center and Pacific Flyway Education Center.
- Bringing water down the west side of the Yolo Bypass will save hundreds of thousands of dollars in pumping costs and has the added benefit of bringing fish into the Wildlife Area wetlands.
- The Resources Agency could fully recognize and capitalize on the enormous potential of the Yolo Bypass Wildlife Area.
- Protection of waterfowl hunting throughout the season.
- Ability to protect the property between the city of Davis and the Yolo Bypass in a mixed use landscape of agriculture and habitat restoration. This area was recently included in the current 100 year flood plain maps.
- A Federal Section 408 Permit may not be required.

Potential Negatives of Unmanaged Flooding

- Section 408 permits required for large scale modifications
- Interruption of environmental education programs such as the “Discover the Flyway” program, which serves 4,000 K-12 Students, many of who come from underserved schools.
- Increased production of methylmercury through the creation of/conversion to tidal wetlands.
- Increased production of mosquitoes because of:

    - Presence of late spring water
    - Inability to implement “Best Management Practices”
- Negative impacts for non and semi-aquatic special status species such as the Giant Garter Snake, Snowy Plover and Swainson’s Hawk.
- Curtailment of hunting activity on public and private lands
- Loss of agricultural and ranching income.
- Negative impact on management of seasonal wetlands and agriculture.
- Adversely affects ground nesting birds.
- New agreements and easements would need to be negotiated with numerous unwilling landowners. Alternately, these landowners would be subject to eminent domain proceedings.
- Increased potential for erosion damage to flood control and navigation levees within and adjacent to the bypass.

Potential Supplemental Funding

- State and Central Valley Water Projects (SWP/CVP)
- Land owner incentive programs should continue to be developed with NRCS
- State and Federal Conservation Programs.
- Wildlife Conservation Board
- Federal stimulus money
- NAWCA Funding (requires local match)
- Central Valley Flood Protection Plan

ATTACHMENT A:
LOCAL IMPACTS FROM HABITAT DEVELOPMENT AND DELTA INFRASTRUCTURE PROJECTS AND SUGGESTED SOLUTIONS

July 15, 2009

Bay Delta Conservation Plan (BDCP) Conservation Measures (and other similar efforts / requirements) will include habitat development projects that may result in a number of economic and physical impacts to local governments, local districts, and landowners. Habitat development projects can include but not be limited to:

- Enhancement of existing private or public habitat
- Restoration of habitat on lands of historic similar habitat type
- Creation of habitat on lands that did not historically have such habitat
- Water delivery and operations

For the purpose of this document, any party(ies) (private or public) assuming the responsibility to design, fund, implement and/or maintain a habitat development project is referred to as the "Implementing Entity". All Implementing Entities will ensure that any proposed habitat project is consistent with existing and anticipated land use policies, guidelines, and agreements including but not limited to the most current (at the time of parcel-specific design and implementation) versions of the following:

- Delta Protection Commission's Land Use and Resource Management Plan,
- Department of Fish and Game (DFG) Yolo Bypass Wildlife Area Management Plan,
- Solano County Habitat Conservation Plan (HCP)
- Yolo Natural Heritage HCP and Natural Communities Conservation Plan (NCCP)
- Solano County General Plan
- Yolo County General Plan
- Sacramento County General Plan
- City of West Sacramento General Plan
- City of Davis General Plan
- City of Woodland General Plan
- CALFED Record of Decision
- The existing statutory and regulatory framework between Yolo Bypass Reclamation Districts (RD) and the Department of Water Resources (DWR) and the US. Army Corps of Engineers (USACE) regarding levee maintenance and flood protection.
- Existing flowage, vegetation management, mineral management easement agreements and permits/regulations between private and public landowners and the DWR / Central Valley Flood Protection Board
- Existing conservation easements between private and public landowners and DFG, US Fish and Wildlife Service, the US Natural Resources Conservation Service / Farm Service Agency, local land conservancies, and others

- Central Valley Flood Protection Plan (CVFPP) (pending approval in 2012 and every five years thereafter.
- Delta Methylmercury Total Maximum Daily Load (potential approval in 2010)

As a rule and whenever possible, habitat development projects should avoid impacts first. This document is consistent with and should be considered as a precursor to any Conservation Measure prepared by BDCP or the Lower Yolo Bypass Planning Forum regarding the Yolo Bypass / Lower Yolo Bypass / North Delta region.

Section 1 - Habitat Development on Agricultural Land and Changes to Current Management of Private and Public Managed Wetlands

Implementing Entities of habitat development must not use condemnation to achieve habitat goals. All projects must be with willing landowners only.

Impacts to Private Landowners

For projects where the landowner will continue to hold fee-title on their parcel, Implementing Entities will be responsible for the following:

1. Provide a one-time, easement-type payment (amount to be determined at a later date) to the landowner.
2. Provide a yearly, per-acre fee (amount to be determined at a later date) to the landowner.
3. Design, fund, and implement all initial infrastructure required to successfully manage a habitat project and achieve habitat goals on the project parcel.
4. Design, fund, and implement all physical / structural / regulatory protections for adjacent landowners that are not part of a habitat development agreement.
5. In partnership with the landowner, develop a project-specific "Management Agreement" that will include but not be limited to the following topics:
    - All operations and maintenance agreements including target timeframes and specific responsibilities
    - Hold harmless clauses to protect the landowner and adjacent landowners from impacts related to the presence / introduction of endangered species.
    - The amount and basis for the one-time easement payment, and yearly per-acre fee
    - Description of specific goals and objectives to be achieved with the respective parcel.
    - Parcel-specific restrictions including but not limited to acceptable timeframes to deliver flood waters, conduct onsite preparation and maintenance, and similar topics.
    - Adaptive management provisions to address unforeseen impacts (see below for additional discussion)
    - Vector control methods
    - Management of invasive species and agricultural / managed wetlands pests
    - Monitoring methods

6. For projects that include the delivery of additional flood flows from the upstream portion of the Yolo Bypass the following also apply:
    - Isolate the project parcel such that water can be delivered and managed as per the seasonal willingness of the landowner.
    - Conduct all pre and post-flood field maintenance

Impacts to Yolo Bypass Wildlife Area

In partnership with State Department of Fish and Game land management staff and with outreach to Wildlife Area partners:

1. Design, fund, and implement all initial infrastructure required to successfully manage to achieve goals of the BDCP related habitat project.

2. Design, fund, and implement all necessary physical / structural protections for adjacent landowners that are not part of the habitat project.

3. Develop a plan and procure ongoing operations and maintenance funding.

4. Develop a project-specific "Management Agreement" that recognizes the goals and objectives of the Yolo Bypass Wildlife Area Land Management Plan and that will include but not be limited to the following topics:
    - All operations and maintenance activities including target timeframes and specific responsibilities
    - Description of specific goals and objectives to be achieved with the respective unit.
    - Unit-specific restrictions including but not limited to acceptable timeframes to deliver flood waters, conduct onsite preparation and maintenance, and impacts to surrounding units.
    - Adaptive management provisions to address unforeseen impacts
    - Vector control methods
    - Management of invasive species and agricultural / managed wetlands pests
    - Monitoring methods
    - Conduct of all pre and post-flood field maintenance
    - Hold harmless clauses to protect adjacent landowners from impacts related to the presence / introduction of endangered species.

5, If increased inundation limits or prohibits existing public access and public use programs on the Yolo Bypass Wildlife Area, then additional acreage needs to be provided adjacent to the Yolo Bypass for those uses to continue. This land base should include access infrastructure, habitat development, funding to modify existing programs to fit new lands and ongoing management funds.

Lost Business Opportunity and Income

The Implementing Entity should pay a one time, per acre charge to the affected county to administer programs that help mitigate third party impacts of habitat development projects. Furthermore, funding should be made available to improve agricultural support facilities to maintain a sustainable agricultural infrastructure. Finally, habitat projects should also require offsetting preservation of agricultural land (ratio to be determined) through easements or fee title.

Loss of Property Tax to Local Governments

Parcels where the Implementing Entity acquires fee-title are often taken off property tax rolls if the new owner is a public entity (State, Federal agency or public district such as a Water District). In such cases, the new owner must provide a guaranteed source of "payment in lieu of tax" that is not dependent on State or Federal appropriations or General Fund revenues. Annual lump-sum payments may be preferred by local governments in some cases.

Loss of District Assessment Fees for Public Services

Similar to the loss of property taxes, fee-title acquisition can result in the loss of fees paid to fee assessing districts that support a range of responsibilities (i.e., water delivery, levee maintenance, emergency services, etc.). Prior to implementation of any habitat development project that requires the purchase of an interest in land or easements, the Implementing Entity must demonstrate its ability to pay in perpetuity all assessments, fees and charges due to local districts (unless it is subject to Proposition 218 restrictions).

Road / Transportation Impacts

Habitat development projects may impact local and State roads through one or more of the following scenarios:

- Temporary closure due to construction activities
- Damage due to construction activities
- Increased traffic and exceedance of service levels due to public visitation

If existing roads are impacted due to a habitat development project, the Implementing Entity will be responsible for one or more of the following:

- Provide new road alternatives and detours
- Conduct proper compliance and implementation steps to modify the service level of the road
- Repair all road damages

Adaptive Management

The BDCP as a program, and specific Implementing Entities must design and implement an adaptive process to address and resolve impacts caused by the implementation of habitat development projects. Potential negative impacts that could occur and require modification of a project may include but not be limited to: reduction of Yolo Bypass flood capacity as a result of extensive vegetation; erosion of, or seepage under levees adjacent to a project; human and environmental health risks from increased mosquito populations; increased water salinity impacting agricultural lands, freshwater habitats, and municipal, and industrial uses in the Delta; and reduced water surface elevations in sloughs and channels that might require relocation of Delta water diversion facilities.

Section 2 - Endangered Species Act (ESA) issues

Impacts to Adjacent Lands

As stated in Section 1, Implementing Entities should assume responsibility for all ESA impacts to lands adjacent to habitat developments such that the current landowners and managers are held harmless.

Local agricultural diversions and land management practices not already addressed in existing Federal Biological Opinions (BO) and/or State 2081 permits need ESA take coverage at no cost / impact to the local landowner / manager / agency providing such service. This will be achieved either through expanded inclusion in existing BOs, State assumption of ESA responsibility for local diverters, or agreements by an Implementing Entity to provide all financial coverage for avoidance structures such as fish screens, or the removal, relocation, consolidation of individual in-Delta, non-project diversions. The costs of moving / modifying / screening Delta water users' diversion facilities and the ongoing operation and maintenance costs of fish screens should be fully funded by the Implementing Entity.

If regulatory agencies require stricter water quality regulation due to the presence of new habitat and species, the State and or Implementing Entities shall be responsible for all costs of compliance in the watershed.

Section 3 - Flood Management

Maintenance and Improvements of Delta Levees

The Yolo Bypass does not currently provide capacity for 100-year flood flows. California law requires urban areas to have a minimum of 200-year flood protection. The CFVPP is being developed by DWR, and is likely to identify future improvements to the Yolo Bypass. It is therefore reasonably foreseeable that future flood improvements will be necessary in the Bypass. Habitat development projects proposed in the Yolo Bypass are likely to cause increased vegetation growth that may reduce the flood capacity and functionality of the Bypass and may violate USACE levee vegetation standards, unless

they are properly managed to prevent growth. Vegetation can, over time, change hydraulic roughness which in turn results in higher water surface elevations, which effectively reduce flood capacity and increase flood risk. In other conditions, aquatic habitat may increase open water areas. Such changes increase the energy of waves and the potential for wave induced erosion on existing levees.

In this context, changes in the weirs and associated infrastructure of the Yolo Bypass should not be implemented to establish habitat before the completion of the CVFPP and must comply with the design and capacity needs of the Yolo Bypass identified in the CVFPP. Habitat established in the Yolo Bypass shall not impede or reduce the flood capacity of the Bypass, conflict with USACE levee vegetation standards, or interfere with any reasonably foreseeable flood control improvements to the Bypass.

Further, BDCP and Implementing Entities shall commit to funding long term vegetation management and hydraulic monitoring programs to identify hydraulic changes and prevent vegetation growth that impedes Yolo Bypass flood capacity or violates the vegetation standards of the USACE.

Lastly, the cost of controlling and repairing wave-related erosion damage due to open water habitat shall be paid for by the BDCP and Implementing Entities and as part of the BDCP Adaptive Management Program (previously discussed) any habitat project shall be re-designed to avoid future ongoing damage to levees. BDCP projects shall not redirect hydraulic or other impacts to levees or other flood control facilities. Ecosystem restoration must be secondary to the protection of public safety and private property and only be pursued if the primary public safety objective can be protected and assured.

Emergency Levee Response

Implementing Entities will work with local Delta governments / agencies, RDs, and DWR to develop and fund a comprehensive program to address emergency levee activities associated with habitat development projects.

Impacts to Rio Vista and Reclamation Districts East of the Yolo Bypass

Habitat projects adjacent to and upstream of Rio Vista, and immediately west of RD 999 and 501 pose a particular risk due to the questionable flood retaining capacity of inland Federal Flood Project levees that have no ‘wetted edge”. This is particularly important in areas adjacent to Egbert Tract (near Rio Vista) and the area known as “Five Points” (north of Prospect Island)

Implementing Entities will fully mitigate any impacts associated with increased river stage due to habitat projects. If restricted height levees at Egbert Tract and Prospect Island are removed, currently dry levees must be evaluated and improved to provide adequate flood protection.

Section 4 – Other Impacts

Mosquito & Vectors

Implementing Entities must not increase the population of vector species, such as mosquitoes, that would create increased vector control costs as a result of habitat development activities on adjacent lands. Vector control, including Best Management Practices (BMPs) for managed wetlands, must be described and funded as part of the Management Agreements (see Section

Invasive Species and Agricultural Pests

Management Agreements must address and fund measures such as rapid intervention programs when invasive species are first discovered. Increased flooding could result in a profusion of invasive plants. Funding must be made available to control these plants using BMPs, including (but not limited to) herbicide or mechanical means such as mowing or discing.

Loss of Existing Wildlife

Implementing Entities must provide mitigation for impacts to existing fish and wildlife populations and habitat resulting from developments of habitat for endangered species. Additionally, all habitat development projects must be consistent with existing federal and state habitat easements, many of which are held in perpetuity.

Geographic Habitat Development Limits

BDCP (and related efforts) will determine an upper limit of habitat developments in each County (or part of a county). This limit should be mapped out geographically to clearly show the extent of potential development, including the extent of inundation due to sea level rise on lands not previously subject to flooding. Any developments above that amount will only be done with concurrence of the County. Projects shall internally incorporate buffers sufficient to avoid physical or regulatory impacts on adjacent properties or operations.

Local HCPs/NCCPs

Delta habitat lands must be counted as part of mitigation requirements for the Solano HCP and the Yolo Natural Heritage Program HCP / NCCP. These local HCP / NCCPs can not be impacted and lose species protection credits due to larger geographic efforts being addressed through BDCP.

Monitoring and Management of New Habitats

New habitat development should be accompanied by a thorough monitoring program which will develop measures for success, indicators for problems, and associated

adaptive management techniques (see Section 1). Implementing Entities need to show proof of advance funding for such monitoring to ensure it is implemented properly.

Potential Increases in Delta Water Salinity

No changes may be made to existing North Delta Water Agency (NDWA) Contract criteria and all BDCP projects must not violate NDWA Contract criteria. Agricultural salinity water quality standards should be set through the State Water Resources Control Board. Flows in the Sacramento River and sloughs must be sufficient to maintain or improve current salinity levels, particularly in Cache Slough and Rio Vista reaches.

Methylmercury Production and Control

Habitat development projects should result in no net increase in methylmercury production or transport. Projects and Implementing Entities must be in compliance with the pending Delta Methylmercury Total Maximum Daily Load. If the conceptual BMPs discussed in the CALFED ERP are not sufficient to avoid this threat, additional mitigation must be made available to all impacted parties. Mitigation options for methylmercury production require further definition and should be addressed in Management Agreements.

Water Rights

No changes can be made to existing area of origin and Delta Protection Act laws. Additionally, the existing water rights priority system and NDWA contract must be maintained and honored.

ATTACHMENT B: List of Lower Yolo Bypass Planning Forum Members in Support of the Yolo Bypass Conservation Measure

Kathy	Barnes-Jones	Solano County
Dave	Brown	Sacramento Yolo Mosquito Vector Control District
Regina	Cherovsky	Reclamation District 2035
Rose	Conroy	Davis Fire Department
Gilbert	Cosio	Reclamation District 536
Dave	Feliz	California Department of Fish and Game
Neil	Hamilton	Reclamation District 501
Mike	Hardesty	Reclamation District 2068/2098
Tom	Hester	Ryer Island
Butch	Hodgkins	Central Valley Flood Protection Board
Henry	Kuechler	North Delta Water Agency
Jack	Kuechler	RD 2060
Robin	Kulakow	Yolo Basin Foundation
Barbara	McDonnell	DWR Division of Environmental Services
Julia	McIver	Yolo County Parks and Resources Department
Selby	Mohr	Mound Farms
David	Okita	Solano County Water Agency
Tom	Scheeler	Port of Sacramento
Don	Stevens	Glide In Ranch
Ron	Tadlock	Private Landowner
Melinda	Terry	North Delta Water Agency
Jan	Vick	City of Rio Vista
Erik	Vink	Trust for Public Land
Bob	Webber	Reclamation District 999
Maria	Wong	Yolo County JPA
Linda	Fiack	Delta Protection Commission
Brad	Burkholder	California Department of Fish and Game

Chapter 3. Assurances Sought by Stakeholders for Habitat Enhancement Activities

INTRODUCTION

As previously described, the Working Group began meeting in autumn 1999 to discuss the future of the Bypass from the perspective of landowners and responsible agencies. Stakeholders have engaged in extensive discussion about issues such as:

- # protection of the current and future flood control function of the Bypass;
- # past, present, and potential future hydrology;
- # existing and potential hydraulic impacts of land use changes in the Bypass;
- # economic impacts of land use changes in the Bypass;
- # impacts associated with introduction, protection, and management of special-status species;
- # historical land management practices in the Bypass, including enforcement of historic and recent state easements; and
- # future involvement of stakeholders in Bypass-related decisions.

As meetings progressed, the landowner stakeholders (including tenants) developed a general consensus that enhancement changes could be implemented in the Bypass with their support if local, state, and federal government representatives could provide them with several assurances. This chapter discusses the assurances identified to date. It is important to note that although these assurances (and associated issues described later) represent a comprehensive list of concerns, it is not the intent of the Working Group to limit itself to only those concerns presented herein. Over time, the Working Group may identify other concerns in addition to those presented in this chapter. Chapter 4 presents several habitat-related ideas that could be feasible over time if the following assurances can be provided.

It is also important to note that the Working Group acknowledges that it is not a formal decision-making body. Such authority exists with the Yolo and Solano County Boards of Supervisors and other bodies of appropriate decision-makers. The Working Group also acknowledges that, as a group, it holds no jurisdictional authority over lands in the Bypass.

Furthermore, it is critically important that the opinions in this chapter (and document) are not construed by any reader as an absolution of private property rights by specific Bypass landowners. Landowner members of the Working Group maintain their private property rights (to the extent allowed by local, state, and federal laws) and contend that those rights should not be subjugated by the actions or desires of adjacent landowners or by the Working Group as a whole. Nonetheless, through a consensus-based process, the stakeholders have established these following assurances and associated issues as vital components of future land use changes in the Bypass.

Lastly, it is important to note that the opinions expressed in this chapter do not necessarily represent the opinions of the Foundation directors or staff.

ASSURANCES

As Working Group meetings have progressed, the landowner stakeholders in the Bypass have discussed numerous topics of concern. Over the course of the project, these topics have been distilled down to six general categories of assurances that should be provided to landowner stakeholders in the future as part of any proposed habitat enhancement land use changes in the Bypass. These six categories are:

- maintenance of stakeholder economic viability;
- protection of stakeholder lifestyles;
- fair compensation for land use changes;
- establishment of statutorially authorized, legally binding, and enforceable safe harbor (or similar) agreements regarding the introduction or enhancement of habitat for special-status species;
- assessment and mitigation of habitat enhancement project impacts related to hydraulic and hydrologic alterations; and
- acknowledgment by local, state, and federal government representatives that the Working Group is a primary advisory organization for all land management/water use issues in the Bypass.

Bypass stakeholders acknowledge that the concept of assurances can have different meanings to different people. While the above categories can be considered as stand-alone items, they also inherently overlap. The following section provides descriptions of these assurances to ensure clarity for the reader.

Maintenance of Stakeholder Economic Viability

Future changes to land use in the Bypass may affect a landowner's ability to remain economically viable. Some examples of impacts are listed below.

- Access issues related to enhanced habitats, such as road closures, culvert and bridge removals, and operations and management restrictions, could create impediments to vehicles and equipment. Such access issues could result in a loss of time efficiency for farmers and field staff, increased fuel consumption as a result of increased detour distances, and increased safety hazards if farm equipment is required to travel on surface roads more often.

- Water conveyance facilities, such as ditches, swales, pumps, check dams, and canals, could be adversely affected by increased vegetation areas, habitat-oriented buffer zones, conservation easements next to actively farmed land, and other similar conditions. Adverse impacts on water delivery facilities could include altering the timing of water delivery, increasing the operation and maintenance costs associated with water delivery and drainage facilities, increasing postflood maintenance efforts, such as removal of increased sediment and debris loads, and other similar impacts.

- Water required to support crops and managed wetlands could be affected by diversions for additional habitat-related uses. Managed wetlands and farming operations relying on water deliveries at certain times of the year could find these resources diverted or minimized because of application of these waters on habitat-based lands. Critical timing for spring and summer irrigation of row crops, flood up for rice fields, and similar situations could be impacted.

- Landowners could be adversely affected by enactment of prohibitions on the application of pesticides, herbicides, and other agricultural amendments. Such prohibitions may result from the presence of special-status species or public land users. Such conditions would minimize a landowner's ability to be competitive with other regional growers that do not have such restrictions.

In general, agricultural interests in the Bypass subsist on relatively small profit margins. The examples of reasonably foreseen impacts discussed above could result in an increased cost of doing business. These increases, coupled with recent agricultural industry surpluses in commodities such as corn and rice and the resulting price decreases of these commodities, could permanently and adversely affect a landowner's (or tenant's) ability to stay economically competitive. Impacts on economic competitiveness could result in a landowner's decision to change from practicing agriculture to fallowing land.

Alternatively, and because of recent state, federal, and nonprofit funding sources, landowners could choose to change from agricultural land uses to habitat-related land uses. In either situation, flowage and clearing easements held by the state (Chapter 2) could be prohibitive to a landowner's

desire to change land uses, even if such changes constituted the landowner's best or only alternative to remain financially stable.

These conditions must be addressed on a parcel-specific basis and cumulatively across the Bypass if landowners are to become willing to implement habitat enhancement changes.

Protection of Stakeholder Lifestyles

Farming and ranching have been the life's work of many Bypass landowners and tenants. In some cases, it is work that their parents and grandparents did. Many of these stakeholders have a bond to the landscape—a bond that transcends economic viability. Some stakeholders in the Bypass choose to remain in agriculture, even with low profit margins, simply because it is a lifestyle they know and enjoy. These stakeholders need assurance that land use changes on adjacent lands or on portions of their lands (potentially in the form of conservation easements or habitat-friendly farming easements) will not impede their lifestyle.

Similarly, duck clubs (privately managed wetlands) have been in the Bypass for many decades. These managed wetlands represent more than just an economic investment to landowners. Rather, these wetlands are a part of landowners' backgrounds as residents of the region and as stewards of the land. Changes in conditions that would threaten the viability of these managed wetlands need to be addressed.

Fair Compensation for Land Use Changes

In some cases, landowners may be willing to sell their land or enter into easement agreements for habitat-related uses. In these cases, potential sellers must be assured that compensation for their land is commensurate with compensation offered elsewhere in the Bypass for similar uses. Additionally, potential sellers need assurance that their land values will be assessed based on the net habitat benefits anticipated to be derived from the future use of the land, rather than on the continuance of agricultural practices. In a potentially depressed agricultural marketplace, such land appraisal based on agricultural uses would be inappropriate and would not reflect fair compensation. Additionally, as part of any compensation package, landowners need to be adequately compensated for any existing habitat values that they have established or preserved on their property.

Lastly, these potential sellers should be assured that the value of their land will not be depressed by their adjacency to land previously purchased or modified for habitat uses by state, federal, or nonprofit organizations. For example, if the USFWS establishes refuge land in the Bypass, properties adjacent to refuge lands should not experience a loss in value and/or utility simply because of that proximity.

Establishment of Statutorially Authorized, Legally Binding, and Enforceable Safe Harbor Agreements Regarding Special-Status Species

The presence, introduction, enhancement, and management of special-status species on lands dedicated to habitat improvements and adjacent to ongoing flood control, water supply, agricultural, and managed wetland practices is a significant concern to public and private landowner stakeholders. Many of these practices are discussed in Chapter 2. Public and private landowners, water users, and associated tenants must be granted statutorially authorized, legally binding, irreversible assurances by state and federal natural resource regulatory agencies. These assurances must state that land use changes resulting in the presence, introduction, enhancement, and management of special-status species will not endanger landowner stakeholders' ability to perform necessary land and water management activities on surrounding and nearby other lands. These lands includes privately managed wetlands (duck clubs) under federal and/or state conservation easements that must maintain certain habitat standards, as specified in easement language. "Necessary land and water management activities" can generally be defined as those activities that must take place to remain economically viable and/or maintain compliance with previously developed legal agreements. For example, operating and maintaining infrastructure, pumping water to irrigate fields, spraying insecticides, applying other amendments, operating field equipment, and managing vegetation cover crops and vegetation distribution are all necessary activities that could be jeopardized by the introduction of and management for special-status species.

Assurances regarding the accommodation of such activities are generally called "safe harbor agreements". The USFWS published general policy language regarding safe harbor agreements in June 1999; however, there has been little resolution of this issue in the Sacramento Valley and Bay-Delta region. Furthermore, the Working Group is acutely aware that the concept of safe harbor agreements has not truly been tested in a court of law, and there is little to no legal precedent as to the ability of such agreements to withstand legal challenges. Therefore, even the application and settlement of safe harbor agreements remains a tenuous proposition to public and private landowners, water users, and associated tenants without the existence of legal precedent from elsewhere in California or the United States. In lieu of such time-tested precedents, private and some public Bypass landowners will require legally binding assurances from appropriate and responsible regulating agencies that if a safe harbor agreement is invalidated, the public and private landowners, water users, and associated tenants are indemnified of all responsibilities associated with the maintenance of special-status species individuals, populations, and habitat conditions. Furthermore, similar indemnifications and assurances need to be provided to public and private landowners, water users, and associated tenants that choose not to participate in habitat-related land use changes. Without such assurances from state and federal agencies, there is little to no incentive for Bypass public and private landowners, water users, and associated tenants to introduce habitat improvements to their lands or to support habitat improvements to neighboring lands.

It must be noted that in response to the above concerns of landowners, water users, and tenants, the federal resource agencies tasked with endangered species regulatory responsibilities (USFWS and National Marine Fisheries Service [NMFS]) assert they have no legal authority to indemnify other parties without specific authorization from Congress. However, Working Group

representatives from the USFWS have stated that they can assist in the defense of safe harbor agreements against legal challenge.

Assessment and Mitigation of Hydraulic and Hydrologic Impacts on Stakeholder Lands

Technical experts generally accept that habitat-related land use changes in the Bypass could have some effect on floodflows. Specifically, the introduction of different types of naturalized vegetation in the Bypass could result in changes to water surface elevations during flood conditions. These changes are caused by friction and back water effects associated with the vegetation and are influenced by the location and extent of such vegetation. The presence, size, and location of naturalized vegetation also may cause other hydraulic effects, such as changes in flow direction and velocities. All of these impacts could occur cumulatively across the Bypass and at a parcel-specific level.

Stakeholders need assurances that any proposed habitat-related land uses will be technically assessed for potential impacts to current and potential future flood control conditions. They further need assurance that any negative impacts are fully mitigated, so that net Bypass-wide and parcel-specific effects are neutral.

Additionally, from a "competing habitats" perspective, some stakeholders are concerned that increased flooding in an attempt to improve habitat conditions for special-status species may adversely impact nesting waterfowl, pheasants, and other ground-nesting birds, as well as other terrestrial species.

Acknowledgment of the Working Group as a Primary Yolo Bypass Advisory Organization

As previously stated, the Working Group is aware of and comfortable with its limited role. The Working Group does not seek to be a decision-making body. However, it is clear to the members of the Working Group that for many years numerous decisions and discussions about Bypass-related issues have occurred without the advice and involvement of the landowners most directly affected by such decisions and discussions. The Working Group seeks to avoid those oversights in the future.

It is important that all elected and appointed decision-makers be aware of the constituent resource available to them in the form of the Working Group. It is critically important that any groups or individuals proposing future activities in the Bypass (as well as activities affecting flood water sources upstream) use the Working Group forum as a means of communicating ideas and gaining affected stakeholder input. The Working Group anticipates a long range and sincere commitment from agency representatives to work together to discuss and solve future management issues.

ASSURANCE-RELATED TOPICS AND ISSUES

As previously described, stakeholders have held numerous, wide-ranging discussions at each Working Group meeting. In the context of the previously described assurances, the landowner stakeholders have identified specific issues that should also be addressed to further ensure that their interests are protected. Some of these issues are pertinent to the entire Bypass; others are more parcel-specific. As with the previously described assurances, these issues can sometimes be considered as "stand alone issues" and, conversely, sometimes can overlap closely with each other. Although they do not need to be resolved as an immediate result of this Management Strategy, the landowner stakeholders assert that these issues are critical to future implementation of habitat enhancement activities in the Bypass. These issues have been organized under the following topic headings:

- # federal and state resource management and regulatory programs,
- # water and flood management structures,
- # land and flowage easements,
- # water use and availability,
- # economic impacts,
- # public access to bypass lands,
- # flooding and floodflows,
- # upstream storage and river capacity,
- # fisheries,
- # waterfowl and upland game birds,
- # agricultural pests,
- # general habitat conditions,
- # general information needs.

Federal and State Resource Management and Regulatory Programs

CALFED (and its natural resource partner agencies NMFS, USFWS, USACE, DWR, and DFG) should not be allowed to mandate land use and land ownership changes in the Bypass. Such changes must remain voluntary.

The existing NRCS Water Bank and DFG Presley Programs and the new NRCS CRP focus on waterfowl and do not allow for greater flexibility of land management in the Sacramento Valley. Increased management flexibility would allow landowners to maintain their conservation easement revenues while creating habitat conditions that would support a wider range of species.

Public and private landowners and tenants engaged in operations necessary to their continued livelihood, institutional missions, and /or previous legal responsibilities require safe harbor agreements, incidental take permits, and/or enforceable and binding

indemnity clauses for any activities associated with the enhancement of special-status species and habitats (see page 3-5 regarding conflicting positions relative to indemnification issues). These specific stakeholders need to have feasible and acceptable land and water management activities defined, memorialized, and resolved by state and federal agencies.

Many issues associated with the proposed USFWS NDNWR remain a concern (several of these issues are described elsewhere in this section). The USFWS must remain an active member of the Working Group and communicate and discuss refuge planning, operations, and management options.

Decisions and commitments made by agency representatives need to be backed up by signed documentation, such as memorandums of agreement or formal contracts. There is a general lack of confidence by landowners that decisions and commitments made by such representatives will be honored or maintained in perpetuity by their respective agencies if those specific representatives are reassigned to jobs outside of Bypass jurisdiction.

The Sacramento–Yolo Mosquito and Vector Control District (SYMVCD) provides a critical service in the Yolo Bypass and adjacent communities. Any future habitat concepts being considered for implementation must be directed to the SYMVCD for their design input.

The recently approved state and federal partnership on CREP easements is supported by the Working Group. Several landowners are eager to determine their potential eligibility for the program. Appropriate agencies need to support inclusion of lands in the Bypass in the CREP. Additionally, these same agencies should make full funding of the CREP a priority in California as a means of effectively implementing habitat enhancement projects and compensating landowners.

Water and Flood Management Structures

Potential or proposed changes to the Tule Canal/Toe Drain and the Fremont and Sacramento Weirs need to be fully analyzed and communicated to Yolo Bypass stakeholders.

Potential or proposed changes to levees upstream in the Sutter Bypass, along the Feather and Yuba River systems, and along the lower Sacramento and American River systems need to be better analyzed and better communicated to Yolo Bypass stakeholders.

Impacts on Bypass capacity from the Ship Channel levee (completed in 1963) need to be assessed. It is unclear whether this issue was analyzed earlier and, if so, by whom (related issues regarding impacts to flowage easements are discussed below).

The City of Woodland needs assurances that the agencies responsible for flood conveyance and flood control facilities (i.e., Reclamation Board and USACE) will ensure conveyance of Cache Creek floodflows through and out of the Cache Creek Settling Basin during floodflow conditions in the Bypass.

Land and Flowage Easements

From the landowners' perspective, flowage easements held by the state should be assessed against current FCP conditions to see whether physical, financial, and legal assumptions made when easements were first written are still valid and equitable. Should discrepancies be identified, easements should then be updated to account for present and future conditions, such as upstream urban development and inflows, habitat enhancement projects, upstream reservoir operations, and other similar conditions that could alter the flow conditions from those that existed when the easements were first granted.

DWR and USACE projects, such as levee raises, in and near the Bypass have raised concern that such projects will increase water surface elevations and flood duration and frequency in the Bypass but will not result in amendments to Bypass flowage easements. Such future proposals need to be more adequately communicated to the Working Group than in the past and have accurate and defensible analyses conducted to determine potential impacts and mitigation for Bypass land parcels.

The degree of Reclamation Board control over vegetation management in the Bypass needs to be assessed and possibly revised to accommodate the opportunity for private landowners to change the use of their land in the Bypass (assuming that such changes do not negatively impact flow conveyance and design water surface elevations)

Any parcel-specific or Bypass-wide flooding increases caused by proposed habitat enhancement projects in the Bypass should be assessed to determine whether additional flood easement payments should be provided to affected landowners.

Any parcel-specific or Bypass-wide flooding increases as a result of upstream changes in land use and the FCP should be assessed to determine whether additional flood easement payments should be provided to affected landowners.

Impacts on Bypass capacity created by the construction of the Ship Channel levee need to be assessed in the context of easements developed before the construction of the levee. Changes to water surface elevations, duration, and frequency have never been assessed or accommodated through additional easement payments to affected landowners.

Operators of gas pipelines and gas well sites need to be protected from undue hardships to the management of their land and facilities as a result of habitat enhancement. Access rights and facilities such as roads, berms, and other structures need to be maintained.

Similarly to the above issue, landowners willing to enter into any type of conservation easements need to maintain their right to also lease and/or sell mineral rights on their properties. Easement language must strike a balance between the enhancement/protection of key habitats and the potential development of mineral resources.

It must be stated that, with regard to the previous bullets under this issue, the Reclamation Board and some flood control and reclamation districts adjacent to the Bypass have expressed dissent with these opinions. Generally speaking, these dissenting affected and associate stakeholders reject the premise that existing flowage and related easements are inadequate, deficient, or otherwise impaired.

Water Use and Availability

Landowners, water users, and upstream water and flood control districts need assurances regarding who is responsible for the provision of flows necessary to support habitats in the event of a dry spell or drought. Water users not participating in habitat programs and not subject to state and federal water project conditions should not be held accountable for the provision of environmental water.

Economic Impacts

Impacts of the proposed NDNWR on the No Mans Land Fire Protection District must be assessed and mitigated to ensure that no revenue loss is incurred by the district as a result of a refuge, particularly in light of the potential for increased vegetation and fire fuels resulting from a refuge.

Impacts of the proposed NDNWR on reclamation district assessments and fees, cooperative rental rates, and other economic factors must be fully and adequately assessed and mitigated.

The loss of local government tax revenues associated with the development and/or enhancement of habitat in the Bypass should be offset by the state, federal, or nongovermental entity responsible for the land use change.

Stakeholders must be fully compensated for any negative impacts on property values resulting from habitat-related land use changes or water rights restrictions.

CALFED and other future state, federal, and private habitat enhancement proponents need to provide assurances or direct compensation for operation and maintenance costs associated with habitat-related land use changes. Most conservation easements do not offer such reimbursement, reducing incentives for landowners to enter into such agreements.

Public Access to Bypass Lands

Plans for future public access to lands in the Bypass need to be fully assessed and discussed with potentially affected landowners. Proponents of land use changes that would result in related public access should be required to develop a "public access management plan" that will include the involvement of Working Group members and/or directly affected landowners.

Present and future state and federal wildlife areas should create hunting programs for those lands to ensure a balance of hunted and nonhunted waterfowl and game bird habitat. Distribution and location of these additional hunted lands should be discussed on a yearly basis with representatives from existing duck clubs. An overabundance of nonhunted refugia could impact the economic viability of existing duck clubs in the Bypass.

Public access for hunting and nonhunting activities must be tightly controlled. Public access roads, trails, parking, and other facilities should not interfere with agricultural and duck club operations. Public access routes should have controlled access points and should be routinely patrolled by enforcement officials. Assurances must be provided by state and federal representatives that trespassers will be prosecuted to the limit of the law.

Land use changes that result in public access should be required to include buffer zones as part of their project/site design. Such buffers should be developed on the property that is incorporating the land use change, rather than the adjacent affected land. Such buffers designs could be part of the previously proposed "public access management plan" but, regardless of the format, should include input from affected landowners.

Lower Bypass access via Yolo CR 155 is limited by the use of the West Bypass Levee for Bypass ingress and egress. This levee facility is subject to closures for flood control situations and cannot be impeded by additional public access infrastructure.

Flooding and Floodflows

Increased floodflows in the Bypass interfere with water supply diversion operations and maintenance by Bypass water users. Better practices need to be developed in cooperation with DWR to accommodate diversion and maintenance needs.

Late-season flooding lasts too long, comes with little warning, and adversely affects the farmers' preparations for crop planting. Additionally, late season-impacts adversely affect ground-nesting birds and reduces the production of food plants for waterfowl. Better flow projection and early warning systems need to be implemented to more effectively inform landowners and tenants of potential late-season flooding.

The flood capacity in the Bypass needs to be maintained and protected for current and future needs. Potential increases in wildlife habitat need to be studied for the cumulative and parcel-specific effects on floodflows. Changes to flood control structures, such as increased levee height, construction of slurry walls in levees, and similar options, need to be implemented if flood control capacity is to be decreased by habitat or increased upstream inflows.

Increased stormwater runoff from all sources in the Sacramento River watershed needs to be accommodated in flood design assessments for the Bypass.

Upstream Storage and River Capacity

New offstream water storage facilities or increases in the capacity of existing upstream reservoirs need to be considered and analyzed. Failure to pursue such options needs to be assessed in the context of future impacts on Bypass landowners and the existing flowage easements held by the state.

Dredging of the Sacramento River should be considered as a means to maintain or increase capacity in the Bypass. If dredging is not a feasible option, the rationale for its infeasibility, as well as other alternatives to dredging, should be fully assessed and discussed with the Working Group.

Fisheries

Land use changes to benefit special-status fish spawning, rearing, and passage must not occur at the expense of economically viable agricultural and privately managed wetland operations. Designs for created fish habitat on private land must be mutually compatible with managed waterfowl habitats and agricultural activities. Landowners must be

adequately, fairly, and fully compensated for changes in land use that would adversely affect economic viability. This compensation also applies to project effects on adjacent properties.

Waterfowl and Upland Game Birds

Foraging and nesting habitat for waterfowl and upland game birds must be maintained and/or enhanced.

Upland habitat conditions should be considered as part of future flood control and habitat-related proposals in the Bypass. Increased flood duration and frequency and late-season floods affect the quality and quantity of breeding, foraging, and cover habitat for avian species.

Potential flight paths for the Sacramento International Airport should be assessed and monitored regarding any potential impacts to waterfowl and other migratory bird populations.

Pest and Predator Management

Extensive technical analysis and public outreach needs to be conducted regarding the potential increase of non-native species, such as mitten crab, pepperweed, water hyacinth, and giant reed, caused by enhanced habitat in the Bypass. Operations and maintenance budgets need to be available to projects that develop additional habitat, so that the presence of non-native species can be controlled.

Analysis needs to be conducted as part of any increase in habitat area to ensure that mosquito populations do not increase and are controllable. Any potential habitat enhancement projects must be designed to meet criteria set forth for mosquito vector control and must be in compliance with appropriate SYMVCD guidelines regarding related planning, design, and operations and maintenance.

Studies need to be conducted to determine the impact of increased habitat on agricultural pests. Habitat areas can provide overwintering areas for crop-damaging and beneficial insects. For instance, the following questions must be answered: What native plants are hosts for key pests? How can areas that are converted to habitat be managed for pest control? How would farmers be compensated for the increased presence of pests and resultant productivity losses?

Any habitat-related land use changes must provide for the management of potential avian and mammalian predators of waterfowl and other game birds.

General Habitat Conditions

The location of potential habitat should concentrate on areas that will not decrease floodflow capacity or impede future floodflow requirements of the FCP.

Habitat options in the Bypass should recognize the habitat needs of upland terrestrial species, not just avian species, and fish and other aquatic species.

Enhanced and/or created habitats should have enforceable and funded operations and maintenance criteria and active management of said efforts.

The implications and impacts of establishing and/or enhancing wetland and riparian habitats in an area documented to have high mercury levels needs to assessed, documented, and publicized.

Landowners participating in wetland and riparian habitat programs need to be indemnified from species protection laws and statues and/or allowed to opt out of said habitat programs if mercury is determined to be present on their lands and exposure to mercury proves to be a detrimental factor to species populations, species reproduction, or similar conditions.

General Information Needs

Flow and stage data-collection facilities, such as gage stations, need to be installed or modified on Putah Creek, Cache Creek, the Knights Landing Ridge Cut, and tidally influenced sloughs in the Southern Bypass to better record and assess the impact of flows from these sources on lands in the Bypass.

Better hydrologic assessment tools need to be developed to compile better information regarding flows over the Fremont Weir. This improvement needs to be made in order to determine whether the flows that make the weir spill today are the same as the flows that made it spill in the past.

The USACE and the Reclamation Board need to confirm and agree on the exact flood conveyance capacity of the Bypass, how close the Bypass has come to meeting or exceeding this capacity, and the future flood conveyance expectations for the Bypass.

The Reclamation Board, with support from the USACE, needs to create an equitable, affordable, and programmatic way for parties interested in habitat enhancement to assess their specific impacts on floodflow conveyance. Presently, there are numerous hydraulic

assessment tools used to assess Bypass conditions and numerous examples of variations on enforcement of Reclamation Board policies. Both the tools and enforcement need to be standardized.

Landowners and tenants need to know what they can expect from any land use modifications and water management conditions upstream, so that they can make educated business decisions for the future.

Communication about public meetings and public comment periods on projects that affect Bypass lands (e.g., levee improvements, size increases) needs to be improved.

TOPICS AND ISSUES RELATED TO THE PROPOSED NORTH DELTA NATIONAL WILDLIFE REFUGE

As previously discussed in this document, the USFWS has proposed to develop the NDNWR in the Southern Bypass. The proposed refuge is of an undetermined size at this time; however, as previously stated, the USFWS is evaluating a preferred alternative consisting of 12,300 acres, focused in the downstream end of the Southern Bypass (Figure 1-3). The USFWS anticipates completing the National Environmental Policy Act process on the proposed refuge by early to mid-2002.

Although the Foundation did not envision the proposed refuge when the Management Strategy project was proposed, funded, and initiated, the refuge became an issue that was dealt with repeatedly in Working Group meetings. As evidenced by previous topics and issues discussed in this chapter, the proposed refuge remains a primary concern of many stakeholders. Therefore, the following discussion is an additional set of topics, issues, and commitments developed by the USFWS refuge planning staff regarding the proposed refuge's effect on the Bypass, its landowners, and other associated stakeholders.

Willing-Seller Basis—Participation in a refuge will be on a voluntary basis and only by willing landowners.

Compensation at Fair Market Value—Landowners who choose to participate in the proposed refuge must and will receive just compensation from the USFWS based on the fair market value of their property.

Conservation Easements for Duck Clubs and Privately Managed Wetlands—Depending on the availability of willing landowners, the USFWS will continue to pursue acquisition of conservation easements in the vicinity of existing duck clubs; fee title purchases will not be pursued in the duck club area.

Exclude Prime Farmland—USFWS will not pursue nor will it acquire fee title interest in any prime agricultural lands.

Participation in the Working Group—If a refuge is established, the USFWS will continue to actively participate as a member of the Working Group to communicate and discuss refuge planning, operations, and management options.

Coordination of Refuge Public Use—Any plans for future public access will be fully assessed, discussed, and developed in coordination with adjacent landowners. Any hunting programs will be designed to ensure a balance of hunted and nonhunted waterfowl and gamebird habitat. Discussions will occur on a yearly basis between the USFWS and representatives from existing duck clubs to ensure that nonhunted refugia are not impacting the economic viability of existing clubs. Public access for hunting and nonhunting activities will be tightly regulated to not interfere with agricultural land and duck club operations.

Compliance with Flood Protection Laws and Policy—The USFWS will comply with the requirements of both existing state easements attached to properties purchased by the USFWS and with Presidential Executive Order 11988, Floodplain Management. The requirements of Executive Order 11988 are to reduce the risk of flood loss and minimize the impacts of floods on human safety, health, and welfare. The USFWS must also comply with its own floodplain management policy, including:

  – avoiding the long- and short-term adverse effects caused by the human occupancy and modification of floodplains;

  – reducing the risk of flood loss and minimizing the impacts of floods on human health, safety and welfare;

  – incorporating the concepts, strategies, and management tools of the Unified National Program for Floodplains Management into the USFWS's programs and actions; and

  – using an integrated process to involve the public in the planning of all actions and decisions.

Participation in the Yolo Bypass TAC —The USFWS will continue to participate in the TAC and use their recommendations to assess refuge management actions that may impact the floodplain. Any modifications of the floodplain proposed by the refuge will be subject to TAC review.

Minimization of economic effects —Any potential or real economic impacts associated with the development of the refuge will be fully and adequately assessed and mitigated.

In response to these commitments, two associated stakeholders provided the following comments.

Reclamation District 2068 with additional support and guidance from other private landowners has stated that the USFWS must clearly and affirmatively waive refuge primacy

requirements and, the USFWS must pursue an agreement or Memorandum of Understanding (MOU) that subordinates the operation of the refuge to the paramount flood control use of the Bypass. No land or easement should be accepted for ownership by the USFWS within the proposed refuge until such an MOU or agreement is completed between the USFWS, the USACE, and the Reclamation Board that clearly defines the primacy of the flood control purpose within the Bypass. This agreement must include preservation of the existing capacity and provide for the possibility of increased future demands on the flood control system as a result of upstream development and altered hydrology. Such changes could require flood control improvements within the Bypass to accommodate those future demands. Any agreement or MOU must also ensure that the USACE and Reclamation Board (and its maintaining agencies) will not be required to mitigate for present or future flood control activities and impacts as a result of this subordinate use as an operation of a refuge. It must be clear that as a condition of the establishment of the refuge, the state and federal governments will provide clear and legal confirmation that all lands in the Bypass, including the refuge land, have flood control as their primary function, unimpaired by the operation of the refuge.

The Delta Protection Commission has stated that as a part of the USFWS's commitment to "exclude prime farmland" (as listed above), such prime agricultural land needs to be defined, mapped, reviewed, and approved by the Working Group.

yolo basin foundation
P.O. Box 943, Davis, CA 95617 • Phone: 530-757-3780 • Fax: 530-757-4824 • www.yolobasin.org

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BOARD MEMBERS

Jan Smutny-Jones *Executive Director, Independent Energy Producers Association*

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Lois Wolk, State Senator, 5th District (founding member)
Mariko Yamada, Assemblymember, 8th District

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History of Stakeholder Involvement in the Yolo Bypass

Yolo Basin Foundation facilitates the Yolo Bypass Working Group and other stakeholder meetings to discuss a variety of issues affecting land management in the Yolo Bypass.

Stakeholder Forums

1989-1994 Yolo Basin Working Group (CVJV sponsored)

1997-2007 Yolo Bypass Working Group (CALFED funded) (meeting summaries posted at www.yolobasin.org)

2007-current Yolo Bypass Working Group (Water Resources Association of Yolo Co. funded)

2008-2012 Lower Yolo Bypass Planning Forum (Ecosystem Restoration Program/DFG funded)

2009-2012 Lower Yolo Bypass Planning Forum BDCP Subcommittee (Meeting summaries and BDCP Conservation measures proposals at www.yolobypass.net)

20010-current Yolo Bypass Fish Enhancement Planning Team sponsored by Resources Agency as stakeholder forum for Bay Delta Conservation Plan

Documents Created with Stakeholder Involvement

1994 Yolo Bypass Wildlife Area Land Management Plan & multi-agency MOU's (Yolo Bypass Wildlife Area Land Management Plan appendices: www.yolobasin.org

2001 A Framework for the Future: Yolo Bypass Management Strategy (CALFED funded) (www.yolobasin.org)

2002 Habitat Improvement for Native Fish in the Yolo Bypass (CALFED funded) (NHI website or DWR ARPI website)

2005 Lower Yolo Bypass Stakeholder Process Feasibility Assessment (CBDA funded) (www.yolobypass.net)

2005 Yolo Bypass Water Quality Management Plan Report (CBDA funded)

2006 Yolo County Integrated Regional Water Management Plan/Yolo Bypass Integrated Project (Water Resources Association of Yolo County funded) (http://www.yolowra.org/irwmp.html) (must)

2007	Yolo Bypass 2-D Hydrologic Model (CBDA funded) (USACOE or CV Flood Protection Board)
2007	Yolo Bypass Wildlife Area Land Management Plan, including CEQA (WCB and CBDA funded) (www.yolobasin.org)
2008	Lower Yolo Bypass Planning Forum Yolo Bypass Conservation Measures Local Impacts From Habitat Development And Delta Infrastructure Projects and Suggested Solutions

Prepared by:

Robin Kulakow
Executive Director
Yolo Basin Foundation

March 25, 2011
Update May 6, 2013

yolo basin foundation

February 1, 2012

Ms. Terry Macaulay
Delta Stewardship Council
980 Ninth Street, Suite 1500
Sacramento, CA 95814

Subject: Comments to Delta Plan EIR

Dear Ms. Macaulay:

Thank you for the opportunity to comment on the Delta Plan EIR (EIR). Yolo Basin Foundation submitted Delta Plan scoping comments to the Delta Stewardship Council on January 26, 2011. Those comments are attached to this letter. This letter will refer to comments in the scoping letter.

As you know the Yolo Basin Foundation is a partner with CA Dept. of Fish and Game (Fish and Game) at the Yolo Bypass Wildlife Area (Wildlife Area). As such our focus is on building partnerships within the Yolo Bypass. The 16,750-acre Yolo Bypass Wildlife Area is a 22 square mile mosaic of seasonal and permanent wetlands, uplands, and wildlife friendly farming and grazing. However, while there is frequent mention of the Yolo Bypass in the Delta Plan, there doesn't appear to be any mention of the impacts to the Wildlife Area of changes to the Yolo Bypass for flood control or floodplain inundation. Please address these issues or describe where they can be found in the document. If there are impacts identified what mitigation measures are being proposed?

Our scoping letter and attachments discusses the impacts of actions proposed for the Yolo Bypass. We understand that the EIR is programmatic, however, there is enough known about the effects of increased floodplain inundation on the thousands of acres of managed wetlands and agriculture on the Wildlife Area and the privately managed lands in the Bypass that impacts should be discussed in the EIR. Four ongoing planning efforts, Central Valley Flood Protection Plan (CVFPP), The Bay Delta Conservation Plan (BDCP) effort, together with the Delta Habitat Conservation and Conveyance Program ("DHCCP") led by DWR have done studies, conducted extensive modeling and have preliminary plans. The intersection of these plans with the Delta Plan and the impacts to current land uses should be discussed in the EIR. Please address these impacts or address where they are found in the EIR. If these impacts are significant what mitigations measures are being proposed.

We urge the writers of the EIR to discuss the benefits of the current land uses in the Yolo Bypass and the subsequent impacts associated with recommended changes listed in the EIR on flood control, agriculture, wildlife management, and vector control. Our January

2011 scoping comments state, "The benefits of current uses must be considered fully in any plan that proposes changes to the operation of the Bypass. Please refer to the attached binder beginning with the document: *BDCP Habitat Conservation Measure (FLOO1.1) Modification of Fremont Weir and Spring Inundation of the Yolo Bypass* (Document 4). The Yolo Basin Foundation has provided related comments to the BDCP Steering Committee, Delta Stewardship Council, Delta Vision and the CALFED Ecosystem Restoration Program for over 10 years." The benefits of current land uses should be fully elaborated before the public can understand the impact of the Delta Plan. We understand that CEQA is not designed to describe benefits but in this case it is important to understand the impacts to current agriculture, flood control, habitat management and vector control activities.

Flood Control, habitat restoration and agriculture currently co-exist in the Yolo Bypass. This is successful based on careful implementation of wetlands best management practices, wildlife friendly farming practices and mosquito control best management practices developed in the last twenty years. The EIR needs to address the impacts of proposed changes for increased floodplain inundation on existing management practices. What are the impacts and how will a balance be reached that extends the currently successful practices?

The EIR misses the opportunity to make recommendations to build on existing partnerships in the Yolo Bypass. The management of the Yolo Bypass Wildlife Area exemplifies the effectives of strong partnerships. The importance of building on existing partnerships in the Bypass is not listed in the recommendations in Appendix C. Descriptions of these partnerships are essential in order address potential impacts.

In the Yolo Bypass there are wetlands projects currently being planned, not just aquatic habitat related plans. These projects address goals of the Central Valley Joint Venture, the Yolo Bypass Wildlife Area Land Management Plan and others. They are being funded in various ways including North American Wetlands Conservation Act funds, Duck Stamp funds, and other ongoing federal or state wetland easement programs. The EIR misses the opportunity to make integrated management a cornerstone of the Delta Plan. We believe that these current plans should be described in better detail in the EIR.

The Yolo Basin Foundation board values environmental education and has supported a very successful K-12 school program that has brought over 4,000 students annually out to the Wildlife Area. These students come from five counties, including the Delta counties of Solano, Yolo and Sacramento. Appendix C makes a recommendation to work on expanding wildlife viewing and other recreational opportunities in the Delta. Support for and expansion of environmental education programs in the Delta should also be a recommendation.

While it is essential that ecosystem restoration efforts for all species continue, it is equally important that there be funds for operations and maintenance costs for existing habitat area such as State Wildlife Areas. O & M costs are an ongoing problem for habitat restoration projects on public lands. This is an important ingredient that should be addressed in the Delta Plan. Unsupervised lands will impact the spread of invasive species.

The impacts of minimal funding of O&M costs are significant and put all habitat projects at risk. How will the plan assure that such funding is provided? If it is not provided this could result in a potential physical impact that should be addressed in the EIR.

The Yolo Basin Foundation appreciates the extensive public outreach prior to preparation of the Delta Plan EIR. We also appreciate the mention of coordination with the Yolo Basin Foundation in the future. The Foundation looks forward to being of service in carrying out elements of the Delta Plan.

Sincerely,

Betsy Marchand

Robin Kulakow

Betsy Marchand
Chair

Robin Kulakow
Executive Director

Yolo Basin Foundation Op-Ed Regarding the Bay Delta Conservation Plan
(This opinion piece appeared in the Davis Enterprise on 4/26/09 as "Spring Flooding Imperils Bypass.")

Don't throw the baby out with the bathwater! A measure contained in the Bay Delta Conservation Plan (BDCP) would do just that if it isn't modified.

The Sacramento-San Joaquin Delta ecosystem is in trouble. Governor Schwarzenegger has assembled an army of agency leaders, staff and consultants with the goal of solving the Delta ecosystem crisis and providing guaranteed water to Southern California people and farms before he leaves office. "Delta Vision," published in November 2008, is the outcome of their effort, and the BDCP is a complex multi-party plan to carry out the goals of "Delta Vision" within the context of the state and federal endangered species acts.

A model for solving the Delta's problems exists here in Yolo County--the 16,000-acre Yolo Bypass Wildlife Area, and the partnerships it was founded on. Instead of incorporating this successful model, policy makers are on their way to undoing 20 years of community effort to create and manage this amazing public resource.

The Yolo Bypass Wildlife Area, owned and operated by the CA Department of Fish and Game, exemplifies the power of diverse interests working together, and its success is possible because of widespread community and agency support that is based on a long running grassroots effort. It exists within the flood control function of the Bypass; it contributes to the agricultural economy of Yolo County; and it is an open space jewel for the regional community, all while providing a healthy, diverse wetlands ecosystem. The fact that the Yolo Bypass Wildlife Area is located adjacent to the State Capitol means it is accessible to a large metropolitan population, and its impact on building a community environmental ethic should not be underestimated.

The BDCP proposes to construct a notch in the Fremont Weir in order to prolong spring flooding, fundamentally changing how the Bypass works. The Fremont Weir currently diverts up to 500,000 cubic feet per second of water into the Yolo Bypass when the Sacramento River reaches flood stage. The proposed modification would be used to flood the Bypass for a 45 day period between January and May in most years.

This proposal is based on studies that compared the health of young ocean-going salmon that were carried by floodwaters into the Bypass with similar smolts caught in the Sacramento River. The fish that migrated via the Bypass showed signs of being healthier than those that migrated through the channelized Sacramento River. It is hypothesized that the difference is based on time spent in the shallow waters of the Yolo Bypass floodplain.

While this proposed measure may improve the survival chances for some young salmon in a few more years than currently happens, it is only one among many actions that need to be completed to improve salmon survival throughout their life cycle to the ocean and back. The Yolo Bypass Wildlife Area Land Management Plan contains five other actions to improve conditions for salmon and other native fish without notching the Fremont Weir. A copy of the plan can be found on the Yolo Basin Foundation's website: www.yolobasin.org.

Increased frequency and duration of spring flooding will have a serious impact on agriculture and habitat management in the Yolo Bypass, tipping the balance toward inviability. The extensive rice growing operations in the Bypass provide millions of dollars of income that contributes to the vibrant Yolo County agriculture economy as well as valuable habitat for water birds. The Yolo County Agriculture Commission estimates that the combination of rice and other crops plus ranching in the Yolo Bypass creates about $44 million in direct farm income annually.

Rice farmers need to start preparing the ground and planting rice starting in March. There are already years in which spring flooding prevents this field work and the rice acreage decreases significantly. Increased spring flooding makes nearly every year a bad year for Bypass farmers and the habitat benefits they provide.

Agriculture, including ranching, is fully integrated into the management of the Wildlife Area. With the involvement of the Dixon Resource Conservation District, agricultural activities help Fish and Game fulfill their habitat goals while generating important income for the operation of the Wildlife Area. This income is what makes it possible for the Wildlife Area to be open to the public and managed in a way that creates and sustains diverse habitat.

Spring flooding is problematic in other ways. Floodwaters that linger into spring encourage the growth of tules, cattails, and willows which left unmanaged will slow down the movement of floodwaters. This proliferation of emergent vegetation reduces the ability of the Yolo Bypass to move floodwaters away from urban areas as designed. Late spring flooding also adversely affects the success of ground nesting birds because the growth of grasses that provide cover is delayed.

Yolo Basin Foundation, the nonprofit associated with the Wildlife Area, is working to deliver the message to the members of the BDCP Steering Committee that there are other measures available to improve aquatic habitat for fish while sustaining the existing high quality mosaic of farm fields and wetlands. We are encouraging them to work with us to develop a set of actions that builds upon the success of the Yolo Bypass Wildlife Area and honors current management underway on public and private lands throughout the Yolo Bypass.

We also urge the citizens of Yolo County to weigh in on the BDCP effort by expressing support for the protection of the Yolo Bypass Wildlife Area and the values it represents. The BDCP EIR/EIS scoping process is open for public comment until May 14th. For information on how to submit comments go to http://www.resources.ca.gov/bdcp/.

Robin Kulakow
Ann Brice
Yolo Basin Foundation

yolo basin foundation

BDCP Habitat Conservation Measure (FLOO1.1): Modification of Fremont Weir and Spring Inundation of the Yolo Bypass

The Yolo Bypass Wildlife Area is a unique resource that provides substantial environmental, social, and economic benefits to the people of California. The 16,000 acres consists of an outstanding mix of terrestrial and wetland habitats that is home to many threatened and endangered species. It is the most popular wildlife viewing, environmental education, and waterfowl hunting destination in the Sacramento Delta.

Habitat Conservation Measures described in the Bay Delta Conservation Plan will have adverse impacts on the Yolo Bypass Wildlife Area. Specifically, the proposed Floodplain Habitat Restoration Conservation Measure (FLOO1.1): "Modify the Fremont Weir and the Yolo Bypass to provide for a higher frequency and duration of inundation," must be evaluated for compatibility with existing public use programs, agricultural and wetland operations, and legal obligations under state, federal and international law.

The immediate **adverse impacts** of more frequent inundation of the Yolo Bypass include but are not limited to:

- **Public Use (All public use activities cease when the Bypass floods.)**
  - School Program: Approximately 4,000 students annually visit the Wildlife Area annually as part of the "Discover the Flyway" program. The program attracts students from over 100 schools in 5 counties.
  - Hunting Activity: Over 4,000 hunters utilize the area from throughout northern California. Hunter dollars provide the largest component of the operating budget at Yolo.
  - Wildlife Viewing: It is estimated that 30,000 people a year visit the Wildlife Area to view the large variety and number of birds, which peak in the winter and spring months.
- **Agriculture**
  - Agricultural Activities: There will be an inability to plant fields until they have dried out enough to begin ground tillage. Delaying this initiation of farming activity severely limits what can be grown here. White rice production will be severely impacted.
  - Forage value of uplands: Prolonged flooding results in the introduction of unwanted plant species, such as cocklebur, in the uplands. This will lead to a reduction in grazing lease fees and subsequent reduction in operating funds.
- **Wildlife**
  - Spring Nesting: This activity will be nearly eliminated. Ground nesting birds such as waterfowl, harriers, kites and shorebirds are especially vulnerable to spring flooding.
  - Rodent Presence: Fewer rodents, due to flooding, results in a reduction in food for wintering raptors.
  - Threatened and Endangered Terrestrial and Wetland Species: There will be adverse impacts to numerous protected species.

Adverse Impacts (continued)

- **Vector Control**
  - Best Management Practices: Established BMPs for wetland management under controlled conditions will not apply, resulting in increased mosquito production. The BMPs are the basis for our working relationship with Sacramento Yolo Mosquito and Vector Control District.
- **Flood Control**
  - Agreed upon vegetation densities will not be manageable with increased spring flooding, which encourages uncontrolled growth of tules, cattails and willows. This will make the Wildlife Area non compliant with the flood control function of the Yolo Bypass.
- **Methylmercury**
  - Best Management Practices: Current BMPs developed as part of a Total Maximum Daily Load for the Delta, will reduce the creation of methylmercury in wetlands that is subsequently transported to the Delta. These BMPs will not be applicable with increased flooding. The result could be a net increase in the levels of methylmercury being transported to the Delta.

Existing Obligations Impacted by FLOO1.1:

- Agreements signed by DFG to manage habitat that is compatible with flood control: Project Modification Report, USACOE and DFG 1992; Other MOUs signed in 1994.

- Legal requirements of federal and state easement programs including federal Wetland Reserve Program, Presley Program and others on both public and private lands require a set management regime.

- Use of NAWCA funds to restore wetlands obligated DFG to manage the constructed wetlands for the benefit of migratory waterfowl and shorebirds in perpetuity.

- Increased spring inundation compromises the long established goals of the Central Valley Joint Venture and violates the DFG's commitment to manage these wetlands for waterfowl and shorebirds.

- Increased spring inundation affects the International Waterfowl Management Plan, an international treaty aimed at protecting migratory waterfowl populations.

- The Wildlife Area provides important habitat for several listed species, including Giant Garter Snake, Snowy Plover, Conservancy Fairy Shrimp, and Ferris' Alakali Milk Vetch.

Yolo Basin Foundation Comments for BDCP Scoping Meeting
Current Land Use Questions related to Fremont Weir Modification for Increased Frequency and Duration Conservation Measure
March 18, 2009

The Yolo Basin Foundation requests that the EIR/EIS should address and quantify existing land uses and how increased frequency and duration of spring inundation with impact them.

Please specifically quantify and address impacts to:

- **Public Use**
  - School Programs
  - Hunting Activity
  - Wildlife Viewing

- **Agriculture**
  - Agricultural Activities including rice, tomatoes, and other crops and what is the economic impact of the loss of farming to the Yolo Bypass Wildlife Area operations budget? What is the overall economic loss to Yolo and Solano County?
  - Forage value of uplands to support grazing leases and what is the economic impact of losses associated with loss of forage value?

- **Wildlife**
  - What is the extent of the impact to spring nesting opportunities for the range of resident species?
  - Rodent Presence for wintering and resident raptors
  - What are the Threatened and Endangered terrestrial and wetland species that will be impacted?
  - What is the extent and quantity of terrestrial species (plants and animals) that will be affected?
  - When will surveys be initiated to determine the species composition of un-surveyed lands on the Wildlife Area?

- **Vector Control**
  - How will current Best Management Practices used at the Wildlife Area for controlling mosquitoes be affected?
  - What is the expected increase in mosquito production with more frequent flooding?
  - What are the expected increases in control costs? What is the expected increase in chemical control versus water management costs?
  - Once the flows over modified Fremont Weir are discontinued, how long will it be until the land is dry enough for mosquito production to cease?
- **Flood Control**
  - How will vegetation densities that slow down flood flow be manageable with increased spring flooding?
  - How much will mechanical control such as mowing and herbicide application cost in comparison to current farming and wetland

-Comments continue on opposite page-

management practices that keep the growth of emergent vegetation to a controlled density?
    - What herbicides are available to control emergent vegetation adjacent to waterways and wetlands?
    - When will 2-D modeling to predict the change in the peak flood flow for the proposed changes in land use be completed? This is the 2D model developed by the USACOE in 2007 for DWR Flood Management Division that is required by the Central Valley Flood Protection Board when application for an encroachment permit for land use changes in the Yolo Bypass?
    - How will the resulting impacts be addressed?
    - When will the Encroachment Permit application be made?
    - How will the BDCP be coordinated with the recently initiated Central Valley Flood Protection Program? Are there lost opportunities associated with modifying the Fremont Weir prior to completion of the system wide flood protection plan?

What are the impacts to the existing land management obligations and how will they be addressed?

- Agreements signed by DFG to manage habitat that is compatible with flood control: Project Modification Report, USACOE and DFG 1992;

- Other MOUs signed in 1994 regarding endangered species and maintenance of the Yolo Bypass as a floodway.

- Legal requirements of federal and state easement programs including federal Wetland Reserve Program, Presley Program and others on both public and private land. What are the impacts to the Land Management Plans mandated for each specific easement?

- Use of NAWCA funds to restore wetlands obligated DFG to manage the constructed wetlands for the benefit of migratory waterfowl and shorebirds in perpetuity.

- The long established goals of the Central Valley Joint Venture for the Yolo Basin and DFG's commitment to manage these wetlands for waterfowl and shorebirds.

- The International Waterfowl Management Plan, an international treaty aimed at protecting migratory waterfowl populations.

- Existing habitat for several listed species, including Giant Garter Snake, Snowy Plover, Conservancy Fairy Shrimp, and Ferris' Alkali Milk Vetch

WORKSHOP COMMENTS of the YOLO BASIN FOUNDATION
on the DELTA VISION STRATEGIC PLAN of the
DELTA VISION BLUE RIBBON TASK FORCE
DECEMBER 5, 2008

The YOLO BASIN FOUNDATION (Foundation) [*] is a non-profit organization formed in 1990 to inspire and educate the public about wetlands and wildlife of the Central Valley while promoting innovative partnerships. Its primary focus has been the creation and management of the Vic Fazio Yolo Bypass Wildlife Area as a resource for the public, working in partnership with the Department of Fish and Game (DFG) and numerous other federal, state and local agencies and organizations. The Foundation has received numerous awards and recognitions for its work in promoting collaborative approaches to managing the lands, water and institutions in the Yolo Bypass over the past twenty years. A list of organizations and public office holders who have been engaged with the Foundation's working groups and collaboratives is attached to these Comments. These Comments reflect the position of the Foundation's Board, a list of whose membership is attached.

The Yolo Bypass Wildlife Area as managed by State Department of Fish and Game is an innovative mix of rice culture, cattle grazing, and row crops that combined with state of the art wetland management, has created a prime example of a wildlife friendly working landscape. It is compatible with flood protection and it is supported by the community. In short, it is the epitome of the vision for a healthy, sustainable Delta.

The Delta Vision Strategic Plan of the Delta Vision Task Force is by-and-large a comprehensive, well-thought-out approach to Delta issues. Its embrace of adaptive management and a balanced approach to the twin objectives of reliability of water supply and Delta ecosystem restoration for multiple uses is both realistic and far-sighted. However, its approach to issues in the Yolo Bypass (Bypass) is a departure from these high standards. The treatment of the Bypass raises serious concerns and is both procedurally and substantively flawed. As a result, the

[*] The Foundation's website is found at http://www.yolobasin.org. *The Yolo Bypass Wildlife Area Land Management Plan* referred to throughout these Comments is available on the website.

Strategic Plan recommended actions both undermine existing successes and obstruct achievement of Strategic Plan goals.

The procedural flaws involve a failure to participate in the ongoing discussions of the Yolo Bypass Working Group and to consider fully formal plans, commitments and environmental documents for the Bypass developed over almost twenty years. This includes most recently the comprehensive *Yolo Bypass Wildlife Area Land Management Plan* (*Management Plan*) issued by the Department of Fish and Game in June 2008 after five-and-half years of collaborative stakeholder effort (*Management Plan,* Appendix A, Public Outreach Summary). A hard copy of the *Management Plan* is attached to the original of these Comments.

Other existing commitments specific to the Bypass but not fully or explicitly considered in the Strategic Plan Final Report include:

- Agreements signed by DFG to manage habitat that is compatible with flood control: Project Modification Report, US Army Corps o Engineers and DFG 1992
- Legal requirements of federal and state easement programs including federal Wetland Reserve Program, Presley Program and others on both public and private lands which require a set management regime.
- Use of North American Waterfowl Conservation Act (NAWCA) funds to restore wetlands obligates DFG to manage the constructed wetlands for the benefit of migratory waterfowl and shorebirds in perpetuity.
- DFG's commitments to the Central Valley Habitat Joint Venture to manage wetlands for waterfowl and shorebirds as directed by the North American Waterfowl Management Plan, an international treaty aimed at protecting migratory waterfowl populations.

The Yolo Bypass is treated by the Strategic Plan primarily as a water conveyance facility, rather than the complex mix of agriculture and terrestrial, wetland and aquatic ecosystems that it is. Full consideration of the *Management Plan* and the stakeholder discussions that led up to it might have improved Delta Vision understanding and treatment of the Bypass.

The procedural flaws lead directly to the major substantive flaw, the Proposed Action 3.1.1(a), implementing Strategy 3.1:

> Sacramento River/Yolo Bypass: Increase inundation frequency on the Yolo Bypass by 2015 without compromising flood protection. Modify the Fremont Weir and other internal waterway features as needed to allow the Yolo Bypass to 1) flood at least 60 days continuously between January and April every other year except during critical dry years, and 2) provide multiple inflow pulses at two-to-three week intervals during this inundation period. Doing so promotes

> primary and secondary productivity, splittail spawning, as well as other benefits. Improvements should ease passage impediments at the Fremont Weir, Lisbon Weir, Toe Drain, and other barrier points for adult and juvenile salmon, sturgeon, and splittail. These actions will be balanced with existing fish and wildlife benefits provided in the bypass. (Strategic Plan, page 71)

Proposed Action 3.1.1(a) directly contradicts the *Management Plan* and would have devastating impacts, unacknowledged by the Strategic Plan, on the extensive state and federal investments in the Yolo Bypass Wildlife Area. The Yolo Bypass Interagency Working Group -- made up of representatives of National Marine Fisheries Service, US Fish and Wildlife Service, DFG, DWR and National Oceanic and Atmospheric Administration -- and DFG in the *Management Plan* have formally considered and rejected Fremont Weir modification in favor of five other measures for improving fish habitat without adversely affecting flood control, agricultural operations, public uses and habitat management in the Bypass. (*Management Plan*, 3.1-18)

Proposed Action 3.1.1(a) should be eliminated from the Plan, or modified to eliminate the Fremont Weir proposal and the 60 days of continuous inundation element.

Proposed Action 3.1.1.1(a) substantially increases the frequency and duration of spring inundation of the Bypass resulting in significant adverse impacts for every stakeholder in the Bypass.* These impacts include:

Public Use (All public use activities must cease when the Fremont Weir spills)

Hunting Activity: Over 4,000 hunters utilize the Yolo Bypass Wildlife Area from throughout northern California. Hunter dollars provide the largest component of the operating budget at the Yolo Bypass Wildlife Area.

* Note that the "balancing" considerations in Proposed Action 3.1.1(a) are limited to "existing fish and wildlife uses." This appears inconsistent with other goals for the Strategic Plan since it ignores the existing public, educational and recreational uses of the Yolo Bypass Wildlife Area and private landholdings in the Bypass. Compare Goal 2 and Strategies 2.2 and 2.3. If the Proposed Action 3.1.1(a) is retained in any form, the balancing concerns must include public uses including recreation, education, and agriculture.

Wildlife Viewing: It is estimated that 30,000 people a year visit the Wildlife Area to view the large variety and number of birds, which peak in the winter and spring months.

Education: Approximately 4,000 students annually visit the Wildlife Area annually as part of the "Discover the Flyway" program sponsored by Yolo Basin Foundation in partnership with the Dept. of Fish and Game. The program serves students from over 100 schools in 5 counties.

Agriculture

Agricultural Activities: There will be an inability to plant fields until they have dried out enough to begin ground tillage. Delaying this initiation of farming activity severely limits what can be grown here. White rice production will be severely impacted. A letter from Jack De Wit, the largest farmer in the Bypass, is attached.

Forage value of uplands: Prolonged flooding results in the introduction of unwanted plant species, such as cocklebur, in the uplands. The loss of forage value will necessitate lower grazing lease fees, and subsequent reduction in operating funds for the Yolo Bypass Wildlife Area.

Wildlife

Threatened and Endangered Terrestrial and Wetland Species: There will be adverse impacts to numerous protected terrestrial species, including Giant Garter Snake, Snowy Plover, Conservancy Fairy Shrimp, and Ferris' Alkali Milk Vetch.

Spring nesting activity for birds will be nearly eliminated. Ground nesting birds such as waterfowl, harriers, kites and shorebirds are especially vulnerable to spring flooding. Fewer rodents due to flooding will result in a reduction in food for wintering raptors.

Vector Control

Established Best Management Practices for wetland management under controlled conditions will not apply, resulting in increased mosquito production, violating the working relationship among DFG, Sacramento-Yolo Mosquito and Vector Control District and other agencies.

Flood Control

Agreed upon vegetation densities will not be manageable with increased spring flooding, which encourages uncontrolled growth of tules, cattails and willows. This will make the Wildlife Area non-compliant with the flood control function of the Yolo Bypass.

Methyl Mercury

Best Management Practices now being developed as part of a Total Maximum Daily Load for the Delta, will reduce the creation of methyl mercury in wetlands that is subsequently

transported to the Delta. These BMPs will not be applicable with increased flooding. The result could be a net increase in the levels of methyl mercury being transported to the Delta.

The Bypass can be -- and already is -- the location of extensive fish habitat and aquatic ecosystem restoration activities that are compatible with agriculture and flood control, as well as the Strategic Plan's balanced vision. The *Management Plan* (Pages 3.1-17 through 3.1-20) supports the five (5) measures determined by the Yolo Bypass Interagency Working Group for improving fish habitat, beginning with realignment of Putah Creek for improving salmon passage, increasing shallow flooded habitat and creating tidal marsh habitat on existing public land (the Yolo Bypass Wildlife Area). **There is the potential for approximately 800 acres of improved fish habitat associated with this action that is already partially funded with the first one hundred acres of expanded tidal marsh habitat restoration slated to begin next summer.** We encourage Delta Vision interests to work with us in making this project a success.

The goals of the Delta Vision Strategic Plan will be successful only if there is broad-based community input and support. We think that the lessons our community has learned in the 20-year effort on behalf of Yolo Bypass Wildlife Area offer hope for restoring a healthy Delta that meets the needs of all Californians.

ATTACHMENTS

List of YBF Board members
List of stakeholder/collaborators
Yolo Bypass Wildlife Area Management Plan
Jack De Wit, De Wit Farms Letter
Putah Creek Realignment Visual

Exhibit I

yolo basin foundation

Timeline of Stakeholder Involvement in the Yolo Bypass 1989-2018

1989 - 1994 Yolo Basin Working Group: Yolo Basin Foundation and Central Valley Joint Venture sponsored

Yolo Bypass Working Group

Meeting summaries are posted at http://www.yolobasin.org/

1997 - 2007 CALFED grant to Yolo Basin Foundation

2007 - 2015 Water Resources Association of Yolo County grants to Yolo Basin Foundation)

2015 - current Yolo Basin Foundation funded.

Other Stakeholder Forums

2008 - 2012 Lower Yolo Bypass Planning Forum Ecosystem Restoration Program: California Department of Fish and Game contract with Center for Collaborative Policy

2009 - 2012 Lower Yolo Bypass Planning Forum Bay Delta Conservation Plan Subcommittee on Yolo Basin Foundation

2010 - 2015 Yolo Bypass Fish Enhancement Planning Team: sponsored by Resources Agency as a stakeholder forum for Bay Delta Conservation Plan

August 2014 Yolo Bypass Salmonid Habitat Restoration and Fish Passage Value Planning Exercise: US Bureau of Reclamation

2014 - 2015 Yolo Bypass Local Planning Group: Yolo Basin Foundation, Yolo County

2015 - 2016 Yolo Bypass Post Value Planning Working Group: Yolo Basin Foundation, Yolo County, Sacramento Area Flood Control Agency

2016 - current Yolo Bypass Biological Opinion Working Group: Metropolitan Water District

Yolo Bypass Related Documents
created with Yolo Basin Foundation participation

1994 *Yolo Bypass Wildlife Area Land Management Plan* and multi-agency MOU's (see Yolo Bypass Wildlife Area Land Management Plan appendices). Yolo Basin Foundation coordinated Yolo Basin Working Group as a stakeholder participation forum in cooperation with Central Valley Joint Venture. (www.yolobasin.org)

2001 *A Framework for the Future: Yolo Bypass Management Strategy* (CALFED grant to Yolo Basin Foundation for Yolo Bypass Working Group participation) (www.yolobasin.org)

2002 *Habitat Improvement for Native Fish in the Yolo Bypass*. The study team included DWR, Natural Heritage Institute and Yolo Basin Foundation. Yolo Basin Foundation coordinated stakeholder participation through the Yolo Bypass Working Group.

2005 *Lower Yolo Bypass Stakeholder Process Feasibility Assessment* (California Bay Delta Authority grant to Yolo Basin Foundation)

2005 *Yolo Bypass Water Quality Management Plan Report* (California Bay Delta Authority funded) Yolo Basin Foundation coordinated the stakeholder technical advisory committee.

2006 *Yolo County Integrated Regional Water Management Plan*/Yolo Bypass Integrated Project. Yolo Basin Foundation is the implementing entity for the Yolo Bypass Integrated Project. (Water Resources Association of Yolo County contract with Yolo Basin Foundation) (www.yolowra.org/irwmp.html)

2007 *Yolo Bypass 2-D Hydrologic Model* (California Bay Delta Authority funded and prepared by USACOE and Central Valley Flood Protection Board) Yolo Basin Foundation coordinated the Yolo Bypass Hydrologic Modeling Technical Advisory Committee.

2007 *Yolo Bypass Wildlife Area Land Management Plan*, including CEQA (Wildlife Conservation Board and California Bay Delta Authority funded)) Yolo Basin Foundation coordinated subject focused stakeholder meetings through the Yolo Bypass Working Group under contract with EDAW. (www.yolobasin.org)

2008 Lower Yolo Bypass Planning Forum: Yolo Bypass Conservation Measures *Local Impacts from Habitat Development And Delta Infrastructure Projects and Suggested Solutions.* Yolo Basin Foundation was the founding member of the Planning Forum.

January 28, 2018

2010 *Preliminary Description of a Westside Yolo Bypass Management Option for Rearing Juvenile Salmon.* prepared by Yolo Basin Foundation, cbec ecoengineers and Wetlands and Water Resources with stakeholder participation through the YBWG.

2012 Yolo Bypass MIKE-21 Model Review: Strengths, Limitations and Recommendations for Refinement (September 2012) Yolo County worked with Northwest Hydraulics Consultants to complete a review of the MIKE-21 model, used in the past to estimate the inundation footprint associated with proposals to increase the frequency and duration of Yolo Bypass inundation. This review applies to other models as well.

2012 Waterfowl Impacts of the Proposed Conservation Measure 2 for the Yolo Bypass – An effects analysis tool (July 2012) Ducks Unlimited worked in cooperation with Yolo County and the Yolo Basin Foundation to analyze the potential impacts to waterfowl habitat of proposals to increase the frequency and duration of inundation in the Yolo Bypass to benefit juvenile salmon and other fish species.

2013 Agricultural and Economic Impacts of Yolo Bypass Fish Habitat Proposals (April 2013) Yolo County worked with UC Davis researchers, the Yolo Basin Foundation and Yolo Bypass farmers to analyze the agricultural impacts of state and federal proposals to increase the frequency and duration of inundation in the Yolo Bypass to benefit juvenile salmon and other fish species. Yolo Basin Foundation coordinated participation of Yolo Bypass farmers.

2014 Yolo Bypass Drainage and Water Infrastructure Improvement Study (April 2014) Yolo County worked with cbec eco engineering, Douglas Environmental, Consero Solutions, and the Yolo Basin Foundation to complete the Yolo Bypass Drainage and Water Infrastructure Improvement Study. The goal of the study was to work with Yolo Bypass land owners, farmers, wetlands managers to identify and prioritize Yolo Bypass drainage and water infrastructure improvements that benefit agricultural and wetlands operations. The study identifies improvements that could be implemented as part of any project to increase the frequency and duration of inundation in the Yolo Bypass for fish.

Exhibit J

MEMORANDUM OF UNDERSTANDING
REGARDING THREATENED AND ENDANGERED SPECIES IN THE YOLO BASIN WETLANDS PROJECT

The Reclamation Board (Board), the Department of Water Resources (DWR), the California Department of Fish and Game (DFG), and the United States Fish and Wildlife Service (USFWS) (all hereinafter referred to collectively as the Parties) have entered this Memorandum of Understanding (MOU) to confirm and clarify their understanding, agreements, representations, and commitments with respect to threatened and endangered species that exist or could occur in the Yolo Basin Wetlands Project - Putah Sinks site and the administration of the federal Endangered Species Act (16 U.S.C. § 1531 et seq.) and the California Endangered Species Act (Fish and Game Code § 2050 et seq.) (together, the Acts), and to facilitate the successful avoidance of adverse impacts to public safety as it relates to flood control.

EXPLANATORY RECITALS

1. The U.S. Army Corps of Engineers (Corps) and DFG have approved an undertaking consisting of the modification of a federally authorized flood control project. The project modification provides for the restoration, enhancement, and maintenance of wetlands and other habitats. The project modification, located within the Yolo Bypass, a feature of the Sacramento River Flood Control Project (SRFCP), is described in detail in the "Project Modification Report and Environmental Assessment/Initial Study (April 1992)."

2. The Corps is developing an Operation and Maintenance (O&M) Manual for the project modification. Upon its acceptance of the completed project from the Corps, DFG, or its assignee will be required to operate, maintain, repair, replace, and rehabilitate (hereinafter referred to collectively as manage) the completed project in accordance with the O&M Manual.

3. The Board has the obligation to operate and maintain the Yolo Bypass, and DWR has obligations to maintain the Yolo Bypass under California Water Code Section 8361.

4. The Board is required by agreement and California Water Code Section 8710 to prohibit encroachments or activities that will adversely affect the capacity, operation and maintenance of flood control works such as the Yolo Bypass. An agreement between DFG and the Board pursuant to Water Code Section 8618 will be necessary for the implementation of the project modification, in lieu of a Board encroachment permit.

5. Based upon their formal and informal communications, and in recognition of the importance of the Parties' respective obligations and missions under state and federal law, the Parties have determined that it is desirable to confirm their understanding and agreement with respect to threatened and endangered species that may occur now or in the future in the project area.

6. The Parties acknowledge that substantial effort has been made to avoid negative effects on flood control, and the project modification can be made compatible with flood control.

7. DFG and USFWS have responsibility for implementing the Acts, including, the review and approval of management plans and habitat conservation plans.

8. As described in paragraphs 11-14, DFG and USFWS consider the likelihood that threatened or endangered species will impede proper operation and maintenance of the SRFCP to be remote. The Parties agree, however, that it is appropriate to enter into this MOU to define their understanding and agreement with respect to threatened and endangered species resulting from the proposed project modification of the Yolo Bypass to restore and maintain wetlands and other habitat.

REPRESENTATIONS AND COMMITMENTS

9. All Parties acknowledge the substantial environmental benefits to be provided by the project modification. At the same time, however, all Parties recognize that the primary purpose of the Yolo Bypass is to provide for the protection of public health and safety and the protection of property, and that the project modification is subordinate to purposes of the SRFCP.

10. DFG and USFWS recognize that proper operation of the SRFCP requires maintenance in accordance with the O&M Manual and that maintenance shall be an integral part of the project modification.

11. DFG and USFWS have determined that currently the project modification area provides, or may provide, habitat during all or certain times of the year, for certain threatened and endangered species, including the Swainson's hawk and the giant garter snake. DFG and USFWS have determined that following the project modification of the Yolo Bypass to restore wetlands and uplands habitat the area may provide potential habitat for these species and other species that either are listed or may be a candidate for listing, including, but not limited to, the valley elderberry longhorn beetle, greater sandhill crane, tricolored blackbird, and black rail. During inundation in flood years, the Yolo Bypass provides a corridor of travel for winter-run chinook salmon. These species may occur in the area after the project modification. DFG and USFWS have determined, based on the information currently available, that the project modification, including management in accordance with the O&M Manual, is not expected to result in a long-term adverse impact to any state-listed or federally-listed threatened or endangered species. Nor should the project modification and management result in any violations of the Migratory Bird Treaty Act (16 U.S.C. § 703 et seq.).

12. DFG and USFWS are of the opinion that the project modification, including management in accordance with the O&M Manual, will provide a net benefit for the environment and for species that may become established in the area of the project modification, and that the long-term environmental benefits to those species outweigh the short-term negative impact that may occur due to habitat management that is for flood control purposes. The project modification is similar in nature to management plans and habitat conservation plans developed for multiple species.

13. DFG and USFWS have reviewed, in depth, all the activities proposed for the management of the project modification in the December 1993 draft O&M Manual, which the Corps has represented to be an ninety percent complete O&M Manual. In the professional judgment of DFG and USFWS, these activities will not threaten in any significant way the existence of species described in paragraph 11 or result in the destruction or adverse modification of habitat that would be considered necessary to the continued existence of such species.

Further, DFG and USFWS have determined that the potential to take such species incidental to management of the project modification does exist. Loss of individuals may occur as a result of implementing the project modifications. DFG and USFWS have determined that if management activities outlined in the O&M Manual are fully implemented and adhered to, then the adverse impacts of "incidental take" will be minimized. DFG and USFWS have not, however, considered the effects of any additional conditions that may be contained in the final O&M Manual or in an encroachment permit or agreement entered into under Section 8618 of the Water Code. If the final O&M Manual, an encroachment permit issued by the Board, or an agreement under Section 8618 of the Water Code contains requirements, terms, or conditions which affect the conclusions in this MOU, DFG and USFWS will so advise DWR and the Board.

14. Management of the project modification area will take into consideration the specific habitat requirements of the giant garter snake and Swainson's hawk, but the area will not be specifically managed for any other listed or candidate species. Consideration of the habitat needs of the giant garter snake and Swainson's Hawk will not impair management in accordance with the O&M Manual.

15. Despite the foregoing, the Parties understand and agree that it is not possible to achieve absolute certainty as to events in the future. For example, laws may change, new facts may come to light, and currently unknown or unanticipated species may be listed as threatened or endangered or otherwise become protected or become established in the project modification area. In recognition of that uncertainty, whatever its magnitude, the Parties agree to cooperate to resolve all endangered species concerns expeditiously and in a manner consistent with applicable law, including laws affecting the SRFCP, and the primary purpose of the SRFCP.

16. By August 1 of each year, DFG will report to the Board and USFWS the occurrence of any known threatened or endangered species in the project area. The report will identify any potential for take of the listed species or other conflict that could occur as a result of management in accordance with the O&M Manual, and will outline the measures that will be taken, with a time schedule, to resolve the conflict, if any.

DFG could also become aware at some time in the future: a) that a threatened or endangered species not contemplated at this time has come to inhabit the project modification area and that the presence of the species could potentially interfere with management in a manner not contemplated at this time; or b) that management of the completed project in accordance within the O&M Manual otherwise has impacts on threatened or endangered species not currently

anticipated, such that a potential for conflict with flood control exists. Recognizing that the absence of management may create adverse impacts for flood control, DFG agrees that in such circumstances, it will give notice to DWR, the Board, the Corps, and USFWS within three working days. Within seven working days after the notice, representatives of the Parties will visit the site of the project modification, and will act as expeditiously as possible and consistent with applicable law to facilitate management that will not have an adverse impact on flood control.

17. In recognition of the primary purpose of the SRFCP, the Parties will observe special procedures in the event of flood control emergencies. For the purposes of this MOU, a flood control emergency is defined as a sudden and unexpected occurrence or set of circumstances which poses an imminent threat to public health and safety or property from floodwaters as determined by the Board, DWR, or the Corps. It is not expected that the measures necessary to alleviate a flood control emergency or eliminate an imminent threat are likely to present additional or unique issues with respect to threatened or endangered species, and the Parties anticipate that imminent flood control emergencies can be resolved without triggering the substantive requirements of the Acts. If, however, it is determined that the measures necessary to alleviate an imminent flood control emergency or eliminate an imminent threat could result in the take of a threatened or endangered species or otherwise trigger the substantive requirements of the Acts, the Parties will immediately confer, in person or by telephone, and will resolve the issue as quickly as permitted by applicable law.

18. This MOU will remain in effect until amended, revised, or revoked by the written agreement of the Parties. The Parties will, as necessary and in keeping with the purposes and intent of this MOU renegotiate the terms of this MOU in good faith based on experience in its operation and changing circumstances.

19. No party shall incur any additional fiscal obligations under this MOU.

20. This MOU may be executed in several duplicate counterparts, each of which shall be an original.

Dated: 1-13 1994

THE RECLAMATION BOARD

By _____
Wallace McCormack
President

Dated: 3/7/94

CALIFORNIA DEPARTMENT OF WATER RESOURCES

By _____
David Kennedy
Director

Dated: Feb 1, 1994

CALIFORNIA DEPARTMENT OF FISH AND GAME

By _____
Boyd Gibbons
Director

Dated: 2/11/94

UNITED STATES FISH AND WILDLIFE SERVICE

By _____
Wayne S. White
State Supervisor

Exhibit K



A Guide to Wetland Habitat Management in the Central Valley

A Cooperative Effort

California Department Fish and Game
California Waterfowl Association

Prepared By

W. David Smith
Glenn L. Rollins
Richard Shinn

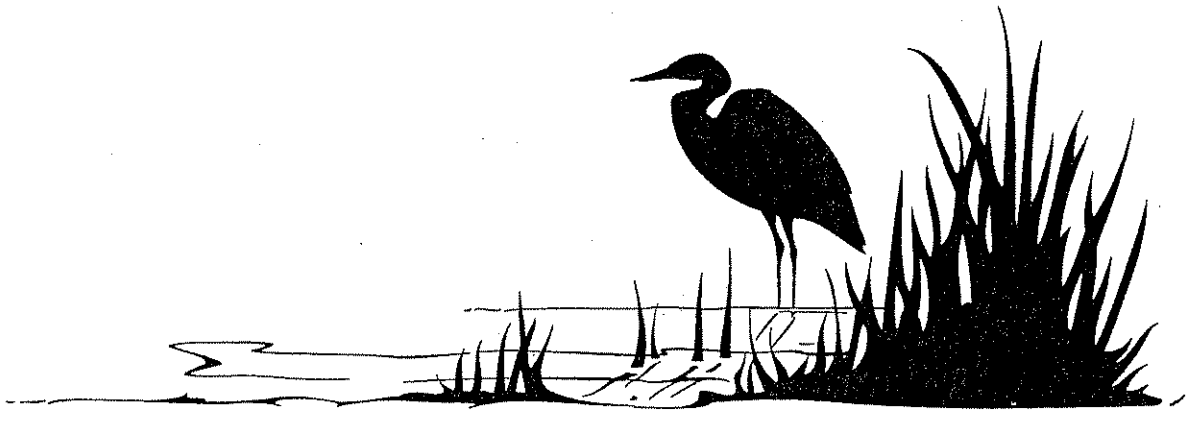


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FOREWORD

The California Department of Fish and Game (CDFG) and the California Waterfowl Association (CWA) cooperatively prepared the wetland management information contained in this handout. Beginning in 1991, CDFG and CWA began developing written materials for Central Valley wetland managers. The intent of this project was to prepare an overview of Central Valley wetland management and six easily-followed, 2-3 page habitat management guides for landowners enrolling in CDFG's California Waterfowl Habitat Program (CWHP). These guides, which are included in all CWHP management plans, describe management practices that can be used to provide a variety of productive wetland habitats.

The theoretical principles of "moist-soil management" (i.e. managing seasonally flooded wetlands for wildlife) were developed primarily by researchers and wetland managers at Mingo National Wildlife Refuge in southeast Missouri. These principles have been field-tested by wetland managers in the Central Valley for the last 20 years and refinements have been made to adapt these ecological principles to the Central Valley. In recent years, CDFG has also developed several techniques for integrating summer wetlands into moist-soil management programs. Thus, the information contained in this handout is a general review of our knowledge of Central Valley wetland management at the present time.

Although this information was intended primarily for use with the CWHP, CDFG and CWA have received numerous requests for this material from agencies, organizations, and landowners involved with wetland management. In response to this demand, CDFG is in the process of expanding the scope of its written materials on Central Valley wetland management to include information on wetland construction, water distribution and delivery systems, water control structures, and vegetation management. This information will ultimately be presented in a Central Valley Wetland Management Handbook that will be published by the CDFG in 1994. This handout, in its current form, was developed specifically for the "Managing Farmlands to Bring Back Game Birds and Wildlife to the Central Valley" workshop on February 19, 1994.

ACKNOWLEDGEMENTS

This wetland habitat management information could not have been compiled without the generous contribution of knowledge from wetland managers throughout the Central Valley. Although small amounts of the information concerning Central Valley wetland management are found in the published literature, the majority of the knowledge exists in the minds of those who spend a large portion of their lives in the marsh. We extend special thanks to J. Beam, D. Becker, P. Blake, S. Brueggeman, C. Dennis, E. Edwards, G. Gerstenberg, B. Huddleston, P. Hofmann, L. Howard, G. Kerhoulas, G. Kramer, R. Lewis, G. Mensik, J. Miller, N. Nelson, T. Poole, R. Riviere, B. Reno, R. Reno, E. Smith, M. Womack, and D. Yparraguirre. Tom Blankenship assisted with earlier drafts of the wetland habitat management guides.

We thank the staff of the California Waterfowl Association for their superb technical support. J. Lee and C. Miglino deserve substantial credit for their patience. C. Isola and R. Shinn assisted with the wetland habitat management guides. We extend thanks to Dr. Robert McLandress for his guidance throughout all phases of the project.

PRINCIPLES OF CENTRAL VALLEY WETLAND MANAGEMENT

Wetland management can best be described as the active manipulation of wetland habitat. Wetlands evolved as dynamic ecosystems, constantly changing due the physical and chemical processes associated with floods, drought, and fire. Today, most of California's rivers have been contained and the majority of the Central Valley's wetlands seldom experience natural seasonal flooding. Most wetlands are now enclosed by levees and flooded with water from irrigation district conveyance systems, rivers and sloughs, and/or deep wells. Whereas natural wetland hydrology was very dynamic, flooding cycles now used for managed wetlands are often very predictable. It is the task of the modern wetland manager to emulate natural hydrology and re-create a dynamic, productive wetland system. With only 5% of the Central Valley's original wetlands remaining, it is also imperative that the remaining wetlands are managed such that they support the maximum abundance and diversity of wildlife. The Central Valley supports the single largest concentration of wintering waterfowl in North America, thus Central Valley wetland managers have an enormous responsibility to provide optimum habitat conditions for wintering waterfowl. However, wetland management can be conducted in such a manner that shorebirds, wading birds, breeding ducks, and other wetland-dependent wildlife also realize maximum benefits.

The management of productive wetland habitat requires dynamic water management, as well as periodic soil and vegetation disturbances. An adequate water conveyance system is essential for meeting water management objectives, thus pumps, delivery ditches, water control structures, and drainage systems must be maintained in functional condition. Discing, mowing, and burning can be used to interrupt the natural evolution of wetland habitat and to stabilize the marsh vegetation at a point which is the most productive of those elements required by waterfowl and other wetland-dependent species. The attached wetland habitat management guides were designed to inform landowners of a variety of management practices that can be used to produce a diversity of productive wetland habitats.

Moist-soil Management (Seasonal Wetlands)

Seasonal wetlands are flooded in the fall, with standing water maintained continuously throughout the winter until drawdown occurs in the spring. A variety of annual plants germinate on the exposed mudflats of seasonal wetlands when surface water is drained during spring and summer. These plants are collectively known as "moist-soil plants". Some of these plants produce seeds, browse, and/or tubers that are important foods for waterfowl. A combination of moist-soil plants and robust emergent vegetation (typically cattails and/or tules) usually results from management practices in Central Valley seasonal wetlands. A primary goal of "moist-soil management" (seasonal wetland management) is to provide an abundance and diversity of seeds, aquatic invertebrates, and other moist-soil foods for wintering waterfowl. Although agricultural grains (e.g. rice, corn) supplement the diets of waterfowl in winter, these foods lack many of the vitamins, minerals, and proteins essential for survival and subsequent reproductive success. The seeds of moist-soil plants provide waterfowl with the essential nutritional balance lacking in grains. Invertebrates are protein-rich by-products of moist-soil management that serve as an important food source for ducks during late winter and spring. Shorebirds are also highly dependent on seasonal wetlands and the invertebrate foods they supply, particularly during spring migration.

Wildlife Values of Various Moist-soil Plants

The wildlife value of a moist-soil plant species is generally based on its seed production capability, the nutritional quality of its seeds, and the invertebrate habitat the plant provides. Management practices that encourage a diversity of highly valuable moist-soil plants are considered most effective. Watergrass, swamp timothy, and smartweed are the most important moist-soil plants in the Central Valley due to their documented value as a food source for wintering waterfowl. Seeds of these three plants, in aggregate, provide waterfowl and other seed-eating wildlife with a relatively nutritionally balanced diet. However, a variety of other wetland plants are needed to provide additional nutrition, cover, and thermal protection. Some moist-soil plants are not good seed producers or produce seeds with modest nutritional value, but have a complex leaf structure and harbor rich invertebrate communities, thus are valuable to wildlife.

Moist-soil plants with exceptional value to wildlife include watergrass, smartweed, swamp timothy, sprangletop, ammannia, chufa, burhead, beggarticks, annual atriplex, goosefoot, and brass buttons. Spikerush, pricklegrass, alkali heath, alkali weed, bermuda grass, aster, and alkali bulrush are moist-soil plants that are believed to be only moderately valuable to wildlife, but may be important in localized areas. Cocklebur, sweet clover, river bulrush, tuberous bulrush, baltic rush, jointgrass, dock, and salt grass are generally invasive and undesirable wetland plants.

Timing of Drawdown and Soil Disturbance

Important moist-soil waterfowl food plants such as swamp timothy, smartweed, and watergrass are easily propagated on most seasonal wetland sites through effective water management and soil disturbance. The primary factors that affect the type and abundance of moist-soil plants that are found in a seasonal wetland are 1) the timing of spring drawdown, and 2) the "successional stage" of the wetland (length of time since soil disturbance). The seeds of each plant species germinate best at a specific soil temperature under specific successional conditions. Therefore, as plants compete for dominance, wetland managers can favor specific plants (or groups of plants) by 1) timing drawdowns to coincide with optimum germination conditions (primarily soil temperature) and 2) discing periodically to maintain the successional stage required by the target vegetation. Although climatic conditions vary by year and location, the drawdown dates listed in the habitat management guides will generally induce germination of the target waterfowl food plant. The management strategies described in these leaflets have been successfully implemented by wetland managers throughout the Central Valley, but are by no means the **only** way to achieve these desired habitat types. Soil type and water quality also influence plant growth, so modification of these general recommendations may be necessary based on local knowledge and weather patterns for specific sites.

Rate of Drawdown

The rate of pond drawdown affects moist-soil plant composition, seed production, soil-salt levels, and the duration of food availability to waterfowl. Slow drawdowns (2-3 weeks) cause invertebrates to become concentrated in the shallow water and allow waterfowl optimum foraging conditions for a prolonged period. Slow drawdowns also typically result in high vegetation diversity and, if executed during mid to late spring, may enhance seed production. However, they may concentrate salts near the soil surface in systems with brackish or saline water. Rapid drawdowns (3-5 days) are desirable if a soil-salt problem exists, as was quite often the case in the San Joaquin Valley in the past. The Grasslands Water District now provides water that appears to be of sufficient quality for managers to execute slow drawdowns without adversely affecting vegetation. However, further research is needed to determine the long-term relationship between slow drawdowns and

alkaline soils. Rapid drawdowns may produce extensive stands of waterfowl food plants if timed correctly, but "rob" wildlife of the extended shallow water habitat associated with slow drawdowns. Rapid drawdowns late in the growing season should be followed by a summer irrigation to insure a good seed crop. Although slow drawdowns are generally better for wildlife, there is no "right" or "wrong" way to drain a seasonal wetland. The rate of drawdown should be based on site-specific knowledge.

Irrigations

Spring and summer irrigations are very important in Central Valley moist-soil management. Most waterfowl food plants will not attain maximum seed production without at least one irrigation. The San Joaquin Valley receives less rainfall than the Sacramento Valley, and therefore the soils dry out faster and irrigations are more often a necessity. Swamp timothy is the only waterfowl food plant that may be grown successfully without an irrigation in the San Joaquin Valley, however, irrigations greatly enhance seed production if timed correctly. Irrigation schedules for smartweed and watergrass vary with annual weather patterns. These plants can be observed for signs of wilting to determine proper irrigation dates.

Fall Flooding

The timing of fall flooding is typically based on water delivery dates. Early fall flooding (August and September) is particularly important for locally-raised mallards and early migrant pintails and is highly recommended if feasible. Generally, most wetland units should be flooded prior to October 15. Since irrigation districts typically cease water deliveries by mid-December and do not resume deliveries until April, wetland managers must devise ways to maintain water in their ponds until spring drawdown. This problem is easily solved on those properties which can simply pump groundwater from deep wells to overcome the effects of evapo-transpiration and seepage (percolation). Wetland properties which do not enjoy access to wells can close all of their drainage structures and rely on rainfall to maintain pond levels. In extreme cases, it may be possible to maintain pond levels by purchasing water from nearby properties that have wells.

Water Depth

Water depth is extremely important in Central Valley moist-soil management. Dabbling ducks (e.g. mallards, pintails, green-winged teal) cannot effectively feed on the seeds and invertebrates found on pond-bottoms if the water is deeper than 12 inches. Water depths of 4-10" are preferred for feeding. Therefore, in order to provide feeding habitat for dabbling ducks, shallow water must be maintained! Shallow water habitat management is valuable to many other wildlife species, as well. In Missouri, only 5 of 54 bird species that use seasonal marshes can effectively forage in water deeper than 10 inches. Shorebirds are particularly dependent on shallow water and seldom use habitats in which the water is deeper than 6 inches.

Summer Wetlands

The Central Valley's resident wetland wildlife are highly dependent on semi-permanent and permanent wetlands during the late spring and summer when seasonal wetlands are dry. Basically, the two primary habitat requirements of wetland wildlife during this time period are: 1) sufficient cover and protection from predators, and 2) an abundant food supply of aquatic invertebrates. Such invertebrates are the primary source of dietary protein for ducks and other wetland birds during the breeding season. Most species of wetland wildlife are dependent upon invertebrates as a direct or indirect food source during the spring and summer. For example, breeding ducks and shorebirds eat invertebrates almost exclusively, but herons eat other direct consumers of invertebrates such as fish,

reptiles, and amphibians. Both semi-permanent and permanent wetlands provide ample protection from predators, however semi-permanent wetlands usually supply a much greater abundance of invertebrates. Invertebrate populations decline with prolonged flooding, thus a dry period of at least 2 months each year is essential for maintaining abundant populations of invertebrates.

Semi-permanent Wetlands

Semi-permanent wetlands, commonly referred to as "brood ponds", are flooded during the spring and summer, but experience a 2-6 month dry period each year. Semi-permanent wetlands provide breeding ducks, ducklings, and other wetland wildlife with protection from predators and abundant invertebrate food supplies. Water depths of 6-12" are necessary to allow wildlife access to invertebrate foods, however deeper areas (e.g. channels, borrow ditches) are also important in that they provide open water. Well managed semi-permanent wetlands require periodic discing to prevent the vegetation from becoming too dense. In order to maximize habitat values without incurring major discing costs, it is recommended that semi-permanent wetlands be relatively small in size (2-10 acres). Various techniques have been developed for integrating semi-permanent wetlands into a moist-soil management program. Specific management practices are described in the attached management guides.

Permanent Marshes

Permanent marshes are wetlands that remain flooded throughout the year. Due to year-round flooding, permanent marshes support a diverse, but usually not abundant, population of invertebrates. However, submerged aquatic vegetation such as sago pondweed, horned pondweed, and water hyssops may occur if adequate water clarity exists. The leaves and/or nutlets of these aquatic plants are commonly consumed by waterfowl, particularly gadwalls, ring-necks, redheads, and canvasbacks. Carp and other rough fish may reduce water clarity and prohibit the growth of these desirable plants. Permanent marshes are important to resident waterfowl in mid- to late summer when local ducks are molting their flight feathers; the deep water and dense cover provide protection from predators.

Habitat Diversity

It is unlikely that wetland managers will be able to produce a monoculture of any one plant in an established wetland, particularly if pond bottoms are of uneven topography. Furthermore, a wetland with diverse habitats is valuable to a wider variety of waterfowl and other wildlife species and will better resist the devastating effects of plant diseases, insect pests, and bird depredation. Diversified habitats also provide a variety of waterfowl foods throughout the fall and winter. Even though some moist-soil plants are poor seed producers, when flooded they may support excellent assemblages of invertebrates. Waterfowl also utilize other plants (e.g. cattails and "tules") for cover. An ideal Central Valley seasonal wetland is dominated by waterfowl food plants, contains other moist-soil plants, and provides waterfowl with substantial cover.

Vegetation Control

Some plants reduce the value of a wetland to waterfowl if they become overly abundant. Tules and/or cattails can eventually "fill in" a pond and eliminate open water. Dense stands of tules and cattails should not occupy more than 60% of a pond. The primary tools for tule/cattail control are discing, mowing, and burning. Mowing and burning are only effective when followed by discing and 2-3 months of exposure to the sun, which is necessary in order to dry out and kill the tubers and

rhizomes. Discing tules and cattails also disturbs the soil and provides favorable conditions for invasion by valuable moist-soil waterfowl food plants.

Discing is typically accomplished with either a "stubble disc" or a "finish disc". The depth of discing varies with soil structure, soil moisture, implement weight, tractor size, and tractor speed. Most stubble discs have blades that range from 26-36" in diameter; these make cuts that are 7-10" deep. Stubble discs are necessary for most types of pond-bottom discing, however, a finish disc and ring-roller can be used afterward to break up dirt clods and make walking easier under flooded conditions. Deep stubble discing can adversely affect the water-holding capacity of a wetland if the disc breaks through the shallow clay pond bottom and into the underlying sandy soil. Although very uncommon, this unfortunate situation can be avoided be contacting the local Soil Conservation Service (SCS) office prior to initiating a deep-discing or excavation project.

Finish discs, which typically have blades that range from 18-24" in diameter, usually make cuts that are 4-6" deep. Finish discs often suffice for discing low-growing vegetation such as pricklegrass and swamp timothy, but have proven totally ineffective for controlling cattails, tules, river bulrush, baltic rush, or other robust wetland plants.

Summer irrigations occasionally cause watergrass, smartweed, sprangletop, and other valuable moist soil plants to occur in very dense stands. Waterfowl use of these areas may be impeded unless openings are created prior to fall flooding. With the use of a finish disc, managers can create strips, channels, and potholes in the otherwise dense vegetation. The appropriate time to create such openings is in July or August.

Wetland Management - An Art

Wetland management is an art, not a science. Wetland management practices are continually being improved as a result of research and experimental management. The results of these learning efforts are disseminated to interested parties by the agencies and organizations involved in waterfowl management. However, it is to the advantage of all wetland managers to keep accurate records of habitat manipulations (e.g. dates of flooding, irrigation, drawdown, discing). Managers should eventually be able to predict how the vegetation on their property will respond to specific management practices, this in turn will allow them to consistently provide high-quality waterfowl habitat.

WETLAND HABITAT MANAGEMENT GUIDE #1

SEASONAL WETLAND

Target Waterfowl Food Plant: Smartweed

Timing of Spring Drawdown:

March 1 - 20. Sacramento Valley
February 20 - March 10. San Joaquin Valley

Moist-soil Plant Community: In addition to smartweed, other desirable wetland plants that may occur under the following water management and soil disturbance schedule include but are not limited to tule, cattail, spikerush, chufa, fat-hen, alkali bulrush, and watergrass.

Potential Problem Plants: Some wetland plants are undesirable if they become overly abundant or create dense stands. These include but are not limited to tule, cattail, asters, cocklebur, salt grass, bermuda grass, and baltic rush.

Value to Waterfowl: A moist-soil plant community dominated by smartweed, but including various other wetland plants, is an important component of a diversified marsh management program. Also referred to as "redweed", smartweed provides ducks with a quality food source throughout the fall and winter. Smartweed produces seeds that contain balanced proportions of essential vitamins, protein, minerals, and carbohydrates. In addition, it has a complex leaf structure, which supports excellent assemblages of aquatic invertebrates when flooded. Recent research in the Midwest shows high invertebrate abundance and diversity in association with smartweed. Tules, cattails, and other emergent plants add structural diversity to the marsh and provide ducks with cover. Wetland units having dominant stands of smartweed in association with these cover plants become an integral part of the wetland complex and receive heavy usage by dabbling ducks, particularly mallards. Smartweed may also occur in combination with watergrass, which has even greater seed value.

Management Strategy: Two important factors that influence smartweed growth are (1) the timing of spring drawdown and (2) the stage of succession (number of years since the area was last disturbed through discing or plowing). Smartweed requires cool soil temperatures and relatively high soil moisture for germination, and therefore, is usually found in wetlands that undergo early spring drawdowns. Smartweed can be maintained in seasonal wetlands for several years if water management coincides with its growth requirements. Periodic soil disturbance is usually essential to the maintenance of smartweed stands. Smartweed is considered a "pioneer" or "invader" plant species because it colonizes recently disturbed wetland sites. Eventually, competition from other

wetland plants, particularly cattails and tules, will eliminate smartweed from the community. Discing should occur when smartweed abundance decreases substantially.

Establishment: Smartweed seeds are present in the soils of most wetlands, ricefields, and set-aside lands, which eliminates the need for any type of planting. If undesirable vegetation is dominant, the area must be disced, preferably during summer. Discing reduces plant competition and prepares the seedbed for improved smartweed production the following spring. Discing dense stands of cattails and tules in early summer is the most effective way to reduce competition and create conditions suitable for smartweed colonization. This method exposes cattail/tule rhizomes and tubers to the sun and kills them, thus preventing their re-growth during fall flooding. Water should be maintained on these areas throughout the winter. Smartweed will usually "invade" the disced areas if an early spring drawdown occurs.

Spring Drawdown: Managers must do everything possible within the constraints imposed by water districts to maintain water until the early-spring drawdown that will typically encourage smartweed development. Coincidentally, the retention of pond water through February assures the availability of protein-rich invertebrates to pre-breeding ducks. Appropriate drawdown dates are listed above. Smartweed seeds should begin to germinate within 2 weeks of drawdown. Rapid drawdowns (3-5 days) typically produce extensive stands of moist-soil vegetation, consisting of relatively few plant species. Slow drawdowns (2-3 weeks) maximize the foraging opportunity for waterfowl and other wetland birds and result in greater diversity of vegetation. Invertebrates, in particular, become concentrated and readily available to ducks.

Irrigation: An irrigation will be needed if smartweed plants show signs of stunting (i.e. halted growth and "yellowing"). This usually occurs 4-6 weeks after germination when plants are generally 3-12" high. Irrigation should occur as soon as possible, but may be delayed until mid-summer if water availability is a problem. A second irrigation is necessary if plants appear stunted before seed development occurs. Summer irrigations encourage the expansion of cattail and tule stands, as well as sprangletop and watergrass development. Smartweed may achieve full development without an irrigation, particularly if a high water table is present, late rains occur, or water seeps in from surrounding wetlands or ricefields.

Fall Flooding: Flooding should coincide with the arrival of migratory waterfowl. Pintails begin arriving in the Central Valley in mid-August, and peak numbers of wintering waterfowl are usually present during December and January. The flooding of individual units should be staggered to match the habitat requirements of arriving waterfowl, if possible. For example, fall flooding should begin on sites suitable for pintails, such as areas dominated by swamp timothy. Smartweed units are typically used by mallards, many of which are raised locally, therefore flooding can occur anytime between August and October. The timing of water delivery plays a major role in the determination of flooding schedules, however. Many marsh managers simply execute their fall flooding when irrigation districts make water available. Marsh units should be gradually flooded to allow ducks maximum accessibility to seeds and invertebrates.

Discing: Periodic soil disturbance is vital to most marsh management programs, particularly those involving smartweed production. It reduces potential problem plants and creates conditions suitable

for smartweed establishment. Discing should be employed when it is obvious that smartweed is no longer dominant and is being replaced by undesirable species. This normally occurs 3-6 years after establishment. However, discing the entire field at one time would eliminate all food and cover from the area for one season and should be discouraged. This practice would also return the marsh to a monoculture of smartweed the following year. Marsh plant diversity is desirable, and discing 30-40% of the pond bottom in a random pattern will create a "mosaic" of smartweed and dense emergent vegetation. Following discing, smartweed will colonize areas previously occupied by cattails, tules and other non-target species.

Note: Occasionally, stands of smartweed develop a fungal infection called "smut", which reduces seed production. Little is known about smut, although it appears most prevalent when too much water is applied during the growing season. Managers should not be overly concerned with the disease because it usually only affects a portion of the smartweed seed source, and not the invertebrate habitat the plant provides. However, the threat of the disease further emphasizes the need for habitat diversity. If, in a given year, a smartweed seed crop fails in a diverse wetland complex, other waterfowl food plants will help supply necessary seeds for wintering waterfowl.

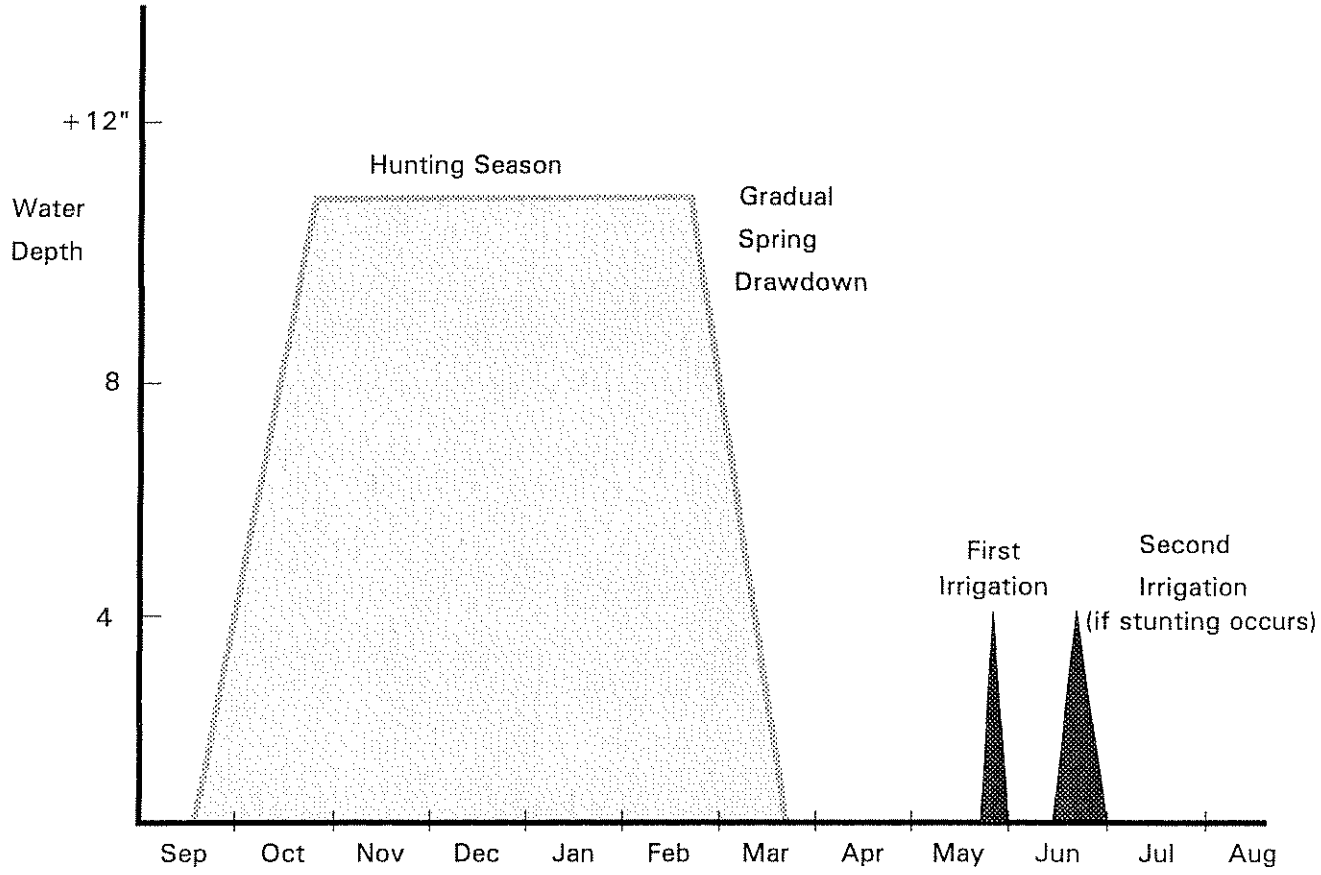


Figure 1. Water management schedule for smartweed in the Sacramento Valley.

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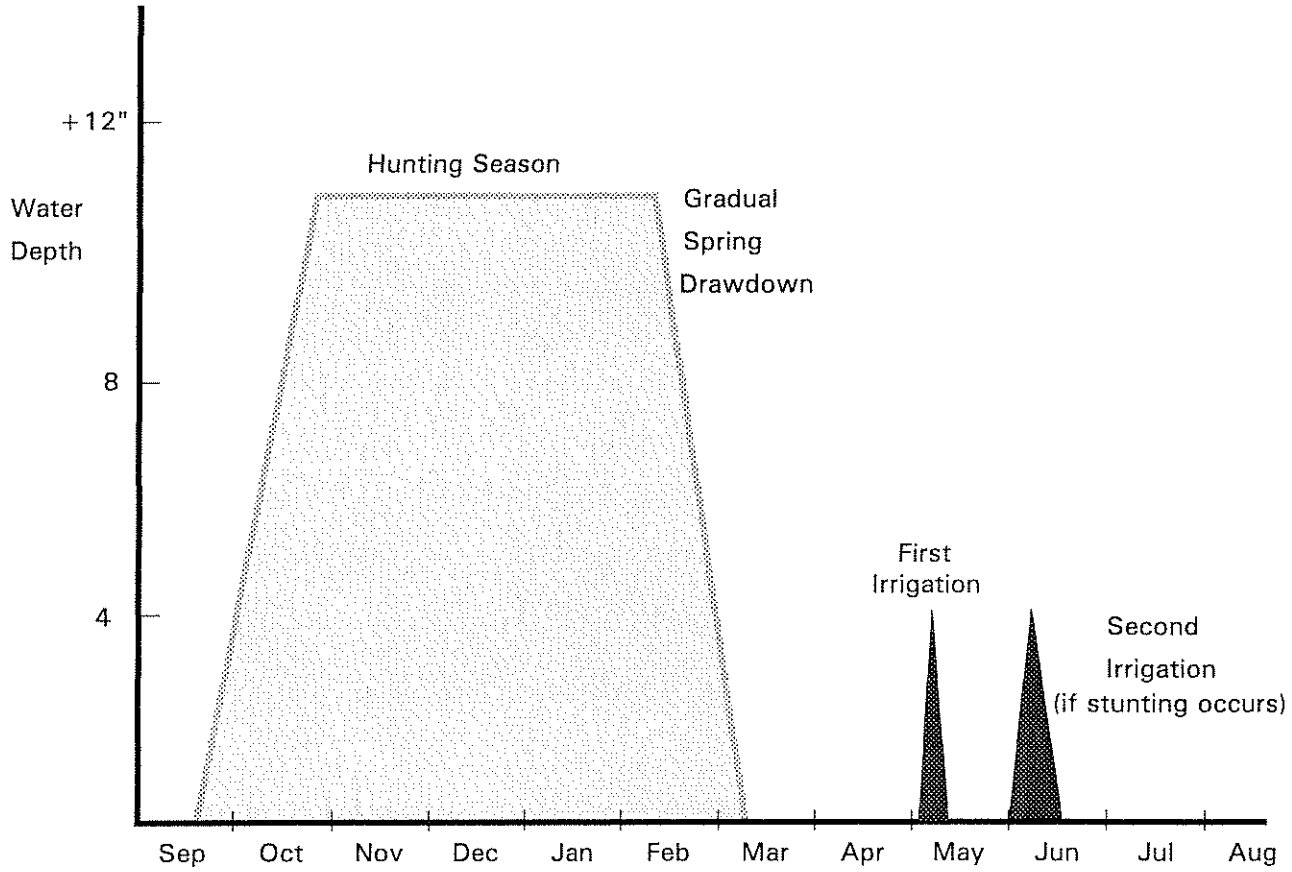


Figure 2. Water management schedule for smartweed in the San Joaquin Valley.

jl\sweed-2.drw

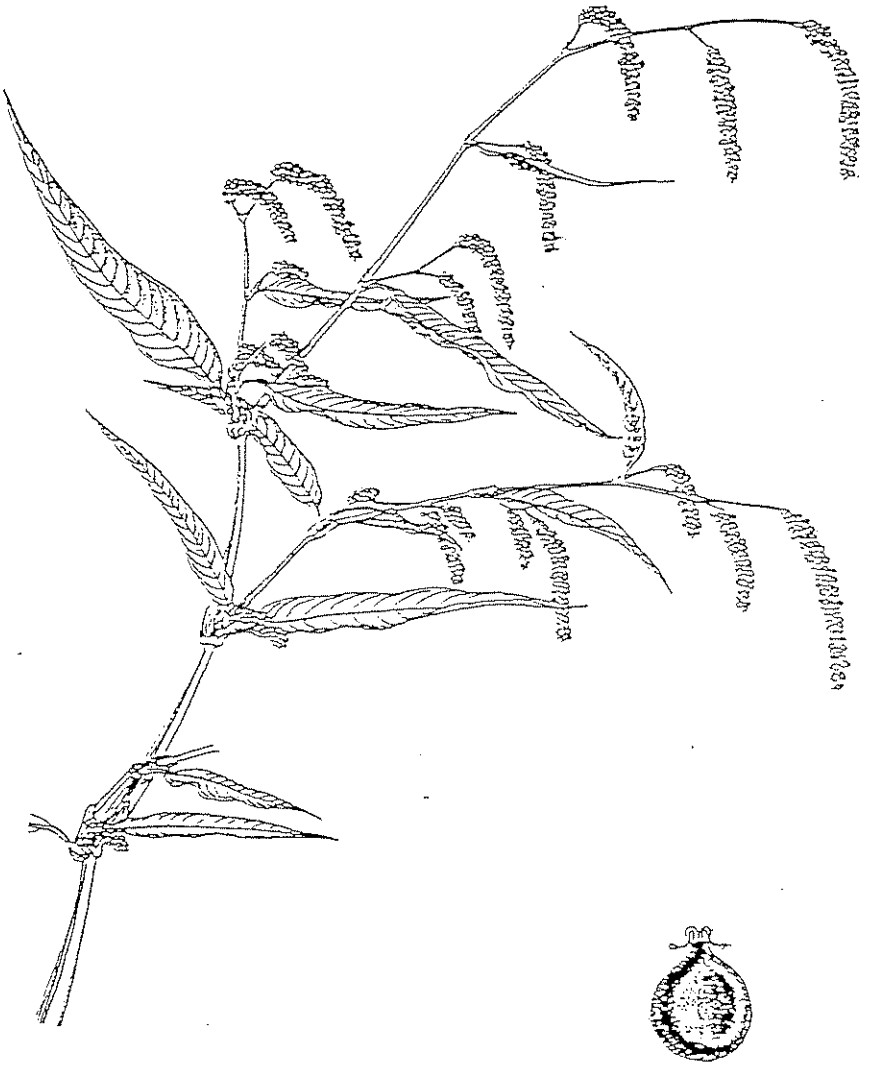


Figure 3 Smartweed
Reprinted from Mason
A Flora of the Marshes of California
University of California Press

WETLAND HABITAT MANAGEMENT GUIDE #2

SEASONAL WETLAND

Target Waterfowl Food Plant: Swamp timothy

Timing of Spring Drawdown:

April 15 - 30. Sacramento Valley
March 20 - April 10. San Joaquin Valley

Drawdown should be slightly later on sites with sandy soils.

Moist-soil Plant Community: In addition to swamp timothy, other desirable wetland plants that may occur under the following water management and soil disturbance schedule include but are not limited to tules, cattails, pricklegrass, watergrass, beggarticks, fat-hen, and alkali bulrush.

Potential Problem Plants: Some wetland plants are undesirable if they become overly abundant or create dense stands. These include but are not limited to tule, cattail, cocklebur, salt grass, bermuda grass, aster, dock, jointgrass, and baltic rush.

Value to Waterfowl: A moist-soil plant community dominated by swamp timothy, but including various other wetland plants, can be an important component of a diversified marsh management program. Seasonal wetlands dominated by swamp timothy are very attractive to wintering waterfowl. Swamp timothy is a low-growing (2-10"), seed-producing, moist-soil plant that provides sheet-water habitats when flooded. Water should be maintained at depths of 4-12" to allow optimum foraging conditions for dabbling ducks. This plant is naturally occurring on bare, poorly drained sites, but can be grown under a variety of circumstances. Conditions that favor swamp timothy germination and growth were examined in the 1970's and propagation techniques have been refined in recent years. Many San Joaquin Valley wetlands that were once dominated by jointgrass and other low-quality moist-soil plants now support excellent stands of swamp timothy.

Pintails and green-winged teal, in particular, prefer wetland habitats dominated by swamp timothy. Swamp timothy seeds are important to ducks arriving in early fall (August and September) as they facilitate the accumulation of fat reserves and the restoration of nutrients expended during molt and migration. As wetland seed resources are depleted during winter, many invertebrate populations reach maximum densities and are readily available in the shallow water of swamp timothy stands. Studies indicate that midge larvae (the worm-like larvae of the midge fly) are heavily utilized by dabbling ducks in swamp timothy habitats during late winter. In addition, these shallow, open-water habitats provide excellent sites for loafing and courtship.

Management Strategy: Swamp timothy is a drought-adapted plant that germinates with a mid-spring drawdown and will achieve seed production without summer irrigation. Swamp timothy management is commonly practiced on areas that lack a reliable source of summer water, but growth and seed formation may be enhanced through irrigation. However, summer irrigations and periodic discing have differing effects on swamp timothy stands at different locations in the Central Valley. For example, irrigations enhance plant growth and seed production in the San Joaquin Valley, but apparently have little impact on seed production in the western Sacramento Valley. The periodic discing of pond bottoms (every 3-7 years) has also resulted in increased plant vigor and seed production in the San Joaquin Valley, although managers in the western Sacramento Valley have maintained productive timothy stands for many years without discing. In general, if the vigor of timothy stands declines significantly over time, regardless of location, discing is strongly recommended.

Establishment: Swamp timothy seeds are present in most Central Valley wetland soils, thus planting is generally unnecessary. Discing may be required to position seeds near the surface if recent soil disturbance has not occurred. Impounding water throughout the fall and winter will create ideal conditions for germination the following spring.

Spring Drawdown: Managers must do everything possible within the constraints imposed by water districts to maintain water until the mid-spring drawdown that will typically encourage swamp timothy development. Coincidentally, the retention of pond water through March assures the availability of protein-rich invertebrates to pre-breeding and breeding ducks. Appropriate drawdown dates are listed above. Swamp timothy seeds should begin to germinate within 2 weeks of drawdown. Rapid drawdowns (3-5 days) typically produce extensive stands of moist-soil vegetation, consisting of relatively few plant species. Slow drawdowns (2-3 weeks) maximize the foraging opportunity for waterfowl and other wetland birds and result in greater diversity of vegetation. Invertebrates, in particular, become concentrated and readily available to ducks.

Irrigations: A shallow "flash" irrigation may be given to swamp timothy stands approximately one month after germination. Extreme care must be taken in this process, however. Maturing plants will not survive flooding which overtops them for more than 10 days, nor will they tolerate flooding once they have produced a seed head. Rainfall may eliminate the need for irrigation in the Sacramento Valley, however San Joaquin Valley wetlands usually require at least one irrigation for optimal swamp timothy development.

Fall Flooding: Flooding should coincide with the arrival of migratory waterfowl. Pintails begin arriving in the Central Valley in mid-August, and peak numbers of wintering waterfowl are usually present during December and January. The flooding of individual units should be staggered to match the habitat requirements of arriving waterfowl, if possible. For example, fall flooding should begin on sites suitable for pintails, such as areas dominated by swamp timothy. The timing of water delivery plays a major role in the determination of flooding schedules, however. Many marsh managers simply execute their fall flooding when irrigation districts make water available. Marsh units should be gradually flooded to allow ducks maximum accessibility to seeds and invertebrates.

Notes: Proper water manipulation may be needed for 1-3 years after initial discing to achieve a robust stand of swamp timothy. If at least a few plants produce a seed crop the first year, ground cover will increase each of the following years due to increased seed production and distribution. Swamp timothy ponds should have 10-35% cattail or tule interspersion to provide cover for loafing waterfowl.

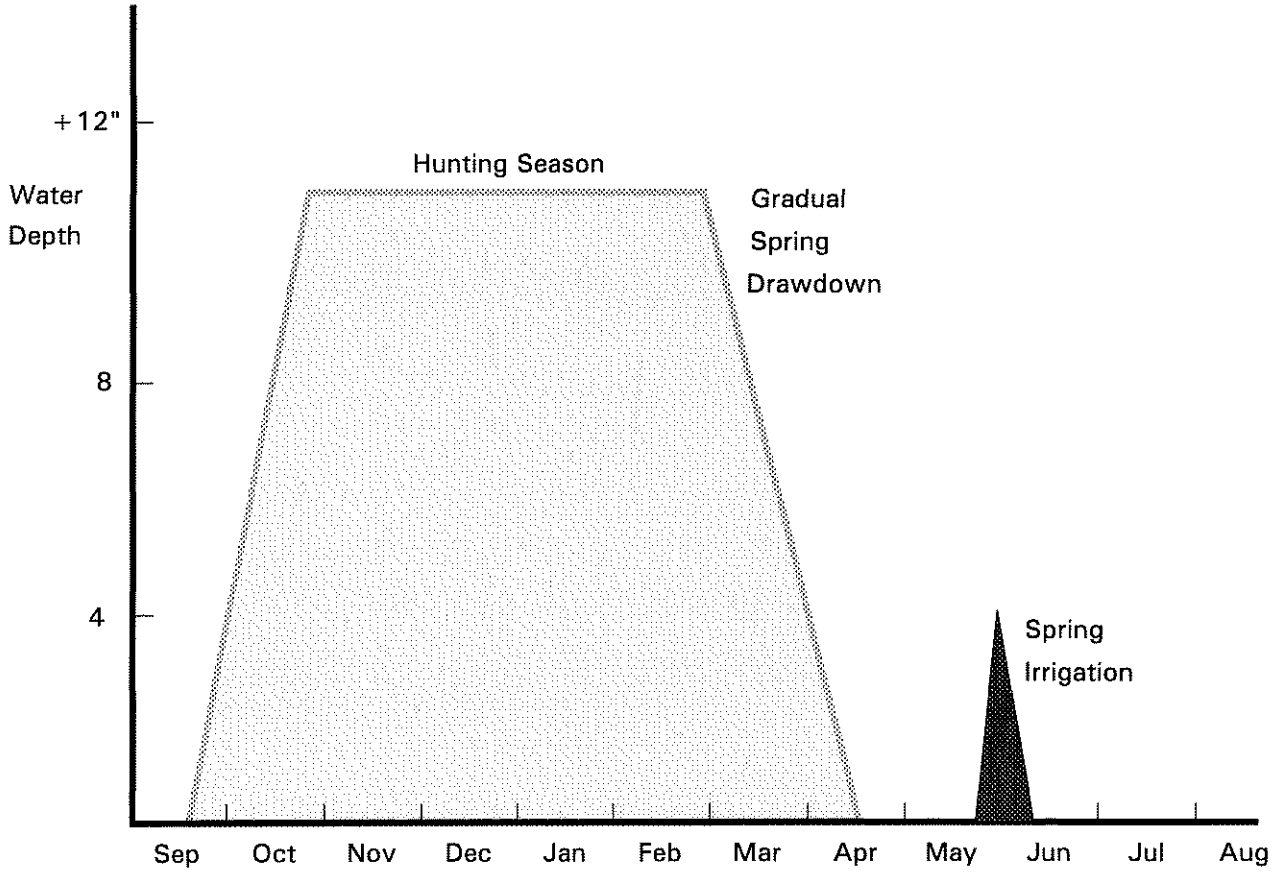


Figure 4. Water management schedule for swamp timothy in the Sacramento Valley.

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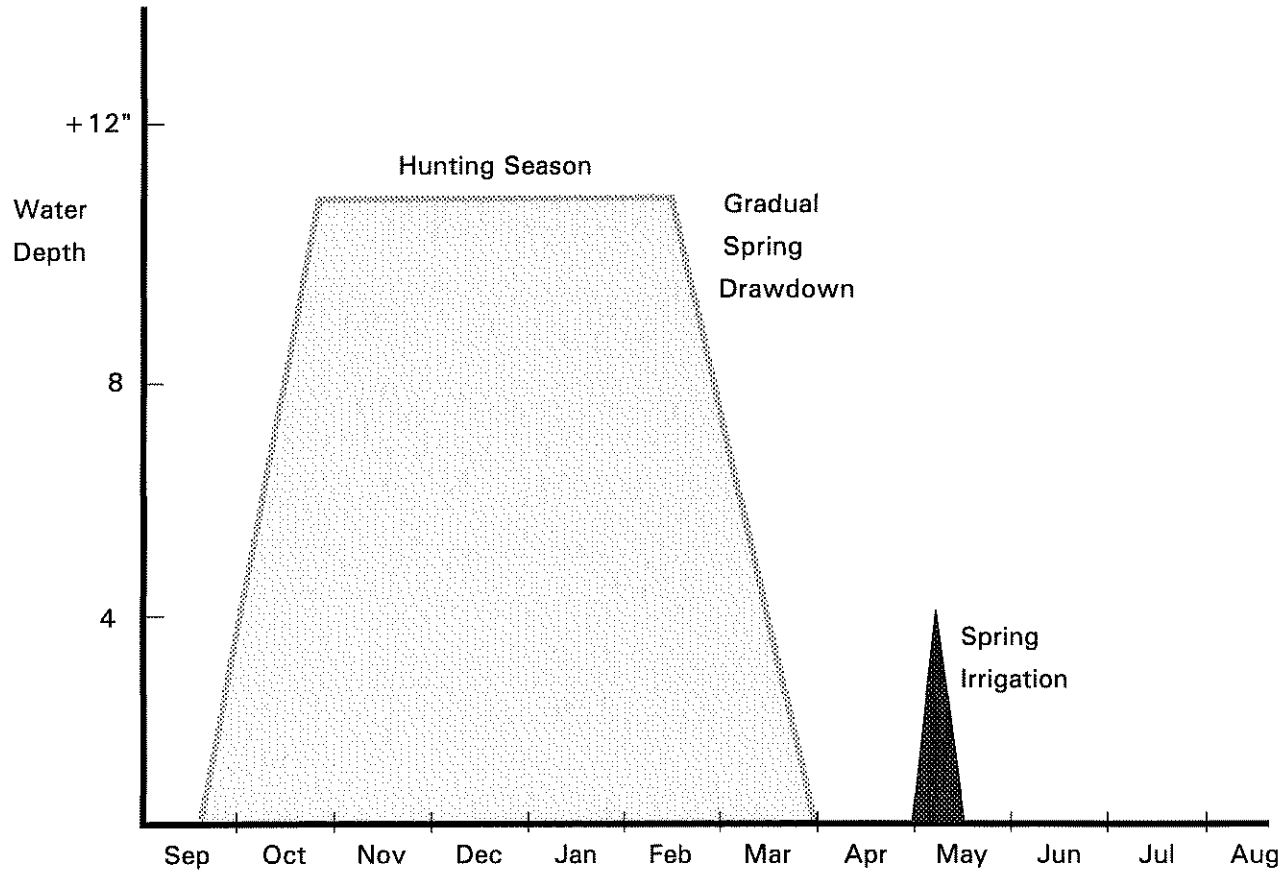


Figure 5. Water management schedule for swamp timothy in the San Joaquin Valley

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Figure 6 Swamp Timothy
Reprinted from Mason
A Flora of the Marshes of California
University of California Press

WETLAND HABITAT MANAGEMENT GUIDE #3

SEASONAL WETLAND

Target Waterfowl Food Plant: Watergrass

Timing of Spring Drawdown:

May 1 -31. Sacramento Valley.
April 15 - May 15. San Joaquin Valley

Moist-soil Plant Community: In addition to watergrass, other desirable wetland plants that may occur under the following water management and soil disturbance schedule include, but are not limited to tules, cattails, sprangletop, ammannia, fat-hen, beggarticks, and smartweed.

Potential Problem Plants: Some wetland plants are undesirable if they become overly abundant or create dense stands. These include but are not limited to tule, cattail, cocklebur, salt grass, bermuda grass, dock, jointgrass, and baltic rush.

Value to Waterfowl: A moist-soil plant community dominated by watergrass is an important component of a diversified marsh management program. Watergrass, also referred to as millet, is an important and very abundant waterfowl food plant in the Central Valley. It is highly attractive to pintails, mallards, and other dabbling ducks, presumably due to its combination of seed production, invertebrate habitat, and thermal cover. Watergrass is a weed that grows in dense stands and may produce in excess of 2,000 lb. of seed/acre. It has substantial stem mass, which provides ducks with thermal cover and protection from predators. Through flooding and waterfowl activity, the stems eventually become matted and serve as excellent substrate for invertebrate production.

Watergrass seeds provide greater balance in nutritive quality than the high-energy, low-protein cereal grains, (e.g. corn, rice). They are especially high in essential minerals. Marsh units dominated by watergrass typically receive heavy duck usage throughout the season. Sprangletop seeds provide waterfowl with a lesser, but still valuable, food source. Ammannia is a plant species that benefits waterfowl, but does not occur in great abundance.

Management Strategy: Watergrass requires more water than other waterfowl food plants, but is an easily propagated wetland plant species. Although an initial seeding may be required, a stand can be sustained for several years with proper water management, which involves late-spring drawdowns and summer irrigations. Unlike other waterfowl food plants, watergrass is commonly propagated in a monoculture. These watergrass units resemble unharvested rice fields in appearance. This management practice maximizes food production at the expense of habitat diversity. However, units can be strategically located so that diverse wetland habitats are nearby. Watergrass is also produced in conjunction with other moist-soil plants in diverse wetland units.

Watergrass and rice have very similar growth requirements. Maximum growth occurs during hot days and warm nights. The establishment (i.e. aerial seeding) of rice can even be used as a local estimate for determining the proper drawdown date for watergrass. Watergrass seed maturation takes approximately 45-80 days, but less time may be required under ideal soil and temperature conditions. Although crops can be established as late as August, seed production is limited due to the cold nights at the end of the growing season. Sprangletop germination generally occurs with late June or July drawdowns. Watergrass grows best in heavy clay or loam soils and will tolerate mildly saline conditions.

Establishment: The introduction of watergrass to a seasonal wetland through seeding usually promotes rapid establishment. Optimal establishment occurs either by: 1) discing, broadcasting the seed, treating the soil with a cultipacker (ring-roller), then flooding for 3-5 days, or 2) through aerial application on saturated soils. The subsequent drawdown should be executed within the time frame in which watergrass locally germinates best (listed under "Timing of Spring Drawdown"). Seeds should begin to germinate within 2 weeks. If germination has not occurred 3 weeks after drawdown, an irrigation will be needed. Irrigation schedules are listed below. Discing prior to seeding reduces plant competition and need not occur if the ground is sparsely vegetated. It may be necessary to repeat the discing process several times to remove dense or robust vegetation. It is important to remember that watergrass is a weed and that drilling or covering the seed is unnecessary. The seed will not germinate if it is buried too deeply in the soil. "Rice cleanings" can be obtained from rice mills and should be applied at 50-100 lb./acre. Though only 10-40% watergrass seed, these have proven quite satisfactory. "Pure" watergrass can be purchased from seed distributors and only requires 15-40 lb./acre.

Spring Drawdown: Managers must do everything possible within the constraints imposed by water districts to maintain water until the late-spring drawdown that will typically encourage watergrass development. Coincidentally, the retention of pond water through April assures the availability of protein-rich invertebrates to breeding ducks. Appropriate drawdown dates are listed above. Watergrass seeds should begin to germinate within 2 weeks of drawdown. Rapid drawdowns (3-5 days) typically produce extensive stands of moist-soil vegetation, consisting of relatively few plant species. Slow drawdowns (2-3 weeks) maximize the foraging opportunity for waterfowl and other wetland birds and result in greater diversity of vegetation. Invertebrates, in particular, become concentrated and readily available to ducks.

Irrigation: Watergrass and other millets are water-dependent plants that require one or two summer irrigations for seed development to occur. Watergrass plants typically show signs of "redness" when soil moisture becomes limiting and the plants are "stressed". Plants will usually be 3-6" high when this condition occurs. At this point the marsh manager may elect to employ either of two strategies. They are as follows:

a) Irrigate Immediately: This method is the most reliable way to produce a highly productive stand of watergrass. The first irrigation should occur when the majority of the plants are turning red, which is generally 4-6 weeks after drawdown. A subsequent irrigation is crucial if plants show redness again. This procedure generally produces a robust stand of watergrass with good seed development. Although ducks may initially have problems utilizing excessively tall

watergrass, weather and feeding activity eventually create openings and facilitate access. Stems serve as an excellent substrate for invertebrates when they become "matted" in the water, therefore, tall watergrass provides good invertebrate habitat.

b) Delay Irrigation Until August: If irrigation water is unavailable until August or if a more open and shorter watergrass stand is desired, then irrigation can be delayed until August. However, under this scenario, high soil moisture must be maintained throughout the remainder of the growing season. This can be accomplished through repeated irrigations or continuous flooding. Early fall flooding (August) can serve as this irrigation. This form of watergrass management is not normally recommended because vegetation response is variable and, therefore, seed production is unreliable.

Fall Flooding: Flooding should coincide with the arrival of migratory waterfowl. Pintails begin arriving in the Central Valley in mid-August, and peak numbers of wintering waterfowl are usually present during December and January. Watergrass units should be flooded between August and October, but the delayed flooding (late November - early December) of an individual unit can make a "new" food source available to wintering waterfowl. The timing of water delivery plays a major role in the determination of flooding schedules, however. Many marsh managers simply execute their fall flooding when irrigation districts make water available. Marsh units should be gradually flooded to allow ducks maximum accessibility to seeds and invertebrates.

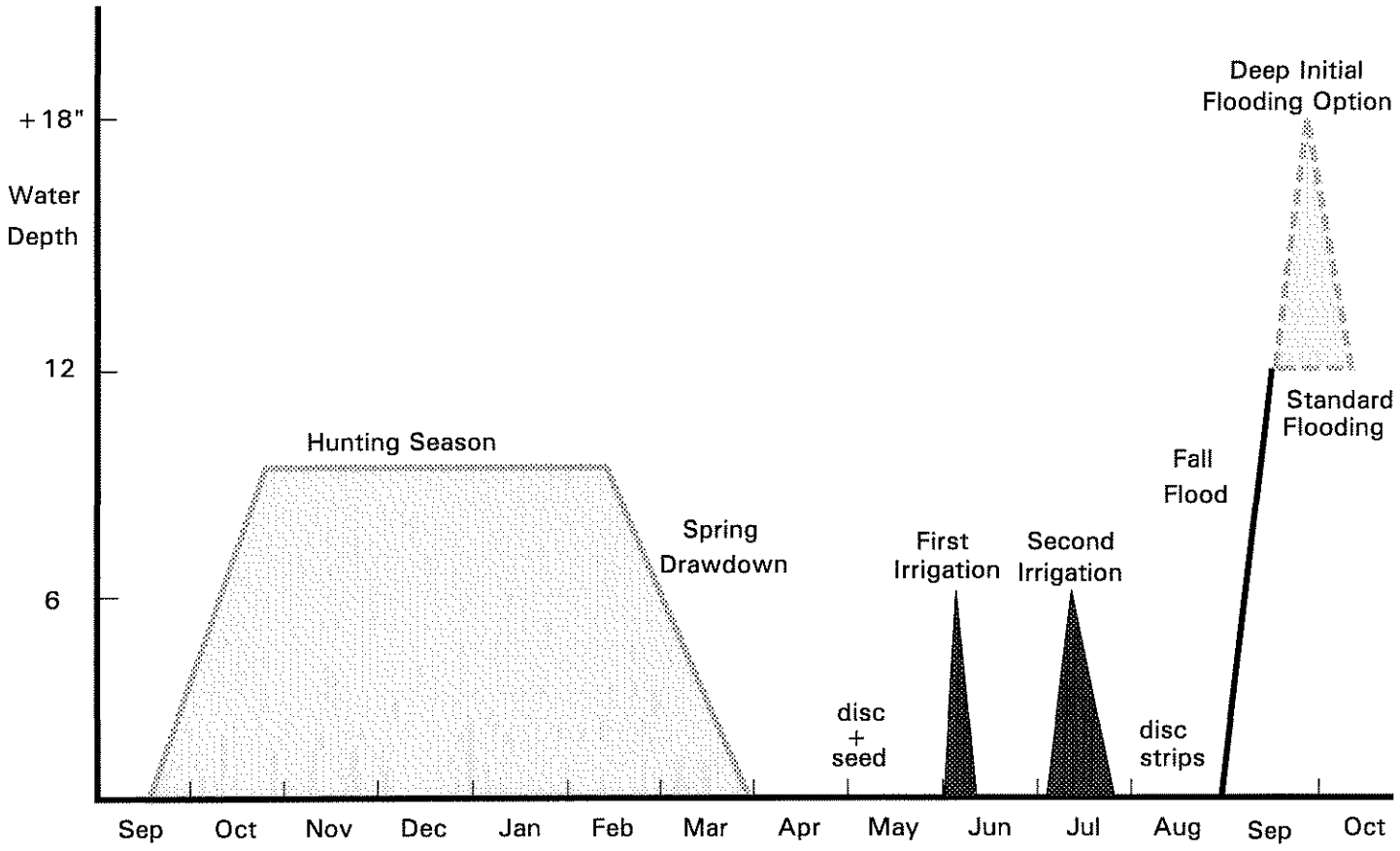


Figure 7. Water management schedule for the initial establishment of watergrass

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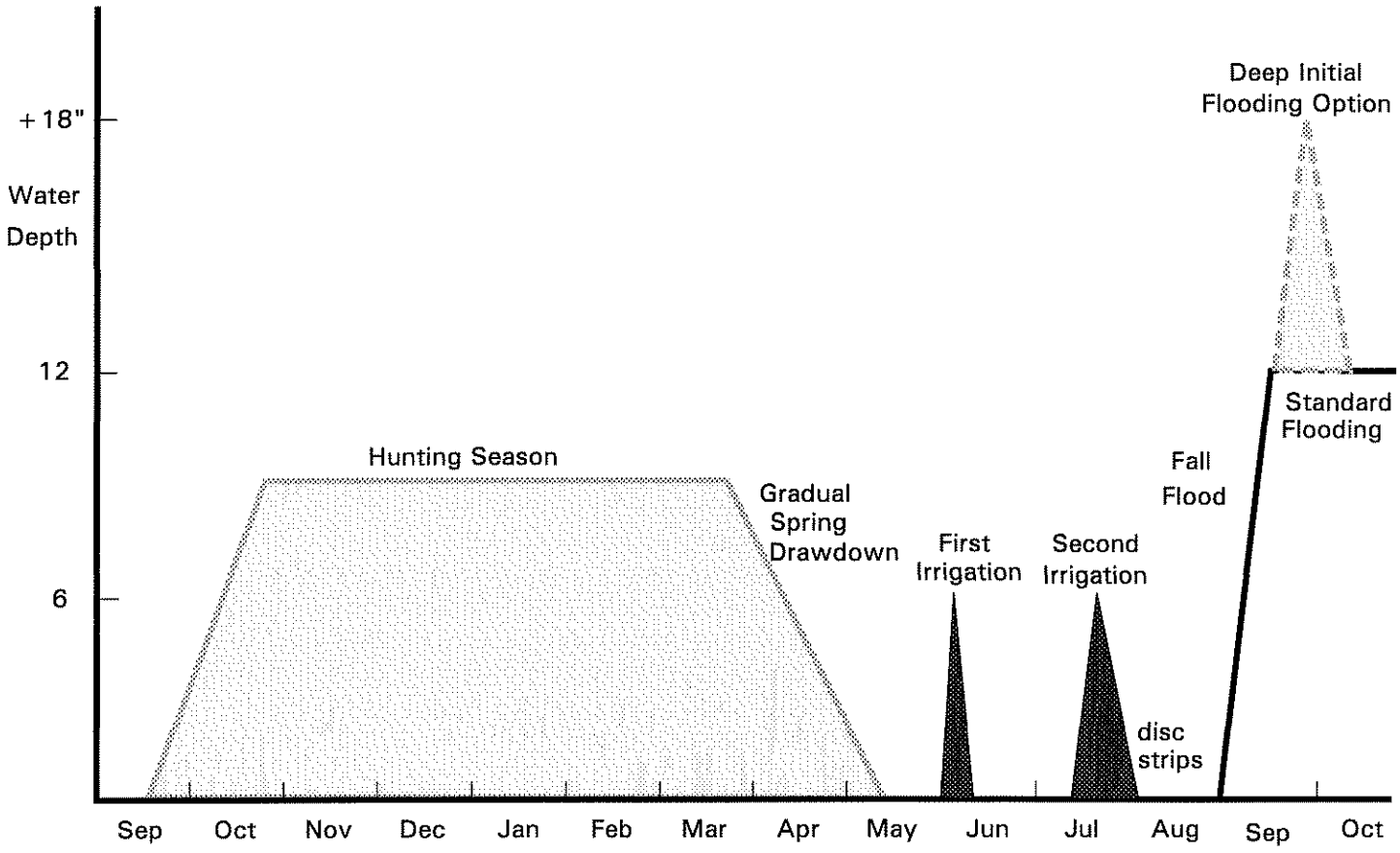


Figure 8. Water management schedule for maintaining stand of watergrass.

jl\wgrass-2.drw



Figure 9 Watergrass

Reprinted from Mason

A Flora of the Marshes of California

University of California Press

WETLAND HABITAT MANAGEMENT GUIDE #4

PERMANENT MARSH

A permanent marsh is a wetland impoundment that incorporates a permanent, year-round flooding regime with dense emergent vegetation, aquatic vegetation, open water, and possibly small islands. These marshes provide critical habitat for wetland wildlife, particularly during the summer when seasonal wetlands are dry. Hardstem bulrush (tules) and cattails are characteristic of permanent marshes. Ideally, these plants cover approximately 50% of the water surface area and the open water area supports extensive beds of submerged aquatic vegetation. Proper management of a permanent marsh satisfies brood-rearing habitat requirements for ducks, therefore, a "brood pond" that is flooded throughout the year in most years will be considered a permanent marsh. Permanent marsh management does not allow for the production of "moist-soil" waterfowl food plants (e.g. watergrass, smartweed, swamp timothy), but does provide waterfowl with a diverse source of invertebrates and aquatic plants.

Value to Waterfowl: Ducks utilize these habitats throughout their annual cycle, but are most dependent upon them during the breeding season and flightless molting period (late spring and summer months). Permanent marshes provide ducks with habitat for brood-rearing, molting (feather replacement), loafing, foraging, and protection from predators. Nestings sites may be available for over-water nesters, such as redheads. Ideally, the pond bottom is uneven, which allows for a diversity of vegetation and optimal foraging depths for various waterfowl and other wetland birds. These habitats are crucial to breeding ducks, wading birds, pheasants, shorebirds, and certain fur-bearing mammals and songbirds due to the lack of summer wetland habitat in the Central Valley. Winter waterfowl use is primarily by gadwalls, mallards, and wood ducks, although permanent marshes are usually attractive loafing sites for a variety of waterfowl. Sago pondweed is a preferred food of many dabbling and diving ducks and typically exists in permanent marshes.

The Central Valley breeding duck population is much larger than it was believed to be in the 1950's, however the factor that ultimately limits the population may be the availability of high quality brood-rearing habitat. Permanent marshes are more productive than the relatively sterile ricefields that breeding ducks use extensively in the Sacramento Valley, thus marsh managers can benefit breeding ducks by establishing permanent marsh habitat whenever practical. Although permanent marshes are typically thought of as brood-rearing habitat, they also serve as molting habitat. Ideal molting habitat is also relatively scarce in the Central Valley. The vast permanent and semi-permanent tule marshes of the Klamath Basin and southern Oregon support large congregations of flightless molting ducks during late summer. Mallards that breed in the Central Valley are known to migrate northward in search of suitable molting habitat and it is possible that other species do as well.

Management Strategy: Permanent marshes are usually maintained at constant water depths, with the circulation of water an important factor in maintaining marsh productivity. Circulation can be achieved with water controls set to provide a "slow flow-through" to offset the effect of evapo-

transpiration. Complete drawdown should occur every 5-7 years to recycle nutrients and control dense emergent vegetation. Overall pond vegetation will increase annually and should be reduced by discing when coverage exceeds 80% of the pond.

Establishment: The construction of a permanent marsh involves establishing uneven topography on the pond bottoms, creating small islands, and the placement of a water distribution and drainage system that allows adequate circulation and complete drainage. Different plants will become established at different water depths.

♦**Size and Location:** Permanent marshes can be of any size, but should be near suitable nesting habitat for ducks to utilize it as brood-rearing habitat. The creation of numerous ponds 5-25 acres in size, scattered throughout a block of wetland habitat generally produces optimum benefits for breeding waterfowl. Generally, such ponds should total no more than 10% of the overall marsh area. The amount and location of permanent marshes on surrounding lands should be taken into consideration when designing a wetland complex.

♦**Gradient:** Pond bottoms of uneven topography tend to develop an interspersion of emergent cover and open water. A water regime that involves the maintenance of water throughout the summer months results in the growth of dense emergent vegetation. Emergent vegetation will become established rapidly in areas where the water depth is less than 2.5 feet. Deeper areas will remain open. Thus, it is important to design a pattern of channels, potholes, and small islands that create a mosaic of open water, dense emergent vegetation, and loafing sites. Potholes and channels should be interconnected and sloped from the inlet to the outlet. This design allows for complete drainage of the pond, which is occasionally necessary for habitat revitalization and the maintenance of water control structures.

♦**Vegetation:** Tules and/or cattails are generally the dominant vegetation in a permanent marsh. Submerged, emergent and floating aquatic vegetation, such as sago pondweed, arrowhead, and duckweed are also common. The position of cover and open water in a permanent marsh is not critical, but consideration should be given to the fact that vegetation serves to protect duck broods from predators. Trees are not generally encouraged in brood-rearing areas because they provide a perch for avian predators, such as hawks and owls. Most managers maintain permanent marshes for the purpose of raising ducks broods. Thus, if it is the manager's intent to maximize duck brood survival, then the establishment of nearby trees is not recommended. However, trees provide outstanding habitat in seasonal wetlands for many species of wintering waterfowl, particularly mallards and wood ducks.

♦**Islands**: The presence of islands in a permanent marsh increases the benefits to waterfowl and other wildlife. They are not essential, but provide additional habitat diversity. Islands can provide important loafing habitats during the wintering, molting, and brood-rearing periods. Ducks prefer barren loafing areas in the fall, thus a late summer burn can be used to provide them with a "clean" site. Winter rains and pond edge moisture will insure that cover is available for duck broods the following spring. Historically, small mounds were naturally created by physical processes such as erosion and silt deposition and were probably low and gently sloping. Man-made mounds should emulate these natural formations. Gentle

slopes will also result in a large "band" of vegetation around the island, creating more emergent cover and diversity.

WETLAND HABITAT MANAGEMENT GUIDE #5

BROOD POND

Flooding Schedule

Fall Flooding: October 1 preferred
Summer Drawdown: July 15 - August 1

A semi-permanent marsh is a wetland impoundment that incorporates a semi-permanent flooding regime with dense emergent vegetation, aquatic vegetation, moist-soil plants, open water, and possibly small islands. In the Central Valley, they are typically flooded from fall until mid-summer to meet the brood-rearing habitat requirements of local waterfowl. For this reason, semi-permanent marshes are often referred to as "**brood ponds**". They provide critical habitat for wetland wildlife, particularly during the summer when seasonal wetlands are dry. Hardstem bulrush (tules) and cattails are characteristic of brood ponds. Brood pond management limits the growth of "moist-soil" waterfowl food plants (e.g. smartweed, swamp timothy), but creates valuable escape cover for duck broods. Brood ponds also provide ducks with a diverse food source of invertebrates and aquatic plants.

Value to Waterfowl: Ducks utilize brood ponds throughout much of their annual cycle, but are most dependent upon them during the late spring and summer when aquatic invertebrates are their primary food source and relatively few wetland areas are flooded. Invertebrates, which are high in protein, are readily available to ducks in both seasonal and semi-permanent marshes during drawdowns. Seasonal wetlands in the Central Valley are typically dry and of little value to ducks during the summer. Although permanent marshes are flooded during the summer, invertebrates are not highly available to ducks in these deep-water marshes. Research has shown that while gadwall hens and their broods utilize permanent marshes extensively, hen mallards with broods prefer shallow seasonal or semi-permanent wetlands over permanent marshes when both habitat types are available. Thus, brood ponds (especially during drawdown) and other semi-permanent wetlands appear to be the preferred feeding habitat for Central Valley mallards during the summer.

Brood ponds typically support vigorous stands of cattails and/or tules. The maintenance of a productive brood pond generally requires periodic vegetation manipulation, however. Studies have shown that wetlands exhibiting the "hemi-marsh" 50:50 cover to open water ratio are ideal habitats for breeding ducks. Frequent discing will accomplish nutrient cycling and insure that the marsh remains in a productive state. Brood ponds also provide excellent loafing habitat for wintering waterfowl, particularly mallards and wood ducks.

Management Strategy: Brood ponds should be flooded continuously from the fall until at least July 15, but preferably August 1. The presence of summer water encourages cattail and/or tule growth in shallow areas, which provides ideal escape cover for duck broods. Discing, mowing, and

burning are methods that can be used to maintain brood ponds in the 50:50 "hemi-marsh" state. Moderate production of moist-soil vegetation may occur (e.g. watergrass), although seed development is hindered by the short period between drawdown and fall flooding, as well as competition from dense emergent vegetation.

In the Central Valley, many wetlands that remain flooded during the spring and summer months are enrolled in the USDA Water Bank Program. Landowners receive annual payments for this provision of brood habitat and may only begin draining these units on established dates between June 15 and July 15. The flightless molting period and part of the brood-rearing period may occur after some Water Bank units have been drained, thus the maintenance of water beyond the contractual calendar date may provide increased benefits to brood-rearing and molting ducks. The timing of fall flooding is not crucial because seasonal wetlands provide the majority of the habitat for early migrant waterfowl. Flooding of brood ponds should occur after maintenance work (i.e. discing, mowing) has been completed.

Note: The presence of summer water benefits ducks and other wetland wildlife, but also may produce mosquitos. Landowners should check with their local mosquito abatement district for guidelines.

WETLAND HABITAT MANAGEMENT GUIDE #6

SEASONAL WETLAND - SUMMER WATER COMBINATION

Most wetland impoundments have borrow ditches on the "inside" or "pond" side of exterior levees. Borrow areas are created during levee construction and are generally 12-24" lower than the average elevation of the pond bottom. A marsh management practice that is becoming increasingly popular in the Central Valley involves the maintenance of summer water in the borrow areas or channels that exist within otherwise drained seasonal wetlands. These flooded borrow areas/channels typically comprise less than 5% of a wetland impoundment, but can be extremely productive habitats. Without impairing the capability of a wetland unit to produce large quantities of "moist-soil" waterfowl food plants, marsh managers can provide critical summer habitat for wetland-dependent wildlife in the low areas of their seasonal wetlands. These wet summer habitats may be drained in August or maintained throughout the year. Such wetlands may be extremely important summer feeding areas for breeding and post-breeding ducks, ducklings, pheasants, wading birds, and shorebirds. These feather-edged habitats offer more upland/wetland interface, and thus a more productive feeding habitat, than do typical "brood ponds" which are generally flooded "levee-to-levee".

Value to Waterfowl: Ducks utilize these flooded borrow areas/channels during the late spring and summer when aquatic invertebrates are their primary food source and relatively few wetland areas are flooded. Invertebrates, which are high in protein, are readily available to ducks in seasonal marshes during spring drawdowns. However, seasonal wetlands in the Central Valley are typically dry and of little value to ducks during the summer. Although permanent marshes are flooded during the summer, invertebrates are not highly available to ducks in these deep-water marshes. Research has shown that while gadwall hens and their broods utilize permanent marshes extensively, hen mallards with broods prefer shallow seasonal or semi-permanent wetlands over permanent marshes when both habitat types are available. Thus, flooded borrow areas/channels within seasonal marshes and "brood ponds" would appear to be the preferred feeding habitat for Central Valley mallards during the summer.

Flooded borrow areas/channels provide some escape cover for duck broods, but function primarily as invertebrate-rich feeding areas for duck broods and other wetland wildlife. Ideally, brood ponds should be located nearby to provide ducks with optimum cover. Although these wet summer habitats are important to duckling survival, they may also be extremely important to the survival of young pheasants. Pheasant chicks are completely dependent on insects as a food source during their first 2 weeks of life; the "feather-edges" of these semi-permanent wetlands support good insect populations.

Management Strategy: The management of a seasonal wetland in combination with a flooded borrow area/channel component involves flooding the entire pond during the fall and draining the majority of the pond during the spring, while maintaining water in borrow areas/channels until at least July 15. However, managers are encouraged to maintain water in borrow areas/channels throughout the entire year at stable levels. This practice is compatible with

the interests of mosquito abatement districts because a mosquito fish population can be established and continuously maintained. These wetland areas generally encompass such small acreage that the amount of water required to maintain them is minimal. In addition to providing mosquito fish, these sites also provide a brood stock of midges. This management practice is thought to increase the production of midge larvae substantially in the pond during the following winter. The worm-like larvae of the midge fly is a major invertebrate food source for pintails and green-winged teal.

Channels or borrow areas may be constructed in wetlands that do not have existing topographic diversity. The depth of these channels may range from 6"-36". Although inexpensive to construct, shallow channels (6"-12") typically require periodic maintenance (e.g. discing) due to the invasion of tules and/or cattails that results from the presence of summer water. Deep (30"-36") channels prohibit tule/cattail growth and require minimal maintenance, but the cost of excavation can be extremely high. Generally, shallow channels are more productive than deeper areas, but either can greatly enhance the value of a seasonal wetland.

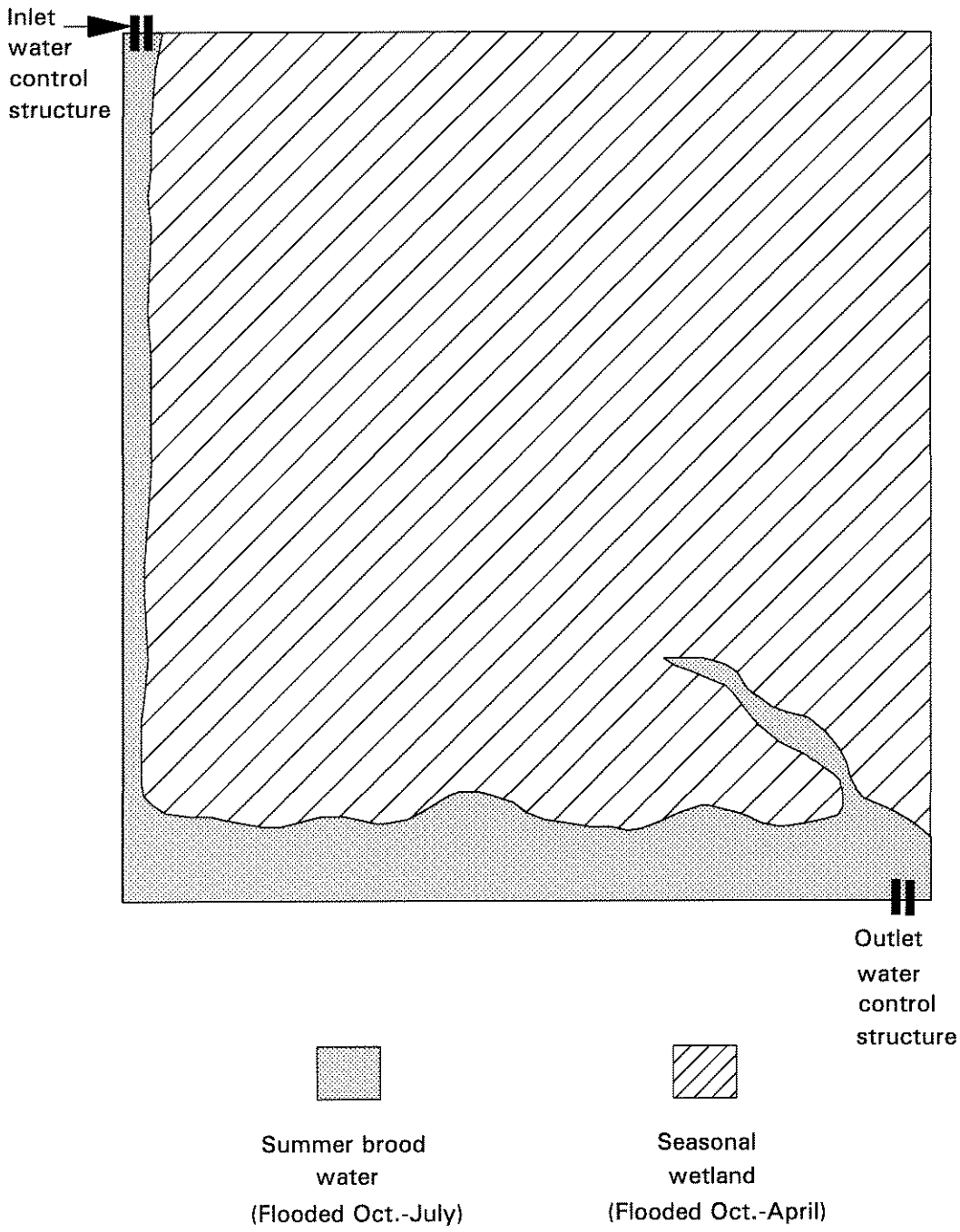


Figure 10. Seasonal Wetland - Summer Water Combination

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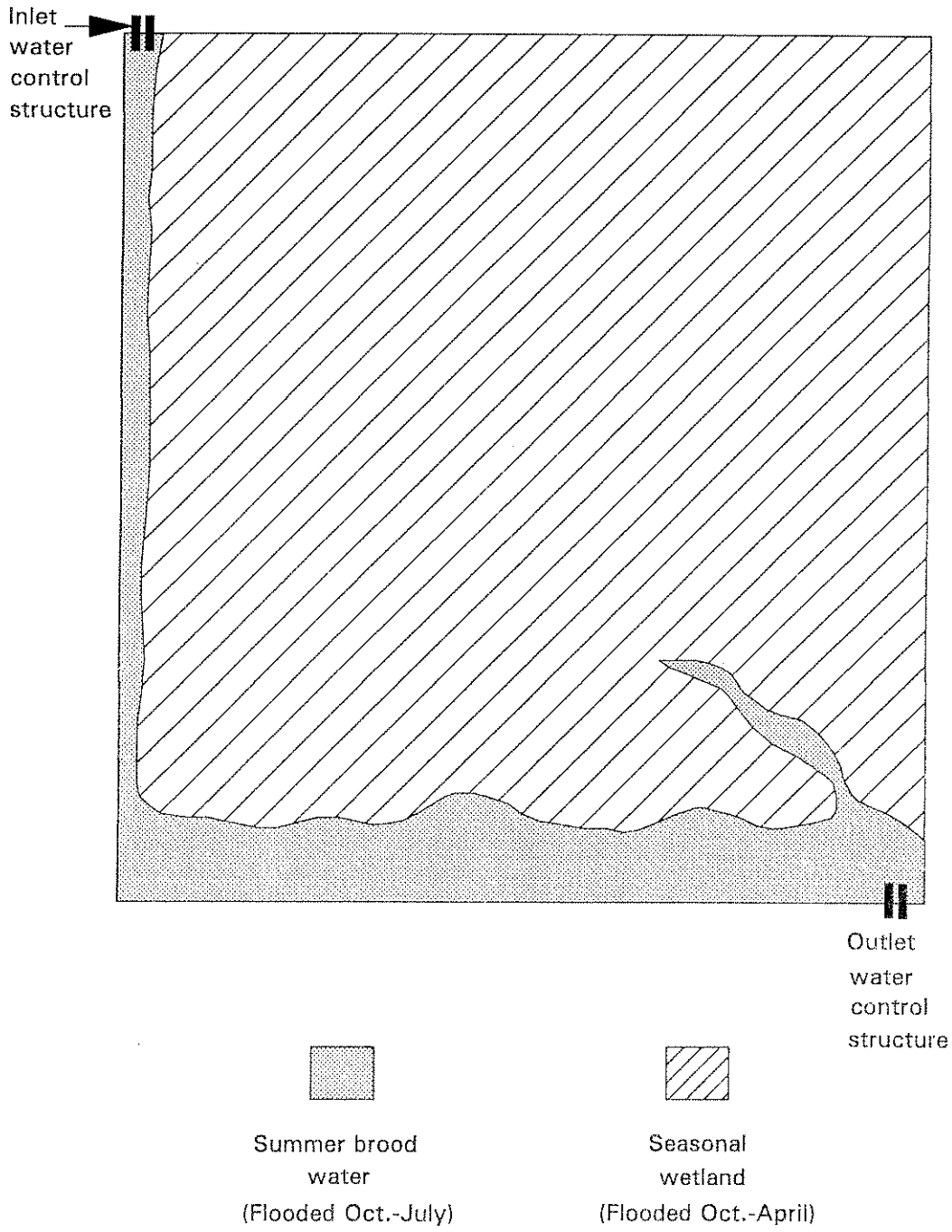


Figure 10. Seasonal Wetland - Summer Water Combination

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Appendix A. Common and scientific names of plants named in text.

PLANTS

Common Name	Scientific Name
Ammannia	Ammannia coccinea
Asters	Aster spp.
Annual atriplex or fat-hen	Atriplex spp.
Water hyssops	Bacopa spp.
Beggarticks	Bidens spp.
Goosefoot	Chenopodium spp.
Brass buttons	Cotula corinopifolia
Alkali weed	Cressa truxillensis
Pricklegrass	Crypsis niliaca
Bermuda grass	Cynodon dactylon
Chufa	Cyperus esculentus
Salt grass	Distichilis spicata
Watergrass	Echinochloa crusgalli
Burhead	Echinodorus cordifolius
Spikerushes	Eleocharis spp.
Alkali heath	Frankenia grandifolia
Swamp timothy	Heleochloa schenoides
Baltic rush	Juncus balticus
Sprangletop	Leptochloa fascicularis
Duckweeds	Lemna spp.
Jointgrass	Paspalum distichum
Sago pondweed	Potamogeton pectinatus
Smartweed	Polygonum lapathifolium
Dock	Rumex crispus
Widgeongrass	Ruppia maritima
Arrowheads	Sagitarria spp.
Tule or hardstem bulrush	Scirpus acutus
River bulrush	Scirpus fluviatilis
Alkali bulrush	Scirpus robustus
Cattails	Typha spp.
Cocklebur	Xanthium strumarium
Horned pondweed	Zannichellia palustris

YOLO BASIN FOUNDATION

Exhibit L

Yolo Bypass Stakeholders Working Group Meeting Minutes

See Exhibit L folder on attached file drive for individual meeting minutes documents

1. November 16, 1999
2. December 7, 1999
3. January 10, 2000
4. February 10, 2000
5. March 9, 2000
6. April 14, 2000
7. May 12, 2000
8. June 29, 2000
9. August 17, 2000
10. October 12, 2000
11. November 16, 2000
12. December 15, 2000
13. January 2, 2001
14. September 20, 2001
15. October 25, 2001
16. January 15, 2002
17. May 2, 2002
18. June 20, 2002
19. August 15, 2002
20. November 21, 2002
21. January 23, 2003
22. February 27, 2003
23. May 29, 2003
24. July 17, 2003
25. September 11, 2003
26. December 18, 2003
27. March 25, 2004
28. March 26, 2004
29. June 17, 2004
30. August 26, 2004
31. October 14, 2004
32. December 15, 2004
33. June 3, 2005
34. January 10, 2006
35. June 5, 2006
36. September 18, 2006
37. December 15, 2006
38. June 5, 2007
39. December 6, 2007
40. February 4, 2010
41. May 23, 2013
42. March 27, 2014
43. December 8, 2015
44. May 24, 2016
45. January 10, 2017
46. June 12, 2017

YOLO BYPASS MANAGEMENT STRATEGY
STAKEHOLDERS WORKING GROUP MEETING NO. 1

DRAFT
Meeting Minutes

MEETING DATE: November 16, 1999

LOCATION: California Department of Fish and Game
Yolo Wildlife Area Headquarters
45211 County Road 32B (Chiles Road)
Davis, CA 95616

IN ATTENDANCE: Regina Cherovsky, PG&E Properties
Chuck Dudley, Joe Heidrick Enterprises
David Feliz, Department of Fish and Game (DFG)
Rick Kirkwood, City Manager, City of Woodland
Yvonne LeMaitre, Trustee, Glide Foundation
Rick Martinez, Martinez Farming Company
Duncan McCormack II, Landowner
Duncan McCormack III, Landowner
Greg Schmid, Los Rios Farms
Gary Wegener, Public Works Director, City of Woodland
Robin Kulakow, Yolo Basin Foundation (YBF)
Marcie Howe, YBF
Dave Ceppos, Jones & Stokes
Alice McKee, Jones & Stokes

NEXT MEETING: **The next Working Group meeting will be held on *Thursday, December 16, from 11 a.m. to 1 p.m.* at the California Department of Fish and Game Yolo Wildlife Area Headquarters. Lunch will be provided. Members of the Working Group are asked to call Jennifer Stock of Jones & Stokes at 916/737-3000 to confirm their attendance.**

ACTION ITEMS

1. Jones & Stokes will gather more information on proposed regional flood control improvement projects and their expected effects on the depths and durations of flooding in the Bypass.

2. Jones & Stokes will investigate the intentions of regional flood control agencies regarding increased flooding in the Bypass.

3. Jones & Stokes will send copies of the CALFED Bay-Delta Program's Ecosystem Restoration Program Plan (ERPP) Strategic Plan for Restoration to the Working Group.

4. Jones & Stokes will send copies of the assurances section of the CALFED Multi-Species Conservation Strategy to the Working Group.

5. Jones & Stokes will send copies of the Fish and Wildlife Service (USFWS) document outlining USFWS's Final Policy and Rules regarding Safe Harbor and Candidate Conservation Agreements to the Working Group.

DECISIONS REACHED

1. The Working Group agreed to continue to participate in the project.

2. The Working Group agreed to meet again in December. The meeting will be held on December 16, from 11 a.m. to 1 p.m. at the California Department of Fish and Game Yolo Wildlife Area Headquarters.

SUMMARY OF MEETING

Introduction

Mr. Ceppos began the meeting, provided introductory comments, and asked the attendees to introduce themselves. He then reviewed the agenda and introduced Ms. Kulakow.

Project Description and Purpose

Ms. Kulakow thanked the Working Group for their time and participation in the meeting. She explained that the purpose of the project is to assist local stakeholders (particularly landowners,

farmers, and water users) in developing a vision for the future of land uses in the Bypass. She stated that she was concerned about projects proposed by other groups that tend to look at the Bypass as a "blank slate" for habitat restoration. YBF believes that local stakeholders are the most logical participants to create a strategy for the Bypass, based on their knowledge of the best use of the land. She explained that this project began when YBF received a CALFED grant to create a strategy for habitat restoration in the Bypass. YBF has expanded the purpose of this grant to create a locally based land management strategy for the Bypass, including a variety of land uses such as agriculture, habitat-friendly farming, and habitat restoration, rather than habitat restoration alone. YBF wants to give local stakeholders the opportunity to create a framework for future projects, to indicate which projects, if any, would be feasible and acceptable to them, and to outline the assurances and conditions that would be required for local stakeholders to support proposed projects. Ms. Kulakow explained that YBF hired Jones & Stokes to facilitate the project process and to provide technical expertise.

Mr. Ceppos added that there are many interests with different ideas for the best land uses (e.g., agriculture, flood control, and habitat restoration) in the Bypass, and that these interests sometimes conflict. He asked the group to refer to the Information Sheet in the Working Group binder, and to read the section that stated that the project's intent is to "develop a long-term strategy for managing fish and wildlife habitat while maintaining agricultural and economical viability and flood control in the Bypass."

Mr. Ceppos added that this project is not intended to defend CALFED, and that it would in fact be quite different from most of the CALFED projects that are underway. He read a portion of the Family Water Alliance's (FWA's) October 1999 Green Ribbon Report, which stated that CALFED's watershed approach

> encompasses not only a huge expanse of land, but families and communities as well. Prior to moving forward with such CALFED laboratories, all citizens within the watershed need to be aware of the proposed watershed declaration, and be involved from the ground up since implementation will be in their backyard. No new agencies or authorities need to be developed to assist in watershed management. Local county government in conjunction with landowners are the best suited to act as their own watershed steering committees . . . This process must not be a top down approach. Agencies and environmentalists without a real understanding of local land use policies and practices often develop and recommend solutions that are not realistic. Assuring that the process is landowner-based will provide realistic solutions to environmental issues (Green Ribbon Report, p.5).

Mr. Ceppos stated that the approach called for in the above text describes exactly the initial vision for the Yolo Bypass project: to assist and encourage local stakeholders in developing a strategy for the area they are familiar with. He stated that this is the only CALFED project to his knowledge where local stakeholders have the opportunity to produce a CALFED product and to send a direct message to CALFED and others about their vision, their concerns, and their need for assurances. This process is intended to give local stakeholders a voice. He stated that today's meeting is intended to see if this group of stakeholders is interested in participating in this unique project.

Mr. Ceppos explained that YBF is proposing to form a Working Group of local stakeholders that will guide the project. He added that the Working Group meetings will give the local stakeholders an inside look at CALFED and CALFED's proposals and decisions. He promised to share the knowledge he has of CALFED at the Working Group meetings.

Project Process

Mr. Ceppos explained that the project team (YBF and Jones & Stokes) has met individually with local stakeholders, including landowners, farmers, water users, Yolo county supervisors, and Congressman Doug Ose's office, to introduce the project. Meetings with the Reclamation Board and the U.S. Army Corps of Engineers (USACE) are forthcoming.

Mr. Ceppos proposed that the Working Group meet every four to six weeks over the next few months. These meetings will be intended as a forum for stakeholders to air their concerns and state their interests in the project. He also explained that the project team would use the meetings to provide tools to help the Working Group make future business decisions, such as inviting representatives of funding agencies to explain easement options, and bringing biological specialists to address the group. He
expressed his initial hope that the final project document would only include proposals that the Working Group thinks are reasonable and feasible, and that involve willing landowners. He emphasized that if, at the end of the process, the Working Group does not want to make any proposals for land use changes in the Bypass, then that is what the final project document will say.

Mr. Ceppos explained that the project will continue for approximately six more months.

Working Group Questions and Input

Ms. LeMaitre stated her concern that the project is funded through CALFED. She believes that CALFED is very arrogant and will bulldoze local stakeholders to do what it wants. She is concerned that CALFED will legislate changes that the landowners will not want. She asked if Jones & Stokes could bring additional information regarding CALFED to the group.

Mr. Ceppos responded that he will convey any information regarding CALFED that he can to the Working Group. He stated that the project team does not want to demonize CALFED, and that this project process will give the Working Group the opportunity to state their concerns to CALFED and to shape CALFED's vision for the Bypass based on what local stakeholders think is acceptable.

Ms. LeMaitre added that the public needs to understand where its food and fiber come from, and that farmers love wildlife. She stated that she is concerned that the public does not understand the business concerns of farming and has more votes than the farmers do.

Mr. Ceppos responded that there are people who would like to see the entire Bypass as habitat, but that this is not YBF's vision. He stated that the project team has developed the vision, based on meetings with stakeholders, of a mosaic of land uses in the Bypass, maintaining much land in agriculture, expanding on the habitat that already exists (including the duck clubs and habitat friendly agricultural practices), and creating additional habitat as appropriate. He recognized that the landowners are afraid that if they give a little, the government might keep wanting more.

Mr. Martinez stated that future regional flood control improvements that would affect the Bypass are being planned, and asked whether proposed improvements were known. He said that he had heard that flood water is expected to be deeper in the southern portion of the Bypass because of increases in levee heights along the American River, and asked if the Working Group could get more information regarding flood depths and durations.

Mr. Ceppos responded that Jones & Stokes would gather more information on proposed regional flood control improvement projects and their expected effects on the depths and durations of flooding in the Bypass. He said that Jones & Stokes could speak with the Sacramento Area Flood Control Agency (SAFCA) and the State Reclamation Board, as well as with Sutter and Yuba counties, if budget allows. He added that the project team would invite representatives of these agencies to speak to the Working Group. He said that to really understand changes in hydrology in the Bypass, hydraulic analyses would need to be conducted. He explained that this project does not have adequate budget for such an analysis, but that an analysis, based on increased roughness, has been conducted for the proposed USFWS North Delta Refuge.

Mr. Ceppos asked if the group felt that flood frequency and duration have increased in recent years.

Mr. Dudley responded that flood durations have been longer because of the management of reservoirs upstream. He stated that the State Department of Water Resources and the U.S. Bureau of Reclamation release large flows late in the season (May) to increase the capacity of reservoirs to hold snowpack runoff.

Mr. Ceppos asked if offstream storage would help the situation.

Mr. Dudley responded that offstream storage would not capture the large flows. He believes that Shasta Reservoir needs to be increased in size.

Ms. LeMaitre asked if it is possible to make reservoirs bigger, especially since dredging of the Sacramento River is not allowed and the river is filling with sediment, decreasing capacity.

Mr. Ceppos responded that a proposal to raise Shasta Dam has been made, but would probably move forward slowly. The proposal will require a multitude of studies from many perspectives.

Mr. Schmid asked if CALFED has a specific proposal for the Bypass.

Mr. Ceppos responded that the Bypass is included in CALFED's *Strategic Plan for Restoration* (Strategic Plan). He stated that CALFED has four primary objectives: 1) conduct ecosystem restoration; 2) improve water supply; 3) improve levee integrity; and 4) improve water quality. He added that improvements to the Bypass are included in the Strategic Plan as Phase 1 actions. Phase 1 actions are actions that will be undertaken within the first seven years after the EIR/EIS record of decision takes place (expected in June of 2000). Mr. Ceppos said that copies of the Strategic Plan will be sent to the Working Group with the meeting minutes.

Mr. Dudley asked what types of habitat could be created in the Bypass without decreasing flood flow capacity.

Mr. Ceppos responded that several types of habitat might be possible, although large stands of riparian forest would probably not be feasible because it would provide too much of an impediment to flood flows. However, he explained that such habitat could potentially be created in small "hydraulic shadows", areas where capacity and flows would not be affected (e.g., behind the Southern Pacific Railroad berm). He cited YBF's recent planting of approximately 3000 trees between the railroad and Highway 80.

Mr. Feliz stated that created riparian habitat supports birds such as raptors and neotropical migrants, as well as mammals such as deer and rabbits. He stated that the mammals need to have somewhere to go when the Bypass floods, but that the flooding is an historic pattern to which animals have long been adapted. He added that the levees now create an unnatural system, and that certain animals fare better than others in the Bypass.

Mr. Ceppos added that several types of habitat compatible with flooding could be created. For example, mudflats would support shorebirds at key times of the year, and flow refuge areas would benefit juvenile fish during floods, allowing them to remain protected from high velocity flows. Waterfowl would benefit from flooded habitat, as would mammal species such as otters.

Mr. Dudley expressed concern that mammals could not flee the Bypass during floods because of the canals and levees.

Mr. Feliz responded that some species are able to adapt to the conditions. He added that wetlands are the most productive habitat type.

Mr. Ceppos asked if the group was concerned about whether it makes sense to create habitat in the Bypass.

Mr. Dudley answered he believes that the nature of the Bypass as a floodway dictates that habitat use be non-terrestrial. He felt that habitat should only be created for species that are able to adapt to flood conditions. He wondered if habitat created in the Bypass could go unused by animals because of the flooding, particularly flooding that occurs during nesting season. He also stated that fish habitat would probably be detrimental to farming.

Ms. LeMaitre stated that she believes it would be cruel to create habitat in an area that floods because animals would starve or drown during flood events. She expressed concern over creating

a situation that might be worse than no habitat at all. She stressed that the Bypass is a human-made structure and as such may not be a good place for natural habitat.

Mr. Feliz agreed that the Bypass could not be a nesting area, but added that it could be a valuable wintering area, which is what the Central Valley historically has been. He stated that the Vic Fazio Yolo Wildlife Area is very successful as wintering habitat. He reiterated that local animals have long adapted to flood conditions, since those are the natural conditions in much of the Central Valley.

Ms. Cherovsky expressed concern over the integrity of the levees along the Bypass if flow patterns are changed. In addition, she raised the issue of waterfowl leaving the Bypass when it floods and settling on adjacent farm land. She stated that adjacent farmers might not want their land used as habitat, and asked what effects forage activity by waterfowl would have on agricultural land.

Mr. Feliz replied that the federal refuges established in the Sacramento area were created in part to relieve some of the pressure of waterfowl foraging on agricultural land.

Ms. Cherovsky stated that Conaway's solution to the forage issue is to set aside some fields for waterfowl foraging. She added that the more forage area there is available, the more dispersed (and thus less damaging) the foraging activity will be.

Mr. Ceppos asked if landowners could add a habitat cycle into their cropping cycles. For example, stubble could be left through the winter in small parcels of land to provide foraging habitat for waterfowl, and good habitat for fish during floods.

Mr. Schmid responded that this might be possible, particularly if done on small parcels, and if an economic incentive were provided, since it would cost farmers more to do this.

Ms. LeMaitre stated that landowners are afraid that if they or a neighbor creates habitat, the government could place restrictions on their land. She added that landowners would need assurances before they would agree to habitat creation.

Mr. Ceppos stated that CALFED is hearing this concern repeatedly, and that he believes it is a very valid issue. He said that CALFED's *Multi-Species Conservation Strategy* (MSCS) includes some assurances about this issue, but that these assurances need to be expanded. He added that copies of the assurances section of the MSCS would be sent to the Working Group.

Mr. Ceppos added that USFWS, the National Marine Fisheries Service (NMFS), and DFG are primarily responsible for imposing restrictions based on endangered species. These agencies have been reluctant to provide Safe Harbor assurances, but the issue seems to be coming to a head. Regulators will soon have to recognize that none of the habitat improvements they want will happen until assurances are given. He added that CALFED is attempting to address this, and that this project's final document could stress the point.

Mr. McCormack III stated that he was concerned about the possible power struggle between agencies; for example, one agency might give assurances while the others disagree.

Mr. Ceppos read the assurances listed in the USFWS document outlining the USFWS's *Final Policy and Rules regarding Safe Harbor and Candidate Conservation Agreements* to the Working Group. He said that copies of this document would be sent to the Working Group with the meeting minutes. He added that this document was a good start, but needed to be expanded upon. He said that the document begins to address the issue of incidental take (unintended killing of a listed species). Mr. Ceppos stated that this group has the unique opportunity to send a message regarding the need for Safe Harbor assurances to CALFED and the resources agencies by participating in this project.

Mr. Martinez stated that endangered species already exist in the Bypass, so this project and process could provide assurances for the existing species, in addition to any created habitat. He added that it should be acceptable to kill some animals inadvertently if their net numbers are increased by habitat creation.

Ms. LeMaitre stated that it is imperative that all landowners be part of this process, to bring both positive and negative viewpoints to the group. She emphasized that all landowners have an economic stake in the project, and expressed concern that CALFED is aggressive and wants to control water in the Toe Drain. She fears that CALFED sees the farmers as expendable, and believes that CALFED would like to render land fallow. She stressed that landowners need to participate to make sure their voices are heard.

Ms. Cherovsky stated that Conaway Ranch cannot access its diversion from the Sacramento River when the Bypass is flooded. In addition, the diversion needs to be repaired every year. If flood duration is increased, it will be impossible to repair the diversion early enough, and Conaway will be required to pump groundwater (inside and outside of the Bypass), which will lead to subsidence. Pumping is also expensive.

Mr. Ceppos addressed the issue of increased flood frequency and duration in regard to CALFED's habitat creation proposals for the Bypass. He said that he believes CALFED is only interested in increasing flow frequency and duration in smaller areas (e.g., near the Toe Drain) to benefit fish and shorebirds. The intent is not to flood the entire Bypass for longer durations. However, he added, we do not know the intent of agencies such as SAFCA, Yuba County, Sutter County, and Sacramento County regarding the Bypass. He stated that Jones & Stokes will investigate the intentions of regional flood control agencies regarding increased flooding in the Bypass.

Mr. Martinez stated that the West Sacramento levees have been increased three feet. He added that the overriding concern of flood operations manuals is the integrity of dams, not operation of the Bypass.

Ms. Kulakow asked what the latest date to plant rice would be. The group responded that it would be Memorial Day, but that accessible land would be required two weeks prior to that to prepare for planting.

Ms. LeMaitre stated that most conservation easements do not cover operations and maintenance (O&M) costs, and that these costs would likely exceed the payment amounts.

Mr. Ceppos responded that he had looked into the issue of funding O&M for another project, and found that the government would not set up a trust fund to help pay for O&M. He stated that CALFED's text in the MSCS assurances section includes the need to cover O&M for fish screens, but that the Working Group could tell CALFED, through this project, that these assurances must be expanded to cover other things.

Mr. Wegener stated that the City of Woodland is concerned about establishing salmon runs in Cache Creek through increased flows.

Mr. Ceppos stated that the Working Group would need to consider how to avoid this problem. He referenced Mr. Martinez's earlier comments regarding minimizing scrutiny and regulatory oversight if net increases occur in fish species populations.

Mr. Wegener asked if environmental flow releases from Clear Lake would be required if a salmon run were established in Cache Creek and a hydraulic link were connected to the Delta.

Mr. Ceppos responded that he did not know but that this is the type of issue the final project document would discuss.

Mr. Ceppos asked if potential land prices would be affected if water uses and sales out of the county were restricted.

Ms. Cherovsky responded that this could potentially affect the price of land.

Mr. Wegener stated that the City of Woodland and Yolo County are very interested in keeping water here. He added that population growth is pushing this issue.

Mr. McCormack III added that if water rights were restricted in any way, land prices would be affected.

Ms. LeMaitre added that if the public wants restrictions on where water goes, they will have to pay for the loss in property values.

Next Steps

Mr. Ceppos asked if this project process seems worthwhile to the group, and if they would like to continue to participate. He added that the Working Group would be expanded to include other stakeholders, as warranted. However, he assured the group that landowners, farmers, and water users would be the core group in the process.

The group agreed to meet again in December. The meeting will be held on Thursday, December 16, from 11 a.m. to 1 p.m. at the California Department of Fish and Game Yolo Wildlife Area Headquarters. Lunch will be provided. Members of the Working Group are asked to call Jennifer Stock of Jones & Stokes at 916/737-3000 to confirm their attendance.

YOLO BYPASS MANAGEMENT STRATEGY
DUCK CLUB BRIEFING MEETING

***DRAFT* Meeting Minutes**

MEETING DATE: December 7, 1999

LOCATION: California Department of Fish and Game
Yolo Wildlife Area Headquarters
45211 County Road 32B (Chiles Road)
Davis, CA 95616

IN ATTENDANCE: Chuck Dudley, Heidrick Farms
Mike Egan, Yolo Flyway Farms
Dick Goodell, Glide In Ranch
Dennis Kilkenny, Dawson Duck Club
Bob Leonard, Yolo Basin Farm
Ken and Cyndi Martin, Rising Wings
Duncan McCormack II, hunter
Duncan McCormack III, hunter
Gary Moody, Yolo Wings
Lynn Pryor, hunter
Dennis Murphy, farmer
Ron Paul Kilkenny
Ray Thompson, Sky Raker Duck Club
David Feliz, California Department of Fish and Game (DFG)
Tom Harvey, U.S. Fish and Wildlife Service (USFWS)
Craig Isola, USFWS
Dan Loughman, California Waterfowl Association (CWA)
Pat Perkins, DFG
Chadd Santerre, CWA
Dave Smith, DFG
Robin Kulakow, Yolo Basin Foundation (YBF)
Mike Lien, YBF
Dave Ceppos, Jones & Stokes
Alice McKee, Jones & Stokes
Jennifer Stock, Jones & Stokes

NEXT MEETING: **The next Yolo Bypass Management Strategy Working Group meeting will be held on January 10, from 11 a.m. to 1 p.m. at the California Department of Fish and Game Yolo Wildlife Area Headquarters. Lunch will be provided. Members of the Working Group are asked to call Jennifer Stock at 916/737-3000 by January 6 to confirm their attendance.**

ACTION ITEMS

1. Jones & Stokes will send copies of the CALFED Bay-Delta Program's (CALFED's) Ecosystem Restoration Program Plan (ERPP) Strategic Plan for Restoration to the meeting participants.

2. Representatives for organizations such as the Grasslands Conservation District (Grasslands) and/or the Butte Sink Waterfowl Association (BSWA) will be invited to speak at a future meeting.

DECISIONS MADE

1. The Duck Club representatives agreed to participate in the Yolo Bypass Management Strategy project as members of the project's Working Group.

SUMMARY OF MEETING

Introduction

Ms. Kulakow began the meeting, provided introductory comments, and asked the attendees to introduce themselves. She then explained that YBF is a nonprofit group whose main focuses are providing educational programs and coordinating with DFG to manage the Vic Fazio Yolo Wildlife Area (Wildlife Area). She added that YBF's role is to facilitate communication between the various individuals and entities with an interest in the Yolo Bypass (Bypass). She then reviewed the agenda, and explained that this meeting was intended to share information of interest to the duck clubs regarding the Yolo Bypass Management Strategy (Management Strategy) project, the Wildlife Area, the proposed USFWS North Delta Refuge (Refuge), and the Water Bank and Conservation Reserve Programs (CRP). She introduced Mr. Ceppos, Jones & Stokes' project manager for the Management Strategy, and explained that YBF hired Jones & Stokes to facilitate the project process and provide technical expertise.

Management Strategy

Project Description and Purpose

Mr. Ceppos thanked the group for their time and participation in the meeting. He explained that the purpose of the Management Strategy is to assist local stakeholders (particularly land owners,

farmers, and water users) in developing a vision for the future of land uses in the Bypass. He stated that YBF was concerned about projects proposed by other groups who tend to view the Bypass as a blank slate for habitat restoration. YBF believes that local stakeholders are the most logical participants to create a strategy for the Bypass, based on their knowledge of the best use of the land. He added that this project began when YBF received a CALFED grant to create a strategy for habitat restoration in the Bypass. YBF has expanded the purpose of this grant to create a locally based land management strategy for the Bypass, which would include a variety of land uses, such as agriculture, habitat friendly farming, and habitat restoration, rather than simply habitat restoration. He added that CALFED's overall goal through this project is to find a realistic balance of land uses for the Bypass. YBF wants to give local stakeholders the opportunity to create a long-range land management strategy that identifies feasible and acceptable land use changes (if any), and outlines the assurances and conditions that would be required for local stakeholders to support proposed projects within that strategy.

Working Group

Mr. Ceppos continued, saying that there are many interests with different ideas for the best land use in the Bypass, such as agriculture, flood control, and habitat restoration, and that these interests sometimes conflict. He explained that YBF has formed a Working Group of local stakeholders that will guide the project. The first meeting of the initial group of stakeholders was held in November. The Working Group meetings will give local stakeholders an inside look at CALFED and CALFED's proposals and decisions. He also explained that the project team would use the meetings to provide tools for the Working Group to make future business decisions, including, for example, bringing representatives of funding agencies to speak to the group to explain easement options, and bringing biological specialists to speak to the group. The meetings will give stakeholders a forum for expressing their opinions and concerns. He added that the Working Group will likely meet every four to six weeks over the next few months. He stated that his intent for the final project document is that it will only include proposals that the Working Group thinks are reasonable and feasible, and that involve willing landowners and water users. He emphasized that if, at the end of the process, the Working Group does not want to make any proposals for land use changes in the Bypass, then that is what the final project document will say.

Mr. Ceppos asked the group to consider joining the Working Group, or at least attending the next Working Group meeting.

Project Process

Mr. Ceppos explained that the project team (YBF and Jones & Stokes) has met individually with local stakeholders, including landowners, farmers, water users, all Yolo county supervisors, Congressman Doug Ose's office, and the State Reclamation Board, to introduce the project. A meeting with the U.S. Army Corps of Engineers (USACE) is forthcoming. He stated that one purpose of the project is to help landowners and water users in the Bypass, including the duck clubs (if they choose to participate), to make good business decisions regarding potential changes in land

uses. In the context of recent and potential future flood flows in the Bypass, Mr. Ceppos emphasized that the project will only involve willing participants and that private property rights must be respected.

Mr. Ceppos explained that the project will continue for approximately six more months.

Mr. Ceppos stated that most people have only a limited voice in CALFED's plans. Their primary option for input is to review and comment on the CALFED Environmental Impact Report/Environmental Impact Statement. However, the Working Group will be in the unique position of sending a direct message to CALFED about the concerns and interests of a geographic specific group of local stakeholders. This is an unprecedented opportunity, and he urged the group to consider participating.

Mr. Kilkenny asked how the group will be able to communicate with CALFED. Mr. Ceppos responded that CALFED representatives and individuals intimately involved with CALFED would be brought to future Working Group meetings, and that the final project document, which will be sent to CALFED, would outline the group's concerns and interests. As an example, he said that Dan Keppan of the Northern California Water Association will speak to the Working Group on December 16. Mr. Keppan is a member of CALFED's Ecosystem Roundtable, a group of regional leaders that represent multiple constituencies in the Central Valley, Bay Area, and Southern California. The Roundtable provides guidance, oversight, and decision-making authority over many of the technical and funding efforts of the ERPP. Mr. Keppan represents Northern California water users with interests similar to those of Bypass stakeholders.

Mr. Kilkenny asked if the duck club group would be notified of Working Group meetings. Mr. Ceppos responded that they would.

Mr. Martin stated that the CALFED process is complex and that it is difficult to understand how all the issues will affect duck clubs. He added that the effects would probably differ depending on each club's location within the Bypass, and that he would like to hear someone address the issues by location.

Mr. Ceppos answered that this project process would do exactly that. He stated that many people do not realize that CALFED does not necessarily have the technical data to back up its ideas, and added that CALFED needs feedback. To aid the group in understanding CALFED's proposals, Mr. Ceppos stated that copies of the CALFED's ERPP Strategic Plan for Restoration would be sent to meeting participants with the meeting minutes.

Mr. Ceppos asked if this project process seems worthwhile to the group, and if they would like to participate in upcoming Working Group meetings. The group responded that they would.

Mr. Ceppos asked if there were any further questions regarding the Management Strategy. There were none.

Overview of Vic Fazio Yolo Wildlife Area

Mr. Feliz introduced himself and explained that he wanted to give the group an overview of the design and maintenance of the Wildlife Area. He stated that the most important factor governing the Wildlife Area is that it is located in the Bypass, a flood control and conveyance structure. He emphasized that nothing could be done in the Wildlife Area that would impede flood flows.

Explaining the Wildlife Area's design parameters to meet flood conveyance requirements, Mr. Feliz stated that the Wildlife Area comprises 3,700 acres, including permanent wetlands (with up to 50% emergent cover allowed) and seasonal wetlands (limited to 5% emergent cover). He explained that the State Reclamation Board limits the amount of cover allowed. The different habitat types attract different species; for example, the larger permanent wetlands are great habitat for canvasbacks, and the seasonal wetlands provide good habitat for pintails. He explained that the amount of water the Wildlife Area can use is also limited, to meet requirements established by the Mosquito and Vector Control District.

Mr. Feliz explained that DFG is trying various management techniques and is working to vary the habitat in the Wildlife Area. They are working to create a mosaic of habitat structure types, varying vegetation heights and diversity and water depths. They are also creating swales and canals. He stated that DFG is seeing more diversity of bird species as a result of these efforts.

Mr. Feliz showed the group an aerial photograph of the Wildlife Area in late August 1999. He indicated the location of the hunting area (1,800 acres), the auto tour loop area, and the sanctuary area in the south. He stated that most of the birds are in the sanctuary area.

Mr. Feliz passed out a table of hunting results (from the 1999S2000 season) to the group. He stated that the Wildlife Area constantly receives new visitors and is becoming a popular area for hunting and birdwatching because of its location and the publicity it has received.

He asked if there were any questions.

Mr. Kilkenny asked how the hunting delay issue (regarding rice growers) could be addressed.

Ms. Perkins stated that wildlife areas were established in the Central Valley to keep ducks off of rice crops. If rainfall delays the harvest of rice, the opener of the duck hunting season may need to be delayed so that the birds do not leave the hunting areas and descend on the rice fields. She explained that DFG asks rice growers how much rice will be harvested by the planned opener, and makes recommendations based on their input.

Mr. Kilkenny stated that the Bypass should not be held to the same criteria as other areas in the region because so little rice is grown there. He added that the delay is devastating to the duck clubs.

Ms. Perkins responded that if the amount of rice grown in the Bypass is small enough that the delayed opener is not an issue there, then DFG needs to know that. Otherwise, the Bypass will be combined with the general region.

Mr. Paul asked who could make the decision regarding including the Bypass in the delayed opener.

Ms. Perkins responded that the DFG headquarters in Sacramento would make the decision. She added that she would carry the message that the Bypass opener should be considered independently of the rest of the region to DFG headquarters.

Mr. Loughman stated that the local rice growers need to let DFG know if the delayed opener is needed in the Bypass.

Mr. Smith stated that the duck clubs need to join forces to send a message to DFG.

Mr. Ceppos asked if an organization similar to the BSWA exists in the Bypass. The group responded that one does not.

Mr. Ceppos stated that the BSWA has been very effective in getting funding to solve the Butte Sink area's issues.

Mr. Smith remarked that the group should look at the example of Grasslands. He said that Grasslands has had incredible results from organizing and lobbying.

Mr. Isola said that a large issue is often required to bring people together. For example, the Grasslands group was formed when water was taken away. He added that CALFED might be the force that leads people in the Bypass to form an organization.

Mr. Smith stated that several small clubs and landowners formed the Tulare Basin Association. Now an $800,000 state funded water delivery project is being delivered to the duck clubs in the association. He stressed the power of a unified voice.

Mr. Egan addressed the design of the Wildlife Area, asking why the middle parcel of land was not included. Mr. Feliz responded that the landowner, the Glide estate, did not make the land available for purchase.

Mr. Kilkenny asked why such a small number of hunters per acre are allowed in the Wildlife Area. Mr. Feliz responded that larger numbers of hunters cannot be accommodated yet because it is difficult for hunters to hide in the Wildlife Area, since there is not much vegetation cover. He said that DFG has created vegetated uplands (planted with summer annual species) this year to improve conditions for hunting. He said that this has worked well. He added that blinds would be too labor intensive to maintain because of seasonal flooding, although he might try installing a few in a small area.

Mr. Thompson suggested that hardy, perennial vegetation such as bulrushes be planted to provide a more permanent screen. Mr. Feliz responded that bulrushes planted in the past have not survived but that new plantings could work if placed in more appropriate locations.

North Delta National Wildlife Refuge

Mr. Harvey introduced himself and explained that he wanted to give the group an overview of the proposed Refuge project. He showed a map of the 50,000-acre study area and explained the history of the proposed project. He stated that the goal of the project was tidal restoration, with a focus on creating fish habitat.

Mr. Harvey stated that the Environmental Assessment (EA) for the project would be released by the third week of December, and that there would then be a 45-day comment period. The EA will recommend a 47,500-acre refuge; the boundary will be finalized in February. Once the EA comment period is over and the boundary is established, the project will move forward if there are willing sellers. He added that the Trust for Public Lands had purchased Liberty Island, which will be transferred to USFWS once the Refuge boundary is established. Liberty Island will then be the first unit in the Refuge.

Mr. Harvey raised the political concern of converting agricultural land to habitat. He stated that USFWS has made key commitments for protecting agricultural land within the study area.

He explained that agricultural land in the southern portion of the study area would be permanently converted to habitat as tidal action is restored. However, prime agricultural land in the northern portion would be preserved. USFWS would pursue agricultural easements on prime land within the Refuge boundary, including a total of 4,600 acres. The emphasis for this land would be on wildlife friendly agriculture. In addition, some of the land USFWS would purchase would continue to be farmed.

Mr. Harvey stressed that flood conveyance would be a significant factor in the project's design. Hydrologists would create a model to see if Liberty Island currently acts as a plug in the Bypass, and to investigate the effects of restoration options on flood flow conveyance.

Mr. Harvey also emphasized that USFWS does not want to create any regulatory burdens on adjacent landowners, and that no management activities would be undertaken that might decrease water available to landowners. He added that USFWS would ensure that no reclamation districts are negatively affected by transfer of land into the Refuge. He stated that USFWS would pay its fair share of any landowner debt.

Mr. Harvey explained that the success of the Refuge would depend on USFWS working with private duck clubs and land owners to coordinate their efforts regarding weed management, regulatory compliance, and other land management issues. USFWS would like the Refuge to benefit

local landowners and duck clubs; USFWS could be an advocate for the local stakeholders with state and federal agencies.

Mr. Dudley asked for an explanation of the concern about fish passage in the Bypass.

Mr. Ceppos responded that splittail, Delta smelt, and juvenile Chinook salmon move through the Bypass when it is flooded. When the water recedes, the fish can become trapped in ponds and depressions. Since these are endangered fish, this stranding is a concern, even though it may be a natural process. Resource agencies are investigating the extent of stranding that occurs, and are considering options for improving fish passage and preventing stranding.

Mr. Harvey stressed USFWS has not yet begun any habitat design effort, that nothing will be implemented without extensive modeling and planning, and that public input will be sought prior to any action.

Mr. Goodell asked if any landowners want to participate so far.

Mr. Harvey answered that the Glides were originally not receptive, but that they now might make some land available. He added that USFWS would not use condemnation to obtain land. He explained that the USFWS rarely uses condemnation.

Mr. Smith stated that in the future, the land in the south Bypass could potentially be under one of three ownerships: nongovernmental organizations, the Refuge, or private landowners. He added that Grasslands is similar. Until recently, he said, there was not much communication between the three ownership entities at Grasslands, which caused problems and rumors. Finally, USFWS, DFG, and Grasslands developed a cooperative land management agreement stating that they would work toward mutual goals. He recommended creating such an agreement in the Refuge at the onset. Mr. Harvey agreed.

Mr. Harvey stated that there is a perception that ducks are staying in sanctuary areas, leading to a decline in duck hunting on private wetlands. He said that the Refuge would be required to plan for fishing and hunting, and that public access would be allowed on approximately 20% of the land. USFWS would be required to prepare a public access plan, and a public input process would help define the land use and public access plan for the Refuge.

Mr. Thompson stated that the Wildlife Area does not provide enough access for hunting, and that even if more were provided, it would have to be good habitat to provide more hunting opportunities.

Mr. Isola explained that generally 40% of refuge land is open for public access (including hunting areas), and 60% of the land is in wetlands and uplands that are closed to the public.

Mr. Smith commented that Mr. Feliz's work at the Wildlife Area has been impressive and should provide much better hunting opportunities once it develops.

Water Bank and Conservation Reserve Programs

Mr. Isola introduced himself and explained that he would be giving an overview of some changes in the Water Bank and CRP programs. He distributed a handout summarizing wetland conservation programs. He explained that there is already a lot of land in wildlife easements in the Bypass, which is great for wildlife. He believes that the individuals managing for wildlife could form a coordinated group, such as the Grasslands group.

Mr. Isola said that two programs can help with funding management of year-round habitat in the Bypass: the state Presley Program, and the federal Water Bank Program (which is converting to the CRP).

He explained that the Water Bank program is being phased out, but that for a limited time participants could enroll in the CRP as a continuance of the program. The CRP has been approved as an extension of the Water Bank Program and, for the Bypass, will be run be Sally Negroni of the Solano County RCD (707/678-1655). He asked individuals to contact Ms. Negroni if their Water Bank contracts are coming up for renewal. Mr. Isola added that the CRP is more flexible regarding management and provides $22 per acre, an increase from the Water Bank. He added that the Central Valley is now a CRP priority area.

Mr. Isola stated that through the CRP, agencies would assist landowners and duck clubs in evaluating habitat, and assessing habitat needs. The goal will be to strive for habitat diversity. He added that the program might target waterfowl, but would also work to provide other habitat, such as for shorebirds. From a habitat and planning perspective, this is an improvement over the former Water Bank program, which focused on brood pond habitat.

Mr. Smith stated that the duck clubs have long provided habitat but have not been given credit for it. He stated that the CRP will help them receive credit for the habitat they provide, and will help educate the public about the benefits the clubs provide.

Mr. Loughman stated that private clubs seem to have greater flexibility with habitat that the Wildlife Area does. He asked how much flexibility the Refuge would have.

Mr. Harvey responded that the Bypass is currently considered to be at flood conveyance capacity, so the Refuge will be constrained in opportunities to create habitat. He added that modeling of restoration options will be crucial to determine the effects, as will coordination with agencies.

Mr. Ceppos said that the State Reclamation Board has a clear vision of maintaining capacity in the Bypass, but that CALFED's goal is to expand habitat in the Bypass. If CALFED sees conflicts between flow capacity and habitat, it will work with the State Reclamation Board to obtain funding to solve conveyance issues. For example, CALFED could try to obtain funding to convert the Southern Pacific Railroad berm to a causeway.

Mr. Goodell asked if the conservation programs on the handout have enough money to cover any interested lands.

Mr. Isola responded that most of the programs on the list have good funding.

Mr. Smith stated that a bond act on the March 2000 ballot would appropriate funds for new contracts under the Presley program. Currently, the program only has enough funding for land already under contract.

Mr. Smith stressed that landowners who allow their Water Bank contracts to expire without converting to the CRP would never again be eligible for the CRP. The transfer must occur within the same year. He said that some Water Bank contracts expired before the CRP transfer was allowed and that these landowners missed out.

CONCLUSION

Mr. Ceppos asked if the group had any additional questions. There were none.

Ms. Kulakow asked if the group would like to hear someone from Grasslands or the BSWA speak. The group responded that they would.

Mr. Ceppos encouraged the group to participate in the Management Strategy and to attend the Working Group meetings.

The meeting was adjourned.

YOLO BYPASS MANAGEMENT STRATEGY
STAKEHOLDERS WORKING GROUP MEETING NO. 3

DRAFT
Meeting Minutes

MEETING DATE: January 10, 2000

LOCATION: California Department of Fish and Game
Yolo Wildlife Area Headquarters
45211 County Road 32B (Chiles Road)
Davis, CA 95616

IN ATTENDANCE: Mike Bennett, Deseret Farms
Robert Brown, Bull Sprig Outing Duck Club
Bob Dorian, H Pond Ranch
Chuck Fulster Jr., Glide-In Ranch
Robert Gill, Gill Land and Farming
Dick Goodall, Glide-In Ranch
Mike Hall, Conaway Ranch
Mike Hardesty, Reclamation District 2068
Tom Harvey, U.S. Fish and Wildlife Service (USFWS)
Arline Jones, Lucky 5 Farms
Elmer Jones, Lucky 5 Farms
Greg Kassis, Glide-In Ranch
Dennis Kilkenny, Landowner
Yvonne LeMaitre, Glide-In Ranch
Bob Leonard, Yolo Basin Farms
Ken Martin, Rising Wings
Rick Martinez, Martinez Farming Co.
Duncan McCormack III, Yolo Ranch
Gary Moody, Yolo Wings
Dennis Murphy, Landowner
Teresa Brooks-Tanin, Capitol Oil Co.
Ray Thompson, Sky Raker Duck Club
Ed Towne, Bull Sprig Outing
Gary Wegener, City of Woodland
Will Wylie, H Pond Ranch
David Feliz, California Department of Fish and Game (DFG)
Sally Negroni, Natural Resources Conservation Service
Patricia Perkins, DFG
Ricardo Pineda, State Reclamation Board (Reclamation Board)
Tim Washburn, Sacramento Area Flood Control Agency (SAFCA)

Robin Kulakow, Yolo Basin Foundation (YBF)
Mike Lien, YBF
Dave Ceppos, Jones & Stokes
Alice McKee, Jones & Stokes
Jennifer Stock, Jones & Stokes

NEXT MEETING: The next Working Group meeting will be held on February 10, from 11 a.m. to 1 p.m. at the DFG Yolo Wildlife Area Headquarters. Lunch will be provided. Members of the Working Group are asked to call Jennifer Stock at 916/737-3000 to confirm their attendance.

ACTION ITEMS

1. Jones & Stokes will send information regarding the Sacramento and San Joaquin River Basins Comprehensive Study (Comprehensive Study), Executive Summary for the Proposed North Delta National Wildlife Refuge (North Delta NWR), Chronology and Timetable for the North Delta NWR, Questions and Answers on the North Delta NWR, Lisbon Gate Inundation Graphs, and North Delta NWR Workshop Flier handouts to the members of the Working Group.

2. Members of the Working Group were asked to send courtesy copies of any letters commenting on the proposed North Delta NWR Environmental Assessment (EA) to the Reclamation Board to make them aware of local concerns. The Reclamation Board's address is:

   Ricardo Pineda
   State Reclamation Board
   1416 9th Street
   Sacramento, CA 95814

DECISIONS MADE

1. The Working Group members agreed that they are interested in hearing from biologists about habitat issues in the Yolo Bypass (Bypass). They also agreed that it would be useful to review existing hydrologic data for the Bypass and to discuss potential future hydrologic modeling of possible to future habitat restoration options and flood flow conditions so that they can make informed decisions. These topics will be discussed at the next Working Group meeting.

2. The Working Group agreed to meet again in February. The meeting will be held on February 10 from 11 a.m. to 1 p.m. at the DFG Yolo Wildlife Area Headquarters.

3. The minutes from the previous Working Group (December 16, 1999) and duck club (December 7, 1999) meetings were adopted as final documents following review and comment by meeting participants.

SUMMARY OF MEETING

Introduction

Ms. Kulakow opened the meeting, provided introductory comments, and asked the attendees to introduce themselves.

Mr. Ceppos gave a brief overview of the project, explaining that YBF wanted local stakeholders to have a process through which they could influence and set parameters for discussing possible changes in land use in the Bypass, including habitat creation. He explained that the project is funded by the CALFED Bay-Delta Program (CALFED) under its watershed stewardship category. He added that the project team (YBF and Jones & Stokes) had met individually with stakeholders to explain the project and discuss stakeholders' interests and concerns. He stated that two Working Group meetings and one meeting of duck club representatives had been held, and that the two groups were now joined into one Working Group.

Mr. Ceppos concluded by explaining that the project would result in a document sent to CALFED, but that the project team has no preconceived idea of what this document will be or what it will say; the document will develop under the guidance of the Working Group. The document, and the entire project process, will allow landowners and other members of the Working Group to express their opinions to CALFED. The project strives to bring together many diverse opinions, including those of farmers, duck clubs, conservation entities, flood control entities, and other government entities.

Mr. Ceppos then asked if anyone wanted to suggest changes to the meeting minutes from the December 16, 1999 Working Group meeting or December 7, 1999 duck club briefing meeting. No changes were proposed and the documents were adopted into the project record as final.

Mr. Ceppos explained that today's agenda included presentations by Ricardo Pineda of the Reclamation Board, Tim Washburn of SAFCA, and Tom Harvey of the proposed North Delta NWR. After reviewing the agenda, Mr. Ceppos asked if there were any changes or additions. The agenda was accepted as presented.

State Reclamation Board Presentation

Mr. Ceppos introduced Mr. Pineda, chief engineer of the Reclamation Board. Mr. Pineda explained that the Reclamation Board was founded by the governor in 1911 to look at solutions to

flooding in the Central Valley resulting from post-hydraulic mining conditions, to address ongoing levee conflicts, and to reclaim historically flooded lands for beneficial uses.

Mr. Pineda added that the Reclamation Board currently works with the Sacramento District of the U.S. Army Corps of Engineers (USACE) to construct and improve levees in the Central Valley. The Reclamation Board works with USACE to assist local Reclamation Districts with flood management during flood events, levee maintenance, and levee rehabilitation after flood events; It also oversees the Sutter and Yolo Bypasses. The Department of Water Resources (DWR) maintains the Fremont Weir, Cache Creek Settling Basin, and Sacramento Weirs on behalf of the Reclamation Board. Mr. Pineda pointed out that the Sacramento Weir is the only operational weir providing inflow into the Yolo Bypass. DWR's maintenance includes regular activities such as debris and sediment removal. Large maintenance projects are done in cooperation with USACE. The state usually pays 35% of the total project cost. Other entities, such as SAFCA, often share some of the state's cost burden.

The Reclamation Board, Mr. Pineda went on, also administers the encroachment permit program to ensure that encroachments within flood control project (FPC) levees and designated floodways are constructed so as not to compromise the levees' and FCP's integrity. The permit process also examines whether proposed projects would create hydologic changes during flood events or would affect the Reclamation Board's ability to repair and maintain levees as necessary. He explained that the regulations and permit process are found in the California Code of Regulations, Title 23, and on the Internet at www.calregs.com, and added that he would be happy to speak individually with anyone who has questions or plans that may require an encroachment permit. He can be reached at 916/653-5440.

Mr. Pineda stated that current Reclamation Board projects include installing seepage cut-off walls along the American River and raising levees in West Sacramento. He added that work on the Cache Creek Settling Basin had been recently completed and that only small elements remain to be completed on that project. Upcoming projects include construction improvements to levees along the mid-valley area of the Sacramento River system planned for 2001. These improvements are in response to the 1986 floods and are intended to upgrade the levees so that they safely contain the design flow capacity. These improvements would include upgrades to the east levee of the Bypass.

Mr. Pineda explained that the Reclamation Board's current study efforts include partnering on several USACE feasibility studies. These studies include a joint effort with SAFCA for flood control improvements on the American River, Sutter County flood control improvements, and flood control improvements to the Sacramento and San Joaquin River systems. He stressed that the goal of these studies is to reduce flood threats and damage. The studies weigh the net benefits of the proposed projects to society against the project costs.

Mr. Pineda then discussed the Comprehensive Study and distributed copies of the study's Interim Report to the meeting participants. Additional information regarding the comprehensive study will be sent with the meeting minutes. Mr. Pineda stated that the Comprehensive Study is an $11 million study whose cost is split evenly between the state and USACE. The study was developed in response to the 1997 floods and is intended to produce a new flood control master plan for the system that may also include extensive ecological restoration opportunities. It is an attempt

to study flood control issues and will result in specific spin-off projects throughout the Sacramento and San Joaquin FCP.

Mr. Pineda added that the Comprehensive Study is evaluating ways to increase the capacity of the Bypass. He stressed that any specific proposed projects will first be evaluated in an open forum with public workshops and hearings. The projects will be required to comply with the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA).

Mr. Pineda stated that the Reclamation Board wants to accommodate habitat restoration whenever possible, and that one of the goals of the Comprehensive Study is to integrate ecosystem restoration with flood control improvements. He added that the Reclamation Board strives to accommodate the habitat restoration permit requests it receives.

Mr. Pineda then asked if the attendees had any questions.

Mr. Martinez asked what permitting process is required for projects that would increase water in the Bypass. Mr. Pineda responded that the Interim Report includes proposals made by the state and USACE, so encroachment permits would not be required; however, NEPA/CEQA compliance and its associated public review would be. He explained that encroachment permit applications by non-state or federal entities are evaluated based on the likely resulting change in hydrology. Part of the application process, he added, is to notify adjacent landowners to get local feedback.

Mr. Martinez asked what the effects of the proposed North Delta NWR would be on flood duration and frequency in the Bypass. He pointed out that there are properties in the Bypass that do not have flowage easements, and that might be affected as a result of the proposed North Delta NWR.

Mr. Pineda responded that USACE had asked the Reclamation Board to investigate this issue. He explained that the proposed North Delta NWR is a federal project, and as such is not required to undergo an encroachment permit application process. However, he added, the Reclamation Board is seeking a memorandum of agreement (MOA) with the USFWS to ensure that concerns over increases in flood frequency, duration, and extent are addressed.

Mr. Pineda asked the group to send the Reclamation Board copies of any letters commenting on the EA for the proposed North Delta NWR so that the Reclamation Board can keep track of the public's comments.

Mr. Martinez asked if the Reclamation Board has a detailed listing of the easements on all the parcels within the Bypass. Mr. Pineda affirmed that they do. He then added that the state easements may not apply to properties affected by the proposed North Delta NWR, which is a federal project.

Mr. Martinez asked if current easements would be increased if actions conducted within the proposed North Delta NWR increase flood-related issues on land in the Bypass (e.g., flood duration).

Mr. Pineda responded that the current easements need to be evaluated to determine if they are sufficient to cover any increased impacts that result from the proposed North Delta NWR.

Mr. Fulster asked if there was truth to rumors he has heard of proposals to lower the Fremont Weir. Mr. Pineda responded that he has not seen any proposals for changes to the Fremont Weir in any of the alternatives being evaluated for the Bypass. He added that it is possibly a measure included in the Comprehensive Study because the study has tried to include all potential options, but that only measures included in proposed alternatives (collections of related measures) are being considered.

Mr. Ceppos stated that he too has not heard of any such proposal. He added that there is a preliminary discussion of making a portion of the Fremont Weir adjustable and possibly installing a fish ladder there so that water can be sent into the Tule Canal in low-flow conditions to allow fish habitat and fish passage in the Bypass in low-water years. Mr. Ceppos stressed that no specifics have been decided for this proposal and that this type of proposal is exactly why the Working Group was formed. He explained that the proposed project would only move forward with the involvement of the Working Group.

Mr. McCormack III asked if a gate at the Fremont Weir would increase flooding of the Bypass. Mr. Ceppos responded that the intent would not be to increase flooding, only to increase water within the Tule Canal. However, he added, a catastrophic failure of the gate could potentially result in flooding in the Bypass. Before any gate is designed, a hydraulic model would examine the effects of a possible failure of the gate. He added that CALFED has authorized the Bypass Management Strategy in part to investigate stakeholders' concerns about proposed projects such as the addition of a gate to the Fremont Weir. Comments such as Mr. McCormack III's will be relayed to CALFED through the project process.

Mr. McCormack III stated that he is not concerned so much with catastrophic events as with the overall intent and function of the gate. He expressed concern whether or not it would provide water managers, who are intent on protecting Sacramento urban areas, the flexibility to impact Bypass landowners by increasing flood frequency, duration, and extent by lowering such a gate.

Mr. Fulster asked if the water level in the Bypass would be raised if the east Bypass levee is raised 6 inches, as is currently underway.

Mr. Pineda responded that the current east Bypass levee project, entitled the "Mid-Valley Rehabilitation Project", is only raising the levee in places where it has subsided below its original design. Because the project will only bring the levee up to its original level, it can be done without mitigation. He stressed that if the water level in the Bypass increased as a result of the project, the increase would only be to the original design level. He added that he would be happy to have the person in charge of the Mid-Valley Rehabilitation Project contact Mr. Fulster to explain the project.

Mr. Fulster then asked why the Sacramento River is not dredged to address flood control problems. Mr. Pineda responded that some studies show that sediment supplies in the rivers are now cut off by dams upstream. He added that rivers in the area are actually subsiding, or scouring, as a result. He explained that dredging does not really work on large systems because it is expensive, and

the amount of capacity gained in the river would be much less than the capacity that could be gained by less expensive options in the Bypass.

Mr. Fulster expressed his impression that there is more water in the Bypass and that, in recent years, the Bypass has flooded earlier. Mr. Pineda responded that the last few years have been exceptionally wet and rainy.

Mr. Ceppos distributed graphs showing 35 years of data from DWR. He explained that the data show that flood frequency over those years has been fairly consistent. Mr. Fulster questioned the accuracy of the data, stating that he feels that the Bypass definitely floods more often, earlier, and for longer durations than in the past. Mr. Ceppos answered that, because of time constraints, the DWR data would be discussed at a later meeting.

Mr. Pineda stated that it is the intent of the Reclamation Board and USACE to increase the flood carrying capacity of the Bypass. He added that they do not yet know how this will be accomplished. He explained that many upstream communities want to improve their flood protection and that this will likely increase the amount of water in the Bypass.

Mr. McCormack III expressed concerns about a lack of security regarding flooding in the Bypass. He explained that landowners do not know when the Bypass will flood and if it floods more frequently or for longer durations to accommodate increased flood flows, farmers and duck club operators may not be willing to continue operating within the Bypass. He stressed that the farmers and duck club operators need to know the extent of the effects of flood control actions so that they can make informed business decisions regarding the feasibility of continuing to operate within the Bypass.

Mr. Pineda stated that any actions taken to change operations in the Bypass would have to undergo review under CEQA/NEPA. If the proposed project increases flooding beyond the current flowage easements, the easements will need to be increased.

Mr. McCormack III pointed out that no restrictions on acre-feet or timing of flooding are included in his easement. He added that many easements are equally general, and questioned whether this meant that these easements would not be increased.

Mr. Ceppos responded that landowners adjacent to Cache Creek and in the Cache Creek Settling Basin had taken the flood capacity improvement project to court and had been awarded increases to their easements as a result of the court's determination that proposed future flows exceeded those generally covered in existing flow easements.

Mr. Ceppos then asked what Sutter and Yuba counties are proposing that would affect the Bypass. Mr. Pineda responded that they are proposing raising levees. The modeling indicates that these changes would only increase water in the Bypass in rare events.

Mr. Ceppos stated that the proposed new Water Bond (due for state vote in March 2000) has extensive language regarding proposed flood control facilities north of the Bypass. He suggested

that the Working Group might benefit from a speaker who could address the March Water Bond at a future meeting.

Mr. Goodall stated that people are concerned about water wars recurring if new levees are built upstream. He added that he is concerned that the new West Sacramento levee is 3 to 5 feet above the level of the Interstate 80 causeway.

Mr. Pineda responded that the West Sacramento levee project raised the levee and that, as a result, flooding in the Bypass would indeed increase during a flood event. He added that the project went through the usual public review process, including public workshops. He acknowledged that these meetings were not well attended and that the project proponents did not make an effort to identify and contact specific landowners in the Bypass. He stated that the levee project was designed to protect West Sacramento from the Sacramento Bypass (the flow channel between the Sacramento Weir and the Yolo Bypass) downstream to a point along the Deep Water Ship Channel.

Mr. Hardesty asked whether the Reclamation Board can address any changes to the Bypass proposed by federal agencies, since the federal government does not need to acquire encroachment permits.

Mr. Pineda reiterated that the Reclamation Board is seeking an MOA with USFWS for the proposed North Delta NWR project. He added that the Reclamation Board does not have MOAs with the federal government for the Sutter or Sacramento River Wildlife Refuges.

Mr. Hardesty stated that impacts declared individually as insignificant during the CEQA process could cumulatively become significant. He asked how the Reclamation Board planned to address this.

Mr. Pineda answered that the Comprehensive Study is looking at this issue. He stated that the Reclamation Board has heard this concern from the public, and is trying to evaluate projects cumulatively as well as individually.

Mr. Pineda concluded by stating that he would be happy to address the group again at another meeting and would be willing to bring additional speakers to address specific issues or concerns. He asked the group to inform Mr. Ceppos and Ms. Kulakow of issues and concerns that are worth addressing in the future. He stated that he would also be happy to answer any questions stakeholders have in the future, and invited the group to relay any such questions to him through Mr. Ceppos and Ms. Kulakow.

SAFCA Presentation

Mr. Washburn began by giving a brief introduction of SAFCA. SAFCA, which represents $37 billion in flood damageable land and other assets in Sacramento, was formed after the 1986 flood to devise protective measures for the area. Two problems are presently facing SAFCA: the

need to stabilize local levees, and the inadequate capacity to hold flood waters in the American River Basin near Natomas and Folsom.

Currently, a 33-mile project extending from Verona to Freeport involves installing slurry walls in levees to minimize seepage and stabilize the levee system along this reach. Providing an acceptable response for increasing holding capacity and improving flood control has been more difficult.

In the past, the proposed Auburn Dam Project was intended to improve holding capacity and alleviate the risk of catastrophic flooding in Sacramento. The proposed project was rejected by Congress in 1992 and 1998, which led to a need for flood control alternatives. The two prominent options are to raise and strengthen the levees around Natomas or to raise the Folsom Dam. Raising the levees around Natomas, at Dry and Arcade Creeks, would increase the American River's carrying capacity and create the need to offset downstream impacts. Raising the Folsom Dam 6-12 feet would increase the holding capacity at the reservoir without impeding reservoir functions. Raising the Folsom Dam seems to be the option favored by SAFCA and the Bureau of Reclamation, but more information is needed from USACE to solidify this option. This addition would allow for more effective management of floods, decreasing the likeliness of a catastrophic event. SAFCA will aggressively continue to pursue enlargement of the Folsom Dam and increased storage in the American River Basin.

Mr. Murphy asked if there were any plans to raise Shasta or Oroville Dams.

Mr. Washburn replied that neither of those dams are in SAFCA's jurisdiction. He added that SAFCA is interested in any projects stakeholders may propose that will help to increase conveyance capacity and that will link agricultural, grazing, flood control, and environmental interests. He stressed that extensive discussion of all concerns would be necessary before any proposals can be made for the Yolo Bypass.

Ms. Tanin inquired if the Auburn project is no longer an option being considered.

Mr. Washburn answered, that due the amount of opposition it has faced, it is no longer being considered an option.

Mr. Ceppos asked what the proposed cost for the Auburn Dam was in 1996.

Mr. Washburn said the cost was roughly $1 billion. The costs of the proposed Bypass projects are estimated at $125 million for the improvements to Sacramento and the Yolo Bypass and $175 million for improvements along the American River. Though this proposal was less expensive, it would not have produced the same beneficial results as storage.

Mr. Leonard asked what is proposed for the Yolo Bypass.

Mr. Washburn replied that there are proposals to widen the Sacramento Bypass by setting back the north levee of the area approximately 1,000 feet and to raise levees east and west of the American River.

Mr. Washburn continued that it would be helpful if the Working Group had factual data to help the stakeholders understand what the potential impacts of different scenarios would be. Technical models would illustrate the effects of these various scenarios. Mr. Washburn also noted that Garden Highway residents would like to see the Sacramento Weir's gates remain permanently open.

Ms. LeMaitre expressed concern over actions taken to protect one area that might result in the increased flooding of another area.

Mr. Washburn assured the group that most proposals are made to protect the region against flood events exceeding those previously experienced, as opposed to usual conditions. But, he added, economic decisions need to be made to determine where floods would do the least amount of damage.

Ms. LeMaitre stated that levees need to be of a quality that will hold water during a large flood.

Mr. Pineda interjected that this is the reason the levees are being improved.

Mr. Ceppos explained that this type of discussion is part of the reasoning behind founding the Working Group. The Working Group will provide guidance and input to agencies such as SAFCA as to what should be modeled before improvement options can be considered.

Mr. Kassis stated that most flowage easements were acquired in the 1940s. He asked if any easements are being acquired today.

Mr. Washburn answered that no flowage easements have been issued in the Bypass in recent years.

Mr. Ceppos stated that stakeholders have indicated to him that, at some point, it might not be effective to farm or run a duck club in the Bypass if flood flows and durations are increased, and that if this happens the land should be acquired; flowage easements can be effectively expanded only to a point.

USFWS Proposed North Delta NWR Presentation

Mr. Harvey passed out a chronology, a list of frequently asked questions, and an executive summary of the EA for the proposed North Delta NWR, and gave a brief overview of the proposed North Delta NWR.

Mr. Harvey explained that the EA document addressed to the establishment of a refuge boundary. The effects of the boundary are evaluated to comply with NEPA regulations. Another NEPA document would have to be prepared before any on-ground changes or developments take place, and such a future document would further evaluate issues such as hydrology and vegetation.

Mr. Harvey explained that the preferred refuge boundary alternative is proposed in the EA. He said that he would be happy to send a copy of the EA to anyone who would like one, and added that the comment period extends until February 5, 2000.

The components of the EA include:

- **Flood control.** Changes to hydrology will be carefully scrutinized. Since the system is at capacity, anything done on the ground must improve conveyance or remain hydraulically neutral.

- **Agricultural lands.** The proposed boundary excludes 5,000 acres of prime agricultural land in Solano County and 4,600 acres in Yolo County, although it does include approximately 3,331 acres of prime agricultural land in Yolo County. USFWS is committed to not acquiring this land; at most, easements would be placed on it. USFWS hopes that this land will be used for habitat friendly agriculture. Approximately 2,500 acres of non-prime agricultural lands are included in the boundaries; this land will be maintained in agriculture through cooperative farming and grazing programs.

- **Endangered Species Act.** USFWS is committed to not increasing regulatory burdens on the proposed North Delta NWR's neighbors. The proposed North Delta NWR will try to set up a Safe Harbors agreement and a programmatic biological opinion and will help neighbors to implement best management practices. USFWS would like to work with DWR and other agencies to create mitigation credits through restoration of the proposed North Delta NWR's lands. Adjacent landowners and agencies could use these credits to offset other activities.

- **Cooperative agreement.** The proposed North Delta NWR would enter into cooperative agreements with fee-assessing entities such as fire districts and reclamation districts, so that local entities are reimbursed 100% for services rendered.

Mr. Kilkenny asked if this would be established at the outset.

Mr. Harvey answered that it would and that any new levees or structural improvements needed would be paid for by USFWS. He then continued to describe the EA components.

- **Water use.** USFWS is committed to ensuring that water associated with a certain parcel of land will stay with that land and that water will not be exported out of the region/Bypass. However, points of diversion may be shifted on specific parcels to modify water delivery and application options.

Mr. Harvey further explained that the proposed North Delta NWR is advocating a mix of land protection efforts and will work with landowners to keep their lands private and with other agencies (if changes of jurisdiction are proposed). Mr. Harvey expressed hopes that the proposed North Delta NWR would benefit landowners. For example, the proposed North Delta NWR is interested in developing an MOA or cooperative agreement between USFWS, other agencies, and

duck clubs to coordinate flood protection, public use, and management techniques. Mr. Harvey stressed that USFWS is not trying to force the proposed North Delta NWR on people; he stated that USFWS has been approached by interested landowners, organizations, and agencies.

There will be two public meetings this month to discuss the proposed North Delta NWR, one on January 17 in Davis and one on January 31 in Vacaville. The 45-day comment period ends on February 5, 2000. *According to a conversation with Anita DeLong on January 18, there is a possibility of a 15-day extension. Call Ms. DeLong at (916)979-2086 for further information.* There will also be public workshops sponsored by YBF, Yolo County, and the Yolo County Farm Bureau. Mr. Harvey would be happy to meet with people individually or to address groups to discuss the proposed North Delta NWR. He stated that he wants to be very open about the proposed North Delta NWR, adding that the project must be publically supported it to succeed. Mr. Harvey's address is:

Tom Harvey
U.S. Fish and Wildlife Service, North Delta National Wildlife Refuge
2233 Watt Avenue, Suite 203
Sacramento, CA 95825
Phone: 916/979-2086
Email: Thomas_Harvey@fws.gov

Mr. Fulster asked if the proposed North Delta NWR would pay reclamation district taxes if it buys land. He expressed concern that taxes would increase for landowners if the North Delta NWR does not pay them.

Mr. Harvey answered that if the proposed North Delta NWR buys land in a Reclamation District, it will enter into a cooperative agreement to make payments, in lieu of taxes, to make up for the loss of income to the county.

Mr. Hardesty commented that payments in lieu do not generally filter down to the Reclamation District.

Mr. Fulster then asked if there are any current easements that are part of the proposed North Delta NWR.

Mr. Harvey responded that lands under easements are included in the proposed North Delta NWR and that USFWS would not acquire this land in fee. The proposed North Delta NWR would work with landowners and would consider establishing easements for wildlife friendly agricultural processes.

Mr. Fulster inquired if the farmers will be permitted to grow sugar beets or tomatoes instead of habitat friendly crops such as corn or grain, which are not as economically viable.

Mr. Harvey answered that the easements are not yet established and the land will have to be reviewed on an individual basis to determine what farmers can do to benefit wildlife. Then the economic impact on farmers can be assessed and an easement set up to cover the loss of revenue and costs. He stressed that this would all occur on a voluntary basis and depends on willing sellers.

Mr. Fulster then asked if USFWS would dictate what crops are grown within the proposed North Delta NWR boundaries.

Mr. Harvey said that USFWS could not dictate anything for any privately owned land within the proposed North Delta NWR boundary. Any changes implemented would be in cooperation with willing landowners.

Mr. Thompson asked if fire district rates would increase if USFWS elects that the proposed North Delta NWR not be a part of the district, but acquires land within the district boundary. His concern was ensuring that an undue financial burden is not placed on remaining paying district members.

Mr. Harvey responded that fire district coverage already exists on the land, and USFWS would set up an agreement to pay the district the same rate currently paid.

Mr. Martinez asked if USFWS will be billed per acre, as would a drainage district.

Mr. Harvey answered that the amount would be negotiated. He added that he is not sure if the proposed North Delta NWR would pay an amount based on specific use or a set, annual fee.

Mr. Kilkenny stated that this could bankrupt the fire district.

Mr. Harvey acknowledged that he would have to look into this issue some more. He stated that the Sacramento Wildlife Refuge is invoiced annually, rather than based on use, so there is precedence to do this.

Mr. Kilkenny commented that the proposed North Delta NWR would increase fire fuel and that there would also be a need to provide emergency medical services to increased public users. These expenses would need to be covered by payments to the fire district.

Mr. Harvey agreed that there would be more fuel with more habitat, creating an increase in burn frequency. He agreed that these issues will have to be addressed. He added that nuts and bolts of the proposed North Delta NWR still need to be examined.

Ms. Negroni wondered what types of habitat would be targeted in the northern part of the proposed North Delta NWR, since the EA states the main goal in the south is to provide fishery habitats.

Mr. Harvey answered that the fishery habitat focuses on tidally influenced land in the south, where tidal restoration would occur.

Mr. Fulster asked if there was a plan to lower the levee along the west side of the Toe Drain.

Mr. Harvey replied that he has not heard of any such plans and that the levee has been breached since 1983 at Little Holland Tract. He added that it is difficult to speak about specifics

until specific proposals are made, modeling is done, and public meetings are held. He then asked if there were any last questions.

There were none.

CONCLUSION

Mr. Ceppos thanked everyone for attending and stated that there is a clear need to discuss more specific issues regarding future flood conveyance improvements, and to bring the Reclamation Board back with modeling information.

Mr. Ceppos said the Working Group should call Robin Kulakow at 530/756-7248 or Dave Ceppos or Alice McKee at 916/737-3000 with any issues they would like the Reclamation Board to address, or if they have any topics they would like to have future speakers address.

The next speakers will be biological experts discussing possible habitat improvements. The Working Group is at the point where they should begin examining existing data and making decisions about what they would like modeled so that decisions can be made.

Mr. Kilkenny stated that these meetings are very useful for getting information.

Mr. Pineda said that if he is given the Working Group's mailing list, he will use it to send the Working Group information in the future. Mr. Ceppos and Ms. McKee clarified that the database of stakeholders prepared for this project is and will remain confidential until individual stakeholders authorize the release of their contact information.

Ms. Kulakow reminded the stakeholders that the next meeting will be held February 10, 2000.

The meeting was adjourned.

YOLO BYPASS MANAGEMENT STRATEGY
STAKEHOLDERS WORKING GROUP MEETING NO. 4

DRAFT
MEETING MINUTES

MEETING DATE: February 10, 2000

LOCATION: California Department of Fish and Game
Yolo Wildlife Area Headquarters
45211 County Road 32B (Chiles Road)
Davis, CA 95616

IN ATTENDANCE: Randy Baxter, California Department of Fish and Game (DFG)
Robert Brown, Bull Sprig Outing Duck Club
Regina Cherovsky, PG & E Properties and Reclamation District 2035
Chuck Dudley, Joe Heidrick Enterprises
Denny Eickmeyer, L. G. Duck Club and Yolo Wings Group Rep.
David Feliz, DFG
Chris Fulster Jr., Glide-In Ranch
Bill Gaines, California Waterfowl Association (CWA)
Mike Hardesty, Reclamation District 2068
Tom Harvey, U.S. Fish and Wildlife Service (USFWS)
Phil Hogan, Natural Resources Conservation Service
Arline Jones, Lucky 5 Farms
Elmer Jones, Lucky 5 Farms
Yvonne LeMaitre, Glide Ranch Trustee
Bob Leonard, Yolo Basin Farms
Ken Martin, Rising Wings
Rick Martinez, Martinez Farming Co.
Duncan McCormack, Yolo Ranch
Duncan McCormack III, Yolo Ranch
Larry Minshall, Yolo Flyway Farms
Scott Morgan, W. T. Morgan Real Estate Co.
Dennis Murphy, Murphy Farms
Lynn Pryor, Yolo Links
Chris Rocco, DFG
Chad Santerre, CWA
Greg Schmid, Los Rios Farms
Ted Sommer, Department of Water Resources (DWR) and UC Davis (UCD)
Ray Thompson, Sky Rakers Duck Club
Ed Towne, Bull Sprig Outing Duck Club

Robin Kulakow, Yolo Basin Foundation (YBF)
Dave Ceppos, Jones & Stokes
Alice McKee, Jones & Stokes
Luke Rutten, Jones & Stokes
Warren Shaul, Jones & Stokes
Jennifer Stock, Jones & Stokes
Gus Yates, Jones & Stokes

NEXT MEETING: **The next Working Group meeting will be held on March 9, from 10:30 a.m. to 1 p.m. at the DFG Yolo Wildlife Area Headquarters. Lunch will be provided. Members of the Working Group are asked to call Jennifer Stock at 916/739-3086 to confirm their attendance.**

ACTION ITEMS

Information on the Water Bond, Proposition 13, will be sent with the meeting minutes.

DECISIONS MADE

1. The Working Group is strongly in favor of exploring a Memorandum of Agreement (MOA) between USFWS and Yolo County that would establish the Working Group as the guiding entity for decisions regarding land use issues in the proposed USFWS North Delta Wildlife Refuge (Refuge).

2. The group agreed that future meetings should be held from 10:30 a.m. to 1 p.m.

SUMMARY OF MEETING

Introduction

Ms. Kulakow opened the meeting, provided introductory comments, and distributed a handout from DFG summarizing hunting statistics at the Vic Fazio Yolo Wildlife Area (Wildlife Area).

Ms. Kulakow explained that she hoped to include an overview of the West Sacramento levee project at the next Working Group meeting and that a separate meeting will be held within the next few weeks to discuss duck club issues. She added that the duck club meeting would hopefully include a representative from the Butte Sink Waterfowl Association. She also added that DFG would get back to the group concerning the opening day of duck season.

Ms. Kulakow then asked the attendees to introduce themselves.

Mr. Jones stated his concern that the stakeholders were not able to express themselves more in the Working Group meetings. He added that he is concerned about the government acquiring land within the Yolo Bypass (Bypass) and limiting access to it. He stated that the stakeholders in the Bypass use the land for their livelihood and need water and good drainage to continue to operate effectively. He added that his concern is not for habitat but for growing food for people.

Mr. Jones also stated that he is concerned about proposals for changes to the Fremont Weir and is worried that changes to flows in the Toe Drain would cause increased flooding on his land. To help alleviate flooding problems in the Bypass, Mr. Jones suggested turning the Deep Water Ship Channel into another Sacramento River Bypass in order to convey water that currently is diverted into the Yolo Bypass. He believes that construction of dams and the Deep Water Ship Channel have

increased flooding in the Bypass. He specifically expressed concern over the effects of management of Shasta Dam on flooding in the Bypass.

Mr. Jones proposed the establishment of a drainage district along the Toe Drain and a water district in the north area of the Bypass.

Mr. Jones stated that farming is not a particularly profitable business; rather, it is a lifestyle that is important to him. He added that he has seen benefits to wildlife as a result of farming activities in the Bypass. He has observed how grazing around a pond on his property has kept weeds down and has seen a multitude of ducks on his pond.

Mr. Ceppos responded that the intent of the Working Group meetings is to provide a forum in which the stakeholders can express themselves.

Mr. Ceppos continued by stating that the purpose of the Working Group meetings was to provide brief updates on activities concerning the Bypass and to provide information about options for land use changes within the Bypass to the Working Group so they could make sound business decisions. He further explained that decisions made by the group will be included in the future Management Strategy and added that the Working Group forum is intended to be the voice of the stakeholders.

North Delta National Wildlife Refuge Update

Mr. Harvey gave an update on the Refuge. He stated that the comment period on the Environmental Assessment (EA) will close on February 22, 2000, but that USFWS is considering extending that period (the comment period has already been extended once, to 60 days). The decision on whether or not to extend the deadline will be made next week.

Note: USFWS has extended the comment period for the EA through March 23, 2000.

Mr. Harvey emphasized that no firm decisions had been made regarding the Refuge boundary, but that USFWS is looking at boundaries that maximize partnership opportunities and provide the most mutual benefits to landowners and USFWS.

Mr. Harvey added that he is currently working on drafting a mutual assurances document with entities such as Yolo County, and has been meeting with sporting groups to ensure the public use provided at the proposed Refuge would be beneficial and would not impose on private land uses. He added that he will meet with representatives of the gas companies next week.

Mr. Harvey stated that he is willing to meet with any individuals or groups interested in discussing the proposed Refuge. He said the meeting in Vacaville went well, and meetings with the Davis City Council and the City of West Sacramento were planned. He stressed that he wants to be responsive, and that he will tailor the Refuge boundary proposal to show that USFWS is sensitive to local concerns.

Mr. Gaines stated that CWA has been working with Mr. Harvey and USFWS for the last year on the Refuge project. He said that CWA represents the concerns of duck clubs but supports the creation of new habitat. However, while CWA recognizes the need for additional habitat in the region, they are proceeding cautiously on the issue of the proposed Refuge. He explained that CWA has the following concerns over the Refuge:

- The majority of land within the Refuge boundary should remain in private ownership. CWA would like current agricultural land to remain in agriculture (possibly using habitat friendly practices) and current duck club lands to remain as duck clubs (hunted and managed as they are now).

- The hunting public is concerned that a decrease in sanctuary land within the Refuge would decrease the quality of hunting in the region. If the quality of hunting is compromised, then duck club memberships will decrease.

Mr. Gaines explained that the Refuge proposal would need universal support to move forward, including that of landowners, duck club members and operators, local governments and agencies, and other local organizations. He stated he had met with Mr. Harvey and local government representatives to discuss the EA. The EA states that as much as 40% of the Refuge would be open to recreation (including hunting). However, this is based on federal policy that requires projects funded with duck stamp money include public access on 40-60% of the land. He explained that duck stamp money would not be used to help fund this Refuge, so the 40-60% limit does not apply in this case and added that USFWS recognizes this fact.

Mr. Gaines continued that many sanctuaries exist in the region and more are planned. He said that CWA is looking at the amount of sanctuary habitat in the surrounding area (for example, the Wildlife Area, Stone Lakes, Conaway Ranch) when evaluating the proposed Refuge.

Mr. Gaines also stated that CWA is looking into potentially developing an MOA regarding adaptive management to address the previously stated concerns. CWA will suggest the MOA in its comments on the EA and would like private duck club owners to support the MOA as well.

Mr. Thompson added that the City of Davis also has sanctuary land.

Mr. Fulster stated that the largest sanctuary in the region is the Cosumnes River Preserve. He added that the land in the Bypass is worth more for duck hunting than farming and landowners in the Bypass are very concerned about the government taking over their land, then closing it to hunting and fishing. He stated that the duck clubs are concerned that they will be put out of business by sanctuary land on the proposed Refuge. He added that the Wildlife Area was very expensive to construct and the cost to create new habitat would be less for private duck clubs than for the government.

Mr. Ceppos stated that it is unfortunate that planning for the proposed Refuge project began before the Management Strategy project because the goal of the Management Strategy project is to discuss options for land use changes, particularly options for creating habitat while keeping land in private ownership. Instead, the Working Group has to consider the proposed Refuge in its discussions.

However, he stated, the goal of the Management Strategy project, regardless if the Refuge is approved, is to organize the local stakeholders into a unified voice to guide and inform decisions by other entities.

Mr. Harvey stated that USFWS recognizes that most of the habitat in California is on private lands. He explained that this is the reason for easement and cost sharing programs and stressed that it is not the goal of USFWS to buy all the land within the proposed Refuge boundary. He said that USFWS is looking for opportunities to keep land in private ownership and to form partnerships with private landowners. He is hoping the proposed Refuge will provide mutual benefits to both private landowners and USFWS. As an example, he explained that water hyacinth was a problem at Stone Lakes, and USFWS was able to assist with securing grants to fund control of that invasive species. He hoped for similar mutual benefits as a result of the proposed Refuge project.

Mr. Harvey stressed that any partnerships or land acquisition undertaken by USFWS would be done only with willing participants, and willing sellers. He added that it would have been ideal had the Refuge planning process begun after the Management Strategy project. Then, the Refuge planning could have been guided by the Working Group's Management Strategy report.

Mr. Fulster stated that Stone Lakes is not open to hunting and this draws ducks away from the duck clubs. He is concerned that something similar not happen in the Bypass.

Mr. Harvey responded that USFWS would not acquire large parcels of land or create large habitat improvement areas that would not have interim public use. He added that only a small amount of the land at Stone Lakes is controlled by USFWS and that there is no access to the public land because it is surrounded by private land. He stated that USFWS is trying to find willing sellers and obtain support from Congress to acquire land that would provide access to the public land at Stone Lakes. USFWS would then open some of the area to hunting.

Mr. Fulster stated that public access must be provided to any future public lands in the Bypass. He expressed concern that public access might not be allowed to the proposed Refuge for many years while habitat and public access issues are studied. He stated that this was his interpretation of language in the EA. He would like public access to be developed concurrently with the Refuge.

Mr. Thompson asked for the exact acreage amounts within the Refuge that would be open to hunting. He added that he would not want public access roads near his private duck club. He is concerned about the poor planning he has seen at Stone Lakes and that it not be repeated in the Bypass. Mr. Thompson also stressed that the duck clubs have easements on their land that prevent them from farming and their land would be useless if hunting conditions are ruined by too much sanctuary being offered elsewhere in the Bypass.

Mr. Harvey explained that the current EA only evaluates a set of proposed boundaries for the proposed Refuge and additional EAs would be required if any other actions were to be taken on behalf of the proposed Refuge.

Mr. Thompson asked how local stakeholders can hold the government responsible for allowing hunting and other public access to the proposed Refuge because the EA allows a 15-year period before public access would be allowed on the proposed Refuge.

Mr. Harvey responded that USFWS is required to study public access issues before a final public access plan is determined. The National Wildlife Refuge Improvement Act states that USFWS must create Comprehensive Public Use plans for all of its refuges within the next 15 years. Therefore, a Comprehensive Public Use plan would be created for this proposed Refuge, but interim public use would be allowed while that plan is being developed. Mr. Harvey offered to clarify the issue further with Mr. Thompson after the meeting.

Mr. Leonard expressed concern that USFWS is asking for a "blank check", asking the stakeholders to trust the government. He is worried that when the details of the proposed Refuge project are revealed, they will not be what the stakeholders want.

Mr. Fulster added that the stakeholders generally trust Mr. Harvey, but do not trust USFWS.

Mr. Harvey reiterated that any new actions taken toward establishing the Refuge would be proposed through a public comment process.

Mr. Leonard added that he was also concerned about the level of public access that would be allowed. For example, he would not want to see jet skis on the Toe Drain.

Mr. Ceppos stated that several organizations (such as CWA) have discussed creating an MOA for the Refuge, similar to the one developed for Grasslands. He and Ms. Kulakow have discussed the possibility of a Bypass-focused MOA that would provide formal recognition of the Working Group as the guiding group for all future land use design of the proposed Refuge, with Mr. Harvey and County Supervisor Dave Rosenberg. The Working Group would meet regularly to discuss proposals and issues related to the Refuge. He said that Mr. Rosenberg liked the idea and would bring it before the county supervisors.

Mr. Harvey stated that he wants to get feedback from the Working Group (i.e., people who have lived, farmed, and hunted in the area for years) on any future developments regarding the proposed Refuge.

Mr. Gaines stated that he supports the MOA idea because USFWS is asking for trust, and his past experience does not engender trust. The MOA would mean that management decisions would be made by the whole Working Group, so everyone would have equal input and USFWS could not simply make proposals and then impose their decisions on the Bypass.

Mr. Ceppos asked if the group felt the MOA was a good idea.

Mr. McCormack III stated that he was strongly in favor of it. The group generally concurred.

Ms. Cherovsky asked if the Management Strategy project was different from the proposed Refuge, in that it focused more on fish.

Mr. Ceppos responded that the Management Strategy was looking at the entire Bypass and would likely include proposals for fish habitat, but that the issues were largely the same. He explained the main issue for both projects was that areas proposed for habitat creation were currently private property. He said the issues involved include management of private land for habitat and willingness of private landowners to participate.

Ms. Kulakow added that discussion of issues pertaining to the proposed Refuge was just one function of the Working Group, and that many other issues would also be discussed.

Mr. Harvey stated that USFWS does not have a vision of the exact configuration of the proposed Refuge. He said the final program might include primarily private land with habitat easements.

Mr. Fulster expressed concern over Endangered Species Act (ESA) issues.

Mr. Harvey responded that USFWS does not intend to police adjacent landowners. He is hoping that landowners adjacent to the proposed Refuge will continue their current practices and felt a programmatic consultation under ESA might be possible to address agricultural practices as well as Refuge issues.

Mr. Ceppos stated that the assurances in the MOA could be very important in setting precedent throughout the Central Valley. He said this could provide an opportunity to force discussion of necessary Safe Harbor assurances for all agricultural land owners.

Ms. Cherovsky asked what the County's position is regarding the proposed Refuge.

Mr. Harvey responded that the County does not yet have an official position, and that Supervisors Dave Rosenberg and Tom Stallard had been assigned to focus on the proposed Refuge.

Mr. Ceppos stated that Mr. Rosenberg or Mr. Stallard could be invited to attend the next Working Group meeting.

Fish Habitat in the Bypass

Mr. Ceppos explained that several biological specialists would give presentations to the Working Group regarding possible habitat creation opportunities within the Bypass. He stressed that these specialists were at the meeting both to inform the Working Group of current proposals and to obtain feedback and input from the Working Group.

Mr. Sommer, a fisheries biologist from DWR and UCD, began by explaining that the suggestions he would present are based on his own opinions that have been formed through interpreting scientific data; they are not those of DWR. Besides working for DWR, he is currently a doctoral student at UCD, studying fish passage through the Bypass. He hoped to dispel any myths about proposed habitat restoration activities and to answer questions relating to fish in the Bypass. In its current state, the Bypass is a major nursery and migration corridor for many fish species, including splittail. The current Bypass, and current land use practices within it, provide very good habitat. Fish species

listed under state and federal ESAs, such as steelhead trout, splittail, winter and spring run salmon, and delta smelt, have been found to use the Bypass.

Delta smelt, Mr. Sommer stated, live in the San Francisco Bay estuary (Estuary), near pumps that export water for use in Southern California. Changes in pump operations, as a result of ESA issues (e.g., under the Bay-Delta Accord), been made to protect this species, and as a result, less water is now exported from the Estuary area.

He continued, explaining that in dry years, migrating fish, such as adult spring run salmon, are unable to cross the Fremont Weir, prohibiting them from entering and benefitting from the Bypass. He added that salmon use the Bypass as both a migrating corridor and major nursery for their young. Studies have shown that the approximately 40 species of fish using the Bypass have flourished in wet years. For example, the splittail's reproductive and growth rates have increased in the recent wet years, when they were able to spawn in inundated vegetation in the Bypass. Unlike the narrow Sacramento River, the flooded Bypass has a wide expanse of shallow, vegetated areas that provide higher quality food, habitat, and protected places where fish can rest. Although there is concern of fish being stranded when flood waters recede, studies have shown Yolo Bypass-reared fish to have a higher survival rate than similar aged juveniles found in Delta channels, and the threat of stranding is far outweighed by the benefits of excellent habitat to populations.

The Bypass is also an important corridor for transporting relatively high quality organic matter (e.g., crop stubble) downstream to the Estuary. The Bypass also slows the transport rates of water downstream allowing time for phytoplankton, an integral part of the aquatic food chain, to grow.

The dynamics of the Bypass' temporary floodplain have allowed native fish species to out-compete exotic species, by providing an ecosystem adequate for sustaining the needs of native species. Though the system is adequate, it could be further improved by increasing the connection of the Estuary to the floodplain within the Bypass. Hypothetically, this could be accomplished by creating a small area, which during dry years, could be flooded to accommodate habitat needs. An area of 300-1,000 acres would significantly increase the amount of habitat in dry years.

Mr. McCormack asked what the splittail is used for.

Mr. Sommer answered that they are moderately used as a sport fish but are currently listed as a threatened species. They are more commonly used as bait for other fish. He added that splittail was historically used as a commercial fish, though not currently.

Mr. McCormack then asked about the use of delta smelt.

Mr. Sommer responded that delta smelt have no direct economic value, but that the many restrictions placed upon the species under ESA result in significant economic effects (e.g., the aforementioned restriction on water being pumped from the Estuary) make it is the single most economically important fish in the region.

Mr. Fulster expressed concern about the loss of pheasant habitat when the Bypass floods. He added that hunters are more concerned with pheasants than splittail, and he did not think the Bypass had ever even been a fishery.

Mr. Sommer replied that the Bypass is the single most important fishery habitat in the Central Valley, even without any improvements to the current conditions, and that this fishery could be improved with some modest changes.

Mr. Fulster then expressed concern that changes might be proposed that benefit fish but could negatively affect people's economic viability. He then asked if any proposals to lower the Fremont Weir were being made.

Mr. Sommer answered that one option being considered is a small diversion in a small section of the Fremont Weir that would allow fish to pass over it. He added that there may be other options for minor modifications to the Fremont Weir, but that studies need to be made to determine the feasibility of any proposal. He stressed that the Bypass already contains valuable habitat, and he hoped to determine which options for increasing that habitat would result in either modest impositions, or no impositions (preferable) on landowners willing to participate (for which they would be compensated), while accomplishing the desired affect.

Mr. Fulster asked if any proposals being studied would increase flooding in the Bypass.

Mr. Sommer responded that the idea to put a small notch in a small portion of the Fremont Weir was intended to slightly increase the flow volume within the Toe Drain. The goal is for these flows to be contained within the Toe Drain and to be delivered to a small area (up to 1,000 acres) adjacent to the Toe Drain somewhere within the Bypass.

Ms. Cherovsky inquired where this flooded area would likely be located.

Mr. Thompson asked what time of year the site would be flooded.

Mr. Sommer answered that the site could be flooded from February through May, but stated that ideally it would be for a 4- 8-week period sometime during February and March.

Mr. Thompson said that this would not conflict with local agricultural practices, but that the stakeholders would want written guarantees that this is the only time when flooding would occur.

Mr. Schmid asked if flooding would be shallow (1-2 feet) or deep (levee to levee).

Mr. Sommer responded that one to two feet of water may be enough, but there is not yet enough information to determine the precise depths fish would prefer. Flooding would occur within a small, measurable area that would be less than or equal to 1,000 acres in size.

Mr. Fulster stated that since adjacent lands require permanent levees to protect them, he is concerned that flooding would require the removal of portions of the Toe Drain levee.

Mr. Sommer stressed that current flooding for migrating waterfowl has not required removal of portions of levees and that flooding for fish would be no different.

Ms. Cherovsky stated that this would not be a problem if the water was free-flowing and contained within its specified area, perhaps by levees that would surround the flooded site to protect adjacent lands. This statement was supported by other Working Group members.

Mr. Sommer continued that one idea would be to practice triple cropping on a parcel to be flooded. This means that farmers would flood rice fields in the fall for waterfowl, and would flood the fields again in the winter for fish, and would then plant rice in the spring and summer.

Mr. Fulster asked how fish would get back into the Toe Drain channel.

Mr. Sommer answered that the land has already been graded by farmers so that it will drain, so a complex wetland system would not need to be constructed.

Mr. Baxter added that the fish species that use the Bypass naturally know how to retreat from the floodplain when floodwaters recede. He reminded the group that the project area would be small scale, and that a large scale project is not feasible or desirable. The Working Group would be used to provide input and guidance for the design of the experimental project.

Ms. Cherovsky said that re-engineering the Fremont Weir scares people because of possible increased flooding of lands within the Bypass.

Mr. Fulster and Mr. Brown asked why the aquatic habitat provided at Little Holland and other lands in the Delta was not enough.

Mr. Baxter replied that he is looking for an area that can be seasonally flooded, since exotic species that compete with and prey upon native species need year-round water, while the native fish have adapted to seasonal flooding. A seasonally flooded area would greatly benefit native fish populations but would not allow exotic species populations to establish.

Mr. Sommer said that the splittail was listed after the 6-year drought. He explained that a small project area would be monitored for correlations between wet and dry years and species abundance.

Mr. McCormack stated that landowners are not going to flood their land just for fish, but there may be less opposition to flooding if they receive easements or other payments.

Mr. Thompson added that, presently, much of the land in the Bypass is already in a nesting program and that land in that program cannot be flooded during the specified times of year.

Mr. Rocco said that very large flows would be required to get water out of the Toe Drain. Also, he added that there are other listed species, such as the Swainson's hawk, that have different needs than fish that need to be addressed.

Mr. Sommer responded that much has been done to improve avian habitat and now improvements to aquatic habitat that do not negatively affect other species protected under ESA are being studied.

Mr. Rocco stated his concern over the possibility that created wetlands could increase the number of mitten crabs in the Bypass.

Mr. Fulster added that created wetlands could also increase mosquito populations.

Mr. Sommer agreed that these are valid concerns and these and other similar issues will need to be addressed.

Mr. Rocco inquired about the proposed change to the Sacramento Weir, that were introduced about a year and a half ago.

Mr. Sommer admitted that he knows nothing of this proposed change, but the Sacramento Weir could be looked at as a possible source of water for proposed fish habitat projects, though no proposals have yet been made.

Mr. Shaul explained that current studies of possible improvements to aquatic habitat in the Bypass are only for proposed, temporary fish habitat. He stated that an increase in seasonal habitat will not create a fishery in the Bypass; it would be intended to increase juvenile fish populations. He emphasized that the current studies strive to find practices that would mutually benefit landowners (for example, through early season irrigation, early germination of weed seeds, groundwater recharge) and fish species, but would not adversely affect current adjacent land uses. He also said that the study's team (primarily himself and Mr. Sommer) needs to get input from the Working Group to further develop ideas and drive decisions.

Mr. McCormack said that monetary opportunities would help convince landowners to support any proposals.

Mr. Rocco voiced his concern that an increase in ESA species will lead to the necessity of screening diversion pumps.

Mr. Sommer replied that the majority of the flooding would take place in winter when little pumping occurs.

Mr. Rocco responded that some pre-irrigation can occur in March.

Mr. Sommer said, in that case, a Safe Harbor agreement would need to be established.

Ms. Cherovsky asked where the water would come from.

Mr. Sommer answered that no water source has yet been determined, but that it would likely be environmental water that could be bought using money provided by the Central Valley Project Improvement Act to create the floodplain in dry years.

Mr. Shaul added that by changing the structure of the floodplain, the project would try to use existing water for flooding so that additional water would not be required.

Mr. Fulster said that it is ironic that in the last drought the farmers were paid not to flood until the late fall, and now they could be paid to flood earlier.

Mr. Sommer replied that not until the past few years have scientists begun to realize the importance of floodplains to aquatic species.

Mr. Shaul added that an experimental project would focus on not impairing agricultural or other land uses; land where flooding in February and March will provide mutual benefits would be preferred sites. The project also would not infringe on private property rights; any project developed would only be implemented on land of a willing participant. The project would also be designed to not affect flood conveyance. The project, if it occurs, would preferably be installed on land that is currently fallow or unmanaged and where flooding can be enhanced by minimal modifications to topography. Mr. Shaul stated the additional consideration that any proposed project location would have to be completely reversible (to original land conditions) with the reversal only having a modest cost. This area would be less than or equal to 1,000 acres, adjacent to the Toe Drain, and between the Fremont and Lisbon Weirs. He continued that alternative means of flooding would be examined. He then distributed a handout explaining the criteria for choosing a project site.

Mr. Fulster asked if the Lisbon Weir would be raised as part of the project. He expressed concern that flooding would result if the Weir is raised.

Mr. Shaul responded that he is not proposing the flooding of any land beyond the project area.

Mr. Brown pointed out that in dry years high tides will flood areas below the Lisbon Weir and that this is a tight system.

Mr. Jones was concerned about the cost to farmers, and possible loss of jobs if additional flooding occurs in the Bypass.

Mr. Fulster said that much of the land in the Bypass is already flooded under the Waterbank program, but that if they are paid, landowners may be willing to flood more.

Mr. Martin inquired about the reason for selecting the Lisbon Weir over the Fremont Weir.

Mr. Shaul answered that an area that will dry out in the summer is needed, and that water management will be easier without tidal influences.

Mr. Brown stated that it dries out south of the Lisbon Weir.

Mr. Fulster asked if any changes will be made to the Fremont Weir.

Mr. Shaul answered that no formal proposals or decisions have been made about the Fremont Weir and that he would prefer to use existing flows for the project, if possible. He added that, currently,

the only discussion is to put a notch or other system in a small portion of the Fremont Weir that will enable flows to be managed. He stated that any proposed changes to the Fremont Weir be studied for feasibility to ensure that they would not affect any lands in the Bypass, except proposed project sites.

Mr. Sommer said that he would prefer a gate on the Weir.

Mr. Ceppos reiterated that there has been no discussion to lower the entire Fremont Weir. He further emphasized that the only discussion he has heard was the one provided by Mr. Sommer and Mr. Shaul, which involves considering a small, manageable water delivery structure on a small portion of the Fremont Weir. This structure would deliver water into the Toe Drain and would not cause flooding on non-project lands in the Bypass. Mr. Ceppos asked if there were further questions on this issue from the group or if previous misconceptions were now clarified. The group generally concurred that the issue was now clear and understood.

Mr. Martinez stated that several years ago there had been a study of possibly increasing capacity over the Sacramento Weir, and that study might be getting confused with the Fremont Weir discussion. He said that this proposal was turned down.

Mr. Rocco asked about the present fish ladder at Fremont Weir and the water level required for it to be useful.

Mr. Sommer responded that it does not function well and that water level must be very high for it to work.

Mr. Fulster asked at what level it functions.

Mr. Sommer replied that it functions at 29 feet and there is no passage over the Weir in dry years.

Mr. Martin wondered if water quality concerns would dictate the project location.

Mr. Sommer answered that one concern is if the project site chosen is downstream from Cache Creek, mercury could be a problem.

Mr. Ceppos reminded the group that, although the stakeholders want specific answers to their questions about proposed projects, the people discussing these proposed projects are coming to the Working Group to get ideas and suggestions about how to design the projects; the projects are still being defined. The project proponents recognize that the members of the Working Group have a lifestyle that they like, and that project proponents need the Working Group's input to guide the formation of any future habitat ideas. They want to make changes that will be approved by and will benefit the stakeholders. Therefore, not all questions can be answered at this time, because not all details have been worked out. Mr. Ceppos stressed that this is a good thing, because it gives the Working Group the opportunity to guide and shape the projects.

Mr. Ceppos said that the purpose of these meetings is to bring this type of information to the Working Group so that projects aren't developed without their input.

Conclusion

Mr. Rutten and Mr. Yates' presentation on hydrology within the Bypass was postponed until the next meeting.

Mr. Ceppos stated that information on the Water Bond, Proposition 13, will be sent with the meeting minutes.

The group agreed that future meetings should be held from 10:30 a.m. to 1 p.m. Accordingly, the next Working Group meeting will be help March 9, 2000 from 10:30 a.m. until 1 p.m.

The meeting was adjourned.

YOLO BYPASS MANAGEMENT STRATEGY
STAKEHOLDERS WORKING GROUP MEETING NO. 5

DRAFT
MEETING MINUTES

MEETING DATE: March 9, 2000

LOCATION: California Department of Fish and Game
Yolo Wildlife Area Headquarters
45211 County Road 32B (Chiles Road)
Davis, CA 95616

IN ATTENDANCE: Randy Baxter, California Department of Fish and Game (DFG)
Robert Brown, Bull Sprig Outing Duck Club
Walt Cheechov, U.S. Department of Agriculture (USDA), National Resources Conservation Services (NRCS)
Chuck Dudley, Joe Heidrick Enterprises
Mike Egan, Yolo Flyway Farms
Denny Eickmeyer, L. G. Duck Club and Yolo Wings Group Rep.
Chris Fulster Jr., Glide-In Ranch
Richard Hadley, U.S. Fish and Wildlife Service (USFWS)
Mike Hardesty, Reclamation District 2068
Bill Harrell, California Department of Water Resources (DWR)
Tom Harvey, USFWS
Craig Isola, Sacramento National Wildlife Refuge
Arline Jones, Lucky 5 Farms
Elmer Jones, Lucky 5 Farms
Greg Kassis, Glide In Ranch
Dennis Kilkenny, Dawson Duck Club
Yvonne LeMaitre, Glide Ranch Trustee
Bob Leonard, Yolo Basin Farms
Rick Martinez, Martinez Farming Co.
Duncan McCormack III, Yolo Ranch
Duncan McCormack IV, Yolo Ranch
Larry Minshall, Yolo Flyway Farms
Gary Moody, Yolo Wings
Scott Morgan, W. T. Morgan Real Estate Co.
Dennis Murphy, Murphy Farms
Ricardo Pineda, State Reclamation Board
Lynn Pryor, Yolo Links
Gordon Rasmussen, Rasmussen Ranch

Ross Rasmussen, Rancher
Chad Santerre, California Waterfowl Association (CWA)
Greg Schmid, Los Rios Farms
Peter Schmidt, Ducks Unlimited
Ted Sommer, DWR and University of California, Davis (UCD)
Ron Tadlock, Ron Tadlock Farms
Ray Thompson, Sky Rakers Duck Club
Ed Towne, Bull Sprig Outing Duck Club
James Waller, Senator Outing
Robin Kulakow, Yolo Basin Foundation (YBF)
Dave Ceppos, Jones & Stokes
Alice McKee, Jones & Stokes
Luke Rutten, Jones & Stokes
Warren Shaul, Jones & Stokes
Jennifer Stock, Jones & Stokes
Gus Yates, Jones & Stokes

NEXT MEETING: **The next Working Group meeting will be held on Friday, April 14 , 2000, from 10:30 a.m. to 1 p.m. at the DFG Yolo Wildlife Area Headquarters. Lunch will be provided. Members of the Working Group are asked to call Jennifer Stock at 916/739-3086 to confirm their attendance.**

ACTION ITEMS

1. Jones & Stokes will conduct additional studies of hydrology within the Yolo Bypass (Bypass). These studies will include investigating the following issues:

   # duration (in days) of flows over the Fremont Weir over a period of years;

   # amount of flow that made the Fremont Weir spill this year versus the amount that made it spill 30 years ago (when the Sacramento River was being dredged);

   # collection of hydrology data for the entire Bypass.

2. The project team will bring additional examples of the U.S. Army Corps of Engineers (Corps) cross sections through the Bypass to the next Working Group meeting.

3. Jones & Stokes and YBF will begin work on a proposal to the CALFED Bay-Delta Program (CALFED) for funding a process that would determine fair compensation for land use changes intended to benefit habitat. The draft proposal will be sent to Working Group members for review before the next Working Group meeting.

DECISIONS MADE

1. The Working Group approved the draft minutes from the February meeting. Those minutes will now be made final.

2. The group agreed to begin work on a CALFED proposal for funding a process that would determine fair compensation for land use changes intended to benefit habitat.

SUMMARY OF MEETING

Introduction

Ms. Kulakow began the meeting by welcoming the group and explaining that the purpose of the Working Group is to discuss current and possible future land use practices in the Bypass, based on the desires and willingness of landowners.

Mr. Ceppos reviewed the agenda and asked for changes or additions; there were none. He then asked for changes or additions to the February 10, 2000 meeting minutes; there were none. The February 10, 2000 meeting minutes were adopted as final.

Mr. Ceppos asked the attendees to introduce themselves.

Mr. Ceppos reminded the group that the purpose of the Working Group meetings was to provide brief updates on activities concerning the Bypass and to provide information about options for land use changes within the Bypass to the Working Group so they could make sound business decisions. He further explained that decisions made by the group will be included in the future Management Strategy document and that the Working Group forum is intended to be the voice of the stakeholders.

Mr. Ceppos added that the purpose of today's meeting was to continue to present landowners and water users with technical information that will aid them in making business decisions and to hear their concerns related to these technical issues. He stated that two questions raised by the Working Group at past meetings are whether flooding has been more frequent in the Bypass in recent years and what type of compensation could be available to landowners who agree to make changes in their practices to improve fish and wildlife habitat. He explained that today's meeting would begin to address these questions, and then he introduced Gus Yates, hydrologist, and Luke Rutten, geomorphologist, from Jones & Stokes.

Flooding and Other Hydrologic Issues

Mr. Yates and Mr. Rutten explained that they would be providing an initial overview of both flooded and low flow hydrology in the Bypass, based on preliminary research they had conducted. They asked for the group's input on their presentation, explaining that the information presented was intended as a starting point for discussion. They anticipated that the group would have many precise details to add to the information they had gathered because the landowners and water users are intimately familiar with the Bypass and its hydrology. Mr. Yates stated that he hoped the Working Group could provide additional information, particularly about low flow regimes, which is not in the official records. He went on to say that the goal of these hydrology studies is to help the group to understand the hydrology of the Bypass which will aid them with making business decisions.

Mr. Yates explained that he and Mr. Rutten had begun researching flood flow regimes and lower flows within the Bypass. They had started by looking at existing information from existing gages.

Mr. Yates then presented several figures and graphs that presented data related to hydrology within the Bypass. Several of the figures, including one distributed at the February Working Group meeting, present gage data at the Lisbon Weir. The group expressed confusion over the maximum stage level at the Lisbon Weir presented in the figures. Mr. Yates explained that two datums are used in the figures. The figure distributed at the February meeting uses the Corps datum, which is 3 feet below sea level. The other charts and handouts use sea level as the datum, so there is a 3-foot discrepancy between the datums. Mr. Yates explained that the sea level datum was used to make the information more understandable to the group.

The group explained that they are accustomed to using the Corps datum and use the Corps stage reading at the Lisbon Weir as a yardstick for understanding changes in hydrology within the Toe Drain. Mr. Yates reiterated that the intent was simply to make the information as clear as possible

for the Working Group and stated that, this being the case, he and Mr. Rutten would use the Corps datum instead of sea level in the future. In the meantime, Mr. Yates asked the group to add 3 feet to the stages shown on all of the charts handed out, to correlate the elevations with the Corps Lisbon Weir datum that they are familiar with using.

Mr. Rutten explained that the main water sources contributing to flows in the Bypass included the Fremont Weir, the Sacramento Weir, the Knight's Landing Ridge Cut, Putah Creek, and Cache Creek. He added that Mr. Yates and he had studied existing data collected at the Lisbon Weir to determine if one of these sources was the major contributor to flooding in the Bypass. They found that the flows over the Fremont Weir were by far the largest contributor to flooding at the Lisbon Weir, while flows over the Sacramento Weir were minor in comparison. Flows from Cache Creek also appear to have some effect on flooding at the Lisbon Weir. He added that the construction of Berryessa Dam had changed Putah Creek's hydrology substantially so that Putah Creek now has much less influence on flooding in the Bypass than it once did. Mr. Yates also stated that the influence of Cache Creek correlated with general flooding in the region. To investigate whether this fact simply means that wet years are wet or if there has been a change in flooding possibly resulting from a change in management, he looked at data charting unimpaired runoff in the Sacramento Valley (natural runoff for the whole valley) and compared this data with the chart that shows flooding at the Lisbon Weir. He found that the 1990s were wet years throughout the Sacramento Valley, and the increase in flooding in the Bypass during these years correlated with the increase in runoff throughout the region. This finding implies that the recent increase in flooding in the Bypass is a result of wet weather patterns, not of changes to the operation of the weirs.

Mr. Pineda pointed out that the only reoperation of a weir in the area occurred at Folsom Dam, and this reoperation causes Folsom Reservoir to hold back more water, which would lead to less flooding in the Bypass. He added that it is important to note that standard operation of weirs and dams is done within a range of parameters, so that some fluctuation could occur but would not be considered a change in operations.

Mr. Yates presented graphs which showed daily stage data for the Lisbon gage and flow data for Cache Creek during water years 1985 and 1988. He explained that jumps in the Lisbon gage stage corresponded well with high peaks in Cache Creek. He also stated that these years were relatively dry and therefore the high stages at Lisbon were likely not influenced by Fremont Weir inflow. He then showed a graph correlating peak flow in Cache Creek to increases in stage at Lisbon Weir. This graph showed flows between 0–4000 cubic feet per second (cfs) causing stage increases of 0–4 feet and flows between 9000–12000 cfs causing stages increases of 9–13 feet.

Mr. Tadlock questioned the ability of Cache Creek to increase the Lisbon Weir gage 10 feet on its own. He said that other sources, such as the Knights Landing Ridge Cut, must also have been contributing flows.

Mr. Yates agreed with this point.

Mr. Yates then asked if there were questions about flood hydrology.

Mr. Dudley stated that he would like to see data regarding the duration (in days) of flows over the Fremont Weir, over a period of years. He asked if the same amount of flow that makes the Fremont Weir spill this year would have made the Weir spill thirty years ago (when the Sacramento River was being dredged).

Mr. Yates responded that he did not know the answer to this question, but the issue could be studied through this project.

Mr. Dudley added that the data presented at today's meeting was based on flooding at the Lisbon Weir, whereas he would like to see data for the upper end of the system.

Mr. Yates explained the data presented today was based on existing gages, primarily the gage at the Lisbon Weir, and the hydrologic studies for the project were just beginning. He added that he intends to study the hydrology of the entire Bypass, not just the lower end.

Mr. Ceppos reminded the group that today's presentation is just the beginning of studies and presentations regarding hydrology issues. He stated that the project team would like to get feedback from the Working Group as to additional areas of study that would be useful. He explained that one intent of the Management Strategy project is to gather information regarding both high and low flows within the Bypass that would be helpful to the Working Group members.

The group questioned the accuracy of a cross section that Mr. Yates had shown. This cross section shows a slight rise in topography to the west of the Toe Drain. The group stated that the Bypass slopes down from the Toe Drain, from East to West. Mr. Yates explained that this cross section has an exaggerated vertical scale of 20:1, resulting in a somewhat misleading graphic. He explained that there appears to be a very slight, localized high spot at this particular point, but that the cross section generally slopes downward from east to west. The group agreed that, while a few locations like this one were possible, the cross section is not representative of the vast majority of the Bypass. This cross section captures an area that is very unusual.

Mr. Sommers pointed out that this set of cross sections was taken every 1000 feet, so the cross sections do not capture all the variability along the Toe Drain. In addition, he added, the surveys for these cross sections were done from the air, so their accuracy is plus or minus one foot. He cautioned the group that this means that any one location on any one cross section should not be considered to be extremely accurate, but that as a set, the cross sections provide a useful initial understanding of topography within the Bypass.

Mr. Ceppos stated that the project team would bring additional examples of the cross sections to the next meeting.

Mr. Kassis asked who conducted the surveys used for the cross sections.

Mr. Yates explained that the Corps had hired Ayres Associates to conduct the surveys.

Mr. Kassis then asked Mr. Pineda about the effects of the repairs to the West Sacramento levees on flooding in the Bypass.

Mr. Yates stated that raising the West Sacramento levees should not increase flooding in the Bypass since the levees never overtopped before they were raised.

Mr. Pineda added that the levees were raised to provide protection for West Sacramento in rare extreme (greater than 100 year) flood events. He explained that an analysis had been conducted and found that the highest benefit-to-cost ratio resulted from raising the levees to provide West Sacramento with 400-year flood protection. He stated that the Corps studies conducted before the levees were raised showed no measurable significant hydrologic effects that would need to be mitigated for.

Mr. Kassis said that he agreed that protecting West Sacramento is important, but wondered if the landowners and duck club operators would be compensated if the newly raised levees result in increased flooding in the Bypass. He explained that additional flooding, particularly with higher stage levels, would require duck clubs to raise their club houses.

Mr. Pineda responded that any comments regarding raising the levees should have been submitted during the environmental review process that occurred before the project was authorized. He added that this review process is over, but that these concerns should still be addressed. Mr. Pineda also added that the Corps analysis of such projects is based on data collected in the first half of the 20th century, but that the region experienced much wetter years in the second half of that century. He suggested that the data used to evaluate projects should perhaps be reanalyzed.

Mr. Fulster asked how high the West Sacramento levees would be raised.

Mr. Pineda responded that the levees would be raised up to 5 ½ feet maximum for an approximately 5 mile reach. He added that the goal of the levee raising project was to overbuild the levees to provide adequate protection and compensate for issues such as seepage and wave action overtopping the levee.

Mr. Fulster then asked if a bike trail has been proposed to be built on top of the new levees.

Mr. Pineda stated that he is not aware of a plan to build a bike trail on the levees, but that the City of West Sacramento could be planning to build a trail. He stressed that the Reclamation Board is not advocating, nor opposing, building a bike trail on the levees.

Mr. McCormack III mentioned the levee reconstruction project that took place near Woodland in the early 1990s to protect Cache Creek. He said that the Bypass floods more often from Cache Creek's flows as a result of the project.

Mr. Pineda responded that the Cache Creek project involved upgrading the Cache Creek settling basin. He explained that the settling basin was designed to cause sediment to drop out of Cache Creek's flows before the water enters the Bypass. The basin is intended to preserve the flood capacity of the Bypass and the navigability of the Sacramento River. The basin was filled with sediment by the late 1980s, so the Corps analyzed how to increase its capacity. This analysis indicated that the levees around the basin should be raised and a new concrete weir that spilled into

the Bypass should be built. Mr. Pineda said that the levees around the settling basin were raised 15 feet. The work on the improvements to the basin is almost complete.

Mr. McCormack III asked if it was a coincidence that the Bypass had experienced increased flows from Cache Creek resulting in increased flooding after the settling basin levees were raised.

Mr. Pineda responded that the project did not increase or decrease water coming into the Bypass system and did not change flows in Cache Creek, except to slow those flows slightly before they enter the Bypass.

Mrs. Jones asked if there have been changes in the operation of the major reservoirs in recent years that might affect the Bypass.

Mr. Yates responded that there have not been changes to any of the reservoirs except Folsom, and those changes resulted in less flow since the reservoir now holds more water.

Mr. Tadlock asked if the new operations at Folsom Reservoir included releasing more water sooner during a flood event.

Mr. Pineda stated that this was not necessarily the case. He explained that projects were underway to strengthen levees along the American River and to enlarge the outlets at the Folsom Dam. The enlarged outlets would allow larger releases to be made earlier during flood events. He added that this change is currently being designed, but that the resulting releases would still conform to the current standard operation parameters for the reservoir.

Mr. Pineda continued, stating that the project was intended to fix problems and to strengthen the levee system. He added that there is currently no plan to expand the flood capacity of the Bypass, although the possibility of expanding its capacity is being studied as part of the Corps Comprehensive Study.

Mr. Yates asked if an increase in flood levels in the Bypass for a short time during storm events would affect current land uses.

The group generally stated that any increase in flood stage in the Bypass (for example, by raising levees) would increase flooding in the unleveed areas of the Bypass, requiring structures and pumps to be raised or protected.

Several members of the Working Group stated that the current flowage easements should be reevaluated because of changes in flows.

Mr. Pineda responded that, if this is the case, then claims could be made either through normal court action or through the Board of Control. He added that the existing flowage easements were inexpensive and very liberal, and the government feels that any changes to flows that have been made are within its rights, as allowed by the easements.

Mr. Jones stated that the easements were purchased before the existing dams were built. He believes that the management of Shasta Reservoir, for example, has increased flood duration in the Bypass.

Mr. Yates said that in general the reservoirs decrease peak flows, and flooding would have been worse during the 1990s if Shasta Dam had not been built.

Mr. Jones disagreed, stating that, based on his experience, the duration of flooding that has occurred after the dams were built has been much longer.

The group generally agreed with this statement and stated that the flows must be controlled somehow, since they seem to be very regular.

Mr. Yates explained that the reservoirs capture peak flows, leading to longer durations of flows.

Mr. Jones stated that if this statement is true, then landowners should be compensated for this increased duration.

Mr. Ceppos said that the flowage easements should be examined to see what they allow. He added that if the easements were purchased before the dams were built, they may need to be reevaluated.

Mr. Fulster asked if modifications could be made to the operation of the Deep Water Chip Channel to take pressure off of the Bypass during flood events.

Mr. Pineda responded that more water entering the ship channel would lead to more sediment in the channel. West Sacramento is already looking for ways to deepen the channel to offset sedimentation and would probably not be open to allowing more flows in to the channel. He added that the purpose of the channel is navigation; protecting the channel from increased sedimentation is essential to maintaining this purpose.

Mr. Fulster asked if the channel could be dredged.

Mr. Ceppos reminded the group that this issue had been addressed by Tim Washburn of the Sacramento Area Flood Control Agency (SAFCA) at an earlier meeting. Mr. Washburn had stated that dredging the channel would be economically unfeasible and raising the levees would be much more economically feasible.

Mr. Ceppos stated that hydrology and flood issues would be discussed further at future meetings.

Fair Market Compensation for Habitat Use of Agricultural Land

Mr. Ceppos stated that a frequent concern of the Working Group has been whether fair compensation would be available for any changes to current practices intended to improve fish and wildlife habitat. He said that the project team had taken this concern to CALFED, and CALFED representatives had

stated that landowners would be compensated for any changes to current practices that they agreed to participate in.

Mr. Ceppos further explained that there is a new round of CALFED funding coming up, and proposals for new projects are being solicited. He explained the CALFED proposal process that leads to funding of projects such as the current Management Strategy project. He said that the director of the environmental program at CALFED had expressed concern over how to determine what fair market value for habitat improvement projects might be. The director had stated that he would rather have the landowners determine fair compensation than have the state do so.

Mr. Ceppos stated that the Working Group, YBF, and Jones & Stokes could all work together to submit a proposal to fund a process through which the landowners, with guidance from agricultural appraisers and economists, would determine formulas for setting fair compensation for a variety of possible actions. Mr. Ceppos said that the Working Group members needed to decide at today's meeting whether they would support such a proposal and participate in the project, if it is funded. He explained that the proposal would be due in May, decisions about which projects to fund would be made in the fall of 2000, and the funded projects would begin in January or February of 2001. If funded, the project would probably involve monthly meetings for 6–10 months; these meeting would be similar to the current Working Group meetings. The Working Group could choose to form a subcommittee to attend these meetings, with the group as a whole reviewing and providing input during the process.

Mr. Martinez asked if Jones & Stokes would be paid to write the proposal.

Mr. Ceppos responded that Jones & Stokes would not be paid, but would expect to be included in the project (as a paid consultant) if it is funded.

Mr. Fulster asked if the group would be determining prices for selling their land.

Mr. Ceppos responded that the project would not determine buyout prices. Instead, he said, there are two types of changes that could improve habitat in the Bypass:

1. habitat enhancement practices compatible with current land use and
2. practices that would require changes in land uses.

The current Management Strategy project is focusing on the former. For example, he added, possible actions could include establishment of habitat friendly farming practices, expansion of habitat along irrigation ditches, or winter flooding in dry years. The proposal would be to determine fair compensation for these types of actions.

The group discussed its support for submitting the proposal.

Mr. Ceppos said that, if it is funded, the project would allow the Working Group to have a strong voice in determining fair compensation for voluntary changes to land use practices in the Bypass. He added that the group would be breaking new ground and setting precedent for compensation for these types of projects because nothing like this project has been done before.

Mr. Kilkenny expressed concern over how the proposed USFWS North Delta National Wildlife Refuge (Refuge) could lead to changes to economics within the Bypass and wondered how the proposal would address these possible, unknown changes.

Mr. Ceppos answered that this issue would be addressed during the project process, if the project is funded.

Mr. Egan asked if support for the proposal would be seen as an endorsement of the proposed Refuge by the Working Group.

Mr. Ceppos responded that it would not be intended to be such an endorsement, and a statement to that effect could be included in the proposal. He added that the Refuge is a separate issue from both the Management Strategy project and the proposal being discussed.

Mr. Ceppos stated that YBF and Jones & Stokes could write as much of the proposal as possible for review by the Working Group before the next meeting and would then revise the proposal based on the group's comments.

Ms. McKee added that if the Working Group was not happy with the draft proposal and did not want to submit it to CALFED, it would not be submitted.

Mr. Ceppos asked if the group wanted to move forward with a draft of the proposal.

A majority of the Working Group supported beginning the process.

CONCLUSION

Ms. Kulakow stated that the next meeting would be held on Friday, April 14, 2000, from 10:30 a.m. until 1 p.m. at the DFG Yolo Wildlife Area Headquarters. The agenda for the meeting will include the compensation proposal to CALFED, further discussion of habitat issues, and a preliminary discussion of the Management Strategy document that this project will produce and submit to CALFED.

Mr. Ceppos distributed copies of the booklet *Bring Farm Edges Back to Life*, a publication on habitat friendly farming published by the Yolo County Resource Conservation District.

The meeting was adjourned.

YOLO BYPASS MANAGEMENT STRATEGY
STAKEHOLDERS WORKING GROUP MEETING NO. 6

DRAFT
MEETING MINUTES

MEETING DATE: April 14, 2000

LOCATION: California Department of Fish and Game
Yolo Wildlife Area Headquarters
45211 County Road 32B (Chiles Road)
Davis, CA 95616

IN ATTENDANCE: Robert Brown, Bull Sprig Outing Duck Club
Regina Cherovsky, Conaway Ranch and Reclamation District 2035
Clifford DeTar, Little Hastings Island
Chuck Dudley, Joe Heidrick Enterprises
Mike Egan, Yolo Flyway Farms
Dave Feliz, Department of Fish and Game
Chris Fulster Jr., Glide-In Ranch
Bob Gill, R.C. Gill & Son
Mike Hardesty, Reclamation District 2068
Bill Harrell, DWR
Greg Kassis, Glide In Ranch
Bob Leonard, Yolo Basin Farms
Rick Martinez, Martinez Farming Co.
Duncan McCormack, Yolo Ranch
Gary Moody, Yolo Wings
Scott Morgan, W. T. Morgan Real Estate Co.
Dennis Murphy, Murphy Farms
Ashley Payne, Rancher
Lynn Pryor, Yolo Links
Ted Sommer, California Department of Water Resources (DWR) and University of California at Davis
Ron Tadlock, Ron Tadlock Farms
Ray Thompson, Sky Rakers Duck Club
Ed Towne, Bull Sprig Outing Duck Club
James Waller, Senator Outing
Will Wylie, H Pond Ranch
Robin Kulakow, Yolo Basin Foundation (YBF)
Dave Ceppos, Jones & Stokes
Alice McKee, Jones & Stokes

Luke Rutten, Jones & Stokes
Jennifer Stock, Jones & Stokes
Gus Yates, Jones & Stokes

NEXT MEETING: The next Working Group meeting will be held on Friday May 12, 2000, from 10:30 a.m. to 1 p.m. at the Department of Fish and Game Yolo Wildlife Area Headquarters. Lunch will be provided. Members of the Working Group are asked to call Jennifer Stock at 916/739-3086 to confirm their attendance.

ACTION ITEMS

1. Copies of the revised hydrologic graphs will be distributed with the April meeting minutes.

2. The project team will investigate the availability of Sacramento River sediment studies and present the studies they locate to the Working Group at a future meeting.

3. Jones & Stokes and YBF will continue to work on the CALFED Bay-Delta Program (CALFED) proposal to fund a comprehensive project that continues the ongoing project and addresses concerns of the Working Group. The draft proposal will be sent to Working Group members for review before the next Working Group meeting.

4. The changes to the proposed draft Management Strategy report outline will show that the Working Group suggested will be incorporated into the outline before it is included with the CALFED proposal.

5. The revised draft Management Strategy outline will be included with the minutes from this meeting.

DECISIONS MADE

1. The Working Group approved the draft minutes from the March 9, 2000 meeting. Those minutes will now be adopted as final.

2. The Working Group agreed to continue work on the CALFED proposal (as discussed herein).

3. The Working Group agreed to create a CALFED proposal subcommittee to make the proposal development more efficient. The subcommittee includes: Regina Cherovsky, Chris Fulster, Bob Leonard, Rick Martinez, Dennis Murphy, Ron Tadlock, and Ray Thompson.

4. The Working Group approved the Draft project information sheet as final with no changes.

5. The Working Group agreed to include the revised draft Management Strategy report outline with the CALFED proposal.

SUMMARY OF MEETING

Introduction

Mr. Ceppos began the meeting by welcoming the group and reviewing the agenda and then asked for changes or additions; there were none. He also asked for changes or additions to the March 9, 2000 meeting minutes; there were none. The March meeting minutes were then adopted as final.

Mr. Ceppos asked the attendees to introduce themselves.

Mr. Ceppos then introduced Gus Yates, hydrologist, and Luke Rutten, geomorphologist, from Jones & Stokes, to give an update on questions raised at the last meeting regarding the hydrologic data that were presented.

Hydrologic Update

Mr. Yates explained that the graphs distributed at the March meeting had been revised to reflect the use of U.S. Army Corps of Engineers' (Corps) datum instead of sea level, at the request of the Working Group. Copies of these revised graphs will be distributed with the April meeting minutes.

Mr. Yates then addressed the Working Group's question about flood frequency and duration at the Fremont Weir. The graphs shown at the March meeting presented data for the Lisbon Gage; Mr. Yates showed graphs that presented the same data for the Fremont Weir. The patterns of flood frequency and duration are generally the same as the patterns for the Lisbon Weir. Slight differences reflect occasional brief spills at the Fremont Weir that do not cause spilling at the Lisbon Weir. In addition, the graphs show that the Fremont Weir spills for a few days before registering at the Lisbon gage, and the area adjacent to the Lisbon Weir tends to remain flooded for a few days after the Fremont Weir stops spilling, as water levels decrease. Mr. Yates indicated that due to the distance between the two structures, these results are not surprising.

Mr. Yates also showed graphs of the same information for the Sacramento Weir. These graphs indicate that the Sacramento Weir spills much less frequently than does the Fremont Weir.

Another question posed at the March meeting was whether the amount of flow in the Sacramento River that causes the Fremont Weir to spill has changed. Mr. Yates addressed this issue, stating that he had compared the flow at the Verona gage (on the Sacramento River) with the flow at the Fremont Weir for the number of years for which records for both were available. He found a fairly consistent pattern, indicating that although there were periodic shifts in the rating curve, there was no consistent trend. He offered two possible explanations for this pattern:

- # the Sacramento River bed is fluctuating but the U.S. Geological Survey only updates its rating curve periodically, so gradual changes appear as these periodic shifts; or

- # the data reflect periodic deposition or erosion of the river channel bed associated with large flood events.

He concluded that there is no evidence of long term changes in Sacramento River bed elevations over the past 30 years, and therefore no changes in the flow at which the Fremont Weir begins to spill.

Mr. Towne asked Mr. Yates if his analysis included Cache Creek.

Mr. Yates replied that his analysis did include Cache Creek. He then stated that he is continuing his research regarding Colusa Basin drainage and the Knights Landing Ridge Cut. Mr. Yates added that he would present this additional data at a future meeting.

Mr. Thomson asked if the new housing being built near Arco Arena would increase the amount of water flowing into the Yolo Bypass (Bypass). Mr. Yates answered that the Sacramento Area Flood Control Agency had development requirements regarding water detention; he did not know what the requirements were for that area.

Mr. Ceppos noted that all new developments must discuss, in a NEPA or CEQA environmental compliance document, hydrologic impacts resulting from their construction. He added that although such developed areas are often in the Reclamation Board's (Board) jurisdiction, the Board does not have the budget or staff to play a large role in reviewing these environmental compliance documents.

Mr. Thompson stated that new developments in Davis and Woodland are required to include onsite storm water detention because these cities do not have adequate infrastructure to handle large increases in runoff. In contrast, areas that simply pump stormwater to the Sacramento River do not require onsite detention, although this additional water in the river affects the frequency and duration of flooding in the Bypass. He added that all new developments in the region should require some onsite water detention.

Mr. Brown asked how much silt has been deposited in the Bypass since it was constructed. He mentioned that there are fences that are now buried by deposited silt.

Mr. Tadlock responded that he does not believe the Bypass has gained sediment.

Mr. Ceppos added that Green's Lake has not filled in from sedimentation. He continued, stating that Mr. Yates and Mr. Rutten's upcoming work includes field visits to meet with individual landowners, hear individual issues and concerns, and learn about their operations and maintenance requirements, e.g., how often sediment has to be cleared out of irrigation canals. These visits should help answer the sedimentation question.

Mr. Ceppos added that anyone who had not been contacted about field visits and would like to meet with the hydrology staff should contact Mr. Rutten at 916/737-3000 or Ms. Kulakow at 530/756-7248 to arrange a field visit.

Mr. Yates added that he and Mr. Rutten are especially interesting in determining parameters for timing dry season flooding for shallow water fish habitat and will be looking for information such as pumps locations so that any proposed plans can be designed to avoid affecting existing infrastructure.

Mr. McCormack III asked if the project team has been conducting any studies of sediment in the Sacramento River.

Mr. Yates responded that the team has not but that such studies by other parties probably exist. He stated that he would look into this request and bring any information he finds to the Working Group.

Mr. Yates continued about another question raised at the March meeting involving the approximate magnitude of the 1986 and 1997 floods. He stated that according to the Corps', both of these floods were 70-year flood events. The Bypass was considered to be at capacity during the 1986 flood, indicating that it has a 70-year flood capacity rather than the 100-year flood capacity that it was built to accommodate. He explained that it is now clear that the first half of the 20th century was relatively dry compared to the second half, but that flood capacities were calculated based on data from the first half. As a result, the capacity ratings of facilities such as the Bypass have been changed recently.

Mr. Hardesty explained that the Bypass was designed to accommodate maximum flows between 490,000 to 505,000 cubic feet per second.

Mr. Martinez asked what hydraulic models for the Bypass are available or will be created.

Mr. Ceppos stated that this issue was one that the Working Group needed to discuss regarding the CALFED proposal.

CALFED Proposal to Fund the Next Steps for the Project

Mr. Ceppos explained that the scope of the CALFED proposal has expanded from its original intent of investigating fair market compensation for land use changes intended to benefit habitat. He stated that at the March meeting, the Working Group agreed that the group, YBF, and Jones & Stokes would all work together to submit a proposal to fund a continuation of the current Management Strategy project, particularly an assessment of fair compensation for any changes to current land use practices intended to improve fish and wildlife habitat. A consensus vote of the Working Group approved this idea. Since the March meeting, YBF and Jones & Stokes (the "project team") have discussed many of the issues raised in past Working Group meetings. Based on these discussions, the project team decided to suggest that the original proposal approach be expanded from what the Working Group discussed in March. Mr. Ceppos explained that the fair compensation issue is still

a major component of the proposal but that some other components had been added to make the proposal more comprehensive. He stated that the ultimate goal is to have the funds available to keep the Working Group going and playing an important role in determining the future of the Bypass.

Mr. Ceppos emphasized that Jones & Stokes is working on the proposal as a marketing project, and that Jones & Stokes employees were not billing time spent on the proposal to the current Management Strategy project.

Mr. Ceppos then explained that the draft proposal could include the following components that would continue the Management Strategy process:

- **Fair Compensation Program.** A process through which the landowners, with guidance from agricultural appraisers and economists, would determine formulas for setting fair compensation for a variety of possible actions that would benefit habitat.

- **Memorandum of Understanding.** Development of an Memorandum of Understanding (MOU) with the agencies would formally establish the Working Group as the public review and advisory body for any public actions proposed for the Bypass.

- **Hydraulic and Hydrologic Modeling.** Hydraulic and hydrologic modeling of potential land use changes would assess the effects these land use changes have on large scale and site-specific flooding conditions and on individual land owners.

- **Assurances.** Further definition and progress towards formalizing the assurances, e.g., Safe Harbor, would be required for landowners to agree to land use changes.

- **Cost-Benefit Analysis.** Information developed through the fair compensation task and modeling task would be interpreted to identify and estimate the major economic benefits and costs associated with possible habitat enhancement activities in the Bypass.

- **Post-Project Monitoring.** An evaluation at the end of the project of the Working Group process would assess whether it is an effective model for public participation in habitat enhancement projects involving private lands and to make recommendations for improving the process for future projects.

Mr. Ceppos explained that the chances of CALFED funding these next steps in the Management Strategy process would be greatly increased if they were submitted under one single proposal. He emphasized that the version of the proposal sent to the Working Group was a draft and could change completely based on input from the Working Group. He then reviewed the draft proposal.

Mr. Ceppos began by discussing the hydraulic and hydrologic modeling task. He explained that the Corps' Comprehensive Study was looking at the whole system and had done some modeling with cross sections at intervals of 1,048 feet. This interval is much too large to be useful for modeling the effects of specific actions in the Bypass.

Mr. Yates added that the focus of the Comprehensive Study's model was on really big floods in the Central Valley. He explained that the work being proposed would add to the Corps' data, so that a model used to study small events and changes could be built.

Mr. Yates has done an initial sensitivity analysis on his own time to see if the proposed model would work; he has determined that it will. However, additional funds are needed to provide the detailed data needed, to build the model, and to conduct test runs.

Mr. Ceppos emphasized that the intent of the proposed modeling is to give the Working Group the tools needed to understand existing conditions and the affects of potential changes in the Bypass.

Memorandum of Understanding

Mr. Ceppos then addressed the MOU task. He explained that many MOUs have been discussed lately, and emphasized that the MOU proposed would not be related to the proposed U.S. Fish and Wildlife Services' (USFWS) North Delta National Wildlife Refuge (Refuge). Instead, this MOU would formalize the importance of the Working Group.

Mr. Kassis asked what the governance of the MOU would be.

Mr. Ceppos responded that he did not know. He added that if the proposal is funded, part of the MOU task would be for all participants in the MOU to decide how they want to set up governance of the MOU.

Ms. McKee added that although the MOU would not be legally binding, it would likely be politically binding, depending on the parties who eventually sign it.

Ms. Kulakow added that the State Resources Agency wrote a letter to the USFWS about the proposed Refuge saying that the agency would support the proposed Refuge only if the USFWS developed an MOU with landowners in the Bypass.

Mr. Ceppos stated that the desired outcome of the proposed MOU would be that anyone interested in undertaking projects in the Bypass would have to talk to the Working Group first for input and advice.

Cost-Benefit Analysis

Mr. Ceppos then discussed the cost-benefit analysis task, stating that after all the proposed studies had been conducted, the Working Group would need to assess what types of land use changes would be worth doing given the associated economic costs. He explained that although this task is called a cost-benefit analysis in the draft scope, it is not intended to be a large, expensive cost-benefits analysis. He added that this task is still very much under development and Jones & Stokes would involve an economist in further refining the scope for this task.

Post-Project Monitoring

Mr. Ceppos explained that post-project monitoring is required for all CALFED projects. Since the proposed project would involve continuing the Working Group process and conducting new research, the proposed monitoring would include an evaluation of the process and its applicability to similar projects and give recommendations for improving the process.

Mr. Ceppos then explained that CALFED's past proposal solicitation packages (PSPs) focused mainly on special-status fish species, but CALFED had been challenged to require more of a scientific basis for the projects it funds. As a result, the current PSP requires that proposals formulate scientific hypotheses that need to be tested. Therefore, the Working Group's proposal will need to be presented in terms of a hypothesis. Mr. Ceppos stated that the project team is suggesting that the hypothesis for the proposal be that ecological benefits could be gained from habitat enhancement activities in the Bypass but many unanswered issues need to be studied before it can be determined whether these activities are feasible and worthwhile from political, social, economic, and habitat perspectives.

Mr. Ceppos stated that Jones & Stokes and YBF have a lot of experience in preparing CALFED proposals and asked that the Working Group trust the project team's judgement in determining how best to present the proposal. He added that the entire CALFED proposal package is available at CALFED's website at www.calfed.ca.gov.

Mr. Ceppos asked if the Working Group wished to continue with preparation of the proposal to CALFED.

Mr. McCormack III asked if an Environmental Impact Report (EIR) would be required as part of the proposed project.

Mr. Ceppos replied that an EIR would not be required since no actual projects would be implemented. He explained that the proposal was not for actual implementation of projects, but to gather information required by the Working Group before any projects could be considered.

Mr. Thompson stated that the duck clubs were concerned with trails being constructed near the clubs, an increased amount of flooding as a result of habitat enhancement activities, and the creation of sanctuary areas that would draw ducks from the duck clubs' lands. He added that he has yet to see anything concrete result from the Working Group meetings and that he would like to see some concrete products as a result of the time the group has put into the meetings.

Mr. Ceppos responded that many issues had arisen during the Working Group meetings that the project team had not anticipated, including those issues that Mr. Thompson mentioned. He stated that discussions of these issues would be included in the Management Strategy report document. He added that the original intent was to only address economic issues that pertained to agriculture but he had learned from the Working Group that the Management Strategy report needs to also address issues pertaining to the duck clubs' economic viability.

Mr. Kassis stated that the CALFED proposal was intended to obtain funding to address these kinds of issues. He then asked if the Working Group meetings would continue if the proposal is funded and what would happen to the process if CALFED does not fund the proposal.

Mr. Ceppos responded that the Working Group meetings would indeed continue if the proposal is funded.

Ms. Kulakow explained that the current project has funding to continue the meetings until this summer and additional funding would be required to continue the process. She stated that YBF would like to continue the process but did not have enough funds to do so on its own.

Mr. Kassis asked if alternative sources of funding existed. Ms. Kulakow responded that CALFED was probably the best source at this point. She added that the U.S. Environmental Protection Agency could be a source but their funds were difficult to obtain. She stated that YBF does not have the budget to continue the process without additional funding.

Mr. Fulster noted that the current PSP includes language that addresses species other than fish, such as birds. He added that flooding in the Bypass is a disaster for upland game birds.

Mr. Ceppos stated that the proposal should include a discussion of this issue. He said that this PSP is less focused on fish than past PSPs have been, and it is the first PSP that mentions the importance of working with the agricultural community and the need to provide fair compensation to agricultural interests for activities intended to improve habitat.

Mr. Dudley stated that the USFWS would have to produce environmental compliance documents before the proposed Refuge project moves forward. He said that, although the Refuge is separate from CALFED or the Management Strategy project, he would like to have the fair compensation plan in place before the Refuge is implemented. He added that the proposal to CALFED would let the Working Group drive the process of determining fair compensation.

The group then asked what the downside would be if the process ceased.

Ms. Kulakow responded that the Management Strategy document would not move closer to implementation.

The group expressed concern that outside agencies would continue to make plans for the Bypass without consulting landowners.

Mr. Martinez gave the example of the West Sacramento levee project, stating that the project went forward without landowners in the Bypass being contacted. He hoped that if the Working Group had been established before that project began, the group would have been notified and asked for input.

Ms. Cherovsky stated that continuing the process was the Working Group's chance to be heard as an entity that should be involved in, or at least informed of, any plans for the Bypass. She added that the process would not be binding and members could leave the Working Group at any time.

Mr. Ceppos stated that he hoped that the group had seen, through the process so far, that CALFED is sincere in supporting the Working Group.

The group expressed general support of continuing the project and submitting the proposal to CALFED. Mr. Fulster made a formal motion to continue the proposal process. Mr. Kassis seconded the motion, and the group voted to approve it.

Mr. Ceppos proposed forming a subcommittee to review the draft proposal before the next Working Group meeting. He explained that the proposal is due to CALFED in mid-May so the review process could not wait until the next Working Group meeting.

The group decided that the subcommittee would include Regina Cherovsky, Chris Fulster, Bob Leonard, Rick Martinez, Dennis Murphy, Ron Tadlock, and Ray Thompson.

Proposed Draft Management Strategy Report Outline

Ms. McKee gave an overview of the proposed draft Management Strategy report outline. She explained that the report would include the issues and concerns that had been discussed at the Working Group meetings, and would present the land use changes to benefit wildlife that the Working Group would be willing to consider, the additional studies that would be required to evaluate potential projects, and the assurances required before the Working Group could support a project. The document is intended to be a guide for anyone proposing land use changes to benefit habitat in the Bypass and would be the starting point for the project currently being proposed by the Working Group to CALFED.

Ms. McKee added that the project team hoped to include a copy of the draft report outline with the CALFED proposal to show the progress that has been made on the current project. She asked if the group had any suggestions for changes to the outline or any concern with sending the outline with the proposal. The group had several suggested changes; these changes will be incorporated into the outline before it is included with the proposal (also see attached revised outline).

She then asked if there were any questions about the outline.

Mr. Fulster asked if this report would be an EIR for the proposed Refuge.

Ms. McKee responded that it would not be. She said that this document would be produced this summer, before the EIR for the proposed Refuge is written. She said that the Management Strategy report would convey the Working Group's opinions, which would hopefully help guide the EIR for the Refuge. She added that the EIR would go into more depth than the Management Strategy report.

Ms. McKee also stated that the Management Strategy report would be written on behalf of the Working Group, and would only be released if approved by the group.

Verification of Duck Club Locations and Names

Mr. Ceppos explained that there had been some question of exact land ownership at the duck club meeting held in March. He explained that attendees of the duck club meeting had raised issues of acreages and had expressed a desire to better understand how water moves between the clubs. He asked representatives of the duck clubs to mark the clubs' locations and extents on a map presented at today's meeting.

Mr. Leonard stated that the USFWS has a list of the duck clubs.

Conclusion

Ms. Kulakow stated that the next meeting would be held on May 12 , 2000, from 10:30 a.m. until 1 p.m. at the DFG Yolo Wildlife Area Headquarters. She added that subsequent meetings would be held on Thursday, June 8, 2000, and Thursday July 6, 2000.

The meeting was adjourned.

YOLO BYPASS MANAGEMENT STRATEGY
STAKEHOLDERS WORKING GROUP MEETING NO. 7

DRAFT
MEETING MINUTES

MEETING DATE: May 12, 2000

LOCATION: California Department of Fish and Game
Yolo Wildlife Area Headquarters
45211 County Road 32B (Chiles Road)
Davis, CA 95616

IN ATTENDANCE: Robert Brown, Bull Sprig Outing Duck Club
Walt Cheechov, U.S. Department of Agriculture and National Resources Conservation Services
Regina Cherovsky, Conaway Ranch and Reclamation District 2035
Anita DeLong, U.S. Fish and Wildlife Service (USFWS)
Chuck Dudley, Joe Heidrick Enterprises
Mike Egan, Yolo Flyway Farms
Denny Eickmeyer, Yolo Wings and L. G. Duck Club
Dave Feliz, California Department of Fish and Game (DFG)
Chris Fulster Jr., Glide-In Ranch
Bill Harrell, California Department of Water Resources (DWR)
Yvonne LeMaitre, Glide Ranch Trustee
Bob Leonard, Yolo Basin Farms
Rick Martinez, Martinez Farming Co.
Duncan McCormack III, Yolo Ranch
Larry Minshall, Yolo Flyway Farms
Gary Moody, Yolo Wings
Dennis Murphy, Murphy Farms
Ricardo Pineda, California State Reclamation Board (Reclamation Board)
Greg Schmid, Los Rios Farms
Ted Sommer, DWR and University of California Davis (UCD)
Jim Staker, Conaway Ranch
Ed Towne, Bull Sprig Outing Duck Club
Will Wylie, H Pond Ranch
Robin Kulakow, Yolo Basin Foundation (YBF)
Dave Ceppos, Jones & Stokes
Alice McKee, Jones & Stokes
Jennifer Stock, Jones & Stokes

NEXT MEETING: The next Working Group meeting will be held on Thursday, June 29, 2000, from 10:30 a.m. to 1 p.m. at the DFG Yolo Wildlife Area Headquarters. Lunch will be provided. Members of the Working Group are asked to call Jennifer Stock at 916/739-3086 to confirm their attendance.

ACTION ITEMS

1. Results from the proposed USFWS North Delta National Wildlife Refuge (Refuge) Public Survey are not yet complete. The results will be included in the Refuge decision document. The release date for this document has not been determined.

DECISIONS MADE

1. The Working Group approved the draft minutes from the April meeting. Those minutes will now be adopted as final.

2. The Working Group approved the draft CALFED Bay Delta Program (CALFED) proposal for submittal to CALFED with no changes.

3. The Working Group agreed to hold its meetings every 6 weeks, instead of every 4 weeks, for the remainder of the project.

SUMMARY OF MEETING

Introduction

Mr. Ceppos began the meeting by welcoming the group. He reviewed the agenda and asked for changes or additions; there were none. He then asked for changes or additions to the April 14, 2000, meeting minutes; there were none. The Working Group adopted the April meeting minutes as final.

Mr. Ceppos then asked the attendees to introduce themselves.

CALFED Proposal

Mr. Ceppos gave a brief overview of the draft CALFED proposal and opened the floor for discussion of the proposal. He explained that this was the Working Group's chance to raise any concerns or request changes before the proposal would be made final and submitted to CALFED on May 15, 2000. He explained that in the weeks prior to this meeting, the team authoring the proposal met with the Working Group's CALFED proposal subcommittee (Cherovsky, Fulster, Leonard, Martinez, Murphy, Tadlock, and Thompson) to review the proposal and receive input.

Mr. Fulster stated that the CALFED proposal subcommittee reviewed the draft in depth and he believed all the changes and concerns the Working Group may have had have been addressed. He suggested that the proposal be submitted to CALFED without changes.

Ms. Cherovsky supported Mr. Fulster's recommendation but added that the group should voice any final concerns.

Mr. Ceppos explained the main issues that were addressed in the proposal as a result of the subcommittee's input. These issues included:

- # the Reclamation Board and the U.S. Army Corps of Engineers consider the Yolo Bypass (Bypass) to be at full design capacity for flood conveyance;

- # the baseline of current habitat conditions in the Bypass is unknown, which further supports a need to do studies to determine the present value of habitat in the Bypass;

- # the Working Group should receive any documents prepared in regards to the Bypass (e.g., documents prepared by DWR or DFG)or other agencies and organizations; and

- # the loss of groundwater recharge if rice fields are converted to habitat.

Terms used in the draft CALFED proposal were also refined to ensure that they precisely conveyed the Working Group's intent.

Mr. Ceppos continued by quoting a disclaimer that is featured on page 15 of the proposal, regarding the proposed Refuge. The following quote appears verbatim from the proposal text:

> It is very important for CALFED decision makers to realize, however, that the authoring of and involvement in this proposal in no way reflects any approval, expressed or implied, of the proposed U.S. Fish and Wildlife Service North Delta National Wildlife Refuge. The Working Group has determined no formal opinion as a group or as individuals in favor or denial of the proposed refuge.

Mr. Ceppos then went over the budget for the proposed project. The total budget requested in the final version was $467,147.00.

Mr. Ceppos asked if there was a motion to approve the proposal as final.

The motion was made, seconded, and approved by the Working Group.

Mr. Martinez inquired if the Working Group should send letters to thank the authors who wrote support letters for the proposal.

Mr. Ceppos said that this was possible. He added that some agencies pledged support even though they were unable to provide a letter of support. Because these agencies are politically involved with CALFED, a letter of support would have been a conflict of interest.

Mr. Pineda said that the Reclamation Board supports the Working Group process but is heavily involved in CALFED and thus could not send a letter of support. He added, however, that the Reclamation Board is happy to support the Working Group process.

Mr. Ceppos told the Working Group that the Yolo County Board of Supervisors sent a letter of support but had hoped that the Working Group keep in mind that the County Supervisors are decision makers regarding land use in the county. Mr. Ceppos reiterated that the proposal language identifies the Working Group as an advisory organization rather than a decision-making body for the county. Another organization that sent a letter of support is the Dixon Resource Conservation District.

Mr. Murphy asked if there were any updates regarding the proposed Refuge.

Ms. DeLong responded that the USFWS is working on a Memorandum of Understanding (MOU) with Yolo County. She added that additional MOUs with the Reclamation Board and the Reclamation Districts are possible. There has been no decision on the establishment of the proposed Refuge; no decisions will probably be made for a couple of months.

Mr. Fulster inquired about the survey sent out regarding the proposed Refuge.

Ms. DeLong answered that the survey was done to get an idea of what Refuge boundaries people would support. She added that the survey's intent was to get input from people who did not want to review the environmental assessment in detail. The survey results are not yet compiled but will be included in the decision document for the proposed Refuge.

Ms. DeLong added that Mike Spears of USFWS is overseeing the decision-making process and wants to see an analysis of the comments. He wants to develop agreements with concerned and appropriate entities before any decisions are made regarding the proposed refuge.

Mr. Ceppos returned to the topic of the CALFED proposal by thanking the Working Group for its input and for the trust they've put in YBF and Jones & Stokes. He explained that the proposal will go through six review panels–three scientific reviews, one administrative review, the Ecosystem Roundtable, and finally a policy-level committee. He said that it will take 7 months, or until November 2000, for a decision to be made. If awarded, the money would be made available by February 2001 at the earliest.

Mr. Ceppos suggested that the Working Group meetings be changed from a 4-week to 6-week cycle. This change would better accommodate agricultural activities, allow more time for Management Strategy document preparation and Working Group review, give the hydrologic staff more time for field visits, and stretch the meetings into fall so that there is no downtime between the end of the current project and a potential start of the proposed new project in February. If it is awarded.

The Working Group agreed to this change.

Habitat-Friendly Agricultural Practices

Mr. Ceppos then introduced habitat-friendly agricultural practices as the next agenda item. He said to remember that the proposal states that landowners willing to implement these practices would expect fair compensation and adequate assurances. He then invited Regina Cherovsky of PG&E Properties to talk about habitat-friendly practices currently used at the Conaway Ranch.

Ms. Cherovsky gave a brief introduction and then introduced Jim Staker, farm manager at Conaway Ranch.

Mr. Staker began by giving a brief history of Conaway Ranch. The land was previously owned by Woodland Farms, Pasadena, California, who transformed the land from tule patches and rolling topography that supported productive rice crops. The ranch has land in the Bypass, Cache Creek Settling Basin, and Willow Slough Bypass. After PG&E Properties purchased the property, Ranch managers began slowly working with 25 tenant farmers to implement habitat-friendly agricultural practices. The ranch hired Mike Hall, wildlife manager, to address hunting and wildlife management issues on the ranch. Mr. Hall has been given a lot of flexibility to develop creative projects.

One agricultural practice that is being implemented is the use of flushing bars during the first cutting of alfalfa. Alfalfa is great nesting habitat for game bird hens, and contemporary cutting practices lead to a high mortality rate of hens and eggs. Conaway Ranch has found that early season habitat flushing, during the first cutting, allows the hens to re-nest in adjacent, safe habitat areas. He explained that brood fields are left fallow for at least a year and are located near the alfalfa fields to act as refuges for displaced hens. Flushing bars extend 6 to 8 feet in front of a harvester. These bars have chains that hang down with bells attached to them. They disturb the hens and flush them from their nests. Though effective, there is still some mortality. California Waterfowl Association published the results of a study undertaken, in conjunction with UCD, which shows that mortality rates are reduced significantly with the use of flushing bars. Conaway also works with volunteers to salvage eggs. Up to 1,000 eggs are sometimes collected and taken to hatcheries.

Mr. Murphy commented that the alfalfa is produced outside of the Bypass.

Mr. Ceppos asked what crops are being produced in the Bypass.

The Working Group answered that the main crops are corn, rice, and safflower. Other fields are pasture and irrigated pasture lands. Some of the landowners are already using limited wildlife-friendly agricultural practices.

Mr. Staker spoke about another practice that involves selective “cleaning” of vegetation around agricultural fields. Traditionally, all vegetation was cut and cleared from ditches, roads, and fields. Conaway Ranch, instead, leaves and 8- to 10-foot unharvested strip of wheat, corn, or rice in the fields. These techniques provide valuable corridors that provide protected routes to water and a source of food for wildlife. Additionally, te ranch also manages their water ditches to support wildlife use. Rather than cleaning out the entire ditch, they clean only half of a ditch in a given year, leaving the other side of the ditch with naturalized, often native, vegetation as a natural corridor.

Mr. Fulster asked if Conaway Ranch has established any predator control measures.

Mr. Staker answered that there isn't much of a predator problem at the ranch.

Mr. Staker added that many roads are wider than they need to be. By allowing vegetation to mature along the road edges, valuable habitat corridors can develop. Besides being beneficial to wildlife, these corridors provide visual diversity.

Mr. Fulster commented that predators that eat eggs, such as racoons, skunks, coyote, and opossums, are devastating to birds. These predators use corridors to travel.

Mr. Staker agreed but added that studies on the ranch have shown that there are relatively low levels of predation. High human and mechanical activity may account for these lows levels.

Ms. DeLong stated that flooding in the Bypass may reduce the number of predators as well.

Mr. Staker stated that the ranch tries to keep from 5 to 130 acres of brood ponds in the summer, yet stressed that 1 to 7 acre ponds are usually very effective. Fields with poor soils can be managed as ponds on a rotational basis. Conaway Ranch uses winter ponding to decompose the rice straw, because the acreage that can be burned is limited. These ponds can provide good winter habitat.

Mr. Staker said that Conaway Ranch has tried various methods of getting rid of rice straw. He explained that they have tried punching it into the mud, in hopes that it would decompose. Instead, it formed a dense mat of rice straw that created a need for additional operations to prepare the fields for planting. They do not roll the straw like this anymore, unless they need to hold water. Discing seems to be a better way to deal with the straw by breaking it up further, allowing the straw to be more effectively available for anaerobic processes to take place. It breaks down the straw and does not create a mat. Discing, however, creates an undesirable terrain for hunters to traverse but seems to be the next best thing to flooding, which flushes the straw out of the Bypass. Flooding is obviously an effective way of disposing of the straw through flows, but due to seasonal conditions, there are never guarantees that such flow event will occur.

Mr. Ceppos asked if there are any issues regarding wildlife that has affected the way that Conaway Ranch deals with rice straw.

Mr. Staker said that they use stripper heads whenever possible to maximize rice production yields from each field. Vegetation will be left on seasonally fallow fields with poor soils to provide nesting habitat. These fields are sometimes fertilized with ammonium sulfate to increase the quality of the habitat. They often plant cover crops (e.g., bell beans, vetch), which are beneficial to habitat, that are incorporated into the soil the next year for a natural fertilizer. Burns are used to clean the nesting areas every few years.

Mr. Wylie asked if the birds would nest again once they were flushed.

Mr. Staker said they would if the timing was right. They use the flushing bars once a year, during the first cutting, usually in the first week of April (depending on weather conditions).

Mr. Ceppos asked why Conaway Ranch made the management change to habitat-friendly practices.

Mr. Staker replied that the partners of Conaway Ranch had a desire and commitment to provide good hunting on the ranch. They realized that if the ranch was managed for wildlife they could improve habitat.

Mr. Fulster commented that Mike Hall is a very effective manager.

Ms. Cherovsky agreed and added that Conaway Ranch has great tenants as well. The keys to their success has been in educating the tenants to see the value in habitat-friendly practices, and in providing monetary incentives to follow such practices.

Mr. Staker continued that Conaway Ranch's tenants are becoming increasingly receptive and have been developing their own, new ideas of ways to improve habitat-friendly practices.

Mr. Staker then said that water clearly has been the biggest expense in instituting these practices, but that it is unavoidable because of the restrictions on rice burning.

Mr. Ceppos asked how much of the Bypass is tenant farmed.

The Working Group generally responded that there are probably more tenants than owners farming the land.

Mr. Cheechov said that habitat-friendly practices have to be in place for a couple of years for their benefits to be seen.

Mr. Fulster said that farmers could be paid to put the land into habitat.

Mr. Cheechov responded that if the land was put into a Conservation Reserve Program (CRP) easement, they would be paid. However, he added, rental rates have been low, and the CRP puts limitations on the land (e.g., land cannot be grazed).

Ms. Cherovsky stated that the problem with a 10-year CRP contract is that the habitat becomes more established, making it harder to revert back to agriculture.

Mr. Cheechov stated that existing programs aren't realistic or beneficial to the landowners.

Ms. McKee inquired how Conaway Ranch makes these practices cost-effective for the tenants.

Mr. Staker replied that Conaway Ranch floods the tenant's fields to provide rice straw decomposition. If tenant's fields are not flooded, the rice straw is left on the fields. They also use practices that are most economical for the tenant.

Mr. McCormack said that there are some benefits (e.g., hunting habitat) to be gained from using habitat-friendly agricultural practices but stressed that there are economic costs.

Mr. Martinez brought up the issue of pest control. He explained that these habitat areas may provide overwintering locations for pests that are detrimental to crops. For example, habitat areas may include weeds that attract stink bugs, and if they are located near tomato fields, the crop may experience significant damage. Therefore, these weeds need to be controlled, because it is illegal to use the one chemical that can prevent the stink bug. He stated that weed control for crop protection would be easy on a large farm like Conaway Ranch, but is more difficult in areas where there are individual landowners on smaller plots.

Mr. Cheechov said that one possibility for addressing this issue could be to spray nonfood vegetation in habitat borders with chemicals instead of the crop. However, he stressed that it would take money to explore the feasibility of options like this one.

He added that no comprehensive studies have been undertaken to determine which weeds act as hosts to insects that are agricultural problems.

Mr. Martinez said that it would be useful to include potential pest control options, problems, concerns, and necessary compensation rates in the Management Strategy.

Conclusion

Mr. Ceppos said that the next agenda will include an initial draft of sections of the Management Strategy report. He added that the goal is for YBF and Jones & Stokes to develop preliminary text for the Working Group. The group may be broken down into subcommittees that will focus on particular sections of the document. He emphasized that the report will reflect the opinions, concerns, and interests of the landowners.

Mr. Ceppos continued that the hydrologists' water management field visits should be conducted by the next meeting. Their findings will be reported to the Working Group.

The next meeting was set for Thursday, June 29, 2000, from 10:30 a.m. until 1 p.m. at the DFG Yolo Wildlife Area Headquarters.

The meeting was adjourned.

YOLO BYPASS MANAGEMENT STRATEGY
STAKEHOLDERS WORKING GROUP MEETING NO. 8

DRAFT
MEETING MINUTES

MEETING DATE: June 29, 2000

LOCATION: California Department of Fish and Game
Yolo Wildlife Area Headquarters
45211 County Road 32B (Chiles Road)
Davis, CA 95616

IN ATTENDANCE: Bob Brown, Bull Sprig Outing Duck Club
Walt Cheechov, United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS)
Cheryl Chipman, Yolo Basin Foundation
Cliff DeTar, Little Hastings Tract
Chuck Dudley, Joe Heidrick Enterprises
Mike Egan, Yolo Flyway Farms
Dave Feliz, Department of Fish and Game (DFG)
Chris Fulster, Jr., Glide-In Ranch
Bob Gill, Gill Land & Farming
Dick Goodell, Glide-In Ranch
Richard Hadley, U.S. Fish & Wildlife Service
Bill Harrell, Department of Water Resources (DWR)
Mark Hennelly, California Waterfowl Association
Phil Hogan, USDA NRCS
Arline Jones, Lucky 5 Farms
Elmer Jones, Lucky 5 Farms
Ken Martin, Rising Wings
Rick Martinez, Martinez Farming Company
Duncan McCormack II, Yolo Ranch
Duncan McCormack III, Yolo Ranch
Gary S. Moody, Yolo Wings
Scott Morgan, W. T. Morgan Real Estate Company
David Morrison, Yolo County Planning Department
Dennis Murphy, Murphy Farms
Patricia Perkins, DFG
Ricardo Pineda, State Reclamation Board (Reclamation Board)

Larry Plumb, USDA Farm Service Agency (FSA)
Lynn L. Pryor, Yolo Links
Greg Schmid, Los Rios Farms
Ted Sommer, DWR
Ron Tadlock, Ron Tadlock Farms
Ray Thompson, Sky Rakers Club
Ed Towne, Bull Sprig Outing Duck Club
James C. Waller, Senator Outing
Will Wylie, H Pond Ranch
Robin Kulakow, Yolo Basin Foundation
Ted Beedy, Jones & Stokes
Dave Ceppos, Jones & Stokes
Susan Imboden, Jones & Stokes
Jennifer Stock, Jones & Stokes

NEXT MEETING: **The next Working Group meeting will be held on August 17, 2000, from 10:30 a.m. to 1 p.m. at the DFG Yolo Wildlife Area Headquarters. Lunch will be provided. Members of the Working Group are asked to call Jennifer Stock at 916/739-3086 to confirm attendance.**

ACTION ITEMS

1. Jones & Stokes will make copies of the USDA Farm Service Agency hand out entitled Conservation Reserve Enhancement Program and the Sacramento Valley Pilot Program (see attached).

2. Larry Plumb of the USDA FSA agreed to further clarify the inclusion of wildlife food plots in CREP. Jones & Stokes will report this information at the next Working Group meeting.

3. Jones & Stokes will contact the appropriate specialists to speak at the next meeting on the impacts of riparian habitat on duck club viability.

4. Jones & Stokes will contact representatives from the U.S. Army Corps of Engineers (Corps) and the Port of Sacramento to speak about the history and future of the west ship channel levee and associated implications for the Bypass.

DECISIONS MADE

1. The Working Group decided to form committees for chapter-specific review of the Management Strategy. These committees will be formed at the next meeting.

SUMMARY OF MEETING

Introduction

Mr. Ceppos began the meeting by welcoming the group. He reviewed the agenda and asked for changes or additions; there were none. He also asked for changes or additions to the May 12, 2000 meeting minutes; there were none. The May meeting minutes were then adopted as final.

Mr. Ceppos asked the attendees to introduce themselves and then introduced Larry Plumb of the USDA FSA, who provided an update on the Conservation Reserve Enhancement Program (CREP).

Conservation Reserve Enhancement Program

Mr. Plumb explained that the USDA FSA is considering approval of a pilot project to determine whether CREP will be a viable program. The project would provide for habitat enhancement on a total of 10,000 acres across nine counties (Yolo, Solano, Butte, Sutter, Yuba, Placer, Sacramento, Glenn, and Colusa), focusing primarily on upland habitat restoration on irrigated farmland. After final approval (targeted for September 1, 2000), landowners would be able to begin signing up for the program, which would receive 20% matching funds from the state.

Currently, the USDA is working on an applicant ranking system to rate suitability to participate in the project, which would provide for a rental rate of $160 per acre for rice ground, with all other land renting for $100 per acre. The term of the rental agreement would be 10 years, after which time landowners could do what they wanted with the land.

Mr. Pineda asked if grading would be done to establish habitat. He also asked who would be developing the land.

Mr. Plumb said that grading could be done, but that the FSA would like to find areas, such as marginal irrigated land, that could easily be converted. He stated that the NRCS would be the main resource for landowners for assistance with program application submissions. NRCS would also implement the actual restoration.

Mr. Thompson asked whether hunting would be allowed on land in the project and whether duck club land would be eligible.

Mr. Plumb responded that hunting would be permitted on refuge land, but that only duck club land with a "planting" history (planted for 2 of the last 5 years) would qualify for the program.

Mr. Martinez asked what would happen if the program holder died and the land was optioned to leave the program before the 10-year participation period had ended.

Mr. Plumb responded that, unless the new owner wanted to participate in the program, the deceased party's estate would most likely have to refund some portion of the money that had been paid as part of the easement.

Mr. Schmid asked whether limited grazing would be used to manage the grassland.

Mr. Plumb said that USDA Headquarters in Washington, D.C. is currently against the use of grazing to manage grasslands. However, the FSA is trying to convince policy makers that grazing, when not abused, may be an effective means of weed control.

Mr. Beedy asked whether specific types of upland habitat had been decided upon.

Mr. Plumb said that although the restoration would be primarily of upland habitat, the FSA is trying to pull together CREP and the Conservation Reserve Program (CRP) (which focuses mainly on wetland habitats) to benefit both habitat types.

Mr. Cheechov stated that a lot of Class 3 and 4 lands could support grassland and shallow ponds for pheasants and waterfowl game birds (in upland areas). Farmers could then sell rights for hunting or could use tailwater ponds to collect runoff.

Mr. Fulster suggested that land could be taken out of production temporarily and farmers could be given an incentive to plant crops to provide food for waterfowl.

Mr. Plumb responded that the philosophy of the program advocates creating habitat in agricultural areas where the land is marginal and therefore either is not normally used for production or has marginal productivity.

Mr. Fulster said that if landowners got $100 per acre of corn, they wouldn't have to disk and could rent the planted land out to a duck club.

Mr. DeTar asked why rice is considered a premium crop compared to other crops that could be planted.

Mr. Plumb responded that upland habitat containing rice crops provides optimal benefits for wildlife

Mr. Hogan asked if FSA has considered incorporating food plots into the program.

Mr. Cheechov suggested that applicants should be rated higher for poorer quality land in the program, so they would have a chance to keep this land in the program.

Mr. Fulster commented that Sacramento and Yolo Counties already have a lot of wetland habitat and more is being created. Creation of additional wetland habitat would significantly increase the amount of water and habitat in the Bypass. He questioned the impact such extensive habitat development would have on duck clubs and their land/capital investment worth. Also, he suggested the program should pay farmers for planting land, not fallowing it, because they are the most important land users in the Bypass, adding, "If you take farming away, what do you have"?

Mr. Ceppos reminded the group that CREP is mainly focused on upland habitat and brood ponds.

Mark Hennelly noted that the program looks great and that it should increase the number of species for hunting.

Mr. Ceppos asked Mr. Plumb where people should call for more information about the program.

Mr. Plumb replied that he would be the first to know about updates, so people should call him at (530) 792-5534.

Riparian Revegetation along the East Levee of the Tule Canal/Toe Drain

Mr. Ceppos introduced the next topic for discussion: expanded riparian vegetation along the Tule Canal/Toe Drain. He explained that at several Working Group meetings, the group has discussed different types of potential habitat enhancement in the Bypass and the impacts of these potential changes to existing economic and flow conveyance conditions. He further referenced previous discussions where the group has heard from different people about opportunities that exist in the Bypass for expansion of riparian habitat. He asked that the landowners again provide their thoughts and ideas on this new topic.

Mr. Ceppos asked whether levee stability could be improved by planting more trees that could potentially minimize wave fetch against the levee and also create expanded habitat.

Mr. Pineda explained that a unique aspect of the Bypass is that a portion of its flow conveyance capacity was minimized by the construction of the ship channel and its adjacent western levee. He explained that the state and federal flood control project (FCP) levee is actually the east levee of the ship channel. He stated that the Bypass needs to maintain its size and capacity for adequate flood control and addressed the question of what the impacts of planting trees near and adjacent to the levee would be. First, trees along the levee could break up wave energy that creates erosion. In addition, they would likely attract birds (including Swainson's hawks) looking for nesting areas. The presence of Swainson's hawks could potentially increase levee maintenance costs, in that maintenance work could be limited by the nesting activities of this special status species.

Mr. Ceppos asked what could be done to mitigate the impacts of vegetation planting and accommodate changes in flow capacity.

General discussion ensued regarding changes that could be made in other parts of the Bypass that could help to accommodate increased vegetation along the Tule Drain/Toe Canal. Specifically, ideas such as removal or reduction of the existing railroad embankments, removal of small transverse levees, and other such changes were discussed. Other possible mitigations for this impact would be reducing vegetative roughness in other parts of the Bypass and/or raising the levee. Mr. Pineda said that the group may be able to work with the Corps to create models that show changes in water surface that might occur from changes in vegetation.

Several Working Group members raised another potential impact of planting trees along the levee: increased siltation. They discussed the possibility that a decrease in water velocity caused by increased vegetation along the levee could cause more silt to deposit in and near the canal.

Mr. Jones asked whether the west levee of the ship channel could be removed, since it doesn't really protect anything.

Mrs. Ceppos responded that the levee is probably needed to avoid the need for dredging of the ship channel. He asked whether the group would like to request a Corps representative to answer questions regarding the history and maintenance of the levee and other related issues.

Mr. Jones noted that he doesn't think the Tule Canal/Toe Drain or the ship channel have been dredged and wondered how big of a problem sediment deposition really is in the south Bypass.

Mr. Pineda responded that the levee isn't needed for flood control, but may be needed for navigation. He also noted that moving the levee could cost up to 1 million dollars per mile. He believes that ship channel maintenance is managed by the Port of Sacramento.

Mr. Martinez added that if it is true that the west ship channel levee decreased the capacity of the Bypass, perhaps this decrease should have a bearing on the existing flowage easements held by the Reclamation Board. He further stated that he does not believe these easements were adjusted to address increased flow duration and depth after the west ship channel levee was built, even though flooding conditions were likely changes after the levee was constructed.

Mr. Martin suggested locating it more eastward and Mr. Pineda responded that moving the levee would be too costly and not practical for ship channel functions.

Mr. Waller questioned whether it is a good idea to plant trees if the group wants to see the levee washed out.

Mr. Ceppos noted that the previous discussion indicates an obvious interest by the Working Group in the history and future of the levee. He committed to trying to get a Corps representative to attend the next meeting to continue this discussion. He recommitted to the Working Group that any land use and habitat development changes would be upon the willingness and agreement of the landowners. He then introduced Ted Beedy, senior wildlife specialist with Jones & Stokes.

Mr. Beedy stated that the original concept plan for the Bypass included planting a lot of willows and cottonwoods but that DWR and the Corps rejected this plan because it would reduce capacity. The thinking of the planners was more along the lines of strips of vegetation rather than chunks of habitat area. He noted (as previously discussed) that another option would be replacing the railroad embankment with trestles to increase capacity because the embankment is the greatest point of constriction and potentially raises water elevation in the Bypass. He added that since the restriction occurs at the railroad embankment, planting trees along the south levee wouldn't potentially affect water flow and elevation. He noted that a riparian forest along the Tule Canal/Toe Drain (adjacent to the levee would greatly benefit wildlife, but that the Corps would need Safe Harbor agreements in case threatened and endangered species appeared in the new habitat.

Mr. Thompson asked whether anyone has the authority to alter the railroad embankment and Mr. Beedy responded that he didn't know.

Mr. Beedy discussed the issue of tree survival in flooded areas, noting recent research by Jones & Stokes that indicates that trees at Lake Isabella can survive as many as 4 years of deep flooding and 60-90 days of flooding with crown coverage. He added that, historically (according to late 1800s - early 1900s maps), the Bypass was tidally influenced and that a huge marsh extended from approximately Interstate 80 (I-80) to the Suisun Marsh.

Mr. Jones noted that in the 1940s, much of the area was covered by tules. He asked what the potential height of the new trees would be.

Mr. Ceppos responded that the 1995 Yolo Bypass Habitat Suitability Analysis (suitability analysis) could provide information about this, as it is probably the most complete document that shows what the area was like historically. He stated that he would get follow-up data on this.

Mr. Thompson asked if the data would be current and include railroad improvements.

Neither Mr. Ceppos nor Mr. Pineda knew the answer. Mr. Ceppos noted that there are currently three openings in the railroad embankment.

Mr. Tadlock stated that he thinks the railroad made recent revisions to the trestle, including removal of some embankment.

A general question was asked by members of the group regarding what the Bypass looked like before the levees were built.

Ms. Kulakow stated that she has a set of photos of the area south of Putah Creek taken for construction of the ship channel, but that they mainly show ranching lands.

Mr. Ceppos stated that flowage easements were put in place a long time ago and that the historic record is fairly limited with regard to what was there prior to the FCP construction. He again referenced the suitability analysis.

Mr. Beedy added that farmers probably created early levees by mounding earth, but these were not up to Corps standards. He asked if anyone present had serious concerns about planting trees near the levee.

Mr. Fulster responded that the riparian forest would likely create a predator problem, adding that trappers used to trap hawks in the area because they prey on ducklings.

Mr. Jones concurred, stating that many predators are already eating the ducklings.

Mr. Beedy noted that this predation is an existing condition.

Mr. Thompson stated that, since summer waters have been present, beavers and otters have been eating his crops. He doesn't want more water coming on his land.

Mr. Ceppos acknowledged that an increase in the presence of predators affecting landowners could result from establishing a riparian forest and asked that the discussion be continued at another time. He suggested that the Management Strategy state the both the problem and the assurances the landowners need with regard to this issue.

Mr. Thompson asked about the possible establishment of a formerly proposed bike path between the channel and the Toe Drain, noting that a bike path would increase the trespassing problem on private property and encourage vandalism. He also noted that the presence of people could affect nesting activities of waterfowl and game birds.

Mr. Fulster added that cyclists and hunters don't get along and that the bike path, if built, should be moved to another location.

Ms. Kulakow suggested that the group get someone from the Corps to come speak about the bike path, adding that she thinks the idea has fallen through.

Draft Management Strategy

Mr. Ceppos introduced Revision 1 of the Management Strategy, along with a handout listing issues raised thus far. He explained the sequence of preparation of a final document, noting the goal of having it completed by late fall. He further recommended that the group set up committees to review specific sections of the document and suggested that it would be possible for individual members to elect to sit on more than one review committee.

Mr. Martin asked whether there is a mechanism in place through which to get federal money to implement recommendations from the Management Strategy. He also suggested it include a section about future implementation of recommendations.

Mr. Ceppos added that an implementation program could be a good part of the document and that the group needs to think about including it.

Mr. Cheechov suggested that Working Group members consider all recommendations with the assumption that future funding will not be available. This, he believed, would be a more realistic approach and would set up more realistic expectations on the part of Working Group members regarding what will be done in the Bypass in the future.

Ms. Kulakow commented that a lot of agencies will be interested in reading the Yolo Bypass Management Strategy, which could help to start the process of acquiring additional funding.
Mr. Cheechov noted that the water bank program doesn't exist anymore and that he would like to be kept up to date on changes in programs and new programs, as they may not include landowner benefits provided by old programs.

Mr. Ceppos stated that he would ask Gus Yates and Luke Rutten of Jones & Stokes to attend the next meeting to provide an update on field investigations of the low-flow hydrology of Putah and Cache Creeks and the Ridge Cut Canal. He said they would also report on the field interviews they conducted with some of the Working Group members. He then introduced Richard Hadley of the U.S. Fish and Wildlife Service (USFWS) to provide an update on the proposed North Delta National Wildlife Refuge (refuge).

Proposed North Delta National Wildlife Refuge

Mr. Hadley has been the lead planner working on the Environmental Assessment for the proposed refuge for about a year. His intent is to speak with the Working Group to become better informed about their issues and to better integrate their needs into future ideas about the proposed refuge. According to Mr. Hadley, the refuge process has slowed down, and he and Mr. Tom Harvey of USFWS would like to participate as members of the Working Group in order to get advice about what USFWS can do better and what objections non-supporters of the refuge have. He further explained that USFWS wants to participate in the discussions as a stakeholder, in order to arrive at a landowner-based decision about whether the refuge is a good idea, noting that the project may not be feasible if the landowners don't want it.

He added that Mike Spears, manager of the California/Nevada Operations Office of USFWS, also is currently talking with the Yolo County supervisors about various issues. In addition, the Corps and the Reclamation Board are in preliminary discussions regarding what type of hydraulic modeling needs to occur in order to get the best information, which is necessary for determining the size, etc. of the proposed refuge.

Mr. Fulster responded that most of the people present at the meeting are conservationists, not environmentalists. He advised that USFWS shouldn't listen to the environmentalists, as they don't care what happens to the farmers.

Mr. Thompson commented that if USFWS had a more specific plan, the landowners would feel better. For example, the landowners want to know how much area would be flooded, how many hunters would be allowed, and where the access roads would be.

Mr. Hadley commented that some areas of discussion can have pretty quick agreement. He added that the plan is still fairly conceptual and that there is a need to acquire information from landowners in order to make a more specific plan.

Mr. Ceppos added that resolution of some issues may have negative and positive impacts, as in the case of issues that affect duck club owners and farmers in different ways.

Mr. Martinez inquired about USFWS's time line.

Mr. Hadley responded that they would like to continue working with the Working Group in order to get the job done correctly and said that there is not a strict time line.

Mr. Ceppos stated that funding for modeling may be available in the future from various sources and that modeling would be a topic of discussion at upcoming Working Group meetings. He advised that the group continue to develop the Management Strategy and bring in speakers to discuss different modeling options, so the Working Group can have input regarding what type of modeling should be done.

Mr. Fulster asked if USFWS would allow some hunting in the refuge. He stated that they should have to open 40% of the refuge for hunting.

Mr. Hadley responded that the 1997 Refuge Act requires USFWS to keep some refuge land open for hunting. He explained that if the land for the proposed refuge were purchased with duck stamp money, USFWS would be required to open 40% of it to hunting. Since the purchase wouldn't be made with duck stamp money, USFWS would make a determination of the appropriate level of land to be opened for hunting based on existing hunting allowances in other refuge areas. The study for this determination would involve the Working Group, Ducks Unlimited, and the California Waterfowl Association. Based on the study, the land opened for hunting could be more or less than 40%; but he anticipates it would be 40% or more of the total refuge area.

Mr. Fulster commented that USFWS can purchase land for less than market value and that their actions in other parts of California have resulted in lowering adjacent land values.

Mr. Hadley responded that USFWS would work with the landowners to ensure fair compensation and protection of land values.

Mr. Martinez asked who would pay for the additional time spent by Jones & Stokes on this project.

Mr. Ceppos responded that a lot of money from the Management Strategy budget has already been spent dealing with refuge issues. He said USFWS has already helped augment the budget to an extent, and added that it is hoped they will continue to do so.

Ms. Kulakow noted that the Yolo Basin Foundation (YBF) will work up a budget for continued Working Group efforts and will seek funding sources for this work. This has not yet been done.

Mr. Hadley said that USFWS would discuss how much more meeting time and budget will be needed.

Conclusion

Mr. Ceppos said that YBF and Jones & Stokes will continue their efforts on the Management Strategy report. He added that the Working Group will receive updated drafts throughout the document writing process. The group will be broken down into subcommittees to focus on particular sections of the document to ensure that the report reflects the opinions, concerns, and interests of the landowners.

He continued that the hydrologists' water management field visit findings will be reported to the Working Group and that he would try to get a Corp representative to discuss the west ship channel levee at the next meeting.

The next meeting was set for Thursday, August 17, 2000, from 10:30 a.m. to 1 p.m. at the DFG Yolo Wildlife Area Headquarters.

The meeting was adjourned.

YOLO BYPASS MANAGEMENT STRATEGY
STAKEHOLDERS WORKING GROUP MEETING NO. 9

DRAFT
MEETING MINUTES

MEETING DATE: August 17, 2000

LOCATION: California Department of Fish and Game
Yolo Wildlife Area Headquarters
45211 County Road 32B (Chiles Road)
Davis, CA 95616

IN ATTENDANCE: Lori Clamurro, Delta Protection Commission
John Currey, Mound Farms
Bob Dorian, H Pond Ranch
Mike Egan, Yolo Flyway Farms
Dave Feliz, Department of Fish and Game (DFG)
Terri Fong, Department of Water Resources (DWR)
Bob Gill, Gill Land & Farming
Mike Hall, Conaway Ranch
Mike Hardesty, Reclamation District 2068
Bill Harrell, DWR
Tom Harvey, U. S. Fish and Wildlife Service (USFWS)
Mark Hennelly, California Waterfowl Association (CWA)
Phil Hogan, U. S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS)
Elmer Jones, Lucky 5 Farms
Greg Kassis, Glide in Ranch
Bob Leonard, Yolo Basin Farms
Ken Martin, Rising Wings
Duncan McCormack II, Yolo Ranch
Duncan McCormack III, Yolo Ranch
John Mohr, Mound Farms
Selby Mohr, M.D., Mound Farms
David Morrison, Yolo County Planning Department
Dennis Murphy, Murphy Farms
Jack Palmer, H Pond Ranch
Steve Patek, City of West Sacramento
Patricia Perkins, DFG
Tom Scheeler, Port of Sacramento
Greg Schmid, Los Rios Farms

Mitch Sears, City of Davis
Ted Sommer, DWR
Ron Tadlock, Ron Tadlock Farms
Ray Thompson, Sky Rakers Club
Ed Towne, Bull Sprig Outing Duck Club
Will Wylie, H Pond Ranch
Gus Yates, Consulting Hydrologist
Robin Kulakow, Yolo Basin Foundation
Dave Ceppos, Jones & Stokes
Susan Imboden, Jones & Stokes
Mike Rushton, Jones & Stokes
Luke Rutten, Jones & Stokes
Jennifer Stock, Jones & Stokes

NEXT MEETING: The September 15, 2000 meeting has been POSTPONED. Chapter-specific meetings, regarding the Management Strategy, will be conducted between mid-September and mid-October, instead. A Working Group meeting focused on modeling issues will be held in mid-October.

ACTION ITEMS

1. Dave Ceppos will find out the specifics of what the City of Woodland Tule Canal/Toe Drain project intends to accomplish and the level and role of Jones & Stokes' involvement in this project.

DECISIONS MADE

1. Chapter-specific committees were established to review the Management Strategy document and are as follows:
   - Chapter 1: John Currey and Mike Hardesty
   - Chapter 2: Regina Cherovsky, Mike Egan, Mike Hardesty, Ken Martin, and Duncan McCormack III
   - Chapter 3: Chris Fulster, Mike Hardesty, Greg Kassis, Bob Leonard, and Ron Tadlock

Chapter 4:	Bob Dorian, Dave Feliz, Chris Fulster, Mike Hardesty, Dennis Murphy, and Ray Thompson. *Auxiliary Reviewers:* Walt Cheechov and/or Phil Hogan, USDA NRCS, and Mark Hennelly, CWA
Chapter 5:	Mike Hardesty
Chapter 6 & 7:	To be determined at a later date

2. The following handouts will be made available to Working Group members at their request:
   - # Yolo Bypass Management Strategy, Revision 2, (dated August 17, 2000),
   - # Goin' to See the Delta Ecosystem Restoration, published by USACE,
   - # Safe Harbor: Helping Landowners Help Endangered Species, published by Environmental Defense, and Yolo Bypass Management Strategy (Revision 2) and related Figures

   To obtain a copy of these documents, contact Jennifer Stock of Jones & Stokes at 916-739-3086.

SUMMARY OF MEETING

Introduction

Mr. Ceppos began the meeting by welcoming the group. He reviewed the agenda and asked for changes or additions; there were none. He also asked for changes or additions to the June 29, 2000 meeting minutes; there were none. The June meeting minutes were then adopted as final.

Mr. Ceppos asked the attendees to introduce themselves. He then told the Working Group about a project he is working on with the U.S. Army Corps of Engineers (USACE). Mr. Ceppos will be handling the public involvement portion of the project, which will look at options to raise the Folsom Dam to increase flood storage capacity. Through this project, additional studies will be conducted to determine the potential need for levee upgrades and expansion (widening) of the Sacramento Weir. There will be three public meetings, beginning in September, that will take place in Folsom, Woodland, and Sacramento. The governing agencies that are involved in this project are USACE, Sacramento Area Flood Control Agency (SAFCA), and the State of California (DWR and California State Reclamation Board). Mr. Ceppos would like to transfer the names of the Stakeholders to this project's database, so the members of the Working Group will be informed of the meetings. He asked Stakeholders who do not wish to have their names transferred to let him know.

Mr. Ceppos then introduced Gus Yates, hydrologist, and Luke Rutten, geomorphologist, from Jones & Stokes, to present the results of their field interviews and give a final report on hydrology for Putah and Cache Creeks and Knights Landing Ridge Cut.

Hydrologic Update

Mr. Rutten began by explaining that the purpose of the field interviews was to gather information that could be used to identify opportunities and constraints for habitat enhancement in the Bypass. Stakeholders in the Northern and Southern Bypass were interviewed about current cropping and land use patterns, effects of flooding, infrastructure, and the use of government hydrology data. He stated that if any of the information had been misrepresented, he welcomes clarification.

The main crops in the Northern Bypass, north of Interstate 80 (I-80), are rice, corn, tomatoes, melons, and safflower. In the Southern Bypass, south of I-80, rice does not produce well because of lower temperatures caused by the delta breezes. Wild rice can be grown in lower temperatures and does do well in the Southern Bypass, but it has a limited market. There has been a decline in tomato production in recent years as a result of repeated wet years and crop destruction by late spring flooding.

Soils in the Northern Bypass are high quality and very productive; however, the west side soils have a higher clay content that makes it less productive. These higher clay areas may be a result of historic flood patterns in the Bypass. There is no significant evidence that flooding has affected soil quality, except by leveling the land and from limited erosion around infrastructure elements in the landscape. In the Southern Bypass, soils to the north are more conducive to farming, especially in the vicinity of Putah Creek, where there are better quality soils and higher elevations of sediment deposited by the creek.

Irrigation systems in the Northern Bypass are fed by Willow Slough, the Knights Landing Ridge Cut, Cache Creek, Sacramento River, and Tule Canal. The Knights Landing Ridge Cut has a small check dam that aids in moving the water north and south. There is a small, fallow floodway (approximately 100 feet wide) that directs nuisance spring flood waters towards the Tule Canal. A pump in the east supplies water to the Tule Canal when the Knights Landing Ridge Cut water elevation is too low. Cache Creek water flows through the settling basin and exits a pipe in the southeast end of the basin. From there, a screw gate can divert water into the Conaway Canal or into the Woodland Settling Ponds, which drain into the Tule Canal. Water is also pumped from the Sacramento River to the Conaway Canal. In the bottom of the North Bypass, irrigation water is tailwater that comes from the Conaway Canal and Tule Canal/Toe Drain with minimal pumping. In the Toe Drain in the Southern Bypass, the Lisbon Weir lets tidal waters enter and leave the Bypass, while keeping levels high enough to pump for irrigation. Putah Creek has a dam and provides a limited amount of water for irrigation.

Flooding has similar effects in both the North and South Bypass. Damage to infrastructure (electrical boxes, pumps, pipes, and buildings), eroded roads, sedimentation of canals (mainly canals that are oriented to the east and west, which are perpendicular to flows), and littering of fields (trees, irrigation pipes, corn stalks) are all common effects of flooding in the Bypass.

Mr. Rutten continued his discussion by explaining that climate and hydrological data from the Department of Water Resources on the Knights Landing Ridge Cut, Clear Lake, and the Fremont Weir have been used to a limited extent to predict flooding. If annual rainfall totals are near or above average levels, flooding is expected. Even when flooding is likely to occur, some farmers feel they have to take a gamble, plant their fields, and hope the crops aren't damaged. In general, there is a feeling that upstream dams are now used more for water supply than for flood control, resulting in more late spring flooding.

Mr. Rutten said that duck club hunters in the Bypass hunt the land from October to January and grow rice or manage the land for waterfowl habitat in the summer. They try to control weed vegetation by mowing, disking, burning, and flooding, and through the limited use of pesticides. Some duck club land is in the USDA NRCS Water Bank and State DFG Presley Programs, which pay club operators to keep the land flooded after the hunting season to provide spring brooding habitat until approximately mid-July. The Tule Canal supplies water for these fields. With the exception of late spring flood damage to crops, duck club lands experience the same flood impacts as do farms.

Mr. Rutten opened the floor for comments and input. There were none. He concluded by thanking those interviewees who were present for their time and help. The write-up for these interviews in included in Revision 2 of the Management Strategy.

Mr. Yates' discussion focused on flood flows, sources, timing, and frequency for the six major inflows to the Bypass: Fremont Weir, Sacramento Weir, Cache Creek, Putah Creek, the Knights Landing Ridge Cut, and Willow Slough. Mr. Yates presented several large graphs showing time span in months and years (beginning in ~~1935~~ 1968) and flows (from the previous six inflow sources) in cubic feet per second (cfs). He told the Working Group that data covering more than 30 years exist for these sources; however, some records had significant gaps for which information had to be estimated.

He explained that the graphs show that Fremont Weir spills, which coincide with Sacramento Weir spills, contribute the largest inflow to the Bypass. ~~Sacramento Weir spills are dependant upon Fremont Weir spills.~~ Cache Creek and Knights Landing Ridge Cut (which picks up Coast Range runoff south of Stoney Creek) contribute most of the remaining flows into the Bypass. Cache Creek and the Knights Landing Ridge Cut (which picks up water south of Stoney Creek) contribute most of the flows into the Bypass. Spills over the Fremont Weir correlate with flows in the Knights Landing Ridge Cut and tributary flooding. ~~Even when no spilling occurs over the weirs~~ Major inflows from local tributaries generally coincide with (and are dwarfed by) spills over the Fremont and Sacramento Weirs. However, tributary inflows in dry years (without weir spills) can generate flow peaks of ~~flood events ranging from~~ 2,000-5,000cfs ~~have registered~~ at the I-5 and Lisbon Weir gages. ~~due to Cache Creek and Ridge Cut inflows.~~

Mr. Yates continued by saying that, in the absence of weir spills, 1,000-5,000 cfs flows are not likely to cause out-of-bank flooding along the Tule Canal or Toe Drain. ~~where Putah and Cache Creek tributaries flow into irrigation canals in the Bypass.~~ There is a chance, however, that some flooding could occur along ~~in~~ some of the canals that convey tributary inflows across the Bypass to

the Tule Canal/Toe Drain. Mr. Yates expressed to the Working Group that if any member has experienced this, he would like to know.

He stated that there have been no major changes to the Folsom Dam since the 1980s and that changes in the operation of Shasta and Oroville Dams do not seem to point to any change in timing, frequency, or duration in weir spills. The last 15 years have included six of the driest years and six of the wettest years in recorded California history. Respectively, this has resulted in associated extremely dry years and prolonged flood flows in the Bypass.

Mr. Thompson asked if deepening the Toe Drain would help shorten the flood period.

Mr. Yates answered that the Toe Drain is so small in comparison to the overall conveyance capacity ~~area~~ of the Bypass that deepening the channel would have little effect.

Ms. Kulakow asked if higher elevations of the Bypass levees cause floods to last longer.

Mr. Yates responded that he's not sure. The duration of peak flows is affected by factors upstream of the Bypass. ~~Improvements to levees increase water surface elevation, but he does not know the duration of the increased elevation.~~

Mr. Martin questioned whether more water enclosed in the Bypass would increase velocities. He also wondered how increased velocities would affect infrastructure.

Mr. Yates said that if peak flows and stages increase, there would be an increase in velocity. He did not think this increase would present a large problem. He asked if any of the Stakeholders had experienced problems with flood damage to infrastructure that he is not aware of.

Several Working Group members expressed that scouring occurs near the bank of the Toe Drain.

Mr. Yates was not aware of this, but said that modeling could help predict how these trouble spots would be affected.

Mr. Leonard commented that some areas have eroded so much that a tractor could be lost. He added that it seems that floods are now lasting for months, instead of a couple of weeks.

Mr. Morrison stated that most pumps at design depth get flooded. He then asked if there would be a breakout of specific river inflows shown in the models.

Mr. Yates answered that models calculate water surface elevation for a specified set of inflows. Inflows from the two weirs and the four west side tributaries would be represented individually in the flood hydraulics model, but the sources of water arriving at each of the weirs would not be itemized. *identified?*~~from contributing flows and that they take into account what happens upstream but not necessarily breaking the data out by source.~~

Mr. Ceppos said that the dams (Shasta, Oroville, and Folsom) were built with only 30 years of data and were considered to provide 100-year protection at the time of construction. The 1986 and 1997 floods, however, were very large, expanded the body of regional hydrologic data, and were determined to be 70-year events.

Mr. Ceppos said that Mr. Rutten will conduct a few more interviews and asked that any Stakeholder with an erosion problem area let either him or Mr. Rutten know. He then introduced Tom Scheeler, Director of Engineering of the Port of Sacramento to speak about the Port of Sacramento Ship Channel.

Ship Channel

Mr. Scheeler gave a brief history of the Ship Channel that began with the project's authorization by Congress in 1947. Construction by the USACE began in 1949 and was halted during the Korean War. Construction resumed in 1956 and the channel was completed and began operations in 1963. The State Flood Control Project (FCP) levee is located on the east side of the Ship Channel. The Bypass levee (separating the Bypass from the Ship Channel) is located on the west side of the channel, approximately 600-700 feet west of the FCP levee. In 1988, dredging began to deepen the channel by 5 feet. This work continues, to date.

Mr. Scheeler told the Working Group about USACE's proposed bike trail. The bike trail's purpose would be to bring people into anticipated and existing habitat restoration areas in the Delta. There was also a concept to ferry bikers back and forth across the Ship Channel somewhere downstream of the Port, but the safety issues and logistics of such a concept quickly squelched the idea. Many landowners in the Bypass and west of the Ship Channel are opposed to the bike trail, even though it would be on USACE's levees, because their private lands lie directly adjacent to the levees. There are still issues that need to be addressed regarding design constraints and landowner concerns. The project has not received funding from CALFED or from any other source and, USACE is still seeking some financial means to support the data.

Mr. Ceppos called the Working Group's attention to a marketing booklet that was published by USACE called Goin' to See: The Delta Ecosystem Restoration. He explained that the booklet gives a brief overview of the bike trail project and that it acts as a tool not only to promote public understanding and support, but to attract potential investors in the project.

Mr. Jones asked if it was the bicyclists who came up with the idea for the bike trail.

Mr. Scheeler answered that no it wasn't the bicyclists but USACE who proposed the bike trail project.

Mr. Ceppos added that it is part of USACE's mission to provide recreational opportunities in conjunction with its other responsibilities for flood control navigation and ecosystem restoration projects.

Mr. Scheeler said that the bike trail was originally envisioned by the USACE as a CALFED project, to provide public access to natural areas. Since they couldn't get funding from CALFED, the plan is to iron out some rough spots and continue searching for funding for the project.

Mr. Scheeler spoke about the Ship Channel levee, stating that, for the long-term, the Port of Sacramento is looking at areas in which to dispose of dredging material from the Ship Channel. The focus of this investigation is to see how the disposal site can potentially be used for habitat creation and/or mitigation banking.

Mr. Ceppos stated that several Working Group members have asked in the past if there is some way to divert water from the Sacramento River into the Ship Channel to create an alternate flow corridor.

Mr. Scheeler responded that, in theory, they could accomplish this diversion. However, there would be two adverse affects: One affect would be the creation of siltation and deposition in the channel. (There is currently no flow in the channel.) This would result in unknown deposition sites or sandbars that could potentially ground ships. Timely removal of the sandbars is unlikely, since it would require a contract (to do the work) to be secured through the governmental contractual bidding process. This process is too lengthy to fit with the scheme of Ship Channel operating schedules. The second adverse affect is that the flows themselves would hinder shipping operations. The skippers of the ships use the tides to time their arrivals and departures. Ships catch the tides at Rio Vista so that they are floated over sandbars, avoiding grounding. Added flows would disrupt this balance that presently exists in the channel.

Mr. Yates stated that using the Ship Channel as an alternative means of flood flow delivery might only happen once every 50 years and would therefore likely not be worth the cost.

Mr. Leonard asked what lands the Port of Sacramento owns.

Mr. Scheeler answered that they own the shipping channel. USACE constructed the channel and the levees and is still required to maintain them.

Mr. Yates asked if there were any hydrologic and hydraulic studies done on potential impacts to the Bypass before the Ship Channel was built.

Mr. Scheeler said that he didn't know of any studies, but could point Mr. Yates in the direction of finding out if any exist.

Mr. Sommer asked if there is a reason for the Bypass levee.

Mr. Scheeler responded that its purpose is to keep flood waters out of the Port and West Sacramento.

Mr. Jones asked Mr. McCormack if he recalled any flooding in West Sacramento before the channel was built.

Mr. McCormack answered that he didn't remember there being any flooding.

Mr. Scheeler recounted that in his 20 years with the Port, the 1986 flood water level was the highest he'd ever seen in the port. He said tidal influences were absorbed by the flood waters, and had there been another 6 inches of water, it would have overflowed the dock and flooded the storage warehouses located 63 feet away.

Mr. Leonard humored that if any changes are made to the Bypass, the port is in the same boat as the Stakeholders, it would seem.

Mr. Harvey asked what the tidal fluctuation ranges are at the docks.

Mr. Scheeler replied that there is a 5–7 foot fluctuation between tides, depending on the season.

Mr. Jones inquired about how often the Ship Channel has to be dredged.

Mr. Scheeler responded that the Port dredges on a 7–10 year cycle, but now that ships are getting bigger this may change. He ended his discussion with the interesting fact that the longest ship that has ever come into the port was 746 feet long.

Management Strategy

Mr. Ceppos began by stressing to all attendees that the document being handed out (Revision 2) is only a draft and should not be publically quoted or referenced.

He suggested that the Working Group should create chapter-specific subcommittees to review the draft document and provide their input. Future drafts will be sent out for the individuals' review and then the subcommittees will meet, independent of the entire Working Group, to discuss any concerns or suggestions.

Mr. Martin asked what the time frame is for completion of the document.

Mr. Ceppos answered that he would like to see the document finished by the end of November or the beginning of December. He then asked for volunteers to review specific chapters of the document. See Decisions Made (above) for a list of chapter reviewers.

City of Woodland Study

Mr. Scheeler inquired about a study that Jones & Stokes is involved in regarding the Tule Canal/Toe Drain. He said that, according to his understanding, the study is looking at the Tule Canal/Toe Drain as a conduit for the City of Woodland, to deliver water discharges from its wastewater treatment facility. He thinks Jones & Stokes employees have been working with graduate students to conduct interviews with recreational users of the Tule Canal/Toe Drain for that study.

Mr. Ceppos stated that he had just found out about this project, unfortunately. He said he would make it an Action Item to find out more about the project and relate it back to the Working Group.

Mr. Murphy added that he believed the purpose of the project is to find out what is going on in the Tule Canal/Toe Drain to determine how to treat water that is going to be discharged.

Conclusion

Mr. Hennelly informed the group that CWA is involved in a task force created by Congressman Doug Ose's office to address issues regarding the proposed North Delta National Wildlife Refuge. The first meeting was to be held Monday, August 21, and the contact person for this task force is Deputy District Director for Congressman Ose, Julie Lillywhite. Ms. Lillywhite can be reached at (530)669-3540.

Mr. Ceppos told the group this task force had recently been formed and indicated that his understanding was that the USFWS Refuge staff had not been asked to participate thus far. He asked Mr. Harvey if this was correct.

Mr. Harvey confirmed that he had not been informed of, or been invited to participate in, this meeting.

Mr. Ceppos said that one of the next steps for the Working Group is to increase everyone's understanding of modeling. He stated that future meetings will be focused on modeling issues. He continued that YBF and Jones & Stokes will continue their efforts on the Management Strategy report.

The meeting was adjourned.

****<u>REMINDER</u>****

If you would like a copy of the following handouts, contact Jennifer Stock of Jones & Stokes at 916-739-3086:

- Yolo Bypass Management Strategy, Revision 2, (dated August 17, 2000),
- Goin' to See: The Delta Ecosystem Restoration, published by USACE,
- Safe Harbor: Helping Landowners Help Endangered Species", published by Environmental Defense, and
- Yolo Bypass Management Strategy (Revision 2) and related Figures

YOLO BYPASS MANAGEMENT STRATEGY
STAKEHOLDERS WORKING GROUP MEETING NO. 10

DRAFT
MEETING MINUTES

MEETING DATE: October 12, 2000

LOCATION: California Department of Fish and Game
Yolo Wildlife Area Headquarters
45211 County Road 32B (Chiles Road)
Davis, CA 95616

IN ATTENDANCE: Margit Aramburu, Delta Protection Commission
Steve Bradley, State of California Recreation Board (Reclamation Board)
Walt Cheechov, U.S. Department of Agriculture National Resources Conservation Service (NRCS)
Regina Cherovsky, Conaway Ranch
John S. Currey, Vaughn Ranch and Mound Farms
Bob Dorian, H Pond Ranch
Chuck Dudley, Heidrick Farms
Mike Egan, Yolo Flyway
Dave Feliz, California Department of Fish and Game
Chris Fulster, Jr., Glide-In Ranch
Richard Hadley, U.S. Fish and Wildlife Service
Dennis Kilkenny, Dawson's Duck Club
Robin Kulakow, Yolo Basin Foundation
Wayne Little, Dawson's Duck Club
Julie MacDonald, landowner
Ken Martin
Rick Martinez, Martinez Bros. Farms
Duncan McCormack II, Yolo Ranch
Duncan McCormack III, Yolo Ranch
John Mohr, Mound Farms
Selby Mohr, Mound Farms
Scott Morgan, William Morgan Realty
Dennis Murphy
Loren Murray, Northwest Hydraulics Consultants
Sally Negroni, NRCS
Caroline Quinn, City of West Sacramento
Mitch Sears, City of Davis
Greg Schmidt, Los Rios Farms

Meg Stallard, Yolo Basin Foundation Board
Ron Tadlock, Tadlock Farm
Ed Towne, Bull Sprig Outing
Jim Waller, Senator Duck Club
Will Wylie, H Pond Ranch
Dave Ceppos, Jones & Stokes
Kyle Keer, Jones & Stokes
Susan Imboden, Jones & Stokes
Gus Yates, Consulting Hydrologist

NEXT MEETING: The next meeting of the Working Group will be held November 16, 2000, at 10:30 a.m. at the Yolo Wildlife Area Headquarters. The meeting will focus exclusively on the draft Management Strategy document.

ACTION ITEMS

1. Contact Butch Hogkins of the Sacramento Area Flood Control Agency (SAFCA) and request that he speak at a future meeting regarding proposed changes to the Sacramento Weir and Yolo Bypass levees.

2. Provide Ms. McDonald and all Working Group members with the California Water Code citation regarding levee heights and freeboard requirements (see below).

   California Code of Regulations, Title 23 Water Code, Division 1, Chapter 1, Article 8, Section 120.

SUMMARY OF MEETING

Introduction

Mr. Ceppos called the meeting to order and reminded the group that the purpose of the stakeholder meetings is to continue work on the development of a stakeholder-based vision of the future of the Bypass and to provide a forum for education on a range of issues pertaining to the Bypass. The focus of this meeting was to learn about hydraulic modeling issues in the Bypass. These issues are of great importance in the management of the state and federal Flood Control Project (FCP) and the long-range economics and land use options in the Bypass.

Mr. Ceppos asked for changes to the minutes of the last meeting; there were none. The minutes were accepted into the project administrative record as final. He also announced that educational brochures on Safe Harbor Agreement issues were procured for the Working Group from the National Cattlemen's Association and Environmental Defense Inc., and that the brochures were available at the meeting or from Jones & Stokes and the Yolo Basin Foundation.

Modeling Workshop

The first speaker was Gus Yates, who is working with Jones & Stokes to assess hydrologic conditions in the Bypass. Mr. Yates stated that he would introduce the concepts of hydraulics (such as simulation of water flow, the role of levees, etc.) and some basic terminology that would allow all present to participate in conversations on this topic and ask informed questions in the future.

Mr. Yates presented a map (Attachment A) of the Sacramento Valley Flood Control System to show how the Yolo Bypass fits into that system. Attachment A shows the network of rivers and existing flood bypasses in the northern California watershed. The flood bypasses are separate from the rivers but mimic historic natural flood basins within the Sacramento Valley. Attachment B shows the approximate extent of the historic drainage basins. Mr. Yates pointed out that, to understand the relationship of the Yolo Bypass to the downstream portion of the Sacramento River FCP, one must compare the conveyance capacity of the Bypass with that of the Sacramento River downstream of the Fremont Weir. The river conveys 110,000 cubic feet per second (cfs), whereas the Basin conveys 500,000 cfs.

Mr. Schmidt asked whether information is available regarding changes over time of these carrying capacities.

Mr. Yates stated that there hasn't been much change over the last 20 years. But, because of mining deposits in the Feather and Yuba Rivers, there are still materials moving through the lower Sacramento River system.

Mr. Schmidt inquired whether dredging the Sacramento River has increased its capacity.

Mr. Yates replied that most of the dredging has been done in the Port of Sacramento Ship Channel.

Mr. Fulster added that some entity used to be responsible for dredging sediment out of the Sacramento River all the way up to the city of Sacramento. He further stated that he has heard from his customers that sloughs and channels in the north Delta are getting more and more sediment deposited in them, minimizing the water-carrying capacity of these features.

Mr. Ceppos pointed out that this issue has been raised several times by members of the Working Group, and that Chapter 3 (Assurances Section) of the Management Strategy identifies this issue.

Ms. MacDonald stated that the question about the capacity of the Sacramento River is significant because the capacity is presently smaller than originally designed.

Mr. Yates stated that it is not necessarily that the capacity of the Sacramento River has been greatly reduced but rather that the flood-control features along the river have been recalculated, and it was determined that they provide less protection than was originally believed. He further explained that this is largely because there was very little hydrologic data on storm event size and subsequent flows when the FCP was built. In recent years, the region has had two very large storm events (1986 and 1997) that have required recalculation of the level of flood protection provided by the Sacramento River FCP.

Ms. Aramburu asked if the group can get a report on the U.S. Army Corps of Engineers (Corps) Sacramento-San Joaquin Rivers Comprehensive Study (Comprehensive Study) . She also pointed out that the Corps is not looking at the Delta as a whole, but the agency is including the Bypass in its study.

Mr. Ceppos stated that the Comprehensive Study has been discussed at previous meetings; the Corps has not completed any of its planning tasks yet, and the large-scale modeling for the study has been completed just recently.

Mr. Murray added that one reason the Corps is doing the study is because it believes the actual design capacity of the FCP may not coincide with the original FCP design. The capacity of the system has changed and this change needs to be quantified to resolve this issue.

A general question was asked as to whether the flow rates shown on Attachment A represent a 100-year event.

Mr. Yates stated that the map shows the design capacity, which was based on a 100-year flood event. The 1986–1987 flood brought the Bypass above design capacity. That even was a 70-year flood event. He noted that this was the condition he spoke of when answering Ms. MacDonald's previous question.

Mr. Yates explained that the two flood-control weirs in the Bypass function in different ways. The Fremont Weir is a concrete grade control structure that is not operated in any way. When water reaches a certain height in the Sacramento River, the water spills over the weir. The Sacramento Weir operates differently; it has large gates that can be opened, but there is no adjustment. Once the gates are open, they stay open until water surface elevations in the river drop.

Ms. Aramburu asked for the elevation of the Fremont Weir; Mr. Yates responded that it is 33.5 feet.

Mr. Yates continued his presentation by explaining that the terms "hydraulics" and "hydrology" mean different things. "Hydrology" refers to the amount of flow from rainfall and runoff (in cfs). "Hydraulics" refers to the depth and speed of flow. There is a hydraulic difference in wet and dry seasons. Mr. Yates presented Attachment C and explained that the Lisbon Gage (just

below the Putah Creek outflow at the "dogleg" of the Bypass, south of I-80) hourly gage data show a little creek during the dry season largely affected by daily tidal fluctuations (Toe Drain) that flows into the Delta. In the wet season, the whole Bypass becomes a river. As storm events occur, all tidal influences get pushed downstream. These situations require different hydraulic modeling tools to assess conditions.

Ms. Aramburu asked what volume of floodflows is required to dampen tidal influence.

Mr. Yates replied that Attachment C depicts stages, not volume or cfs. However, as the Toe Drain fills, tidal effects to stage height within the Toe Drain seem to be eliminated.

Mr. Towne indicated that the water stopped flowing once in the Bypass when the rivers were at flood stage and a high tide occurred. This effect occurred as far up as the Lisbon Gage. Several participants then asked how well the Bypass has performed at flood stage.

Mr. Yates agreed that high storms and lunar tides can create this effect. With regard to the question of how well the Bypass has done, he noted that during the last two major floods (1986 and 1997), it functioned at or above it original design capacity. Attachment D shows a longitudinal profile of the levee crown and water surface profiles representing the 1986 and 1997 floods and how the water surface encroached into the design freeboard for the Bypass.

Ms. Aramburu asked how many feet above design freeboard the water encroached.

Mr. Yates responded that water surfaces encroached into freeboard by 2–3 feet.

Mr. Ceppos pointed out that the California State Code of Regulations (Title 23 for water issues) states that, in flood bypasses and upstream and downstream of bridges, there must be 6 feet of freeboard.

Ms. Aramburu commented that this isn't the case for agricultural levees.

Mr. Yates went on to explain that the levee built at the ship channel (navigational levee, east levee of the Bypass, south of I-80) is not a federal flood-control levee and was not built to these standards. However, this levee is actually higher than the original FCP levee located east of the ship channel and south of the Port of Sacramento.

Mr. Hadley asked if the high-water mark shown on Attachment D was taken on the FCP levee or along the ship channel levee. He further asked if there was enough freeboard along the levee shown. Lastly, he asked what the date range of the high-water marks was and if anyone has reviewed other historical data to investigate changes.

Mr. Yates stated that he is fairly certain that the longitudinal levee profile is based on the original FCP levee design and that the 1986 and 1997 high-water marks were taken from the Bypass side of the west ship channel levee but were charted on information from the original FCP levee

design. He further stated that it is estimated that 10–15% of the conveyance capacity at the south end of the Bypass was removed by the construction of the navigational ship channel levee.

Mr. Yates continued his presentation about hydraulic models. He presented Attachment E and explained that models represent how water moves and relate that movement to depth, velocity, friction, and the overall geometry of the feature being studied. Geometry is often a measure of a cross-sectional area of a feature. In the Bypass, cross-sectional areas are defined by the width and depth of the Bypass. During floodflows in the Bypass, decreased cross-sectional areas can result in increased flow depth If there are objects within a channel causing resistance, increased flow resistance will also result in increased flow depth. Resistance factors are referred to as "roughness". In the Bypass, resistance factors can include trees, shrubs, agricultural crops, small internal levees, railroad and highway embankments, and other features that can be resistant to flows. Hydraulic models show the relationships of these resistance factors to flows. Some commonly used models are mathematical models. Mr. Yates pointed out that, by contrast, the San Francisco Bay Model operated by the Corps near Sausalito, California, is an example of a physical model in which a very small replica of the Bay has been built to physically simulate flow conditions in San Francisco Bay.

A mathematical model contains the factors shown in Attachment E. Mathematical models use channel geometry to describe surface water topography. Flow is assumed, and roughness is judged based on conditions and known/investigated parameters. A historical event with known flow data is chosen for a simulation that is used to calibrate the model. Modelers use the known information from the historical event to see if the model will match the exact water surface profile from that event. If the model doesn't replicate the historic data, roughness coefficients and other variables may be adjusted to ensure a match. This process is called calibration. The calibrated model provides a tool to simulate "what ifs", such as planting a riparian forest or moving a levee.

Mr. Yates presented examples of roughness coefficient values (Attachment F) assigned to different types of vegetation. He pointed out the subjectivity in some of the values. Some of the factors requiring subjective judgment are open water, tule marsh, grassland, seasonal wetland, riparian vegetation, and dense riparian vegetation. A modeler must use judgment with all of these.

Ms. MacDonald asked whether a higher roughness coefficient means more resistance to flow.

Mr. Yates stated that it does; however, the depth of flow also plays an important role in measuring the resistance. For example, a 4-foot shrub barely flooded by water provides a lot more resistance to that water than if that same shrub is flooded under 20 feet of water.

Mr. Schmidt asked whether tidal changes are factored into the coefficient.

Mr. Yates said that it depends on the question you're trying to answer; it is common to assume a worst-case scenario, such as high lunar tide/high flood stage conditions, when developing a model.

Mr. Ceppos pointed out that in preparing for this presentation, the consultant/presentation team was aware of the inherent flaws in modeling; the team considered whether to point them out.

The group of presenters and project management staff unanimously agreed that it is important for stakeholders to know that there are inherent inconsistencies and subjectivity involved in creating models.

Mr. Egan stated that, when the FCP was designed, the Bypass was covered by tule marsh. Mr. Egan wondered if this fact is taken into consideration in present-day modeling and assessment of Bypass capacity.

Mr. Yates was uncertain whether such conditions have been considered.

Mr. Ceppos stated that the project team and other teams that have worked previously on Bypass issues have never been able to find the historic engineering records regarding the roughness coefficients used to design the Bypass.

Several participants pointed out that changes, such as narrowing the Bypass could cause changes in flood capacity. They further wondered whether the original flood-control easements contracted by the state were affected by these changes.

Mr. Ceppos answered that Jones & Stokes is in the process of doing easement research. The results of this research will be discussed at a later date and will be included in the Management Strategy document.

Mr. Yates continued his discussion of modeling: when constructing a longitudinal profile of the Bypass, if one increases the roughness coefficient, the water depth will increase.

Ms. Aramburu asked if upstream elevation will increase but downstream elevation won't.

Mr. Yates answered that most resistance (and subsequent increased water surface elevations) does happen upstream; however, sometimes downstream effects are seen also.

Next, Mr. Murray, hydraulic engineer with Northwest Hydraulic Consultants, provided information about the different types of hydraulic models.

Mr. Murray began with a discussion of the different kind of hydraulic models used to model floodflow. He noted that the decision of which type to use is based on several factors (Attachment G). Modelers look at existing conditions and ask how deep the water will get if a change, such as planting trees, is made. The degree of analysis is also defined by the cost.

Mr. Murray introduced three types of model analyses: steady versus unsteady, 1- versus 2-dimensional, and high- versus low-flow conditions (Attachments H and I).

A steady-flow model provides a snapshot of a water surface profile, velocity, and depth, and is independent of time. An example of this type of model is the river shown in Attachment J. An unsteady-flow model reflects change over time, such as tidal change and inflows from multiple tributaries (Attachment K). This type of model reflects water surface, depth, velocity, water storage

capacity, and changes over time. Modelers ask: how do the characteristics of water flow change over time at discreet locations? The time relationship is key to this type of model.

A 1-dimensional model indicates flows that are parallel to the main channel direction, e.g., the north-to-south Bypass flow (Attachment L). A 2-dimensional model provides much more specificity. For example, it reflects changing flow patterns (e.g., flow splits around obstacles such as tree plantings). A 2-dimensional model also provides information on turbulence at the confluence of two flows and indicates how much flow goes in each direction around obstacles (Attachment M). The names of some of the different 1- and 2-dimensional models used are shown on Attachment N. A 3-dimensional model is extremely complex and unstable.

A high-flow model addresses flood-related issues of interest to everyone (Attachment O), such as the integrity and capacity of a flood conveyance facility at flood stage. A low-flow model is localized for a specific issue, such as restoration or a specific land use change.

Mr. Feliz asked for an example of when a low-flow model would be used.

Mr. Murray responded that, when building a road or channel or changing crop types, rerouted flows could impact a neighbor's property. He added that separate modeling tools are constructed depending on conditions.

Mr. Martinez gave an example of a model prepared for the Dixon Resource Conservation District. He indicated that conditions that seemed acceptable during high flows actually seemed more questionable when low-flow conditions were assessed.

Mr. Ceppos stated that the Working Group should have the ability to assess site-specific hydraulic impacts because questions being addressed by the Corps' Comprehensive Study are capturing multiwatershed issues. These macrolevel analyses are being modeled using a 1-dimensional model on 1,000-foot cross sections throughout the entire Sacramento and San Joaquin River valleys (excluding the Delta, as pointed out by Ms. Aramburu). This work by the Corps does not assess microscale conditions that could occur if individual landowners wanted to change their land uses. Mr. Ceppos said that the request to conduct this type of assessment was a key component of the CALFED proposal that the Working Group prepared last Spring.

Mr. Murray added that the cumulative results of many land use changes may have an effect, whereas a localized change would not. The flood-control system is always changing. Conditions (e.g., flow, geometry, land use) need to be reassessed, as do the modeling parameters. Part of a modeling scheme is understanding how the model is being used and how valid its information will be in years to come.

A participant asked what the procedure is for obtaining accurate cross sections.

Mr. Ceppos answered that the Corps conducted aerial studies in 1998 to develop digital terrain data that was used to create topographic maps at 1- to 2-foot intervals throughout much of the Sacramento and San Joaquin River valleys (excluding the Delta). This data was then supported

by bathymetric data on the geometry of the rivers. Recently, the Foundation has learned that, in the Bypass, the Corps did not create full topographic data, but rather only developed topographic information at the location of the cross sections (approximately every 1,000 feet down the Bypass). Mr. Ceppos noted that the Working Group needs alternate means to obtain the topographic data so that the Working Group can make Bypass-level assessments of impacts in the future.

Mr. Murray agreed that the 1,000-foot cross sections approach may not provide an accurate representation of land use changes between cross sections (Attachment P).

Ms. MacDonald asked whether information missed between cross sections would be picked up through calibration for the roughness coefficient.

Mr. Murray responded that, to some degree, such conditions might be observed. It boils down to what question you're asking. He stated that people relying on modeling results have to understand the limitations of the tools being used. A 2-dimensional model calculates information within each box of a grid (Attachments Q and R). The grid is created by the modeler to overlap the area being modeled. Mr. Murray explained that, when constructing a 2-dimensional model, the grid needs to be more detailed in areas that are suspected to have greater flow velocity, direction, and depth changes (e.g., Putah Creek outflow, the Sacramento Weir bypass). He added that 2-dimensional models are always unsteady; some may run as steady, but limitations on results begin to occur.

A participant asked what model was used in assessing the impacts of the Vic Fazio Yolo Basin Wildlife Area.

Mr. Murray responded that the RMA-2, 2-dimensional model was used (Attachments Q and R).

Several Working Group members began to ask related questions, such as whether models are run using known conditions first.

Mr. Murray responded that they are, but that many variables might influence the results; exactly what those variables are might not be known.

Presenting Attachments S and T, Mr. Murray explained that most 2-dimensional models are based on a mesh grid. He described how the model results show how individual cells change with respect to flow, velocity, etc. The vector arrows shown on Attachments S and T reflect changes in direction and velocity. The bigger the vector arrow, the higher the velocity.

A participant asked who sets the size of the mesh grid.

Mr. Murray responded that grid size and variability are set by the modeler; in the case of the RMA-2 model for the Bypass, the grid was created by hydrologists at the Corps many years ago. The model computes a lot of information for each cell in the grid. It also requires a lot of information. Detail is needed in some areas but not required in others. A continuity-type equation

is used. Two-dimensional models require substantially more information than 1-dimensional models; a lack of detail may mean poor output.

Mr. Ceppos noted that the 2-dimensional model for the Bypass has many idiosyncracies in the present grid form. The idiosyncracies provide complications for the model, so it crashes often when provided with too much physical data input. The Corps has indicated that it doesn't have the funding necessary to modify the tool. Mr. Ceppos further stated that he and Ms. Kulakow have been investigating to see who might have funding available to update the RMA-2 model in the near future. The Corps has indicated that it would be amenable to someone else doing such revision work on the model as long as the Corps remains the repository of all the data.

Ms. Kulakow asked whether a 1-dimensional model is less expensive than the 2-dimensional model.

Mr. Murray responded that it is not necessarily less expensive; the cost depends on the level of detail sought. He further explained that "what if" games may be played by changing channel geometry to assess how land use changes might affect localized hydrology.

Mr. Fulster asked if Mr. Murray was suggesting that there should be no tules in the Bypass.

Mr. Murray responded that he was suggesting that land use changes can affect neighbors and that modeling can indicate what those effects might be.

Mr. Martinez asked whether the models are verified by physical examination and whether the Corps has any accountability with regard to its flood-control models.

Mr. Murray said that he didn't know what the Corps' legal obligation is, but that when it turns the model over to a local organization, the Corps walks away free and clear. Ideally, modeling should be done at both high and low flow. Many decisions are made on anecdotal information from landowners, which is figured into the model. Modelers definitely take advantage of this type of information. Changes may be made to adjust the model; if a significant event occurs, modelers will go out and survey again specifically to refine the model.

Ms. MacDonald noted that big flood events were used by the Corps for modeling in the second half of the century and asked if there is a window of non-event. Big flood events occurred in 1955, 1964, 1986, 1992, 1995, and 1997.

Mr. Murray responded that many flood-control facilities were built in the middle of the 20th century. He gave an example: when Folsom Dam was built, 50 years of records were available. Now we have 50 more years of records, so the statistical representations are changing.

Ms. MacDonald pointed out that capacity changes seem to be a result of land use changes also.

A participant asked if sedimentation behind the dams is being accounted for.

Mr. Murray commented that most design studies for the construction of large dams account for the accumulation of sediment, although accumulation may not have been assessed correctly.

Mr. Ceppos announced that more information on modeling will be provided in the future and closed the discussion on modeling.

Management Strategy Update

Mr. Ceppos raised the topic of the Management Strategy document process, noting that it is a little behind schedule. The subcommittee sections are going to be sent out for independent review in the coming weeks. He stated that the subcommittees are set up so that not all Working Group members have to read the entire document; however, they are encouraged to do so if they have the time. Chapter 2 of the document will include easement information (as previously discussed). Mr. Ceppos explained that the research on easements has not been an exhaustive study, but was based on samples from various kinds of easements. He explained that Jones & Stokes staff is looking at how the language changed over time and what the different restrictions are in various geographic locations in the Bypass. Finding this information is a difficult process because it is located in different county and state offices. Instructions will be included in the Management Strategy document to help Working Group members gather more specific information on easement language for their specific properties.

Mr. Ceppos added that none of the easement language that has been examined to date prohibits the state from moving water across the Bypass at any time of the year, and that the state hold several different types of easements regarding flowage, site clearing, mineral removal, and others.

Mr. Fulster asked whether the easements grant a landowner the right to restrict access to his or her property.

Mr. Ceppos responded that the easements allow for only federal, state, or state-contracted personnel to access easement lands and not the general public.

Ms. MacDonald asked who will use the Management Strategy and whether it will dictate what a property owner can and cannot do with his or her property.

Mr. Ceppos explained that the Management Strategy process arose in response to CALFED's intended Ecological Restoration Project Program. That program's document identified goals and visions for the restoration of lands, including Bypass lands. However, the document did not take into account that the lands in the Bypass largely are privately owned and the effects its specified restoration projects or "programmatic actions" could have on those private lands, landowners, and tenants. Mr. Ceppos explained that this issue concerned the Yolo Basin Foundation and that the Foundation sought CALFED funding to provide local stakeholders a voice in identifying a vision for the Bypass.

Generally, the Management Strategy is intended to be a tool to integrate collective Bypass interests into the CALFED decision-making process. Specifically, the Management Strategy will address each CALFED programmatic action regarding the local, real-world effects of such an action on landowners. In other words, the Strategy will let CALFED know, from the voice of local landowners, what actions are feasible and what assurances are needed by landowners to safeguard their interests in the Bypass.

Ms. MacDonald asked if the Management Strategy will be a consensus document.

Mr. Ceppos responded that it would.

Ms. Aramburu noted that there may be other materials that describe the thought processes behind the writing of the easements. She thinks the Working Group should be looking for the original intent of the easements; when they were written, the intention probably wasn't to put people out of business.

Mr. Ceppos stated that he'd like Ms. Aramburu to let him know if she is aware of any documents that discuss the original intent of the easements.

Mr. Ceppos expressed an understanding that the conditions present when these easements were adopted were different than they are now. One of the fundamental questions that has been posed by numerous stakeholders is whether these easements are fair under present conditions.

Mr. Martin asked if the group's responses to the chapters of the Management Strategy could be emailed.

Mr. Ceppos said that they could.

Farming in the Bypass

Mr. Martinez introduced the issue of the present state of farming in the Bypass. He began by stating that farm prices have taken a downward spiral. Hunts and other canning/processing plants have closed down. The sugar beet market has dried up for Northern California. Cargill had a grain shipping facility port, but now rice is being shipped by truck from the Port of Sacramento to Stockton. Also, the Bypass isn't the best place to farm. He asked the group if they feel that this is a long-term situation.

Mr. Fulster said that there is still a lot of money generated from hunting. Farmland can be converted to hunting land.

Mr. Martinez added that the NRCS has proposed various farming incentives for which the agency is trying to obtain funds.

Mr. Cheechov asked if modeling can be used to predict how many times individual areas will be affected by flooding.

Mr. Yates responded that it could, but not easily. Two issues affect this analysis: when water spills over weirs, everything floods. When the creeks flow, it's not such a major event. A combination of tools may be used to assess these situations.

Mr. Martinez stated that he attended the recent Corps/Department of Water Resources/SAFCA public workshop regarding the American River emergency releases from Folsom Dam. One proposal is to raise Bypass levees. Mr. Martinez asked the Corps engineers how high the Bypass levees will have to be raised; they told him they would be raised 6 inches. Mr. Martinez stated that more flooding in the lower-lying areas could occur and reiterated that whatever is done at Folsom Dam will affect landowners in the Bypass.

Mr. Martin stated that the meetings regarding the Folsom project were too close together for some people, so if you were out of town you missed both meetings.

A participant commented that SAFCA representatives should know what impacts occur in the Bypass. At the last SAFCA meeting he attended, the representative did not have any information on those impacts.

An unknown attendee stated that that was because the Sacramento Weir is SAFCA's boundary.

Mr. Thompson suggested that maybe the Working Group should hire a water attorney.

Mr. Martinez responded that he talked to one who said that determining potential flooding impacts in the Bypass would be difficult. Someone would have to determine what a substantial impact is.

Ms. MacDonald suggested it would be worthwhile to ask an attorney what the Working Group's recourse is and whether an environmental study should be done.

Mr. Ceppos pointed out that the project being started by the Corps/Department of Water Resources/SAFCA is that requested study; there will be several opportunities in the future for stakeholders to comment on potential impacts.

Mrs. MacDonald asked what the legal rights for landowners are regarding changing land uses and endangered species. Ms. MacDonald also asked how much the agencies would have to pay for additional easements.

Mr. Ceppos replied that it is difficult for Jones & Stokes to ask a lawyer to come to the Working Group's Management Strategy meetings because there is no lawyer under contract to the project. If the stakeholders wish to speak with an attorney, they should hire one because this type of service has not been contracted.

Mr. Thompson said he thinks Jones & Stokes should hire an attorney to come talk to the group.

Mr. Ceppos replied that there are too many stakeholders with too many different scenarios requiring representation; he isn't sure that such a suggestion is feasible. He stated that perhaps the project management team could identify a state attorney to speak to the group but he asked the group whether they would trust a state attorney to advise them on this issue.

Ms. Aramburu said that someone should ask an attorney about prior litigation.

Ms. MacDonald suggested that two or three attorneys should attend pro bono because it would be a good investment for them.

Mr. Cheechov stated that it would be a waste of time to have attorneys speak to the group because the attorneys couldn't advise the stakeholders on a case-by-case basis.

Mr. Mohr assured the group that Butch Hogkins of SAFCA will be a good person to explain the matter; Mr. Mohr suggested the group have Mr. Hogkins come, then have a panel of attorneys following Mr. Hodgkins' visit.

Mr. Ceppos said that he and Ms. Kulakow will arrange these visits and will have someone give an update on CALFED in the near future.

A participant asked if representatives from the Corps' Comprehensive Study could come and speak.

Mr. Ceppos replied that he will try to get someone to attend. He then asked the group if there were any other comments regarding Mr. Martinez' question about agriculture in the Bypass.

There were no further comments and the meeting was adjourned.

YOLO BYPASS MANAGEMENT STRATEGY
STAKEHOLDERS WORKING GROUP MEETING NO. 11

DRAFT
MEETING MINUTES

MEETING DATE: November 16, 2000

LOCATION: California Department of Fish and Game
Yolo Wildlife Area Headquarters
45211 County Road 32B (Chiles Road)
Davis, CA 95616

IN ATTENDANCE: Lori Clamurro, Delta Protection Commission
Chuck Dudley, Heidrick Farms
Mike Egan, Yolo Flyway
Denny Eickmeyer, Yolo Wings and L. G. Duck Club
Dave Feliz, California Department of Fish and Game
Mike Hardesty, Reclamation District 2068
Bill Harrell, California Department of Water Resources (DWR)
Gillian Harris, National Fish and Wildlife Foundation
Tom Harvey, U.S. Fish and Wildlife Service (USFWS)
Robin Kulakow, Yolo Basin Foundation
Rick Martinez, Martinez Bros. Farms
Nelson Mathews, Trust for Public Lands
Duncan McCormack III, Yolo Ranch
Scott Morgan, William Morgan Realty
Dennis Murphy, Murphy Farms
Mitch Sears, City of Davis
Ron Smith, PFC Duck Club
Ron Tadlock, Tadlock Farms
Ed Towne, Bull Sprig Outing
Will Wylie, H Pond Ranch
Kevin Dolan, UC Davis Student
Kim Hunter, UC Davis Student
Jen Mayer, UC Davis Student
Dave Ceppos, Jones & Stokes
Jennifer Stock, Jones & Stokes

NEXT MEETING: **The next meeting of the Working Group will be held December 15, 2000, at 10:30 a.m. at the Yolo Wildlife Area Headquarters. The meeting will focus exclusively on the draft Management Strategy document.**

ACTION ITEMS

1. Working Group members will provide individual comments on the Management Strategy, Revision 3 document by November 30, 2000.

2. Jones & Stokes will provide to the Working Group a short document titled "How to Find Your Easement" (Attachment A).

3. Mike Hardesty requested that Working Group members contact the managers of the U.S. Army Corps of Engineers (USACE) and State of California's Sacramento and San Joaquin Rivers Comprehensive Study (Comprehensive Study) with regard to his and others' concerns about the status and progress of the Comprehensive Study. Mr. Hardesty requested the mailing address for the Comprehensive Study managers (as discussed further on page 7 of these minutes).

SUMMARY OF MEETING

Introduction

Mr. Ceppos began the meeting by welcoming the group. He asked if there were any changes or additions to the October 12, 2000, meeting minutes; there were none. The October meeting minutes were therefore adopted as final.

Mr. Ceppos explained that the sole purpose of this meeting was to give the Working Group an overview of the Management Strategy, Revision 3 document (document). He further explained that each chapter would be reviewed in terms of content and format style. The process for providing document input would also be explained.

He said that this project has successfully identified numerous stakeholder concerns regarding land use changes in the Bypass, particularly with regards to habitat enhancement. He stated that the YBF and Jones & Stokes (project team) have identified several different entities (e.g., landowners, flood management agencies, upstream and downstream water users, environmentalists, etc.) that are interested in the Bypass. He reminded the group that each of these entities has a different perspective on what the Bypass can be and that the role of the Management Strategy is to find a common ground where all entities can reach a consensus on the future vision of the Bypass.

Ms. Kulakow further explained that this document has attempted to capture the voice of the Working Group. She requested that if it does not do so, to please provide input on the document and let the project team know how it can be improved.

Management Strategy, Revision 3 Overview

Mr. Ceppos began by stressing the fact that the document handed out at the meeting is an INTERNAL DRAFT. Ideally the document should not be shared outside of participants in the Working Group process and that if the document is shared, Working Group members remember to stress to any recipient that the document is a draft and not a final version.

Mr. Ceppos continued by apologizing for the technical problems at Jones & Stokes that have resulted in figures that are not complete and up-to-date. He explained that these issues will be worked out and that the updated figures will be in the next revision.

Mr. Ceppos explained that the remainder of the meeting would be to move through and discuss each chapter.

Chapter 1

This chapter is the introduction for the document that describes the document organization, the location and current function of the project area, the project process and its future, and past and present studies or projects that relate to this project. Most of this chapter is straight forward, and the only issue was where the southern boundary of the project location should be.

Mr. Ceppos said that it seemed hard to justify the southern project boundary (pages 1-1 through 1-2) at the Yolo County line when the Bypass extends past that point. He explained that some previous studies had done so, but it seemed to be more an administrative convenience rather than what made geographic sense.

Several members stated their opinion that the project boundary should extend downstream to include the Egbert Tract. Mr. Ceppos confirmed that this would be done

Mr. Mathews stated that Phil West and Jeff Carey should be added to the stakeholder list as they are landowners in and near the Egbert Tract. Mr. Ceppos indicated that someone from Jones & Stokes would contact him to get contact information for Messrs. West and Carey.

Chapter 2

This chapter describes the existing conditions in the Bypass and describes such things as landforms and soil, land and water use, governmental land management, vegetative communities, and hydrology.

Mr. Ceppos first focused the group on the section entitled "Agricultural and Duck Club Land and Water Use" that starts on page 2-3. This section grew out of technical information that has been presented to the Working Group and from stakeholder interviews with the project team. It acts as a broad overview of how water is actually moving through and being used in the Bypass. He said that this is important in giving parties interested in habitat enhancement in the Bypass a realistic view of how water is actually used and moved around.

He added that the subsection "Duck Club Land and Water Use" (page 2-7) has not been divided into north and south, as the agricultural land use section was organized, because duck clubs occur in various locations within the Bypass and generally function the same regardless of location.

Next, Mr. Ceppos focused the group on the portion of Chapter 2 that describes the various habitat communities in the Bypass and the animals that are associated with each one.

Lastly, Mr. Ceppos focused the group on the largest topic in Chapter 2, "Hydrology". The bulk of the chapter focuses on hydrological issues in the Bypass, starting on page 2-14 and continuing to the end of the chapter. This portion has been generated primarily from questions the Working Group has asked about these issues. Mr. Ceppos reminded the group that the project team has spent much time gathering past data and creating new data to answer these questions. One problem that has been encountered during this process is that gaps exist in the historical data. These questions have given rise to specific concerns the Working Group has (e.g., implementing an early flood warning system and the need for better water gaging stations).

Page 2-16 discusses state easements in the Bypass. Mr. Ceppos explained that it is apparent that many Bypass landowners do not know what the language of their easements specifies. As a result, the project team researched easements that varied by date of agreement and location within the Bypass. He continued by saying that the project team consulted with Jones & Stokes' internal staff counsel who indicated that Jones & Stokes and YBF are limited in what can be presented to the Working Group regarding an interpretation of easement language. This concern is based on the potential liability that any interpretation of such easements could be construed by Working Group members as a legal opinion. Mr. Ceppos continued by stating that due to this concern, interpretation of easement language in the document is very limited and that any such interpretation does not constitute a legal opnion of such text.

Mr. Ceppos further explained that as part of Jones & Stokes' efforts to find and review these easements, it became apparent that the process to find and copy them is quite arduous. Therefore, Jones & Stokes has prepared a small instructional document titled "How to Find Your Easement" (Attachment A) which explains the process of locating and obtaining easements.

Mr. Ceppos continued describing the hydrologic data included in the document. All of the technical information that has been gathered by Gus Yates, a hydraulic consultant, and Luke Rutten, a geomorphologist from Jones & Stokes, has been compiled and starts on page 2-17. The figure packet includes the final versions of the figures that are associated with this text (these figures have been presented to the Working Group at past meetings).

On page 2-27 is the heading "Hydrology Conclusion". Mr. Ceppos indicated that Jones & Stokes is still working on this section of text.

Mr. Harvey asked if this chapter addresses future projects in the Bypass.

Mr. Ceppos answered that they are addressed in Chapter 4.

Chapter 3

Mr. Ceppos explained that this chapter is where the document becomes very different from previous documents about the Bypass. Chapter 3 is where the voice of the Working Group has been closely memorialized to identify the different assurances stakeholders in the Bypass need to consider any future land use changes beneficial to habitat and wildlife. These assurances have been identified from all the previous Working Group meeting minutes and organized in an effort to clearly convey specific assurances and assurance-related topics and issues that pertain to stakeholders in the Bypass.

Mr. Ceppos drew the attention of the Working Group to the bottom paragraph on page 3-1. He wanted it to be clear, at the meeting and in the document, that the Working Group acknowledges that it is not a decision making body and that the Working Group does not hold any superceding role over any individual stakeholders.

Mr. Ceppos stated that it was a somewhat difficult task to accurately capture the concerns and positions of numerous stakeholders and then translate that into concise statements. He asked that all reviewers and the Chapter 3 review subcommittee pay extra attention to this chapter to ensure that it is appropriate and accurate.

Mr. Mathews asked if there are mechanisms, discussed in the document, for accomplishing these assurances, and if not, should a section on this be added. He suggested that would be a good section to add because conditions in the Bypass are so different than in outlying areas.

Mr. Ceppos responded that there is not a specific section that addresses this issue; the document addresses this issue in different ways throughout the document. He also said that this may be a good section to add and that any suggestions or ideas Mr. Mathews or other Working Group members have would be appreciated to help create this new section.

Mr. Harvey commented that it seems that the document only addresses duck club and agricultural stakeholders in the Bypass. He was concerned that there is no mention of flood control agencies and the assurances needed to make sure that levees can be maintained.

Mr. Ceppos agreed that that was a good point.

Mr. Hardesty said that he will provide a lot of input on this topic for the document.

Mr. Dudley stated that everyone knows the entire Bypass is needed for flood control, and that the Working Group needs to make sure that critical improvements necessary for levees can be made.

Mr. Ceppos continued that page 3-6 contains a list of specific issues that were taken from the meeting minutes, combined, and sorted to convey stakeholder concerns. He said that this may be a good location to discuss state management activities for the Bypass. He asked to please let the project team know if it missed any issues.

Mr. Martinez said that there has been an increase in the amount of runoff water coming into the Bypass from new development taking place in surrounding communities, such as Davis, that may act to degrade water within the Bypass. He questioned whether this is a subject that could, down the road, be a cause for future restrictions, and he wondered if it should be addressed now, in the document.

Mr. Ceppos said that it probably should be addressed now. He asked the other stakeholders what they thought.

Mr. Martinez asked Mr. Ceppos if he knew of anything in regards to the current state of the water quality.

Mr. Ceppos answered that he has not seen any data for this issue. He knows that the Colusa Basin, which drains a large amount of agricultural land, drains into the Bypass; that there is the Woodland sewage treatment facility; and that Cache Creek carries high amounts of mercury. He said that the treatment facility releases treated water, but acknowledged that accidents may happen.

Mr. Martinez asked if there should be a paragraph or two, then, that addresses water quality issues, and Mr. Ceppos affirmed that there should be.

Chapter 4

This chapter is a response to CALFED's programmatic documents (listed on page 4-1) and vision for what could happen in the Yolo Basin and the San Joaquin Delta. These documents have been reviewed with the specific focus being on the Bypass. This information has been evaluated in a manner that responds to CALFED and says what is realistic and feasible to occur in the Bypass from the perspective of the Working Group. This is achieved by listing all the CALFED Targets and Programmatic Actions (pages 4-2 through 4-11) that apply to the Bypass and then describing different options that could be implemented in the Bypass. These options are the "Working Group's recommendations of what **might be** '*reasonable, affordable, cost effective, and practicably achieved*'... in the Yolo Bypass" (page 4-12). Each option is explained and then the basic benefits are listed. The basic benefits are followed by how this option would benefit CALFED; and these

benefits are related back to the Targets and Programmatic Actions. After the CALFED benefits are discussed, opportunities and constraints for each for particular option are also discussed.

Mr. Mathews asked if this process is intended to be used as a means of gaining funding for the Working Group from CALFED and other sources.

Ms. Kulakow answered that it is not. It is a middle-ground for stakeholders in the Bypass who may want to change land uses for habitat enhancement and have identified benefits to habitats but have also identified numerous constraints. The document is not intended to mandate stakeholders to do anything if they choose not to. Funding for an option would depend on what would be implemented and the various agencies that would be involved.

Mr. Ceppos used tailwater ponds (page 4-15) as an example. Tailwater ponds in the Bypass would need to have a portable pump that could be removed during the flood season. However, the Yolo County Resource Conservation District (RCD) (which would normally fund this), has a policy prohibiting funding support for tailwater ponds in flood bypasses because of the potential that the portable pumps would not be returned to the appropriate location each year. Currently, there is no enforcement body set up that could monitor the relocation of the pumps to their correct location. Also, in the Bypass, the ponds would have to be long and linear to avoid any flood impacts. The document therefore describes how tailwater ponds could be feasible and beneficial; however, there are numerous issues that have to be sorted out to implement such a change. These issues could include funding options and policy changes.

Mr. Ceppos said that most of the discussions at previous meetings regarding required assurances (Chapter 3) have focused on small parcels of land. Starting on page 4-26, it is explained that the assurances needed would be the same whether on a small parcel or big block of land. He would like the reviewers to pay attention to this section to make sure it accurately represents the Working Group.

Mr. Ceppos continued by saying that on page 4-27 the document states that previous documents have neglected to factor in stakeholders' concerns. It took this group, with the help of a CALFED grant, to address the many issues of the Bypass in a realistic light.

Ms. Kulakow said that if the Working Group knows of any issues of oil and/or gas utitlities to let the project team know.

Mr. Ceppos then explained the "Document Feedback Packet". Once the entire Working Group has had enough time to start reviewing the document, the project team will begin to call the chapter-specific review subcommittees to see if there are any major concerns. If there seems to be a consensus among the committee members that a meeting would be helpful, such a meeting will be set up to review that specific chapter.

Ms. Kulakow added that individual comments need to be provided to the project team by November 30, and the committees could meet during the first week in December, if needed.

Mr. Harvey asked if the project team has talked to anyone about the Comprehensive Study.

Mr. Ceppos responded that he spoke to a Comprehensive Study representative (Ms. Sue Fry) who indicated that USACE would like to speak with the Working Group since it represents one large unified area. He also said that he and Ms. Kulakow have spoken to CALFED and USACE about the aerial mapping that was conducted for the Comprehensive Study.

Mr. Hardesty said that the USACE has dropped the ball, in regards to the Comprehensive Study and requested that members of the Working Group write to the managers of the Comprehensive Study to express their concern at the time it is taking and the limited progress that has been occurring in getting the study completed. As requested by Mr. Hardesty, the addresses of the Comprehensive Study managers is as follows:

> Merrit Rice, Project Manager, U.S. Army Corps of Engineers and/or
> Steve Yeager, Project Manager, State Reclamation Board
> 1325 J Street, Room 1540
> Sacramento, CA 95814-2922

Mr. Smith asked what the Management Strategy document is trying to achieve, and if the Working Group has any type of mission statement to guide them.

Mr. Ceppos answered that a mission statement/vision has not yet been created for and by the Working Group, but the ultimate goal will be to have the Working Group be self-sufficient.

Mr. Martinez asked how the proposal application for the second phase was going.

Mr. Ceppos responded that he was not sure but that things still look good. He will let the Working Group know the outcome as soon as he hears something.

Mr. Ceppos said that the purpose of the next meeting will be to review the next revision of the document. He stated that there may also be a representative from USACE and the Sacramento Area Flood Control Agency to discuss the Comprehensive Study and the proposed changes at Folsom Dam, the American River, and the Sacramento Weir.

Mr. Ceppos concluded the Working Group meeting by saying the next meeting will be held on December 15, 2000, from 10:30 a.m. to 1 p.m.

YOLO BYPASS MANAGEMENT STRATEGY
STAKEHOLDERS WORKING GROUP MEETING NO. 12

DRAFT
MEETING MINUTES

MEETING DATE: December 15, 2000

LOCATION: California Department of Fish and Game
Yolo Wildlife Area Headquarters
45211 County Road 32B (Chiles Road)
Davis, CA 95616

IN ATTENDANCE: Margit Aramburu, Delta Protection Commission
Christy Barton, Yolo County Flood Control and Water Conservation District (YCFD)
Bob Dorian, H-Pond Ranch
Mike Egan, Yolo Flyway
Dave Feliz, California Department of Fish and Game (DFG)
Chris Fulster, Jr., Glide In Ranch
Mike Hardesty, Reclamation District 2068
Tom Harvey, U. S. Fish and Wildlife Service (USFWS)
Phil Hogan, Natural Resources Conservation Service (NRCS)
Campbell Ingram, CALFED Ecosystem Restoration Program
Stephen Jaouen, NRCS
Greg Kassis, Glide In Ranch
Dennis Kilkenny, Dawson's Duck Club
Robin Kulakow, Yolo Basin Foundation
Lee Laurence, U.S. Bureau of Reclamation
Bob Leonard, Yolo Basin Farms
Julie MacDonald, Landowner
Duncan McCormack, Yolo Ranch
Duncan McCormack III, Yolo Ranch
Selby Mohr, Mound Farms
Jack Palmer, H-Pond Ranch
Steve Patek, City of West Sacramento
Greg Schmid, Los Rios Farms
Ted Sommer, California Department of Water Resources (DWR)
Ed Towne, Bull Sprig Outing
James Waller, Senator Outing
Dave Ceppos, Jones & Stokes
Jennifer Stock, Jones & Stokes

NEXT MEETING: **Note: The meeting scheduled for January 18, 2000, has been POSTPONED due to schedule conflicts with the guest speakers. The new meeting date and time is February 2, 2001 from 10:30 a.m. to 1:00 p.m. at the Yolo Wildlife Area Headquarters. Our guest speakers will be representatives from the U.S. Army Corps of Engineers (Corps) and the Sacramento Area Flood Control Agency (SAFCA) who will discuss ongoing and proposed projects that could affect the Yolo Bypass (e.g., the comprehensive study; Folsom Dam reoperation; Lower American River levee improvements). A meeting agenda will be sent out soon.**

ACTION ITEMS

1. Jones & Stokes will integrate the input from the Working Group into the draft Management Strategy document.

2. Jones & Stokes will deliver to the Working Group the Reclamation Board regulations that were adopted in 1996.

SUMMARY OF MEETING

Introduction

Mr. Ceppos began the meeting by welcoming the group. He asked if there were any changes or additions to the November 16, 2000 meeting minutes; there were none. The November meeting minutes were then adopted as final.

Attendees of the meeting introduced themselves. Ms. Kulakow then told the Working Group about a recent award she accepted on behalf of the Working Group.

Governor's Award

Ms. Kulakow explained that the Working Group was awarded the 2000 Governor's Award for Environmental and Economic Leadership in Environmental Restoration and Rehabilitation. She said that this shows that the Working Group is gaining recognition from high up in the state government and that, because of this, the group will more likely be respected as the pertinent voice for the Bypass. She said several prominent organizations such as Nissan Motor Company and

several counties were also recognized with awards, and this shows that the Working Group's stature is increasing and improving.

Mr. Ceppos explained that this award was established ten years ago by Governor Deukmejian and that it has significant clout. It is a testament to the Working Group's efforts over the past year.

Yolo Hydraulic Technical Advisory Committee

Mr. Ceppos said that the Technical Advisory Committee (TAC) was formed to answer questions the Working Group has had over the past year, such as: What is the actual, existing flood capacity of the Bypass, and what will happen in the Bypass if upstream levee rehabilitation occurs in the Sacramento River Flood Control Project (FCP)? The TAC is also an effort to bring together the California State Reclamation Board (Reclamation Board) and the U.S. Army Corps of Engineers (Corps) in a more coordinated and proactive manner.

Mr. Ceppos explained that there has been little coordination between the Reclamation Board and the Corps to come up with a clear, comprehensive protocol for modeling within the Bypass. There are different types of existing models that may or may not be appropriate to use depending upon the location of a proposed project in the Bypass and by what is being learned from the model.

The TAC met earlier in the morning before the Working Group to discuss these questions and issues. Mr. Ceppos stated that there is uncertainty between the Corps and Reclamation Board as to with whom specific responsibilities lie. There is no mechanism in place to determine the cumulative impacts and the positive or negative effects of changes in the Bypass. The idea is to put a system into place that allows for the equitable assessment of all potential land uses in the Bypass. A concern is that landowners will enter land use (habitat) programs and change land uses, then the Reclamation Board and the Corps will determine that no more land can go into these programs because of unforseen impacts to flood conveyance and capacity, and future landowners will not be able to enter these programs. The proposed Bypass modeling system would help create a system that will allow for the fairest treatment of landowners and land use changes with respect to location within the Bypass. From the TAC meeting, it is clear that there are many more questions to answer before this goal is obtained.

Ms. Aramburu stated that she understands the Bypass is included in the Corps' and State's comprehensive study, and that there will be a minimalist picture of how the Bypass fits in with the rest of that very large (Sacramento and San Joaquin River Valleys) study area. She asked if it wouldn't be better to spend more money now, rather than later, to get a more comprehensive understanding of the Bypass.

Mr. Ceppos answered that this is what the TAC is trying to accomplish now. The Comprehensive Study looks at the Bypass in cross-sections 1,000 feet apart. One of the issues the TAC is pursuing is to get the digital topography that was used to create those cross-sections so that more specific data can be available for more specific modeling than the existing cross-sections.

Ms. MacDonald said that there used to be a number of ways to evaluate flood control, and it was the Corps that set up standard studies.

Mr. Ceppos added that the Comprehensive Study was initiated in response to the Governors' Flood Emergency Action Team (FEAT) report that was created after the 1997 floods. It was the state that determined there was a need to assess the entire FCP. He reminded the Working Group that the Corps's current mission is to reduce flood damage while restoring ecosystems and that is the stated goal of the Comprehensive Study.

Mr. Fulster asked if the work of the TAC will ultimately dictate what landowners will be able to do on their own land.

Mr. Ceppos responded that all Bypass landowners are already constrained on what they can do on their land because of the State's easements. The Bypass is a flood control facility. One of the reasons the Working Group was established was so landowners would have more choice in what they will do with their land. For example, there is a program that compensates farmers who convert their land from agriculture to seasonal wetlands to benefit avian species. A farmer decides he or she would like to convert his or her land to a duck club because it is a good business decision and other farmers decide to do the same. Then the agencies realize that a lot of land has been converted to seasonal wetlands in the Bypass. The agencies then prohibit any other landowners from converting land, therefore ending any chances of future, interested landowners from benefitting from this specific program.

Mr. Fulster disagreed with Mr. Ceppos' saying that the agencies will dictate what landowners can do on their land, regardless. He stated that the Southern Pacific Railroad trestles and Port of Sacramento Ship Channel were put in with a disregard to landowners.

Mr. Leonard stated that he has worked for the government a long time. He sees that this group could be waking up the government which can create problems in the future. The agencies could get tunnel vision and what Mr. Ceppos said about the agencies "realizing" what is happening in the Bypass is true. The fear is that waking up the agencies can defeat the whole purpose of the Working Group.

Mr. Egan said that when the original Bypass was designed, the entire area was covered in tule reeds. In Chapter 2 of the draft Management Strategy (Strategy), it says that the original Bypass design was 500,000 cubic feet per second (cfs). This design was completed and built before the ship channel. He asked if the current design of the Bypass, and the amount of water that now comes down the Bypass has been addressed.

Mr. Ceppos referred Mr. Egan to Chapter 3, stating that his concern is one of the issues that have already been identified as needing to be addressed. General discussion ensued about what is the existing flow capacity of the Bypass.

Mr. Egan continued saying that, historically, the Bypass was land that no one cared about. In the 1930s, it was easy for surrounding communities to divert water into the Bypass, and it was

mostly tules. He wondered if, by reducing the number of tules and marshland, there has been a reduction in the ability of the Bypass to slow down and exhaust flood waters.

Mr. Hardesty responded that massive amounts of tules, or any vegetation impedes flood flow. Theoretically, the reduction of tules and marshland could have increased the capacity of the Bypass. When the Bypass was constructed, it was intended to have a certain capacity, and no one knows if they got it right or not. It does not work as well as it was intended, especially in the southern portion. If one looks at the easements, there are no time or flow constraints. So, there is no accounting for upstream development, increased flows and duration, etc., that could continually affect landowners in a manner different from when the easements were written.

Ms. MacDonald said that the 1997 flood had flows through the Bypass exceeding 500,000 cfs, and this would have been larger if the levees upstream had not broken. HEC models are beneficial for modeling a discrete site, but they do not portray what will happen upstream with regard to changes downstream. Also, the Reclamation Board used to have only four pages of regulations regarding land use changes in floodways and Bypasses, and four years ago they rewrote them. There are now more than 100 pages that were approved without public review or input.

Mr. Ceppos addressed Ms. MacDonald regarding the HEC modeling and said that the existing RMA-2 two-dimensional model for the Bypass does show what would happen upstream with regard to downstream changes.

Mr. Egan said that he has looked at his easement and agrees that there are no time or flow constraints. But, there is nothing in his easement that says what he can or cannot do on his land.

Mr. Ceppos responded that different people have different easements, which can potentially limit that person to what they can do on their land. The TAC committee is proposing to get the modeling process standardized so that all Bypass landowners are treated as fairly as possible.

Mr. Egan stated that it would feel better if the Working Group had received the Governor's Award for resolving some of these issues. It has been all information in and no resolved issues resulting from the process thus far.

Mr. Fulster returned to the topic of the Reclamation Board regulations. When the Reclamation Board rewrote the regulations they had no landowners at the table. Now, the people that wrote those regulations are no longer working there.

Mr. Leonard said that the landowners have no idea of what is written in these regulations.

Mr. Ceppos made this an action item, to deliver these regulations to the Working Group. One of the reasons the Working Group was established was to have stakeholders involved in things such as this. With regard to the Governor's award, he said it has historically been given to entities that are in a start-up mode that are perceived as having a good likelihood of success, as a way of helping them along.

Mr. Ceppos reminded the group that there is a difference between capacity and flood risk. Capacity can stay the same, while risk can increase. Depending on location within the Bypass and the scale of a flood event, a landowner may or may not experience inundation. For example, a 10-year flood event may only inundate certain parts of the Bypass, while other areas experience no inundation at all. However, with a 100-year flood event everyone in the Bypass will be flooded; this event will result in the maximum height flood waters are ever expected to reach. A 100-year flood means that in any given year there is a 1 in 100, or 1%, chance of a flood of a specific size. There was not a lot of flood data when the Bypass was built. Therefore, since more data has been gathered since the 1950's, what was thought to be a 100-year flood prior to then has changed. There are also global climate trends that can act to skew data. So, with more data and a better understanding of data there is a more accurate understanding of what a 100-year flood event actually is. As a result, the historical design of the Bypass does not necessarily accommodate a 100-year flood event.

Mr. Egan asked who is there to update this information and make sure they get it right.

Mr. Ceppos answered that this is another goal of the TAC, to refine these questions, define problems, and to send these problems to the flood management decision makers and say "fix them." He also pointed out that this topic has been addressed in Chapter 3 of the Strategy.

Mr. Fulster asked why the Port of Sacramento could not dredge the ship channel.

Mr. Hardesty responded that Mr. Tom Scheeler from the port, who presented to the Working Group at the August 17, 2000 meeting, had said that it was too expensive. The port currently dredges the channel to keep it passable for ships. Mr. Ceppos stated that despite Mr. Scheeler's comments, this issue is still discussed in Chapter 3 of the Strategy.

Ms. MacDonald stated that the reason she is at the meeting is that it took her and her husband 18 years to buy the land that they own, and they do not want the government telling them what they can or cannot do. She wants there to be some way of making sure that, whatever happens, they will be kept whole. What strikes her about the document is that the text reads that stakeholders need to be compensated when it is really the landowners and operators who do. She further raised the issue of safe harbor agreements, stating that safe harbors has never been challenged in court, and there is presently no safe harbors program in California.

Ms. MacDonald continued that there need to be legally enforceable agreements for landowners and operators, when dealing with safe harbor agreements, that will be instruments for keeping the landowners and operators whole against the federal and state governments.Mr. Ceppos pointed out that this issue is addressed in Chapter 3 of the Strategy, but that his staff will enhance the existing text.

Mr. Egan and Mr. Leonard asked the CALFED representative, Mr. Campbell Ingram, to speak about CALFED's intentions for the Bypass.

Mr. Ingram replied that CALFED has no ability to purchase land. He is new to the project and was at the meeting to learn more about the Working Group. Because of this, he was unable to answer in-depth questions.

Ms. Aramburu stated that flood control agencies have the power to take land as under eminent domain, but they have said that they are only going to buy land from willing sellers. There are willing sellers and then there are "*willing sellers*." Mr. Ceppos pointed out that this topic is addressed in Chapter 3 of the Strategy.

Mr. Ceppos told the Working Group that the group's second phase proposal was formally granted by CALFED the day before the meeting. Everything was funded except the hydraulic modeling portion of the proposal. This grant will allow the Working Group's socioeconomic and land impact questions to begin to be answered. The grant money ($210,000), which should be available in March, will support the continuation of the Working Group meetings, a farm land appraisal subconsultant, and bringing more information and answers to the group.

Management Strategy, Revision 3 Overview

Mr. Ceppos said that there have been many important points made, so far, during this meeting. One concern already raised is that the document discusses the hydraulic connection between Cache Creek and the Bypass. There were some people that felt that information related to Cache Creek should not be included in this document, and Mr. Ceppos said if that was the general consensus of the Working Group, then those sections will be removed from the document.

Ms. Barton replied that the connection between Cache Creek and the Bypass needs to be addressed to explain that continuity of flows do not exist, even at a flood stage. However, ideas by CALFED regarding Cache Creek and any connection to the Bypass are not appropriate for the document.

Mr. Fulster said that he is worried that the addition of a gate or fish ladder on the Fremont Weir will eventually lead to an increase in flows entering the Bypass.

Mr. Ceppos responded that text will be added to the document stating that any modifications to the Fremont Weir will not pose any flood impacts or be used as a flood control structure.

Mr. Leonard wondered how a fish ladder can be put in and not have it affect flows, since water will be coming into the Bypass.

Mr. Sommer answered that fish ladders have two purposes: to deliver water downstream and to let fish pass a vertical barrier.

Mr. Fulster thinks that the main purpose is for fish passage not water delivery. His concern is that more water entering the Bypass will increase the number of splittail, making the Bypass a fishery.

A Working Group member commented that splittail are off the endangered species list.

Mr. Sommer corrected them saying it is not yet off the list, but they are in the process of taking it off.

Ms. MacDonald said that it would be helpful to have someone from the USFWS Endangered Species office come to speak to the Working Group. She also asked that if species and habitats are introduced more in the Bypass, and if there is a lack of water in the future, will someone else have to make up for this lack of water in order to support the affected species.

Ms. Barton added that a concern of YCFD is that if there is a nursery in the Bypass for affected fish species, regulators will look to Cache Creek to make up for the lack of water in critical years.

Ms. Aramburu asked if agencies approach landowners, do the landowners have the ability to "condition" the terms of the agreement—for example, that flows can only occur between this date to that date, what the compensation rates depend on, etc.

Mr. Hardesty said that if special status species are relocated to areas where they were not found before that the water users are stuck with long-term impacts of this introduced species. There is no way to tie things together; someone puts it there, and the stakeholders get stuck with the problem.

Ms. MacDonald added that if a special status species does arrive that the law says that species has to be allowed to be there and to live. But, landowners still need to be whole once economic burdens arise from the species being there.

Ms. Aramburu said that stakeholders may want to check out the San Joaquin Habitat Conservation Plan, which has dealt with this issue.

Mr. Harvey said that he has been hearing a lot about safe harbor agreements, and he wishes that this issue could be better resolved by his agency (USFWS). A Biological Opinion (BO) is a good way to address the issues of a proposed refuge and levee maintenance. He cited the USFWS Stone Lakes National Wildlife Refuge as a good example where no economic hardships have been experienced by adjacent landowners as a result of the refuge.

Mr. Ceppos explained that the federal Endangered Species Act (ESA) compliance process requires that the lead agency prepare a Biological Assessment (BA) for a particular project, which explains how things will be managed. BAs are not intended to be written in a vacuum; they are supposed to be negotiated while being developed. The regulating agency (e.g., USFWS or National Marine Fisheries Service) issues a BO stating their opinion on the project. Mr. Ceppos explained that in the Sutter Bypass, the west side water users have only a few weirs and pumps while the east

side has over 50 pumps. The USFWS and NMFS have said that eventually everyone will need to apply fish screens to their diversions. However, they have expressed a willingness to only screen the major diversions first and to then monitor the system over time to see if the Butte Creek fish populations are increasing. If they do, there is a chance that future water users will not have to screen because the populations will have stabilized from all the other restoration/fish passage efforts done in the watershed. If pumps are required, the Butte Creek water users are demanding that they receive financial help to build and maintain such screens. The solution seems to be a good way of trying to fix the problems, monitoring what occurs, and adapting approaches over time.

Ms. MacDonald inquired what is keeping the agencies at the table. She wondered if they are required to go through this process and if they have the power to force changes upon the landowners.

Mr. Ceppos replied that Lower Butte Creek has more than 130 stakeholders, and every pump out there is technically a take problem for listed fish species. The agencies decided it is more beneficial to work with the stakeholders than to force things upon them. As a result, 13 new weirs and fish ladders are being installed to improve the system, and this is keeping everyone whole. Over the past 2–3 years several hundreds of thousands of dollars have been spent on this process. What is keeping regulators at the table is the knowledge that a better way of dealing with large numbers of stakeholders needed to be created that was less litigious and expensive and more publically acceptable. He further stated that, at this point, the agencies will look very bad for spending a lot of money on a failed public outreach effort and so that too helps the process along.

Mr. Egan said that after being at the table for over a year, he has not heard much about the intent of the agencies that have control in the Bypass. His thought is that if the federal government was not involved there would not be these problems. He questioned what the Working Group is here for and what is the intent and position of the Working Groups "opponents" on the Bypass.

Mr. Fulster commented that Mr. Egan had a point and asked if there is a fishery in the Bypass will stakeholders, here, have to screen their pumps in the future, similar to what has happened in the Sutter Bypass.

Mr. Mohr stated that the best defense is a good offense. There needs to be an attachment at the end of the document that each stakeholder writes that says that this is how and why I have participated in the Working Group effort. That is the important part, that readers of the document know that the Yolo Bypass stakeholders are organized and resolved to not be taken advantage of.

Mr. Egan asked if the Working Group was established because of the proposed North Delta Wildlife Refuge (refuge).

Mr. Ceppos answered no; the group was envisioned well before the refuge was ever proposed. It was just the way the sequence of events played out. Also, this group does not act as rule over any individual member of the group.

Mr. Kilkenny said that the No Man's Land, East Davis Fire Protection District wants to make sure the document addresses that there is to be no loss of revenue and the safety needs of fire protection and emergency services. With increasing community activities, any net loss of revenue

will impede the means of providing these services. Mr. Ceppos pointed out that this is addressed in Chapter 3 of the Strategy.

Mr. Harvey addressed Mr. Egan's earlier refuge comment. The USFWS wants to preserve these places for the stakeholders. The stakeholders are in the driver's seat; they are not trying to force the refuge on the stakeholders.

Mr. Leonard asked if there have been any discussions between the USFWS and the Glide Ranch trust.

Mr. Harvey answered no.

Mr. Dorian asked if there will be enough water in dry years, and will this conflict with the management of created habitats and the protection of endangered species.

Mr. Ceppos responded that Chapter 3 in the document discusses that any habitat-based land use changes are not to be at the expense of agricultural and duck club land uses.

Mr. McCormack III wondered how the project team can be confident to know that this document will pass down through new generations of stakeholders and agencies. If there is a state of emergency, this document could be put aside as conditions change within the Bypass.

Mr. Ceppos said that people have to be realistic about things such as eminent domain and states of emergency. These things happen in rare occurrences but that Mr. McCormick is correct and that such conditions could occur. He pointed out that such situations could occur whether the Strategy exists or not and that the way to keep this document alive is by keeping the Working Group going.

Ms. Barton asked how the Working Group can establish local provisions for safe harbors agreements.

Mr. Ceppos responded that issues like this are often not solved or challenged until a collective group unites to say, for example, that no one will sell their land until protection from liability conditions change.

Mr. Mohr suggested that the title be reworded to incorporate and reflect that the document is from the Working Group.

Ms. MacDonald said that there should be a section that speaks to the issue of the ESA and safe harbor issues, in the situation of the refuge, and legislative exceptions.

Mr. Ceppos agreed that this is an interesting idea.

Mr. Ceppos concluded the Working Group meeting by saying the next meeting will be held on January 18, 2001 from 10:30 a.m. to 1:00 p.m.

NOTE: The next meeting has been postponed until February 2, 2001, from 10:30 a.m. to 1:00 p.m.

YOLO BYPASS MANAGEMENT STRATEGY
STAKEHOLDERS WORKING GROUP MEETING NO. 13

DRAFT
MEETING MINUTES

MEETING DATE: February 2, 2001

LOCATION: California Department of Fish and Game
Yolo Wildlife Area Headquarters
45211 County Road 32B (Chiles Road)
Davis, CA 95616

IN ATTENDANCE: Christy Barton, Yolo County Flood Control and WCD
Regina Cherovsky, Conaway Ranch and Reclamation District 2035
Bob Childs, U.S. Army Corps of Engineers (USACE)
Lori Clamurro, Delta Protection Commission
Mike Egan, Yolo Flyway
Denny Eickmeyer, Loose Goose Duck Club and Yolo Wings
Linda Fiack, Yolo County Planning
Sue Fry, USACE
Merritt Rice, USACE
Chris Fulster, Jr., Glide In Ranch
Bill Harrell, California Department of Water Resources (DWR)
Tom Harvey, U.S. Fish and Wildlife Service (USFWS)
Mark Hennelly, California Waterfowl Association
Butch Hodgkins, Sacramento Area Flood Control Agency (SAFCA)
Robin Kulakow, Yolo Basin Foundation
Wayne Little, Dawson Duck Club
Rick Martinez, Martinez Bros. Farming
Duncan McCormack, Yolo Ranch
Duncan McCormack III, Yolo Ranch
Mike Mirmazahert, DWR
Selby Mohr, Mound Farms
John Mohr, Mound Farms
Gary Moody, Yolo Wings
Dennis Murphy, Murphy Farms
Sally Negroni, Natural Resource Conservation Service (NRCS)
Jack Palmer, H-Pond Ranch
Steve Patek, City of West Sacramento
Ricardo Pineda, DWR

Caroline Quinn, City of West Sacramento
Greg Schmid, Los Rios Farms
Elizabeth Soderstrom, Natural Heritage Institute
Ted Sommer, DWR
Jim Staker, Reclamation District 2035
Ron Tadlock, Tadlock Farms
Ray Thompson, Sky Rakers Duck Club
Ed Towne, Bull Sprig Outing
Rod Williams, Yolo Links
Gus Yates, Hydrologist
Dave Ceppos, Jones & Stokes
Jennifer Stock, Jones & Stokes

NEXT MEETING: **The next meeting of the Working Group has not been scheduled. Working Group participants will be notified at a later date regarding the meeting date and agenda.**

ACTION ITEMS

1. Jones & Stokes will complete the interim final Management Strategy document and mail it to the Working Group for their final input.

2. Jones & Stokes will deliver to the Working Group the Reclamation Board regulations that were adopted in 1996 regarding land use in the Yolo Bypass.

3. Jones & Stokes and the Yolo Basin Foundation will assist the Working Group in writing a response to the USFWS regarding the January 12, 2001 Federal Register discussion of the relationship between the Yolo Bypass and Sacramento Splittail (see attached).

4. Jones & Stokes will give the Working Group contact database to the USACE Sacramento and San Joaquin Comprehensive Study (Comprehensive Study) team to ensure that the Working Group receives future Comprehensive Study information.

5. Jones & Stokes will identify the point of contact and mailing list for Sacramento County projects, so the Working Group can stay informed about new developments taking place in Sacramento County.

SUMMARY OF MEETING

Introduction

Mr. Ceppos began the meeting by welcoming the group. He asked if there were any changes or additions to the December 15, 2000 meeting minutes; Mr. Selby Mohr handed in comments on the minutes that needed clarification. The first paragraph on page 6 will be changed to read as follows:

> Mr. Ceppos reminded the group that there is a difference between capacity and flood risk. Capacity can stay the same, while risk can increase. Depending on location within the Bypass and the scale of a flood event, a landowner may or may not experience inundation. For example, a 10-year flood event may only inundate certain parts of the Bypass, while other areas experience no inundation at all. However, with a 100-year flood event everyone in the Bypass will be flooded; this event will result in the maximum height flood waters are ever expected to reach. A 100-year flood means that in any given year there is a 1 in 100, or 1%, chance of a flood of a specific size. There was not a lot of flood data when the Bypass was built. Therefore, since more data has been gathered since the 1950's, what was thought to be a 100-year flood prior to then has changed. There are also global climate trends that can act to skew data. So, with more data and a better understanding of data there is a more accurate understanding of what a 100-year flood event actually is. As a result, the historical design of the Bypass does not necessarily accommodate a 100-year flood event.

With this change, the December meeting minutes were adopted as final.

Attendees of the meeting introduced themselves. Mr. Ceppos then introduced Ms. Sue Fry from the USACE to discuss the Comprehensive Study.

Sacramento and San Joaquin Comprehensive Study

Ms. Fry explained that the Comprehensive Study's mission is to "develop a system-wide comprehensive flood management plan for the Central Valley to reduce flood damage and integrate ecosystem restoration." The study focuses on Hydrologic and Hydraulic Analysis, Geographic Information Systems (GIS) database and mapping, Riparian and Wetland Resources Inventory, Flood Damage Analysis, Ecosystem Function Model Design, policy and institutional issues and constraints, plan formulation, and outreach. Ms. Fry introduced Mr. Merritt Rice, also from the USACE, to describe each focus.

Mr. Rice explained that Hydrologic and Hydraulic Analysis of a system involves looking at the synthetic hydrology and reservoir operations to complete a hydraulic model of the system. Synthetic hydrology uses historical storm and natural flow data to determine the total volume and spatial distribution of water to create a hydrograph of unregulated flows which simulates the input of water into a reservoir. The unregulated hydrograph is then used to do reservoir operations modeling. Reservoir operations modeling is used to simulate reservoir conditions, reservoir/river system relationships, flood flows, flow frequencies, reoperation scenarios, and ecosystem restoration opportunities. The output data from reservoir operations modeling from all the reservoirs in the system are then plugged into a hydraulic model. The hydraulic UNET and FLO-2D models are being used for the Comprehensive Study. The UNET model is used to determine river flow routing by looking at river conveyance, transient storage, and levee conditions/alterations, and by then assessing these conditions under different flood management system capacity scenarios. The FLO-2D model is used to assess different levels of levee failure and subsequent flows through a flood plain for a specific scenario. The end result of this system analysis is an overall prediction of what could occur in a system in a given natural event such as flood or drought conditions.

Mr. Rice continued that, with this information, different scenarios can be looked at to investigate and evaluate areas of importance within a system, such as levee integrity and composite inundation analyses. Levee integrity is largely a function of strength. Weak levees are usually not engineered and are made mostly of sand, while strong levees are highly engineered and are made of clay. Strong levees usually do not fail until water spills over the top and erodes the backside of the levee.

Composite inundation analyses look at where different storm centers could occur and how such a storm would affect other areas in the river system. The result of this is a preliminary mapping of the composite inundation areas for the Sacramento and San Joaquin River Basins. These maps can be used to determine and designate areas for floodways and flood control.

Most of this mapping is done using GIS. GIS has also been used to map baseline topography, land use, historically flooded areas, wetland and riparian resources inventory, and other data to create an overlay system. This overlay system can help planners determine areas that would be supported and benefitted by system elements such as a levee's riparian vegetation, and river bank protection improvements and to come up with alternative plans for providing these system elements. Most of the GIS mapping for the Comprehensive Study is complete.

Mr. Rice explained that Flood Damage Analysis uses the HEC-FDA model that integrates Hydrologic and Hydraulic Analysis and economic data to be an evaluation tool and to aid in the formulation of plans to reduce flood damage. These plans may be both structural (levees) and non-structural. The purpose of a Flood Damage Analysis is to look at populations at risk under different flood depths and conditions which are then associated with other potential risk factors to create a graphic of potential risk areas.

An Ecosystem Functions Model is being created by the Comprehensive Study team using the GIS overlays to evaluate different ecosystem restoration alternatives. These alternatives will be

joined with the rest of the Comprehensive Study findings to produce a feasability report that the USACE will distribute to Congress, other agencies, and the public.

Mr. Rice explained that the feasability report will use collected data to formulate alternatives for initial projects. These initial projects will: be complete and separable; compatible with the Comprehensive Study Framework Plan; effectively meet flood damage reduction and ecosystem restoration objectives; and be acceptable to agencies and the local public. These alternatives will be evaluated and then included in the document.

The concept plan strategy is to provide balance by creating a specific level of system performance for flood control and by maximizing habitat values and restoring natural river processes for ecosystem restoration. The initial concept plan is focusing on restoring advertised capacity system-wide (see Attachment A for the Yolo Bypass' advertised capacity), not making conditions worse, and integrating environmental restoration.

Ms. Fry concluded the presentation by saying that the Comprehensive Study team is working to develop plan alternatives. She then asked if there were any questions.

Mr. Martinez asked if prior studies were used to get cross sectional data for the UNET model.

Mr. Rice answered that cross sections were taken from bank to bank and levee-to-levee. The average cross section was taken every 1,000–2,000 feet depending on the area they were looking at.

A Working Group member asked who they could call to find out the relationship between specific levee design levels and levee capacity.

Mr. Rice gave his phone number, which is 916-557-6761.

Mr. Harvey asked if the ecosystem design projects will compliment ongoing ventures of organizations such as CALFED and Central Valley Joint Habitat Venture.

Ms. Fry answered that the Comprehensive Study team is in direct communication with other groups.

Ms. Barton asked if the initial projects take into account the potential comprehensive affects in the Bypass.

Mr. Rice replied that all projects will be complete and separable and they cannot increase negative impacts. He reiterated that this situation is difficult since flood-related issues are so related throughout a given river system.

Mr. Egan asked if the Working Group would have access to the information papers about the initial projects.

Ms. Fry answered that the USACE could send the information papers to the Working Group if the USACE can be given contact information.

The Working Group agreed to release this information to the USACE. If any stakeholder wishes this information to be withheld, they are to contact Jennifer Stock or Dave Ceppos of Jones & Stokes at 916-737-3000 or Robin Kulakow of the Yolo Basin Foundation at 530-756-7248.

Mr. Thompson stated that there is a lot of new development going on in Sacramento, and he is concerned that this is adding to the amount of water entering the Bypass. He asked if the Comprehensive Study team could take an active part in making sure certain restrictions, such as retention ponds, are placed on these new developments.

Mr. Rice replied that local land use restriction is the jurisdiction of cities and counties, and therefore, it is up to them to make restriction changes. The Comprehensive Study defines what increases flooding in the Sacramento and San Joaquin River Basins. A created project resulting from the Comprehensive Study is evaluated and modified to avoid any potential increase in flooding. This information will be distributed to the cities and counties; it is up to these governing bodies to use this information to guide local development restrictions.

Mr. Ceppos asked Mr. Pineda if the Reclamation Board is involved in determining local development restrictions.

Mr. Pineda answered that it is something the Reclamation Board and staff are working on. He stated that staff comments about increased run-off volumes (from proposed projects) contributing to flooding problems are not always addressed by project proponents. He also stated that the Reclamation Board does not regulate such development outside of floodways and the state flood control project..

Mr. Ceppos asked who is the regulatory body that would deal with this issue.

Mr. Pineda responded whoever the lead agency is— the city, county, etc. This issue is a statewide concern of local activities, and the Reclamation Board encourages cities and counties to join the National Flood Insurance Program.

Mr. Dennis Murphy asked if the USACE approved the diversion of water from the City of Winters to Chickahominy Slough and Putah Creek. He pointed out that such a diversion increases flows into the Bypass.

Mr. Rice said that to divert water would require a permit and any project proponent would have to go through the permit process, including a public notification and comment period.

Ms. Barton added that she remembered having seen a notice of it in the newspaper.

Mr. Thompson asked if the Working Group could be put on a contact list to be notified of new developments taking place in Sacramento County.

Mr. Ceppos committed to finding an answer and reporting it to the Working Group.

Mr. Ceppos introduced Mr. Bob Childs, project manager of the Lower American River Project, from the USACE, to present on the proposed Folsom Dam modifications, Lower American River Project, and the related implications to flood flow management in the Yolo Bypass.

Folsom Dam Modifications, Lower American River Project, and the Yolo Bypass

Mr. Childs explained that he has been working on this project since 1986.

The 1999 Water Resources Development Act initiated the Folsom Dam Modification Project that proposes to increase flood control for the City of Sacramento. There have been several plans to accomplish this. The Folsom Dam Raise Plan would increase the holding capacity and enlarge existing outlets on the dam to increase the amount of water that can be held and released during the early stages of a flood event. The dam could potentially be raised from 480 feet to as high as 492 feet. This would allow construction to occur without having to drain the reservoir and rebuild major portions of the dam. If the dam were to be built higher than the proposed maximum 12 feet, there would be two summer seasons without water reserves in the reservoir. The additional 12 feet of height would increase capacity by 10%, holding larger events, while keeping outflows the same. A proposed Stepped Release Plan has been designed to increase the release from the dam from 115,000 cubic feet per second (cfs) to 145,000–180,000 cfs, in large events, with early releases in the beginning stages of these events. At the confluence of the American River and the Sacramento River, this extra flow would split with part of the flow going down the Sacramento River and part of the flow going into the Yolo Bypass. The initial plan alternative is to modify the Sacramento Bypass to accommodate the flow split. The USACE would need to look at new models (UNET, etc.) to determine how to offset impacts. The Yolo Bypass would potentially experience 0.7 foot more water in the Bypass. To accommodate this there could be modifications in the Bypass such as setback levees and modification of flow obstructions. A cost-benefit analysis needs to be completed and all options evaluated before any of these ideas are finalized.

The USACE will develop two alternatives and compile a report and then put it out for public review to get comments on what everyone (local government and the public) would like to do for flood protection for the City of Sacramento. They have not yet arrived at any answers. From an early economic standpoint, raising Folsom Dam seems feasible while the costs of increasing the capacity of the Sacramento Bypass might exceed the benefits.

Mr. Thompson asked if there are many people around the Folsom Reservoir now that would experience a loss due to an increase in the water level.

Mr. Childs responded that there really are not, since it is state-owned land. Also, the reoperation of the dam would not really change summertime flows or water surface elevations. The reoperation would lower the peak and spread it out over a longer period of time.

Mr. Tadlock asked if there could be a third plan to create another dam that would serve to create hydroelectric power (considering the current power crisis), flood control, and recreation.

Mr. Childs said that this is something that individuals or the group would need to take up with local politicians. Washington, D.C. sees Folsom Dam as the only means of flood control for Sacramento.

SAFCA Interest in Yolo Bypass

Mr. Butch Hodgkins of SAFCA elaborated on the topic of another dam. He went to Washington, D.C. in 1994 and 1996 to lobby for the building of Auburn Dam. However, there are two national grass root organizations that are opposed to the dam. Because they are so organized, they've had the ability to call all of the different offices of Congress, while those who support the dam have not mobilized such an effort. In 1994, the Auburn Dam proposal did not get past the floor in the House of Representatives. In 1996, there was a Republican controlled government, and they did not even get to the floor. It is Mr. Hodgkins' opinion that it is a better project, but that the politics in Congress make it impossible to get the proposal passed. SAFCA was formed to assist in political support to build the Auburn Dam. By 1992 the consensus for such a project was minimized. He also pointed out that the best function of Auburn Dam would have been to be a flood control project. Due to flow on the north and middle forks of the American River, it would not have had the capacity to make a significant amount of hydroelectric power.

Mr. Childs said that his report may include a recommendation of need for an upstream reservoir but will not name Auburn as that reservoir.

Mr. Murphy asked if the Port of Sacramento ship channel and levee has increased the amount of water in the Bypass.

Mr. Hodgkins answered that he has never seen any data about that issue, but it is his gut reaction that it probably did minimize the Bypass's capacity.

Mr. Yates asked what level of event would warrant the increase of release from 115,000–145,00 cfs.

Mr. Childs responded that it would be a 50-70 year range.

Mr. Hennelly said that there has not been much new on-stream storage constructed in the last 20 years; it has been mostly off-stream storage. Environmentalists are still opposed to on-stream storage, and CALFED does not call for it in their programmatic documents.

Management Strategy

Mr. Ceppos told the Working Group that the interim final Management Strategy document will go out by the end of February. New comments will be noted in shaded text. All comments have been additive and not conflictive. Some comments were constructively critical, while others said that the project team has done a good job thus far. The interim final document will be the last chance to provide any input. Mailing packets and instructions about how to submit comments will be provided with the document to ensure consistent and timely responses.

Mr. Selby Mohr suggested that Working Group members write a letter telling what they have gained from the group and that they support the efforts of the document or that they do not.

USFWS Splittail Issue

Mr. Ceppos presented recently acquired information regarding USFWS statements in the January 12, 2001 Federal Register regarding Yolo Bypass being a threat to splittail. The register reads that there would need to be 30 days of flooding in the spring, a review of pesticides use, and other requirements. He stated that the formal comment period closes on February 12, 2001.

Mr. Harvey stated that he was very surprised by this, as well. This view of the Yolo Bypass is a minority view within his agency; and he has already weighed in on this with the agency.

Mr. Hennelly said the California Waterfowl Association is writing a letter to show their disapproval of the statements in the Federal Register.

Mr. Martinez asked if Mr. Sommer could make any information he has about his findings on pesticides' effects on splittail available to those interested.

Mr. Sommer said yes, and that he has not found any evidence that pesticides are a problem.

Mr. Staker stated that floods in March and April flush the Bypass, and therefore, pesticides causing any problems for splittail seem ludicrous since the timing is off.

The Working Group agreed that Ms. Cherovsky, Mr. Palmer, and Mr. Martinez would work together to draft up a response to the register on behalf of the Working Group and that Jones & Stokes and the Yolo Basin Foundation would support this effort.

Mr. Staker stressed that the Working Group response letter should be in addition to individual comments.

Mr. Harvey asked if the language in the Federal Register would jeopardize the Management Strategy.

Mr. Ceppos answered that it would not, since the document is addressing many other issues including splittail.

Mr. Ceppos adjourned the meeting at 1:30 p.m.

The Yolo Bypass Working Group

February 12, 2001

Field Supervisor
Sacramento Fish and Wildlife Service office
U.S. Fish and Wildlife Service
2800 Cottage Way, Suite W-2605
Sacramento, CA 95825

Subject: Notice of reopening of comment period on the threatened status of Sacramento splittail. Federal Register: January 12, 2001 (Volume 66, Number 9) and the impact of notice to Yolo Bypass landowners and water users.

The Yolo Bypass Working Group is pleased to provide the U.S. Fish and Wildlife Service (USFWS) comments on the subject matter of the January 12, 20001 Federal Register (Register), regarding the reopening of the comment period on the threatened status of Sacramento splittail (splittail).

The Yolo Bypass Working Group (Working Group) is a collection of over 70 stakeholders directly related to, and affected by activities and management of the Yolo Bypass (Bypass). These stakeholders include landowners and landowner tenants (including agricultural and managed wetlands land and water users), local adjacent governments, and flood management agencies. The Working Group was initiated in 1999 by the Yolo Basin Foundation (Foundation), a non-profit organization dedicated to education about the Bypass, and communication and assessment of issues regarding the Bypass. The Working Group was formed initially to develop a long-range vision of the Bypass. This vision has been captured in the Working Group's draft document '*The Yolo Bypass Management Strategy' (to be completed in February 2001)*. This vision describes the Bypass as a place where agricultural, managed wetlands, and other habitat-based land uses may coexist in a mutually beneficial environment. The goal of the development of the Management Strategy has always focused on providing future interested parties, a locally-driven vision of what the Bypass should and could be. This vision is in the context of the Bypass being a primary flood conveyance facility, and a place where many landowners earn their living.

For the past year and ½ , the Working Group has been holding meetings to discuss critical flood control, economic, water management, and habitat related issues. Due to the proposed USFWS North Delta National Wildlife Refuge, staff from the USFWS refuge planning department have regularly attended these meetings. The Working Group is aware that the USFWS is a multi-departmental organization. However, through the efforts of the Foundation and USFWS refuge planning staff, it has been the Working Group's understanding that USFWS regional leadership have been clearly aware of the Working Group's efforts. In that light, the Working Group is particularly displeased with the USFWS language in the January 12, 2001 Register. In summary, the Working Group feels that the USFWS text of the Register:

- Ignores the fact that existing programs (e.g. CALFED) could improve fish habitat conditions without having to list species as endangered (such listings will cause significant hardship to the flood control functions and farming aspects of the Bypass);

- Ignores and invalidates the important resource and stakeholder-based planning efforts by the Working Group (and the results of our consultants and regional expert's findings);

- Ignores the realistic economic needs and conditions of landowners in the Bypass; and

- Indicates a fundamental lack of understanding of the function, operations, and aquatic ecology of the Bypass.

A more specific analysis of Register text follows.

Text on pages 9 and 13 of the Register refer to "operations" of the flood bypass. As previously stated, this reflects a fundamental lack of understanding of the bypasses. The flood bypasses of the Sacramento River State and Federal Flood Control Project (FCP) are by design, non-operational. With the exception of the Sacramento Weir, all of the flood relief structures (FRS) in the FCP are grade control structures with no operational parts or practices. All FRS in the FCP spill at specific flows in the Sacramento River. To infer that the bypasses are operational and by default could be operated differently, is fundamentally incorrect.

The Working Group has been privileged to have held educational discussions regarding Sacramento River and Delta fisheries with acknowledged specialists such as Ted Sommer of California Department of Water Resources, and Warren Shaul of Jones & Stokes consultants. It is the opinion of the Working Group that the USFWS position regarding the Bypass being a "threat" to splittail is contrary to all of the published literature on splittail and to the opinion of scientific experts. A "threat"by definition (and with regards to affected species) is something that adversely affects that species; if a "threat" is removed, the status of the species improves. It is the understanding of the Working Group that the Bypass (in its current state) is one of the single most important habitats for splittail in the San Francisco Bay- Sacramento/San Joaquin River Delta region.

With regards to information provided to the Working Group by fishery experts, the assertion that the entire Bypass needs to be inundated for 30 continuous days between March and April is erroneous and unfounded. Furthermore, it is detrimental to the economics of the Bypass and in light of the important work being conducted by the Working Group, such a pronouncement is extremely counterproductive to a stakeholder-based vision of the Bypass. The Working Group has been told that controlled inundation of isolated parcels could be a means to provide additional spawning habitat for splittail. This has been, and will be an area of future discussion among landowners that might be willing to be involved in such a conservation endeavor. For the USFWS to suggest that full inundation of the Bypass is the most practical approach to protect this species reflects a lack of scientific basis, a lack of sensitivity to the Working Group's efforts, and a lack of understanding of the importance that Bypass plays on

flood management. It also appears that the USFWS' Bypass inundation proposal would also be detrimental to the state's water supply in "below normal" water years.

Similarly with regard to input from the fishery experts, it is the Working Group's understanding that there is presently no scientific basis for the assessment and regulation of pesticide use. Furthermore, the period of time identified as being critical for splittail spawning is at the end of the wet/flood season. In normal years, the Bypass would have already been inundated periodically by flood flows. Such flows would have flushed any potential residual agricultural amendments downstream, long before the target time frame for spawning. Again, such an assertion reflects a fundamental lack of understanding by the USFWS regarding the function of the Bypass.

Regarding stranding issues in the Bypass, it is the understanding of the Working Group that splittail stranding on floodplains after flood waters recede is unfounded. Studies on the Cosumnes River, Sutter Bypass and Yolo Bypass show that splittail are very effective at emigrating floodplain habitat after flood waters recede.

Lastly, the USFWS position will undoubtedly create critical social setbacks for future restoration activities in the Bypass. The blatant threats of inundation without compensation, and enhanced regulatory burden of pesticide regulation are completely contrary to the consensus-based, resource planning approach of the Working Group. Such language will only cause more distrust and more hesitancy among a group of landowners that are already highly suspicious of the motives and actions of the USFWS within the Bypass. A more appropriate and wise approach for the USFWS would be to wait for the final version of the Yolo Bypass Management Strategy and to then work with stakeholders, rather than against them.

In closing, this letter has been written at the direction and approval of the Yolo Bypass Working Group to formally challenge the validity and logic of the USFWS approach and comments in the January 12, 2001 Register.

cc: Congressman Doug Ose
Senator Dianne Feinstein
Senator Barbara Boxer
Yolo County Supervisor Tom Stallard
Yolo County Supervisor Dave Rosenberg
Yolo County Supervisor Lynell Pollock
Yolo County Supervisor Lois Wolk
Yolo County Supervisor Mike McGowan
Ted Sommer, California Department of Water Resources
Pete Rabbon, General Manager, State Reclamation Board
Robin Kulakow, Yolo Basin Foundation

YOLO BYPASS WORKING GROUP
MEETING NO. 16

DRAFT
MEETING MINUTES

MEETING DATE: September 20, 2001

LOCATION: California Department of Fish and Game
Yolo Wildlife Area Headquarters
45211 County Road 32B (Chiles Road)
Davis, CA 95616

IN ATTENDANCE:

Robin Kulakow, Yolo Basin Foundation
Dave Feliz, California Dept. of Fish & Game (DFG)
Don Stevens, Glide-In Ranch
Chris Fulster, Glide-In Ranch
Mike Egan, Yolo Flyway
Selby Mohr, Mound Farms
John Currey, Dixon Resource Conservation District
Rick Martinez, Martinez Bros. Farming
Mark Kearney, Landowner
Ron Tadlock, Tadlock Farms
Al Wright, DFG
Dennis Kilkenny, Dawson Duck Club, No Man's Land Fire District
Chris Unkel, The Nature Conservancy
Lori Clamurro, Delta Protection Commission
Mike Hardesty, Reclamation District 2068
Dennis Murphy, Murphy Farms
Ed Towne, Bull Sprig Outing
Greg Schmid, Los Rios Farms
Duncan McCormack III, Yolo Ranch
Mark Hennelly, California Waterfowl Assn. (CWA)
Robert Gill, Landowner
Pat Perkins, DFG
Boone Lek, California Dept. of Water Resources (DWR)
Ted Sommer, DWR
Ray Thompson, Skyraker Duck Club
Mary Ellen Baldwin, aide to Supervisor Lois Wolk

Currently, a Memorandum of Understanding (MOU) between DWR, the State Reclamation Board the U.S. Fish & Wildlife Service (USFWS), the U.S. Army Corps of Engineers, and DFG affirms that the primary purpose of the Bypass is flood control and that the Wildlife Area would not be managed specifically for threatened and endangered species.

A lot of public use takes place in the existing Wildlife Area. So far, 6,000 hunters have used the land; within that group, the number of junior hunters has doubled. So far, the education program has had 7,700 youth and 600 parent participants who came to learn about wildlife.

The newly acquired lands have variable vegetative features. Glide Causeway Ranch is used for the production of wild rice, safflower, and tomatoes. Tule Ranch has some grazed and some fallow lands. DFG wants to continue the grazing, as grazing is an integral part of grassland management. Feed may be grown through agricultural leases. Surplus lands not useful to DFG could potentially be sold back to interested parties.

Mr. Feliz addressed several issues discussed in the Assurances section of the Management Strategy.

- With regard to water for private wetlands, he stated that there needs to be a reliable supply or water for the adjacent duck hunting clubs. DFG will help insure the supply (for example, through Glide Tule Ranch) and share the operation and maintenance costs as is currently done with the Los Rios ditch system. He also noted that DFG will not transfer water out of Yolo County.

- Regarding safe harbor agreements, DFG hopes to expand the MOU to include the newly acquired lands.

- DFG also plans to maintain a realistic perspective on agricultural use; although the Bypass is a "tough place to farm," DFG will maintain all existing leases until the management plan is in place. Ultimately, agricultural activity will remain as another management tool.

- A hunting program will be maintained on the newly acquired lands that will include hunting of upland game and waterfowl.

- Fishing and other public uses will be maintained.

- The state will pay Yolo County in lieu property fees equivalent to current property taxes.

- Lastly, Mr. Feliz stressed that a management plan for the newly acquired lands will be developed by DFG and that the Working Group will be the forum to include the voice of the local landowners and stakeholders.

Mr. Fulster asked if the land purchase transaction had been completed.

Mr. Kilkenny said he thinks the purchase is a good thing but that the Working Group is supposed to be notified about such things. He further stated that he and others have attended these meetings for 2 years and have been led to believe that they were to be kept aware of such situations. He is concerned and wanted to have it on record that such a situation as conducted by the State on this land purchase seems to invalidate the whole stakeholder process.

Mr. Ceppos said that he had been contacted by a few other members of the Working Group who also expressed concern and disappointment about not having been notified of the transaction.

On a different topic, Mr. Mohr asked if DFG expects the 1986 flood levels to be exceeded.

Mr. Feliz said there is no way to know the answer to that question.

Mr. Ceppos noted that the U.S. Army Corps of Engineers' environmental documents for the Lower American River and Folsom Dam reoperations projects are out and that they supply information on this topic.

Mr. Wright noted that the expansion for flood capacity won't be locked in and that the potential for an increase is always there.

Mr. Hennelly stated that the California Waterfowl Association supports the acquisition and offered support to DFG.

Mr. Egan expressed concern about trespassing by the public into nearby private lands.

Mr. Feliz responded that the boundaries for the Wildlife Area will be clearly marked and that DFG would work toward increasing DFG personnel to enforce trespass laws.

The Nature Conservancy's Role in the Yolo Bypass Land Acquisition

Mr. Unkel of TNC provided background information on the events leading up to the land acquisition by the state. He explained that there is a big difference between land use allocation and land use acquisition. Land acquisition is a private process. Also, in this case, the landowner required discretion. Initially, TNC was interested in acquiring the Glide Jepson Prairie property, which contains key wildlife habitat. TNC representatives had made approaches and had discussions with the Glide family about this property since 1990. Upon the death of 2 Glide family property owners, all of the Glide properties went to the Glide Foundation. Then when Peggy Colby (the last owner) passed away, the heirs decided to sell property that included 4 ranches: the Wilcox, Giverson, Tule, and Causeway ranches.

Russell White, the representative of the Glide Foundation, rejected the initial TNC offer to purchase the properties. A land developer then offered 25 million dollars and received a 6-

Ms. Perkins asked what the geographic scope of the modeling would be.

Mr. Lek said that it would encompass the entire Bypass. Mr. Hardesty and Mr. Harvey stated a concern about what is meant by the "entire Bypass."

Mr. Ceppos suggested the Mr. Lek talk to Mr. Harvey and Mr. Hardesty about the modeling scope. He continued his discussion of the direction of the Working Group by noting that CALFED has funded a socioeconomic study related to changes in land use in the Bypass. This and other issues identified in the Management Strategy document will be the topic of many more Working Group meetings. Mr. Ceppos then asked Mr. Feliz to discuss the Wildlife Area management plan.

Yolo Wildlife Area Expansion Management Planning Process

Mr. Feliz explained that the opinions of the Working Group will be included in the management plan document and that these opinions will be considered prior to going through the CEQA process. Also, the progress of the project will be reported to the Reclamation Board, the Yolo County supervisors, and the Working Group. The plan may be organized by elements or biological units and will specify goals. For example, one goal of the waterfowl element might be to increase nesting mallards. Some of the public use elements will be hunting, wildlife viewing, public tours and trails, education programs, and fishing. Some of the management elements are wetlands, agricultural leases, and new headquarters for the Glide Tule Ranch. As part of the management plan project, specific goals for these and other elements will be established.

Mr. Fulster asked what percentage of the newly acquired lands will be kept in farming and opened for hunting.

Mr. Feliz said that agricultural fields will continue to be an important source of food for waterfowl and other wildlife, but the percentage of land to be kept in agricultural use is not yet determined. Likewise, hunting will be allowed but the percentage of land to be designated for hunting isn't established yet. He said that DFG needs to know where the landowners want the closed lands to be located so as not to impact the duck clubs.

Mr. Hennelly asked if the new Wildlife Area lands would be affected by the 60/40 hunting use split as mandated at the federal level.

Mr. Feliz responded that there are no strict regulations on state lands as there are onfederal lands.

Mr. Hardesty asked how DFG plans to deal with outbreaks of avian cholera

Mr. Feliz responded that DFG takes the lead on addressing outbreaks of cholera in the Delta, including cleanup on private lands.

Mr. Feliz said they are assigned to specific regions and are not supervised by himself. They work for the Wildlife Protection Branch. He said additional refuge staff that are not wardens are also helpful. They don't make arrests, but do take down information and make reports about problems that need law enforcement attention. Wardens will be in the vicinity on most hunt days.

Mr. Hardesty asked if all land acquired is in the Bypass.

Mr. Feliz said he thought that roughly 12,000 acres are inside and that fewer than 1,000 acres are outside.

Mr. Hardesty asked if anyone knows if there was a price difference between the 2 locations.

Ms. Perkins commented that DFG staff won't be aware of actual acreages and land costs until after close of escrow.

Mr. Fulster said he understood that $1,330 per acre was paid for the Glide property. Mr. Feliz said he doesn't think property outside the Bypass sells for more than property inside the Bypass.

Mr. Kearney asked if mineral rights will be obtained in the sale.

Mr. Feliz said they would not. Mr. Ceppos told the group that he and Robin will send each member a questionnaire with a list of issues already identified as needing to be addressed. The questionnaire will also ask for issues for discussion not already on the list, and for input on logistics such as meeting times. The information gathered from the questionnaire will set the stage for future meetings.

Mr. Ceppos adjourned the meeting.

YOLO BYPASS WORKING GROUP
MEETING NO. 17

MEETING MINUTES

MEETING DATE: October 25, 2001

LOCATION: California Department of Fish and Game
Yolo Wildlife Area Headquarters
45211 County Road 32B (Chiles Road)
Davis, CA 95616

IN ATTENDANCE:

Robin Kulakow, Yolo Basin Foundation
Dave Feliz, California Dept. of Fish & Game (DFG)
Don Stevens, Glide-In Ranch
Chris Fulster, Jr., Glide-In Ranch
Dick Goodell, Glide-In Ranch
Selby Mohr, Mound Farms
Rick Martinez, Martinez Bros. Farming
Margit Aramburu, Delta Protection Commission
Mike Hardesty, Reclamation District 2068
Dennis Murphy, Murphy Farms
Ed Towne, Bull Sprig Outing
Bob Dorian, H Pond Ranch
Bob Leonard, Yolo Basin Farms
Ric Reinhardt, MBK Engineers
David Brown, Yolo County Mosquito Vector Control District
Tom Harvey, U.S. Fish and Wildlife District (USFWS)
Mark Hennelly, California Waterfowl Assn. (CWA)
Elizabeth Soderstrom, Natural Heritage Institute
Campbell Ingram, CALFED
Pat Perkins, DFG
Ray Thompson, Skyraker Duck Club
Selene Jacobs, Jones & Stokes
Dave Ceppos, Jones & Stokes

NEXT MEETING: The next meeting will be held January 15, 2002 from 10:30 a.m. to 1:00 p.m. at the Yolo Wildlife Area Headquarters.

ACTION ITEMS:

1. Jones & Stokes will provide a copy of the Sacramento-Yolo Mosquito and Vector Control District's California Environmental Quality Act (CEQA) Negative Declaration for review.
2. Jones & Stokes, Yolo Basin Foundation and California Waterfowl Association will coordinate scheduling of a subcommittee meeting to discuss the impacts of Sacramento-Yolo Mosquito and Vector Control District activities on migratory waterfowl.
3. Jones & Stokes will send a copy of the Yolo Bypass Management Strategy to Mike Coleman.
4. Mike Hardesty will provide information on the State Board of Reclamation-owned Giant Garter Snake habitat at the next Working Group meeting.
5. Dave Feliz will provide information on midge populations.
6. Mark Hennelly will forward information on Assembly Bill 299 to Jones & Stokes.
7. David Brown will provide contact information on the weather station at the McCormack property for the meeting minutes.

Mr. Ceppos called the meeting to order and introduced David Brown, Director of Mosquito and Vector Control for Yolo and Sacramento counties (MVCD). Mr. Brown discussed the MVCD's interest in collaborating with local landowners to support their efforts while protecting public health.

Mr. Brown provided an overview of the activities and responsibilities of the MVCD. The MVCD adopts an integrated pest management approach, and wants to explore water management methods to control pest infestations in the Yolo Bypass and associated diseases in nearby human populations. Some of the activities in which MVCD is currently involved include:

- ⇒ Working with landowners to reduce pesticide applications using water management practices;
- ⇒ Producing and using mosquito fish in biological control efforts to manage some of the 25 species of mosquitoes found in this region; and
- ⇒ Treating aquatic larval sites to reduce the need for pesticide application.

Mr. Brown identified some constraints to effective pest management as:

- ⇒ Warm climate and abundant flood waters;
- ⇒ Restrictions on aerial spraying for six days following the September 11 terrorist attacks in New York and Washington, D.C.; and
- ⇒ National Pollutant Discharge Elimination System (NPDES) restrictions. On March 12, 2001, in Headwaters, Inc., et al. vs. Talent Irrigation District, the 9th Circuit Court of Appeals ruled that an NPDES permit is required when applying pesticides to navigable waters. However, the interpretation of this ruling has been unclear. The organization Delta Keeper supports the Appeals Court decision requiring an NPDES

permit. Some members of Congress have appealed to The U.S. Environmental Protection Agency (EPA) to issue an interpretive rule advising the public that pesticide application to waters of the U.S. does not require an NPDES permit. The EPA is working to clarify the specific restrictions and requirements of the NPDES rules in this matter. Additionally, an exemption for agricultural activities is being considered, as the current regulations expire in 2003.

Mr. Stevens asked if the MVCD has ever produced an environmental document that addresses harassment of waterfowl. Mr. Brown indicated that he does not think so, as the CEQA document produced by the MVCD was a Negative Declaration. The document did not evaluate impacts of aerial flying and spraying on waterfowl and habitat. However, the MVCD has worked with a number of groups that have determined that MVCD activities do not have significant negative effects on waterfowl. Mr. Ceppos added that Jones & Stokes will provide copies of the CEQA document for review at the next meeting. A participant asked if ducks consume significant numbers of mosquito larvae. Mr. Brown answered that they do not, but that a recent concern has been the West Nile Virus. Although corvids (e.g. blackbirds, crows) are more vulnerable to the virus, ducks serve as hosts for the disease. Mr. Brown indicated that the virus is currently found as near as Louisiana and the Caribbean, and that the best way to prevent its spread to California duck populations is to limit mosquito populations while ensuring activities do not impact landowner programs.

One participant asked if there is an alternative to aerial spraying, as the MVCD's spraying 2 to 3 days prior to the season's opening is scaring away ducks in the Yolo Bypass. Mr. Brown responded that the MVCD is interested in working with landowners to resolve these types of issues.

One participant asked how often the MVCD conducts aerial sprays. Mr. Brown responded that spraying is not done according to a set calendar, but that efforts are being made to coordinate spraying with landowner activities. B.t.i (*Bacillus thuringiensis israelensis,* a compound that specifically targets larvae) and IGH (insect growth hormone, which prevents adult development) are being used to reduce disturbance impacts to waterfowl concentrations. The MVCD is concerned that mosquitoes may develop resistance to applied treatments.

A participant asked if it is possible to apply the IGH before flooding. Mr. Brown indicated that it is possible, but that the use of these products is regulated by the U.S. EPA and California EPA. He stated that the MVCD can require landowners to be responsible for mosquito control, but that he would prefer not to do that.

A participant asked if pretreating with Altocid methoprene pellets is still being done in the Bypass. Mr. Brown answered that Altocid methoprene application is still performed, and that it has been used effectively for eight years. However, resistance has started to develop, hence the need for alternative treatments. Another participant asked if Golden Bear oil is still being applied. Mr. Brown answered that the District is not using pupicides such as Golden Bear oil, and instead targets larvae before they reach the pupal stage, as larval treatment has greater impacts on population control.

A participant asked about the use of gambuzia to control mosquito populations. Mr. Brown stated that gambuzia are ineffective if they do not eat the target species. Different species of mosquitoes have different life cycles. For example, the flood mosquito lays eggs on the ground rather than on the water's surface. The flood mosquito has a 3-4 day life cycle. Other species have a 7-10 day life cycle and lay eggs on the water's surface, and gambuzia are effective in managing these species. Therefore, gambuzia should be used in sites that maintain water and provide habitat to species other than the flood mosquito, rather than in sites that allow water to drain.

One participant asked if B.t.i. applications have been shown to have detrimental effects on midge larvae. Mr. Brown submitted that studies have shown larvae populations to rebound quickly from the applications, indicating no significant effects.

Another participant asked if it makes sense to apply treatments to water before flooding. Mr. Brown responded that it does not, as those treatments do not disperse properly. Another product, Agnique MMF film, is similar to Golden Bear Oil as it has greater impact on air-breathing organisms. However, it can be a problem because it indiscriminately kills all air-breathing organisms, most of which are beneficial to a healthy ecosystem

One participant asked what is the status of use of the fungus that was reported to be an effective treatment. Mr. Brown answered that it turned out to be a disappointment because it was not consistently effective. There is not much incentive for innovators to develop new formulations due to relatively limited uses, but the treatments still need improvement.

A participant asked if the MVCD keeps track of flooding of ponds so that aerial spraying is not unnecessarily repeated. Mr. Brown answered that the District does keep track of spraying, but different products last for different periods of time. The District is working with another bacillus product that recycles, lasting 2-3 weeks rather than 12-24 hours. The District cannot use a 30-day product because it has found that pest resistance develops and the product then cannot be used the following year.

Another participant suggested that it would be a good idea for duck club owners and the MVCD to meet in mid-August each year to develop a schedule of sprays and flooding. Mr. Brown responded that he plans to attend more of the Working Group meetings and to develop alternative methods, including water management methods.

Ms. Perkins stated that the Yolo Bypass Working Group is lucky to be dealing with Mr. Brown, as some abatement districts use treatments that kill everything. She stated that Mr. Brown is willing to consider alternatives, and is interested in adopting a collaborative approach.

Mr. Feliz stated that the DFG is in constant contact with the MVCD from late summer through the onset of the wet season, and that this communication has proven effective.

A participant asked if landowners may contact the MVCD to notify the District of flooding schedules. Mr. Brown answered yes and reiterated that the MVCD is interested in working with landowners to meet their needs. He suggested that many problems are related to water delivery systems, and if water were delivered faster, mosquitoes would have fewer hatching cycles. Only one treatment would be required, rather than multiple treatments. These are the types of innovative approaches the District hopes to develop with landowners.

Another participant indicated that he had worked with the San Joaquin and Contra Costa Vector Control District, and that Ducks Unlimited has conducted a related analysis of differing treatments. Suisun Marsh has also dealt with this problem. He wondered if perhaps Yolo Bypass mosquito control efforts should be treated as a pilot program.

A participant reiterated the importance of communication and indicated that Stone Lakes National Wildlife Refuge has proven to be an example of effective collaboration. The MVCD has acted as an information resource and has demonstrated a willingness to work with others.

Mark Hennelly of California Waterfowl Association stated that CWA has sponsored Assembly Bill 299, the Suisun Marsh Wetlands Enhancement and Mosquito Abatement Demonstration Program. The bill authorizes the Program to devise and evaluate methods by which wetland management techniques in the Suisun Marsh can be better integrated with mosquito abatement programs. These methods include manipulation of the timing of flooding. Mr. Hennelly suggested a similar effort could be established in the Yolo Bypass. Jones & Stokes, Yolo Basin Foundation and California Waterfowl Association will coordinate scheduling of a duck club subcommittee meeting to discuss the impacts of Sacramento-Yolo Mosquito and Vector Control District activities on migratory waterfowl and collaborative ways to solve problems.

CALFED Ecosystem Restoration Program Update

Campbell Ingram of CALFED stated that CALFED is grateful to the Working Group for its efforts in developing the Management Strategy. The next steps for ERP are to reorganize and adapt a regional approach. This will be accomplished by dividing the CALFED study area into 4 regions: Sacramento Valley, San Joaquin Valley, Bay Region, and Delta Region.
Mike Coleman is the Delta Region coordinator, Rebecca Friss is the Sacramento Valley coordinator, and Mr. Ingram is the San Joaquin Valley coordinator. Three hundred twenty projects have been funded throughout the CALFED study area. The regional approach allows CALFED to break out coordination into regions, and coordinators can maintain closer communication with projects such as the Yolo Bypass efforts in their regions.

Mr. Ingram stated that the CALFED Ecosystem Restoration Program (ERP) Proposal Submittal Process closed on October 5, and that at least 3 or 4 proposals were submitted for the Yolo Bypass. These proposals should be posted on the web within one month. All proposals will undergo review by multiple selection panels, and selections should be completed by March 2002.

Mr. Ingram indicated that the ERP expects to receive $20 million from the federal government for this round of funding. The Feinstein-Calvert bill would provide $2.3 billion to the CALFED programs. However, this issue is still being debated in Congress due to San Joaquin Valley water user concerns. Future implementation actions include the ERP staff providing outreach to local groups to identify pertinent ecosystem restoration issues. The resulting input will feed back into the Implementation Plan and will be reflected in future PSPs.

Mr. Hardesty raised an issue regarding the Giant Garter Snake habitat in the southern Bypass. He stated that the Reclamation Board constructed a 6-foot levy around 160 acres of snake habitat, violating permit requirements. He suggested this might be a conflict of interest.

Another participant indicated that CALFED is attempting to develop region-specific subplans for each region with more specificity based on habitats. The Delta Region is the first effort, coordinated by Mike Coleman. The Working Group may want to participate in public review of these subplans.

Mr. Feliz indicated that CALFED will fund the preparation of the management plan for the Yolo Wildlife Area expansion. The Resources Agency still must authorize the action and CALFED must amend the Phase 2 contract. The DFG promised the Working Group involvement in the public input process. The DFG will get funding to do the Management Plan over a period of 2 years.

Working Group Questionnaire Results

Mr. Ceppos stated that the questionnaire was designed to find out if the Working Group is on the right track. The questionnaire asked if Working Group participants think a Working Group Steering Committee should be formed. Currently, YBF and Jones & Stokes develop the agendas for, and coordinate Working Group meetings. Mr. Ceppos asked if the group is satisfied with the meeting format, level of participation, etc.

One participant indicated that differences of opinion create the potential for disagreement with YBF. More control over the meeting process may be desirable because conflict could someday arise. It would be a good idea to have a Steering Committee to provide checks and balances.

Mr. Ceppos stated that YBF has limitations because it is a 501(c)(3) organization and cannot lobby, etc. For this reason, the Working Group may want to form a separate entity.

Another participant stated he thinks "we should not fix what is not broken." Too many committees would complicate the situation.

Mr. Mohr stated that this Working Group is currently comprised of a core group of participants. A Steering Committee would be redundant.

A participant asked if CALFED dictates the priorities. Mr. Ceppos answered, yes but only with regards to the priorities set forth in the recent proposal that CALFED funded. He stated that the Working Group can obviously discuss any number of issues but that it can not expect for those meetings (and all the costs associated with them) to be paid by CALFED. CALFED rightfully has some expectations for their investment of funding. Mr. Ceppos also reminded the group that the current priorities to be focused on were developed by the Working Group in their CALFED proposal.

Mr. Hardesty indicated that the Working Group needs a structure that could survive without a consistent funding mechanism.

Mr. Martinez suggested that Ricardo Pineda and Steve Bradley from the Department of Water Resources (DWR) and the Reclamation Board (respectively) should come to the meetings on a more regular basis.

One participant asked if YBF could keep the Working Group alive. Ms. Kulakow answered that at some point the group needs a life of its own, since YBF is ultimately just another stakeholder.

A participant asked how landowners protect themselves with respect to the flooding issue. Another participant stated that not all Working Group participants are connected. The group needs people involved in issues; who are aware of developments, and have political knowledge.

Mr. Ceppos asked Mr. Reinhardt if someone from the Comprehensive Study should come speak to the Working Group. Mr. Reinhardt responded that the U.S. Army Corps of Engineers (Corps) has recently received criticism of its public outreach efforts, and would likely be willing to attend the meeting. Mr. Ceppos stated that maybe a Corps representative should be invited to the next meeting.

A participant asked for a definition of the Comprehensive Study. Mr. Reinhardt responded that the DWR and Corps are conducting a watershed level study from the Sacramento and San Joaquin River watersheds to the limit of the Delta. The study will develop a programmatic plan and smaller projects focused on flood damage reduction and ecosystem restoration. Additional flood storage (including reservoir and flood plain storage) will be incrementally developed over time. This additional flood storage does not include the Yolo Bypass.

Update on DFG Yolo Wildlife Area Issues

Wildlife Area Expansion

Mr. Feliz stated that there is not much to report on the expansion of the Wildlife Area. Escrow will not close until the end of November. Mr. Feliz is currently discussing lease and easement options with Causeway and Tule Ranches.

Hunting Programs

Recent hunting programs yielded a 3.5 bird average by 94 hunters. The Junior Pheasant Hunt is for hunters under the age of 16. It will be held on November 17. DFG will plant 50 birds. To register, interested parties should send a postcard to the Wildlife Area with name, phone, license number, and adult chaperone's name (adult cannot hunt). Last year, this event had a low turnout, so Working Group participants should make an effort to recruit additional hunters.

There are more pheasants this year because there has been no flooding thus far. Pheasant hunting will take place on Saturdays and Wednesdays from November 10 to December 8. DFG will provide 40 permits per hunt. To register, send a postcard to the DFG Regional Office.

Mr. Ceppos adjourned the meeting.

YOLO BYPASS WORKING GROUP
MEETING NO. 18

MEETING MINUTES

MEETING DATE: January 15, 2002

LOCATION: California Department of Fish and Game
Yolo Wildlife Area Headquarters
45211 County Road 32B (Chiles Road)
Davis, CA 95616

IN ATTENDANCE:

Robin Kulakow, Yolo Basin Foundation
Dave Feliz, California Department of Fish & Game (DFG)
Will Wylie, H Pond Ranch
Jack Palmer, H Pond Ranch
Mike Egan, Yolo Flyway
Steve Jennings, Channel Ranch Duck Club
Richard Smith, U.S. Fish and Wildlife Service (USFWS)
Don Stevens, Glide-In Ranch
Chris Fulster, Jr., Glide-In Ranch
Regina Cherovsky, Conaway Ranch
Duncan McCormack, Yolo Ranch
Selby Mohr, Mound Farms
Rick Martinez, Martinez Bros. Farming
William T. Morgan, William T. Morgan Real Estate
Scott Morgan, William T. Morgan Real Estate
Ken Martin, Rising Wings Preserve
Butch Hodgkins, Sacramento Area Flood Control Agency (SAFCA)
Dennis Murphy, Murphy Farms
Ed Towne, Bull Sprig Outing
Tom Harvey, USFWS
Mark Hennelly, California Waterfowl Association
Elizabeth Soderstrom, Natural Heritage Institute
Campbell Ingram, CALFED
Ted Sommer, California Department of Water Resources (DWR)
Steve Gold, DWR
Boone Lek, DWR
Linda Fiack, Yolo County Resource Management

Pat Perkins, DFG
Mark Kearney
Mike Rushton, Jones & Stokes
Selene Jacobs, Jones & Stokes
Jennifer Walker, Jones & Stokes
Paul Cylinder, Jones & Stokes

NEXT MEETING: The next meeting was scheduled for February 21, 2002 from 10:30 a.m. to 1:00 p.m. at the Yolo Wildlife Area Headquarters however, that date was postponed until May 2, 2002.

ACTION ITEMS:

1. Jones & Stokes and Yolo Basin Foundation will refer to past meeting minutes to determine who has volunteered to participate on the Hunting Subcommittee and report back on their findings at the next meeting.

2. Regarding Endangered Species Act compliance responsibilities of a private landowner with an agency easement that allows flow, etc over the land. Jones & Stokes will assess this issue further and will report an opinion at the May 2, 2002 meeting.

Ms. Kulakow called the meeting to order and introduced Mike Rushton, Jones & Stokes' Principal-in-Charge of the Yolo Bypass Management Strategy project. Ms. Kulakow stated that Mr. Rushton is filling in for Dave Ceppos during his family leave. Ms. Kulakow then introduced Mark Hennelly of the California Waterfowl Association, who spoke in the place of Greg Yarris. Mr. Hennelly provided a summary update of the 2001-2002 Waterfowl Season

Mr. Hennelly stated that 2001-2002 was a poor season for waterfowl hunting. There was poor hunter success at federal and state wildlife refuges and areas, particularly in the first half of the hunting season. The average daily duck bag was the lowest in six seasons. The primary reason for poor hunting is fewer young birds are being produced.

One participant commented that the primary reason for poor hunting is not fewer birds but closed zones. He stated that the only time the birds leave these closed zones is when the Yolo Bypass floods, and that increased sanctuary lands reduce hunting opportunities. Mr. Hennelly agreed that the presence of rice habitat plays a role in hunting success, and that CWA is working to reduce flooded rice fields. He suggested the distribution of sanctuary also influences the availability of hunting opportunities. Another participant indicated that there is increasing concern among the hunting community that public acquisition of additional property in the Bypass will further reduce hunting opportunities.

A participant commented that recent radio telemetry efforts miscalculated the duck count because of anti-hunting sentiment, and therefore the bull sprig limit should be increased. Mr. Hennelly responded that the pintail population has increased over the past few years, but that there is concern among resource agencies that allowing increased hunting limits will excessively impact the population. Agencies working with various flyways of the United States cooperatively develop bag limits that cannot be made more liberal by DFG. A participant asked why DFG regulations are liberal for the take of mallards if production of young birds is lower than desired. Mr. Hennelly answered that Federal regulations are based on midcontinental mallard counts. The state does not impose stricter regulations because most mallards in this region are produced by the state. He suggested that regulations should be more specific to local conditions.

One participant asked why there is the high limit of seven birds if current production is low. Mr. Hennelly responded that he expects moderate federal bag limits across the flyways next year. Another participant asked if the CWA has been lobbying decision makers for lower bag limits. Mr. Hennelly answered that CWA has suggested that low limits make sense if production is low. A participant commented that the hunting season should be scheduled for the last Sunday in January and should allow for a bag limit of five large birds. Mr. Hennelly answered that such a change in regulation would require Federal approval, and that all flyways must agree to a change in the hunting season dates.

Another participant asked how interested parties could provide input on bag limits. Mr. Hennelly answered that people can go to Fish and Game Commission meetings in late summer and early fall to provide input.

Another participant asked if we are appropriately benefiting natural resources by protecting one resource (fish) at the expense of another (birds). Mr. Hennelly responded that these are policy decisions guided by the Federal Endangered Species Act. One participant then asked if hunting is really the limiting factor reducing population. Mr. Hennelly answered that CWA believes that breeding habitat, rather than harvest, has the greatest impact on population. Another participant commented that predation is a significant problem with duckling survival. Mr. Hennelly then answered that Delta Waterfowl Association raised nest survival from 10% to 40% by implementing predator control measures. A participant responded that hawks kill ducklings: "Duck club owners raise ducks and resource agencies raise hawks."

Mr. Hennelly stated that there has been high rainfall this year, and that he therefore expects greater mallard production next year. However, Canada and the Dakotas are still experiencing drought, which may counteract production in this region. Canada is attempting to manage grasslands for ducks and reduce farmland to enhance duck populations.

A participant commented that hunters should be allowed to take three sprig to keep license proceeds up. Mr. Hennelly responded that while this is a good suggestion, the Federal framework must approve changes to regulations. Such a change to bag limits would require the cooperation and lobbying efforts of all conservation groups in the Flyway. Mr. Hennelly expressed the opinion that bag limit decisions must be made on the flyway level. A participant

asked if the Working Group had agreed to form a subcommittee on this issue. Mr. Selby Mohr answered that the Working Group did agree to form a subcommittee on hunting in the Bypass, and that it should be established in the near future. This subcommittee would then address and research the bag limit issue. Jones & Stokes agreed to identify who volunteered to participate on the Hunting Subcommittee and report back on the findings at the next meeting.

Reclamation Board Pope Ranch/Giant Garter Snake Habitat project update

Steve Bradley (Reclamation Board) was not present to address this agenda item. The Pope Ranch project will be discussed at the May 2, 2002 meeting.

Sacramento Bypass Habitat and Hydrology Work Update

Mike Rushton (Jones & Stokes) explained that in 1999 the State Reclamation Board and U.S. Army Corps of Engineers (USACE) initiated the Sacramento Bypass project by dredging material from the Bypass and distributing it on the adjacent levees. Currently, a pond of standing water with no outlet is created whenever the Bypass floods. This in turn can trap endangered fish. The Reclamation Board and USACE attempted to remedy this problem by connecting these ponds to a nearby ditch. However, this effort ultimately resulted in the creation of a larger, permanent pond. The agencies are now attempting to connect this large, permanent pond to the Bypass perimeter drainage system (Tule Canal/Toe Drain). Construction was expected to begin October 1, but was suspended because of giant garter snake concerns.

Ted Sommer (DWR) confirmed that the Sacramento Bypass tends to trap fish, and that the conditions that cause this are worse when gates are not opened. A trickle of water coming through the closed gates can carry fish that in turn become trapped in the Sacramento Bypass ponds.

One participant suggested that there is very little additional water available to put into the Bypass. Another participant asked what is the goal of the project, and was told that the agencies want to drain the ponds completely and provide an outlet for the fish.

Another participant indicated that the Bypass has experienced increased flooding due to development, and asked if this will decrease the presence of pheasant and other waterfowl. He suggested that no efforts have been made to require developers to control runoff. A respondent answered that the DWR/USACE Comprehensive Study is attempting to address these issues.

Sacramento Area Flood Control Agency

Butch Hodgkins (SAFCA) asked the participants what are the specific issues they would like to discuss, and that he would like to participate in a focused conversation. The groups generated the following list of topics to be addressed:

1. Local development
2. Management of tributaries
3. Flood control in the Bypass
4. Habitat restoration in the Bypass
5. Flows on other creeks (Putah, Cache)

Mr. Hodgkins stated that the Comprehensive Study could perhaps provide some insight into how decisions relating to these issues are made.

Endangered Species Act, Safe Harbor, and Incidental Take Regulatory Overview

Jennifer Walker and Paul Cylinder (Jones & Stokes) provided a general overview of the Federal and State Endangered Species Acts (ESA). Ms. Walker stated that the Federal ESA (FESA)'s take prohibition is broad, encompassing both direct take and indirect take, such as habitat modification and harassment.

There are two avenues to acquire incidental take authorization under the ESA: Section 7 for projects involving federal funding, permits, or authorizations, and Section 10 for private, local, and state projects not involving federal funding, permits, or authorizations. Under Section 10, there are two compliance options: **Section 10(a)(1)(b) Incidental Take Permits**, for otherwise legal activities that may result in the incidental take of listed species, and **Section 10(a)(1)(A) Authorized Take Permits** for activities that contribute to endangered species enhancement and recovery. The **Section 10(a)(1)(b) Incidental Take Permit** is acquired through the development of a **Habitat Conservation Plan** (HCP) that meets USFWS and National Marine Fisheries Service (NMFS) approval. An optional component of the HCP is the development of a **Neighboring Landowner Agreement**, that is used to provide protection to adjacent landowners who are signatories to the HCP from violations of the ESA if listed species were to come onto their land. Under a **Section 10(a)(1)(A) Authorized Take Permit,** if landowners want to take part in management activities (agricultural, etc) that benefit listed species, the USFWS and NMFS will guarantee that they will not be subject to additional restrictions on their property, nor be held in violation of the ESA, for the life of what is called a **Safe Harbor Agreement.** The landowner can end the Safe Harbor Agreement at any time (return to baseline conditions) with no penalty. *[See attachment: **Endangered Species Issues** for more information about FESA]

Ms. Walker continued with a description of the California ESA (CESA). One important difference between the state and federal ESA is that CESA's prohibition on take does not encompass prohibitions on habitat modification and harassment (a narrower definition). She indicated that the DFG typically allows FESA Section 7 and 10 permits and authorizations to serve as a permit application for incidental take under CESA for all species that are jointly listed under the FESA and CESA. (The Section 2080.1 process). If a species is listed under CESA only, the applicant will need to acquire incidental take authorization under a Section 2081 permit.
*[See attachment: **Endangered Species Issues** for more information about CESA]

Participants were invited to ask questions of Ms. Walker and Mr. Cylinder. Mr. Rushton stated that Yolo Basin Foundation is not under contract to develop a solution for landowners in the Basin. The purpose of this discussion is only to provide information on vehicles for complying with regulations.

The following is a list of the questions asked, answers provided, and comments made.

Why is the endangered species topic included as an agenda item at this meeting? How would Jones & Stokes be involved in choosing a management option?

Endangered species regulation was identified as a topic of concern in the development of the Yolo Bypass Management Strategy. The Working Group requested additional information on endangered species and vehicles for compliance with endangered species regulation. This Strategy was initiated prior to recent land acquisitions (e.g. Glide Ranch). Jones & Stokes is not attempting to make specific recommendations to the Working Group.

If duck clubs continue to function in the same way they always have, is it necessary to go through the endangered species permitting process?

Not necessarily. However, both FESA and CESA prohibit take, and all private, local, state, and federal actions are required to comply with the law. These laws have been in place for almost 30 years, and are applicable to everyone. The USFWS, NMFS, and DFG do not have a history of pursuing incidental take violations associated with ongoing activities in this area, but that does not mean that the risk of prosecution is not there. Conditions in the Bypass are changing, and areas of habitat attractive to listed species are increasing. The duck clubs could be affected by FESA/CESA if new species are listed or if species from adjacent habitat move onto the duck club lands. Going through either a Section 7 consultation or developing a Section 10 Habitat Conservation Plan (HCP) (with a Neighboring Landowners Agreement) or a Safe Harbor Agreement are some methods to solve the potential for enforcement actions.

Wouldn't a Neighboring Landowner Agreement set major new legal precedent?

No. Neighboring Landowner Agreements (NLA) are not new – in fact, there is one in place for the San Joaquin HCP. However, in order to take advantage of a NLA, there needs to be an HCP in place, which there is not in the Yolo Basin. Without an HCP, there is no mechanism (as provided in present ESA law). The NLA is just one way to deal with ESA compliance, but other options (such as a Safe Harbor Agreement) are stand alone agreements not requiring an HCP. What vehicle people use depends on whether they want private, state, and/or federal lands covered; whether their activities will be enhancing habitat for listed species or simply causing incidental take; and other criteria. Currently, FWS and DFG proposed activities in the Yolo Basin would increase habitat and reduce agricultural land. It is therefore important to focus efforts on protecting the present ongoing activities and operations in light of the changing situation. We want to look at ways that could work with existing landowner activities and ESA regulations.

Do landowners have to pay for monitoring programs per Safe Harbor Agreements?

First of all, it is important to note that Safe Harbor Agreement is a voluntary agreement for private landowners – it is not forced upon anyone. As such, the specifics of funding monitoring programs is decided during negotiation of the Safe Harbor Agreement between the signators and the FWS/NMFS/DFG. While the landowner may choose to pay for the monitoring, etc., there are many ways to obtain grant money from various state and federal funding sources.
The USFWS refuses to provide final signatures on take applications, dragging them on for years.
Mandated timelines often can't be met due to funding and staffing limitations. While Section 7 consultations have timelines associated with the phases of permitting, HCPs and Safe Harbor Agreements have no specified time limits.

If the purpose of activities in question is enhancement of habitat for listed species, then the applicant would be able to use the Section 10(A)(1)(a) Safe Harbors Agreement process. If the purpose of the activities in question is gaining incidental take authorization, the applicant would want to use the 10(A)(1)(b) HCP/NLA option. If there is a federal nexus (i.e., A federal agency is somehow involved with the planning and/or implementation of the project), the applicant would be involved in the Section 7 consultation process with the federal agency.
For example, duck clubs would use Section 10(A)(1)(a) if they were managing for endangered species enhancement, and Section 10(A)(1)(b) if managing activities that result in take.

Who gives the government permission to come on my land?

All participants must agree to grant permission in the agreement negotiation. Private landowners are often reluctant to allow government agencies on their property to conduct surveys. Baseline conditions are often the biggest point of contention in Safe Harbor Agreements. (The baseline is the present conditions on the land (number of species, amount of habitat, etc,), and this is the threshold the landowner is allowed to return to with no threat of penalty or prosecution if the Safe Harbor Agreement is ended.)

Have state and federal refuges met to discuss management practices on refuges?

Yes, but nothing concrete has been developed as of yet. Perhaps at future meetings or through other avenues, the Yolo Bypass Management Group can be informed of progress in this area by USFWS/NMFS/DFG staff (e.g. Stone Lakes)

If water flows into the Yolo Bypass, and endangered species die, isn't that considered take?

Not necessarily. The agencies responsible for this flow may need to consult with FWS/NMFS regarding this, but only if this activity is not already covered under an existing Programmatic Section 7 Incidental take authorization. It is likely that the structure and operations involved with this flow are considered as part of an existing environmental baseline that is covered already. On a related note, questions have been raised in the past about the legal

responsibilities of a private landowner with an easement that allows flow, etc over the land. Jones & Stokes will assess this issue further and will report an opinion on May 2.

Is there a time limit for complying with the ESAs?

As stated above, FESA and CESA prohibitions have been in existence for a long time. If activities are occurring unchanged without permits, then the landowner is at risk for prosecution whether it is in knowing violation of the law or not. Historically, these prosecution efforts have been minimal for ongoing activities. However, if a refuge or other entities are developing a plan to authorize take/enable protection from prosecution, then a private landowner may want to tie into that process. This is not required, but it does reduce the risk.

Mr. Rushton adjourned the meeting at the conclusion of this discussion.

YOLO BYPASS WORKING GROUP
MEETING 19

MEETING MINUTES

MEETING DATE: May 2, 2002

LOCATION: California Department of Fish and Game
Yolo Wildlife Area Headquarters
45211 County Road 32B (Chiles Road)
Davis, CA 95616

IN ATTENDANCE: Robin Kulakow, Yolo Basin Foundation
Dave Feliz, California Department of Fish & Game (DFG)
Rachelle Rounsavill, Yolo Basin Foundation
Dave Ceppos, Jones & Stokes
Rebecca Fris, CALFED
Mike Hall, Conaway Ranch
Chadd Santerre, California Waterfowl Association (CWA)
Mark Hennelly, CWA
John Currey, Dixon Resource Conservation District
Lori Clamurro, DPC
Bill Harrell, Department of Water Resources (DWR)
Ted Sommer, DWR
Randy Mager, DWR
Marianne Kirkland, DWR
Boone Lek, DWR/Reclamation Board
Don Stevens, Glide-In Ranch
David Kohlhorst, Glide-In Ranch
Jack Palmer, H Pond Ranch
Greg Hayes, Kinder-Morgan
Dave Cornman, Kinder-Morgan
Rick Martinez, Martinez Brother's Farms
Selby Mohr, Mound Farms
Elizabeth Soderstrom, Natural Heritage Institute
Cindy Mathews, National Weather Service (NWS)
Mike Hardesty, Reclamation District 2068
Butch Hodgkins, Sacramento Area Flood Control Agency (SAFCA)
Ray Thompson, Skyraker Duck Club
Richard Smith, U.S. Fish and Wildlife Service (USFWS)
Craig Denisoff, Wildlands, Inc.
Linda Fiack, Yolo County Parks & Resource Management
Mike Eagan, Yolo Flyway Farms
Dennis Murphy

Dennis Kilkenny
Chuck
Mark Kearney
David Kearney

NEXT MEETING: The next meeting was scheduled for June 20, 2002. 10:30 a.m. to 1:00 p.m. at the Yolo Wildlife Area Headquarters.

ACTION ITEMS:

1. Cindy Mathews, NWS, will clarify what datum the NWS is using at Lisbon for flooding forecasts. Is the datum based on 3 feet below sea level, or at sea level?

2. Regarding the Concord/Sacramento Pipeline Project, insure the State Lands Commission will address flow easements in the Environmental Impact Report (EIR).

3. Dave Ceppos (Jones & Stokes) said he could get information about the giant garter snake before the next meeting. Richard Smith (USFWS) will give Robin Kulakow a copy of the giant garter snake letter drafted and send out with the meeting notes.

4. Butch Hodgkins (SAFCA) will obtain information on peak flows in the Natomas Basin.

Mr. Ceppos called the meeting to order and explained the purpose of the working group. Mr. Ceppos stated the working group is "a forum for land owners, tenants, and agencies that have an interest in the Bypass. But most importantly it is a forum for land owners". Mr. Ceppos asked for introductions of those in attendance and briefly went over the agenda outline.

Mr. Ceppos announced that Elmer Jones had passed away and that a condolence card would be passed around at the break.

National Weather Service/Lisbon Flooding Information
Cindy Mathews (NWS)

Cindy Matthews (NWS) announced that the NWS is standardizing all of its operational procedures including river forecasts for California. Beginning fall 2002, no flooding forecasts will be issued until a forecast point is above its established monitor stage. The monitor stage in the Yolo Bypass at Lisbon has been set at 19.0 feet. Historically, Lisbon forecasts have been issued for stages as low as 14.0 feet. Gauge levels will still be available, but forecasts won't be available until 19.0 feet.

The forecast point can not be changed without the help of the local communities and land owners documenting exact locations and stages of previous flood events. Ms. Matthews gave examples of documenting information that would be helpful in establishing a lower forecast point. These examples included "Joe's Ranch on the south end of Liberty Island begins to remove cattle at 13.0 feet at Lisbon" and "the lower end of Prospect Island floods at 15.0 feet". A handout titled "Lisbon Flooding Information Needed" was passed around and is attached at the end of the meeting notes.

Ms. Matthews's goal is to complete the historical documentation by July 1, 2002 in order to finish the process of changing the official monitor stage at Lisbon by September 1, 2002.

Participants were invited to ask questions of Ms. Matthews. The following is a list of questions asked, answers provided, and comments made.

Why are they letting us know at 19.0 feet when we will already know our land is flooding at that point? Why aren't they continuing at 14.0 feet and how did they come up with 19.0 feet?

The National Weather Service is trying to standardize all of their operations. The 19.0 foot monitoring stage is based on U.S. Army Corps of Engineers recommendations.

What was the peak flood stage last year?

The peak flood stage was 15.66 feet on January 7, 2002.

Was the 19.0 foot gauge based on sea level or 3.0 feet below sea level?

I'm unsure, but I will check and clarify what datum the NWS is using.

Participant: You should also include the flow not just the height because the flow can be traumatic.

Concord to Sacramento Pipeline Project
David Cornman (Kinder-Morgan)

Mr. David Cornman (Kinder Morgan) discussed the construction and operation of a proposed replacement petroleum products pipeline from Concord to Sacramento. Mr. Cornman gave a brief history of Kinder-Morgan and the evolution of petroleum pipelines. Kinder-Morgan is based in Houston, Texas, was established in 1997 and is a $19 billion dollar company. Prior to 1997 Santa Fe Pacific Pipelines and Southern Pacific Railroad operated the current Concord to Sacramento pipeline now under Kinder-Morgan ownership.

Petroleum products pipelines connect all major refineries to the market, are an integral part of the infrastructure and are regulated by the California Public Utilities Commission. The current common carrier 14-inch Concord to Sacramento pipeline was installed in 1964 and carries diesel, gasoline and jet fuel. The existing 70-mile pipeline route travels north from Concord through the Carquinez Strait, along Interstate 680 through Suisun Marsh to the Interstate 80 corridor, through Dixon and Davis, and into the Port of Sacramento. The replacement of the pipeline will be completed in the next 4 to 5 years to increase the volume of product movement.

Kinder-Morgan Energy Partners, (SFPP, L.P.) is proposing to construct and operate a new 20-inch pipeline between Concord and Sacramento. The proposed new pipeline corridor travels north through Carquinez Strait, along Interstate 680 corridor, bypassing Suisun Marsh, Dixon and Davis up to Hay Road. The pipeline then follows the former Sacramento Northern Railroad right of way to Mace Boulevard (North of Midway), follows the PG&E powerline right of way to Interstate 80 corridor, between I-80 and the railroad tracks (through the northern edge of the Vic Fazio Yolo Wildlife Area) and into West Sacramento.

Before the pipeline project was made public, Kinder-Morgan "pulsed" the public officials and regulatory agencies to get their input regarding the pipeline route. The proposed route is designed to travel as much as possible along existing utility corridors and rights-of-way, bypassing residential neighborhoods and sensitive environmental areas where feasible. The new pipeline will require lots of land acquisition. Mr. Cornman stated that Kinder-Morgan is sensitive to working with landowners. California State Lands Commission is currently in the process of interviewing consultants to conduct the Environmental Impact Report. The draft environmental impact report is anticipated to be finished by November 30, 2002 with the final report produced around March or April 2003. Permitting and land acquisition are slated for completion by April 2004, when the 8-month construction period will begin.

Participant: Will the 14-inch pipeline be decommissioned or utilized for other chemicals?

Mr. Cornman stated the pipeline will not be used for petroleum hydrocarbon distribution and it can not be used as a backup for the new pipeline. The new pipeline will be utilized for petroleum hydrocarbon products.

Participant: Does Kinder-Morgan have the right to condemn property?

Mr. Cornman stated that they do, but they do not want to have to use that right.

Dave Feliz (DFG): How is Kinder-Morgan going to prevent contaminant releases like the one from the 14-inch pipeline in Elmira?

Mr. Cornman stated that they inherited the contaminant release problem with the purchase of the pipeline. The release was from a small leak from a factory defect in the weld. Mr. Cornman emphasized that "smart pigs" will be used in the new pipeline to measure the

thickness of the metal and the welds. If a loss of metal is a concern, Kinder-Morgan will dig up the pipe and replace it.

Jack Palmer (H-Pond Ranch): Will the pipeline change the topography of the land which may affect the flood flows?

Because the pipeline will be 6-feet below the surface, the ground surface change in appearance should be negligible.

Participant: Are there any proprietary interests with Western Geophysical?

Mr. Cornman stated there are not.

Participant: "Who determines what is contaminated and remediated?" and "What happens if we have a leak in the bypass?"

Mr. Cornman informed the audience that they have remediation consultants who go to the release, stop, contain, clean-up soil, and deal with the biological impacts. Wells are often installed to determine whether there is an impact to the underlying aquifer. If so, water from the aquifer is often pumped out and treated to remove the contaminants.

Partipant: Why are you moving out of Suisun Marsh if the railroad easement is already there?

Kinder-Morgan wants to replace the old line away from sensitive environmental and populated areas.

Participant: Why are you going through the heart of the refuge area?

Everyone said to go to the utilities right-of-way which comes into the bypass along Interstate 80 through the PG&E corridor.

Participant: Who will address the flowage easements for the project?

State Lands Commission (SLC) will address the flowage easements in the EIR.

Dave Ceppos requested that a follow-up on SLC be conducted to insure the flowage easements are addressed in the EIR be made as an action item.

Greg Hayes (Kinder-Morgan) left a stack of brochures and business cards for the participant use. Mr. Cornman informed the land-owners that they could call with any questions.

Yolo Wildlife Area Expansion Management Plan Update
Dave Feliz (DFG)

Dave Feliz, Yolo Wildlife Area manager, gave a brief update on the Yolo Wildlife Area expansion management plan. Mr. Feliz informed the working group that the Yolo Basin Foundation has secured funding through an amendment to their existing Cal-Fed grant to continue working group meetings with an emphasis on the management plan. The working group will conduct focused meetings to give information and get input regarding public use programs, habitat restoration, flood protection, and the long term role of agriculture in the wildlife area. Funding has also been secured for vegetation surveys on Tule Ranch. The vernal pool, native grassland and alkali soil vegetation surveys will be conducted spring of 2003. Mr. Feliz stated that some biological surveys have already begun along the proposed pipeline route in the railroad easement.

In the interim, Mr. Feliz is pursuing a cooperative agreement between the Dixon Resource Conservation District (DRCD) and the Department of Fish and Game. The agreements will be used to help negotiate leases, manage funds and to help with infrastructure improvements on the expansion property.

This year rice crops in the north portion of the property will be reduced by 400 acres and some organic tomatoes will be incorporated. The Los Rios and Tule Ranch properties will be used for grazing. This is a big change for the Los Rios properties because 2/3rds of the land has remained predominantly fallow for the last 2 years. Tom Schene's grazing lease will continue. The Yolo RCD will help with grazing and formulas in the grassland to manage for grasses. Leaving areas fallow without management is not good because invasive plants such as pepperweed could take over. Therefore, grazing will assist with keeping exotic species down. Overall there will be an increase in productivity for the Yolo Wildlife Area.

The purchase of property by the Wildlife Conservation Board from Lyle Parker is on the agenda for the May 23rd meeting. Mr. Parker is very enthusiastic to sell. Mr. Parker's property will be incorporated into the grazing project this year. Approximately 150 acres purchased in March 2002 are already enrolled in the Wetland Reserve Program. A restoration plan for the 150 acre piece is already finished and the permitting process has begun. Mr. Feliz said they will try to tap into Putah Creek as the water source.

Participant: Will the new area be hunted?

Probably, yes.

Participant: Will it be flooded for ducks?

A small portion north of the northeast unit may be flooded. However, approximately 20 blinds will be open this year for duck hunting. The eastern area of the rice fields will be hunted.

Participant: Are there any plans for the abandoned duck ponds on the Tule Ranch? Fireman's duck pond?

I haven't seen them; can you tell me where they are? Pheasant hunting may occur in the northern part of the ranch. It's possible the Fireman's Club will be hunted.

Participant: Will the area where Putah Creek peters out be open for Dove hunting?

South of Putah Creek possibly.

Participant: How is hydraulic capacity being monitored? Who is making sure your changes are not affect the hydraulic capacity of the bypass?

Guidelines outline that topography does not exceed existing road levels and no massive movement of materials. The reclamation board requires we acquire a permit for with all major purchases.

Potential Habitat Improvement Funding from North American Waterfowl Conservation Act (NAWCA)
Dave Feliz (DFG)
Chadd Santerre (CWA)

The NAWCA funds are collected from federal fines and penalties. These funds are can be directed to specific projects, and can be used for restoration. Restoration of the Causeway Ranch and Los Rios will be conducted by CWA. Tule Ranch restoration will most likely be conducted by Ducks Unlimited.

Chadd Santerre discussed CWAs involvement. Mr. Santerre informed the audience that money spent on a land acquisition can be levied against the federal fund (NAWCA) to pay for restoration and/or property improvements. The fund money must be spent within a 2 year period. Therefore, CWA is working with local duck clubs to help with improvements and restoration as well as work on the bypass. The federal fund will pay for 75% of the improvements or restoration work. The remaining 25% is the responsibility of the property owner.

Mr. Feliz informed the audience that the NAWCA fund is also being used for enhancements in the northeast corner of the wildlife area. The enhancements include re-engineering of the loafing islands, swales and water delivery systems. South duck clubs will benefit also because the master lift system will allow them to access water in a more efficient manner.

Senator, Skyraker, H-Pond and others have enhancement money from NAWCA for the 2003/2004 year. Acquisition of a permit for additional funds for the new properties is

currently underway. Actual restoration work in the bypass is expected to begin between 2005 and 2008.

Participant: How were owners contacted regarding NAWCA funds? Them or you?

Chadd Santerre: We did both. We called and solicited area property owners. You can contact me if you are interested in participating.

Pope Ranch Project Update
Craig Dennisoff (Wildlands, Inc.)

Craig Denisoff is Vice President of Wildlands, Inc. Wildlands, Inc, is a private company that uses many of its properties as mitigation and restoration sites, along with cattle grazing and hunting. Wildlands, Inc. acquired two separate properties from Ashley Payne. Forest Halford and Tony Lucchesi are the land managers and should be contacted if you have any questions or needs, such as site management. Wildlands, Inc. constructed giant garter snake habitat on this property last fall. The construction on the remaining field will begin this summer. There are four main goals associated with the Pope Ranch project:

1. Provide mitigation for past flood control projects.
2. Create giant garter snake habitat
3. Design and manage in a manner compatible with flood conveyance
4. The project will remain compatible with adjoining land use (i.e. set buffers on pope ranch property not adjacent properties).

Mr. Denissoff informed the participants that the property will continue to be hunted and portions grazed.

The original property acquisition was 391 acres, however Wildlands, Inc. also purchased an adjoining 409 acres, for summer pasture lands for the companies cattle operation. Wildlands, Inc. did contact the immediately adjacent property owners to let them know about the project, The adjacent properties include the Silva property to the south, Bill Kerney Duck Club to the west, Glide Ponds to the northeast, Chevron Oil Company to the east, and the Yolo Wildlife Area to the north.

The habitat design for the Pope Ranch project was modeled after giant garter snake habitat at other refuges where species success was high. The property will include 40 acres of open water, 180 acres of perennial marsh, and 209 acres of seasonal upland habitat. Northwest Hydraulic Consultants helped design the flood and flow topographic characteristics of the habitat.

Giant garter snakes prefer perennial marsh habitat with seasonal wetlands and uplands. Much of the habitat had to be built below surrounding existing roads and berms due to guidelines in the bypass that do not allow for topography above existing elevations. Because the pre-

construction elevations of the roads were uneven, the roads were raised in places to be consistent. Wildlands intends to gravel some of the roads to make them driveable in the wet season. Giant garter snakes evolved/adapted to live in flood prone Central Valley habitat. During a flood event, they can reside in burrows for 2 to 3 weeks. If they do not reside in their burrow they will remain in close proximity to them during a flood event. Based on comments from the Fish and Wildlife Service information, giant garter snakes are compatible with grazing practices.

Because Pope Ranch resides within the bypass, no woody vegetation is allowed on the property and cattails/tules must be maintained to approximately 25% of total property. Additional management practices for the ranch area are as follows:

- Grazing for vegetation control
- Property will continue in private ownership (Wildlands, Inc.)
- An endowment account will be set up to ensure management of habitat and flood control (Department of Water Resources has access to the endowment account).
- The site will be protected by a conservation easement

The Pope Ranch project was supported by United States Army Corps of Engineers, U.S. Fish and Wildlife Service, California Department of Fish and Game, California Department of Water Resources, and the Yolo County Farm Bureau.

Participant: What is the BIA and the approximate population of giant garter snake out there?

BIA = Building Industry Association. I haven't seen the giant garter snake on the property. It has reportedly been seen in the area, however I haven't personally seen it. Based on the Recovery Plan much of the area is considered giant garter snake habitat and species are considered to be present. However I haven't seen any on the site.

Participant: If giant garter snakes live in burrows can you disc the property?

According to our management plan, we can disc the site after drawdown

Participant: Have you trapped in snakes yet?

We trapped for snakes last year but didn't find any.

Participant: Did the construction crew see any?

No. Biologists walk in front of the bulldozers at the beginning of construction and the equipment operators are given instruction on how to determine for giant garter snake, but they didn't see any.

Participant: Can you buy a male and female pair and put them on your property?

No, I don't think so. The only listed species that I know of that can be relocated are burrowing owls, but I haven't heard of that happening with giant garter snakes and we have no intention of doing so.

Dave Feliz (DFG): During construction of the habitat, biologists regulate the site, however during active management the site isn't regulated. That doesn't make sense.

For the large fields, if we need to manage the site for vegetation we are required to contact the regulatory agencies to let them know what we are going to do and consult with them. However, pond drainage and tule discing is incorporated in the management plan.

Participant: How do you manage for giant garter snakes?

Seasonal wetland management, some open water and upland habitat. The management plan is based on the Natomas Basin conservation plan for GGS which was developed in concert with the regulatory entities.

Participant: During flood events you said giant garter snakes can survive 2 to 3 weeks in burrows, aren't the burrows flooded also?

My understanding is the burrows have pockets of air and the snakes can survive in those. Radio telemetry studies have tracked giant garter snakes during floods and this is what they found.

Participant: Where does your information come from?

FWS experts and the USGS Dixon Office. I don't know if this information is in print.

Participant: The bypass sometimes floods for periods longer than 2 to 3 weeks, how are the giant garter snakes going to survive?

The property is on higher ground that historically doesn't flood at the length that properties closer to the toe drain do. We did look at properties closer to the toe drain by the FWS felt that those areas would flood too often and for longer periods.

Dave Ceppos (Jones & Stokes) said he would get information about the giant garter snake before the next meeting. Richard Smith (USFWS) will give Robin Kulakow a copy of the giant garter snake letter drafted and send out with the meeting notes.

Dave Ceppos introduced Butch Hodgkins (SAFCA). Before Mr. Hodgkins' presentation, Mr. Ceppos informed the working group that SAFCA has hired Jones & Stokes to assist SAFCA. According to Mr. Ceppos, SAFCA is working with USACE on flood control measures and has put together a lot of ideas. SAFCA has paid a great deal of deference to the Yolo Bypass Working Group. Mr. Ceppos informed the working group of the following:

- Jones & Stokes is not acting as an advocate for SAFCA but working to poke holes in SAFCAs ideas.
- Jones & Stokes is trying to see if flood control benefits can be achieved and serve the Yolo Bypass property owners.

SAFCA/Yolo Bypass Issues
Butch Hodgkins (SAFCA)

We have been to Congress twice trying to get the Auburn Dam approved. Both attempts failed. Since then Mr. Hodgkins has adjusted his philosophy on flood control in the Sacramento and Central Valley region. The philosophy includes coordinated incremental projects and accomplishing things in small steps, because there are numerous people to keep things from happening. Mr. Hodgkins likes to use federal and state money for flood protection. Dave Ceppos is helping SAFCA understand what the issues are in the Bypass area.

Mr. Hodgkins discussed the stormwater runoff detention policies for the rapidly developing areas of the Sacramento region (Handout included at end of meeting minutes). The Natomas region development detention will be built to maintain flow to 1/10 of a cubic foot per second per acre (0.01 cfs/ac). This is lower than agricultural flows into the Sacramento River below the Freemont Weir. The reclamation of interior flood plain has resulted in a small increase in pumping capacity. The master plan for the RD 1000 drainage system calls for pumping capacity to be increased by approximatly 900 cfs combined flow.

The Roseville/Rocklin area flow can not be more than 90% of the original flow before development. The peak flows are attenuated to prevent any increase in 100-year flows. Enforcement agencies for these areas are Placer County Flood Control and Water Conservation District, Sacramento County, and SAFCA.

Folsom development does not have a flow policy. Flows are detained as a part of normal operation of Lake Natoma.

East Sacramento County and Elk Grove flows are attenuated to prevent any increase in 100-year flows. These areas are not a big impact to the Sacramento River system.

Participant: Does the east main drain cause problems for the areas due to backing up? Dry Creek fills up quickly.

Nothing feasible can be done to alleviate the back-up. It is due to the influence of the Sacramento River System, where high water levels cause the system to back up.

Mike Hardesty: How big is Natomas Basin?

55,500 acres.

Mike Hardesty: Can we infer peak flows will be 5,500 acres?

Unsure. Butch Hodgkins will obtain Natomas Basin peak flows.

Mr. Hodgkins handed out a summary of current SAFCA projects (included at end of meeting minutes). The Corps of Engineers, with SAFCA serving as the local sponsor has completed five of the eight coordinated incremental projects. These finished projects are as follows:

- Reconstruct the Sacramento River East Levee
- Raise and strengthen the levees around Natomas and North Sacramento
- Improve reservoir operations at Folsom Dam
- Prevent bank erosion at critical sites along the lower American River
- Reconstruct the American River levees.

The current step SAFCA is working on is providing a least a moderate (or 140-year) level of flood protection to all properties in Sacramento. Achieving this will involve raising levees in two locations, the American River and South Sacramento. The lower levees on the American River control the release from Folsom Dam. Some of the existing levees are not safe to handle the emergency release from Folsom Dam, 160,000 cfs, Approximately three miles of downstream levee will be raised an average of about one foot so that all levees can safely pass the emergency release. The South Sacramento levees are along creeks that are tributary to the Cosumnes River and are therefore not of a concern to the bypass, but are a concern to downstream property owners in the North Delta.

The Corps is enlarging the eight low level outlets on Folsom Dam and will add two more. The existing outlets can only release 25% of the flow the American River can take. To use the full capacity of the American River, the Bureau must allow levels in the reservoir to rise above the spillway gates which fills up about 50 percent of the flood control space. The new outlets will allow full use of the River's capacity without increasing reservoir levels. At present, SAFCA is attempting to get Congress to approve raising Folsom dam by 7-feet. In connection with the raise and outlet modifications at Folsom, a change in reservoir operations is also proposed that would incorporate weather forecasts for large storm events, such as those in 1997. A 3-day forecast will be used to trigger increasing reservoir releases creating more flood space before the storm arrives. The reservoir would be refilled to pre-storm levels as the storm passes.

The Dam was designed in 1950. Since 1950 there have been 5 floods larger than any occurring before 1950. Engineers sized the dam to accommodate what was believed to be a 500 year storm, based on a statistical analysis of the historical floods prior to 1950. When the same type of analysis is done using today's historical records, it shows that what was believed to be a 500-year storm in 1950 is about a 50-year storm today. The point, according to Mr. Hodgkins is that the storms occurring over the last fifty years are much greater than the storms that occurred in the first half of the century. The flood control system design is based on the first half of the century, and with larger storms occurring more frequently it is not surprising that flooding is a more frequent problem. In essence, the rivers are producing bigger floods than anyone ever thought they would.

CALFED Phase II Proposal
Dave Ceppos (Jones & Stokes)

The Cal-Fed proposal for hydraulic modeling tools for the Bypass; however CAL-Fed did not fund the project. The premise of the proposal and the need for a hydraulic modeling program includes the Bypass has multiple land uses and there is not an effective flow model for the area. Yolo Basin Foundation is writing a letter to CAL-Fed for a re-assessment to fund the project. Mr. Ceppos offered to draft a letter for the re-assessment that would include information from the local landowners, farmers, and duck clubs in the bypass. Mr. Ceppos asked for a representative from each subcommittee (duck clubs, flood agencies, land owners and farmers) to draft their concerns and needs for a working hydraulic modeling program for the bypass. Dave requested the letters be sent into him by May 10th. All participants in the working group agreed to the letter. Selby Mohr (Mound Farms), Rick Martinez (Martinez Bros. Farming), and Mike Hardesty (Reclamation District) volunteered to help Mr. Ceppos with the draft letter.

Participant: Who would be responsible for modeling, does it go to Jones & Stokes or out for bid?

The reclamation board is the recipient of the funds. The US Army Corps will manage the modeling but does not want to be responsible for modeling. Jones & Stokes will not do the modeling because they do not do modeling. However, the modeling will most probably go to a private engineering entity.

Mr. Ceppos adjourned the meeting at the conclusion of this discussion.

YOLO BYPASS WORKING GROUP
MEETING 20

MEETING MINUTES

MEETING DATE: June 20, 2002

LOCATION: California Department of Fish and Game
Yolo Wildlife Area Headquarters
45211 County Road 32B (Chiles Road)
Davis, CA 95616

IN ATTENDANCE: Robin Kulakow, Yolo Basin Foundation (YBF)
Dave Feliz, California Department of Fish & Game (DFG
Dave Ceppos, Jones & Stokes
Ed Towne, Bull Sprig Outing
Dean Kwasny, DFG
Rob Capriola, California Waterfowl Association (CWA)
Steve Jennings, Channel Ranch
Philip Martinelli, Channel Ranch
Mike Hall, Conaway Ranch
John Currey, Dixon Resource Conservation District (RCD)
Randy Beckwith, Department of Water Resources (DWR)
Marianne Kirkland, DWR
Don Stevens, Glide-In Ranch
David Kohlhorst, Glide-In Ranch
Chris V. Fulster Jr., Glide-In Ranch
Bob Dorian, H Pond Ranch
Will Wylie, H Pond Ranch
Rick Martinez, Martinez Brother's Farms
Selby Mohr, Mound Farms
Walt Cheechov, Natural Resources Conservation District (NRCS)
Jim Schneider, NRCS-Dixon
Mike Hardesty, Reclamation District 2068
Ken Martin, Rising Wings Duck Club
Butch Hodgkins, Sacramento Area Flood Control Agency (SAFCA)
David Brown, Sacramento Yolo Mosquito Vector Control District (SYMVCD)
Rachelle Rounsavill, Yolo Basin Foundation
Linda Fiack, Yolo County Parks & Resource Management
Mike Eagan, Yolo Flyway Farms
Craig Isola, U.S. Fish and Wildlife Service (USFWS) Sacramento Refuge
Tom Harvey, USFWS Stone Lakes Refuge

NEXT MEETING: The July 23, 2002 has been postponed. The new meeting date is August 15., 2002 This next meeting will have a very full agenda therefore, the meeting time has been expanded to 10:30 a.m. to 1:30 p.m. at the Yolo Wildlife Area Headquarters.

ACTION ITEMS:

1. Dave Ceppos will further clarify whether the Lisbon Flooding Gauge is based on 3 feet below sea level (United States Engineering Datum) or sea level.

2. Dave Feliz (DFG) and Robin Kulakow (YBF) will try to reschedule the Wildlfe Area expansion Management Plan focused meetings after October 9th and preferably not on Wednesdays to better accommodate the fall hunting schedule. Meeting dates will be posted on the Yolo Basin Foundation website.

3. Butch Hodgkins (SAFCA) will obtain information on peak flows from the Natomas Basin into the Sacramento River. In addition Butch Hodgkins will look into whether the Bypass Toe Drain can be utilized for decreasing flood stress.

4. Dave Ceppos will revisit representative nominations at the next meeting for participants in the Sacramento River Corridor Floodway Planning Forum to be held at the end of July 2002.

Mr. Ceppos called the meeting to order and explained the purpose of the working group. Mr. Ceppos stated the Working Group is "a forum for land owners, tenants, and agencies that have an interest in the Bypass. Mr. Ceppos asked for introductions of those in attendance and briefly went over the agenda outline.

Mr. Ceppos asked if there were any changes or edits to the draft May 2, 2002 meeting minutes. No changes or edits were requested and the May 2, 2002 meeting minutes were adopted as final.

Mr. Ceppos announced that Regina Cherovsky had appendicitis and a get well card would be passed around at the break.

Mr. Ceppos briefly covered the four action items from the May 2, 2002 Working Group meeting as follows:

1. . Cindy Mathews (National Weather Service), via electronic mail with Mr. Ceppos, clarified that the Lisbon flooding gauge datum is based on 0.00 feet according to the California Datum Exchange Center (CDEC). Mike Eagan (in attendance) requested further clarification regarding whether the 0.00 feet is at sea level or 3.00 feet below sea level. Marianne Kirkland (DWR) and. Randy Beckwith (DWR) informed the Working Group that CDEC datum is likely based on United States Engineering Datum (USED) or NGV29 datum both of which are based on 3.00 feet below sea level. According to participants the Lisbon Flood Gauge is at 3.00 feet below sea level already, therefore there was further confusion as to whether the gauge

readings are actually 6.0 feet below sea level or 3.0 feet below sea level. Mr. Ceppos said he would acquire further clarification from Ms. Mathews.

2. Mr. Ceppos passed out educational information regarding historical sightings and the life biology of the giant garter snake in the Bypass. A letter to Congressman MikeThompson signed by Steve Thompson, Manager, California Nevada Operations Office was included in the informational packet.

3. Mr. Butch Hodgkins did not have Natomas Basin peak flow information available. Mr. Hodgkins stated he would get the information before the next Working Group meeting.

Yolo Wildlife Area Expansion Management Plan Update
Dave Feliz (DFG)

Dave Feliz, Yolo Wildlife Area manager, gave a brief update on the Yolo Wildlife Area Management Plan (Management Plan). Mr. Feliz informed the Working Group that the Yolo Basin Foundation has secured funding through an amendment to their existing CALFED grant to continue Working Group meetings with an emphasis on the Management Plan. The Working Group will conduct focused meetings to give information and get input regarding public use programs, habitat restoration, flood protection, and the long term role of agriculture in the Wildlife Area. Mr. Feliz handed out a focused meeting schedule for the upcoming months and stated that agendas will be developed and sent out prior to each meeting. Mr. Feliz briefly outlined potential topics for each of the meetings as follows:

- *Public Hunting and Fishing* on the newly acquired lands will be discussed on September 11, 2002. Topics may include how hunting will evolve and change in the Wildlife Area as well as discussions on sanctuaries, tour routes, etc.

- *Hydraulic Modeling* discussions are scheduled for September 18, 2002. The recent Reclamation Board proposal for modeling is likely to be on the agenda.

- *Flood Protection* discussions are scheduled for September 25, 2002

- *Agriculture* discussions are scheduled for October 2, 2002. Topics are likely to include specific areas within the new acquisition that can be used for agriculture, grazing for management of native grasses, and utilizing corn, safflower, and rice to attract wildlife. Range management specialists from the Yolo RCD will be present.

- *Fish* will be discussed on October 9, 2002. Specific topics will include management of the flood plain for native fish and movement of salmon in the Bypass. Fishing opportunities in the Toe Drain and in the vicinity of the Lisbon Weir will also be discussed.

- *Wildlife Management* discussions are tentatively scheduled for October 16, 2002. Development of wildlife habitat will likely be included on the agenda.

- *CALFED Ecosystem Restoration Plan* objectives and role is tentatively scheduled for October 23, 2002.

- *Wildlife Viewing and Environmental Education* is tentatively scheduled for October 30, 2002.

Mr. Feliz is interested in hearing about other areas of interests for future meetings or agenda items.

Participant: All of the meetings are scheduled for Wednesdays. That might create a conflict with hunting season, can the meetings after the first of October be rescheduled for an alternate day?

Robin Kulakow: Wednesdays are the only day we did not have a scheduling conflict for the conference room, however Mr. Feliz and she will look into rescheduling the October 16th, 23rd and 30th meetings.

Funding has been secured to conduct vegetation studies on the Tule Ranch. Biologists are excited by the rare plants that have been observed to this point.

Participant: (In reference to a slide in Mr. Feliz's presentation.) Is there a map where you can show us the location of the photo.

Mr. Feliz: The photo is a picture of the Umbrella Barn field (Mr. Feliz pointed out the location on an aerial photograph map).

Mr. Feliz mentioned that there are many alkali soils on the Tule Ranch and Umbrella Barn field regions (approximately 2,100 acres). These soils are ideal for many rare plants, but do not produce a lot for cattle. In addition Mr. Feliz pointed out on an aerial photograph potential locations for grazing, nesting, wetlands and agriculture in the new acquisition areas.

At the present time, DFG is maintaining existing leases with the same tenants. Mr. Feliz is pursuing a cooperative agreement between the Dixon RCD and DFG. The agreements will be used to help negotiate leases, manage funds and to help with infrastructure improvements on the expansion property.

The water system at the south-end of the Tule Ranch along the Toe Drain will be managed by DFG, therefore if you need water you will need to contact Mr. Feliz. Mike Brock will still manage the pump and you will be charged based on how much water is pumped to you.

Participant: How much does the water cost?
Mr. Feliz: I have not seen a bill yet, therefore I am unsure of the cost at this point.

Participant: We have an easement, can we put a pipe in for gravity irrigation?

Mr. Feliz: DFG will still control the gates and you will still be charged for the water you use, however you can install a pipe for gravity irrigation. Contact Chadd Santerre (CWA) about the NAWCA proposal to help with funding for your irrigation pipe.

Participant: Farming is an important part of maintaining ducks. Are you putting more into farming or less?

Mr. Feliz: That is a subject we will be covering in the Agriculture focus meeting on October 2, 2002.

Participant: You list wild and organic rice in the northeast (Glide Ranch). Will you grow organic rice.

Mr. Feliz: At this point organic rice is not one of the rotated crops this season.

Participant: How much of the Los Rios grazing lease is irrigated.

Mr. Feliz: Greg Schmidt is not irrigating more than 100 acres..

The Wildlife Area currently has an on-going 150-acre wetland reserve project. DFG is working with NRCS and CWA on this project and they are currently in discussions with the Reclamation Board about permitting this project.

Participant: Is the reserve under perpetual easement?

Mr. Feliz: Yes

Participant: Will there be a CEQA document produced from the Management Plan?

Mr. Feliz: Yes, once the plan is prepared.

Participant: Are the upcoming focus meetings just for the Working Group or are they open to the public?

Robin Kulakow: They will be open to the public also. We will be mailing out fliers to the Working Group and to others.

Dave Ceppos: Will the meeting dates be posted on the Yolo Basin Foundation website?

Robin Kulakow: Yes

CALFED Phase II- Issues of Interest in the Future
Dave Ceppos (Jones & Stokes)

Mr. Dave Ceppos discussed the letter writing campaign to CALFED for re-assessment of the proposal to fund a hydraulic modeling program for the Bypass. The Yolo Basin Foundation, Yolo County, Sacramento Area Flood Control Agency (SAFCA), and the Working Group composed letters to CALFED. Working Group participants Selby Mohr (Mound Farms), Rick Martinez (Martinez Bros. Farming), and Mike Hardesty (Reclamation Board 2068) signed the final letter.

Mr.Ceppos announced the letter campaign was a success. CALFED senior decision-makers re-evaluated the previous reviewer's decision and moved the proposal from the Competitive category to the DirectedAction category. It is likely that representatives from CALFED, the Reclamation Board, and the U.S. Army Corps of Engineers will meet soon to discuss revising some aspects of the proposal.

Participant: Who will run the modeling program?

Mr. Ceppos: Unsure at this point.

Participant: Is the base model chosen?

Mr. Ceppos: RMA-2 is the proposed base model.

Participant: Does the base model cover the entire Bypass?

Mr. Ceppos: No. The previous RMA-2 model was produced in 1995and does not cover the entire geographic area of the Bypass. Furthermore, it is based on the computational ability at that timeand is somewhat unstable

Mr. Ceppos then described the current CALFED funding for continuation of Working Group efforts. He outlined the main tasks of the contract:

1. Continued funding for twenty additional working group meetings over the next two years.

2. Meetings and Wildlife Area management planning support in the coming year including additional focused meetings with specific stakeholder groups.

3. Potential implementation of the Management Strategy. The Foundation and Jones & Stokes will initiate discussions with willing Working Group members to assess any interest in pursuing land use opportunities discussed and approved in the Management Strategy. Landowners interested in such opportunities will meet with consultant staff and will identify what ideas could be feasible and desirable on their properties. These ideas will be memorialized in a concept plan developed by the consultant. As these discussions take place, nothing will go forward unless adjacent land owners are protected regarding endangered species impacts unless potential flood control impacts are neutral.

Sacramento River Corridor Management Planning Forum
Butch Hodgkins (SAFCA)

SAFCA and the Reclamation Board are developing a Sacramento River Corridor Management Planning Forum (Forum). Both agencies would like the Yolo Bypass Working Group to participate in the Forum.

Mr. Hodgkins gave a brief history that has lead up to the development of the Forum. Businesses, civic leaders, habitat advocates are interested in developing the waterfront around the Sacramento area. Encroachment permits have been denied due to the added stress that these encroachments could potentially impose on the flood management system and its capacity. A detailed analysis of the flood management system and where the stresses potentially could be alleviated is needed. Therefore, SAFCA and the Reclamation Board determined that a Sacramento River Corridor Management Planning Forum was necessary.

The purposes of the forum incorporate the following:

- Greater certainty/predictability in environmental permitting.
- Informal discussion of proposed projects
- Create a better understanding of the flood management system and its capacity to withstand encroachments
- Explore opportunities to reduce stress on the flood management system
- Improve transparency, communication and coordination of permitting process
- Expand opportunities for riparian habitat restoration and enhancement in permitting encroachments.

Ms. Kulakow (YBF *why the acronym?*), Mr. Hardesty (RD 2068) and Linda Fiack (Yolo County) were interviewed as part of the initial convening process for the Forum.

Mr. Hodgkins discussed the Sacramento and San Joaquin Rivers Comprehensive Study graphs for the combined natural flows at the Fremont Weir and the Sacramento River. The graph illustrated one and three day peak flows and showed that an increase in water is coming through the system since its construction in the early 1920's. The fundamental assumption for the increase in flows is climate change. During the 1986 and 1997 floods, peak flows reached a maximum height of 39 feet at the Fremont Weir . The USACE has extrapolated the potential increase in maximum peak flows over the next 100 years to reach 41.2 feet. The increase in flows is expected to result in added stress to the downstream flood management system. Therefore, the Forum calls for the following outcomes:

- Sacramento River Corridor Floodway Management Plan
- New procedural and analytic tools to assess individual and cumulative project impacts.
- Broad public and agency support for implementation of recommendations.
- Improved public understanding of the potential roles of the floodway in the future of the region.

The Forum will not make recommendations with respect to the following:

- Particular floodway project proposals
- Resolution of controversies relating to private property rights and public access
- Pollution discharge control, water supply allocation, endangered species recovery and other issues that are managed through established planning and decision processes.

Participant: I noticed there is nothing in the proposal about dredging Sacramento River. Are you discussing this?

Mr. Hodgkins: Yes. The questions are whether dredging helps in alleviating stress on the flood system and what is happening in the Sacramento River during a flood. During a flood, less than 20% of the flood water is carried by the Sacramento River, the remaining 80% is in the Bypass. Dredging the river would likely only increase the flood capacity by a relatively insignificant amount
Participant: How has original depth of the Toe Canal been affected over the past 40 years?

Mr. Hodgkins: We are unsure. The Forum process will focus on areas that cause stress and where stress can be alleviated.

Mr. Ceppos: As an action item for the next meeting, can we get additional information on the use of the Toe Drain for use in decreasing flood stress on the system?

Mr. Hodgkins: Yes

Participant: Can you reduce stress by putting additional flood waters in the deep water ship channel?

Mr. Hodgkins: The deep water could take on flood watershowever, it would require significant design modifications . Additional flood waters in the deep water ship channel are likely to flood West Sacramento and wash out the deep water channel.

Participant: It's a given the Deep Water Ship Channel GLOBAL will be dredged. Has there been a time when big ships could not come up the ship channel?

Mr. Hodgkins: No.

A project is being conducted to deepen and widen the deep water ship channel because ships are getting much larger and some of the newer ships may not be able to navigate the channel.

Participant: Is the Port of Sacramento in financial trouble?

Mr. Hodgkins: My understanding is they need $250,000 to finish the dredging project, however, I have no knowledge of the Port's overall financial status.

Participant: If the project is finished, could the deep water channel convey more water? Is the channel continual dredged because of a silting problem?

Mr. Hodgkins: It will be able to carry more water. It is my understanding that the deep water channel maintenance dredging is done to correct bank erosion, but I am unsure if there is a silting problem related to flows or tidal action in the deep water channel.

Participant: Have the levees been weakened by ship wakes?

Mr. Hodgkins: There is a large berm between the ships and levees. Therefore levee bank weakening is not likely caused by ship wakes.

Participant: Is it possible the Sacramento River has silted in over the past 45 years?

Mr. Hodgkins: Yes but it is also possible that sediment has continued to move through the system. We really don't know all the answers.

Participant: Has anyone looked into dredging the Sacramento River to relieve stress on the flood control system?

Mr. Hodgkins: Not recently to my knowledge.

Mr. Hodgkins explained that Forum members will include representatives from leading organizations with demonstrated effectiveness in representing the following major interests:

- Cities/Local Land Use Planning Agencies
  - City of Sacramento
  - City of West Sacramento
- Counties
  - Sacramento County
  - Sutter County
  - Yolo County
- Flood Control Agencies (Federal, State & Regional)
  - Army Corps of Engineers-Flood Control Operations
  - Department of Water Resources-Division of Flood Management
  - Reclamation Board
  - SAFCA
- Reclamation Districts
  - RD 1000
  - RD 1001
  - RD 900
  - Elkhorn area RD's
  - RD 2068
- Resource Agencies
  - US Fish and Wildlife Service
  - National Marine Fisheries Service
  - Department of Fish and Game
  - State Lands Commission

    - CAL-FED Program
    - Delta Protection Commission
- Conservation/Habitat Protection Organizations
    - Friends of the River
    - Sierra Club
    - The Nature Conservancy
    - Environmental Council of Sacramento
    - Sacramento River Watershed Program
    - Yolo Basin Foundation
- Recreation and Bicycle Transportation Advocates
    - Friends of the Sacramento Greenway
    - Sacramento Area Bicycle Advocates
    - River recreation groups
- Business and Commercial Development
    - Sacramento Metropolitan Chamber of Commerce
    - West Sacramento Chamber of Commerce
    - Building Industries Association
    - Old Sacramento Management Board
    - Marina Owners Association
    - Union Pacific
- Neighborhood and Community Associations
    - Garden Highway Neighborhood Association
    - Little Pocket Neighborhood Association
    - Sacramento Riverfront Association
- Yolo Bypass Interests
    - Yolo Bypass Working Group
    - City of Woodland
    - City of Davis
    - Port of Sacramento

Mr. Hodgkins encouraged the Working Group to designate someone they feel could represent their views at the Forum.

The Forum will further be organized as follows:

1. **Inter-Agency Steering Committee** – Members are the elected officials and appointed decision-makers of the MOU signatory agencies. They will have general oversight of the process, set its broad goals, provide funding, select the initial members and review progress every six months.

2. **Sacramento River Corridor Planning Forum** – The forum consists of the representatives of the above interests. The forum will be charged with achieving the six purposes mentioned above by producing a broadly supported Sacramento River Corridor Floodway Management Plan and informally reviewing potential projects. It is anticipated the forum will meet approximately six times per year, allowing sufficient time between meetings for the completion of technical and Working Group assignments.

3. **Working Groups and Coordination** – The forum will initially use three working groups and a coordinating entity as follows:

   - **Policy and Permitting Working Group**: The primary functions of this group will include review of current criteria used in the regulatory processes for each project within the river corridor requiring permitting and construction and review the key policies underlying current decision criteria.

   - **Land Use Scenarios Working Group**: This group will have a limited assignment of reviewing existing land use plans of all types regarding the future of the corridor in this reach of the river and proposing scenarios for use in computer modeling.

   - **Flood Control and Public Safety Working Group**: The assignment to this group will be to review and report to the Forum on technical data regarding 1) the current state of the flood control system, 2) its capacity to tolerate further encroachments consistent with public safety and 3) analytical tools that can be used to assess cumulative impacts of various corridor development scenarios.

   - **Technical Team**: The technical team will consist of staff members of the MOU signatory agencies. The team will assist with coordinating the various efforts of the Forum and will meet prior to each Forum and Inter-Agency Steering Committee meeting. It will review, monitor and coordinate the work of the three working groups and oversee the presentations of the groups to the plenary sessions of the Forum and the Steering Committee to ensure timely completion and technical accuracy.

The initial working group time-line for consensus building activities is anticipated to be 6-months. According to Mr. Hodgkins the time-line will include an agreement by January 2003 regarding what how flood control system currently functions .
Participant: Will the working groups help to determine whether any available proposals can be deducted to reduce stress for additional land use issues?

Mr. Hodgkins: No, that is not within the scope of the Forum working groups.

Participant: Is the system in trouble, especially from the Fremont Weir south?

Mr. Hodgkins: That is the task for the Forum over the next six months to figure out.

The main objective of the Forum is to get more capability out of what is already in place.

The next steps we need to take include:

- IWG endorse concept
- Obtain funding commitments in June/July

The Forum group will be convening August 2, 2002.

Participant: Is there a limit to the number of representatives?

Mr. Hodgkins: Yes. We prefer that one person speak for their group, however anyone can attend the meetings.

Participant: How long will the meetings be?

Mr. Hodgkins: Approximately half a day. Working teams would be in between the meetings.

Dave Ceppos (question to the working group): Who would you like to see representing the working group at these meetings?

Mike Hardesty (RD 2068) was nominated, however he declined because he wants to represent the Reclamation District. Chris Fulster (Glide-In Ranch) declined because he will be on vacation.

Participant: Can the representative be someone from CWA?

Mr. Hodgkins: Yes they can represent YBF interests.

It was suggested that Regina Cherovsky or someone from Conaway Ranch may be interested in being the Working Group representative. This topic will be revisited at the next Working Group meeting.

Mosquito/Vector Control Discussion Session
David Brown (SYMVCDD) and Working Group

West Nile virus has been found in the Central Flyway in Texas. When will the West Nile virus arrive in the Pacific Flyway? The answer to that question is not known, but most public health officials believe it will arrive by next year. West Nile virus is carried by birds and transmitted by mosquitoes. Wet areas, such as wetland habitats can be great breeding grounds for mosquitoes. However, there are multiple ways to reduce mosquitoes while enhancing wetland habitat including chemical, mechanical and biological controls. Mosquito/Vector Control (SYMVCD) has the authority to serve abatement notices to land owners if mosquitoes on their property are not sufficiently managed. Landowners can be charged up to $500.00 per day if mosquitoes are coming from their property.

In the Butte Sink area, they have a tremendous mosquito problem. Three districts have served notices informing land owners they need to assist with control of the mosquitoes or abatement measures will be taken. This year the SYMVCD Board has directed the manager to look at ways to reduce costs. There is a potential 20% cut in SYMVCD revenues which can create a problem for future mosquito control efforts. Therefore, we need to assess what management techniques we can implement to meet wildlife habitat, public health, and agricultural needs. Just spraying insecticides is not the answer.

USFWS locally has been tremendous in helping landowners do what is necessary to solve or implement techniques that will reduce mosquito populations. If you have an easement, offered by the USFWS or some other government program, you still own the property and fall under state law. Therefore, you are still responsible and liable for mosquitoes that come from the property.

Participant: Is there achance landowners or duck clubs can obtain and apply pesticides themselves?

Mr. Brown: Yes, but it can be very expensive. A land owner from the Butte Sink area researched this and found that landowners who apply the pesticides themselves usually pay approximately $40.00 per acre. This is in contrast with the $18.00 an acre and/or irrigation the three districts are proposing.

Participant: How effective are fish in controlling mosquitoes?

Mr. Brown: Fish are effective within given parameters.

There are three main genus of mosquitoes. I'm assuming these have been proofed by David Brown? They are the Ochlerotatus, the Culex and the Anopheles. Ochlerotatus eggs reside in soil until a flood event occurs, such as flood irrigation. They have a very short and rapid life cycle. Fish are generally not effective controlling this genus. The Culex and Anopheles mosquitoes eggs are found in water. Fish can be effective with these two genus' because they have a longer life cycle.

Participant: What species carries the West Nile virus?

Mr. Brown: Mosquitoes in the genus Ochlerotatus and Culex. Ochlerotatus is a good vector and Culex is a great vector, based on research done at UC Davis. More work is being done to discover which of the remaining mosquitoes in this area can transmit the disease.

Participant: What species is found in pasture land?

Mr. Brown: Ochlecotatus. In regards to duck clubs, the eggs of Ochlecotatus are in the soil and when you flood the eggs hatch quickly.

Participant: Does water depth matter?

Mr. Brown: A quick flood will usually result in only one hatch. A slow, gradual flood will result in multiple hatches.

Participant: How long do the eggs stay viable?

Mr. Brown: 20 years

Participant: Do the eggs have to dry out to be viable?

Mr. Brown: Yes.

Participant: Is prolonged flooding without fluctuations better?

Mr. Brown: Yes.

Participant: I often see SYMVCD spraying multiple times in the same area and it seems like overkill. Do you have to spray that often?

Mr. Brown: The type of species and stage of life cycle determines the spraying regime. Therefore SYMVCD spraying events are likely for management of these different life stages.

Participant: How long before a mosquito matures after it hatches from an egg?

Mr. Brown: Depending on the species and on the weather, approximately four days. The mosquitoes lay the eggs on the soil, the eggs will hatch during a flood event. Once they mature, the male and female immediately mate, the female searches for a blood meal and proceeds to lay eggs.

SYMVCD had developed threshold data that is used by our district to implement control events. The district uses standard Integrated Pest Management practices that are specifically geared for mosquitoes. The district first considers cultural (delaying flooding events) physical (modifying the land or water control structures) biological (mosquito fish or other predators of mosquitoes) and chemical (using the most effective target-specific insecticide). Three components of mosquito control have been compromised through the creation or management of wildlife/wetland habitat that has not also incorporated mosquito control. Therefore, many districts have had to use a greater reliance on insecticides. The District has larval data and threshold limits for larvae and adults which determine whether a larvicide or adulticide is used through sampling and trap data.

Participant: I have heard a mosquito that hatches in the Bypass can be carried to West Sacramento on prevailing winds. Why are we only targeting the Bypass?

Mr. Brown: Yes, some species can fly 20 miles from their source. Trap counts and larval sampling can demonstrate where they originated, therefore we target the source locations.

Participant: Would best management practices be to build up a good head and then flood quickly? Should we minimize vegetation along pond ditches and edges?

Mr. Brown: Regarding flooding quickly. yes, and if you could flood in October instead of September it would be even more effective. However I understand that duck hunting areas flood in September for the duck season. The primary issues in mosquito control and abatement are flooding management, timing, depth and vegetation management.

Participant: Is it true that mosquito larvae are an excellent source of protein for ducks?

Mr. Brown: This doesn't show in data. However, other invertebrates are a better source of protein for ducks. Ducks will eat mosquito larvae if they are present but they are not an integral part of waterfowl diet.

Participant: What was the mechanical device that was used last year at the corner of H-Pond?

Mr. Brown: It was a new technology called a Mosquito Magnet. We purchased ten of them and put them throughout the Bypass. We caught a large number of mosquitoes, but they did not significantly reduce the population.

Participant: Are your treatments and field sampling the same ones used in the Butte Sink?

Mr. Brown: I believe so, but I can't speak for them. We use larvicides which are more expensive initially but I believe it is the most effective because we can treat smaller areas. Larvicides are much more target specific. Adulticides may affect beneficial invertebrates, however the dosage rate used minimizes this.

Mr. Ceppos wrote down the key questions provided for this session as follows:

1. Question: Can duck clubs do their own vector control maintenance?
   Answer: Yes, but it may not be economical.

2. Question: How effective has fish predation been?
   Answer: They are effective for certain genus', however, they are ineffective for control of Ochlerotatus which resides in the soil until a flood event. Therefore, effective maintenance of this genus includes fast flood-up to avoid progressive hatches.

3. Question: Would permanent non-fluctuating levels be a benefit in vector control?
   Answer: Yes, but you need deep water (1-2 feet).

4. Question: What does data show about duck clubs versus other land uses in regards to vector sources.
   Answer: That information can be found at your local mosquito control agency.

Mr. Brown proposed another meeting with just the duck clubs to discuss what can be done to work on the issues. Mr. Brown is very willing to explore alternatives with landowners. Mr. Brown is aware that duck clubs are getting pulled from multiple directions. We all need to go through the general requirements for NRCS and State and Federal easements to figure out an equitable answer. The main issue at hand is communication practices between SYMVCD and landowners and other resource groups.

Mr. Ceppos adjourned the meeting at the conclusion of this discussion.

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YOLO BYPASS WORKING GROUP
MEETING 21

MEETING MINUTES

MEETING DATE: August 15, 2002

LOCATION: California Department of Fish and Game
Yolo Wildlife Area Headquarters
45211 County Road 32B (Chiles Road)
Davis, CA 95616

IN ATTENDANCE: Robin Kulakow, Yolo Basin Foundation
Dave Feliz, California Department of Fish & Game (DFG)
Dave Ceppos, California Center for Public Dispute Resolution (CCPDR)
Elly Fairclough, Assembly Woman Helen Thompson
Congressman Mike Thompson
Ed Towne, Bull Sprig Outing
Chadd Santerre, California Waterfowl Association (CWA)
Phil Martinelli, Channel Ranch
Jessica Kilkenny, Dawson's Duck Club
Armano Gonzales, DFG
Randy Mager, Department of Water Resources (DWR)
Marianne Kirkland, DWR
Ted Sommer, DWR
Boone Lek, DWR/Reclamation Board
John Currey, Dixon Resource Conservation District (DRCD)
Chris V. Fulster, Glide In Ranch
Dick Goodell, Glide In Ranch
Don Stevens, Glide In Ranch
Jack Palmer, H Pond Ranch
Bob Dorian, H Pond Ranch
Rick Martinez, Martinez Brother's Farms
Selby Mohr, Mound Farms
Jennifer MacLean, Natural Resources Conservation Service (NRCS)
Jim Schneider, NRCS
Mike Hardesty, Reclamation District 2068 (RD2068)
Ken Martin, Rising Wings Duck Club
Butch Hodgkins, Sacramento Area Flood Control Agency (SAFCA)
David Brown, Sacramento Yolo Mosquito Vector Control District (SYMVCD)
John L. Lewallan, SYMVCD
Ray Thompson, Skyraker Duck Club
Richard Smith, U.S. Fish and Wildlife Service (USFWS)
Paul Simmons, Yolo Basin Foundation Board Member

Rachelle Rounsavill, Yolo Basin Foundation
Mary Ellen Baldwin, Yolo County Supervisor Lois Wolk
Mark A. Kearney
Ron Tadlock

NEXT MEETING: The next meeting is scheduled for November 21, 2002. 10:30 a.m. to 1:00 p.m. at the Yolo Wildlife Area Headquarters.

ACTION ITEMS:

1. Dave Ceppos, CCPDR, will schedule an additional meeting with Working Group participants and David Brown, SYMVCD, around September 11, 2002. The meeting will focus on the requirements of state and federal regulations and what can we do this year in a voluntary capacity with land management.

2. Dave Ceppos will look into how (i.e. open space, wildlife corridor etc) the Bypass is designated within the Yolo County General Plan.

Robin Kulakow called the meeting to order. Due to the number of new attendees a round of introductions was conducted. Ms. Kulakow introduced Dave Ceppos. Mr. Ceppos briefly went over the agenda and the purpose of the Working Group. The Working Group is open to the public and has been in existence for 3 years. It provides a focused opportunity for farmers, land owners and agencies within the Bypass to discuss Bypass related issues and provide guidance and opinions on such issues. Mr. Ceppos recently left Jones & Stokes and is now with the California Center for Public Dispute Resolution. Robin is arranging to have the contract transferred from Jones & Stokes to the California Center for Public Dispute Resolution.

Mr. Ceppos asked if there were any changes or edits to the draft June 20, 2002 meeting minutes. Dave Brown referred to some spelling errors of mosquito species. Mr. Ceppos said those corrections would be made prior to the final printing of the meeting minutes. No other changes or edits were requested and the June 20, 2002 meeting minutes were adopted as final.

Mr. Ceppos passed out the schedule for the upcoming Yolo Wildlife Area Management Plan focused meetings. A packet will be mailed out for the September meetings in a couple of weeks, with additional information for each meeting. Mr. Ceppos re-iterated that it is important to have the Working Group members involved.

Lastly, Mr. Ceppos regretfully announced that Duncan McCormack III had recently passed away. A sympathy card was passed around for Mr. McCormack's family.

Update on Sacramento River Corridor Management Planning Forum
Butch Hodgkins, SAFCA

Butch Hodgkins covered two topics;

- Reclamation District 1000 (RD 1000) pumping plant capacities
- Sacramento River Floodway Management Planning Forum update

Reclamation District 1000 (RD 1000) pumping plant capacities

Mr. Hodgkins passed out a handout for the RD 1000 pumping capacities and maps with the six pump station locations. Two of the pump stations discharge to the Sacramento River above the Sacramento Weir. One of these pumping stations will be enlarged to increase the pumping capacity by 85 cubic feet per second (cfs), which is not likely to make a difference during a storm. Total changes to the other pump stations will increase the pumping capacity to approximately 3000 to 3800 cfs during a big storm. This information on the handouts was compiled from a clmr a document submitted to FEMA. These documents are official public information central to FEMA for revising flood maps.

Sacramento River Floodway Management Planning Forum update:

Mr. Hodgkins posed the question of how can regional stakeholders help the Reclamation Board and land use agencies to better communicate when a Sacramento River front development project is brought to the table? We need to look at the overall flood control capacity. The forum meetings are open for participation and Mr. Hodgkins or Mr. Ceppos can get Working Group members information about when they will occur. There are three working groups in the forum: flood capacity, land use, and permitting and policy group. The objective of the forum is to have all three groups work together to identify each group's concerns and requirements for acceptable criteria in judging if an encroachment for a project will have an adverse impact on the flood control features of the floodway.

Mr. Hodgkins further described that the Bypass was built in the 1920s and since then we have been seeing an increase in storm intensities. We seem to be continually breaking records. We are at a point where we need to decide what has to be done to accommodate these increases. SAFCA thinks its time to consider increasing the Bypass capacity. One idea is to construct a weir that would dump floodwater into the Port of Sacramento Deep Water Ship Channel (Ship Channel) during a flood event in order to reclaim some of the flood capacity lost when the Ship Channel was constructed. Of course this would mean that we would also need a flood structure to keep additional flood waters from backing up into West Sacramento.

Participant Question: With the increased capacity RD 1000 has with draining North Natomas, is there some lead time during a flood event and is that being coordinated with the mechanical improvements you are proposing?

Mr. Hodgkins: Because RD 1000's drainage area is significantly smaller than the watersheds for the main components of the flood control system, their runoff almost always occurs before the river is at its peak. We almost always receive the brunt of rain in the valley before the mountain regions where the big flood control systems are located. There is little concurrency between peak flows in the Bypass, Feather and Sacramento rivers and smaller watersheds like Cache Creek and Natomas.

Participant Question: Where do you think we are in relation to raising Folsom Dam and what is the projected time frame?

Mr. Hodgkins: The most cost effective method is to raise Folsom Dam by 7 feet. This results in more storage capacity and better control of flows in the American River system thus providing benefits to downstream areas because flows are more controlled. There is political tension because there is a perception that this increased flood protection makes Auburn Dam less needed. The Folsom Dam project is not likely to begin for another 5 to 6 years. It is the only practical way at this point to add flood control protection to the American River.

Everything that has happened in the Sacramento and American River is focused on what happens to the capacity at the lower American River. Raising Folsom Dam is the last piece of what can be done outside of dealing with weather forecasting.

Participant Question: If Folsom Dam is raised, will there be competing demands for water? How much flood control will you actually get? Won't agriculture want that extra water and not want releases?

Mr. Hodgkins: The Army Corps is the federal authority on reservoir operation for flood control. It would require a political fight to change the use of the dam storage.

Mr. Ceppos: As per the National Environmental Policy Act (NEPA)/California Environmental Quality Act (CEQA) document prepared for the proposed dam raising, the dam raising is strictly for flood control amelioration, not for consumptive water storage. To allow the dam raising for any other use other than flood control would require a new NEPA/CEQA impacts analysis because that is not what the project has been approved for.

Participant Question: The 7 feet increase would be what percentage increase to storage?

Mr. Hodgkins: 7%

Mosquito/Vector Control Discussion
Dave Brown

Mr. Ceppos provided introductory remarks, reminding the participants that the Working Group is trying to find ways to avoid conflicts between duck clubs, land owners and mosquito/vector control regarding who is responsible for health issues associated with mosquitoes. Mr. Dave Brown then continued his discussion of what the SYMVCD needs from land owners and how SYMVCD can help land owners with compliance.

Mr. Brown passed around a handout that bulleted some main points for wetland construction and management.

Mr. Brown stated that when West Nile virus reaches California it will raise the bar especially in the public view. In Louisiana, West Nile Virus is not just affecting the young and elderly, its affecting all age groups. California Governor Davis called a press conference recently about what we are doing about West Nile Virus. In addition, Julia Gerberding of the U.S. Center for Disease Control and Prevention referred on Face of the Nation to West Nile Virus as the fasting growing epidemic in the United States.

Participant Question: When do you expect it to hit California? Isn't it carried in migrating bird flyways? Doesn't the Sierra's create a formidable barrier to migratory birds to cross over to California?

Mr. Brown: Birds will co-mingle in Central and South America and some of those birds will use the Pacific Flyway. It is possible that West Nile could show up this year or next year. There are over 110 species of birds that carry West Nile virus. Crows, magpies and blue jays do not fare well with the virus and die relatively quickly. We have a very healthy crow population here and there have not been signs of West Nile Virus at this point. If they are infected with West Nile Virus, these birds would literally fall out of the sky.

Participant Question: Hasn't it been detected in Seattle?

Mr. Brown: I believe that individual had been to Louisiana and did not contact West Nile Virus in Washington State.

Participant Question: Has it been found in migratory waterfowl?

Mr. Brown: Yes, I have the list and it's believed that waterfowl can carry the virus.

Some of the issues we are dealing with are flooding dates. One of the items we would like to look into is pushing the hunting dates back. I also understand that farmers/wetland managers have mandates as to when they have to flood that conflict with District objectives. Let's bring these issues to the table. How can we enhance wetland habitat and reduce mosquito populations?

Participant Question: Are there any plans to go to all the refuges to test the migratory waterfowl? Can we check out dead birds at the check out stations during hunting season?

Mr. Brown: Yes, we are already testing birds at the Sacramento Refuge. We are also conducting a sentinel chicken program that is more effective. However, the easiest detection is dead crows, due to the fact that they do not fare well when West Nile Virus hits.

Participant Question: Aren't they only charging the duck clubs up north?

Mr. Brown; Yes, but as discussed at previous meetings the duck clubs up north are producing significantly more mosquitoes than other habitats. Remember, there are different species of mosquitoes, and the duck clubs in the north part of the state are responsible for tremendous numbers of day biting mosquitoes.

The species of mosquito that can carry West Nile Virus are *Ochlecotatus* and *Culex* which are raised on Duck Clubs. They can affect both mammal and avian species.

Participant Question: This isn't the first time that we have been presented with land owners paying for mosquito control. We are concerned that this is going to happen to us again, much like what is happening in Butte Sink.

Mr. Brown: We have a state budget with serious issues. They will be cutting in some districts, some have already lost revenue. We have not lost revenue yet. If we lose revenue we have a couple of options:

1. We can charge you and have meetings like this. However West Nile Virus is a big issue and we need to balance multiple interests.

2. We can be proactive such as pond flood-up timing etc. so that we don't have to charge you.

Participant Question: Can't the state come up with the money? They find money for fires, so why not this if it's such a big deal?

Mr. Brown: What are we going to do? Spray. You have all told me you don't want to spray and pesticides aren't the answer as we discussed in the last meeting. The concept should be how can we avoid expensive pesticide applications.

Participant Question: The state and feds find a way to fight fires. The fires (i.e. West Nile Virus) aren't here yet. The potential is out there to get funding to clean ditches etc. to alleviate the problem as much as possible. I'd like to know what we can do here to propose partnerships with the state and university for research so we don't have to rely exclusively on pesticides and charge landowners for treating mosquitos on their property.

Mr. Brown: We are trying to find other resources so you don't have to fund it. You are following multiple policies for other resource groups. We are looking at other ways where we can meet that balance.

Mr Ceppos: At the very least there is the NAWCA funding. There is potential under existing contracts with the Yolo Basin Foundation, that CCPDR can prepare a proposal for funding, and a proposal for SYMVCD to help with funding. I would want some oversight committee from this group to help with the proposal. But what are some things that can be done voluntarily this fall to help alleviate the problem?

Participant Question: The state has agreed to provide water to various clubs next year. Approximately three days of water, but right now it takes us 21 days to fill. We would be happier to fill in a shorter period of time. Maybe the state should come up with more funding for bigger pumps.

Mr. Brown: We don't have the staff to cover all the acreage in the area. Let me know what it would take to achieve these items. One thing I mentioned is holding duck season off. Some of you are flooding in August which is not helping with the mosquito populations.

Chadd Santerre: The current NAWCA grant we have is to improve pumping capacity to all the clubs and drainage efficiency. The grant will allow much more in the way of improved water delivery and drainage. The proposal looks at 14 of the clubs which should help to significantly decrease mosquito problems. I'm intimately involved with all the projects and can tell you all the carrying capacities for delivery to all the clubs involved. To get water on and off all the properties in three days is not possible because some of the properties are 200 to 300 acres.

Mr. Brown: Biological control is better in deeper water (at least 3 to 4 inches) because it means you have predators. Can you flood the 200 acres at differing times rather than all at once? Water quality can make a huge difference also. Systems with large organic loading will contribute increased mosquito populations. Mosquitoes are adapted to the low oxygen and high organic content of eutrophic wetlands. If you are not getting good water quality let me know.

Participant Question: What is the effect of mowing? When we disc, the organic matter is deeper. When we mow the water quality turns brown.

Mr. Brown: Discing is better. If you mow the loose vegetation should be picked up and burnt or disposed of in some way.

Dave Feliz: Some of the grasses don't disc well so we mow, but burning might be better.

Mr. Ceppos: Do the duck club managers think water quality is an issue because of organic loading?

*Participant*s: It depends on the year. Some years are worse than others, depending on the weather. If we mow and don't flood until November is it ok?

Mr. Brown: That would be great.

Mr. Feliz: There are two ways to control sweet clover. Mow and flood. It is more cost effective to flood than mow and we start flooding in September.

Mr. Brown: Unfortunately, then you leave us little option but to spray. I find it hard to believe it is more cost effective to flood early and spray pesticides for mosquitoes rather than look at other management options.

Participant: We have to flood early or the birds go to Mexico.

Participant Question: Can you graze it?

Mr. Feliz: That's a possibility but the sweet clover is a problem for cows, but goats could be a possibility.

Participant: Dave Feliz has to flood earlier to keep the birds out of the rice fields.

Participant: We can't graze so what are we supposed to do?

Mr. Brown: I understand, we are working with agencies to coordinate.

The predator population should sustain through your deep water pond up to 2 to 3 feet (with 4 inches surrounded by deep water). I realize some of you are constrained by how deep your water can be. Another management practice should include a high slope index: Steep sides are preferred, but I understand that is not possible in Bypass.

Participant Question: For those of us that flood before November does it make sense to add Gambusia to the water? And when do we put it out, after the water is stabilized?

Mr. Brown: That would be great.

Mr. Feliz: We have a problem with cattails if we keep our water that deep, which creates a problem because of discing etc. It's really not possible for us and creates a two year cycle.

Participant Question: If we call you, will someone come and take a look to tell us if we need to do something or we have a clean bill of health?

Mr. Brown: Yes

Mr. Ceppos: We need to have a focused meeting about the things that Dave Brown is talking about, sooner rather than later. A more specific discussion on these bullet points, pros and cons and what can be done. We also need to discuss the requirements of state and federal regulations. The goal of the meeting should be what can we do this year in a voluntary capacity with land management? Who would be willing to attend this meeting?

Participant: I have a suggestion. Can we have a checklist of what we can do for specific properties that we can give back to you? That way we can coordinate based on the checklist.

Mr. Ceppos: It is something we could work on at the meeting. It looks like enough people to organize a meeting.

Participant Question: What kind of chemicals are associated with predators?

Mr. Brown: Many organisms give off pheromones that keep mosquitoes from ova depositing eggs.

The main thing that helps control mosquito productivity is the water. One of the major issues in the Bypass is water delivery around November 1st. Any date before that we need to discuss. Can we reduce some of the vegetation stands? Chemical control is the last option.

Yolo County General Plan Open Space and Recreation Element
Paul Simmons, YBF Board Member

Mr. Simmons described that he was asked to discuss the changes to the Yolo County General Plan that are under consideration. We are all grappling with this issue especially such topics as loss of agricultural land and property development. Mr. Simmons stated that he was not asked to support or oppose the changes. He provided the following disclosures: He is a member of the YBF Board. His law firm does work for Yolo County and Colusa County but has not worked on the General Plan. He is not speaking for any of these agencies. He works on a number of other issues where habitat and conservation efforts are issues for his clients. His wife works for a land conservation group.

The important parts of a general plan are:

1. The map which shows what can happen in each area.
2. The elements of the plan.

If an area is shown on the map as residential housing it doesn't mean that houses have to be built on it. The property can be left vacant. Currently, if the map says the property is agricultural, naturalized habitat can also occur on that same property in Yolo County.

CEQA says anytime a local agency approves a project (i.e. adoption or amendment of a general plan) you have to do an environmental analysis of the project. If there are some significant effects, you have to do an Environmental Impact Report (EIR). If there are no significant effects you write up a Negative Declaration.

The handout passed around is current as of April 2002. AP-39 on the second page states that "prior to the conversion of prime agricultural land for the primary purpose of establishing wildlife habitat, where agricultural production is precluded, including habitat conservation easements, habitat mitigation or related improvements, the appropriate Open Space land use designation shall be required, and where appropriate, an amendment to the applicable Yolo County General Plan."

Participant Question: How do they define prime agricultural land?

Mr. Simmons: It usually relates to soil and or water availability.

Participant: That can be a broad category.

Participant Question: Who decides that it is prime agricultural land?

Mr. Simmons: I'm not sure. There probably is a specific definition. If you asked a county planner they could tell you.

*Mr. C*eppos: Board of Supervisors would ultimately decide the appropriate and legal definition for the County.

Mr. Simmons: It is up to the supervisors whether this is something that should be adopted.

Some of the things that may affect yours or their thinking:

Pros:

1. The County has land use authority. They can say what the land use is and should be concerned with overall balance of uses. The protection of prime agricultural land is an appropriate priority. There are not a lot of other government agencies with this priority. Protecting agricultural land for the over all public good is a goal of the County.
2. Compatibility issues: Habitat conversion may affect neighbors; for example endangered species. There is no place to go realistically if there are concerns about conflicts.
3. The potential language only relates to prime agriculture land, channels restoration to lower value agriculture land.

Cons:

1. There are potential interpretation issues such as, what does it mean to preclude agricultural production.
2. The proposed language presents an impediment to restoration activities and land owners ability to do what they want to do with their land. It creates a "set of hoops" that doesn't currently exist.
3. CEQA would apply to County supervisors to amend the plan. Certain presumptions under CEQA that projects that affect prime agricultural land are significant and not mitigatable could apply.
4. The policy wouldn't apply to state and federal agencies. They are exempt from local land use laws.

Participant Question: What is the main push behind the basic policy change? It's basically trying to road block private restoration projects.

Mr. Simmons: It is an effort to try and get a handle on all the changes.

Participant Question: Are they worried about losing the tax base on the property?

Mr. Simmons: That is certainly a possibility.

Mr. Ceppos: In Colusa County it was done up there as a chilling effect to proposed habitat restoration projects.

Participant Question: If a state or federal agency buys land, they are exempt. If they buy an easement on a piece of property that property is not exempt?

Mr. Simmons: That is correct. If it was a conservation easement that modified use, before you entered into the easement you would have to go through this approval. If the state bought it before changes take place, you presumably wouldn't have to go through it.

Participant Question: There are areas designated by the County as open space and wildlife corridors, is the Bypass included in this?

Mr. Simmons: I'm not sure. It should be checked.

Participant: One thing that hinges on this is the definition of prime agricultural land. If you didn't farm that area over the past 10 years it wouldn't qualify.

Participant Question: We are in the Williamson Act area, if you aren't using this land for farming they'll tax your property. Will this create a problem?

Mr. Simmons: Unsure.

Rick Martinez: It's not a coincidence that this is coming up after the Glide Area purchase. The supervisors receive pressure from groups like the Farm Bureau, who are against any agricultural land being converted to wildlife habitat. We should leave the option to land owners not to county supervisors.

Participant Question: If they adopt this program won't it basically kill any conservation easements?

Mr. Simmons: That's a concern that some have. Note for State land clarification: The State would still have to comply with CEQA. The County would not have direct approval authority however.

Mr. Ceppos: There are a lot of questions regarding this document. Robin and I feel that you as land owners should have an opportunity to know what is going on.

Participant: It appears that the supervisors are going to have more control of our property than they already do. I don't want this.

Participant Question: Where are we in regards to time frame? When is the county going to open this up for comment? I think one of the supervisors should come in and present this.

Mr. Ceppos: We are thinking about this. Lois Wolk thinks it may come up this fall.

Participant Question: Therefore our November meeting may be too late?

Mr. Ceppos: We are going to be keeping this group aware. There may be a need for a special meeting. We will keep you aware.

Participant: Maybe you can write a letter saying we are an important group and please let us have a chance to review and react.

What is the best vehicle? From the county perspective they are probably just trying to keep control. Just because the land is being retired out of farming doesn't mean it can't be brought back into farming some day.

Mr. Hodgkins: It is the same with levee set backs and decreases in agricultural land. As you use land you don't have enough land left to keep it going. It would be interesting to have someone come in and say why this issue is coming up.

Participant: Maybe we should shoot for exemption in the whole Bypass.

Participant: That addresses our issue but not the issue of conversion of agricultural land to habitat.

Mr. Ceppos: We will identify how the Bypass is designated in the General Plan.

Mr. Ceppos adjourned the meeting at 1:30.

YOLO BYPASS WORKING GROUP
MEETING 22

MEETING MINUTES

MEETING DATE: November 21, 2002

LOCATION: California Department of Fish and Game
Yolo Wildlife Area Headquarters
45211 County Road 32B (Chiles Road)
Davis, CA 95616

IN ATTENDANCE: Robin Kulakow, Yolo Basin Foundation
Dave Feliz, California Department of Fish & Game (DFG)
Dave Ceppos, California Center for Public Dispute Resolution (CCPDR)
Ed Towne, Bull Sprig Outing

Jake Messerli, California Waterfowl Association (CWA)
Dennis Kilkenny, Dawson's Duck Pond
Mark Crossland, DFG
Armand Gonzalez, DFG-Region 2
Dean Kwasny, DFG
John Currey, Dixon Resource Conservation District (DRCD)
Marianne Kirkland, Department of Water Resources (DWR)
Ron Tadlock, Farmer
Chris V. Fulster Jr., Glide In Ranch
Dave Kohlhorst, Glide In Ranch
Don Stevens, Glide In Ranch

Jack Palmer, H Pond
Will Wylie, H Pond
Mark Kezny, Kezny Ranch
Mike Martinez, Martinez Farming Company
John Mohr, Mound Farms
Walt Cheechen, Natural Resources Conservation Service (NRCS)
Jennifer Maclean, NRCS
Kent A Lang, RD 1600
Chuck Dudley, RD 2035, Conaway JH Enterprises
Mike Hardesty, RD 2068
Betsy Marchand, Reclamation Board
Ken Martin, Rising Wings Duck Club
Butch Hodgkins, Sacramento Area Flood Control Agency (SAFCA)
Tim Washburn, SAFCA
Mick Klasson, Consultant to SAFCA
Barbara Gualco, Gualco Consulting/SAFCA

Tom Harvey, U.S. Fish and Wildlife Service (USFWS)
Tony Lucchesi, Wildlands, Inc
Brett Williams, Yolo County Parks and Recreation
Rachelle De Clerck, Yolo Basin Foundation

NEXT MEETING: January 23rd, 2003. 10:30 am to 1:30 pm

ACTION ITEMS:

1. Obtain the website and e-mail address list for Bill Mork regarding local flood forecast reports. Set up a separate meeting to learn how to read the flood forecast reports.

2. Contact DWR-National Weather Service in regards to why the Yolo Bypass concerns were not addressed in determining the monitor and flood stages at Lisbon Weir.

Dave Ceppos called the meeting to order and began introductions of attendees. Mr. Ceppos briefly covered the agenda and the purpose of the Working Group. The Working Group is open to the public and has been in existence for 3 years. It provides a focused opportunity for farmers, land owners and agencies within the Bypass to discuss Bypass related issues and provides guidance and opinions on such issues. Mr. Ceppos recently left Jones & Stokes and is now with the California Center for Public Dispute Resolution.

Mr. Ceppos asked if there were any changes or edits to the draft August 15, 2002 meeting minutes. No changes or edits were requested and the August 15, 2002 meeting minutes were adopted as final.

Update on the Yolo Wildlife Area Management Planning Process
Dave Feliz, DFG

Mr. Feliz gave a brief summary of the recently concluded focused management planning process meetings. The meetings were well attended, successful and feedback from the participants included local knowledge. The next task is to review the meeting minutes and decide if additional focused meetings are necessary.

Mr. Feliz's meeting summaries were as follows:

Hunting and Fishing:

When restoration of the newly acquired lands is completed, approximately 8,000 acres of the Yolo Bypass Wildlife Area (Wildlife Area) will be available for hunting of waterfowl. Hunter capacity is estimated to be 250. The majority of the habitat will be large acreages of seasonal marsh.

Current hunting capacity is subject to change, based on how many people are hunting in the blinds. Since the Wildlife Area has been open, hunting capacity has increased. Currently DFG maintains a free roam capacity of 35 hunters and blinds limited to 64 seats are also available.

Approximately 1,600 acres on the west side of the Tule Ranch was discussed for pheasant hunting. The exact location would be dependent on grazing practices and what type of vegetation will grow in that location. Currently, this location is not good for pheasant because it is too heavily grazed.

Approximately 3,800 acres will be dedicated for wildlife viewing and touring. A total of 1,100 acres will be dedicated as a sanctuary. Proposed uses for these areas include wildlife viewing, school tours, hiking and in the case of the sanctuary areas, no public use is allowed.

Flood Protection:

SAFCA may have a one dimensional (1D) model available to model hydraulic conditions in the Bypass. The outcome of the meeting indicated that additional discussion is needed to determine the appropriate model input variables. Mr. Feliz indicated that the State Reclamation Board may be willing to support habitat restoration if an appropriate model is used to assess potential future land use conditions correctly and the results are acceptable with regards to the maintenance of Bypass flood conveyance and capacity.

Agriculture:

Farming practices such as tenant farming, market farming and grazing programs were discussed at this meeting. Tenant farming would be the most feasible approach if the crops were farmed in at least 200-acre blocks.

Custom farming: In custom farming DFG does not receive any money from the crops. Instead each aspect of the farming process (discing, planting, mowing) is contracted separately.

The Department of Fish and Game currently farms about 400 acres.

The grazing program was discussed as a tool to control/change vegetative communities, especially in the vernal pool areas.

Currently farming provides income for the Wildlife Area. As the state continues to have funding issues, agriculture in the Wildlife Area will be an additional supplemental funding source.

Participant Question: Is the funding available for the Wildlife Area.

Mr. Feliz: We will have a dedicated account in the state treasury. At present we are trying to get the account approved but we don't have that agreement yet.

Fish:

There are great opportunities for native fisheries habitats in the Wildlife Area, especially by utilizing the tidal flows near the Toe Drain and flood flows of Putah Creek. However, any changes would have to be compatible with the existing management strategies.

Wildlife Management:

The overall conclusion at the meeting was that the Wildlife Area goals should mirror what is in the Central Valley Habitat Joint Venture Plan but that these goals should also be compatible with flood protection.

Environmental Education:

Tour route ideas and potential locations were discussed. The discussed locations included the Tule Ranch, Umbrella Barn and Green's Lake. Approximately 9 additional miles of auto tour route are anticipated.

In addition to the tour route, it was re-iterated that one of the top two priorities of the Director of DFG are environmental education programs that meets the state's teaching standards. Yolo Basin Foundation in collaboration with DFG is way ahead of the curve in this area. The current educational program should continue with the Foundation managing the teaching portion and DFG providing the facilities.

Where to next:

The next step in the planning process will include a level of analysis that may require an Environmental Impact Report (EIR). Currently DFG is seeking funding to contract for the preparation for this report.

Mr Ceppos pointed out that that minutes for the focus group meetings have not been sent out yet. The minutes for these meetings are likely to range between 15 to 22 pages per meeting. Therefore when recipients receive these minutes via e-mail they will be very comprehensive, large files.

Update on the Yolo Wildlife Area Hunting and Other Related Programs
Dave Feliz, DFG

This year's waterfowl opener was the worst in recent years. In 1998, 75 waterfowl were shot on opening day. Successive year openers were as follows:

1999 = 240 waterfowl
2000 = 293 waterfowl
2001 = 281 waterfowl
2002 = 181 waterfowl

Local duck clubs are also experiencing problems. The drought in the North American prairie pothole regions, where the ducks nest during the summer is contributing to the low waterfowl count this year. However, the waterfowl numbers are up in Suisun Marsh.

Participant: I would also attribute the low waterfowl numbers to an increase in closed zones.
Participant: How many hunters were at the Wildlife Area on opening day?

Mr. Feliz: 102

Hunting blinds 8 and 13 are doing well, relative to the other blinds.

Pheasant hunting has had a banner year. The Bypass has not flooded in recent years and so the numbers of pheasants has been steadily increasing. More pheasants (157 pheasants) have been shot this season than in any other season in the first five days. Previous years pheasant opener counts are as follows:

1997 = 19 pheasants
1998 = 8 pheasants
1999 = 10 pheasants
2000 = 21 pheasants
2001 = 40 pheasants
2002 = 42 pheasants

Wednesdays are apparently the day to hunt, with numbers relatively high. On Saturday, November 16, 50 pheasants were planted for the Junior Hunt. Only 14 birds were shot. The Junior Duck Hunt was also poor, with no birds shot.

Update on the NAWCA Grant Process
CWA

Dave Feliz gave a brief update on the progress of the North American Waterfowl Conservation Agreement (NAWCA) grant. Yolo Basin Foundation and DFG gave a tour of the Wildlife Area to the NAWCA group in October.

CWA's proposal was ranked #4 in the nation. Items included in the NAWCA proposal are improvements to the northeast unit of the existing Wildlife Area and some improvements to local duck clubs. Ducks Unlimited (DU) has submitted a proposal for the east end of Tule Ranch, the Cosumnes River area and portions of the Delta. DU's proposal may be a year behind the CWA proposal.

Work can get started on the Causeway Ranch no later than the 2005 work season due to time constraints of the NAWCA projects. The approved Wildlife Area Management Plan and associated hydraulic analysis is needed to take advantage of the NAWCA grant. The definitive answer on funding will come in the spring. If CWA receives funding, work could start on improvements in the northeast corner of the Wildlife Area in 2003 and may carryover to 2004.

Update on E-mail Rollover Process and Distribution of Yolo Wildlife Area Management Planning Process and Yolo Working Group Meeting Minutes
Robin Kulakow, Yolo Basin Foundation

Ms. Kulakow informed the participants that beginning the second weekend in December Yolo Basin Foundation will be e-mailing the Working Group meeting minutes. E-mailing the minutes to participants will result in a significant cost savings to the Foundation and ultimately a large savings in CALFED grant money. Ms. Kulakow encouraged participants to send in their postcards with their current e-mail information if they have not already done so.

Sacramento Regional Project Planning Study
Butch Hodgkins, SAFCA

Mr. Hodgkins informed the Working Group participants that SAFCA is concerned about flooding along the Sacramento River. While the primary focus of SAFCA is to protect Sacramento from flooding, SAFCA has learned it is important to engage a broad range of people in discussions regarding their needs and to try and incorporate partnerships to fulfill those needs thus providing the greatest level of support for a project to improve flood control. SAFCA is interested in a project that should increase the capacity of Sacramento River Flood Control Project from the Fremont Weir south.

Mr. Hodgkins summarized SAFCA's efforts on the American River, noting that after two attempts to obtain congressional approval of Auburn Dam, SAFCA undertook an incremental strategy focused first on improving levees and then on modifying Folsom Dam. Levee work is authorized and under construction. Three of four steps to improve Folsom Dam are authorized, and the fourth is now before congress. If that last step is approved and constructed, Sacramento will have achieved its goal of 200-year flood protection along the American River.

The levees along the Sacramento River are the oldest levees in the system. Many of these levees were built by dredging sand out of the river, and were constructed prior to the development of U.S. Army Corps of Engineers (Corps) standards for levee construction. Seepage is the greatest threat to these levees. Levee seepage at several locations throughout the system have been addressed by State and Corps levee restoration projects. However, the threat posed by seepage in foundation soils under the levees has not been addressed. Mr. Hodgkins explained how underseepage can cause a levee to fail. Underseepage occurs when the underlying soil layer is of high permeability (i.e. sand) and the surface layer of soil is of low permeability (i.e. clay). The sand layer provides a conduit for water under the levee while the overlying clay layer acts as a confining membrane. Water pressure in the sand layer begins to push the clay layer up (also referred to as heaving). Eventually the clay layer ruptures and the sand layer becomes a pipe for water. As the water flows through the rupture, sand is carried away creating a void beneath the levee. The levee settles into the void and the levee is overtopped.

Participant Question: What about the levees from Freeport south?

Mr. Hodgkins: I think every levee in the Central Valley has this problem.

Participant Question: Are you going to address the levees from Freeport south?

Mr. Hodgkins: I don't think the levees from Freeport south will be ignored, but SAFCA's area of focus is Sacramento.

Underseepage is a tough issue to analyze. Soil borings provide some information, but don't show how soil conditions change between borings. Consequently, the normal approach is to assume you must construct controls continuously even when intermediate borings may indicate controls are not needed. Currently, underseepage is a concern from Freeport to Verona, and is a very costly problem to address. For example, in the Pocket Area, costs may range between $30 to $50 million and in the Natomas region anywhere between $100 to $200 million. This is all compounded by the fact that there is too much water coming through the system.

Participant Question: We sometimes feel like you ignore the Delta and only worry about Sacramento.

Mr. Hodgkins: SAFCA is an elected board and their job is to address the concerns of the population that elected them. Sacramento residents elect SAFCA's board members; therefore SAFCA concentrates on improving Sacramento's flood control problems. In addition, Corps standards require that project benefits be at least equal to project costs. This can make it very costly to improve flood protection in undeveloped areas.

Mr. Hodgkins presented a graph of unregulated Sacramento River system flows at Verona that demonstrates peak flows and trend line flows are increasing. SAFCA has developed a 200-year storm model that can be used in designing improvements that would provide 200-year protection. Models show that such a storm would overtop Yolo County levees in East Elkhorn, which are lower than Sacramento county side levees. Once flooding begins, most of the Elkhorn area is flooded. Additional water probably goes into the Bypass, and may raise water levels high enough to overtop the navigation and Bypass levees protecting West Sacramento.

Participant Question: Can't Yolo County levees be raised?. If the Sacramento city side is going to raise levees why can't the farming side raise their levees?

Mr. Hodgkins: From a practical standpoint, the Sacramento side levees are already higher, and when push comes to shove Sacramento residents would be upset by a potential for an increase in flooding on the city side that could result if the Yolo levees are raised. Consequently raising levees is not the best approach, as it tends to shove water onto someone else.

Transitory storage was an option considered in the Sacramento and San Joaquin Rivers Comprehensive Study. In the event that farm land under transitory storage easements is damaged by a flood, the damages will be repaired and property owners will be compensated for their losses. But farmers need to understand that in a large flood like 1997, farm lands will flood first because of their lower levees and property owners who are flooded are not assured of being compensated. Under the transitory storage concept, flood damage is minimized and property owners are compensated for their damage.

Participant Question: Isn't the real worry that when flooding occurs in the Elkhorn area, the water will back up against and fail the north Sacramento bypass levee and then run into both the Yolo Bypass and the Sacramento River, thus negating any improvement in flood control?

Mr. Hodgkins: That is a possibility that we have not analyzed, but we will look at it in the future.

An option that benefits Yolo, Sacramento, Yuba, Sutter, Placer, and Solano counties is to increase the capacity of the Yolo Bypass. Elements of such a project include widening the Fremont Weir, setting back the levee between the Fremont Weir and Interstate 5. The Bypass is constricted at Interstate 5. Below Interstate 5 increase the Bypass again by setting levees back. Below Interstate 80 put an operable weir from the Bypass into the Deep Water Ship Channel (Ship Channel) and gates to prevent back-up of flood flows into the Port of Sacramento. Lastly,in order to increase conveyance capacity, remove the restricted height levees in the lower Bypass (e.g., Liberty Island, Egbert Tract).

What will the flood control project do? Overall, it will lower water surfaces in the Yolo Bypass and in the Sacramento River including Sutter, Yuba and Placer Counties. In addition it will:

- preserve agriculture,
- provide opportunities for water and flood control improvements for Yolo County cities,
- provide opportunities for Bypass landowners,
- provide opportunities for environmental restoration,
- reduce cost of SAFCA projects,
- and provide an opportunity to improve government cooperation in the Central Valley.

The project will not:

- increase the frequency of flooding in the Bypass,
- or place new unmitigated burdens on Bypass landowners.

Participant Question: Is there any potential increase in the duration of flooding?

Mr. Hodgkins: The duration of flooding is likely to increase because this approach shifts more water into the Bypass. However; adding the weir into the Ship Channel may mitigate for this in events greater than about a 50-year storm because some of the increase goes into the Ship Channel. We need to do more analyses to get a better handle on the changes in duration.

Participant Question: Why wait for a fifty year flood to open the Ship Channel when the Bypass floods? Why not open it during any flood?

Mr. Hodgkins: While it may be possible to open it for a smaller storm, it can not be open all the time, because closing the gates that prevent flooding of the Port will shut down shipping.

Participant Question: Is the east levee of the Ship Channel good enough to handle the added flow?

Mr. Hodgkins: We are proposing to limit the amount of water that goes into the ship canal to 50,000 cubic feet per second (cfs), which is not enough to go over the existing berm. However, more analyses of these levees are also part of the study.

Participant Question: If you only put water into the Ship Channel for a 50-year flood, aren't you putting more water into the lower Bypass in most flooding conditions?

Mr. Hodgkins: Yes, but is also depends on what you do with the levees in Liberty Island and other key places. Removing these low levees could help drain the lower Bypass more rapidly.

Participants: The implication is that the project will lower Bypass flood levels by about a foot. In most years it's not going to do that.

Mr. Hodgkins: I apologize, in smaller floods there is a higher water level in the lower Bypass. The frequency and duration we don't know yet.

Dave Ceppos: Therefore, there is a concern regarding whether non-design events will result in deeper water and more frequent flooding in the lower Bypass.

Participant Question: If you are going to put the gate in for the Ship Channel, why can't they utilize the gate to let ships in and out and still use it to regulate small flood flows?

Mr. Hodgkins: I am unsure, we haven't thought about that detail at this point.

Participant Question: Are you going to increase the velocity of Bypass flood flow?

Mr. Hodgkins: It will probably increase a little, possibly by 2 cfs.

Participant Question: If you increase the flood flow, will we see a lot of gouging and erosion on farm land?

Mr. Hodgkins: I don't think it will be significant, but more analysis will clarify this point.

Participant Question: When you define what the capacity of the Bypass is? Will it be where it is now or where it should be given future capacity needs and past design performance requirements?

Mr. Hodgkins: The capacity should be at more than either of your concerns.

Participant: You need to define what the capacity of the Bypass is.

Participant Question: I don't agree that flood frequency of the Bypass is going to stay the same. All these changes have increased the frequency and velocity. All these changes are not going to help at all in the lower Bypass. Urbanization will cause increased frequency of floods.

Mr. Hodgkins: We are not changing the elevation of the Fremont Weir so water won't flow over the weir more frequently than it does now. That's not to say that additional changes further up the system along the river won't change frequency of flooding.

Participant Question: The people who have changed all the land around the Bypass and funneled all this water in the Bypass should take some responsibility. There is an easy answer, just buy us out and turn it into a river channel.

Mr. Hodgkins: That is not outside of the realm of discussion here. But what I don't want to do is create additional concerns such as loss of agriculture in Yolo County and the Central Valley.

Participant Question: You're only going to lose maybe 25,000 acres of farm land which is really insignificant. The ground will become useless for farming if flooded every spring. Maybe there is another use for it.

Mr. Hodgkins: What about custom farming? How about a program where you get compensated for flood loss?

Participant Question: Is the Bypass going to flood faster?

Mr. Hodgkins: I can't answer that question, but my instinct says yes. It is a topic that needs to be addressed.

Participant Question: Is it going to flood more frequently and rapidly? I'm concerned about lead notice. My conservation easement requires I maintain levees and wetland habitat.

Participant Question: Are you going to do channel improvements along the Sacramento River and gate improvements at Oroville? Velocity is a big issue. Everyone is caving into political reality of flood control, but not dealing with increasing reservoir capacity. It doesn't make sense to spend so much money for flood control and not include storage too.

Mr. Hodgkin: If you need a better forecast, I can help you get a better one. The information is available. Bill Mork (the state meteorologist), puts out a daily e-mail in the winter when there is threatening weather. These notices are usually 3-4 day notice.

Mr. Ceppos: Mr. Hodgkins will obtain the website address and assist us with reading the reports at the next meeting. In addition we will obtain information regarding the Lisbon Weir monitoring and flood stages and why Bypass landowners concerns were not addressed.

Participant: Removal of the stair step levees (Liberty Island) could have some detrimental effects to the lower Bypass because of tidal influence.

Participant Question: Why don't you dredge the Sacramento River?

Mr. Hodgkins: In a big flood we are dealing with 500,000 cfs in the Sacramento River system. In these events, the flow split at the Fremont Weir is about 80 percent into the Bypass and 20

percent in the Sacramento River. If the river were two feet deeper, it might carry an additional 10,000 cfs, or about 2 percent. To achieve this increase, you would have to dredge the channel every year from Fremont to Rio Vista. Dredging for additional capacity does not make sense.

Participant: You're completely right about proportion; however you're forgetting about the sand bar on the Feather River. Eventually the levee is going to fail because of the sandbar causing deflection of the water that may direct flows into levee walls.

Mr. Hodgkins: It may make sense to dredge the Feather River. This is where people who have been out there can help us. You know the changes that have affected the bottom of the river, such as the sand dam moving down the river. The Feather River needs to be cleaned. We have been approached by Teichert for areas where they can get more sand.

Participant: We are proposing to sell our sand to Teichert, sell our water to Sacramento Municipal Water District and the lower part of our property to the U.S. Fish and Wildlife Service.

Participant: If the State bought our land they could lease it for farming, etc.

Originally land in the Bypass was bought by the State in fee, but there was a large outcry. The State sold back the property and put in easements. However, government fee purchases with lease options back for agriculture or habitat might make sense. If Yolo County and Solano County give up this land to flood control, the counties will benefit immensely.

Participant: I would hate to see the tax base disappear and all the farmers disappear. The current agriculture practices keep the Bypass clean and convey flow for everyone. Not all of us support the concept of fee title purchase.

Betsy Marchand: We need some factual explanations that could be handed out on various issues. Such as the increased water coming this way and why is that so. In regards to the new models that the Corps has done, what do you think that they will add to this process?

Mr. Hodgkins: We are using the model the Corps used for the Comprehensive Study. We had MBK Engineers look at the model in detail because we are not 100% sure it reflects the reality of the situation. I am unfamiliar with the 2D and 3D models. The 2D model looks at different velocities at different places in the same cross section. Steve Chainey from Jones and Stokes has described what the water is doing on the upstream weir. It's basically a moving lake.

Participant Question: Two impacts need to be addressed. Longer duration floods result in a loss of nesting season. Also, a look at the effects of the changes of duration of floods and velocity on the multiple types of conservation easements in the Bypass should be conducted

Participant: Please discuss lengthening the Fremont Weir and also fish passage through the Bypass.

Mr. Hodgkins: Fish experts are interested in making the Tule Canal suitable for fish conveyance. SAFCA is interested in incorporating environmental restoration into the project, because environmental restoration features are subject to more generous cost effectiveness guidelines and are therefore easier to justify. To the extent environmental measures help with flood protection, they can overcome the problems of improving flood protection for agricultural lands that can't meet more rigorous Corps of Engineers cost-benefit tests.

Marianne Kirkland: In the old plans for the Fremont Weir, the original weir was designed with a large notch.

Participant: There used to be a steelhead run up Putah Creek. Maybe we should worry about Putah Creek as opposed to the Fremont Weir.

Mr. Hodgkins promised to keep the group informed and to provide updated information as it becomes available.

Dave Ceppos: Summary of what has been said:

1. Will non-design events result in deeper water more frequently in the lower Bypass?
2. Why can't ships move through the Ship Channel with small flood flows coming through the proposed operable weir?
3. Will flood flow velocities increase?
4. Is the capacity of Bypass currently where it should be?
5. Urbanization will cause increased frequency of floods in the Bypass.
6. Suggestion to buy out all Yolo Bypass land and lower Fremont Weir.
7. Will the Bypass flood faster? .
8. Concern of flood lead notice.
9. Concern of impact to existing conservation easement habitat management regulations.
10. What about channel dredging on the Sacramento River and Oroville improvements?
11. It doesn't make sense to spend so much money for flood control and not include storage options also.
12. Removal of stair step levees at Liberty Island could cause tidal impacts to land owners.
13. Sandbars cause deflection eddies of water that may direct flows at levee walls.
14. Government fee purchases with lease options back for agriculture or habitat might make sense.
15. Yolo County tax base needs to be protected.
16. Dislike the idea of agriculture displacement and loss of agriculture practices That currently keep the Bypass clean and conducive to flow conveyance.
17. Need fact sheets describing issues (e.g. future flood flows)
18. What might the new Corps models tell us in regards to the SAFCA proposal.
19. Not all landowners support the concept of fee title purchase.
20. Longer duration floods in Spring impact nesting habitats. (also impact grazing practices), and vegetation management in Wildlife Area.

Meeting was adjourned. Next meeting scheduled for January 23, 2003.

YOLO BYPASS WORKING GROUP
MEETING 23

MEETING MINUTES

MEETING DATE: January 23, 2003

LOCATION: California Department of Fish and Game
Yolo Wildlife Area Headquarters
45211 County Road 32B (Chiles Road)
Davis, CA 95616

IN ATTENDANCE: Robin Kulakow, Yolo Basin Foundation (YBF)
Dave Feliz, California Department of Fish & Game (DFG)
Ed Towne, Bull Sprig Outing
Dave Ceppos, California Center for Public Dispute Resolution (CCPDR)
Casey Walsh Cady, California Department of Food and Agriculture (CDFA)
Dennis Kilkenny, Dawsons Duck Club
Armand Gonzales, DFG - Region 2
Dean Kwasny, DFG
John Currey, Dixon Resource Conservation District (Dixon RCD)
Lori Clamurro, DPC
Marianne Kirkland, Department of Water Resources (DWR)
Randy Mager, DWR
Ted Sommer, DWR
Boone Lek, DWR/Reclamation Board
Don Stevens, Glide In Ranch
Will Wylie, H Pond
Mark Kearney, Landowner
Scott Stone, Landowner
Ron Tadlock, Landowner/Farmer
Selby Mohr, Mound Farms
Sally Negrai, National Resource Conservation District
Cindy Mathews, National Weather Service (NWS)
Pete Fickenscher, National Wildlife Service (NWS)/CNFRC
Mike Hardesty, Reclamation District 2068 (RD 2068)
Betsy Marchand, Reclamation Board
Butch Hodgkins, Sacramento Area Flood Control Agency (SAFCA)
Mick Klasson, SAFCA
Tony Lucchesi, Wildlands Inc., Pope Ranch
Gaye Lopez, YBF Board
Rachelle De Clerck, YBF
Brett Williams, Yolo County Parks and Resource Management Division
Cheechoy
Dick Goodell

NEXT MEETING: February 27th, 2003. 10:30 am to 1:30 pm

Dave Ceppos called the meeting to order and began introductions of attendees. Mr. Ceppos briefly covered the agenda and the purpose of the Working Group. The Working Group is open to the public and has been in existence for 3 years. It provides a focused opportunity for farmers, land owners and agencies within the Bypass to discuss Bypass related issues and provides guidance and opinions on such issues. The Working Group is continually funded by Cal-Fed.

Mr. Ceppos introduced himself and informed the participants that he is an employee of the California Center for Public Dispute Resolution. Participants introduced themselves.

Mr. Ceppos asked if there were any changes or edits to the draft November 21, 2002 meeting minutes. No changes or edits were requested and the November 21, 2002 meeting minutes were adopted as final.

E-mail Rollover Update
Robin Kulakow, YBF

Over the past couple of months Yolo Basin Foundation (YBF) has attempted to convert outreach communications to e-mail. At present there are approximately 65 people on the Working Group list who have not listed their e-mail addresses. If you haven't received the last e-mails YBF has sent please let Robin Kulakow know so that YBF can make the appropriate corrections.

On December 18th Yolo Basin Foundation sent out the minutes for the first two focus group meetings via e-mail. Robin asked for a show of hands from anyone who received the e-mail. Based on the show of hands, only the first twenty people on the list received the e-mail. YBF's internet provider apparently filters out e-mails with more than 150 people as spam mail. The internet provider claims they do not filter e-mails. YBF made a second attempt, but the e-mails were once again filtered out. Therefore, YBF has converted the e-mail list into 15 groups of 10. Everyone who YBF has e-mail addressed for should have received an e-mail at the end of last week, except for the 65 people who have requested hard copy mailings.

Robin asked for a show of hands from people who received last weeks e-mail. The analogue board on Robin's computer went out and the computer was lost. Therefore the first focus group meeting minutes will be e-mailed again.

Update on the Yolo Wildlife Area Management Planning Process
Dave Feliz, DFG

The Department of Fish and Game (DFG) is currently pursuing CALFED funding for preparation of the management plan and participating in the Yolo Regional Restoration

Planning effort for SAFCA. DFG has indicated areas where riparian restoration would be desirable and located potential sites to create wetlands that would be affected by tidal action.

NAWCA funding requires that the modeling for the Bypass bye completed by 2005. Realizing that the modeling efforts may not be completed in the timeframe necessary to take advantage of the two NAWCA proposals, Dave is proceeding with the assumption that the current limitations on emergent vegetation and riparian areas will be applicable to the new lands. The Reclamation Board approved Dave's scenario of 5% vegetation and 5% permanent wetlands after the 1D modeling was completed by the Army Corps of Engineers (ACOE). Dave needs further clarification from the Reclamation Board whether the same modeling effort is sufficient to proceed with the NAWCA proposals. For this reason, Dave feels it is important to the effort that the Yolo Hydraulic Technical Advisory Committee is reconvened. The Yolo Regional Restoration Planning effort and the newly approved Reclamation Board Hydraulic Model test case will become an important part of the process to restore riparian and emergent vegetation in excess of the current standards.

Update on the Yolo Wildlife Area Hunting and Other Related Programs
Dave Feliz, DFG

The duck hunting season ended in the Bypass on December 15th, due to flooding. The early helped contribute to a bad hunting year with only 1371 hunters killing 882 waterfowl for an average of less than 1 bird per hunter. Pheasant hunting was much more successful with 271 birds shot. This was an increase of over 130 birds from last year. The increase in pheasants was likely a combination of several years without major flooding along with agricultural plantings of millet, milo, and wheat, harvested rice fields and the application of late spring water. DFG hopes to be open for the Junior Hunt the first weekend in February.

The public tour route has been open intermittently since mid-December. DFG re-opened the tour route up to Parking Lot B today for wildlife viewing. School group programs have been working around the flooding however, the hunting areas are still flooded especially on the east side where the water is much deeper.

Department of Water Resources Lisbon Monitoring Stage
Cindy Mathews, NWS

Cindy Mathews of the Department of Water Resources (DWR) presented information and answered questions regarding the Lisbon Weir monitoring stage.

Participant Question: As I recall, you received a lot of input from many of us in the Working Group to lower Lisbon Weirs monitoring stage from 14 feet to 11feet. However, the monitoring stage remains at 14 feet, can you explain this to the group.

Ms. Mathews: I may not have made myself clear during our last meeting. Originally the forecasts were to be set at 20 feet, I was trying to keep the forecast at 14 feet.

Participant Question: Guidance plots are forecasting at less than 14 feet, so why are the forecasts set at 14 feet.

Ms. Mathews: Guidance plots will forecast lower than 14 feet, but text issues will not be sent out until 14 feet. It is difficult for DWR to forecast at the Lisbon Weir based on the tidal effects; therefore the forecasting is set as a basin. DWR will be able to forecast trends using the guidance plots for Lisbon Weir, but they will not be accurate at levels lower than 14 feet.

Participant: After the peak flows in the basin, the guidance plots seem to forecast faster receding water than what really happens in the Bypass. The rate of decrease appeared to be the same as increase, but in actuality it falls off much slower.

Participant Question: Does the gauge fit in that cylinder?

Ms. Mathews: Yes.

Participant: You mentioned the science is only good to 14 feet. Can you be more specific?

Ms. Mathews: How to measure flow is the hardest part. The lowest the rating goes down to is 12feet. If we could improve the rating it would help DWR with the forecasts. The other problem is the fact that the Bypass is so flat that there is a looped rating due to fact that the influx of water is faster than the outflow.

Participant: When Lisbon is at 14 feet my property is under 3 feet of water. I need to rely on the forecasts in order to remove my equipment before water is on my property.

Participant: An acoustic Doppler has been installed at Lisbon Weir which measures the net amount of flow that goes through the Weir. Can DWR post this information on CDEC?

Ms. Mathews:

Mr. Ceppos: Can you walk everyone through the information on the graph and explain what it means?

Ms. Mathews briefly walked the Working Group through the graphical river forecasts. The river forecast graphs are updated only after forecast models are run and the official forecast is issued. The observed stage information in not updated between forecast issuances.

The top graphs on the river forecast page depicts both the observed and forecast rain and snowmelt. The blue bar graph illustrates the actual observed rain and snow melt over the past 6-hour period, whereas the green bar graph is the forecast rain and snow melt for the next 6-hour period.

The bottom line graph illustrates the observed and forecast river stages. The red dotted line is flood stage and the orange dotted line is monitoring stage. The vertical scale on the right is the stage in feet. The vertical scale on the left is discharge in cubic feet per second (cfs). The bottom horizontal scale is the date and hour. There are three colors on the plot line, blue, green and pink and are as follows:

- Blue – Observed river stage for the previous 5-days.
- Green – Official river forecast for a 24 to 48 hour period depending on location.
- Pink – Guidance over a 2 to 5-day period.

The official river forecast line plot agrees with the text forecast in the river bulletin. This portion of the graph has a high confidence in the forecasted stages. The guidance plot line is not an official forecast. This portion of the graph has a larger degree of uncertainty and lower confidence. The guidance plot should be used only as a planning tool.

Some of the assumptions that are included in the forecast and guidance plots are as follows:

<u>Precipitation Assumptions</u>

- The amount forecasted will be the amount that falls.
- The amount of forecasted rain versus snow will be correct.
- The amounts will fall within the forecasted 6-hour period (i.e. the storm will arrive as planned and not stall off the coast or arrive early).

<u>Reservoir Assumptions</u>

- Reservoir releases will remain constant through the 5-day period. (WARNING – Reservoir releases are not likely to remain constant during most storm events. A new reservoir release change can radically change the forecast and guidance graphs.)

The 6-hour precipitation plots include the water sheds north up to Shasta Dam.

Ms. Mathews discussed an “after-the-flood” analysis of how well the Graphical River Forecast did in comparison to the actual observed river stage. In the short term (the actual forecast section of the graph) the forecasts are usually good. But if the storm stalls, the short term forecast can be very wrong (as shown on the third slide). In that instance, the storm stalled off the coast and dumped its rain directly into the ocean;

therefore the actual river stages were significantly different from the forecast. Ms. Mathews reiterated that major decisions should not be based on the guidance portions of the graphs, they should be utilized as planning tools only.

Ms. Mathews listed websites for river forecast graph locations:

- CDEC Web Page – River/Tide Forecast Links http://cdec.water.ca.gov/rivforecasts.html.
- NWS Web Page –Hydrology Link http://www.wrh.noaa.gov/sacramento/html/hydro_data.html
- Weather Forecast daily e-mail updates, send an email to weather_list@water.ca.gov and ask to be included on the e-mail list.

Participant: I like the idea of being able to plan out 5-days in advance, even if it is imprecise because it gives us a basis. Lisbon is the middle of the Bypass; however my property is located at the south end of the Bypass which is heavily affected by tidal influence. Can we get another station farther south?

Ms. Mathews: United States Geological Society (USGS) has posted another station at the southern end of Bypass where it empties into Cache Slough. There is also a stage gauge at Liberty Island which is available on CDEC.

Participant: On the current river prediction stage for the Bypass there are two stations south of Lisbon. There are currently no predictions for these stations, but they at least list the current river stages.

The LIY graph is inside the bypass, CDEC is doing real time within the hour for this location.

Participant: Will the gauge on the southern end of the Bypass be on CDEC?

Ms. Mathews: That isn't clear at this point; however DWR is working on that.

Participant: On the graph it says not rated for flow at Yolo Basin at Lisbon Weir. Why?

Ms. Mathews: Lisbon Weir is within the influence of tidal flow. At this point DWR can not measure tidal flow because the flow direction changes.

Participant: Is the influence of tidal flow built into the DWR forecast model?

Ms. Mathews: DWR does not have that capability at this time.

Weather and Flood Forecasting Websites

Butch Hodgkins, SAFCA

Mr. Hodgkins briefly went through the steps on using the CDEC website to find real time data that is available on water and weather in California. Mr. Hodgkins' handout illustrated the steps used to maneuver through the CDEC website. Please see handout for information.

Participant: Do these flows illustrated on the website take into account a flood event?

Mr. Hodgkins: There is fundamentally a 5 – 10 day weather forecast which includes a 6-hour quantitative precipitation forecast for up to 5 days. The precipitation forecast plus the snow melt is run through the models, and estimates a 6-hour runoff period.

At Folsom Dam in the middle of winter, when the reservoir storage goes above 60% full, the rules mandate that additional water is released from the reservoir up to the point where released water would exceed downstream capacity.

Participant: Can you explain what the increments are for the boxes on the blue line graph.

Mr. Hodgkins: The 23 on the blue line graph indicated January 23rd, the black lines indicate each day after.

The data for these graphs are run through two computer models prior to posting on the graphs. It is not likely that SAFCA will not hear of a large flood before it comes, in fact the NWS may say the coming flood is bigger than what actually occurs; however, SAFCA would rather be over prepared than under prepared.

Mr. Ceppos: The Bypass picks up local flows as well as Sacramento flows. Does the data include Putah Creek and Cache Creek flows? Are these flows being averaged?

NWS: Yes the data includes Putah Creek and Cache Creek flow, but the two flows are lumped together. This is an area that can be improved.

Mr. Hodgkins: I don't see Putah Creek on the CDEC graphs?

NWS: Putah Creek is not an official forecast.

Participant: Lisbon weir is only one, point location in the Bypass. If your property is north of Lisbon, then the flood crest will reach your property sooner and leave later than a property south of Lisbon Weir. There are many micro-geographical situations in the Bypass. The CDEC information is two-days should be used as a forecast, 3 to 5 days as guidance.

Mr. Ceppos: What doesn't exist on the graphs is flow to topography, the Bypass is micro-topography.

NWS: The NWS can estimate the inundation after the flood, but that is the current extent of NWS' capabilities.

Mr. Hodgkins: SAFCA hopes to take some aerial photographs during flood events to help us better understand what is happening at various stages at Lisbon. SAFCA is currently in the process of using data from the CDEC website for SAFCA's website.

Participant: Is there a chance that the model will show Freemont Weir will not spill but Sacramento Weir will?

Mr. Hodgkins: I can't conceive of an event where that would be happen?

Participant: There is a graph that illustrates that Sacramento Weir has never opened unless the Freemont Weir was spilling.

Participant: What determines the statement "monitor stage"?

NWS: On the levied river system, the monitor stage is when the river rises up onto the levee. For Lisbon that stage was lowered because the deep water channel is between an official levee and a weir. At Freemont Weir the monitor stage is when water tops the weir. Monitoring stages are different at different places.

Participant: What is Ridge Cut?

Mr. Hodgkins: Ridge Cut is south of Knights Landing and consists of two parallel canals upstream of Cache Creek. It is a connection of Colusa Basin drain.

In 1997 the Ridge Cut overtopped its bank and flooded Highway 113. The Ridge Cut flows into the Bypass; however, in 1997 Bypass water was so high that it acted as a dam to Ridge Cut flows and backed up the Ridge Cut.

Participant: Is the data on the CDEC website in feet at sea level or something else?

Ms. Mathews: Datum on the CDEC graphs is either in USED or NGVD both of which do not agree on sea level measurements and vary between 3 to 5 feet. According to Michael Mossbacker, Lisbon Weir is -3 feet NGVD. Therefore, use the datum from the CDEC chart and using a USGS topographic map subtract 3 feet from the Lisbon Weir elevation. This means 3 feet below seal level. In order to know the elevation you need to understand and know what your local datum is compared to such as NGVD or USED data.

Participant: Why can't all the data be zeroed out so that all the data is consistent?

Mr. Ceppos: To whom would the YBWG write a letter to in order to standardize all the data? Who does the standardization?

Ms. Marchand: I would suggest you write the reclamation board.

Mr. Hardesty: DWR would be a good place to start; however, that means you have to change all the data and gauges which is costly. The stages and datum information is included on the back of the flood operations manual. In addition, the CDEC website includes a datum information page which is a good reference.

Participant: Why doesn't CDEC make the conversions before plotting the data on the graphs?

NWS: There is a history of data that would have to be converted.

Participant: This is an academic issue is not that important to us in the Bypass. As long as we understand the measurement parameters at Lisbon, we can do our own conversions. What's important is the height at any given point in time and then we know what will happen to our property.

Mr. Hodgkins: I work with these sister agencies all the time, change is difficult. I suggest you do your own development of what you need. In that way you can insure you will get what you need.

Mr. Ceppos: Cindy Mathews handed out a thumbnail on her power point presentation. Contact information for Cindy Mathews is 916-979-3049. Butch Hodgkins handed out river guidance materials and on the back of that he included an e-mail list serve information for forecasting.

Mr. Martinez: Is there a phone number we can call to obtain updated forecast information if we are unable to use a computer?

Ms. Mathews: Forecast recordings are still available at 800-952-5530 and are updated with each forecast.

Participant: The lower and upper Sacramento bulletins also have a lot of useful information for the Bypass. The CDEC website also gives you access for weather forecasts and weather forecast discussions.

Update SAFCA Regional Flood Control Plan
Butch Hodgkins, SAFCA

There has been little change in SAFCA's regional flood control plan. Since the last Working Group meeting, SAFCA has met with a couple of Bypass land owners. SAFCA is coordinating efforts with DFG through Dave Feliz regarding land uses in the Bypass. SAFCA is interested in including environmental restoration; however it needs to be understood that the vision of DFG and the community is not likely to happen if there is

any loss in flood capacity of the Bypass. There is a lot of water in the Bypass, even when Freemont Weir is not flooding. SAFCA would like to have a better understanding of flooding in the Bypass; therefore if you would like to help SAFCA in this endeavor please contact Butch Hodgkins.

Ms. Marchand: What concerns has SAFC run into in their discussions with land owners?

Mr. Hodgkins: Those involved in agriculture want to preserve agriculture in the Bypass and not lose productive farm land. However, agricultural land owners have a different view than that of the farm bureaus. Elected officials are interested in hearing from farmers and land owners in the upper Elkhorn area in order to avoid conflict with them. From SAFCA's standpoint, issues in the Bypass can not be approached without Yolo County input or support. If there is a great deal of opposition, SAFCA will fall back on just raising their levees.

Participant: What concerns has SAFCA heard from constituents down stream such as Rio Vista?

Answer: SAFCA is just beginning to talk to people downstream; however there could be some big changes in the Rio Vista area.

Initiation of Individual Landowner Interviews
Existing and Potential Land Use Conditions in the Bypass
Dave Ceppos, CCP

In the beginning, when Working Group was convened and the first CALFED grant was made, there was a naïve belief that at the culmination of the Working Group meetings a map on could be placed on the table illustrating property ownership and identifying who was interested in any land use changes. Over time the underlying mission applied to this project and group became to help every single land owner and tenet make the best land use decisions without negatively impacting neighbors. Conversely, if a land owner wants to make a change to their property without the limitations imposed by easements, etc, the mission would allow the land change to occur within reasonable boundaries.

The first phase of the CALFED project, the management plan, intimately involved the Working Group. The document that ensued included the issues that the Working Group felt should be addressed. The second phase of this project, one-to-one discussions with land owners in the Bypass regarding what will happen in the Bypass, is slated to begin. These discussions will be bound by the management strategy.

Some of the issues that will be of discussed will include land use changes such as habitat friendly farming, long term easements, habitat change or addition and property improvements. These meetings are not a requirement of land owners. If a land owner chooses not to participate they will not be bothered any further. If a land owner would like to participate, then the discussion will focus on the most current farm bill issues. The

discussion will be documented and a concept plan drafted which will include what land owners want to do and the constraints. The next stage will be to see how land owners wants can be addressed, and still stay whole and compensated without affecting flood control capacity of the Bypass. The bottom line is land owner wants for their property, such as habitat management for endangered species, will be known as well as the potential negative impacts to neighboring properties.

Participant: Will the discussions focus on land as a whole or only on the fringes?

Mr. Ceppos: Based on the management strategy the habitat change is along the fringes of the properties in addition to the NAWCA grant.

Property: What is the latest on Tom Hardy's proposed refuge?

Mr. Ceppos: Currently the refuge is on hold. The North Delta refuge is 12,300 acres. Liberty Island, Prospect Island and Little Holland Tract are hoping to pursue the North Delta Refuge through the Environmental Policy Act or through legislation. Representative Doug Ose is in a position of resistance to the refuge and is an influence in Congress regarding this issue. At this point it is uncertain whether it will come into fruition.

Participant: How is the information that is being collected going to move where it is most effective?

Mr. Ceppos: At this point there is no intention of publishing the survey results; however there is an advantage to having land owners combine for larger scale improvements within the framework of the current farm bill. Cooperative efforts between land owners could result in a higher ranking; therefore, the information collected could be utilized for funding purposes for land owners in the Bypass.

Ms. Marchand: How is public safety, etc, going to be addressed?

Mr. Ceppos: If the information collected illustrates trends, these will be communicated to the Reclamation Board. These discussions are happening independently of the regional flood plan. At the same time, the regional flood plan indicates certain flood regulations are changing which could influence land use in the Bypass. The political and physical landscape is always changing.

Ms. Marchand: It might be good to have a discussion Pete Laboon before the land owner meetings so that there isn't any miscommunication.

Participant: What we want to see come out of this is an overall plan for the Bypass, the goals and objectives of duck clubs and agriculture, and a plan for recommendations and best management practices that are in compliance with flood control. Hopefully the modeling will be done quickly so that land improvements can begin. If a land owner is involved in an overall management plan, then they get more points for their

improvements at the farm bureau. When the Working Group has this plan we can then go to USFWS and obtain a biological opinion and an incidental take protection document.

Mr. Ceppos: I'm acting as a conduit for NRCS to do their leg work

Participant: What is the time frame for completing the concept paper? Six to nine months?

Mr. Ceppos: The interviews should be completed within the next 3 months and the paper written within 6 months.

Some of the issues that may be discussed include agricultural economic change, family lineage changes, etc. Fro example, a land owner would like to get out of the agriculture business. Their options for their property include continued farming, fallow fields, hunting or habitat change. The purpose of these discussions is to avoid having land owners not make changes to their land due to regulations.

Participant: I understand you want to get everyone together to make a big master plan; however what about those land owners who aren't at these meetings.

Mr. Ceppos: YBF knows who they are and will try to engage them in these discussions.

Participant: How do you handle absentee land owners?

Ms. Kulakow: In the case of absentee land owners, many of the tenants of those properties are attending these meetings.

Participant: In my cased I represent multiple absentee owners and we work around their absence.

Mr. Ceppos: YBF will do everything it can to contact absentee land owners. Education of what is happening in the Bypass will be critical. Properties will be enhanced not ruined.

CALFED Modeling Project
Boon Lek, DWR

Mr. Ceppos how to find proposal 32da of the CALFED modeling project. The initial 32da proposal was submitted in 2001. That proposal was not funded; however, CALFED recommended some changes in the proposal and to resubmit in 2002. In December 2002, the proposal was approved for a roughly $500,000 grant. Approximately $350,000 was allotted to YBF for outreach and modeling. CALFED is hoping to have the modeling selection finalized soon. The current timeline is a two year plan beginning in

2003 and ending in 2005. SAFCA has proposed to support the project with $50,000 per year for two years. Whether that will be included in a grant hasn't been decided yet. The YBF technical advisory committee, an ad hoc collection of the reclamation board, army corps of engineers, Gus Yates, Dave Feliz, Robin Kulakow, Mike Hardesty, NHC engineers, NBC engineers and others, will be included in modeling. CALFED is thinking of reconvening another technical committee. If you are interested in being on the committee please contact Boone Lek.

Ms. Marchand: The reclamation board put into CALFED for this and there was a lot of agency and resource support. The resources agency was very supportive and feels the 2D model is what will be needed for this project.

Participant: What's the start date for the project?

Mr. Lek: CALFED is shooting for the end of February to finalize funding contracts. The project may begin in early of March, although it may be awhile before we have any results.

Participant: As new things are added to the Bypass will there be updates to the model?

Mr Lek: That was discussed but CALFED does not have a continuum. It is possible additional CALFED funds could be requested for a second phase for maintenance.

One of the goals of the project was to make this a more user friendly tool where a manual is produced in a CD-ROM format so that changes could be made during planning. However, other issues need to be looked into first.

Participant: Can the farm bureau presentation be tied in with a NAWCA presentation by Chadd Santerre?

Dave Ceppos: Yes.

Central Valley Regional Water Quality Control Board (CVRWQCB) had a 20 year waiver for agricultural land and water runoff from property during a flood event. The waiver ended December 31st, 2002. In June 2004 farmers will need to select being involved in a regional program water quality monitoring or do it on their own. This process needs land owner participation but most people don't know anything about it. Water quality monitoring program for a farmer's property will be part of regional program.

Mr. Ceppos: Can we get a more formal discussion?

Mr. Lek: A watershed faire is scheduled for Feb 5th at noon at the Ulatis Community Center in Vacaville. The state board will give a discussion first.

Meeting was adjourned. Next meeting scheduled for February 27, 2003.

Yolo Bypass Working Group
Meeting 24

MEETING MINUTES

MEETING DATE: February 27, 2003

LOCATION: California Department of Fish and Game
Yolo Wildlife Area Headquarters
45211 County Road 32B (Chiles Road)
Davis, CA 95616

IN ATTENDANCE: Robin Kulakow, Yolo Basin Foundation (YBF)
Dave Feliz, California Department of Fish & Game (DFG)
Ed Towne, Bull Sprig Outing
Dave Ceppos, Center for Collaborative Policy (CCP)
Casey Walsh Cady,
California Department of Food and Agriculture (CDFA)
Ed Burns, California Waterfowl Association (CWA)
Dan Loughman, CWA
Mitch Sears, City of Davis
Mike Hall, Conaway Ranch
Dennis Kilkenny, Dawsons Duck Club
John Currey, Dixon Resource Conservation District (Dixon RCD)
David Guy, Northern California Water Association (NCWA)
Randy Beckwith, Department of Water Resources (DWR)
Boone Lek, DWR/Reclamation Board
Dick Goodell, Glide In Ranch
Dave Kohlhorst, Glide In Ranch
Clyde Owgard, Glide In Ranch
Don Stevens, Glide In Ranch
Mark Kearney, Landowner
Dennis Murphy, Landowner, farmer
Larry Jahn, Los Rios Farms
Arline Jones, Lucky Five
Walt Chechov, Natural Resource Conservation Service (NRCS)
Phil Hogan, NRCS
Tom Moore, NRCS
Gordon Rasmussen, Rasmussen Livestock

Ross Rasmussen, Rasmussen Livestock
Betsy Marchand, Reclamation Board
Butch Hodgkins, Sacramento Area Flood Control Agency (SAFCA)
Mick Klasson, SAFCA
Tom Schene, Schene Enterprises
Ron Tadlock, Tadlock Farms
Tony Lucchesi, Wildlands Inc., Pope Ranch
Mel Castle, Yolo Basin Farms
Bob Leonard, Yolo Basin Farms
Gaye Lopez, YBF Board
Rachelle De Clerck, YBF
Brett Williams, Yolo County Parks and Resource Management Division
Duncan McCormack III, Yolo Ranch

NEXT MEETING: ***POSTPONED:*** **April 10th, 2003. to May 29th, 10:30-1:00**

ACTION ITEMS

1. All interested Working Group members will review the Regional Water Quality Control Board agricultural waiver materials provided by David Guy and John Curry. Interested participants will have until close of business April 10, 2003 to provide specific questions regarding the waiver issue to Dave Ceppos (916-341-3336). These questions will be the basis for future Working Group meeting agenda items on this topic.

Dave Ceppos called the meeting to order and began introductions of attendees. Mr. Ceppos briefly covered the agenda and the purpose of the Working Group. The Working Group is open to the public and has been in existence for 3 and one-half years. It provides a focused opportunity for farmers, land owners and agencies within the Bypass to discuss Bypass related issues as well as provide guidance and opinions on such issues. The Working Group is funded by a grant from CALFED.

Mr. Ceppos introduced himself and informed the participants that he is an employee of the Center for Collaborative Policy (formerly the California Center for Public Dispute Resolution). Participants introduced themselves.

Mr. Ceppos asked if there were any changes or edits to the draft January 23, 2003 meeting minutes. No changes or edits were requested and the meeting minutes were

adopted as final.

Mr. Ceppos briefly covered the meeting agenda.

Discussion of Regional Water Quality Control Board Agricultural Waiver

Mr. Ceppos introduced David Guy, Executive Director of the Northern California Water Association (NCWA). Mr. Guy provided the following description of the agricultural waiver issue.

In 1982 the Central Valley Regional Water Quality Control Board (RWQCB) adopted a resolution waiving several categories of previously regulated water discharges. These waivers included irrigation return flows and storm water from irrigated lands. The waivers essentially meant that agricultural landowners did not need a wastewater permit. In January 1999, Senate Bill 390 was signed into law, requiring that the 1982 waivers expire by January 1, 2003. That decision lead to numerous appeals, lawsuits, and mediations to resolve issues associated with the waivers and the pending expiration of the waivers. In response to these difficulties the RWQCB adopted a new conditional waiver on Dec 5, 2003.

The conditional waiver for agricultural runoff approved by RWQCB included both irrigated return flows and agricultural storm water runoff. Most significantly, the Regional Board order provided an opportunity for watershed and sub-watershed groups throughout the Central Valley to form and then develop water quality monitoring programs and identify existing management practices underway within the watershed or sub-watershed. For those areas in which problems are identified, proposed management practices will be developed and presented to the Regional Board.

Most importantly, for those areas covered by such a watershed program, farmers, special districts, companies and other dischargers will not need a waste discharge requirement (WDR). For those areas not covered by such a program, there is an alternative process for individual dischargers to receive the protection under the waiver or any discharger can submit a waste discharge report and seek a WDR under the Water Code. The waiver does not apply to the Rice Pesticide Program, at least with respect to the five pesticides covered under the existing program. The waiver appears to cover discharges of other pesticides used in rice production.

The order also calls for RWQCB workshops on either an annual or semi-annual

basis for each watershed program to report to the RWQCB on its progress. If it appears to the RWQCB that adequate progress is being made and there are no major water quality problems, the watershed group will continue its efforts to comply with the requirements and timelines adopted by the RWQCB. If a problem arises, the RWQCB can revoke the waiver for entire watersheds, sub-watersheds or individual discharges. The RWQCB can also utilize its existing authority to enforce illegal discharges.

One way to approach the permit process is through a nested watershed approach: A nested watershed approach incorporates a macro-watershed level such as the entire Sacramento Valley watershed. Within the macro-watershed are nested smaller geographically focused groups. NCWA is working closely with county farm bureaus, agricultural commissioners, Ducks Unlimited and other wildlife organizations, Grape and Tree Fruit League and local RCDs to meet the initial parameters in the conditional waiver. This approach is intended to eventually provide coverage to all landowners and growers that would be subjected to the permit process. Efforts to be conducted include the compilation of existing management practices in the Sacramento Valley and the coordination, implementation, and reporting of management practices by sub-watershed groups.

By June 2003 the RWQCB will need a proposal that should include the main issues affecting discharge as well as monitoring the watershed. The monitoring approach will be the initial portion of the report. There are multiple areas in the Central Valley that have water quality problems. One of the major issues includes Organophosphates (Diazanon). In order to address these problems correctly and to submit the monitoring plan to the RWQCB by June 2004 the group must begin immediately to find funding sources. NCWA is currently in the process of identifying management practices in the Central Valley that may need to be addressed. The existing rice program will be moving forward independently of this program. If the proposal process is successful, each individual landowner who is involved will not need a discharge permit.

Participant: How has RWQCB responded to this proposal?

Answer: The response by the RWQCB has been positive NCWA and associated parties are currently setting up a proposal for RWQCB. There are also four other groups (who are these groups) emerging in the Central Valley that are using a similar approach.

Participant: How does NCWA envision the monitoring process working? Will it

be based on individual discharges or a whole stream approach?

Answer: The initial monitoring will begin in the main stem of a watershed and will incorporate a broad based approach that may include some tributaries near main agricultural drains. It is not likely that the interior watershed will be monitored (outside of the main-stem systems). The monitoring will begin in the lower part of a system and work its way up. Linwood Hall will be developing the monitoring plan and can provide more insights at a later date.

Participant: How will current problems such as e-coli and cattle ranching be approached?

Answer: Currently e-coli does not appear to be a focus; however it is not clear how that topic will be approached in the future. Currently, the main focus is pesticides especially organophosphates.

Participant: Is NCWA working with the Sacramento Watershed Program?

Answer: NCWA and its partners on this process does not see the Sacramento Watershed Program playing a role in this program.

At this point John Currey from the Dixon Resource Conservation District gave his presentation.

The southern portion of the Yolo Bypass is more or less an orphan area because it is located in Solano County, which is located in both the Central Valley and the San Francisco Bay RWQCBs. The Dixon Resource Conservation District (DRCD) is presently in the discussion stage of creating a watershed group for this area to help landowners. DRCD is interested in pairing with other agencies in the region to use the "nesting" approach to protect the landowners in the district. The current RWQCB resolution rules are the same, however they may change and agencies and landowners need to be prepared to implement these rules.

Participant: Which group will be in charge, because it is going to be confusing.

John: At this point we need a coordinated effort. NCWA is the lead on overall Sacramento Valley effort at this time.

The confusing thing is that our area is a confluence of many different agencies; therefore, we want to make sure landowners rights are preserved and that they have

a choice before everything starts to develop.

Participant: A CALFED grant was given to the City of Woodland to conduct water quality monitoring in the Yolo Bypass. There are funds in the grant for some Bypass landowner participation through the Working Group.

Participant: Is it possible for some of the landowners to go with the local or regional groups?

The proposal that is being written by NCWA and their partners includes all the agencies and groups that work with the Sacramento watershed landowners. If a landowner did not want to affiliate themselves with one of the nested watershed groups they would have to sign up as an independent and get their own help.

Participant: What are the long-term implications of the waiver to landowners?

The process is being put in place to deal with water quality regulation and compliance at a broad level. At the end of the day, growers will not need individual permits.

Participant: What are the penalties for non-compliance? How are the people at the tail end of a system going to be protected?

On the local level, we would sample at the very bottom and then look at all the materials used in the watershed. It is assumed that water quality issues are a cumulative effect. The resolution goal is that people are educated on best management practices to reduce the problems. You may be penalized in education costs, but not likely on a legal side.

Participant: The landowner has to declare whether they will be in a local group or on their own. The local group will share the costs as opposed to an independent. If you ignore the resolution you won't be able to discharge.

Participant: What role are the cities taking?

Cities are not covered by this action. Cities are under a different set of guidelines and will be part of Phase II.

Butch Hodgkins: Cities with a population up to 50 thousand are not part of the storm water monitoring program. City populations over 50 thousand have been

monitoring storm water discharges. The city storm water monitoring programs set into motion the gathering of data that will answer questions about whether there are problems with water quality associated with agricultural return flow. If agriculture is causing problems, farmers could be penalized.

Dave Ceppos: The Working Group will be tracking the progress of the resolution and will set future agenda items when there is information available. In addition, the Yolo Basin Working Group will work with Casey Walsh Cady of CDFA to learn more about the City of Woodland grant monies and John Currey will continue with updates on the southern Yolo Bypass.

Participant: Does the Yolo Bypass constitute a group or will it be included in some other group?

Answer: Yolo County Farm Bureau has created a non-profit organization to deal with the waiver issues and NCWA is coordinating with them; however, the situation is still very fluid.

Dave Ceppos: Both David Guy's and John Currey's informational handouts are available via Dave Ceppos at 916-341-3336. Please read the handouts. Two weeks after meeting minutes are distributed, you can comment and these comments will be addressed at the next meeting.

Federal Farm Bill Conservation Easement Programs Workshop
Phil Hogan, Natural Resources Conservation Service

The Natural Resources Conservation Service (NRCS) approach to conservation is wise use of natural resources in order to sustain productivity and maintain the quality of life. All NRCS programs are voluntary, focus on private lands, and include non-regulatory local partners in the decision making process. Some of the ongoing NRCS programs include snow surveys, soil surveys, national resource inventory, plant materials centers, watershed planning, emergency watershed protection, resource conservation and development, and technical assistance to agriculture.

There are several new NRCS programs that were created and several existing programs that were improved as part of the 2002 Federal Farm Bill. These programs include conservation security program (CSP), environmental quality incentives program (EQIP), wildlife habitat incentives program (WHIP), wetlands reserve program (WRP), grasslands reserve program (GRP), conservation reserve

program (CRP), and farm and ranchland protection program (FRPP). The NRCS receives input and information from landowners and farmers through the national rulemaking process as well as three formal tiers in California; State Technical Advisory Committee, Local Work Groups (LWGs), and locally convened Stakeholder Groups.

The State Technical Advisory Committee (STAC) was established by the 1996 Farm Bill and its primary function is to give advice on all USDA conservation programs. STAC also consults on state program management policies, gives technical recommendations, distributes information through outreach, identifies resource concerns, designs guidelines for ranking and project selection, and advises on cost-share rates and practices.

STAC members are comprised of federal, state, local and tribal members and have expertise in agribusiness, production, environmental policy, farming interests and conservation. The committee meets quarterly or as needed and membership is open. NRCS subcommittees within the STAC include EQIP, WRP/WHIP, FOTG, CSP, and FPP.

The LWGs are convened by the Resource Conservation Districts (RCD) and include federal, state, local and tribal entities. Resource needs within the LWG are considered on a watershed basis. LWGs assess natural resource conditions and needs and recommend program priorities based on these assessments. An emphasis is put on local input for cost-share rates, practices, ranking criteria, and assistance in education and outreach.

Local stakeholder meetings are also convened by RCDs. These meetings solicit input from producers, environmental and farming interests, private citizens and others. Concerns raised at these meetings are brought to the LWG and the NRCS.

In California there are 103 RCDs which are special districts governed by state law. They are locally led with volunteer directors and some paid staff. Priorities are locally determined and the RCDs work in partnership with NRCS and other federal, state, and local groups.

In Yolo County, the majority of land is privately owned and many practices are installed without federal cost-share assistance. Yolo County has a great unmet need to provide technical assistance to producers. In 2002, NRCS received over $32 million dollars in financial assistance funds with no technical assistance funds to carry out the work. Eighty full-time staff had to be redirected from other work

to carry out these programs. The NRCS technical assistance includes irrigation water management, nutrient management and pest management. Practices to enhance soil quality, conserve production inputs, and protect water were implemented and include:

- ☐ drip irrigation systems,
- ☐ irrigation tailwater return systems,
- ☐ cover or green manure crop,
- ☐ insectary hedgerows ,
- ☐ windbreak establishment,
- ☐ hedgerows,
- ☐ critical area planting of bare areas and;
- ☐ filtering and capturing runoff water and sediment.

NRCS has developed a new program for 2003, the Conservation Security Program (CSP), which may start as a pilot program. The program has $2 Billion dollars in budget authority and will pay agricultural producers for stewardship. The program consists of flexible tiers for eligible lands used to produce crops, livestock and forested land that is incidental to an agricultural operation. Tier requirements are as follows:

Tier	Resource Concern	Payment Schedule	Amount not to Exceed
I	At least one resource concern for a minimum of part of the operation	Annual Payment	5% of base payment, cost share and maintenance payment, and enhancement payments not to exceed $20,000 (5 years).
II	At least one resource concern for the total agricultural operation.	Annual Payment	10% of base payment, cost share and maintenance payments, and enhancement payments, not to exceed $35,000 (5-10 years).
III	Address all applicable resource concerns for the total agricultural operation.	------	15% of base payment, cost share and maintenance payments, and enhancement

payments not to exceed
$45,000 (5-10 years)

The Environmental Quality Incentives Program (EQIP) is a conservation program that provides cost-sharing to install conservation practices and to promote adoption of practices such as:

- ☐ Irrigation systems
- ☐ Fencing
- ☐ Air Quality (PM10 – road treatment, chipping orchard prunings)
- ☐ Grazing land management
- ☐ Animal waste structures
- ☐ Nutrient management plans
- ☐ Erosion control
- ☐ Water quality

In 2002 the EQIP was restructured to include new changes. The per person limit was increased to $450,000 and the contract length ranges between 2 to 10 years. There are no priority areas or bid downs and payments can be made in the first year. Up to 90% of the funding is for beginning and limited resource farmers and also for nutrient management plans. Restrictions on animal waste units for large livestock operations have been removed. The program includes ground and surface water conservation and will support irrigation improvements, conversion to less water-intensive crops, and dry land farming (practices to preserve soil moisture). There is a broad applicability in California (e.g. Klamath Basin).

The Wildlife Habitat Incentives Program establishes and improves wildlife habitat on private lands through cost-shared conservation practices. The program has received a $700 million dollar overall increase in budget authority. This program has not been well funded in the past but has been popular in California and where there is much more potential to expand it. There is an increased emphasis on habitat for endangered species. The program is currently looking for opportunities for special projects beyond single land ownership partnering.

The Wetlands Reserve Program restores wetlands on agricultural lands and is a voluntary program. In California there are 60,000 acres already enrolled with many more on the waiting list. Approximately $20 to $25 million dollars for California are expected in 2003. The program has been reauthorized through 2007 and the overall program acreage cap has been increased to 2,275,000 acres.

Permanent and 30-year easements and restoration cost-share agreements are included.

The Grassland Reserve Program reestablishes native vegetation on working agricultural lands. This program is also voluntary and includes rental or easement plans up to 30 years or permanent easements. It is a new program similar to the Wetland Reserve Program; however there are currently no set rules. A likely restriction will include utilizing land for grazing but not for crops with the exception of hay. There is $254 million dollars in the budget authority that can apply to California rangelands particularly oak woodlands and coastal hills.

The Conservation of Private Grazing Lands program is a technical assistance program only. In order to request assistance contact a local NRCS field office for the following:

- ☐ Maintain and improve grazing land
- ☐ Implement grazing land technology
- ☐ Protect water quality and quantity
- ☐ Enhance recreational opportunities
- ☐ Sustainable grazing systems.

The Conservation Reserve Program provides rental payments for planting of sensitive cropland to long-term cover. This voluntary program has been extended through 2007. The acreage cap has been increased to 39.2 million acres with 10-15 year rental contracts. Program requirements allow for managed haying and grazing with commensurate reduction in payments but the land must have been cropped for 4 of the past 6 years.

The Farm and Ranchland Protection Program preserves prime, unique and other productive lands in perpetuity for agricultural production. Changes in this voluntary easement program expand the definition of eligible lands to include agricultural land that contains historic or archaeological resources eligible for enrollment. Non-profit organizations are eligible entities for program participation. The California Department of Conservation is a major partner.

There are many new features associated with applying for and implementaing NRCS conservation programs. These features provide for certification of third party technical service providers and protect the confidentiality of producer's conservation plan information, and locations of Natural Resources Inventory data collection points. In addition, the Forestry Incentives Program has been replaced

by the Forest Land Enhancement Program, administered by the Forest Service.

The closing messages to producers are all programs have continuous signup but, apply early to maximize chances for funding. There may be more than one funding cycle but earlier applications are better. NRCS will only consider for ranking those applications that have been planned.

Betsy Marchand: There is huge resistance to setback levees due to concern over potential loss of farmland and related revenues. How can we use these NRCS program funds to support the continuation of such farmlands and/or landowner compensation within a new levee program?

Mr. Hogan: Each different stakeholder group has different programs. You would need to contact each individual program. There is the flood plain easement program, that is submitted to state conservationists before approval.

WHIP is not an easement program. It is used to restore overall native communities. Landowners do not have to have agricultural history on the property.

Participant: What is the time cutoff for EQIP?

Mr. Hogan: NRCS would like the applications completed by February 28, but they will still accept applications after February 28.

Other Items:

Due to time constraints, Mr. Ceppos' update on the landowner interviews was canceled.

Meeting was adjourned. The next meeting scheduled for April 10, 2003 has been POSTPONED.

Next Meeting Date is scheduled for May 29, 2003.

YOLO BYPASS WORKING GROUP
MEETING 25

MEETING MINUTES

MEETING DATE: MAY 29, 2003

LOCATION: California Department of Fish and Game
Yolo Wildlife Area Headquarters
45211 County Road 32B (Chiles Road)
Davis, CA 95616

IN ATTENDANCE: Robin Kulakow, Yolo Basin Foundation (YBF)
Dave Feliz, California Department of Fish & Game (DFG)
Ed Towne, Bull Sprig Outing
Dave Ceppos, Center for Collaborative Policy (CCP)
Casey Walsh Cady, California Department of Food and Agriculture (CDFA)
Chadd Santerre, California Waterfowl Association (CWA)
Bryan Plude, Canvasback Consulting
Margit Aramburu, Delta Protection Commission
John Currey, Dixon Resource Conservation District (Dixon RCD)
Marianne Kirkland, Department of Water Resources (DWR)
Trevor Greene, DWR
Ted Sommer, DWR
Boone Lek, DWR/Reclamation Board
Pat Fitzmorris, Ducks Unlimited
Chris Fulster, Glide In Ranch
Dick Goodell, Glide In Ranch
Dave Kohlhurst, Glide In Ranch
Don Stevens, Glide In Ranch
Jeanne Jones, Jones and Associates
Armand Ruby, Larry Walker and Associates
Greg Schmid, Los Rios Farms
Ron Morazzini, Supervisor Mike McGowan Representative
Ken Rood, Northwest Hydraulic Consulting Engineers (NHC)
Ken Martin, Rising Wings
Butch Hodgkins, Sacramento Area Flood Control Agency (SAFCA)
Mick Klasson, SAFCA
Tim Washburn, SAFCA
Tony Lucchesi, Wildlands Inc., Pope Ranch
Kingsley Melton, Assemblywoman Lois Wolk
Tom Harvey, USFWS Stone Lakes NWR
Rachelle De Clerck, YBF
Beth Gabor, Yolo County Board of Supervisors
Paul Robbins, Yolo County Resource Conservation District (RCD)

Brett Williams, Yolo County Parks and Resource Management Division
Walt Chechov, Natural Resources Conservation Services (NRCS)
Tom Moore, NRCS
Chuck Dudley

NEXT MEETING: July 10th, 2003. 10:30 am to 1:30 pm

Dave Ceppos called the meeting to order and began introductions of attendees. Mr. Ceppos briefly covered the agenda and the purpose of the Working Group. The Working Group is open to the public and has been in existence for 3 and one- half years. It provides a focused opportunity for farmers, wetland managers, land owners and agencies within the Bypass to discuss Bypass related issues as well as provide guidance and opinions on such issues. The Working Group is continually funded by CALFED.

Mr. Ceppos updated the Working Group on an action item from the January 23rd, 2003 meeting. Working Group participants who had questions regarding the Farm Bill were to contact John Currey, Dave Guy or Dave Ceppos. No one was contacted with questions.

Mr. Ceppos asked if there were any changes or edits to the draft January 23, 2003 meeting minutes. No changes or edits were requested and the January 23, 2003 meeting minutes were adopted as final.

Update on Individual Landowner Interviews in Bypass
Dave Ceppos, CCP

One of the tasks under the current CALFED contract is contacting individual landowners about their interest in potential land use changes on their properties. In order to maintain the confidentiality of those interviewed, no names of interviewees were given; however, the majority of those interviewed to date have been affiliated with agriculture. Many of the land use changes discussed were short term, interchangeable changes as opposed to long term, in perpetuity changes. Some interview participants closer to the Tule Canal were interested in creating temporary shallow flooded habitat for fish.
The next round of interviews may be with the local Duck Clubs in the Southern Bypass. Chadd Santerre and Ducks Unlimited will be assisting with those interviews.

*Participant Q*uestion: Please remind the Working Group of the goals and the geographic scope of the interviews.

Mr. Ceppos: The purpose of the interviews is to see if landowners in the Bypass have an interest in land use changes. The basis of these potential changes was previous determined and memorialized by the Working Group in the Management Strategy document. The interviews and any potential changes are based totally on willing landowners. The geographic scope of the interviews includes Fremont Weir to the bottom of Liberty Island.

Update on the Regional Water Quality Control Board Agriculture Waiver

John Currey, Dixon RCD

John Currey gave a brief summary of where the Dixon RCD has been and where it is currently going in regards to the Regional Water Quality Control Board (RWQCB) Agricultural Waiver.

On December 5, 2003 agricultural landowners will need to decide whether to apply to the RWQCB Agricultural Waiver as a group or as an individual. The agricultural waiver requires that drains and the flow direction of water on the property be listed. Monitoring under the agricultural waiver will be implemented by 2005.
In April a staff report was submitted to RWQCB that looked at historical water quality issues, identified problems and where work can begin. Based on the staff report a proposed resolution would have made a regulatory approach directing watershed groups and individuals to report *by* June 2004. The proposed resolution was rejected and the December 5th date was reaffirmed. However, the resolution has been held over until July for a revote. Therefore, the bad news is that these proposed steps and rules may change. The good news is there are many entities and individuals to help landowners continue figuring out and complying with the process. There will be additional issues that will have to be dealt with in regards to water discharge from agricultural properties.

The Dixon RCD wants to represent landowners in its district as a group. Currently, Dixon RCD has been putting together information and materials for landowners. In April, Dixon RCD had a meeting and sent a survey to land owners in its district. Approximately 50% of the surveys were completed. Of the completed surveys, 25% of the landowners would like to help with a watershed group and 25% would like to meet with the Dixon RCD. The overall consensus was to have Dixon RCD form a watershed group to represent landowners. In order to avoid duplication and redundancy, John Currey will be on the Sacramento Valley Watershed Coalition steering committee. The steering committee is trying to submit a report to RWQCB by June 30th to cover watershed users in the Bypass among others.

The Sacramento Valley Water Quality Coalition has divided the larger watershed into ten sub-watersheds. Yolo and Solano are considered one sub-watershed. Yolo RCD, Dixon RCD and the Farm Bureau have submitted plans to try to defer the costs of monitoring and currently are waiting for information from the RWQCB. Yolo and Solano are working hard to develop a program to allow landowners to farm and manage wetlands in a manner that has minimal disruption to operations; however the RWQCB will be directing groups on the nature of monitoring over the next 12 months. Therefore, landowners should look at their properties for potential threats to the watershed.

In summary, the Dixon RCD is unsure of what RWQCB will decide in July 2003 but will continue to monitor the situation and report back to the Working Group.

Participant Question: Are urban discharges listed?

Mr. Currey: Not under the agricultural waiver; however the urban areas are monitored heavily under other regulations.

Participant Question: Are their any feelings for what the RWQCB will be looking for during the water quality monitoring?

Mr. Currey: In April, the RWQCB was requiring everything including salinity and organic carbons but the final constituents remains to be determined.

Participant Question: Temperature also?

Mr. Currey: Yes and flow.

Participant Question: What does a landowner need to do in the near future?

Mr. Currey: Landowners should watch for information from their local agencies, because at some point sub-watersheds will need to do informational outreach letting land owners know about necessary actions. Ultimately, under the December 5th ruling, landowners have to be part of a watershed group or comply as an individual.

Participant Question: Does this include Duck Clubs? Will they be monitored for discharge into the toe drain?

Mr. Currey: All water from all landowners would be monitored; but not as individuals. The sub-watersheds want to see changes in the general area that result is an overall positive effect at the end as opposed to monitoring individual landowners.

Mr. Ceppos: What can the Working Group do to keep everyone in the loop? Will land owners prefer to get the information from their local RCDs or do they want to give the information to YBF to give to the RCDs or should YBF keep land owners linked on the website?

Mr. Currey: The problem is the situation is so fluid with the RWQCB and there are 10,000 individual landowners. It would be almost impossible to keep everyone abreast of all the constant changes. The RCDs are currently paralyzed and there aren't any definitive guidelines on what landowners need to do. As soon as the Dixon RCD knows something definitive they would like to participate in outreach to the local landowners.

Participant Question: Is there someone providing guidance to land owners about the difference associated with what is going to occur in July and advocacy?

Mr. Currey: There has not been a great public outreach effort to all the various landowners however; Dixon RCD has sent it out extensive information to those landowners who want to be part of the political process. General information has been sent to all landowners.

If anyone would like to become more involved, another point of contact is the North Delta Water Agency.

Participant Question: Is the Water Quality Coalition going to cover all the monitoring?

Mr. Currey: An assessment of what is already being monitored needs to be conducted, but most of the monitoring will likely occur at the sub-watershed level. In April the RWQCB wanted monitoring points in not more than 5,000 acres, which would be a huge amount of monitoring points. However, this number could change by the July meeting.

Participant Question; Any sense about what the board is going to due in regards to low flow periods?

Mr. Currey: The RWQCB is not familiar with the local topography, that's where the local agencies will step in to define the watershed so monitoring plans can be designed.

At this point the RWQCB doesn't know what the problems are or how to approach them. The RWQCB would like something done.

City of Woodland CALFED Grant to Develop a Yolo Bypass Water Quality Planning Process
Armand Ruby, Larry Walker Associates

The Yolo Bypass Water Quality Planning Project is funded through CALFED for a total sum of $288,081. The lead agency is the City of Woodland; however the City of Davis and UC Davis are also participants of the grant.

How the Project Came to Be:

The City of Woodland and others were under increased regulation especially in regards to wastewater and urban runoff. Some of the new regulations are monetarily prohibitive and the increased costs would be passed onto city individuals. Some of the new regulations would require wastewater plant improvements to reduce salt content to allow for salt sensitive plants, such as strawberries, to be grown in the area. The potential impact to the Bypass is loss of water for irrigation and wetland management.

The overall goal of the project is production of a comprehensive plan for improvement of water quality within the Yolo Bypass. Such a plan will account for the diverse interests in and uses of the Bypass, and will aim to make the best and most reasonable use of funds available for that purpose.

The objectives of the Yolo Bypass Water Quality Planning Project are:

1) Identify specific Pollutants of Concern (POCs) currently impacting the beneficial uses of surface waters in the Bypass and downstream Bay-Delta
2) Identify effective, implementable controls for the high priority POCs;
3) Develop a comprehensive management plan to improve water quality in the Bypass.

The overall approach is as follows:

1) Form an advisory group of Yolo Bypass stakeholders to participate in collaborative process of developing the water quality management plan;
2) Compile and evaluate existing water quality, flow, and land use information;
3) Conduct a surface water quality assessment and monitoring program to identify the current POCs for the Bypass;
4) Quantify the POCs and their apparent sources with the Bypass;
5) Assess whether the measured levels of POCs are causing impairment of beneficial uses of the Bypass;
6) Identify and evaluate alternative controls to reduce significant sources of POCs, including where appropriate POTWs, urban runoff, and agriculture.
7) For those POCs for which effective controls appear technically or economically infeasible, investigate the applicability of current water quality objectives for these POCs and suggest site-specific objectives, pollutant trading, or other alternative approaches, as appropriate;
8) Provide public education and obtain public input regarding potential methods for improving water quality in the Bypass, as well reducing loads on the Bay-Delta; and
9) Produce a Water Quality Management Plan report containing a recommended program of implementation to reduce POCs that are degrading beneficial uses of surface water.

The monitoring program is intended to supplement other available information. There will be four sites and four quarterly monitoring events a year. The monitoring data will be supplemented wherever possible with data from other programs.

Participant Question: Will the management plan include the possibility of discharging water into the Toe Drain?

Mr. Ruby: Water discharged into the Tule Canal and Toe Drain from urban and agricultural uses is considered effluent.

Participant Question: Is the primary focus urban runoff and the effect on the Bypass, or is agricultural water also being monitored for water quality in Bypass?

Mr. Ruby: All water sources are being looked at including agricultural water.

Participant Question: Is this grant and monitoring plan going to overlap with the agricultural waiver?

Mr. Ruby: The monitoring program is limited to four sites and four events. The monitoring results will be useful to those affected by the agricultural waiver as background information in regards to what is discharging into and leaving the Bypass. It can be used as baseline information of water quality.

Participant Question: Will information also be collected regarding the discharge sources at the monitoring location?

Mr. Ruby: Yes.

Participant: Cities are considered to be point source polluters. Agriculture, duck clubs and wetlands are considered non-point source polluters; therefore cities are heavily regulated.

Participant: In the summer, flow in the Bypass is upstream. Sampling in the summer should be about monitoring the downstream impacts, not the upstream impacts.

Participant Question: Where does the City of Davis and UC Davis discharge?

The City of Davis discharges to their treatment plant near the Willow Slough Bypass, which then is treated and released into the Bypass. UC Davis discharges into Putah Creek.

Larry Walker Associates is already contacting people but would like to contact a few participants from this Working Group.

Presentation of May 3, 2003 Yolo Bypass Flood Event
(Butch Hodgkins, Tim Washburn, SAFCA)

Mr. Hodgkins was originally going to present aerial photographs of the Bypass from the May 3rd flood; however, the aerial photos were not conducted as requested of the photographer. Therefore, Mr. Hodgkins brought contact aerial prints from early March 2003 to show a background of the Bypass. The aerial photograph prints are 1 inch to 1,000 feet scale.

Mr. Hodgkins had a meeting with the Department of Water Resources (DWR) to estimate the cost of maintaining flood control structures and waterways. DWR controls vegetation in the Bypass in order to prevent flow impedance. In the northern Bypass near the Fremont Weir, DWR spends $500/acre/year to control vegetation. This information drove home to Mr. Hodgkins how agriculture results in good stewardship of the land and why agriculture is a great benefit to flood control.

Over the next year SAFCA will be meeting with land owners, stake holders, etc. to obtain information for SAFCA's proposed Lower Sacramento River regional flood management project and to help get the proposal through Congress. Farming in the Bypass is a significant cost savings because of the intensive maintenance associated with the agricultural process. SAFCA would like to develop an Agricultural Viability Element within the project. SAFCA would like to begin focused discussions with agricultural interests in June.

There are many approaches SAFCA would like to look at to reduce the impact to the Bypass during flood events including:

- Can anything be done to prevent late spring floods?
- Can anything be done to Cache and Putah Creek, Willow Slough and the Ridge cut to prevent broad scale local nuisance flooding?
- Look at 5-day forecast for flood control estimates to improve estimates of Fremont Weir spillage.

- Is there a drainage plan that could involve significant portions of the Bypass so when Fremont Weir spillage occurs in spring, it can be estimated where the water will go?
- How much compensation could flood control easements contribute on an annual basis to help make farming viable in Bypass in order to prevent farmers from selling off their land?

SAFCA needs the help of landowners in the Bypass to answer these questions and to help design the project.

Regarding recent legislative efforts by SAFCA, they had noticed that the water bonds from the Proposition 13 program have typically given large amounts of money to conservancies for waterways. SAFCA thought it would be a good idea to create a conservancy along the Sacramento and American Rivers. SAFCA introduced a spot bill (ABA 95) to the state legislature. The spot bill was intended to be a placeholder and was therefore, very vague. Legislators asked for the spot bill to be more specific. The changes to the spot bill included SAFCA proposing the funding of staff and creating a conservancy. SAFCA forgot to tell the Yolo County Board of Supervisors, and unfortunately this was perceived as an effort to create something without telling Yolo County.

Participant Question: There is no one on SAFCA's board from Yolo, how will that be addressed in the future?

Mr. Hodgkins: If there is ultimately a regional project representation on the board will be expanded to include Yolo County with a seat strictly for project-related issues.

Participant Question: Is there any component of the plan that looks at existing duck clubs or wetlands that could benefit from the flooding?

Mr. Hodgkins: The plan includes duck clubs and the Wildlife Area.

Presentation of Current SAFCA Engineering Study of Internal Bypass Flood Management Features
(Ken Rood, Northwest Hydraulic Consulting Engineers)

Northwest Hydraulic Consulting Engineers (NHC) is identifying management strategies for spring floods in the Bypass that benefit agriculture in combination with ecological or environmental measures.

NHCs approach includes:

- Hydrologic analysis
- Site Inspections (May Floods)
- Interviews
- Identify management strategies or physical works that benefit agriculture.

Project constraints include:

- Focus on West Side Tributaries
- Lack of gage records
- Lack of hydraulic models
- Coordination with other Lower Sacramento Regional River Project components

NHC conducted:

- Hydrologic Analyses
- Historic Records (1968 to 2002) searches for April, May, and June
- Historic information regarding durations of floods

April is the month most likely to have high flows that will result in overtopping of the riverbanks. In May the flows slow significantly and in June flows rarely overtop banks.

Participant Question: How are the numbers created for the hydrologic analyses created?

Mr. Rood: The numbers were created through modeling; estimation with some actual flow data.

Overall plan strategies are different for each tributary as well as for properties along the Tule Canal and Toe Drain.

Flood Management Tools:

- Flood forecasting on tributaries
- Channel Maintenance
- Channel Capacity Increases
- Channel Modification or Re-alignment
- Other Major Works (i.e. levies, large structures)

NHC would like to talk to more people including duck clubs. NHC is unsure of the timeframe; however NHC will be coordinating with Dave Ceppos and the ongoing interviews he is conducting.

Group Discussion of Recent Flood Event Impacts
(All Participants)

Participant Question: How can dam releases and unregulated flow be monitored in Putah Creek?

Mr. Rood: NHC is looking at what can be done in the Bypass and not so much in Putah Creek.

Dave Feliz: It may be possible to create wetlands and divert spillage into the lowlands to diminish the impact on the Bypass.

Dave Ceppos: Mr. Rood would like to know how the Bypass is configured, such as grading, vegetation elevation etc.

Participant Question: What about expanding the toe drain by dredging out the berm next to the deep-water channel levee?

Mr. Rood: That could be an option that is combined with other projects.

Participant Question: If the toe drain were widened wouldn't it just fill with tidal water?

That is possible. How about an inflatable weir at Lisbon?

Participant Question: How about upstream changes such as an increase in storage capacity? Can tertiary treatment stations be designed to absorb additional water during times of increased flow?

Answer: The west side tributaries might be able to do some re-operations with Clear Lake. However; this may not be feasible. Attempting to get water out of the lower half of the Bypass seems more important than dealing with the west side tributaries.

Are the spring events that periodically cause impacts just an expected cost of doing work in the Bypass?

Participant: We understand the Bypass will flood; however, when it floods April through June it creates an economic hardship. Frequencies seem to be increasing or at least in the mid-late 1990s.

Participant Question: Are there places, such as Knights Landing where enlarging the irrigation channels could be a benefit to get water to the Tule Canal? Is that feasible?

An increase of flow to the Tule Canal will affect downstream properties. Some options that are being considered are using wetlands as holding ponds.

Participant: It's not the west side flows that are creating the problem but the releases out of Bullard's Bar that result in the Bypass being flooded for two days and out of business for three weeks. Overtopping of the Fremont Weir is the significant problem.

A better forecasting scenario would enable farmers to plan plantings. West side flooding is pretty rare; however attention should be focused on the Sacramento River flows. These events are impacted by large amounts of water being dumped out of the reservoir. They far exceed natural runoff.

Group Discussion of Creating Bypass-specific Agricultural Subgroup
(All Participants)

SAFCA is looking for people who want to participate in a brain storming exercise to come up with ideas that would be directed towards agriculture to make it more viable in a flood management scenario. How can those in the urban sector contribute in some way to make agriculture viable in the Bypass? Who would like to sit down with SAFCA and NHC consultants to brainstorm ideas for agriculture viability? Participants will be meeting frequently to come up with material to work with.

Yolo Bypass Working Group Participants:

- Chuck Dudley
- Ken Martin
- John Currey
- Casey Walsh
- Pat Fitzmorris
- Tom Moore
- Chris Fulster (or Dick Goodell)
- A representative from Wildlands

Meeting was adjourned. Next meeting scheduled for July 10, 2003.

YOLO BYPASS WORKING GROUP
MEETING 26

MEETING MINUTES

MEETING DATE: JULY 17, 2003

LOCATION: California Department of Fish and Game
Yolo Wildlife Area Headquarters
45211 County Road 32B (Chiles Road)
Davis, CA 95616

IN ATTENDANCE: Robin Kulakow, Yolo Basin Foundation (YBF)
Dave Feliz, California Department of Fish & Game (CDFG)
Ed Towne, Bull Sprig Outing
Dave Ceppos, Center for Collaborative Policy (CCP)
John Anderson, CDFG
Armand Gonzales, CDFG
Dean Kwasny, CDFG
Theresa Le Blanc, CDFG
Phil Martinelli, Channel Ranch
Vince Rosdahl, Channel Ranch
Trevor Greene, California Department of Water Resources (DWR)
Greg Green, Ducks Unlimited
Greg Schmid, Farmer
Chris Fulster, Glide In Ranch
Dick Goodell, Glide In Ranch
Dave Kohlhurst, Glide In Ranch
Don Stevens, Glide In Ranch
Bob Dorian, H Pond
Timothy French, H Pond
Jeanne Jones, Jones and Associates
Mark A. Kearney, Landowner
Ron Morazzini, Superviser Mike McGowan Representative
Tom Moore, Natural Resource Conservation Service (NRCS)
Walt Chechov, NRCS,)
Betsy Marchand, Reclamation Board
Mike Hardesty, Reclamation District 2068 (RD 2068)
Ken Martin, Rising Wings
Mick Klasson, Sacramento Area Flood Control Agency (SAFCA)
David Brown, Sacramento Yolo Mosquito Vector Control District (SYMVCD)
Jerry Case, SYMVCD
Garth Ehrke, SYMVCD
Tom Harvey, US Fish and Wildlife Service Stone Lakes National Wildelife Refuge
Tony Lucchesi, Wildlands Inc., Pope Ranch

Kingsley Melton, Assemblywoman Lois Wolk
Gaye Lopez, YBF Board of Directors
Rachelle De Clerck, YBF
Beth Gabor, Yolo County Board of Supervisors
Brett Williams, Yolo County Parks and Resource Management Division

NEXT MEETING: September 11th, 2003. 10:30 am to 1:30 pm

ACTION ITEMS

Burn Permits

1. Dave Brown and Dave Ceppos to meet with the Yolo County Air Pollution District Officer and the City of Davis Fire Chief jointly to discuss the feasibility, permitting, staff requirements, and timing of proposed vector control related burn activities in Yolo Bypass.

2. Dave Brown to speak with a representative from the California Department of Health Services to describe proposed vector-control burn activities and to request a letter of support.

3. Dave Brown and Dean Kwasny will discuss and potentially draft DFG letter of support for Yolo Bypass vector control-related burn activities.

4. Dave Brown and Dave Ceppos will meet with California State Air Resources Control Board representative to discuss proposed vector control related burn activities in Yolo Bypass.

Agency Coordination

1. Dave Brown will meet with Chad Santerre of California Waterfowl as soon as possible to discuss proposed NAWCA grant implementation activities and related features that will be mutually-beneficial to managed wetland habitat and vector control.

2. A joint agency and landowner coordination meeting will be held in August to discuss the proposed flood-up schedule for the Bypass and related vector control issues.

3. SYMVCD staff will develop a preliminary set of water delivery, vegetation management, and land management recommendations to be discussed at the joint agency / landowners meeting

4. Agency and advocacy organization leaders will schedule a Spring coordination meeting in May, 2004 in support of 2004 season planning efforts.

General

Landowners will contact SYMVCD to arrange an in-field assessment of water management facility conditions to determine applicability and appropriateness of using SYMCD equipment to conduct management actions on private lands.

1.

Dave Ceppos called the meeting to order and began introductions of attendees. Mr. Ceppos briefly covered the agenda and the purpose of the Working Group. The Working Group is open to the public and has been in existence for 3 and one- half years. It provides a focused opportunity for farmers, land owners and agencies within the Bypass to discuss Bypass related issues as well as provide guidance and opinions on such issues. The Working Group is continually funded by CALFED.

The meeting focus was on vector control; therefore Mr. Ceppos requested that a discussion of the May 29, 2003 meeting summary be postponed until the next meeting.

Mr. Ceppos gave a brief outline of the meeting agenda.

Sacramento Yolo Mosquito Vector Control District (SYMVCD)
Staff Introduction
Dave Brown, District Manager

Mr. Brown introduced himself, Jerry Case and Garth Ehrke. Mr. Case and Mr. Ehrke both work in the field within the Yolo Bypass.

Sacramento Yolo Mosquito Vector Control District (SYMVCD)
General Mosquito Information
Dave Brown, District Manager

There are more than 20 different species of mosquitoes in the Sacramento area. All mosquitoes require water. The females lay eggs which hatch as larvae, pupate and emerge as adults.

There are three main genera of mosquitoes as follows:

Culex – This genus carries encephalitis. SYMVCD is very concerned about this genus because it can transmit the West Nile Virus. The life cycle of this genus is between 7 to 14 days and requires a more permanent water body type that is present longer than the span of the life cycle.

Anopheles - This genus carries malaria and requires freshwater. They are often prolific in rice fields.

Ochlerotatus – This species' life cycle is 4 days with a life strategy that maximizes habitats that flood. This species is often seen in irrigated pastures. These mosquitoes can fly over 20 miles and are an issue in the Pocket Area which is only 2 to 3 miles east of the Bypass.

The primary question is how can management practices reduce or avoid issues that will impact human populations. By changing management practices mosquitoes will not be eliminated, however their numbers will be reduced as well as the potential costs for abatement and control.

September 2002 Vector Control Issues Special Meeting Review
Dave Ceppos

Portions of the following meeting minutes are adapted from a summary sheet handed out during the meeting.

Opportunities and Constraints from the Habitat Management and Vector Control Issues Special Meeting I: September 2002. The following items were not prioritized.

1. Develop water management practices (i.e. water depths, delivery timing, etc) to maintain and support natural predators such as mosquito fish, predatory insects, beetles, etc. Keep pools filled as a fish reservoir.

2. Conduct disking and mowing on managed wetlands. Disking is preferable to mowing and burning as it helps set up a seed bed and can help promote beneficial wetland vegetation. It can make the ground very soft however, and can inhibit access for a while. Mowing produces excess vegetation that can provide important nutrients and forage but also creates rotting vegetation that promotes mosquito growth. Mowed materials could be disked in, collected in wind rows, or burned however disking and collecting can be prohibitively expensive and collecting and burning can reduce beneficial forage food for waterfowl.

3. Consider mowing edges of ponds. Open water can be better for pesticide efficiency.

4. Organize and apply for a group burn permit to allow all clubs to burn selectively after conducting respective mowing operations. Review and consider the Suisun Marsh management and burn permit model.

   Dave Brown worked initially with California Department of Forestry (CDF) as a training exercise. Presently there is not enough funding to allow for CDF to continue this practice however, there is the potential to work with California Department of Fish and Game for selective burns.

5. Consider funding agreement by and with the District to offset labor and direct costs associated with large-scale burning and collecting. Pursue such an effort if it can be shown to minimize mid-late season mosquito control costs (when compared to more conventional management such as spraying).

   Participant Question: Is it possible to have SYMVCD manpower the burn process?

Dave Brown: Yes, if you let me know how many people you will need and if you designate the property to be burned.

Participant Question: Is permitting controlled by the State Air Resources Control Board?

Answer: Burn permits are an involved process and are controlled at the State Air Resources Control Board District offices, which in the case of the Bypass is likely to be in Davis.

6. Ensure each club can maintain consistent flow through ponds in summer irrigation and brood pond maintenance. Assess efficacy of intake/outfall pipes and consider cooperatively funded improvements of piping by the District, NACWA funding and the clubs if such improvements can be shown to minimize mid-late season mosquito control costs (when compared to more conventional management such as spraying).

7. Most brood ponds are drained in July. Keep water in ditches all summer to build up predator fish base to inoculate seasonal ponds.

8. Redesign and rebuild ponds to allow deep parts that can retain water for seasonal maintenance of predator fish populations. Fish can reside in deeper sections that will not support mosquito larva and when shallow areas are re-flooded, the fish will inhabit the shallow edge and eat the larva.

9. Draw down ponds to limited deep-water areas to minimize the surface area for spraying.

10. Consider drawing down earlier in spring (e.g. March) so that irrigation can occur in June rather than in July.

11. Develop management techniques and tools to conduct rapid flood up in 3 to 7 days in order to control the hatch of mosquito eggs. Such synchronization allows a single pulse mosquito hatch, rather than multiple hatches with slowly advancing water. A disadvantage of such rapid management is the potential loss of the slowly flooded feathered edge for shorebirds, teal, etc. Another disadvantage is the overall loss of foraging time when fields are flooded fast. A last disadvantage is whether short inundation can adequately control invasive wetland species (e.g. cocklebur) and adequately saturate the soil for effective irrigation. A constraint is whether Bypass water supplies can support such a collective, rapid flood up at one time, or if conversely the clubs need to take turns flooding up due to water rights or similar reasons.

12. Alternatively, consider management techniques and tools to conduct multiple rapid irrigations that achieve single pulse mosquito hatches but support effective soil/vegetation irrigation over the maintenance season.

13. Create a cost-share partnership to support water delivery pumping costs. Greater flexibility in water delivery and residence times can occur with the availability of bigger more powerful pumps. Higher electricity costs may be incurred but for maintaining stable water supply but the greater flexibility may be worthwhile if such improvements can be shown to minimize mid-late season mosquito control costs (when compared to more conventional management such as spraying).

14. Coordinate DFG yearly inspection of Presley Program easement holders with mosquito abatement personnel to direct habitat manipulations in a manner that minimizes mosquito production.

15. The District will consider providing backhoe work and/or mowing for duck clubs if such activities are specifically for abatement purposes (rather than habitat purposes) and it can be shown that such activities minimize mid-late season mosquito control costs (when compared to more conventional management such as spraying).

SYMVCD Bypass Review and Discussion of Management Expenses for Recent Years
Dave Brown, SYMVCD

Because of budget constraints some, Mosquito Vector Control Districts have had to charge land owners fees. Many mosquito issues, such as money and revenue, can be addressed by changes in land management practices. In the coming months, there will some changes in local government funding possibly including 40% cuts. If the cuts are deep, SYMVCD will not be able to continue vector management without charging land owner fees. Management practice changes can help to offset these costs.

SYMVCD has the authority under department code to serve abatement notices. In other words, if an individual does not take care of a vector nuisance, SYMVCD can charge that individual up to $1,000 per day to abate the nuisance.

Airplane applications of pesticides in the Bypass resulted in costs close to $500,000 not including labor. Application timing is based on threshold counts of both larval and adult mosquitoes. The best management practice is to drain off water; however this practice is not always feasible. Aerial pesticide application can range from $20,000 to $200,000 per land owner. Ground pesticide application is an additional cost.

Participant: Is there data showing populations of mosquitoes from the Bypass going to the Pocket Area?

Mr. Brown: Yes. If anyone is interested in seeing this data please contact SYMVCD.

Participant Question: Is there a threshold number of complaints before SYMVCD does something?

Mr. Brown: By the time SYMVCD hears complaints about mosquitoes, the mosquitoes are gone. However, SYMVCD can show what areas in the Bypass the mosquitoes are likely to come off of and abate the problem before it affects a nearby residential area. SYMVCD tries to treat for mosquitoes before and during the larval phase because the total affected area is smaller. Once mosquitoes are adults, the impacted area is larger and more expensive to treat. When SYMVCD receives complaints from people, SYMVCD requires the resident to have a sample in order for SYMVCD to narrow down the mosquitoes originating location.

Participant Question: What kind of mosquitoes breed in residential areas?

Mr. Brown: Culex. SYMVCD spent $100,000 in outreach notices to residential areas on how to minimize mosquitoes.

Participant Question: Is SYMVCD working with governmental agencies to control mosquitoes?

Mr. Brown: Yes, but SYMVCD would rather work with management practices as opposed to governmental intervention.

Participant Question: What about urban areas?

Mr. Brown: Yes, SYMVCD monitors and treats urban areas as well.

Participant Question: Can SYMVCD provide numbers at a per acre cost as opposed to per land owner costs?

Mr. Brown: Yes. Abatement costs can range from $5 to $75 per acre depending on the product and the species being treating for.

SYMVCD tries to minimize impacts on landowners. SYMVCD also tries to use more than one product because mosquitoes can build up a resistance to products. This can change the costs over the years as well as the frequency of application. For example, SYMVCD may apply a cheaper product every 5 days as opposed to a more expensive product that is applied once every 30 days.

Participant Question: Will there be cost share projects with the budget crisis?

Mr. Brown: I cannot say for sure at this time.

Participant Question: When is the best time to flood up fast without having mosquito problems?

Mr. Brown: November 1st is the preferred date; however SYMVCD is willing to work for some time between October and November 1st.

Participant Question: We can flood one pond quickly and then flood the other ponds on November 1st. Will that help?

Mr. Brown: Yes.

In certain situations SYMVCD can not use cheaper pesticides due to vegetation density. In those cases granular pesticides are applied. Therefore, it is important to note that vegetation management is also key.

Current and Proposed Bypass Vector Control Projects and Expected Benefits Discussion
SYMVCD Staff

Please refer to page 2 for a list of action items resulting from this discussion.

Burn Permits:

Participant: Can No Man's Land Fire District be utilized for the burn permits? Do we need to talk to Rose Conroy, Fire Chief?

Betsy Marchand: The burn permit must come from the Yolo Solano Air Pollution Control District (YSAPCD). Interested parties should meet with YSAPCD and then seek the cooperation of the fire districts. The permit process should be a 3-agency cooperative effort.

Participant: It is important to note that DFG should be involved, because anyone applying for a permit would need DFG's support.

Dave Brown: It may also be advantageous to obtain a letter from the Department of Health Services (DHS) noting that a controlled burn would reduce the risk of mosquito related health issues.

Betsy Marchand: The State Air Resources Board should also be involved.

Participant: In the past, burning was utilized for wildlife habitat benefits and needed wildlife biologist approval. Now there is a dual benefit of vector control and wildlife habitat benefits.

Participant Question: Who is responsible for making sure the fire doesn't get out of hand?

Answer: The landowner.

It was decided that a policy level discussion with DHS, the local Air Pollution Control Office and the local fire departments (No Mans Land and East Davis Fire Departments are both contract districts with the City of Davis Fire Department) would be advantageous. A boilerplate letter from DFG could be used on a repetitive owner by owner basis, depending on where the constraints lie.

Tom Moore stated that prescribed burning on NRCS Easements is allowed as long as authorization from NRCS is obtained in advance of the burn.

Participant Question: Will the permits be looked at in only 20 acre parcels? There is probably 2,000 acres that need to be burned in the Bypass.

Dave Feliz: In Suisun Marsh there was a 200-acre limit per year for 200,000 acres.

Participant: It would be important to conduct public outreach before burning so people in Sacramento don't complain.

Participant Question: Let's assume there is a joint project for a dozen land owners. If these land owners are only allowed to burn 500-acres a year how do they separate out who burns?

Answer: They would likely need to talk to someone at the agencies. The burn permits most probably would be allocated according to each club based on their management plan for that site.

Participant Question: Does discing help?

Answer: Yes, but many landowners don't like to disc because it makes the land too soft.

Participant Question: When is best time to burn?

Answer: Fall (i.e. September)

<u>Vegetation Management</u>

Participant Question: Does the SYMVCD abatement district have equipment such as water tanks?

Answer: Yes; however they may not be sufficient for use as fire suppressant tanks.

Participant: Drawing down ponds earlier is not an option for swamp timothy growth or for shore bird concentrations, not to mention it creates a large sweet clover problem. Can we use grazing for sweet clover instead of mowing?

Mr. Brown: The problem occurs when grazing animals are put on irrigated properties creating an ideal mosquito habitat with water filled ruts. If the properties with sweet clover are not being irrigated it should be fine to bring in grazing animals. The best times for grazing are in June, July and August, as long as there are no cattle in areas with flooded ponds. The optimum time depends on when water is pulled off the property.

Participant Question: Are there any best management practices (BMPs) that are written up to minimize impacts while removing vegetative material?

Answer: Every year is different. If water is left on longer how does that affect the mosquito populations? If the water is drained off too early then cocklebur and sweet clover out grows desirable vegetation.

Participant: Both NRCS easements and Presley program documents do not allow for grazing. There may be a way to work around these policies; however it should be double checked first.

Agency Coordination

SYMVCD conducts two site visits per year; one in May and the other in September. Land owners should work with SYMVCD on the follow up visit this September to coordinate for site specific needs for next year.

Flood Up and Discing:

Dave Feliz: Suisun Marsh has an early flood-up program and management practices are included in that program.

Participant Question: How do we identify who the early flood-ups are?

Answer: Grasslands Water District has an early flood-up meeting with mosquito abatement to coordinate flood-up schedules with everyone.

Dave Ceppos: The working group is an ideal group to convene for early flood-up schedules. The duck clubs could meet with Chadd Santerre of CWA and Dave Brown during a working group meeting to discuss flood-up schedules.

Dave Feliz: DFG discs the ponds before flood-up which usually helps with swamp timothy and smart weed in the spring.

Dean Kwasny: Burning is not usually effective for vegetation management. Discing seems to work better. However, using burning to thin vegetation and then disc afterwards appears to work very well for vegetation management.

*Dave C*eppos: Do land owners need to increase their discing practices? Do land owners need funding assistance? What management practices should land owners begin?

Participant Question: Is SYMVCD willing to promote a discing program? Discing is expensive and most land owners don't own the equipment.

Dave Brown: SYMVCD is willing to help on areas that have to flood-up early. SYMVCD may not have the equipment for discing but would be willing to put money towards this program if it provided cost savings benefits to effective vector control.

Participant: The driving force behind flood-up schedules is the hunting opener date.

Participant: Our properties have great nesting habitat and we don't want to lose it. Can we have some deeper water with habitat still?

Answer: Many of the pesticides SYMVCD use are applied aerially. If there is a lot of vegetation these pesticides can't penetrate the water which does not solve the problem.

Participant: Did the burn/disc program at the Grasslands Water District work well for mosquito abatement and is it something land owners should follow?

Dean Kwasny: Yes, but mosquitoes are still an issue during flood-up.

*Dave C*eppos: Garth Ehrke and Jerry Case, can you identify which clubs could have improved water management in lieu of vegetation management? Would you be willing to advise at a coordination meeting to help make changes this year?

Mr. Ehrke and Mr. Case: Yes, set up the meeting.

Dave Ceppos: How does the Working Group get all the clubs here? Send out letters and a follow up call? Set up individual meetings at each individual club and discuss it on the site?

Participant: If a letter is sent to Bypass land owners it should mention that flood-up scheduling in the Bypass will be discussed. Land owners will attend because they will not want to be the last on the flood-up list.

Participant: What does SYMVCD need from land owners to get District staff and equipment to help with cleaning a ditch?

David Brown: SYMVCD only needs a land owner request as long as the ditch cleaning is likely to result in a reduction of the mosquito populations. SYMVCD will do the assessment of the ditch and the work.

Participant: Before sending out a letter to land owners in the Bypass, a couple of clubs should be identified as pilot projects to assess the cost-benefits of changing management practices for mosquito abatement. In that way a greater response may be received from other land owners if they can see how they will save money.

Participant: Southern Bypass land owners often end up on the bottom of the pile; therefore most of the land owners don't feel like their time and energy is worth the outcome. Instead of using a model club for the pilot program, use a southern Bypass club and deal with their water issues.

Dave Feliz will coordinate with Dave Brown in scheduling an early flood-up meeting in mid-August.

Meeting was adjourned. Next meeting scheduled for September 11, 2003.

YOLO BYPASS WORKING GROUP
MEETING 27

MEETING MINUTES

MEETING DATE: SEPTEMBER 11, 2003

LOCATION: California Department of Fish and Game
Yolo Wildlife Area Headquarters
45211 County Road 32B (Chiles Road)
Davis, CA 95616

IN ATTENDANCE: Robin Kulakow, Yolo Basin Foundation
Dave Feliz, California Department of Fish & Game (DFG)
Dave Ceppos, Center for Collaborative Policy (CCP)
Ric Reinhardt, MBK Engineers
Patrick Akers, California Department of Food and Agriculture (CDFA)
Bryan Plude, Canvasback Consulting
Phil Martinelli, Channel Ranch
Vince Rosdahl, Channel Ranch
Lori Clamurro, DPC
John Currey, Dixon Resource Conservation District (RCD)
Boon Lek, Department of Water Resources (DWR)
Roger Churchwell, DWR
Marianne Kirkland, DWR
Mike Mirmazaheri, DWR
Michael Perrone, DWR
Greg Green, Ducks Unlimited
Ted Sommer, DWR
Chris Fulster, Glide In Ranch
Dick Goodell, Glide In Ranch
David Kohlhorst, Glide In Ranch
Don Stevens, Glide In Ranch
Jack Palmer, H Pond Ranch
Gus Yates, Hydrologist
Mark Kearney, Landowner
Armand Ruby, Larry Walker and Associates
Ron Morazzini, Representative for Supervisor Mike McGowan
Selby Mohr, Mound Farms
Erin Strange, NOAA Fisheries
Tom Scheeler, Port of Sacramento
Mike Hardesty, Reclamation District 2068
Cyndi Martin, Rising Wings Preserve
Ken Martin, Rising Wings Preserve
Mark Martin, Rising Wings Preserve

Butch Hodgkins, Sacramento Area Flood Control Agency (SAFCA)
Ray Thompson, Skyraker Duck Club
Walt Cheechov, USDA, Natural Resource Conservation District (NRCS)
Phil Hogan, USDA/NRCS
Tom Harvey, USFWS Stone Lakes National Wildlife Refuge
Tony Lucchesi, Wildlands Inc.
Kingsley Melton, Assemblywoman Lois Wolk Field Representative
Bon Leonard, Yolo Basin Farms Inc.
Rachelle De Clerck, Yolo Basin Foundation
Gaye Lopez, Yolo Basin Foundation Board Member
Beth Gabor, Representative for Supervisor Helen Thomson
Chuck Dudley, Dudley Ag
Ron Tadlock, Farmer

NEXT MEETING: November 13th, 2003. 10:30 am to 1:30 pm (POSTPONED)

ACTION ITEM:

1. Determine whether there is a way to augment Conservation Resource Enhancement Program (CREP) to include other land uses in the Bypass such as duck clubs.

Dave Ceppos called the meeting to order. The Working Group has been in existence for four years. During that time the Yolo Bypass Management Strategy was developed. It discusses the possibilities for future land use changesand a wide range of landowner concerns.. The Management Strategy has been used by many agencies in the area.

Mr. Ceppos briefly summarized the agenda.

Update on Regional Water Quality Control Board Agricultural Waiver
Water Quality Issues
John Currey, Dixon RCD

The Central Valley Regional Water Quality Control Board (RWQCB) passed the latest version of the conditional agricultural waiver for irrigated lands and wetlands on July 11, 2003. Under the Porter-Cologne Act all lands that discharge water into State waterways are required to report waste discharge, and improve water quality to meet State standards. In 1982 the State passed a 20-year agricultural waiver. In December 2002 the agricultural waiver was sunsetted. In anticipation and as a result of this sunset condition, the RWQCB proposed a range of options that water dischargers could pursue to remain in legal compliance. Agricultural landowners and owners of managed wetlands have three choices in regards to discharge water: join a watershed group, comply as an individual, or file reports of waste discharge. RWQCB is not set up at this time for reports of waste discharge. However, this choice means reporting parties have to immediately meet State discharge standards. Currently the agricultural waiver exempts agricultural landowners and managed wetlands from reporting waste discharge. Agricultural landowners and managed wetlands that are associated with a watershed group will not have to pay fees directly to the State.

Participant Question: What happens if landowners in the Bypass don't get a watershed group up and going?

Answer: Environmental groups could go to RWQCB and push for individual compliance to standards or not to discharge until they can comply.

The California Farm Bureau calculated the costs to individual landowners assuming an average farm of 200 acres with a single point of discharge. In order to implement monitoring by July 2004, the cost will range from $3,000 to $6,000 per entity. Monitoring a single point of discharge is estimated to cost between $7,000 to $14,000 dollars annually. There may be potential to modify monitoring plans. For example, a farm with uniform cropping patternss and multiple points of discharge may be treated as a property with one point of discharge.

Notices of intent and an inventory of properties owned by landowners involved in a watershed group is due by November 1, 2003. Detailed property and pesticide descriptions are due April 1, 2004 along with monitoring plans.

Participant Question: If a landowner is aligned with a coalition watershed group, what do they have to do as individuals?

Answer: The Dixon RCD will send out a sign-up sheet during the week of September 15th through the19th, 2003 with requests for names, parcel numbers, tenants. Fees are to be paid up front and are $2.00 per acre. Other watershed groups are requesting from $1.50 to $3.00 per acre, depending on location of the properties.

The Sacramento Valley Coalition is filing a notice of intent on November 1st; and hoping the application will be accepted by RWQCB. The Sacramento Valley Coalition filing doesn't remove land owners from the obligation of joining local groups. In order to maintain the confidentiality of individual land owners, the Dixon RCD is trying to aggregate local data to submit to RWQCB. In this way, local groups can work with individual land owners to correct problems. Only gross errors will be reported to the State.

Participant Question: Is the fee the same for Bypass duck clubs in the Dixon RCD coverage area?

Answer: Yes. At some time in the future, the per acre fee may be revised to reflect the specific land use of the property but as this time, the RCD needs to move ahead rapidly and is assessing the fixed fee on all cooperating properties. This issue will likely be a point of discussion at future meetings of the watershed group participants. Because the Bypass is unique, the watershed group will consider the nature and properties of the Bypass that will affect monitoring plans. The RWQCB is aware of the unique situation in the Bypass. A location within the Bypass will be selected to represent the collective summer draining of Yolo and Solano Counties for the monitoring plan. Sampling will not be conducted during full flood events in the Bypass.

Participant Question: Does the Department of Fish and Game (DFG) have to comply on their properties?

Answer: All lands have to participate in the program in some capacity.

Participant Question: DFG supplies water to our property, therefore who is responsible for monitoring and compliance?

Answer: Both parties will be responsible

Participant Question: All the duck clubs flood and receive their water from upstream properties. Therefore all discharge from the duck clubs is from other properties. Won't the duck clubs be disproportionately penalized for non-compliance with discharge?

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Answer: If the duck clubs are affiliated with a watershed group, discharge from the duck clubs will be included in the group monitoring which will be representative of the whole region, not just individual properties.

Participant Question: The duck clubs do not participate in farming and only discharge waters off of their properties during flood events. How does this impact the duck clubs?

Answer: Managed wetlands are required to participate including storm water runoff from duck clubs. It is an immediate requirement of managed wetlands and agriculture land to enroll in the program.

Participant Question: If upstream properties discharge onto downstream properties due to natural flow patterns how does that impact the downstream property?

Answer: If the downstream property owner participates in the program as an individual they should be concerned about discharge onto their property. If the landowner participates in an aggregate group the discharge would be considered a regional problem.

Participant: Duck clubs should not pay the same rate as agriculture properties because the duck clubs don't contribute to the discharge problem.

Watershed groups will need to assess the qualities and characters of individual properties and their threat to State Waters. As previously discussed, once the assessment is complete, variable rates can be justified. Watershed groups will first need factual reasoning to grasp why some properties will have to pay more than others. This will also provide an opportunity to create incentives to improve land practices and reduce costs for landowners over time.

Participant Question: If a property is a managed waterfowl area and doesn't discharge how is that property affected?

Answer: The program also applies to storm water that leaves the property.

Participant Question: Has RWQCB considered that water quality is often improved by wetlands?

Answer: RWQCB doesn't have any hard science to prove that water quality is improved by wetlands; therefore this program was put into place to collect water quality data.

Participant Question: How can landowners be penalized?

Answer: The base law allows for civil penalties for landowners who are discharging pollutants. In the watershed group, landowners are shielded from immediate liability. Therefore monitoring will be conducted and problems identified without identifying individual landowners. Regional modifications will be implemented to improve water quality within watershed groups. If a site within the watershed group consistently violates State standards, the RWQCB will take over for that site. Individual landowners will have to meet state standards immediately and will work directly with RWQCB.

Participant Question: Bypass flows are extremely complex. Does the monitoring plan require information about flows and volumes?

Answer: Yes, but the complexity will be brought up with the RWQCB. Sub-watersheds will need to look at the true geographic areas, find areas that yield good results without monitoring every ditch in order to avoid inadequate data.

Participant Question: What will be the penalty for non-compliance?

Answer: Landowners will be given notice. Fines can be on a per day basis which is determined according to the severity of non-compliance

Participant Question: What is northern boundary limit of the southern Yolo Bypass?

Answer: Interstate 80, Putah Creek and all of Solano County. North of the southern Yolo Bypass is included in the Yolo County Group.

Participant Question: Is there a group forming to oppose this legislation?

Answer: There are many appeals to modify the legislation and make it more palatable.

Landowners have a couple of options; participate as an individual or in a watershed program. Because this is a mandated program and there is no State money to run the program, watershed groups are looking for landowner fees to help with the cost. The Yolo County group is requiring a $1.00 to $1.50 per acre and Solano County is requiring $2.00 per acre for start up costs. An outreach meeting is scheduled today (September 11, 2003) at 2:00 pm at the Winters Community Center for detailed information. Monitoring will begin July 2004. Difference in discharge and land management should be applied to fees on a per acre basis. Land management and discharge differences will be investigated further, but currently there is a flat fee which may be adjusted at a later point in time.

Participant Question: Will the fees be assessed on all the acreage on the property or only the acreage that is flooded?

Answer: Irrigated land only.

Update Yolo Bypass Water Quality Planning Process
Armand Ruby, Larry Walker Associates

The Yolo Bypass Water Quality Project is funded by CALFED to the City of Woodland in cooperation with the City of Davis and University of California at Davis (UCD). The State issues waste discharge requirements and National Pollutant Discharge Elimination System (NPDES) permits. If dischargers are proactive and monitor as an individuals or as a group they can avoid the NPDES waste discharge requirements. NPDES is stringent and mandates specific minimum fines on a daily basis for each infraction. This stringency is what prompted the City of Woodland and those in cooperation to monitor discharge on a watershed basis. NPDES permitees and other permitted entities are unfunded mandates and rely on money that is charged to constituents. The City of Woodland has begun to reach out beyond the major project stakeholders to include landowners and farmers in the Bypass. Anyone who is interested should contact Armand Ruby at Larry Walker Associates (530-753-6401, armandr@lwa.com).

The major focus of the Yolo Bypass Water Quality Project at this time is to put together the monitoring plan and implement it by October 18, 2003, which coincides with World Water Monitoring Day. The current idea is to use volunteers to assist with the water quality monitoring. The goal is to try and figure out the complex hydrology in the Bypass to best represent flows in Bypass. The draft plan is scheduled for completion by the end of next week and as well as have the network of sampling volunteers lined up.

Participant Question: Where will the stakeholder minutes be available?

Answer: Either through Armand Ruby or Robin Kulakow.
Participant Question: Who should want to be stakeholder?

Answer: The stakeholder group should consist of a cross section of state agencies, local agencies, farms, recreational and management interests.

Participant Question: Can electronic minutes be made available on a website?

Answer: They can be made available on the Yolo Basin Foundation website (www.yolobasin.org).

Update on DFG Yolo Wildlife Area Expansion Management Planning Process
Dave Feliz, DFG

DFG has received funding from the Wildlife Conservation Board for the preparation of the Management Plan. DFG is considering a contract with the UCD based John Muir institute for

the preparation of the plan and associated CEQA document using teams of faculty, graduate students and renowned experts. DFG will have the ultimate approval of the final plan. The tentative contract date is slotted for November 1st, 2003.

The final management plan will comply with CEQA through the development of an Environmental Impact Report (EIR) which will be prepared by DFG in partnership with UCD staff. Many of the current DFG management plans are very non-specific and do not include maps, numbers and only outline missions and goals.

Note: Since the following presentation was made, UCD has informed DFG that UCD staff will not be available to assist in the preparation of the Environmental Quality Act (CEQA) document.

Participant Question: This will be a policy and guideline document for the Wildlife Area. At what point will DFG develop an administrative document for the management plan?

Answer: . Issues were discussed at the focused Wildlife Area Planning meetings last fall DFG will conduct formal CEQA public scoping as required.. Mr Feliz also reiterated that the UCD staff will not be making CEQA or planning decisions. That is the legal responsibility of DFG

Hunting Season 03/04

The Duck Hunting Opener for all DFG Sacramento Valley Wildlife Areas has been delayed until November 1st, 2003 due to the late rice harvest. In addition DFG's operating budget has been cut by $330,000.00 this year. Therefore, DFG is not printing hunting regulations this year. Waterfowl regulations can by downloaded from the DFG website. Duck stamps will not be sold at the Yolo Bypass check station, only one day hunting passes. Closed zones and tour routes will remain the same.

The 2003 Dove Opener resulted in 279 birds and 207 hunters.

North American Wetlands Conservation Act Project

Levees have been reconfigured and a new canal constructed in the northeast unit of the Wildlife Area. Each unit can be independently flooded and drained and it didn't cost the State any funds because it was completed with Federal monies.

Participant Question: What is going on with the rock being installed near the Wildlife Area entrance along the south side of I-80.

Answer: The rock going next to the freeway is a Caltrans project and is not associated with DFG.

Participant Question: How much money does DFG get from farming?

Answer: About $400,000. DFG has an agreement with the Dixon RCD who receives the money which is then spent on projects within the Bypass. .

Participant Question: How much of that money goes to fisheries? Will water ways in the Wildlife Area have enhanced connections to the Toe Drain?

Answer: It's a possibility. One of the ideas to be considered in the Management Plan is to run Putah Creek to and through the historic Putah Sinks and continue south through historic sloughs in the Bypass.

Update on SAFCA Regional Flood Management Planning Process
Dave Ceppos

SAFCA has been working on a partnership to revise and update flood management in the Southern Sacramento River Area. Flood management improvements might include, widening Fremont weir, removing interior levees, and removing resistance in the system as a means to decrease the water surface elevation of design flood events . SAFCA is creating regional partnerships with northern areas also. SAFCA has come to a conclusion that a regional collaborative project is the most effective way to assess and potentially implement changes in the Sacramento River and the Bypass. Such a project would affect and therefore need to include interests from agriculture, urban communities, and environmental advocates..

Creation of an Agricultural Task Force

The agricultural task force will answer the following questions:

1. How does agriculture land management need to function in the Bypass to maintain flood control in Bypass and keep agriculture economically feasible?
2. What are flood constraints and environmental benefits?

Creation of a South Bypass Focus Group

Through mutual discussions between SAFCA and YBF there is a proposal to create a subgroup of the Working Group in the Southern Bypass to address the issues specific to that part of the Bypass. The focus group would start out with a subset of issues and poll landowners for issues that concern them to create future discussions for the subgroup. SAFCA issues include removing interior levees and how that affects flooding. Affects on publicly owned lands that were to have been in the proposed U.S. Fish and Wildlife Service (USFWS) North Delta Refuge would also be addressed. Other concerns to be discussed include how communities such as Rio Vista will be impacted. Meetings will be open to all comers, but will focus on South Bypass issues. The meetings will likely be held in someplace closer to the Southern Bypass.

Participant Question: Any idea of when the first meeting will be?

Answer: We anticipate December at the earliest.

Update on Corps/State Reclamation Board Hydraulic Modeling Project for Yolo Bypass

Mike Mirmazaheri, DWR

The State Reclamation Board doesn't have funding for the Hydraulic Modeling Project for the Yolo Bypass; therefore money from Proposition 204 will be utilized if it is signed by September 2003. Together with the U.S. Army Corps of Engineers, the State Reclamation Board will develop a 2-D model for the Yolo Bypass. Work is slated to begin in November 2003.

The study will be based on topographic information from a comparative study. Any missing information will have to be developed. A technical workbook will be developed at the same time. The model will be calibrated to 1997's high water levels. This project will not be able to update levee problems.

Participant Question: Which version of RMA will be used?

Answer: RMA 2.

Participant Question: Will calibrated datum between gauges be included in the model?

Answer: The Reclamation Board is not yet certain which datum will be used to calibrate the model. The Reclamation Board anticipates that the model will be split into pieces because the geographic area to be addressed (the Bypass) is so large.

Conservation Reserve Enhancement Program (CREP) for the Delta
Pat Akers, California Department of Food and Agriculture (CDFA)

Growers are facing increasingly difficult challenges meeting environmental requirements and staying economically viable. The CREP helps farmers make land management and business decisions to maximize their productivity, minimize activities on minimally productive lands, and comply with environmental requirements.

What is CREP?

- CREP stands for Conservation Reserve Enhancement Program
- CREP is a sub-program of the Farm Bill's Conservation Reserve Program (CRP).
- CREP funds come from USDA and are administered by FSA
- Both programs issue set-aside contracts to farmers to take USDA commodity crop (e.g., rice, cotton, corn, wheat) lands out of production and install NRCS conservation practices on them (e.g., native grass cover) for 10-15 years in exchange for rent.
- CRP is an on-going program, entirely funded by USDA, with occasional enrollment periods, It applies statewide.
- CRP presently doesn't serve California's needs very well
  - In the last enrollment from this summer, approximately 2-million acres were enrolled in 41 states.
  - California enrollment was approximately 4500-acres or roughly 0.2% of the total acres enrolled.

- The main problem is the payments are based on dryland farming and are too low for irrigated agriculture.

- CREP requires development of a program locally or at state level, in cooperation with USDA (FSA and NRCS).
- The program must identify a geographical area to focus on and identify particular environmental goals (water quality, habitat).
- CREP requires at least a 20% non-federal (state) match of the funds provided by USDA.
- CREP allows flexibility in the tailoring of rent payments, kinds of lands targeted, technical assistance, payments for maintenance, conservation practices in order to meet local conditions, payments for installing practices.
- CREP provides for up to a 90% cost-share for installation of conservation practices (e.g. re-vegetation with native grasses) on set-aside lands.
- In the Sacramento Valley CREP rent of row crops is $100/yr/acre and $170 for rice. There are specified and very clear set of practices to achieve specific goals. Other CREPs in other states are various combinations of incentives, targeted lands, environmental goals, and targeted practices.

Why is CDFA interested in CREPs?

- Growers are facing increasingly costly environmental challenges and restrictions on the use of their lands.
- CREP can offer one tool to help farmers stay in business and help them try to meet environmental demands.
- CREP can pay an adequate rent to farmers to manage their lands for environmental goals.
- CREP uses a delivery system many farmers are used to dealing with (NRCS, Farm Services Agency).
- The Secretary of CDFA wants California to receive more USDA conservation funds.
- CDFA wants to see more money being spent by CALFED go towards helping growers stay on the land and be rewarded for their good work, especially in the Delta Area.

Developing a CREP

- CDFA staff can provide technical writing and research services in developing a proposal.
- In order to fulfill Federal Endangered Species Act requirements (ESA), a Biological Opinion must be prepared. CDFA staff is willing to work on this and have been told by the USFWS that consultants are more efficient, but USFWS is willing to provide guidance. DFG may help on California ESA requirements.
- Local interest and participation is needed. For example, ideas on conservation practices could be addressed including: where they would work best, documenting level of interest, and local economics.
- The 20% state match must be identified. The CALFED Ecosystem Restoration Program (ERP) has $20-million earmarked by law (Proposition 50) to help farmers

incorporate conservation practices into their ongoing operations. They have repeatedly indicated an interest in working with USDA to develop some program.

CDFA would like Bypass interests to consider the possibility of pursuing a CREP in the Southern Bypass. CDFA will continue to work on resolving the funding and inter-agency coordination that needs to occur for a Delta / South Bypass CREP to happen.

Participant: It has been speculated that CALFED state entities are not currently interested in providing state match for wildlife friendly farming. CALFED-ERP had specific goals in different management areas throughout their program. The Staten Island purchase and associated conservation and agricultural easements for the island met those goals in this region. Is that true?

Answer: CDFA is more interested in the Bypass because of its flood capacity. CALFED does have a numeric acreage goal was for wildlife friendly farming, however CREP could address flood control or water quality etc. However, admittedly there is more enthusiasm for surrounding areas around the Delta.

Participant Question: Has there been a discussion with the Reclamation Board to make sure CREP is compatible with flood control issues?

Answer: CDFA is aware of this issue but has not had a formal discussion with or commitment from the Reclamation Board

Participant Question: If acreage is put into CREP, what can it be used as?

Answer: The acreage can be put into nesting habitat and/or water. Water is limited to 10 acres and the rest would be nesting habitat and brood ponds. Grazing is not permitted and weeds must be managed.

Participant Question: How does CREP deal with the economic loss due to loss of production and the associated loss of taxable revenues and property taxes?

Answer: There are no allowances in CREP to cover in lieu fees to cover the loss of property tax, nor to cover the loss of taxable revenues from agricultural production.

Participant Question: Is there enough flexibility if there is property moved to fallow lands?

Answer: Not currently. Currently, by law, no more than 20% of farming in the country can be enrolled.

Participant Question: Is there a geographic area that CDFA is focusing on? The Bypass seems desirable especially upland habitat during floods.

Answer: No geographic lines are drawn as of yet.

Participant Question: What are the local economic impacts of putting lands into the CREP? For instance, what impact does the loss of productive land have on local taxes, on local assessment districts like Reclamation Districts and Irrigation Districts that rely on member fees to stay solvent Similarly, what are the local impacts to the agricultural economy like labor, materials, etc by taking land out of production
Answer: CREP offers another alternative to help farmers keep their bottom lines up. CREP does not advocate taking productive land out of production but rather, it advocates helping a farmer focus their energy on making the productive land most productive. In that context, it should not impact local economies dependent on healthy production. The impacts to assessment districts and local property taxes is less clear and needs to be addressed.

Participant Question: What is the time frame?

Answer: The first proposal solicitation package will be due next summer or fall.

Proposed Department of Water Resources (DWR) Fish Passage/Fish Study Structures in the Yolo Bypass
Roger Churchwell, DWR

The DWR Fish Facilities Section will install, operate and maintain a resistance board weir in a study to provide engineering and biological design information for fish passage. This project will determine the physical and environmental conditions under which the fish pass the weir. Results from this study will have application at other facilities and locations throughout the Central Valley including the Sacramento-San Joaquin Delta.

Specific questions DWR seeks to answer include:

- How do the target species (Chinook salmon, striped bass, splittail and sturgeon) behave near a fish passage impediment?
- How close do fish need to be to identify the fish passage opening in the weir?
- Is passage of fish through the weir impaired by water velocities?
- During what time of day or night do fish pass through the facility?

<u>What is a resistance board weir?</u>

A typical weir used in fishery studies is a fence-like structure that does not impound water but allows flow to pass downstream, while at the same time preventing fish from moving upstream. The resistance board weir for this application is a hinged, porous structure that limits the area where fish can pass, while allowing the water to continue to flow past. The resistance board weir prevents the passage of fish along its length, except at a passage chute at which fish can be counted as they swim upstream. The resistance board weir is composed of polyvinyl chloride (PVC) pickets, joined to form rectangular panels that are then hinged to a steel foundation. The downstream end of the panel is supported above the water surface by the floatation of the PVC pickets and a resistance board that planes upward.

Because of its hinged design, the weir is resistant to washout and virtually self-cleaning during debris laden high water events. It will not prevent flow in either direction, and therefore will not interfere with diversions from the Toe Drain.

Boat ramps will be installed upstream and downstream of the structure for access to the Toe Drain by boats used in the study, but access to the levee will continue to be restricted to prevent public use.

When and Where?

The resistance board weir will be temporarily installed in the Toe Drain approximately two miles south of Interstate 80. Construction will begin in September 2003, and the weir will be removed approximately three years later.

Whom to contact.
For further information, please contact Roger Churchwell, Chief, Fish Facilities Section, Department of Water Resources at rchurchw@water.ca.gov or (916) 227-7546.

Participant Question: The design of the resistance board weir appears to be relatively high in terms of water levels for this time of year. Will the weir hold water 5-feet higher than it already is?

Answer: No.

Participant Question: Flows in the Toe Drain are from the North. Will there be more water backed up to the north?

Answer: The water in the Toe Drain shouldn't back up because the resistance board weir will be lower than Lisbon Weir.

Participant Question: Are you putting this in the Toe Drain for convenience or for application in Bypass?

Answer: The weir will be used as a study site and so the location in the Toe Drain is for convenience.

Participant Question: The weir will be hinged at the bottom, but is it hinged for both directions?

Answer: No the weir will only be hinged for one direction of flow. The weir will be porous due to the PVC pipe being spaced one inch apart in order to not impede flow.

Participant Question: Is someone watching the fish 24 hours a day?

Answer: No, but there will be someone observing during some evenings and nights. The anticipated study times are slated for November through March. During other times of the year the weir will be pulled out.

The study will be looking for the behavior of the fish around the structure but not necessarily the numbers of fish. Fish will be radio tagged with a new technology of duel frequency identification sonar that will work through turbid water.

Participant Question: On the surface it appears DWR is replicating work already done at the Montezuma Sough in Suisun Marsh. Why is DWR building a structure in the Bypass when there is one in the Montezuma Slough?

Answer: DWR biologists recommended this area as favorable to study fish.

Participant Question: Given that the PVC pickets occur every other inch, that means that one half of the total surface area of the proposed weir is still an impediment to water flow. Aren't the pipes going to restrict the flow of water, causing a back up of water?

Answer: High flows will push the gate down which will allow water to flow over the weir without backing up water.

Participant Question: During high water, the flows are very high and bring with it large trees and other objects. Aren't these things likely to either tear out the structure or impede flow by blocking the structure?

Answer: This structure was looked at because it has been used in areas where debris has been an issue.

Participant Question: Have any provisions been made for people who navigate the Toe Drain?

Answer: The chute is 8 feet wide and shouldn't cause an issue.

Dave Ceppos adjourned the meeting.

YOLO BYPASS WORKING GROUP
MEETING 28

MEETING MINUTES

MEETING DATE: DECEMBER 18, 2003

LOCATION: California Department of Fish and Game
Yolo Wildlife Area Headquarters
45211 County Road 32B (Chiles Road)
Davis, CA 95616

IN ATTENDANCE: Robin Kulakow, Yolo Basin Foundation
Dave Feliz, California Department of Fish & Game (DFG)
Dave Ceppos, Center for Collaborative Policy (CCP)

NEXT MEETING: February 19. 2004, 10:30 am to 1:30 pm

Dave Ceppos called the meeting to order. The Working Group has been in existence for 3 and ½ years. During that time the Yolo Bypass Management Strategy was created close to two years ago. The management strategy has been used by many agencies in the area as an informative document about local stakeholder sentiments regarding the Bypass.

Previous meeting minutes were adopted as final for the project administrative record.

Mr. Ceppos briefly summarized the agenda.

Update on Regional Water Quality Control Board Agricultural Waiver
Water Quality Issues
John Currey, Dixon Resource Conservation District

The Dixon Resource Conservation District (RCD) looked at the agriculture waiver requirements, established staffing time and needs, generated a budget and sent landowners south of Interstate 80 a letter regarding the local agriculture waiver group. To date, approximately 50% of irrigated lands in the Dixon RCD region have been enrolled. Dixon RCD has requested that if local landowners in the Bypass have not received the letter and would like additional information please leave address and contact information with Robin Kulakow of the Yolo Basin Foundation.

On November 1st, 2003, the Dixon RCD turned in a document to the Central Valley Regional Water Quality Control Board (RWQCB) listing landowners who have enrolled in the local agricultural waiver group program. Information collected in the Dixon RCD letters from the landowners will be kept at the local level and will not go to the RWQCB until it is determined that a problem is present. Participants in the local agriculture waiver groups will be assessed a

flat fee through December 2005 for lands that are flooded. The Dixon RCD will consider the feasibility of assessing a varied rate scale after 2005. If landowners have not enrolled, there will be no penalties on the local level to enroll at a later date; however, enrollment fees will not be pro-rated. Dixon RCD has requested that landowners enroll as soon as possible.

Participant Question: Are some areas of the Bypass part of the North Delta Water Agency (NDWA) group?

Answer: If the property is in the southern Bypass, then that property is likely part of the NDWA. The NDWA is also working closely with the Sacramento Coalition. To date, these agencies have not needed anything from the southern watersheds; however that is beginning to change and landowners in those areas are likely to be contacted soon

Participant Statement: Until the NDWA and the Sacramento Coalition contact the southern watersheds it doesn't make since for those landowners to enroll at $2.00 per acre.

Answer: True. Dixon RCD will adjust landowner enrollments according to monitoring locations and lands that provide surface water sources to those monitoring locations.

Participant Question: Does the Dixon RCD require a letter that southern Bypass landowners are deferring enrollment until further information is obtained from NDWA?

Answer: The Dixon RCD, together with other participating agencies, will be coordinating with each other to make sure land owners are covered. According to the state regulations, the only way a landowner is covered is if they are signed up with an agency, otherwise the state assumes that landowner is participating in the agriculture waiver program as an individual.

Participant Question: Who is communicating with southern Bypass landowners to let them know what is going on?

Answer: The Dixon RCD would prefer that NDWA take care of this.

The Sacramento Coalition status right now includes everything north of the Delta up to Oregon border because those watersheds drain into the Delta. The Dixon RCD is working on a cost structure, a watershed evaluation report, and a monitoring plan, which is due April 1, 2004. How the monitoring plan is structured and approved by RWQCB will affect landowners. Currently the Dixon RCD has estimated six monitoring sites for the local watershed; however the RCD is trying to limit the monitoring locations to three. If a landowner decides to not join a local group program, monitoring could cost up to $15,000.00 per year assuming no toxicity is found. If toxicity is found the cost could increase up to $85,000.00 per year.

Participant Question: How is toxicity determined?

Answer: If the organism that is used during the testing dies, then the monitoring location is considered positive for toxicity.

As a reminder to landowners, the local agency program group enrollments cover the piece of ground in the local watershed not the individual landowner. Therefore, if a landowner has multiple parcels in different watersheds that landowner will need to sign up at different agencies to ensure all their properties are covered in the program.

Participant Question: Has Dixon RCD talked to anyone about frequency of monitoring at other sites because of toxicity.

Answer: Dixon RCD has assumed 50% in the budget.

Dixon RCD has looked at the local watershed for toxicity. Solano County has had three toxicity hits. The basic idea of the program is if toxicity is found the agency will not test each and every drain to identify one farm, because in most cases the toxicity is due to an aggregate effect. Instead the agency will draw a line of the sub-watershed and look at pesticide applications, farming rotations, etc. and work with the individual farmers to try and figure out best management practices and modifications to reduce input into the system and to reduce toxicity.

Participant Question: What if water a landowner pumps out of the toe drain is already toxic, will Dixon RCD stop that landowner from pumping out of the drain?

Answer: As an individual, the landowner would be responsible for any water that leaves their property. As a group, landowners won't be penalized if the water dilutes out by the time it reaches the monitoring point. Dixon RCD will look at the whole watershed, including source water, and not just one location in order to assess the aggregate effect.

Participant Question: What are the agencies going to do if the water is bad at the in source?

Answer: The agencies will look upstream and see where the problem lies and then look at best management practices in those upstream locations.

Participant Question: Can the agencies stop a landowner from flooding their property?

Answer: No.

Participant Question: What are the characteristics of a monitoring site?

Answer: Dixon RCD is still looking at that; however, a monitoring site is not likely to be a place that is small and prone to flash water events, but rather, a location that has more consistent water.

Participant Question: Would it make since to sample at the entrance to the toe drain, because of the tidal influence?

Answer: Yes, Dixon RCD will be addressing this on a local basis to determine the appropriate influence at the site.

Participant Question: Are these locations anticipated to be permanent sampling locations?

Answer: The current understanding is these locations will be for two years, but if they are successful they could be used for 10 years.

Participant Question: When does the program start?

Answer: July 1st, 2004.

Wildlife Area and Management Plan Update
Dave Feliz, Department of Fish and Game

The University of California at Davis will not be writing the management plan for the Wildlife Area recently acquired properties. Currently, the management plan will be going out to private consulting firms for bids to prepare the plan and associated California Environmental Quality Act document. Robin Kulakow, Dave Feliz and other staff members will be assembling some of the management plan in advance of any consultant support.

There have been a few changes in the Wildlife Area. Some of the rice income has been used to change the irrigation system near Interstate 80. Because of these changes, this was the first year that the rice fields in the northeast unit could be flooded early. The early water has brought in thousands of geese.

Participant Question: How many more acres have Department of Fish and Game (DFG) flooded?

Answer: Approximately 1,000 acres.

Participant Question: How many acres are open for hunting and how many acres are closed?

Answer: If there is approximately 1,000 acres of flooded rice, then approximately 500 acres of the flooded rice is open for hunting, which includes Green's Lake.

Participant Question: Can everything east of Green's Lake be hunted?

Answer: Yes.

DFG is not decreasing farming in the Wildlife Area but expanding land use. An additional 2,000 acres were opened for pheasant hunting and the free roam hunting capacity was expanded from 35 hunters to 75 hunters.

Participant Question: If it rains will the free roam area be open after pheasant season?

Answer: Yes.

This year the Yolo Wildlife Area has had about 2,200 hunters and is beginning to see more and more new hunters to the area. As of Thanksgiving, 587 pheasants were harvested which is up

from last year's 270 pheasants. Hunters are seeing the new land and getting a taste of what the future will bring, such as additional ponds in the fallow fields during the winter months.

Participant Question: Will the state freeze on contracting make it difficult to get a contractor for the management plan?

Answer: Possibly, however the money is dedicated, but we are not sure if the management plan will be impacted by the state spending freeze. Much of the work in the Wildlife Area is being funded by income from farming, because the budget has been severely cut.

Putah Creek Salmon Update and Fishing Restrictions
Ted Sommer, Department of Water Resources

Every year a few salmon swim up Putah Creek. This year 20 salmon have been noted in Putah Creek, which is more than in the recent past. DFG and Department of Water Resources let Solano County know when salmon are in the toe drain so that the Putah Creek check dam can be opened to release pulse flows down the creek to try to attract salmon that are in the toe drain.

Participant Question: Are there any steelhead in Putah Creek?

Answer: There is not a verified report of steelhead trout in the creek; however they have been caught near the mouth of Putah Creek so it is possible.

The New Zealand Mud Snail has been found in Putah Creek. This snail is a serious invasive species that is causing severe problems in Montana by covering the gravel and mucking up the watershed. These snails can have density covers of 700,000 snails per square meter. They do not have any natural predators here in the United States. Fisherman are the main mode of transport for these snails, therefore, fishing is currently closed on Putah Creek. Other potential controls may include dewatering the section of Putah Creek where the snails have been found, and monitoring in the Bypass to check for movement down the creek.

Participant Question: Is there salmon spawning habitat between Lake Berryessa and Lake Solano.

Answer: Yes, however the Solano Diversion dam prohibits salmon from proceeding upstream.

Participant Question: Would the New Zealand Mud Snail affect salmon?

Answer: Yes, because these snails coat hard surfaces such as spawning gravels.

Participant Question: At the last Working Group meeting there was a presentation of the fishing weir in the Toe Drain. Can we have an update?

Answer: Yes. The weir has been constructed and it's up and running. DWR will start tagging fish to see if they can get through the weir. Where the weir has been built, the flows are low, but DWR is hoping for higher flows with the winter weather.

Update on Sacramento Area Flood Control Agency Efforts (SAFCA)
Butch Hodgkins

Congressman Doolittle and Congressman Matsui are in the process of getting project authorization to raise Folsom Dam. This is considered the last feasible project that will help with American River flows. This project is not slated to begin for a while.

The division of flood management at DWR came to SAFCA with a report on flood control systems management problems. The report recognized a need to remove sediment at Tisdale and Fremont weirs but indicated there are no funds to do so. This is important because if the State chooses not to fix the problems at Tisdale and Fremont weirs, the State could be liable for all damages that may occur from failure of the weirs. An example of this problem is the 1996 Lindon flood. The San Joaquin flood control system was deemed a management responsibility of the State of California. The State chose not to fix a deficient levee that they had received from the San Joaquin flood control agency in 1974. The decision to not fix the levee benefited the State of California, but not the residents of Lindon. Therefore, the decision resulted in the State paying $400 million in 1996 dollars to the residents of Lindon for damages. The courts decision to have the state pay Lindon residents for damages could have a huge impact on management of the Sacramento flood control system.

Participant Question: Mr. Hodgkins, as an engineer do you think in the future SAFCA will want to get rid of everything that will impede the flow of flood waters to the ocean?

Answer: That is not likely. What is most probable is widening of the Bypass to allow larger flood flows. Current practices in the Bypass are not interfering with the conveyance of floodwaters.

If anyone in the Working Group is interested in getting a sense of what SACOG is doing in their "Blueprint" project please check out their website at :
http://www.sacregionblueprint.org/sacregionblueprint/ .

Update on Valley-wide, Regional, and National Waterfowl Conditions and Trends
Fall/Winter 2003-2004
Mark Hennelly, California Waterfowl Association
Greg Green, Ducks Unlimited (DU)

Mark Hennelly, CWA:

Spring rains this year helped with the nest densities in some areas of the state and overall there were more mallards returning to nest. Sacramento Valley densities were a slightly lower; however, on a regional basis as a whole the breeding populations were up. One of the best

indicators for this is the adult vs. immature ratio, which for this year was 2.5. This translates into a lot of young, naïve ducks.

The Wing B studies show that the Mallard and Pintail young to adult ratios were good. Green Wing Teal and Northern Shoveler were average or below average.

Many of the current waterfowl surveys indicate that waterfowl numbers overall are up. The Sacramento Valley is up to 2 million birds, which are twice as many birds as last year at this time. The Klamath region has only 500 thousand birds, but this may be due to the low water situation in that region.

There were a few problems this year, which may have contributed to the lower numbers of birds in the Bypass this fall. Flooding was delayed in some areas due to Mosquito Abatement Districts requesting no flood ups until November 1st because of West Nile Virus and the late rice harvest because of the late spring rains.

Participant Question: Is there any evidence that the birds flew by the Bypass looking for other areas because there was no habitat?

Answer: Currently there are no studies that have looked at that.

Lois Wolk is carrying Assembly Bill1406 that would create better coordination between mosquito abatement districts and wetland landowners to alleviate the bottleneck and problems that were experienced this past fall.

Participant Question: What's in the bill that would avoid those problems?

Answer: The Central Valley Habitat Joint Venture is working on best management practices to control mosquitoes while creating good habitat for waterfowl. Once these management practices are developed and tested they could potentially be applied statewide. Work is being conducted to find funding to implement these practices, such as vegetation control measures, discing, water management control, and restoration projects. The bill is intended to increase coordination between landowners and agencies in order to improve the system and to act as guidelines.

Participant Question: Is there an area that can be flooded early so the geese will have a place to stay if they come through the Bypass early?

Answer: That is something that would need to be addressed regionally. Grasslands Water District begins flooding on August 1st.

Other factors that likely impacted the bird densities in the Bypass may include the lack of water at Klamath as well as very little cold weather moving through the system. Habitat conditions in the Klamath are declining. Until the water situation improves in the Klamath Basin, the waterfowl populations are likely to continue declining. In the 1970's there were anywhere between 7 to 8 million birds in the Klamath, now there are only about 1 million in the Klamath Basin.

Greg Green, DU:

Waterfowl have not moved down into the Bypass yet because the weather hasn't been bad enough yet. Once the cold fronts start moving through, it is likely the birds will start to move down the valley.

Participant Question: What is the reason for having refuges if they are no longer needed to keep the birds off the rice fields any longer?

Answers: Sanctuaries within the wildlife areas will help the hunters on that refuge by reducing the pressure on the birds and keeping them in the area. In addition there are other people with other uses.

Participant Question: The hunters pay for those refuges through fees etc, but bird watchers, hikers, and naturalists don't. Why not?.

For example, the Yolo Bypass Wildlife Area traditionally is not funded through hunter fees but from the environmental license plate program. This land was purchased from Proposition 12 money and the expansion came from the general fund.

Last year over 80% of the birds were on Mandeville Island, which is private property. Mandeville Island does not have a lot of hunting and includes closed zones. The birds have options throughout the valley and places such as Mandeville Island give the birds refuge, which is not funded by hunting fees.

Duck clubs need to adapt their property management practices to incorporate the changes that are occurring in the valley. Some changes could include ways to entice birds to their properties and reduce the pressure by adding closed zones within the property.

General Bypass Questions and Topics
Dave Ceppos

A subcommittee regarding the lower Bypass is needed. The Bureau of Reclamation has started moving on dispensation resolution for Prospect Island. If no other agency is interested in buying Prospect Island, then the property will go out to the open market. Friends of the Delta are generally talking about creating a non-profit conservancy that might take over Prospect Island and managing it as a non-governmental multiple use area.

If a subcommittee is put together the Working Group would be informed.

Participant Question: How does the Working Group stand with CALFED funding?

Answer: A request for an extension has been submitted for a least one more year and it is likely to be approved. In addition, the Ecosystem Restoration program is rumored to have another grant cycle in the spring, which could be another funding source. .

Participant: Agenda suggestion for the next Working Group meeting. Have DFG give a recap of the hunting season.

Dave Ceppos adjourned the meeting. Next meeting set for February 19, 2004.

YOLO BYPASS WORKING GROUP
MEETING 34

DRAFT MEETING MINUTES

MEETING DATE: March 25, 2005

LOCATION: California Department of Fish and Game
Yolo Wildlife Area Headquarters
45211 County Road 32B (Chiles Road)
Davis, CA 95616

IN ATTENDANCE: Robin Kulakow, Yolo Basin Foundation (YBF)
Corky Quirk, YBF
Dave Feliz, California Department of Fish & Game (DFG) Yolo Wildlife Area
Jeff Weaver, DFG – Region 2
Marina Brand, DFG - Region 2
Teresa LeBlanc, DFG – Region 2
Stephanie Buss – DFG
Tom Schroyer – DFG
Charlie Alpers, U.S. Geological Service
Dave Ceppos, Center for Collaborative Policy
Bonnie Turner, California Wildlife Conservation Board
Dan Tibbits, US Army Corps of Engineers (Corps)
Colonel Ron Light, Corps
Greg Kukas, Corps
Jack DeWit, DeWit Farms
Selby Mohr, Mound Farms
Darell Slotton, UC Davis
Shaun Ayers, UC Davis
Stephen McCord, Larry Walker and Associates
John McNerney, City of Davis
Dave Brown, Sacramento Yolo Mosquito Vector Control District (SYMVCD)
John Fritz, SYMVCD
Mike Hall, Conaway Preservation Group
Tony Lucchesi, Wildlands, Inc.
Chuck Dudley, Farmer
Robert Eddings, California Waterfowl Association
Donna Podger, California Bay Delta Authority (CBDA)
Lauren Hastings, CBDA
Mel Castle
Ed Towne, Bullsprig Outing
Dick Goodell, Glide-In Ranch
Chris Fulster, Glide-In Ranch
Chris Fulster Jr., Glide-In Ranch
Don Stevens, Glide-in Ranch
Dave Kohlhorst, Glide-In Ranch
John Legakis, Senator Outing
Richard Smith, U.S. Fish and Wildlife Service
Ted Sommer, Department of Water Resources (DWR)

Michael Perrone, DWR
Randy Mager, DWR
Trevor Greene, DWR
Heidi Rooles, DWR
Butch Hodgkins, Sacramento Area Flood Control Agency (SAFCA)
Peter Buck, SAFCA
Brad Burkholder, DFG
Ron Tadlock, Tadlock Farms
Spencer Defty, Diamond D
Ron Morazzini, Yolo County Board of Supervisors, Mike McGowan
Beth Gabor, Yolo County Board of Supervisors, Helen Thompson
Chris Foe, Central Valley Regional Water Quality Control Board
Vicki Fry, Sacramento Regional County Sanitation District

Meeting Introduction

Dave Ceppos called the 34rd meeting of the Yolo Bypass Working Group (Working Group) to order. The Working Group was started five years ago with funding from the CALFED Bay-Delta Program (now the California Bay Delta Authority, [CDBA]). The group continues to be funded through CBDA. It is the primary forum for Yolo Bypass (Bypass) issues, specifically on Bypass conditions as related to landowners, tenants and regulatory entities that have a direct responsibility or land ownership responsibility in the Bypass.

Mr. Ceppos discussed that due to the increased participation at meetings, YBF is asking for $5.00 donations for lunch for the first time ever.

The previous meeting minutes were revised to reflect that references to the "Bureau of Land Management" should be changed to "Bureau of Reclamation". Following these changes, the minutes from Meeting 33 were adopted as final for the project administrative record. Also, Mr. Ceppos announced that the Working Group's Colusa Basin Drain Committee has not met again yet and is still awaiting information from the Northern California Water Association regarding their preliminary report by CH2MHill on Colusa Basin Drain conditions.

Mosquito Vector Control Update
Dave Brown, SYMVCD

Dave Brown, Manager of SYMVCD handed out information about recent West Nile virus occurrences. He stated that 33 birds have been found so far this season in the Sacramento Area including one in Davis. Mosquito populations are just starting to grow but the virus has already been detected in some captured specimens. There has been no human infection yet. SYMVCD has recently adopted a West Nile response plan and is now acting on it. The District is already in emergency response mode. They have an epidemic response contingency that is not enacted yet but the District remains cautious because some of conditions described in that contingency are present (e.g. heavy, prolonged snow pack and rainfall).

The District is not collecting dead birds anymore as it is an inefficient use of limited resources. However, they still want to know about bird occurrences and Mr. Brown gave out the following phone number to report dead birds: 877-968-BIRD. People can also go to the following website for information: www.westnile.ca.gov/.

Q. How bad is the virus' impact to the birds.
A. Districts throughout the state are seeing 95% mortality in crows.

Mr. Brown encouraged everyone that if you find a dead bird, use the following steps. 1. Call or go to the website and report the bird. 2. Use a plastic bag and throw away the bird. Do not touch the bird. There is no evidence that humans get the virus from dead birds but there is no reason to take chances. In closing, Mr. Brown introduced John Fritz – District water manager specialist. Mr. Fritz will be coordinating water activities with Yolo Bypass landowners, duck clubs, and farmers

Landowner Advisory Committee

Mr. Ceppos reminded the group that the primary purpose of the Working Group was to be a forum for Bypass landowners and associated / regulating agencies. He described how the ratio of landowners to agency participants is dropping and that the Yolo Basin Foundation wants to be sure that meetings are a place for everyone. Mr. Ceppos asked if any landowners are willing to participate in a landowner advisory committee to advise on and see if this can help improve landowner attendance. Selby Mohr, Jack DeWit, Ron Tadlock, and Mike Hall volunteered.

Yolo Bypass Wildlife Area 2004-2005 Hunting Season Summary
Dave Feliz, DFG

Dave Feliz summarized the hunting season. DFG is doing adaptive management of hunting areas as new opportunities arise. He provided the following information:

- The Wildlife Area "Open Zone" has 1,900 acres, 50 free roam blinds. 16 double blinds. Opening day allowed for 50 people in the free roam area plus hunters in all the blinds.
- The pheasant opener included 2,200 acres south of Putah Creek. 4,450 additional acres were also added some time later. Both are on the north end of Tule Ranch. Pheasant season closed on December 26th.
- In December, the Wildlife Area opened the closed zone to hunting for first time.
- Hunting season was impacted by Bypass flooding. The Wildlife Area was closed due to flooding from January 3 to 21.
- The Wildlife Area has seen a dramatic rise in hunters since 1997, increasing from 500 in 1997 to 3,800 in 2005. Junior hunters were up to 250 this past season. Pheasant hunting has seen increases from 57 to 500 with 100 hunters using the area this year.
- In 1997, hunters were commonly harvesting ruddy ducks. In 2005, over 5,000 birds were harvested with a regular pattern of green winged teal, scaup, northern shoveler, widgeon, and mallard being the top five birds. We are on the cusp of more habitat being created and this season was best hunting year yet.

Mr. Feliz concluded his presentation by reminding participants that he is available to talk any time about the hunting program, and/or conditions on duck clubs etc.

Presentation by U.S. Army Corps of Engineers
Colonel Ronald Light

Greg Kukas from the Corps introduced Colonel Ronald Light, the recently appointed District Engineer for the Corps's Sacramento District. Col. Light has been in command of the Sacramento

District since August 2004. Col. Light provided a Certificate of Appreciation and a Corps coffee mug to Robin Kulakow for her continued public service on behalf of Yolo Bypass interests. Col. Light remarked that he has a strong affinity for the land uses and values of Bypass landowners, having a father that was a farmer / rancher and being an avid hunter.

He described his mission with the Corps and addressed the changes in the Corps. He acknowledged that previous Corps approaches to project work were to be too directive and authoritarian. The new thinking in the Corps is that successful projects are a result of working collaboratively with groups like the Working Group.

Q. A participant asked who is responsible for maintenance of Toe Drain.
A. Col. Light stated that dredging is a generally a Corps responsibility when the area is one the Corps has jurisdiction over. Such work usually requires local cost share and a local expression of need and that as far as he knows, the Corps has not been approached yet about the Toe Drain. Butch Hodgkins stated that he believes the Toe Drain is a state responsibility because of the state flowage easements in the Bypass. Col. Light will check with staff to see if there is anything he can do.

Update on Yolo Bypass 2-D hydraulic model.
Greg Kukas, Corps

Mr. Kukas introduced discussion about two-dimensional (2-D) model activities. The Yolo Bypass Modeling Technical Advisory Committee (MTAC) has met twice. The primary purpose of discussion at the last meeting regarded how fine to make the 2-D modeling mesh. There are trade offs of funding and time depending on how complex it is made. The MTAC provided some consensus on how fine to make the mesh.

Dan Tibbets of the Corps presented a geographic description of the model. He defined the boundary reach of the model as extending from Fremont Weir, downstream to Rio Vista (including Prospect Island, Cache Slough, Prospect Slough, and Egbert Tract.) He described the model as being capable of incorporating flows from Cache Creek, Putah Creek, Willow Slough, and the Knights Landing Ridge Cut but that the model will assess all those flow cumulatively in the Bypass, rather than being able to isolate conditions that reflect impacts from a single or even multiple tributaries. He said that the model will reflect 1997 topographic data for the Bypass but that it will assess impacts to system design flows which were first developed in the 1950s.

Q. Has the Corps done "sensitivity analyses" yet?
A. Mr. Tibbets stated that is what they are doing right now. He reiterated that the model will assess design flows. The advice from the MTAC is related to the sensitivity analysis, particularly regarding how detailed or not to make the modeling mesh.

Q. What will results be used for?
A. The model will be used as an assessment tool for impacts of proposed land use changes in the Bypass. Current projects require a neutral or beneficial impact to flows and flow capacity. The Corps and other proponents of the model anticipate it will be a tool to assess land use changes and to a lesser degree, future land use design options

Q. Has there been any change in flows due to siltation?
A. Most siltation happens just below Fremont Weir. Other localized areas have been observed but we've never been told by landowners that major siltation is occurring. Velocity data from the model

may also help assess siltation conditions by identifying where water is slowing down and perhaps dropping its sediment load.

Q. Are there established gauges in the Bypass to support data and measure sediment deposition rather than relying on a model?
A. No. There has been discussion of the need for more gauges to get actual data, and to assess changes over time. There is no way to track land use and land feature changes over time to update the model save for physically collecting the data. The Corps will do simulations to compare modeling results to known data. DWR has some gauges measuring siltation just below the Fremont Weir. Calibration of the model will use data from the Verona gauge upstream of the Bypass and the Woodland gauge within the Bypass.

Q. Is the model going to be used to justify moving more water down the Bypass?
A. No. This is an impact assessment tool being done with CALFED's support as requested and supported by several parties including the Working Group. It is not and has never been intended to be a flood relief or flood management model.

Lower Yolo Bypass Stakeholder Process Feasibility Assessment Update
Dave Ceppos, CCP

Mr. Ceppos gave a brief history of the feasibility study purpose and process. He and his staff are interviewing over forty people including: all Reclamation Districts adjacent to the Bypass from I-80 south; the public agency and NGO owners of Liberty Island; Prospect Island, and Little Holland Tract; private land owners within the Bypass; Federal and State natural resource trustee agencies; flood system agencies; environmental advocacy groups; ecological experts; local government representatives; and emergency and vector control services providers. The interview process uses an identical questionnaire to ensure that the process is standardized. CCP is assessing whether it is feasible and appropriate to establish a lower Bypass group and if so, whether such a group would be structured similar to or different from the Working Group. Mr. Ceppos reported that after having completed approximately two thirds of the interviews, only one participant has stated that convening a group is not a good idea. He explained that the final assessment report will present basic findings from participants comments, CCP's professional assessment of the conditions, and a set of recommendations that could be anything from "don't start a process" to "start a process". CCP's report will be done by early May and will be available online at CCP's and YBF's websites.

Mercury Mini-Workshop
Donna Podger-CBDA

Donna Podger introduced background information on mercury issues and CBDA's Regional Management Strategy (http://science.calwater.ca.gov/pdf/MercuryStrategyFinalReport.pdf).

Ms. Podger described some of the problems with regional mercury such as the existence of over 200 abandoned mercury mines and the use of mercury in historic gold recovery. Mercury is spread all over the Sacramento Valley and State. It is estimated that more than 13 million pounds of mercury are deposited in the environment. Ms. Podger explained however, that mercury primarily poses a threat when it is transformed into methyl mercury and becomes biologically available. This is the form that gets into the food chain. By example, she explained how methyl mercury concentrates in

sport fish because they are near the top of the aquatic food chain but that total mercury in drinking water is generally not a problem. The primary problem occurs when methyl mercury is ingested.

CBDA supported independent researchers to come up with a mercury strategy (see website listed above). One CBDA goal is to remove toxics from the environment but the problem with that is creating unintended biotic exposure. It is unclear if we can effectively manage the landscape to reduce the risk. We don't know yet how to effectively minimize getting methyl mercury into the food chain.

Current studies are showing that methyl mercury exposure adversely effects fish reproduction and avian reproduction. It can cause human neurological impairment later in life if exposure occurs as an infant. Recent data shows there is an effect on clapper rails. Scientists are now looking at diving ducks, terns, stilts, and avocets; studying if and how methyl mercury is bio accumulated in those species. Specialists are also studying methyl mercury effects on splittail. Specific sources for methyl mercury production remain somewhat uncertain; however, wetlands and floodplains have been shown to have conditions that create methyl mercury as have mining tailings

CBDA wants to provide better coordination between researchers and land managers. To that end, CBDA is funding studies to quantify mercury loads, inventory mine sites, determine bioavailability and characterize the process affecting methyl mercury production. Proposition 13 slated $12 million for mine remediation and CBDA is working with Corps' restoration of abandoned mines program to maximize this funding. CBDA is similarly developing strategies to reduce risk. Scientists are conducting fish tissue monitoring in the Delta and its tributaries and have formed collaborative groups to do public outreach. They are also doing limited fish consumption studies to assess who is most at risk and are evaluating existing data in order to issue new advisories if warranted. CBDA is also trying to encourage data standardization and integration to ensure shared understanding in future investigations and advisories.

Q. A participant asked if there is any proof that people are getting sick from eating mercury laden fish.
A. Studies done in Japan show risks to fish eating populations. The United Nations is sponsoring some studies and a National Academy of Sciences study backs up intake limit requirements. Some fish in the Delta region could be approaching intake thresholds.

Q. Is it safe for my children to swim in tributaries that are known mercury sources?
A. Yes, there is no mercury damage.

Q. Is there a concern about airborne mercury?
A. The levels in California are unknown. East coast levels are high due to coal burning emissions. Airborne mercury could be more biologically available but that is conjecture at this point.

CBDA's goal is to develop a predictive model for methyl mercury assessment. An annual review of data/findings will be available to the public and we are always working to keep the data high quality and integrated with other studies

Q. SAFCA is doing a large habitat restoration on the lower American river. There will be thousands of yards of soil from mine dredge tailings. Are there any best management practices to help control mercury?
A. Yes there are and we should discuss them in a more focused setting than this meeting. The

project could be an excellent opportunity to monitor conditions.

Q. There are many studies on the extent of mercury in the region. Are there any studies on how to clean it up?
A. Yes but most methods remain uncertain.

Introduction of Mercury Regulations
Chris Foe, Central Valley Regional Water Quality Control Board

Chris first discussed why the Regional Water Quality Control Board (RWQCB) is involved in mercury research and regulation. He described that the Federal Clean Water Act (CWA) requires states to identify water bodies that don't meet Federal standards for clean water. This approach requires an assessment and development of a total maximum daily load (TMDL) for an impaired water body. The list of impaired water bodies is called the 303 (d) list (from Section 303 of the CWA). The Delta is on the 303(d) list and was put on the list several decades ago when mercury was found in Delta striped bass. In the 1990s, the State Water Resources Control Board was sued by environmental interests for not pursuing its jurisdictional responsibility to regulate mercury conditions. The Board's TMDL is due soon for the Delta estuary including the Yolo Bypass.

The TMDL report will be provided to the U.S. Environmental Protection Agency (EPA). The report will include: a problem statement, target intake numbers for ingestion of fish tissue, targets to bring fish levels down to .3 parts per million, and comprehensive source analyses to better attribute where the total mercury is coming from. The RWQCB will provide the EPA with a report in the following year describing control actions for methyl mercury. Mr. Foe reiterated Ms. Podger's statements that methyl mercury is a neurotoxin. Populations most at risk are pregnant women and developing fetuses. Methyl mercury accumulates up the aquatic food chain, primarily (with regards to human exposure) in fish tissue. Total mercury moves downstream through a watershed in elemental form. Production of methyl mercury is an aquatic problem regarding production and an ingestion problem regarding contamination. Farm workers and crops are not at risk from exposure to water with mercury in it.

Regarding conclusive fish data for the Yolo Bypass, there is very little. There have been studies done on large mouth bass but they don't move around the area too much. Researchers have compared fish locations, average annual mercury concentrations, and fish size to see if some conditions correlate. Preliminary research shows that as mercury concentrations increase with downstream conditions, so does mercury content in fish tissue as the fish size increases.

Mr. Foe described specific methyl mercury data for the Bypass. Much of the data was collected in Prospect Slough east of Liberty Island and Little Holland Tract in the lower Bypass, in the Toe Drain south of I-80, and near and upstream of the Cache Creek Settling Basin on the northwest edge of the Bypass. Data shows there are higher concentrations of methyl mercury in the winter than in the summer. Correlation graphs show that total mercury levels in the Bypass are high. Mr. Foe attributed these levels to the contribution from Cache Creek- 125 kilos of total mercury annually or approximately 40 percent of the mercury believed to be moving through the Delta. Researchers believe that the Cache Creek contribution is actually higher but that about half of the mercury is being trapped in the Cache Creek Settling Basin. The total mercury load for the Delta is approximately 377 kilo per year.

Potential control programs could include up to a 95 percent reduction in mercury contribution to the Bypass but the solutions are not easy or inexpensive. Controls would include raising the Settling Basin levees to trap a specific target of silt. This would still require periodic dredging of silt from the basin. Most of mercury has left mine sites and is moving slowly down Cache Creek. We still need to clean up the mines but we need to clean up mercury in canyon more and remediating the mines will be exceptionally expensive.

Q. Where would we put the silt and sediment dredgings?
A. We need to put it where it will stay out of the water table. Use it to cap landfills. Keep it above the 100 year flood plain.

Mr. Foe stated that researchers need better data on total mercury throughout Bypass. They need to get data to help advise where to put wetland habitat where total mercury is lowest. We need to have tools to inform management first, perhaps as a way to avoid certain future regulation.

Q. How high are early recommendations for raising the Settling Basin weir?
A. Maybe 10 feet although that is a total estimate.

Mr. Foe concluded his presentation by reiterating key highlights about mercury sources and current data. He reiterated his desire to work with landowners to sample conditions throughout the Bypass as a way to better characterize mercury conditions and to come up with workable control actions.

The meeting was adjourned at 2:15

YOLO BYPASS WORKING GROUP
MEETING 29
MEETING MINUTES

MEETING DATE: MARCH 26, 2004

LOCATION: California Department of Fish and Game
Yolo Wildlife Area Headquarters
45211 County Road 32B (Chiles Road)
Davis, CA 95616

IN ATTENDANCE: Robin Kulakow, Yolo Basin Foundation
Dave Feliz, California Department of Fish & Game (DFG)
Dave Ceppos, Center for Collaborative Policy (CCP)
Ric Reinhardt, MBK Engineers
Ed Towne, Bullsprig Outing
Casey W. Cady, California Department of Food and Agriculture
Robert Eddings, California Waterfowl Association (CWA)
Lauren Hastings, California Bay-Delta Authority Ecosystem Restoration Program
Lori Clamurro, Delta Protection Agency
Brad Burkholder, DFG
Spencer Larson, DFG
John Currey, Dixon Resource Conservation District (RCD)
Marianne Kirkland, California Department of Water Resources (DWR)
Mike Perrone, DWR
Ted Sommer, DWR
Bill Harvey, DWR
Jerry Bare, DWR
Greg Green, Ducks Unlimited
David Kohlhorst, Glide In Ranch
Don Stevens, Glide In Ranch
Jack Palmer, H Pond Ranch
Armand Ruby, Larry Walker and Associates
Rick Martinez, Martinez Farms

Ben Tustison, MBK Engineers
Ron Morazzini, Supervisor Mike McGowan
Tom Moore, Natural Resources Conservation Service (NRCS)
Salley Negroni, NRCS
Dick Johnson, NRCS (Bay-Delta)
Walt Cheechov, NRCS
John Brennan, Wildlands, Inc.
Butch Hodgkins, Sacramento Area Flood Control Agency (SAFCA)
Mick Klasson, SAFCA
John Legakis, Senator Outing

Ralph Bulkley, Skyrakers Duck Club
Betsy Marchand, State Board of Reclamation
Ron Tadlock, Tadlock Farms
Tom Harvey, US Fish and Wildlife Service,
Stone Lakes National Wildlife Refuge
Dirk Brazil, Assemblywoman Lois Wolk Field Representative
Rachelle De Clerck, Yolo Basin Foundation
Brett Williams, Yolo County
Beth Gabor, Yolo County Board of Supervisors- Helen Thompson
Tim Heidrick, Yolo County Farmer
Chuck Dudley

NEXT MEETING: May 13. 2004 or June 17, 2004 from 10:30 am to 1:30 pm

Dave Ceppos called the meeting to order. The Working Group has been in existence for 3 and ½ years. During that time the Yolo Bypass Management Strategy was created close to two years ago. The Management Strategy has been used by many agencies in the area as an informative document about local stakeholder sentiments regarding the Yolo Bypass (Bypass).

Previous meeting minutes were adopted as final for the project administrative record.

Mr. Ceppos briefly summarized the agenda and gave a short report on the Bay Delta Authority Grant. The Bay Delta Authority has extended the Working Group grant for two more years. This is in large part do to the extensive savings incurred while converting mailings to e-mails.

Update on Regional Water Quality Control Board Agricultural Waiver
Water Quality Issues
John Currey, Dixon RCD

The agricultural waiver program is moving forward and there are no major changes to the July 2003 rules. In other words, landowners must be part of a group or comply with the agricultural waiver as individuals. The Dixon RCD has sent out the fee notices to participating land owners. Yolo RCD is expected to wait until the April 15th submission date before sending out fee notices.

The Dixon RCD will begin monitoring water discharges on July 1st and is currently working towards reducing the number of monitoring sites that were included in the budget. Dixon RCD budgeted $2.00 per acre for monitoring but the state has not finalized the budget. If the state approves the number of anticipated sites projected in the budget, the fees should carry the project through the rest of the calendar year and the next budget year.

On January 15th, the North Delta Water Agency sent a notice reporting they will not be facilitating a program in their region and land-owners need to contact the appropriate representatives in their area. The Dixon RCD is the representative for Solano County and most of the southern Bypass.

Update on Yolo Bypass Water Quality Planning Process
Armand Ruby, Larry Walker Associates

The Yolo Bypass Water Quality Planning process integrates all water quality projects in the Bypass, including recreation and agriculture. The monitoring program is based on a list of pollutants of concern including metals, pesticides, nitrates, and organic carbon. Dissolved solids, color, electrical conductivity and bacterial indicators such as fecal coliform and e-coli are also included in the monitoring plan.

Currently there are four months of monitoring data beginning with November 2003. Twelve sites were set up from the Knights Landing Ridge Cut (Ridge Cut) through Willow Slough to the Yolo Bypass Wildlife Area and further downstream. The eastern side of the Bypass was also included.

November, December and January were dry weather monitoring months and samples were collected from all sites except Fremont Weir and Sacramento Weir due to lack of flow. February was a wet weather-monitoring month and both weirs were sampled. Some sites were not sampled during February including the southern most monitoring site due to excessively wet conditions on the levee and the central Bypass sites because they were under water.

One set of toxicity tests has been collected at four main input streams. All toxicity test results were negative at these sites. These tests will be repeated three additional times during the upcoming sampling year.

Water quality testing result concentrations were generally higher during flood events. Mercury and bacterial levels were concentrated at these times. During dry sampling events there are fairly high levels of mercury in Cache Creek, where by contrast, during flood events mercury is approximately three times higher at all sampling locations.

Participant Question: Was total mercury and methyl mercury equalized at all sampling locations?

Answer: Only total mercury was measured during the February sampling event.

Participant Question: When the Bypass floods with the higher mercury, will landowners be responsible for the mercury that settles from the flood event onto their property, especially when the properties are re-flooded and the excess mercury flows off the landowner's property?

Answer: Currently Larry Walker and Associates is looking into that matter. They are aware that the mercury is mobilized but do not have a regulatory compliance answer to this question yet.

Participant Question: Are sampling locations during flood events all downstream of Cache Creek?

Answer: No. Fremont Weir is upstream of Cache Creek and showed 25 parts per thousand (ppt) mercury in sample results.

Participant Question: What were the sampling results at the Ridge Cut?

Answer: Mercury was 10 ppt at the Ridge Cut, which is low but three times higher than during dry sampling events.

Historically the Berryessa Range was where many mercury mines were, but the mercury was also transported across the valley for gold mining in the Sierra Foothills. Therefore, the American River drainage is often high in mercury also.

Participant Question: Which side of the Fremont Weir was tested?

Answer: The southwest side because it gives a better picture of Sacramento area water. The east side of the Bypass is predominantly Sacramento River water.

Participant Question: What type of sampling are you doing?

Answer: Unfiltered water samples are collected and it is probable that the elevated source of mercury during flood events is from the additional suspended sediments.

Participant Question: Is the sampling data available for public review?

Answer: It will be available at a later date.

Participant Question: Are any sediment samples being collected?

Answer: Not currently. Sediment samples are on the wish list, but additional funding is needed.

Participant Question: Where is the Ridge Cut sampling site?

Answer: County Road 16 just west of the Bypass.

Participant Question: Was the sampling regime frequency changed?

Answer: Yes, additional funding from the City of Woodland was acquired and volunteer samplers were used whenever possible.

Participant Question: Will sampling continue through next winter?

Answer: Sampling will continue through November 2004.

Dave Ceppos: It may be advantageous to partner with Department of Water Resources to get a grab sample in the middle of the Bypass when it is flooded next year.

Participant Question: What were the results for additional monitoring program parameters at the Ridge Cut sampling site?

Answer: The remaining monitoring program parameters were not significantly different from any of the other sampling sites.

Participant Question: Were samples taken when rice drainage water was coming downstream from the Sacramento Valley?

Answer: Sampling was started in November 2003 and will continue monthly, ending in November 2004. so likely reflects rice drainage.

Update on SAFCA Regional Planning Process/Sacramento River Corridor Forum Process
Butch Hodgkins, SAFCA

The SAFCA Regional Planning Process/Sacramento River Corridor Forum is an effort between SAFCA, the Reclamation Board, the Cities of Sacramento and West Sacramento, and the counties of Yolo, Sacramento and Sutter. The focus of the forum is to better understand, recognize, and protect flood control efforts in relation to development and recreation within the context of a more formal plan.

The Forum adopted a plan from the River Front City Development and interim guidelines have been developed. Currently the Forum is trying to adopt the guidelines as permanent for the areas from Clarksburg to Fremont. Anyone interested can participate in the process, see www.SAFCA.org or the local reclamation board websites

Update on Yolo Bypass Wildlife Area Management Planning Process
Dave Feliz, DFG

The Yolo Bypass Wildlife Area received a grant from the Wildlife Conservation Board (WCB) for $200,000 to support hiring a consultant to prepare the Management Plan and associated environmental compliance. It was determined that a request for qualified applicants is needed. The start date is scheduled for June 1st and is anticipated to be an 18 month project. The plan should coincide with the third phase of the NAWCA projects. Larger scale restoration of newly acquired lands is scheduled to begin in 2007.

When the additional lands were acquired for the Wildlife Area, it was under the assurance that participation from local groups, such as the Working Group would be included. The amendment to the CALFED grant solidified that assurance.

Yolo Bypass Wildlife Area Joint NRCS-DFG Restoration Project
Dave Feliz; DFG
MBK Engineers
NHC Consultants The Wetlands Reserve Program

- NRCS purchases conservation easements with willing/eligible landowners
- Restore natural wetland function and values to the extent possible

Typically the NRCS is responsible for the Wetlands Reserve Program however it is being turned over to DFG.

The original plan was to restore the riparian habitat along the southern length of Putah Creek within the Bypass. That plan has been adjusted and the riparian area will be enhanced along the edges and a narrow new zone will be designed to work with the predominant Bypass flood water flows.

Hydraulic Impact Analysis,

The US Army Corps of Engineers (USACE) Comprehensive Study UNET model was used for the hydraulic impact analysis. The results show the projected water surface elevations that could take place at current, existing locations due to implementation of the proposed restoration project. Change in water surface elevation was un-measurable at Lisbon Weir, Sacramento Weir, Woodland gauge, as well as up and downstream of the project. A change of only 0.01 of an inch at I-80 was calculated.

Participant Question: What were the restoration goals according to species and habitat?

Answer: The restoration goals will include Swainson's Hawk, Giant Garter Snake, waterfowl, and seasonal habitats. Native plants, such as Santa Barbara sedge, will also be incorporated.

The habitat breakdown is:

21 acres Riparian (most of this is existing)
11 acres Upland
25 acres Permanent Wetlands
115 acres Seasonal Wetlands

The goal is to direct flow downstream towards the Putah Creek Sinks.

Participant Question: How deep are the ponds?

Answer: The permanent ponds are about 4-feet deep and the seasonal ponds are approximately 1.5-feet in depth.

Financial Situation at the Wildlife Area

State budget cuts have significantly impacted the Wildlife Area. At present there is no operating money for the Wildlife Area and next year's budget has not been secured. Funds from the agricultural leases will help with the budget shortfall, however the restoration projects need secure and adequate funding

Participant Question: What is in the budget currently? How is DFG allocating resources for the Wildlife Area?

Answer: There is currently no budget.

Participant Question: What is the charge for a daily hunting pass?

Answer: $13

Participant Question: The funding that is currently available is for developing the plan only and does not include money for management and implementation?

Answer: Yes. The agricultural money was originally used for maintaining roads, parking lots, etc., but now it will be used to pay for the everyday bills such as electricity for the pumps.

DFG has an agreement with the Dixon RCD where all the agricultural lease income will stay at the Wildlife Area.
Participant Question: Are all of the other DFG Wildlife Areas receiving severe cuts?

Answer: Some areas are worse than others. Yolo Wildlife Area relied on environmental license plate funds which were diverted to other departments which resulted in the severe cuts to the Yolo Wildlife Area.

Participant Question: What about using volunteer groups to help man check stations?

Answer: That is a possibility that needs to be looked into.

Participant Question: Is it possible between now and the next Working Group meeting to come up with a list of where volunteers can be utilized?

Answer: Many of the jobs in the Wildlife Area require special skills, including tractors and equipment. In addition many of those jobs enable the prevailing wage rule.

Deseret Farms Purchase and Future Land Management Proposals
Craig Denisoff, Wildlands, Inc.

Wildlands Inc, is a private, for-profit company that is in the business of habitat development, land management, and land holdings. Many of the properties are utilized for mitigation of wetlands, endangered species, rice, ranching, row crops and vineyards. TheRiver Ranch, a 3,682 acre site, is located at northeastern Yolo County north of I-5.

Participant Question: Is the property in the Bypass just south of DWR's property?

Answer: Yes

Hydrologically the site is interesting because of the multiple confluences of the Sacramento River, Feather River, Butte Creek and Sutter Bypass, Sacramento Slough, and others. The land is primarily agriculture with roughly 800 to 1000 acres in walnut orchards. Wildlands will manage and obtain money from the orchards for the next five years.

Wildland's plan is to maintain some of the orchards, rice and other row crops. Half of the property will be in irrigated pasture and the remaining half will be in mitigation banking for habitat. Much of the property is marginal ground that will be used for mitigation banking and the better properties will be utilized for agriculture. Swainson's hawk, valley elderberry long-horned beetle mitigation habitat will be integrated with the high value agricultural lands. The goal is to have the agricultural crops to pay the property bills.

The property is unique for multiple reasons, especially in relation to hydrologic properties and the confluences of the Sacramento River, Sutter Bypass, and the Feather River. Discussion of modifications to Fremont Weir will be an issue for this site, and Wildlands is looking for guidance from other parties for site development. Fisheries passage improvement could be another possibility.

Participant Question: What are your water rights?

Answer: There is a settlement contract and overlapping contracts for water rights. Wildlands is working on getting contract rights to take water from the ridge cut.

Participant Question: Do the water rights include pre-1914 rights?

Answer: Only in the riparian zones.

Participant Question: Will there be public access to the property?

Answer: County Rd 16 will be open for hunting, but to the road will likely include a turnaround to direct people out.

Participant Question: Any policy on water rights with neighbors?

Answer: There are none so far, but working on a good neighbor policy.

Participant Question: Are the goals for land use in agriculture and habitat based on demand or need? If there is the opportunity to devote 50% of the property to habitat will it happen?

Answer: The land use will be controlled by an agricultural easement, which will be locked down before mitigation begins. It is probable that the property will be 80% agriculture and 20% habitat.

Participant Question: Where will water from the property be discharged?

Answer: All property discharge is released to the Tule Canal in the Bypass.

Participant Question: What types of agricultural easements are associated with the property and what are the sources?

Answer: It is anticipated that the easements will be typical, but the easements are currently under development.

Participant Question: The Reclamation Board used Wildlands, Inc. for an easement. The contract required that the water on the land remain to satisfy the requirements for the mitigation. On the agricultural easements, will there be contracts that you will keep the water on the land as opposed to fallowing fields to sell water.

Answer: The water on the property is dictated by the conservation easement values.

Participant Question: If the easement requires water to stay on the land, can it be taken off the agricultural fields and into habitat where it can be utilized for hunting?

Answer: In order to maximize the value of the property, hunting will be included.

Participant Question: What percent of Pope Ranch (Lower Bypass) flooded?

Answer: There was flow over the entire property.

Participant Question: When Fremont Weir spills how does it flow over the property?

Answer: Water from Fremont Weir inundates the property at a diagonal on the southwest portion of the site.

There are 600 acres of walnuts along the river and an orchard will be removed in the northeast portion of the property. Rice, beans, tomatoes, wheat, corn and safflower will be included on the site. Heavy clay soils in the middle of the property are ideal for rice.

Participant Question: How will agricultural easements affect or be affected by future flood management practices?

Answer: That will depend on how the agricultural easement is written. There is a low demand for habitat currently.

Participant Question: The agricultural easements may be used to offset other agricultural loss in other places. Therefore, is the site predominantly just agricultural mitigation as opposed to species? Are these mostly private agricultural easements?

Answer: The integrated agricultural mitigation project has enough money to keep it running.

Aerial Photos of February Bypass Flood Event
Butch Hodgkins, SAFCA

SAFCA flew over the Bypass on February 19th in order to assess what can be done to preserve portions of Bypass from late spring flooding and to make agriculture more viable in the Bypass without problems.

The photos are digitized with each being approximately 70 MB a piece. The resolution can be reduced if exact detail is not important.

Participant Question: Are the photos all ortho-rectified and in a geographic information system system?

Answer: No, but if someone is interested in doing this, SAFCA would be interested. DWR staff stated that they can help in this effort.

The Sacramento River flood management system is not set up to give information about a small flood event. The Woodland Gauge is set up according to USGS but not with Tule Canal water, therefore it is not registering additions to the Tule canal. In other words, it is not reliable until flows of 40 or 50 cubic feet per second (cfs) are reached.

It appears that the little flood events are affecting a minimum of 50% of what is happening in the Bypass. The big flood events usually come after local small events.

Participant Question: What is the capacity of Sutter Bypass before Fremont Weir spills?

Answer: Fremont spills when the Sacramento River is at 33.5 feet height. Sutter Bypass is probably 10% filled before Fremont Weir spills, assuming the Feather River isn't flowing into the Sutter Bypass.

In 1986 the Bypass took more water than ever before and was over the rated capacity. The Bypass could potentially be overwhelmed especially if more water is forced over Fremont Weir or a levee fails upstream.

Participant Question: How did the flows look on the American River this year?

Answer: American River was a dribble.

Participant Question: Did the photos include Fremont Weir?

Answer: Yes.

Participant Question: How are the new housing tracks in the region going to impact flood control?

Answer: If current land use planning isn't changed an additional 400,000 acres of non-urban use properties will be consumed, which will increase the amount of water in the system significantly.

YOLO BYPASS WORKING GROUP
MEETING 30

MEETING MINUTES

MEETING DATE: June 17, 2004

LOCATION: California Department of Fish and Game
Yolo Wildlife Area Headquarters
45211 County Road 32B (Chiles Road)
Davis, California 95616

IN ATTENDANCE: Robin Kulakow, Yolo Basin Foundation
Dave Feliz, California Department of Fish & Game (DFG)
Paul Phillips, California Waterfowl Association (CWA)
Ralph Bulkley, Skyrakers Duck Club
James Navicky, DFG
Chris Erichsen, Larry Walker Associates
Chris V. Fulster, Jr., Glide In Ranch
Selby Mohr, Mound Farms
Walt Cheechov, Natural Resources Conservation Service (NRCS)
Michael Stumbos, Stumbos & Company
Robert Eddings, CLOA
Greg Kukas, US Army Corps of Engineers
Mick Klasson, Sacramento Area Flood Control Agency (SAFCA)
John Currey, Dixon Resource Conservation District (RCD)
Bryan Plude, Canvasback Consulting
Tony Lucchesi, Wildlands, Inc.
Don Stevens, Glide In Ranch
Dick Goodell, Glide In Ranch
Phil Martinelli, Channel Ranch
Ken Martin, Rising Wings
Ed Towne, Bullsprig Outing
Dennis Kilkenny, Dawsons Duck Club
Dennis Murphy
Casey Walsh Cady, California Department of Food & Agriculture
Ted Sommer, Department of Water Resources (DWR)
Marianne Kirkland, DWR
Michael Perrone, DWR
Lauren Hastings, California Bay Delta Authoity –Ecosystem Restoration Program
Betsy Marchand, State Board of Reclamation
Butch Hodgkins, SAFCA
Chuck Dudley, Dudley Ag

Jack Palmer, H Pond Ranch
David Kohlhorst, Glide In Ranch
Clyde Ongard, Glide In Ranch
Lori Clamurro, Delta Protection Commission
Chris Voight, Mosquito & Vector Control Association of California
Dave Brown, Sacramento Yolo Mosquito Vector Control District
Regina Cherovsky, Conaway Ranch
Mike Hall, Conaway Ranch
Dave Ceppos, Center for Collaborative Policy (CCP)
Carla Blanton, CCP

NEXT MEETING: August 26, 2004 from 10:30 am to 1:30 pm

Dave Ceppos called the meeting to order. The Working Group has been in existence for approximately 4 years. During that, time the Yolo Bypass Management Strategy was created in 2001. The Management Strategy has been used by many agencies in the area as an informative document about local stakeholder sentiments regarding the Yolo Bypass.

Mr. Ceppos briefly summarized the agenda and made changes per the request of the group. He also asked participants to please update Robin Kulakow with any new contact information or let her know if you are experiencing problems with e-mails/agendas.

Yolo Wildlife Area – Fiscal year 2004/2005
Robin Kulakow – Yolo Basin Foundation

The DFG is pursuing a consultant to complete the Management Plan for the expanded Wildlife Area. (Dave Feliz was interviewing consultants during the meeting and was unable to present other status information.) Mr. Feliz's goal is to complete the Management Plan within 18 months of having a consultant under contract.

Update on Regional Water Quality Control Board Agricultural Waiver
Chuck Dudley

The Yolo County and Solano County Ag Waiver groups met the Regional Board's deliverables deadline

Participant Questions: My farm is not enrolled in a program currently and I'm not sure which group I'm supposed to be in. I want to get in the program but I also don't want to be assessed twice. How much communication will occur between the two counties' groups?

Answer: Both counties are sharing information and cleaning up database records. For now make sure you are registered with both groups and can show payment of fees for at least one of them. Hopefully, the lists will be combined before the next mailing.

Participant Questions: Are the fees different for the type of acreage use? For example, total property verses floodable property?

Answer: It might be. Check with both groups for the specific rules they are using.

Participant Questions: Is there going to be an April 2005 deliverable regarding compliance and monitoring results?

Answer: It's not clear yet whether the Regional Board is going to adjust some of its previously prescribed compliance dates.

Update on the Yolo Bypass Water Quality Planning Process
Chris Erichsen, Larry Walker Associates

The Yolo Bypass Water Quality planning process is trying to integrate information from all water quality projects in the Bypass. The monitoring program is based on a list of pollutants of concern including metals, pesticides, nitrates, and organic carbon. Dissolved solids, electrical conductivity and bacterial indicators such as fecal coliform and e-coli are also included in the monitoring plan.

Information is still preliminary but it appears that the highest degree of contaminants in the Bypass is pesticides

Participant Questions: What monitoring sites are you looking at?

Answer: There is a monitoring station at Knights Landing co-located with a USGS survey site, A station near I-80 at the downstream confluence of a small canal that carries Cache Creek water into the Toe Drain, and a final station south of Lisbon Weir near the "Z drain".

Information so far indicates that total mercury increases starting in November in Cache Creek and the Sacramento River. Bioassays of benthic invertebrates in the laboratory show high toxicity/ mortality from samples taken at the Tule Canal / Cache Creek station.

Participant Questions: What about monitoring in the Sacramento River

Answer: Sacramento River conditions are being monitored by the Sacramento River Watershed Program and other Ag Waiver groups in the Sacramento Valley.

A general question was asked about any interest of the group to have a future focused discussion about mercury issues in the Bypass. A show of hands indicated a strong majority interest in such a discussion.

Participant Questions: What solutions are there regarding mercury? How is mercury generated?

Answer: There is some natural contribution of mercury from the geology of the region but most of it is remnant of historic mining activities. Cache Creek is one of the primary mercury sources in the Sacramento River system. Mercury stays suspended as an inorganic metal until it gets deposited in certain perennially wetted conditions like a wetland or river sediments. When that happens, it is chemically transformed into an organic format called methyl mercury. Methyl mercury is organically available to organisms and so enters certain food chains including humans' by way of consumption of fish that have eaten contaminated smaller organisms.

Update on SAFCA Regional Planning Process/Sacramento River Corridor Forum Process
Butch Hodgkins, SAFCA

The SAFCA Regional Planning Process/Sacramento River Corridor Forum is an effort between SAFCA, the Reclamation Board, the Cities of Sacramento and West Sacramento, and the counties of Yolo, Sacramento and Sutter.

The Forum has adopted a draft plan for Sacramento River front development and interim guidelines have been developed.

Mr. Hodgkins presented a set of aerial photos taken during the Winter of 2003-2004. The purpose of the photos was to identify localized flooding conditions in the Bypass before the Fremont Weir spills, and then locations of flooding after the Weir spills.

It is hoped that aerial photos such as these, in concert with pending modeling efforts by the U.S. Corps of Engineers will provide better information on how and when the Bypass floods and how landowners can be better safeguarded from localized flood events.

Lower Yolo Bypass Working Group Feasibility Assessment
Dave Ceppos, CCP

Mr. Ceppos described the ongoing dilemma of current land management in the lower Yolo Bypass. Specifically, several large tracts of land have been owned for some time by public agencies and one non-governmental conservation advocacy organization. These lands have gone for sometime now with no comprehensive management plan. Some land and flood management conditions on these properties have deteriorated over the past several years. It was recently proposed that a subgroup should be spun off of the Yolo Bypass Working Group to try and address these outstanding issues in the lower Bypass. A general question is whether such a subgroup should be formed and if so, what format should it take. The Working Group is not a decision-making body and participants have previously determined that they did not want to play that role. In the case of the lower Bypass, the specific issues may require a more structured process that is focused on a making some specific recommendations. The first step to be taken by the Yolo Basin Foundation is to have the Center for Collaborative Policy assess stakeholder conditions and come back with recommendations about whether it is feasible to start a lower Bypass group and what format it should take.

Participant Statements: We would like to remain as a group and not be broken down into sub-divisions. We could be more powerful as an official structured group. Who will be appropriate stakeholders?

Status of West Nile virus in California
(Dave Brown, Sacramento Yolo Mosquito Vector Control District)

The West Nile virus has been documented in 26 states. 17 humans have died in California from the virus. There have been 5 confirmed cases in the Los Angeles area. An alarming number of crows and related species in southern California have been infected with the virus. In addition, the horse population has been infected. The virus is now found in virtually every mosquito species commonly found in California. There have been no reported human cases in northern California so far but the virus has been confirmed in bird species in almost every county in northern California.

Participant Questions: In humans, who is largely affected?

Answer: Individuals 45 years or older

Symptoms:

- Extended paralysis (most recover)
- Extreme flu like symptoms
- Fever
- Persistent headaches

Participant Questions: Can you obtain the virus after eating an infected bird?

Answer: If cooked, no, it is unlikely. There is no clear evidence about whether consumption of improperly cooked bird meat can pose an infection risk.

Participant Questions: In southern California what are they doing about the bird deaths?

Answer: The birds have been getting picked up and tested in certain zip codes. However, due to the number of avian deaths, it appears the vector control and public health districts in the south have suspended further testing since the virus appears to be fully incorporated into the vector chain at this time .

Update and discussion on potential Conaway Ranch Land Sale
(Helen Thomson, Yolo County)

A Yolo County Board meeting regarding the purchase of the Conaway Ranch was held on June 17, 2004 at 6pm. Yolo County would like to purchase the ranch to ensure water rights. Currently, there is no access to the land. There is no appraisal. The land is part of a bankruptcy sale and commissions are involved. Main interests in the land are:

- Surface water
- Flood control
- Mineral rights

Known facts are:

- No sale price (bankruptcy)
- No appraisal yet
- 17,000 + acres
- Interest bids will be accepted July 17, 2004 (narrows the field)
- Second round of bidding
- Will go to the highest bidder
- Land will be acquired by new owner (as is)

Would like to use the land for:

- Flood plain
- Hunting
- Housing
- Agriculture

Participant Questions: Who is involved in the quest to purchase the Ranch?

Answer: Yolo County, Davis, Woodland, Winters, and UC Davis.

Participant Questions: Will a group letter of support from the Working Group be written?

Answer: There is no formal membership to the Working Group but we have written group letters previously expressing the groups concerns. A sub-committee will be developed and a draft letter will be given to the entire group for review and approval at the next meeting. The following individuals will be on the sub-committee:

- Chuck Dudley
- Dick Goodell
- Michael Perrone
- Chris Fulster
- Selby Mohr
- Dennis Kilkenny

YOLO BYPASS WORKING GROUP
MEETING 31

MEETING MINUTES

MEETING DATE: August 26, 2004

LOCATION: California Department of Fish and Game
Yolo Wildlife Area Headquarters
45211 County Road 32B (Chiles Road)
Davis, California 95616

IN ATTENDANCE: Robin Kulakow, Yolo Basin Foundation (YBF)
Dave Feliz, California Department of Fish & Game (DFG)
Dave Ceppos, Center for Collaborative Policy
James Navicky, DFG
Selby Mohr, Mound Farms
Robert Eddings, CLOA
Mick Klasson, Sacramento Area Flood Control Agency (SAFCA)
John Currey, Dixon Resource Conservation District (RCD)
Tony Lucchesi, Wildlands, Inc.
Don Stevens, Glide In Ranch
Dick Goodell, Glide In Ranch
Phil Martinelli, Channel Ranch
Ed Towne, Bullsprig Outing
Dennis Kilkenny, Dawsons Duck Club
Ted Sommer, Department of Water Resources (DWR)
Marianne Kirkland, DWR
Michael Perrone, DWR
Lauren Hastings, California Bay-Delta Authority-Ecosystem Restoration Program
Betsy Marchand, State Board of Reclamation
Butch Hodgkins, SAFCA
Chuck Dudley
Jack Palmer, H Pond Ranch
David Kohlhorst, Glide In Ranch
Clyde Ongard, Glide In Ranch
Dave Brown, Sacramento Yolo Mosquito Vector Control District (SYMVCD)
Regina Cherovsky, Conaway Ranch
Mike Hall, Conaway Ranch
Brad Burkholder, DFG
Tom Schroyer, DFG
Dirk Brazil, Staff to Assemblywoman Lois Wolk

Robert Thompson, Sky Raker Duck Club
Dean Kwasny, DFG
Roy Gill, R.C. Gill & Son
Duncan McCormack IV, McCormack Farms
Ron Tadlock, Ron Tadlock Farms
Bob Gill, Landowner
Dan Fehringer, Ducks Unlimited, Inc.
David Guy, Northern California Water Association
Jack DeWit, Dewitt Farms
Don Morrill, Yolo Basin Foundation
Mary Jean Quirk, Yolo Basin Foundation
Ron Morazzini, Yolo County
Jake Messerli, California Waterfowl Association.
Tests Dunham, Larry Walker Associates
John Legakis, Senator Outings Club
Jeanette Wrysinski, Yolo County
Marilyn Waggoner, YBF
Mariko Yamada, Yolo County Board of Supervisors
Tom Harvey, USFWS
David Brown, Sacramento Yolo Mosquito Vector Control District (SYMVCD)
Gary Wegener, City of Woodland
John Brennan, Wildlands/Knaggs
Sally Negroni, National Resources Conservation Service
Mike Egan, Yolo Flyway Parks
Mark A. Kearney, Landowner
Stephan Patek, City of West Sacramento
Caroline Quinn, City of West Sacramento
Vince Rosdahl, Channel Ranch
Stan Wright, SYMVCD
Gary Goodman, SYMVCD
Dan Thompson, Sky Raker Duck Club
Beth Gabor, Yolo County Board of Supervisors
Gaye Lopez, YBF

NEXT MEETING: October 14, 2004 from 10:30 am to 1:30 pm

Mr. Ceppos called the meeting to order. The Working Group has been in existence since 1998. During that time, the Yolo Bypass Management Strategy was created, close to two years ago. The Management Strategy has been used by many agencies in the area as an informative document about local stakeholder sentiments regarding the Yolo Bypass.

Mr. Ceppos briefly summarized the agenda and made changes per the request of the group. He asked all participants to update Robin Kulakow with new contact information or let her know if you are experiencing problems with e-mails. Yolo Basin Foundation staff: Don Morrill,

Development Director, Ann Brice, Associate Executive Director, and Mary Jean Quirk, Program Coordinator were introduced to the Working Group.

Ms. Kulakow announced that the 14th annual Bucks for Ducks fundraising event for YBF will be held on October 8, 2004. The proceeds support YBF's education program. The theme is "Where the Wild Things Are". There will be fine Mexican cuisine, music, a raffle, and live and silent auctions.

October 8, 2004
5:30 – 8:30pm
Veterans Memorial Center
203 East 14th Street
Davis, CA
(530) 757-3780
Tickets $25.00

U.S. Army Corps of Engineers, Yolo Bypass Hydraulic Modeling Effort

The Corps has received the CALFED funding to begin work on the Bypass hydraulic model. Robin Kulakow and Dave Ceppos will meet with the Corps staff in September. They anticipate reconvening the Yolo Bypass Hydraulic Modeling Technical Advisory Committee. Updates as the project progresses will be added to the Working Group agenda.

Colusa Basin Drainage Plan and Impacts to Yolo Bypass
David Guy, Northern California Water Association

David Guy presented the general concept for a new proposal titled the *Colusa Basin Drainage Plan*. The purpose of the project concept is to assess the feasibility to move agricultural tail water from the Colusa Basin downstream through the Yolo Bypass, avoiding discharge into the Sacramento River. Informational materials were passed out at the meeting. If you would like a copy of the handouts please contact Robin Kulakow.

Question: How will water quality in the Sacramento River be improved?

Answer: It's not clear yet if it will be. That is the purpose of the initial study. With data from the study, we will determine the quality of the Colusa basin drain water and go from there.

Questions: What pathway does the discharge water currently follow?

Answer: That is not clear yet. It is available in the Bypass below the Knights Landing Ridge Cut. But the amount that is discharged to the Sacramento is not clear

Questions: How will water flow be managed at a certain time of year?

Answer: We don't have an answer for that yet During irrigation season it will be explored.

Question: How will this be funded?

Answer: A long-term solution could be funded by water and agricultural entities, or from government funding.

Question: It seems there is a delicate balance of water quality to be dealt with. How will that be addressed? Also, what kind of the new infrastructure will be needed get rid of the low quality of water?

Answer: We don't have answers to any of those questions yet.

Question: What months will the study take place in?

Answer: The entire year. We want as much information as possible.

Question: What are the affects of fish being attracted up the Yolo Bypass by the presence of Sacramento River water? Could volume alone attract fish?

Answer: We don't know. We don't know if Colusa Basin water would create an attractant flow.

Question: Looking at the list of initial signators supporting the study, private landowners have been missed and they're upset about being left out. How will you improve communication and how information is released?

Statement: We need to do a better job with communication. Tell us how to reach everyone.

Question: Are there other ways to treat the water and obtain a higher quality prior to it being released to the Sacramento River?

Answer: No, not nearly at that point.

Statement: NCWA needs to coordinate with the City of Woodland and their current water quality study. There may overlap.

Question: Will one goal be to change the flow?

Answer: Don't know yet.

To address many of the Yolo Bypass concerns raised during the discussion, it was suggested that a Working Group subcommittee be formed to assist NCWA in the implementation of it's proposed studies and to ensure that Yolo Bypass interests are being considered.

<u>Sub-Committee Members</u>

Mariko Yamada	Betsy Marchand	Jack Palmer	Marianne Kirkland
Regina Cherovsky	Chuck Dudley	Ron Morazzini	Michael Perrone
John Brennan	Petrea Moyle		

Yolo County Flood Control and Water Conservation District Presentation
Tim O'Halloran, General Manager

The Yolo County Flood Control and Water Conservation District (District) covers much of Yolo County and the following communities in the county: Woodland, Davis and Winters.

Water delivery is via distribution canals, river diversions, local sloughs, and other facilities. The role of the District is to maintain the proper water release schedules for all appropriate water users.

Question: How is the District board elected? How is revenue generated?

Answer: the five-member Yolo County Board of Supervisors appoints them to a two-year term. Revenue is earned through various fees. Approximately two thirds of the revenue comes from water sales. Approximately one sixth comes from tax revenue and the remaining one sixth comes from hydroelectric power. The District has 25 employees that work throughout the county on a variety of assignments.

Please contact Robin Kulakow if you would like a copy of Tim's PowerPoint presentation.

Conaway Ranch
Working Group Sub-committee and Full Group

During the previous Working Group meeting, a subcommittee was formed to draft a letter for the Working Group's consideration regarding support of the creation of a Conaway Ranch Joint Powers Authority (JPA). Given the decision by the County Board of Supervisors to pursue eminent domain condemnation proceedings on the Conaway Ranch property, the subcommittee decided to place this action on hold. The subcommittee felt it would be better to use the group for communication and open dialog about the eminent domain issue than to provide support of the JPA.

Yolo County is using eminent domain to pursue the purchase of the Conaway Ranch. Yolo County would like for the ownership and resources of the ranch to remain local/regional. The County would like to make sure there is an open line of communication regarding actions taken regarding the Conaway Ranch.

The discussion took place in a debate format with parties speaking for and against the purchase by the County. County representatives Linda Fiack, Petrea Moyle, and Supervisor Mariko Yamada answered questions.

Statement: Many in the public are not in favor of government ownership. Mismanagement is a major concern. The County should tell people what they'd do with the land before the public supports their efforts.

Question: Are health and safety issues a necessary factor in order for eminent domain to be used?

Answer: In this process, health and safety of county citizens are part of it.

The County and Yolo County cities have formed a Joint Powers Authority to take on the purchase of the Conaway property. There has been no discussion regarding future development of the property. There is a possibility that the management of this property could broaden through a consensus process. JPA meetings are open to the public. The JPA would like to learn and improve communication by using additional outreach tools.

- Next meeting is 9/29/04 at 6pm

The JPA Point of Contacts are:

Petrea Moyle
530-666-8835
petrea.moyle@yolocounty.org

Linda Flack – Acting Manager for JPA
530-666-8019
Linda.flack@yolocounty.org

JPA information line
530-666-8724

Question: Why eminent domain? If there is a willing seller, can't anyone purchase the ranch?

Answer: We are using eminent domain because the county is at a disadvantage. The land is expensive and there are too many other entities involved. It also prevents a closed-door sell. Private entities can conduct purchase negotiations in private. As a local government, we cannot exclude our citizens from the discussion but since the seller has put a confidentiality restriction on discussions about the purchase, our hands are tied unless we pursue the eminent domain option

Question: Is there precedence for something of this size?

Answer: No, not really.

Question: Why do you need a JPA if the eminent domain purchase is going to be in the county's name?

Answer: the JPA reflects a collaborative intent for future management of the property.

Question: Can there be public information about the sale of property bid?

Answer: This is a sealed bid, therefore prohibiting public distribution of sale information.

Question: How are taxes going to be paid?

Answer: If the property is taken out of private ownership, tax loss will need to be addressed.

Question: Why can't we discuss everything?

Answer: Not everyone has received all of the information.

Question: Are the sellers requesting additional information?

Question: Once owned and revenue is received from the land, where will the revenue go?

Answer: There is currently 10 million dollars in revenue from the current operation. The jury must decide if the county will receive it. The county is open to all processes. Some of the previously received letters of support to the JPA would not support the eminent domain effort.

Question: Are you going to sell water or develop the land?

Answer: A specific plan has not been developed.

Yolo County and West Nile Virus in California
Dave Brown, Sacramento Yolo Mosquito Vector Control District

State Level

All counties have birds infected with the virus. There have been 277 human infections in southern California.

Local Level

Yolo County has observed one virus case. It is believed that the individual was infected in the southern part of the state.

DFG has received $750,000 through a bill supported by Assembly member Lois Wolk to implement best management practices statewide for vector control.

Question: Once the virus is here, is it always here?

Answer: Yes but the response of different vectors to the virus presence is what is in question. We don't know whether vectors such as rodents, equine species, avian species, humans, etc will develop immunities over time or whether it will become more virulent and challenging instead. We also expect an enormous drop in some bird populations (crows, ravens, magpies, etc.) over the next two years

Question: How do the east and west coast compare?

Answer: The trend is numerous infections in the beginning and then it tapers off in numbers, no matter which coast you are living on.

Question: Will there be an increased vector control assessment on rice growers?

Answer: This is still an on going discussion. It is not currently part of pending State legislation.

Question: Who pays for the planes spraying the duck clubs? Why should taxpayers help the duck clubs? Shouldn't the duck clubs pay the cost?

Answer: Taxpayers currently pay but duck clubs do pay assessment fees in some districts. Vector control is funded through taxes.

For additional information visit http://www.westnile.ca.gov/

Question: Is the virus in all mosquitos?

Answer: We're not sure but it does seem to be in all the primary species endemic to the Central Valley.

The meeting was adjourned at 1:30 PM. Several agenda items were postponed until the October 14th meeting.

YOLO BYPASS WORKING GROUP
MEETING 32

MEETING MINUTES

MEETING DATE: October 14, 2004

LOCATION: California Department of Fish and Game
Yolo Wildlife Area Headquarters
45211 County Road 32B (Chiles Road)
Davis, CA 95616

IN ATTENDANCE: Robin Kulakow, Yolo Basin Foundation (YBF)
Dave Feliz, California Department of Fish & Game (DFG)
Dave Ceppos, Center for Collaborative Policy
James Navicky, DFG
Selby Mohr, Mound Farms
Ron Unger, EDAW
Petra Unger, EDAW
Corky Quirk, Yolo Basin Foundation
Greg Schmid, Los Rios Farms
Armand Ruby, Armand Ruby Consulting
Linda Fiack, Yolo County Planning Department
Rick Martinez, Triad Farms
Dan Tibbits, US Army Corps of Engineers (COE)
Paul Forsberg, DFG
Tony Lucchesi, Wildlands, Inc.
Greg Kukas, COE
Bryan Plude, Canvasback Consulting
Craig Isola, US Fish and Wildlife Service
Luke Naylor, Ducks Unlimited
Mitch Sears, City of Davis
Mike DeWit, DeWit Farms
Bob Schneider, Regional Water Quality Control Board
Ellen Mantalica, Watershed Center, U.C. Davis
Dennis Orthmeyer, California Waterfowl Association (CWA)
Mark Hennelly, CWA
Tom Moore, Natural Resources Conservation Service
Robert Eddings, CWA
Bill Harrell, DWR
Kathy Kuivila, US Geological Survey
Gus Yates, Consulting Hydrologist
Mel Castle, Yolo Basin Farms
Steve Gidaro
John Currey, Dixon Resource Conservation District (RCD)
Don Stevens, Glide In Ranch

Dick Goodell, Glide In Ranch
Phil Martinelli, Channel Ranch
Ed Towne, Bullsprig Outing
Dennis Kilkenny, Dawsons Duck Club
Ted Sommer, Department of Water Resources (DWR)
Marianne Kirkland, DWR
Michael Perrone, DWR
Lauren Hastings, California Bay-Delta Authority-Ecosystem Restoration Program
Butch Hodgkins, Sacramento Area Flood Control Agency
Chuck Dudley
Jack Palmer, H Pond Ranch
David Kohlhorst, Glide In Ranch
Brad Burkholder, DFG
Tom Schroyer, DFG
Jeanette Wrysinski, Yolo County Resource Conservation District
Marilyn Waggoner, YBF
David Brown, Sacramento Yolo Mosquito Vector Control District (SYMVCD)
Mike Egan, Yolo Flyway Farms
Mark A. Kearney, Landowner
Beth Gabor, Yolo County Board of Supervisors, Helen Thompson
Casey Walsh Cady, CA Dept. of Food and Agriculture

NEXT MEETING: December 16, 2004, 10:30 am to 1:30 pm

Dave Ceppos called the 32nd meeting of the Yolo Bypass Working Group (Working Group) to order. The Working Group was started four years ago with funding from the CALFED Bay-Delta Program (now the California Bay Delta Authority, [CDBA]). The group continues to be funded through CBDA. It is the primary forum for Yolo Bypass (Bypass) issues, specifically on Bypass conditions as related to landowners, tenants and regulatory entities that have a direct responsibility or land ownership responsibility in the Bypass.

Robin Kulakow thanked all participants and recognized a very significant financial gift to YBF from the Glide In Ranch.

Mr. Ceppos briefly summarized the agenda. He gave a brief update about the Conaway Ranch regarding the inability of a key Conaway Ranch representative to attend the meeting. Mr. Ceppos explained that the Conaway Ranch issue is becoming a challenging situation. It is not just a public information issue now; it is a legal proceeding. Regina Cherovsky of Conaway Ranch, was unable to attend the meeting due to a family illness, and asked that the Ranch discussion item be removed from the agenda and to table it for a later date so the Conaway Ranch perspective on related issues could be presented. Mr. Ceppos stated that for future meetings, Conaway Ranch discussions will be handled in a more formal matter due to the legal context.

Introductions were made around the room.

The previous meeting minutes were adopted as final for the project administrative record.

Update on Regional Water Quality Control Board Agricultural Waiver Water Quality Issues

John Currey, Dixon RCD and Chuck Dudley

Sampling in the Yolo-Solano County water quality effort continues. Some toxicity was found in the flathead minnows. However, the Regional Water Quality Control Board has informed project leaders that there is some kind of pathogen that is affecting flathead minnows. The cost of the sampling effort was about $2,000. Additional samples will likely be taken in October and then they'll wait for two storms then sample again.

Q: How are things going with getting landowners signed up to be a part of the program? Are you getting pretty good participation?

A: Yes, we are satisfied with the response. We anticipate the need for future fee structure adjustments by next spring, maybe February or March.

Bob Schneider indicated that he is the chair of the Central Valley Regional Water Quality Control Board and he can be contacted for any further questions.

Update on City of Woodland Water Quality Study

Armand Ruby

The last monthly monitoring will be done in October. Samples have been collected and analyzed from 12 different locations in the Bypass including all of the major tributaries and several locations along the Tule Canal and Toe Drain. During one flooding event in February, samples also were collected from the Sacramento Bypass Weir, and Fremont Weir. A lot of data has been collected for water quality. Over the next few months that data will be analyzed and we will start to develop a coordinated control strategy to manage water quality.

Q: Can you explain the purpose of the study and what you are hoping the outcomes will be?

A: The project is funded by a CalFed grant to the City of Woodland. The purpose of the study is to determine what water quality conditions exist in the Yolo Bypass and develop an integrated water quality management plan to address the related issues. We will discuss potential management strategies to to address water quality issues at the next Water Quality Stakeholder Group meeting, which will be held on October 28, 2004, at Larry Walker & Associates office in downtown Davis. It is an open meeting. Robin Kulakow has information regarding that meeting.

Q: Is there any overlap with the ag waiver issue?

A: Yes. Since we are already out there doing the sampling and field monitoring, we offered to supply, basically gratis, sampling services to the ag waiver group. Our water quality monitoring program ends this month. After that, the ag waiver group may have to support those sampling sites on their own.

Yolo Wildlife Area Management Plan Update
Dave Feliz, Department of Fish and Game

Dave gave a presentation indicating work conducted through funding from NAWCA (North American Waterfowl Conservation Act). Enhancements were done in partnership with the California Waterfowl Association and Ducks Unlimited. The ponds can be flooded independently to meet different habitat objectives. There are 16 new blind sites for hunting and each blind is an island and has four seats. This was to encourage folks to bring their family members. We have been creating levies and swales. Ducks Unlimited work is taking place in the Central Unit of the Wildlife Area. A new water distribution ditch was created. Inefficient water control structures have been repaired.

Near the newly installed Kinder Morgan pipeline, areas are getting replanted with native grasses. The grazing program on the Wildlife Area continues. The rice south of the I-80 Causeway is a major asset as an income source to fund the irrigation infrastructure. The new pump structures have been installed built above ground so they no longer need to be removed in winter.

Early flood of harvested rice was done to provide seasonal wetlands for early arriving migratory waterfowl since the SYMVCD asked that seasonal wetlands flood up be postponed until Oct. 1 to assist with mosquito abatement. We hope to re-create what we did last year with flooded rice fields so that waterfowl will flourish. The milo fields will soon be flooded for a habitat pond. We are pioneering management of shore bird habitat during migration and will plant rice the following year.

At this time there are about 15,000 Mexican Freetail Bats roosting under the Bypass causeway. It was reported that there were as many at 100,000 over the summer. The bats do a great job eating mosquitoes and moths.

Dave introduced Petra and Ron Unger from EDAW, the consultant that has been chosen to complete the management plan. Currently, a scope of work is being finalized with an anticipated start date of November 1, 2004, and a target finish date of December 31, 2005. EDAW is looking forward to input and working with everyone involved in the Working Group. They realize there is a lot of interest in the land management planning process. There are various interests and programs that are involved in this wildlife area. There is a lot of talent here which will be valuable to the process.

Q: Will this group have input to draft the EIR and will we be able to review it?

A: Yes, The scope is under development . EDAW wants to incorporate the Group's input since it is the key stakeholder group. There will be public meetings. The Yolo Basin Foundation is also involved.

Update on U.S. Army Corps of Engineers/Department of Water Resources Yolo Bypass Modeling Project and Technical Advisory Committee

Greg Kukas, Corps of Engineers and Dave Ceppos, CCP

Mr. Ceppos described that several years ago in there were a lot of questions about hydraulic impacts in the Bypass relative to ongoing discussions of changing land uses. As a resultwe convened a technical advisory committee. It was comprised of representatives of regulatory and technical agencies such as DWR,. Different consultants were also asked to take part and there were informal discussions that revolved around what the future is going to hold for the Bypass and what might we want to do about that. One recommendation was that the previous, and to this date current two-dimensional modeling tool had some deficiencies in it in terms of use and availability. In what appeared to be a likely trajectory of land use change in the Bypass including ag to habitat, there was no effective way to see how those changes would impact the overall flood control program and the ultimate use of the. It was suggested that we try to get someone to update the model to make it more user friendly. A series of proposals were submitted to the CALFED Program by the US Corps of Engineers, DWR / Reclamation Board and the Yolo Basin Foundation. The proposal was approved and agencies now have the money and are beginning work on this modeling effort. Greg Kukas and his colleagues are here to present that to you and let you know what they are hoping to achieve as an outcome.

Greg Kukas: We met with Dave Feliz to discuss the management plan for the Wildlife Area expansion. DFG experienced about the same delay we did in seeking funding. We will be using the Causeway Ranch portion of the Wildlife Area as our case study as a component of the model development and calibration. We have also met with Dave Ceppos and Robin Kulakow to begin work to reconvene the modeling technical advisory committee that Dave mentioned.

We're here today to give you a brief demonstration using a RMA-2 model to show how it's going to be used and what its capabilities are. The end user will be able to locate areas of interest within the geographic mesh of the model. To simplify their efforts, the user will be able to trim off the portions that they don't need and work with a more manageable area. The user will be able to refine the mesh to reflect geographic features for hydraulic analysis. The roughness value represents the obstruction of flow, determining how fast and how deep the flood water flows. The Corps will assign a regional level baseline roughness value to the mesh. A point of interest can be selected, a roughness value can be assigned and the model can be run to see water surface elevation. The first step is to establish the baseline hydraulics against which whatever is proposed will be used. The user can view the impact on the model and use the tool to try different values to view different impacts of proposed land use modifications. One of the benefits of this tool as opposed to others that are available, we're able to look at the velocity factors which help to visualize the approximate level of flow and the flow conditions of what is being proposed using different values.

We will meet with the model technical advisory committee to see if this tool will meet their needs. We will initiate a series of meetings with them to see what we can do to make sure that our efforts address their concerns.

Q: Are you saying they can dictate what can be planted?

A: This tool that will allow planners to more explicitly identify the effects of land use use changes on the flood control function of the Bypass.

Dave intervened and described that Greg and his group are not here to act as regulators or on behalf of the State Reclamation Board. The Corps of Engineers is creating a modeling tool, working with DWR and the Reclamation Board to help better assist the Reclamation Board and landowners with each of their permitting decisions.

Participant: Will the Reclamation Board come down to our place and tell us that they don't want certain plants in place. We don't think that's right.

Dave: That has been an ongoing issue that you all raised as part of the Management Strategy. It is a conflict that is worthy of further discussion. It is important to remember that because all Bypass lands are under flood and flowage easements, the state already has the authority to dictate vegetation cover private land in the Bypass.

Greg: What we are looking at is contours associated with the predicted change in water surface elevation, not the ground elevation. We are starting with the representation of the ground that the model geometry mesh is based on.

Participant: This is a great tool for the Reclamation Board. Based on what you're doing here, it is not great for the private wetland managers in the Bypass. We don't want you to come down and tell us what we can and what we can't do in the Bypass and that this is good or bad for the wildlife and habitat.

Dave: It's a predictive tool. You have land in the floodplain and there are responsibilities relating to vegetation management.

Q: How well does this model allow for changes of roughness over time such as vegetation being knocked down by flood flows?

Greg: We will assign a single roughness value in the analysis. We will be able to have that change during the course of the analysis.

Q: What if the roughness disappeared?

Greg: We will be establishing our roughness values based on simulations and historic flood events. This will calibrate the hydraulic model. Land use will be scrutinized for calibration.

Q: Once complete, will this tool be available to planners free of charge? Will the Corps maintain the tool?

Greg: Maintenance, ongoing distribution, improvements to the model are things that we recognize there will be a need for and hopefully the right agencies will step up and take on those

responsibilities. The COE's effort is not funded to take on those responsibilities. The tool will be available to planners and the public domain. Our funding will go to a certain point, but at this time there is no funding to maintain the tool long term. There will be a concerted effort to distribute the model.

Dave: The goals envisioned several years ago were, in addition to the update itself, was to make it user friendly and user available with a workbook so that landowners could use it for ongoing assessments. Not only for the purposes of regulatory impact, but as well to assess where you can make improvements to your land and minimize impacts. (The other goal which was not able to be realized with current funding was updating the tool. Everybody recognizes that that will be necessary. The funding just wasn't available. If this tool is successful, we're confident that funding will be supported.)

Q: Can the user physically alter roughness to maintain balance?

Greg: This is possible, but more involved. From that scenario, we assume the end user will be a semi- experienced hydraulic consultant who is familiar with the program. This is not to say that anybody won't be able to use it. Some analysis will need more formal experience. Consulting firms will be able to manage and use the tool.

Q: What is the date from which the topographic data is coming from?

Greg: The topo data is from a variety of sources over the last few years including data from 1997 -2004

Dave: In addition to that, later this month myself, Robin, Corps staff and representatives from CWA and DU will be meeting to go over the most recent restoration efforts in the Bypass to get the most up-to-date topo data as is reasonably available.

Participant: My recollection is that anything new regarding the Bypass must go to the Reclamation Board. This data will be used as an analysis tool. It will be made available to the public. DWR will work on a manual, a workbook that will lay out case studies.

Q: Regarding the calibration, are N values assigned to each grid?

A: We will be using global N values and will rely on existing data. We do not have funding to develop any kind of comprehensive land use database to reflect current land uses out there.

Q: How good is the flood elevation data?

A: We have some limited gauge data available and some high water mark data. The calibration effort is to get as close as possible to fairly represent a baseline condition. What we are developing is a tool for impact assessment and impact assessment compares existing to a proposed condition. It's not as important to accurately represent the baseline condition out there; as it is to accurately represent how much of a difference occurs from what is being proposed.

Q: Is there any similar model in the Sutter Bypass?

A: Not that I'm aware of. There is one existing hydraulic model, but it is not a two dimensional model, although there may be one out there.

Update on DWR/DFG Fisheries Programs Coordination
James Navicky, DFG

The Department of Water Resources and Department of Fish and Game have begun a collaborative effort to identify fishery problems in the Yolo Bypass. For the last few months, Ted Sommer, Marianne Kirkland and I have met and identified a couple of areas for shared consideration. One is the proposed realignment of Putah Creek near the Toe Drain to facilitate more natural passage of fish. We will meet next Thursday, October 21, 2004, and what we are doing now is the beginning stages of what are the ideas from the DFG, what do we want to see happen with the fisheries in the Bypass. What can we accomplish? One of the projects we want to move forward on in relatively short term involves UC Davis, DWR, Fish and Game and that project that will hopefully confirm the number of salmon that actually enter Putah Creek as a result of current flows and current operations. We want to place an electronic counting device and infrared scanner in the Los Rios dam once the dam is removed sometime in November to count salmon that pass.

Q: When will the dam come out?

A: Mid-November. We wait for salmon to be present in the Toe Drain.

Update of Current and Recent Fisheries Studies in the Yolo Bypass Region
Ted Sommer, DWR

Ted Sommer of the Department of Water Resources spoke on behalf a consortium of different agencies and the work in the Delta estuary. If you have been following some of our previous results we've noticed some dramatic differences between the Bypass and the Sacramento River. What we found is that the Bypass, at least seasonally, is one of the major nursery areas for fisheries. We feel food web enhancements in the flood plain for things like plankton, and different invertebrates support several fish species that grow faster, survive better, and produce more offspring. The purpose of this presentation is to provide an update on recent fisheries results in the Bypass: 1) legal status of splittail; 2) invasion of an exotic shrimp; and 3) fish passage issues.

One of the notable recent events has been a change in the legal status of the splittail, a common species in the Yolo Bypass. This is a large native minnow that was listed as a threatened species in 1999. However, it was subsequently "de-listed" in 2003. Remarkably, this is the first extant (surviving) fish that has ever been de-listed from the endangered species list. So what happened? As part of our work with the Interagency Wildlife Program, one of the discoveries was that the range of splittail was actually broader than we initially understood. In addition, we found that the abundance of splittail improved substantially during the recent wet years. Overall, we have

learned a lot more about the life cycle of the splittail. The strength of splittail population is determined largely by the flood plain inundation. The splittail move out into the flood plain seasonally. They are able to spawn on some of the inundated vegetation, the young rear in the flood plain and they move off. Based on this knowledge of the importance of flood plain habitat, there has been an increased emphasis by CALFED, DFG and other groups on floodplain restoration. These efforts should help improve the long-term viability of the species.

Ted also gave an update on the recent invasion of the Siberian Prawn. It is native to Asia, typically found in fresh water. It spawns in the warmer months and several times during the course of the year. However, there is relatively little information about the species. It is a fairly large shrimp. It was initially collected in the Columbia River in 1995. We first detected the shrimp in our trap down at the base of the Bypass in January 2001. By June it was up to I-80, by August it had spread all the way to the top of the I-5 causeway. Shrimp densities are very high, much higher than the fish species in the Yolo Bypass. We seem to be at ground zero for the shrimp invasion in the Delta. Some of our staff had done sampling in different parts of the estuary in 2001, and in 2003 they were detected around Decker Island, Sherman Island, San Joaquin River and border islands. But none of these Delta locations showed densities as high as the Bypass

We have reason to be concernedbecause of major impacts from previous invaders to the estuary. For example, clams have come in and stripped much of the plankton from the water. The other thing that has us worried is that shrimp have become one of the most common organisms in the Bypass, frequently occurring at much higher densities than fish. Surprisingly, for all the different species we are monitoring, we have yet to see a substantial effect of the shrimp. It may be that the Yolo Bypass floods is "wipe clean" the flood plain, which helps keep the populations in check. The shore birds have not yet been checked for shrimp consumption, but could be a valuable food source.

As noted by James Navicky of DFG, there are several fish passage issues in the Bypass, particularly for salmon runs. The Department of Fish and Game has a tagging operation down near Suisun Marsh. Starting this year, Fish and Game has been putting receivers in different locations to give an indication as to where the fish are going upstream. An interesting development is that it appears that a large percentage of fish take a "wrong turn" at Rio Vista and swim up towards the Bypass.

Update on Lower Bypass Subgroup Feasibility Assessment
Dave Ceppos, CCP

Mr. Ceppos briefly reviewed the plan to conduct a feasibility assessment for the Lower Bypass. He explained that CCP will work with local land owners in and adjacent to the Bypass as well as a number of agencies for flood management, resource management, law enforcement, etc to determine if it is feasible to start a subgroup of the Working Group specifically with the intent to resolve long standing land and flood management issues in the lower Bypass. CCP will begin interviews in December and will have a recommendations report likely in February or March.

Update on Conaway Ranch

Linda Fiack, Yolo County

Linda gave a brief report on the status of the Joint Powers Authority efforts and also about the eminent domain proceedings. She explained that Yolo County is attempting to resolve some misunderstanding about near term land use and they hope to meet with Ranch staff and tenants.

The Meeting was adjourned at 1:30.

YOLO BYPASS WORKING GROUP
MEETING 33
MEETING MINUTES

MEETING DATE: December 15, 2004

LOCATION: California Department of Fish and Game
Yolo Wildlife Area Headquarters
45211 County Road 32B (Chiles Road)
Davis, CA 95616

IN ATTENDANCE: Robin Kulakow, Yolo Basin Foundation (YBF)
James Navicky , California Department of Fish & Game (DFG)
Dave Ceppos, Center for Collaborative Policy
Petra Unger, EDAW
Petrea Marchand, Yolo County Planning Department
Rick Martinez, Triad Farms and Dixon Resource Conservation District (RCD)
Dan Tibbits, US Army Corps of Engineers (COE)
Mike DeWit, DeWit Farms
Jack DeWit, DeWit Farms
Bob Schneider, Regional Water Quality Control Board
Robert Eddings, California Waterfowl Association
Mark Kearny, Landowner
Kathy Kuivila, US Geological Survey (USGS)
Jim Orlando, USGS
Ed Towne, Bullsprig Outing
Dennis Kilkenny, Dawsons Duck Club
Ted Sommer, Department of Water Resources (DWR)
Marianne Kirkland, DWR
Michael Perrone, DWR
Butch Hodgkins, Sacramento Area Flood Control Agency (SAFCA)
Mick Klasson (SAFCA)
Brad Burkholder, DFG
Tom Schroyer, DFG
Mike Mirmazaheri, DWR
Ron Tadlock, Tadlock Farms
Lori Clamurro, Delta Protection Commission
Spencer Defty, Diamond D
Ron Morazzini, Yolo County Board of Supervisors, Mike McGowan
Betsy Marchand, State Reclamation Board
Walt Cheechov, Natural Resources Conservation Service
Jeanette Wrysinski, Yolo County Resource Conservation District
Mike Egan, Yolo Flyway Farms
Beth Gabor, Yolo County Board of Supervisors, Helen Thompson

NEXT MEETING: March 25, 2005 10:30 am to 1:30 pm

Action Items

1. A DWR flood control person should be added to the Colusa Basin Study Subcommittee.

2. Ron Tadlock should be added to the Colusa Basin Study Subcommittee

Meeting Introduction

Dave Ceppos called the 33rd meeting of the Yolo Bypass Working Group (Working Group) to order. The Working Group was started four years ago with funding from the CALFED Bay-Delta Program (now the California Bay Delta Authority, [CDBA]). The group continues to be funded through CBDA. It is the primary forum for Yolo Bypass (Bypass) issues, specifically on Bypass conditions as related to landowners, tenants and regulatory entities that have a direct responsibility or land ownership responsibility in the Bypass.

Robin Kulakow requested participants to let her know whether they are receiving and would like to continue receiving meeting summaries / meeting agendas via email. The Yolo Basin Foundation (YBF) continues to make use of email as a cost saving device to distribute Working Group materials.

Introductions were made around the room.

The previous meeting minutes were adopted as final for the project administrative record.

Update on Regional Hunting Conditions
Robert Eddings, California Waterfowl Association

This action item was slight impacted by schedule changes in some meeting participants and a computer system failure leading to the loss of a critical file that was to have been used in the presentation. General hunting numbers for the Yolo Bypass Wildlife Area were reviewed by Mr. Ceppos, reading from a recent Wildlife Area spreadsheet (also available on the web).

The remainder of the presentation/discussion was largely anecdotal. Generally speaking, conditions in northern rearing habitats were poor. Species composition in the Sacramento Valley is skewed compared to what there normally is. General discussion took place about what affect the Wildlife Area has on hunting conditions on clubs in lower Bypass. Participants commented that these clubs are not holding as many birds. Two club owners stated that hunting is getting progressively worse and that many clubs had a bad first day. Alternative opinions were raised that the Wildlife Area may be keeping more birds in the Bypass and actually benefiting duck clubs. Hunting on the Wildlife Area is improving. Rice fields in the newly acquired lands seems to be holding birds and conditions should continue to improve once new areas are hunted when the management plan is done.

Generally speaking, the last early wet season (similar to this year) was 1995. There was a lot of rice that flooded early this year and this is the highest rice acreage year ever recorded including over 600,000 acres of rice in the valley. Early storms dispersed the birds and lots of grain (rice) was left on the ground. Therefore, this is probably not a good year to assess general valley-wide conditions.

Update on Putah Creek Fisheries Conditions
Marianne Kirkland, DWR

Fall run salmon arrived in Putah Creek in November when the Putah Creek dam was removed in the Bypass. DWR is considering using an infrared counting device in the future to better track the numbers of fish migrating upstream. This equipment would need to be approved by the State Reclamation Board due to its location in the floodway. Generally speaking there were not as many salmon this year as in recent years. James Navicky took a tour of Putah Creek with Rich Marovich, the Putah Creek Stream Keeper. They saw salmon near Dennis Kilkenny's home near Winters.

Update on Ag Waiver and City of Woodland Water Quality Studies
Rick Martinez, Dixon RCD and Robin Kulakow, YBF

Ag Waiver Conditions. Rick Martinez gave a short report. Monitoring started in July 2004 as required and the first year of monitoring showed no problem sites. Letters requesting acreage information of irrigated land are going out and members of each watershed group are encouraged to respond in a timely manner. The next billing for landowners will probably go out in the second half of 2005. A question was asked about what happens with landowners that are out of compliance in 2005? Mr. Martinez stated that those people will be identified if there is a problem found through monitoring that is related to their property. There is no penalty phase yet as the program is still signing people up.

City of Woodland Water Quality Study. Ms. Kulakow gave a short report on the monitoring study. Thirteen sites were monitored. Monitoring is completed and the data is being compiled /reviewed. Early information shows that there are problems with mercury and electrical conductivity (EC) levels.

Update on U.S. Army Corps of Engineers/Department of Water Resources Yolo Bypass Modeling Project and Technical Advisory Committee (MTAC)
Dan Tibbets, Corps, Mike Mirmazaheri, DWR, and Dave Ceppos, CCP

Mr. Ceppos reiterated information from the October meeting, describing the history of the Bypass original hydraulic issues technical advisory committee that was re-engaged as the MTAC.

Dan Tibbets and Mike Mirmazaheri discussed project status. The Corps is doing a sensitivity analysis in the Toe Drain /Tule Canal to assess how much topographic and site-specific information should be incorporated. A sensitivity analysis helps them determine how complex or simple the base model data needs to be to accurately assess impacts to flows and water surface elevations. Additional data makes the model more complete but is more expensive and makes the model runs slower. The basic question is how much detail can be left out and still get reliable results.

Dan and Mike described that there is a limit to how much of base condition data can be used due to budget constraints. Mike explained that updating the model was intended over time (assuming future funding is available) but that this project will just develop the initial revised model.

The next MTAC meeting will be in the February – March timeframe and the group will assess / react the Corp's proposals for developing model sensitivity.

Q: What is the timeframe for model completion?

A: The model will be ready for use nine months from now. One year from now, a case study on the Causeway Ranch land will be underway. This is a two-year program and includes developing a user manual the public can use. Once all appropriate and cost effective data is collected, the modeling will begin.

Q: What is the geographic area of project?

A: The entire Bypass. Fremont Weir to Rio Vista including Egbert Tract and Liberty Island. Technically speaking, the model will start a few hundred feet downstream of the Fremont Weir. The Corps will not evaluate changes to the weir. SAFCA would like to see some data on the Port of Sacramento ship channel and the Upper Elkhorn area east of the Fremont Weir.

Q: Can proposed LIDAR work be helpful to modeling and what is LIDAR?

A: Ted Sommer responded. LIDAR stands for Light Detection and Ranging. It uses the same principle as RADAR. The LIDAR instrument transmits light out to a target. The transmitted light interacts with and is changed by the target. Some of this light is reflected / scattered back to the instrument where it is analyzed. The change in the properties of the light enables some property of the target to be determined. The time or the light to travel out to the target and back to the LISAR is used to determine the range to the target.

DWR plans on doing LIDAR analysis for the entire Delta including the Bypass however it will take a couple of years to evaluate data. LIDAR generates a huge amount of data that takes months to assess. Also, LIDAR can't read through turbid water, which could be a future constraint for Bypass conditions. DWR's South Delta Program in funding the LIDAR study. This is the Delta Levees Section under the Division of Flood Management.

Dan explained that Sacramento-San Joaquin Rivers Comprehensive Study topographic data is being used for the model. It is at a 2-foot contour interval, which should be of a sufficient level of detail for the Bypass. So far the model is on schedule. It is important not to expand the scope such that the budget and schedule get impacted. DFG is dependent on the model being ready to assess hydraulic impacts described in the future Wildlife Area Management Plan. The Causeway Ranch of the Wildlife Area will be used as case study for the model. The timing is important since the Management Plan needs to be approved in time to use NAWCA funding.

Update on Colusa Basin Drain Study
Numerous Participants

A study is underway regarding the Colusa Basin Drain. Agricultural drainage from the Basin is usually delivered to the Sacramento River above Knights Landing. During wetter times it is delivered through the Knights Landing Ridge Cut into the Bypass. Some parties are interested in diverting more drain water into the Bypass in an effort to improve Sacramento River water quality conditions below Knights Landing. These parties also believe that such additional flows could be a benefit to Bypass water users during the summer season. A study is underway to look at available data and conduct an initial feasibility assessment. In October, the Working Group created a subcommittee to track this study. A subcommittee meeting was held with some of the

project proponents in late November. Mick Klasson, Michael Perrone, Ron Morazzini, Kathy Kuivila were among the meeting participants and also attended this Working Group meeting.

Members described the project proponent's attempts to improve Sacramento River water quality and do something beneficial for the Bypass. The project proponents (lead by the Northern California Water Association [NCWA]) are waiting for initial study results from CH2MHill, their consultant. NCWA does not know how they will proceed until the report is in and they have had a chance to review it with the Subcommittee and other interested parties. NCWA firmly believes that future efforts regarding the Colusa Basin have to be a win-win situation or it's not going to happen.

The group further reported that discussion of a potential fish ladder at the Fremont Weir took place since additional Sacramento River water in the Bypass (by way of the Colusa Drain) might cause the attraction and stranding of more salmon in the upper Bypass. Kathy mentioned a proposal from Yolo Flood Control and Water Conservation District to assess if some west valley water could be captured upstream and west of the Basin and used to recharge the aquifer near Dunnigan Hills. Butch asked if anyone has evaluated using the Colusa Basin drain to get salmon further upstream. DWR and DFG attendees stated they have looked at this idea before and it appears infeasible. They would prefer a closer way to get the fish back into the Sacramento River. Betsy noted that the primary function of the Bypass is flood control and that this should not be lost in the discussion. She recommended that a DWR flood control person should be on the subcommittee. Ron Tadlock should also be added to the subcommittee

Update on Lower Bypass Subgroup Feasibility Assessment
Dave Ceppos, CCP

Dave reiterated some of the information he presented in October 2004. He described that CCP is conducting a feasibility assessment to determine whether conditions in the Lower Bypass could be addressed through some type of stakeholder process. He explained that for a number of years, there has been some levee degradation such as on Liberty Island. Over time there has also been a diversity of public and quasi-public landowners: Prospect Island is owned by the U.S. Bureau of Land Management, Liberty Island by Trust for Public Lands, Little Holland Tract by the Corps. There are private landowners on Ryer Island, Little Hasting Tract, and Egbert Tract. There doesn't appear to be a way to resolve lower Bypass issues. No agency has stepped forward to try to find solution. The assessment is an interview process. Interviews are being set up now. CCP will talk with many interests, including private landowners as the budget allows. CCP will assess how much people know about the Bypass, what they perceive as problems, what forum would be appropriate to convene a stakeholder group, etc. Dave described that a new group could be part of the Working Group with the same structure, it could be more formal in structure to facilitate agreement on solutions, or it might not be feasible at all.

Update from SAFCA
Butch Hodgkins and Stein Buer

Butch introduced Stein Buer, the new Executive Director for SAFCA. Butch retired last fall but was asked to stay on as SAFCA staff supporting Yolo Bypass and Lower Sacramento River issues.

Butch gave a summary of a recent Yolo County Board of Supervisors meeting wherein Yolo County unanimously agreed to partner with SAFCA on assessing the feasibility of creating a Lower Sacramento River collaborative process, similar in concept to the Lower Bypass assessment. The Bypass is out of SAFCA's jurisdiction area but it plays a critical role in the flood control system. SAFCA is funding the initial assessment.

Update on Conaway Ranch Joint Powers Authority (JPA)
Petrea Marchand, Yolo County

The next JPA meeting is January 26. Legal action related to the eminent domain process is constricting what the JPA is doing. There may not be any action on legal status of the property until April 2005. The County is considering a service agreement with the JPA. A land management committee of the JPA has met with tenant farmers on the Ranch. There should be a final decision on the status of the Ranch by the end of 2005.

Q: What is relationship between the JPA and the County?

A: The two entities are completely separate. The only interaction will be through the proposed service agreement

Q: What is the assessed value of the Ranch?

A: This information is not publicly available. A jury trial will be held and the assessed value will be debated at trial.

The Meeting was adjourned at 1:30.

YOLO BYPASS WORKING GROUP
MEETING 35
MEETING MINUTES

MEETING DATE: June 3, 2005

LOCATION: California Department of Fish and Game
Yolo Wildlife Area Headquarters
45211 County Road 32B (Chiles Road)
Davis, CA 95616

IN ATTENDANCE: Robin Kulakow, Yolo Basin Foundation (Foundation)
Dave Feliz, California Department of Fish & Game (DFG) Yolo Wildlife Area
Jeff Weaver, DFG
Marina Brand, DFG
James Navicky, DFG
Tom Schroyer, DFG
Dave Ceppos, Center for Collaborative Policy
Dan Tibbits, US Army Corps of Engineers
Jack DeWit, DeWit Farms
Mike DeWit, DeWit Farms
Selby Mohr, Mound Farms
Tess Dunham, Larry Walker and Associates
Phil Hogan, Natural Resources Conservation Service
Betsy Marchand, State Reclamation Board
Dave Brown, Sacramento Yolo Mosquito Vector Control District (District)
Casey Walsh Cady, California Department of Food and Agriculture
Mike Hall, Conaway Preservation Group
Regina Cherovsky, Conaway Preservation Group
Mark Hennelly, California Waterfowl Association (CWA)
Jason Rhine, CWA
Lauren Hastings, California Bay Delta Authority
Mike Hardesty, Reclamation District 2068
Lori Clamurro, Delta Protection Commission
Mel Castle
Ed Towne, Bullsprig Outing
Jack Palmer, H Pond Ranch
Dennis Kilkenny, Dawsons Duck Club
Mark Kearney, Landowner
Phil Martinelli, Channel Ranch
Don Stevens, Glide-in Ranch
Dave Kohlhorst, Glide-In Ranch
John Legakis, Senator Outing
Robert Gill, Landowner
Bob Schneider, Tuleyome
Brian Plude, Brown and Caldwell
Steve Macauley, Foundation
Ted Sommer, Department of Water Resources (DWR)

Marianne Kirkland, DWR
Jim Long, DWR
Michael Perrone, DWR
Laura Patterson, DWR
John Reynolds
Petrea Marchand, Yolo County
Butch Hodgkins, Sacramento Area Flood Control Agency (SAFCA)
Michelle Hladik, US Geological Survey (USGS)
Jim Orlando, USGS
Brad Burkholder, DFG

Meeting Introduction

Dave Ceppos called the 35rd meeting of the Yolo Bypass Working Group (Working Group) to order. The Working Group was started five years ago with funding from the CALFED Bay-Delta Program (now the California Bay Delta Authority, [CDBA]). The group continues to be funded through CBDA. It is the primary forum for Yolo Bypass (Bypass) issues, specifically on Bypass conditions as related to landowners, tenants and regulatory entities that have a direct responsibility or land ownership responsibility in the Bypass.

Phil Hogan, District Conservationist with the of the Yolo County Natural Resource Conservation Service presented an award to Robin Kulakow for Yolo Basin Foundation from NRCS for continued and outstanding work in habitat conservation and environmental education.

Mr. Ceppos reviewed the previous meeting minutes and adopted them as final after receiving no requests for changes

Update on West Nile Virus Conditions and Regional Mosquito Abatement / Vector Control Activities (Dave Brown, Sacramento Yolo Mosquito Vector Control District)

Dave Brown announced that there was very little West Nile Virus (virus) activity to date due to mild weather. There has been one equine case in the north state. That said, Mr. Brown said they are waiting and anticipating dramatic increases in mosquito populations and that everyone should start getting prepared for a difficult summer. He explained that all the risk factors (temperature, available water, vector migration, etc) seem pointed to a challenging event

Mr. Brown explained that at the state level, the District is working with other groups to get additional funding for control of the virus. The State Assembly dropped the requested $12 million in funding from the Governor's budget.

There will be a District open house on June 18th from 10 am to 3 pm at their Elk Grove facility.

Q. Mark Hennelly asked about status of Assembly Bill (AB) 1982 which covers funding for managed wetlands best management practices.
A. Mr. Brown said that the bill was funded for $750,000 for one year only. He explained that there is a need for much more money to fix water structures on all wildlife areas. $98,000 has been made available for the Yolo Wildlife Area for discing joint grass. Mr. Brown reiterated that management of vegetation is very important to control disease vectors.

Mr. Hennelley stated that no funding was made available for private wetlands. CWA tried to get funding for private clubs but was unsuccessful. Joint grass remains a problem on duck clubs and the District needs to be able to show that managing joint grass and other vegetation will decrease the need for spraying.

Update on Yolo Bypass Wildlife Area (Dave Feliz, DFG Yolo Wildlife Area)

Mr. Feliz stated that it had been a normal spring until May 20 when the Bypass flooded. Water levels at the Lisbon Gauge reached 13 feet. At 10 feet, parking lot "F" goes under water. The flooding on the Wildlife Area was a combination of flows from the Sacramento River system and Putah Creek which was flowing at approximately 850 cubic feet per second during the flood event. The results of the flooding may prove challenging. The cocklebur has received an early irrigation which will likely contribute to an abundance of that plant this coming season. Many Wildlife Area roads went underwater and some needed repair. Nesting areas for pheasants were flooded and will probably be devastating to pheasant populations this season. Safflower that was planted for doves went underwater as did several fields of white rice. All of the safflower was replanted to get a follow up crop on the flooded areas.

As previously discussed by Dave Brown, the Wildlife Area and District are partnering to implement AB 1982. Several North American Wetlands Conservation Act (NAWCA) projects are underway. Staff from several organizations and agencies are working together to implement these projects. Examples include revising habitat areas with swales and islands, and creating micro topography in each management unit that can then be drained independently for mosquito and vegetation control, As earth moving takes place, it is creating a boon for several bird species such as pelicans and herons. On a related note, the Wildlife Area's newest Wetlands Reserve Program project will start this summer

The Wildlife Area hosted an open house at the Tule Ranch in April. 200 people showed up and enjoyed a great exhibit of wild flowers. Jepson Prairie docents volunteered to help put on the event.

A young bull Tule Elk wandered very close to the Bypass in April. It had been released on the DFG Grizzly Island Wildlife Area in February. Mr. Feliz's previous experience at Grizzly Island showed that it sometimes doesn't work to bring new bulls there. Radio telemetry from a collar showed that the elk swam Montezuma Slough, stayed near Jepson Prairie for a few days, and then continued over to the lower Bypass. It was recaptured on the Bowsby Ranch and moved up to the Cache Creek herd. As of today, he is still there in an area near the intersections of Highway 20 and 16.

Q. Why can't we have elk on the Yolo Wildlife Area?
A. They are very big and don't honor fences lines and other infrastructure very well. They would easily wander over everyone's property. Also, they would be very hard to move quickly when the Bypass floods.

County Water Resources Coordinator

The Yolo County Water Resources Association (WRA) is starting the planning process. Petrea Marchand described the County's recent role in assessing options for natural resource improvement projects, including but not limited to a study of options for the Fremont Weir. Ms. Marchand clarified the County's role studying several options and she stressed that the County is not pursing any specific project at this time the issue. The County has convened a small group of fisheries and other related specialists to discuss potential projects. Any projects considered feasible will be integrated into the lager water resources plan.

Ms. Marchand stressed that the Bypass Management Strategy is and will be an important source of information for the plan. The WRA has applied for State Proposition 50 (Prop 50) money for the integrated plan. The planning process will have broad public participation as well as support from several water related agencies. The planning work is expected to start in 2006 and will proceed regardless of getting Prop 50 funds. The County has hired a facilitator and is writing preliminary issue papers. Comments and inquiries are welcome and should be directed to either Ms. Marchand (Petrea.Marchand@yolocounty.org ,(530) 666-8835) or Tim O'Halloran, General Manager at (info@ycfcwcd.org, (530) 662-0265). Interested parties can also contact Donna Gentile at wra@dcn.org to get involved.

Q Mr. Feliz asked if wetlands and shorebird habitat will be included in the plan.
A. Ms. Marchand said most likely it will.

Q. Jack Palmer asked what the study at Fremont Weir is about.
A. Ms. Marchand explained that the study is assessing fish passage issues and options to minimize fish stranding.

Ms. Marchand reported on Yolo County mercury issues. The County is commenting on the Regional Water Quality Control Board's (RWQCB) Total Maximum Daily Load (TMDL) process on Cache Creek. The TMDL that will be established for Cache Creek will also be for the Bypass. The RWQCB will be voting on the TMDL levels at their June 23rd meeting. There is a concern at the County about how the RWQCB will handle the design and location of wetlands, particularly in the Bypass and as they relate to the methylation of mercury. The County has concerns about the TMDL recommendations, proposed methods to control discharges of constituents of concern, the associated costs, etc. Casey Walsh noted that there is a good science program publication on mercury issues available on the CBDA website. She stated that if wetland design has the potential to affect methyl mercury production, there must be a remediation plan and monitoring. Ms. Marchand noted that County has a concern that remediation and avoidance costs will fall on private landowners with no help from the RWQCB. Mr. Hennelly noted that mercury issues are affecting wetland restoration in the Delta and that it could happen in the Bypass as well.

Discussion of Proposed Landowner BBQ / Meeting (Dave Ceppos, CCP, Mark Hennelly, California Waterfowl Association; Working Group Landowner Advisory Committee)

Mr. Ceppos started the discussion by reading a RWQCB statement on wetlands and mercury. He then explained that this is good example why the Working Group is hopefully an important forum for landowners and why he and Ms. Kulakow are trying to determine if the group needs to be revised in some way. Don Stevens noted that Wednesday meetings are not good during the

duck season. Phil Martinelli said that some of the duck club owners attend the State Fish and Game Commission meetings and encouraged Mr. Ceppos to not schedule Working Groups meetings on commission meeting dates. Mr. Ceppos described that the Group's Landowner Committee met recently to discuss options. He stated that the Committee feels that continued landowner participation is important. They suggested that an evening barbeque/discussion be planned for this summer. A show of hands by landowners present showed that that there is interest in a landowner focused event in mid July or early August. Mark Hennelly asked duck club owners present to get support from other landowners to attend and stated that this will be a good opportunity to focus on landowner issues and talk about strategies for increasing landowner participation.

Selby Mohr talked about agency participation and pointed out that at the last Working Group meeting, 50 percent of the participants represented agencies. He asked whether these agencies can go back and evaluate who really needs to be at the meeting. He said that the reason that fewer landowners are participating is due to perception that there are too many agencies attending. Mr. Feliz noted that it's a tough balancing act; that it's good for landowners to hear what is going on with agencies. Regina Cherovsky said that the presence of so many agency people affects what landowners are willing to say.

Ms. Cherovsky suggested that it might help to have agency staff attending to say why they are here. But she also said that it is important for landowners to get what is inhibiting them out on the table as well. It is important that agencies recognize that landowners don't always trust agencies. Another participant stated that landowners need to recognize that the agency people in the room could be their best allies. Marianne Kirkland supported the idea that people say what their interest is. For example, she brought two new people because they are going to write the DWR fish passage report. Jim Weaver stated that to inhibit agency participation makes it more difficult to collaborate. As an agency person, it is easier to work with people when you can connect a face and personality with a name; it makes it easier to work together.

Results / Recommendations of the Lower Bypass Stakeholder Process Feasibility Assessment (Dave Ceppos, CCP)

Mr. Ceppos started the discussion by listing the interview participant categories. CCP interviewed about 50 people. CCP has prepared an initial conclusion that shows it is feasible and warranted that a Lower Bypass group be convened. The study will be available in a few weeks on the CCP website, and possibly the Foundation website also. Hard copies will be available to all interview participants.

Q Mike Hardesty asked a question on baseline conditions. Will a stakeholder discussion need to go back in time to determine baseline conditions?
A. Mr. Ceppos stated that it's likely there will have to be a period of education so everyone understands all of the conditions and that a future group will need to decide how far back in history they want to bracket their discussions.

Q Betsy Marchand asked how CCP handled assessing differing opinions within agencies.
A. Mr. Ceppos acknowledged that there is always a limitation when interviewing agency representatives because limited resources don't allow large numbers of interviews within each agency. He stated that the interview process does its best to ask comprehensive questions and confirms that a participant knows they are answering to the best of their ability on behalf of their

agency.

Q. Bob Schneider represents the local conservation group, Tuleyome. They will want an oversight function.
A. Mr. Ceppos confirmed that if a group starts up, there will have to be a robust outreach effort to ensure that the general public is aware of, and involved with the process.

Q. Don Stevens asked why CCP chose to have the south boundary of the Wildlife Area as the north boundary of the Lower Yolo Bypass study.
A. Mr. Ceppos described that the duck clubs in the Lower Bypass were believed to potentially be affected by habitat management efforts on the Wildlife Area. The issues may not be as critical as levee failures but that the clubs should still have a voice in the process.

Q. Mr. Mohr asked if a lack of agency participation is a "show stopper". More specifically, he asked if a process can start without the U.S. Army Corps of Engineers for instance.
A. Mr. Ceppos stated that missing agencies in a process like this is not ideal but that a process can start without them and see whether they can find the resources and other incentives to join the process. He further stated that having certain key agencies absent throughout an entire process can prohibit the process from resulting in durable and sustainable outcomes.

Lauren Hastings stated that CBDA managers are very supportive of this proposed effort and that it is a line item of the proposed CBDA multi year budget but she also cautioned that the budget has not been approved yet.

Yolo Bypass Water Quality Management Plan - Recap and Look Ahead
(Tess Dunham, Larry Walker Associates)

Tess Dunham stated that the Management Plan is complete and is available in electronic format. She reiterated that the stakeholder process included a diverse group including representatives from local cities, agricultural interests, resource agencies, and other Federal and State agencies. Ms. Dunham discussed some of the conclusions in the report. The Bypass has water quality issues on many levels including storm water discharges, effluent discharges, agricultural return water, Putah and Cache Creek flows, and Willow Slough flows. Beneficial uses in the Bypass include: agriculture, wildlife, fish passage and spawning, and recreation.

The study included 12 total sampling sites. Sacramento and Fremont Weirs were only collected once at flood stage. The other 10 primary sites included the Knights Landing Ridge Cut, Cache Creek, Willow Slough, the Wildlife Area, Putah Creek, the Z-drain, two Woodland sites, the Tule Canal, and the Toe Drain. The results indicate that listed elements had a least one exceedence of water quality criteria including the following: aluminum, boron, chromium, total mercury, methyl mercury, total dissolved solids, and conductivity. Conductivity appears to be a concern, associated with the current salinity levels. E coli had high counts but this is not necessarily an indicator of human pathogens from waste water and it may be due to high wildlife use. However, high methyl mercury levels should be of interest to downstream landowners as they may have to incur cleanup costs in the future. There were not high levels of toxicity from pesticides as had been expected. Similarly, there were surprisingly low levels of pesticide in the Ridge Cut coming down the Colusa Basin. Methyl mercury was detected at 6 sites and it exceeds levels that are expected from new RWQCB TMDLs. The pollutants studied were

prioritized based on stakeholder discussions. High priority items included: total coliform, boron, aluminum, mercury, and salinity.

Brief Update on Colusa Basin Drainage Concept and the Working Group's Colusa Basin Committee (Dave Ceppos, Center for Collaborative Policy)

Mr. Ceppos reported that the Colusa Basin Drain study was recently completed by CH2MHill consultants. The Working Group's Colusa Drain Committee is meeting June 27 at Yolo County annex in Davis to discuss the report with the study proponents and study consultants. This will be the first review of the report with stakeholder representatives. Interested stakeholders should contact Dave Guy at dguy@norcalwater.org or 916-442-8333 for a copy of the executive summary.

YOLO BYPASS WORKING GROUP
MEETING 36

MEETING MINUTES

MEETING DATE: January 10, 2006; 3 PM – 6 PM

LOCATION: California Department of Fish and Game
Yolo Wildlife Area Headquarters
45211 County Road 32B (Chiles Road)
Davis, CA 95616

IN ATTENDANCE: Robin Kulakow, Yolo Basin Foundation (Foundation)
Jodie Monaghan, Center for Collaborative Policy (CCP)
Beth Gabor, Yolo County
Brad Burkholder, Department of Fish and Game (DFG)
Brett Whitin, US Army Corps of Engineers (COE)
Brian Plude, Brown and Caldwell
Casey Walsh Cady, California Department of Food and Agriculture
Chad Fien, DFG
Chuck Dudley,
Chris Fitzer, EDAW
Craig Isola, US Fish and Wildlife Service (USFWS)
Dave Feliz, DFG Yolo Wildlife Area
Dave Kohlhorst, Glide-In Ranch
David Guy, Northern California Water Association
Debra Chase, Tuleyome
Dennis Kilkenny, Dawsons Duck Club
Dick Goodell, Glide In Ranch
Don Stevens, Glide-in Ranch
Ed Towne, Bullsprig Outing
Greg Kukas, COE
Heidi Rooks, Dept. of Water Resources (DWR)-Department of General Services (DES)
Laura Patterson, DWR
Linda Fiack, Delta Protection Commission
Marianne Kirkland, DWR
Michael Perrone, DWR
Mark Kearney, Landowner
Matt Kaminski, Ducks Unlimited
Paul Forsberg, DFG
Robert Eddings, California Waterfowl Association (CWA)

Steve Macaulay, California Urban Water Agencies
Ted Sommer, DWR
Teresa LeBlanc, DFG
Tom Harvey, USFWS
Ron Tadlock, Farmer
Sally Negroni, Natural Resources Conservation Service
Selby Mohr, Mound Farms

Introductory Comments

Robin Kulakow called the 36th meeting of the Yolo Bypass Working Group to order. She introduced Jodie Monaghan, the meeting facilitator. She will be filling in for Dave Ceppos who is in Florida taking care of a family emergency. Robin noted that this is the first afternoon meeting of the Working Group. There was a barbecue for Yolo Bypass Landowners in July. One item of discussion at the event was how to encourage landowner attendance at Working Group meetings. It was suggested that it would be easier for farmers to attend if the meetings were held at the end of the day. There was also a request that when introductions are being made at the beginning of a Working Group meeting, that the person also state their affiliation and interest in being at the meeting

The previous meeting minutes were adopted as final.

Update on Delta Protection Commission Activities (Linda Fiack, Executive Director of DPC)

Linda introduced herself and described the DPC. There is a commissioner who's specifically represents hunting interests in the Delta. DPC was founded in 1992 through legislation sponsored by Senator Patrick Johnston. It is a focused local stakeholder group that functions as the voice for those who live, work and play in the Delta. Commissioners represent Delta landowners, Reclamation Districts, three-area council of governments, five different counties, DFG, DWR, Boating and Waterways, State Parks, State Lands Commission, Food and Ag, Sacramento Area Council of Governments, Bay Area Council of Governments, San Joaquin Council of Governments and others. Mike McGowan is the current chairman. It is a good grou to bring all perspectives to table. One of the main concerns of the DPC is to preserve resources of the Delta primary zone. DPC's adopted land use and resource management plan for the Delt is part of all five county general plans. This includes agriculture, habitat, water, recreation, and boating, along with other areas of focus. Linda was hired in August as the Executive Director. The DPC is involved in the Delta Visioning Process. The DPC is trying to be more proactive a part of regional collaborations. They are co sponsors of the Lower Bypass Collaborative Proce that will begin soon and they coordinate the newly formed Mercury Collaborative. A Delta branding concept is under discussion. This would include common signage, a visitor center, an information kiosks through out the Delta. They hope to start work on a center in June. The DP is working with the counties on abandoned vessel removal. This is a growing problem. The

DPC submitted a working landscape grant to CBDA last month. The Delta is a small part of each of the 5 Delta counties so it is often overlooked. The mercury issue is very important and one of the goals of the Mercury collaborative is to educate regional board staff about local issue The Mercury collaborative was formed several months ago. More and more people are coming on board including TNC, all five Delta counties, NRCS, the boating industry, DFG, and YBF. This issue is bigger than many people realize. The Collaborative has written a letter to the Regional Water Quality Control Board once already to comment on the issue. Linda has experience with the mercury issue from her time with the Yolo Co, Planning Dept. DPC meetings are held in Walnut Grove, every other month. Flood protection is the main issue on th January 26th agenda. State Senator Tom Torlakson will be talking about a Delta wide trail that would meet with the East Bay trail. There will also be discussion of the governor's finance plan regarding an infrastructure bond for levees. DPC works closely with DWR and the local office o emergency services on flood issues. There are some communication technology inconsistencies between counties for emergency backup. DPC will help with discussion of coordination of emergency services. COE has $90 million for flood control and implementation of CBDA goal The COE is looking for projects that are $7 million or less. They want RD's and other flood project proponents to submit projects even if they don't have a local match or meet the $7m guideline criteria. The COE intends to show Congress about the flood control problems local RD's are facing. The COE report to Congress is due in May, 2006 so they are on a fast track an are asking for project input by early February. They are on a fast track. Linda provided handou with additional details about the Delta Protection Act, the DPC, the Management and Land Use Plan, and a map of the legal Delta, including the primary and secondary zones. Visit the DPC website on DPC programs. (www.delta.ca.gov)

Update on Yolo Bypass RMA2 Model
(Greg Kukas, US Army Corps of Engineers)

Greg Kukas is the project manager for development of the Yolo Bypass RMA2 model. Dan Tibbitts and Bret Whitin are members of the project team. The project is a partnership with The State Reclamation Board and Department of Water Resources to develop a 2 dimensional computer model to look at impacts of changing land use on surface water elevations when the Yolo Bypass is at the designed capacity flood event. A draft model is completed. The model consists of about 85,000 elements knitted together to represent topography of the Bypass. Each element is assigned a coefficient of friction representing its effect on the velocity of the floodwaters. The project team used data from the 1997 flood event to calibrate the model. Project proponents will use the model to show the effects of a project to The Reclamation Board during the permitting process. The project includes working with the end users and other stakeholders in a Modeling Technical Advisory Committee (MTAC). The MTAC met yesterday to discuss the draft model. A draft model and office report is available for review. Contact Mike Mirmazaheri, <mikemi@water.ca.gov> at DWR for a CD with a copy of the COE's report and the data sets and code to run the model. The next step

is to finalize report, develop a user's manual and technical handbook, and respond to reviewers' comments. The project team will work closely with Dave Feliz on a case study modeling proposed land use changes on the Tule Ranch portion of the Yolo Wildlife Area. This work coincides with DFG's development of a Land Management Plan for the lands purchase by DFG in 2001 and will be part of the permitting process required by the State Reclamation Board. The Case study will become part of the Users' Handbook. The plan is to the wrap project up in Sept. 2006. Greg will come back to the Working Group around Sept. to go into more detail on the final model. The geographic scope of the model is from just below the Fremont Weir to Rio Vista. It also includes as few segments of some tributaries. It can be used to compute water surface elevation and velocity using project topographic and roughness data. It is specifically to be used for flood level analysis; anything less than about 200,000 cfs is not feasible. Completing the model to the draft stage is a big milestone for the COE. The model may eventually be expanded to include the Sacramento and Fremont Weirs specifically. The flows are too complex right at the weirs to be modeled with this project. Why are they so difficult to model? The hydro dynamics are very different at the weirs compared to the main Bypass. Bret will work closely with Dave Feliz on the case study. How does the model deal with tidal effects? It can simulate unsteady effects such as tides but only under flood conditions. How was roughness assigned? The calibration represented two main conditions in the Bypass…fallow fields and grasslands. Others are based on professional judgment and are assigned values defined by other references. Have any runs allowed evaluation of the recent expansion of tidally influenced habitat in the south Bypass. A lot of open water was noted in development of the model. Restricted height levees by little Holland tract are noted in the model. There was a question on if fencing is taken into account in the model. Many are acting as small dams and are full of tulles today. Greg said that if flood water over 15 ft deep, the effects of vegetation is negligible.

Update on Yolo Bypass Wildlife Area Hunting Season (Dave Feliz, DFG Yolo Wildlife Area)

The RMA2 model is key to planning for the Yolo Wildlife Area. The case study will be very important. The original case study area was to be the Causeway Ranch. It will be shifted down to Tule Ranch. Rice farming on the Causeway Ranch has become an important source of income for Wildlife Area operations and consequently much of the Causeway Ranch will most likely remain in agriculture rather than managed wetlands as originally thought. Opening day of hunting: 16 blinds filled with 50 free roam areas available for a total of 2200 acres in hunting. The Tule Ranch was open for pheasant season. This added another 488 hunt able acres. Ducks can be hunted on all 2800 acres. X?? acres of wetlands hunted. The South unit (aka Closed Zone) was going to

be open for a junior hunt. A junior pheasant hunt was held in November. Quite a few kids came out and had a good time. An important milestone has been reached in the Wildlife Area hunting program; the same number of mallards were shot as shovelers. Many people are concerned about wild migratory birds carrying avian flu. A day of sampling by UC Davis scientist was held in November. It was a huge media event with local and national coverage. We haven't seen result of the bird testing yet. They used high tech equipment to sample the air for viruses…avian flu or cholera were not found. There is thought that this flu might be found in wild birds in Asia and some of the birds found in the USA mingle with them in their winter or summer grounds but its thought that the main threat is with commercial poultry or pets. 3261 ducks were shot on 5500 acres. It was considered a moderate year. First nesting season was wiped out by May flooding. The second nesting season seemed pretty successful. Another important milestone was also reached: The Same number of hunters as school children visited the Wildlife Area. The number of hunted acres is steadily going up each year. Dave described the flood conditions in the Bypass. The Central canal pumps were flooded up to the bottom of pumps. They will probably have to be sent to a shop for clean up. What is the peak number of birds found on the Wildlife Area at one time? Dave noted that no more ground surveys are done due to funding cutbacks. When it was surveyed several years ago the numbers were peaking at 139k. Now the numbers are probably around 239k. Dennis Kilkenny expressed his frustration saying there may be others. Ever since the Wildlife Area was established duck hunting on the clubs to the south has decreased significantly. He said that the club hunting areas are not doing well. He was under impression that 75% of the Wildlife Area would be hunted. There are thousands of ducks sitting in rice and very few in south area. Dave explained that the birds being seen along I-80 are in a fairly narrow band that area can't be hunted. He expanded the hunting area to include a large area of rice fields. The birds are moving in and out of the hunting area. It looks like closed zone in any other refuge just that is much more visible since it is along the highway. Dave explained that this is a good thing because of large numbers of people are seeing birds. We get a lot of complements. People who see the birds are more likely to support funding of state wildlife area. The southern part of area (Tule Ranch) is being grazed. There is not a green light to restore wetlands on the Tule Ranch. One main factor in the expansion of wetlands for hunting is the lack of funding to manage additional acreage. Another possibility is to grow rice on the Tule ranch but its difficult due to the cooler climate. That would bring ducks down there. In the future there will probably be a closed zone adjacent to the Duck Clubs to the south. That could improve hunting conditions for them. Comment from other hunter: you don't have to flood the rice or you do not have to flood so early. That would distribute birds more. Dave explained that as a DFG wetland manager his goal is to attract birds and provide good hunting for public hunting. Over 4,000 hunters have used this public area. Dave Kohlhurst commented that it should be considered that the clubs have been here for 30 years. One idea is to flood around Dec. 15th but if DFG had waited there would have only been one week of

birds in the rice before the Bypass flooded. Comment by a Duck Club member: great hunting has been taken away. The birds used to rest on clubs and move between them. Dave said that the total number of birds has probably increased in the Bypass as a whole but the distribution has changed. Selby Mohr said that this group was formed to develop a management strategy. He referred to his father hunting in the Bypass 50 years ago. 1000 acres was probably flooded then and it still is but its been shifted. He wants DFG to look at the flooding overall, to plan for flooding 1000 acres including clubs also. Maybe flood ponds further south first? Greg Isola with USFWS said that the only thing that has changed is that there are more flooded acres in the Delta, on Conaway, Swanston, and 330k flooded rice farther north. He doesn't think the Yolo Wildlife Area is the only reason the birds have changed distribution. Dave: there is more food around than birds can possibly eat. Dick Goodell…having a show of birds along the highway is not the goal/reason for managing birds. From DFG's point of view this is not a bad thing. It isn't the goal but it is a benefit. DFG's funding circumstances must change and non-hunters are part of that equation. We can't rely on just hunters for funding in the long term. Question on whether hunting area is full: Dave said they fill up almost all of the time. There is more and more use every year. DFG tries to make hunters welcome. By not crowding hunters in DFG is providing a good quality place to hunt. They try to make it family friendly. Are bird watchers being charged? Not at this time, there is no way to collect money at this time. It was tried before unsuccessfully on other areas about 15 years ago. Sacramento National Wildlife Refuge now charges $3.00 per car. It's been a successful program. A duck stamp can be purchased to cover the entry fee. DFG needs to do something about funding and it shouldn't just the hunters. Dennis Kilkenny states that now that I've vetted my frustration…you do a very good job. You've got a big job…applause from group.

Update on Yolo Bypass Wildlife Area Land Management Plan (LMP) and CEQA (Dave Feliz and Chris Fitzer, EDAW)

A public information meeting was held on Dec. 12, 2005 DFG took some comments then. Chris Fitzer works for EDAW and they have the contract to prepare the LMP and CEQA documents. He passed around a handout that summarizes the public out reach efforts to Dave. Focus meetings held when Dave Feliz and Robin Kulakow thought they would just write the plan. Minutes taken at the meetings and those comments will be considered. Chris Fitzer gets to digest all of the comments. EDAW is also looking over all Working Group meeting and focus meeting minutes plus new comments. A Stakeholder Working Draft of the LMP will be out Mar 16. It will be available on the YBF website. Also CDs will be available at the Yolo Wildlife Area Headquarters. Following release of the stakeholder working draft, a series of focus meetings will be held. Five meetings are planned. We will consider others if they are suggested. The current list of focus meetings includes public use, agriculture,

mercury, flood protection, and fisheries resources. There will be technical experts on mercury at the mercury focus meeting. We will then take comments generated at focus meetings and will work them into public draft that will be released in May for a 30 day review. The final plan is due out Oct. 31, 2006 along with the Initial Study (IS), the environmental review. The idea of a stakeholder working draft is an extraordinary effort for stakeholder involvement that is not required. We did want to make sure that our neighbors could comment early on. The Working Group will have input in the planning process before the draft LMLP goes out for public comment. Prior to public scoping meeting information was sent to Working Group participants on how and when to provide comments. We have received lots of comments. The original deadline was Jan. 6 but we will still take comments. There is still plenty of time. This is a good time for you to write down your interests and concerns. The question was asked: What is the definition of flood protection. Dave answered that we can't affect the design capacity of Yolo Bypass. Projects will have to be run through the RMA2 model previously described. Robin Kulakow asked that people who do not use email contact her if they want to receive information on the LMP through regular mail. Notice of the focus meeting schedule will be sent out to Working Group participants.

Update on Colusa Basin Drainage Concept and the Working Group's Colusa Basin Committee (Dave Guy, Northern California Water Association and Steve Macaulay, California Urban Water Agencies)

Dave Guy gave a summary of the Colusa Basin Drainage Concept. A study was done last year supported by the Northern California Water Association, various urban water agencies and others to look at the Colusa Basin Drain. The study was aimed at gathering information on the flows and quality of the Colusa Basin Drain, in anticipation that a further study would be done on potential projects to improve quality of water in the Sacramento River and provide water supply benefits to the Yolo County region. Three pieces were looked at in the study. The study looked at operations of the Colusa Basin Drain. (Map was distributed.) The Knights Landing Ridge Cut was built as a flood control structure. This study looked at the summer use of the Ridge Cut. The second piece was to look at flow patterns into the Sacramento River and what is in the water. What is the effect of the Colusa Basin Drain on the quality of the Sacramento River. Several conclusions were reached: the Colusa Basin Drain flows are variable, the primary flows are in August and they tend to coincide with releases of rice water. There is organic carbon and other constituents at slightly less loading levels than in the Sacramento River (although the concentrations were higher). This was a surprise. Water constituent levels that are important to urban users may not be a concern for ag use. The study concluded that the quality of water for ag is ok. A detailed presentation on the study was made to the Working Group last year. Where are we now? Is there enough information to justify going on to a phase 2 study? Are there enough potential benefits to the urban water users for them to be willing to

pay for the study? Steve explained that it is unclear based on the phase 1 results whether there would be a benefit for drinking water. Nutrients and organic carbon are not a good thing for drinking water since they pose problems for drinking water treatment systems. If it is possible to reduce these constituents, and see measurable decreases at drinking water intakes, then there may be a benefit for urban users. Urban water users are likely to participate in a study, and ultimately in a feasible project(s), if a project with multiple benefits can be found. Urban users want to do a fatal flaw analysis, consisting of some initial technical work to see if there might be improved quality at drinking water intakes and to examine whether diversion of water from the Colusa Basin Drain is workable from a water rights standpoint. Phase 2 would do water quality modeling work to see how the river system works. Steve said that no matter where this effort goes, we cannot afford to throw away any water supplies these days. Phase 2 is still under discussion. Ron Tadlock participated in the Working Group Colusa Basin Drain subcommittee. Bringing Colusa Basin Drain water into the Bypass as an additional supply is a good idea. However, landowners that would benefit are not participating in the meetings. The downstream users are concerned about taking on the responsibility of water if something toxic is found in it…they don't want to be liable for it. Quality and responsibility needs to be looked at before landowners want it. Only a few landowners are involved. Dave Guy asked if Dave Feliz wants the water for the Wildlife Area. He answered, only if it is good quality. There is concern that organic carbon plays a role in mercury methylation. The Duck Clubs are worried about flooding on the east side of the toe drain with additional flows into the Bypass. What is the volume of water that would be coming down? Dave Guy said he could get the numbers. Dave Guy stated that this is not an all or nothing idea, and any practical project that might be developed would control flow to prevent downstream problems. DWR can control distribution of the Drain water at outflow gates. The capacity of the Colusa Basin Drain is about 2,000 cfs, and any controlled releases into the Toe Drain would be released in the summer and fall. Additional monitoring is not being done now, and it is expensive. Chuck Dudley said that he has observed 2 times when a lot of water flows in Drain, when rice water is released and if there is a rain in May rice growers will release a lot of water. This could cause some flooding. Chuck Dudley suggested that the water really should go to the Yolo-Zamora area of Yolo County for ag use and ground water recharge. Tim O'Halloran with Yolo Flood Control and Water Conservation District has talked about that concept also. Steve Macaulay stated that if you can find multiple benefits then a project could be worthwhile. There could be an ag benefit and maybe a benefit for water quality. Colusa Basin Drain water is low in organic carbon loading compared to other sources tributary to the Sacramento River. It adds some but it's not the largest contributor. Don Stevens said he remembers studies done 10 years ago and water pollutants levels were high. Dave Guy said that studies this time show differently. Rice farming has changed dramatically so water quality may have improved. Dick Goodell asked–what is driving this? Steve Macaulay said that it is a collection of people that intuitively

thought there might be a benefit so they funded a study, and that this idea arose to his knowledge 30 years ago when Jerry Meral was Deputy Director of DWR. Dave Feliz asked -were there any ideas on what the water use needs are in the Bypass? For example – wetland managers usually can't use water in August and Sept. due to mosquito control and weed problems plus the new information on mercury problems. The next step is to answer whether there are projects that would merit spending the money…water quality was not as big a problem as originally thought, and flows are not as reliable as they had hoped.

Status of the Lower Yolo Bypass Stakeholder Collaborative Process (Brad Burkholder, DFG)

YBF funded a feasibility assessment on lower Bypass issues. CCP conducted the assessment and concluded that there is enough support to start a formal collaborative process to develop a management plan for the Lower Bypass. DFG is looking at carrying out CCP's recommendations. A draft scope of work is done but still needs a little work and a budget. The project area includes Little Holland, Liberty and Prospect Island and adjacent lands. This would be a formal collaborative process, much more so than the Yolo Bypass Working Group. The goal of the collaborative process would be to develop a plan on how to manage that area. What is driving this? Flood control: Little Holland levees have been breached. There is significant vegetation growth. There has been a lot of pressure on DFG to manage the lands. However, there are a lot of liabilities that DFG is concerned about, especially related to responsibilities for and compatibility with flood control maintenance. The stakeholders want to ensure that a strategy is developed that minimizes potential impacts and liabilities to affected parties. The potential management liabilities would apply to any entity and this effort should contribute greatly towards development of a balanced approach and plan for resolution.

Discussion / Analysis of Recent Challenges, Constraints, and Status of the Agricultural Waiver Program (Dave Guy)

There is a series a water quality laws in CA known as Porter-Cologne. For 20 years there was an Ag waiver assigned by the Regional Water Quality Control Board. Some legislation passed in 1999 said that if you have a waiver you have to meet more stringent guidelines. It's really not a waiver…there are some stringent regulations. Farmers can be part of a watershed group or they can get their own permit from the Regional Board. In 2001 NCWA put together the Sacrament Valley Water Quality Coalition. Goals of coalition include a nested approach that coincides with the Regional Board's jurisdiction. They set up sub watersheds. There is the Yolo Solano Coalition. Determining the water quality in a sub watershed is the first step…four sites are being monitored around the Bypass as part of the Coalition's commitment. There has been some toxicity at the Z drain site but not enough to trigger the next step.

Mostly very little pesticide has been found in the water. There are other issues like boron levels. There have been very positive monitoring results on broad level; about 3 percent of the sampling sites have problems with pesticides. The Coalition submitted an annual report as required under the waiver. If toxicity found you file a report with the Regional Board with an action plan to address problem. Physical solutions include things like the Colusa Basin Drain study. The Coalition has submitted a monitoring program for 2006 that includes Yolo and Solano sites. Fees are now required by the Regional Board at $.12 per acre. The Regional Board wants a list of participants in each watershed group. Yolo-Solano will be submitting list of non-responders. The Mercury TMDL has some major implications for this area. He encourages people to look at the draft TMDL plan. John Currey, who manages the Yolo-Solano sub watershed group, was unable to attend. Casey Walsh Cady asked – what has the response been by the Regional Board to the monitoring reports? According to Dave Guy the Regional Board staff has not been responsive to positive data to date. The Coalition has hired experts to back up actions in response to the Regional Board. If there is going to be a problem it will be with the pyrithroids. Dave passed out letter to the Regional Board with the annual report.

Discussion / Analysis of Recent State-Level Reviews, Proposed Changes, and Associated Stakeholder Impacts of CALFED Restructuring (Steve Macaulay and Dave Guy)

CBDA has been going through a lot of scrutiny. Dave and Steve will give an update on the effects of this. Steve described the handouts he distributed – Water components of Governor's Strategic Growth Plan, 4 pages from Governor's budget released today, and a draft of the CALFED 10-year plan. In the Governor's road map they are embracing integrated water management plan investments and aggressive flood control investments, with bonds of $3 billion next year and another $6 billion in 2010. The Governor's office will embrace the Ecosystem Restoration Plan (ERP) of CBDA and an integrated water management plan. What are proposals to reinvent CBDA? #1 we need to re-look at the Delta and what it will become. AB1200 requires DFG/DWR to look at ecosystem restoration and flood control in the Delta, in the context of the long-term health of the Delta levee systems, and report on it. The long-term process of looking at the future of the Delta will not be done under CBDA but as a directive from the Governor. Joe Grindstaff and Lester Snow (DWR) want this to be done outside DWR as well. The second thing is hidden in the 10-year plan – fisheries agencies and water users will do an HCP/NCCP (Federal habitat conservation plan, State natural communities conservation plan) for the Delta. This is a long term planning process in the context of what potential beneficiaries will want including water users, flood control, and endangered species. Funds for this will come from water users who are willing to put up $6-$7 million /year to fund this effort. The Governor's program in the CBDA 10-year plan includes reinforcement of the need for an independent science

program. It was an effort supported by the CBDA science program that recently concluded that recent fishery agency biological assessments for salmon did not use the best available science. The science program also commissioned an independent review of Delta smelt programs. While that review was generally positive, it also concluded that such programs need to look at all of the effects that may have contributed to the smelt population crash over a long period of time, not just events of the past three years. The commitment to science should be continued. How will the science program be funded? This will all go to the Legislature. Reinventing CBDA will mean a change in governance. A new state advisory committee will be established, replacing the current Bay-Delta Public Advisory Committee which for legal reasons has only been able to advise federal agencies and not the Bay-Delta Authority as a whole.. There will more institutional linkages with federal agencies. There is a recommendation to abolish the CBDA appointed board. It is a mixture of oversight and implementation, as set forth in the implementing legislation. The Little Hoover Commission says those functions should be separate. There will some body created that will provide independent oversight.

Dave Guy said that the Little Hoover Commission, KPMG, State Dept. of Finance, and an appellate judge as well all concluded that CBDA is dysfunctional. CBDA put out a finance plan last year that was rejected by most stakeholders. All this killed CBDA. You can't just say it is gone. What will it become? Governor's strategic growth plan deals with some issues that CBDA left out. It is important to identify the problems causing the population crash of the Delta smelt. There is, however, an increase in salmon and steelhead runs. Where is all of this going? Levee debate is the big one. When people start paying for levee fixes, will people want to pay to bring levels up to standard? Dave Guy thinks it will lead to a peripheral canal discussion as part of strategic growth plan. A lot of this comes back to financing. What are the voters willing to pay for? A water resources investment fund would be created through a tax on retail water users. CBDA as we know it is gone. According to Dave Guy, we have a bold vision laid out by the governor.

Steve asked how would the vision be implemented? There would be a state oversight committee that would advise the Secretary of Resources. Members would be appointed. They would be different than stakeholder advised committees. Implementation would be the responsibility of a new Water Policy Committee, presumably consisting of top representatives of all the state and federal implementing agencies. In order to create all of this the law needs to be changed, and a legislative package will soon be introduced. Steve doesn't agree with Dave that people will walk away from fixing the levees. This will come out of the Delta visioning process. He expects that the Administration will come up with a proposal for who will be in charge of the Delta vision. CBDA has accomplished a lot, for example the ERP. Ground

water programs are new, and many other accomplishments have been made. However, the need for stronger leadership and a large number of serious problems, including funding limitations, requires major changes to the program.

Meeting Minutes
Yolo Bypass Working Group
Meeting 37

MEETING DATE: June 5, 2006

LOCATION: California Department of Fish and Game
Yolo Wildlife Area Headquarters
45211 County Road 32B (Chiles Road)
Davis, CA 95616

IN ATTENDANCE: Charlie Alpers, US Geological Survey (USGS)
Brad Burkholder, Department of Fish and Game (DFG)
Casey Walsh Cady, California Department of Food and Agriculture
Regina Cherovsky, Conaway Ranch, RD 2035
Mark Cocke, City of Woodland
Jack DeWit, DeWit Farms
Linda Fiack, Delta Protection Commission
Craig Isola, US Fish and Wildlife Service (USFWS)
Dave Feliz, DFG Yolo Wildlife Area
John Fritz, Sacramento Yolo Mosquito and Vector Control District (SYMVCD)
Chris Fulster, Glide In Ranch
Karen Gerhart
Tom Harvey, USFWS
Michelle Hladik, USGS
Mark Kearney, Landowner
Dave Kohlhorst, Glide-In Ranch
Dennis Kilkenny, Dawsons Duck Club
Marianne Kirkland, Department of Water Resources (DWR)
Dean Kwasny, DFG
Steve Macaulay, California Urban Water Agencies
Steve Mahnke, DWR
Cindy Matthews, National Weather Service (NWS)
Julia McIver, Yolo County
Selby Mohr, Mound Farms
Sally Negroni, Natural Resources Conservation Service
Michele Ng, DWR
Jack Palmer,
Michael Perrone, DWR
Bob Rooker, SYMVCD
Don Stevens, Glide-in Ranch
Jeff Schuette, DWR
Ed Towne, Bullsprig Outing
Jeanette Wrysinski, Yolo County Resource Conservation District
Mariko Yamada, Yolo County Supervisor, District 4
Dave Ceppos, Center for Collaborative Policy (CCP)
Robin Kulakow, Yolo Basin Foundation (Foundation)

Meeting Introduction

Dave Ceppos called the 37th meeting of the Yolo Bypass Working Group (Working Group) to order. The Working Group was started five years ago with funding from the CALFED Bay-Delta Program (now the California Bay Delta Authority, [CDBA]). The group continues to be funded through CBDA. It is the primary forum for Yolo Bypass (Bypass) issues, specifically on Bypass conditions as related to landowners, tenants and regulatory entities that have a direct responsibility or land ownership responsibility in the Bypass.

Mr. Ceppos reviewed the previous meeting minutes and adopted them as final after receiving no requests for changes

Fremont Weir Sediment Removal Project and Bypass Levee Maintenance

Michelle Ng of DWR described the proposed activities at the Fremont Weir. The last sediment removal below the Fremont Weir was done in 1992. Ms. Ng described where sediment will be removed. DWR contractors will concentrate their work on the west side of the Weir. The sediment is about 3 feet deep. They won't get into the existing depressions. The goal is to set up the area so it can be mowed by DWR. The project will open for private companies to bid on June 6, 2006. Sediment will be spoiled outside the levee and Wildlands Inc. may farm it. DWR estimates about 800,000 cubic yard of material will be moved. The sediment has accumulated at a more rapid rate than usual due to limited maintenance associated with budget constraints in the Bypass.

Q: What kind of maintenance cycle will there be?
A: Maybe ten years. They now have a baseline budget for Fremont Weir sediment removal. Sediment drops out when water goes over the weir. Sand and silt drop out just below the weir. Fines drop out farther down.

Q: Who determines what sediment projects will be done?
A: It is a risk management decision. Based on what is most important for public safety?

Q: Is DWR looking at a new Operations Manual?
A: DWR would have to do that with the US Army Corps of Engineers.

Steve Mahnke and Jeff Schuette from DWR spoke about levee maintenance on Yolo Bypass levees. After the flooding last winter, people are noticing the wave erosion. DWR manages levee maintenance from Fremont Weir to Highway 16 as well as levees south of the Willow Slough Bypass. The worst erosion was on unit 4 (near Yolo Causeway on West side of Bypass). They are planning to place large rock to prevent damage from wind erosion (there are 4 foot swells at times). A lot of areas have rock from a long time ago but it is small cobble and not as resistant to the wave action. Large angular rock is needed. DWR is just starting a project description for necessary environmental compliance through California Environmental Quality Act (CEQA) requirements Unit 4 is about 3 miles long.

Q: Why do waves affect the west side of the Bypass?
A: The southwest wind pushes it up everywhere. The east side of the Bypass has large rock already in many places and so is generally more resistant to wave action. The northwest levee has a lot of vegetation. The worst area of levee erosion is between the Union Pacific Railroad tracks and I-80.

They are still trying to figure out which sections to do. DWR may have to do mitigation for giant garter snake habitat as a result of proposed work.

West Nile Virus Conditions and Regional Vector Control

John Fritz from SYMVCD led this discussion. Last year there were 177 human cases in the Sacramento area; Davis had 12 cases. Hopefully the peak was reached last year. The District doesn't know what will happen so they are preparing for the worst. Two dead birds have been counted so far. The District thanks the refuges and duck clubs for waiting until October to flood up last year. They will ask for the late flood up again this coming fall. John introduced Bob Rooker to the group. He will be working with Yolo Bypass landowners.

Q: Are you treating brood ponds?
A: They will be inspected to evaluate whether treatment is needed.

Delta and Yolo Bypass Mercury Research Proposals

Charlie Alpers of USGS spoke about two Yolo Bypass mercury research proposals that have been submitted by the USGS, DFG, and Yolo Basin Foundation along with other partners. He described mercury cycling briefly. It is one of the more complicated chemical processes in the environment. It is the only metal that can vaporize. The main sources of it are from gold rush era gold mining sediments moving down the Sacramento River Watershed and tailings and runoff from mercury mines in Cache Creek. The problem is that mercury accumulates in predatory fish that are eaten by wildlife and humans. Methylmercury is the organic format that enters the food chain. Sampling of water flow in and out of wetlands is an important first step in understanding the problem. The proposed mercury regulations for the Delta will require the development of Best Management Practices (BMP's). The overall goal is to look at the formation and export of mercury and methylmercury from rice fields and wetlands that then moves on through the Delta. They will look at other chemicals that could be influencing mercury production in wetlands. They will look at root zones, vegetated vs. nonvegetated wetlands, and methyl mercury in bird eggs. The consolidated proposal submitted to CALFED is titled: "Methylmercury cycling and export from agricultural and natural wetlands in the Yolo Bypass" There are five key questions to be looked at. Determine:

1) If and to what extent seasonal and annual methylmercury production and export loads differ for the dominant wetland types in the Yolo Bypass: non-farmed wetlands, white-rice fields farmed annually, and fields undergoing a 3-part rotation regime.
2) To what extent specific management practices lead to any observed differences in mercury cycling and export;
3) If differences in wetland habitat types result in measurable differences in methylmercury bioaccumulation in aquatic invertebrates; and
4) The underlying processes that lead to any observed difference in mercury cycling among wetland types or best management practices.

The benefits from this project include:

a) Providing critical data on land use and BMP's;
b) Finding that can be used to improve BMP's that will minimize the bioaccumulation of methylmercury in sensitive bird populations that use the Yolo Bypass as critical habitat,

c) Public/educational outreach regarding land use, mercury cycling, and mercury bioaccumulation in sport fish,
d) Regional, national, and global transferability value of the project's findings.

Another part of this proposal would look at giant garter snake use of wetlands and rice fields in the Yolo Bypass Wildlife Area. Mercury accumulation in giant garter snakes would also be sampled. ***(Note: In July, DFG, USGS and the Foundation were informed this proposal was not funded)***

Mr. Alpers also described a sampling schedule. He said that photodegradation is related to demethylation. Chris Fulster noted that his concern is that wetlands will be shut down. He said that they (the landowners) didn't cause the problem. Dave Ceppos explained that the mercury issue is a regulatory issue that is coming and will continue to affect landowners and tenants in the Bypass. The two biggest problems facing wetland managers are West Nile Virus and methylmercury.

Dave Feliz added that we all agree that wetlands have many benefits and that public and private wetlands managers are trying to get the word out about the methylmercury issue. He further stated that specialists don't know which factors are causing the problem. It appears from some research results that open water may be helping to demethylate. It is not business as usual if we want to restore more wetlands in the Yolo Bypass. Don Stevens noted that he has the same concerns as Chris. This will impact landowners. He is concerned that the mercury issue is getting out of hand. He doesn't know of any one who has been harmed. Dave Feliz said that we would like to continue research. We need to learn about it. There is some evidence from recent research that methylmercury is affecting some stilt egg production. Linda Fiack said that landowners are mandated to consider this issue. There is no turning back. Lake and Yolo County have already dealt with Total Maximum Daily Load (TMDL) on Cache Creek. The DPC formed a collaborative group to assess the problem and they continue to meet about this. DPC members are learning about the issue. She encouraged people to refer to the DPC website to learn about the DPC's activities relating to mercury production. Letters of concern to the Central Valley Water Quality Control Board are also posted on the website.

A second proposal with similar goals was submitted by USGS to the Central Valley Regional Water Quality Control Board. This proposal looks at only mercury not the giant garter snake. Charlie closed by giving a further update on the current work of USGS in the Bypass. They have an active mercury sampling program going with funding from the Sacramento River Watershed Project.

DWR Aquatic Ecosystem Restoration Implementation

Marianne Kirkland with DWR gave an update of the work of her group. They are looking at base line data for the Yolo Bypass; establishing a flow gauge at Knights Landing Ridgecut; looking at low flow rates; looking at sediment settling at the Fremont Weir. Up to 4 inches settled out this year. They are sampling to determine what contaminants may be in the sediment.

Yolo Bypass Datum Adjustment

Cindy Matthews of the NWS described there are about 75 gages in the San Francisco-San Joaquin Delta and Bypass. Some are telemetered. They are owned by different agencies. All of these agencies have changed their datum to the NBVE 1988 single point reference for North America. Now DWR is changing to 1988 single point reference also. Sea level will mean the same thing everywhere in US. Datum will change on October 1, 2006. This is important information for Yolo

Bypass operations. Referring to a handout, Ms. Matthews explained how they will change the datum. By example, at the Lisbon Weir the monitor stage and flood stage will drop by 1 foot. There is not a change occurring north of Bryte. Gages are recalibrating so water will be the same but the number will be different. She explained an analogy to how time changes during daylight savings time. Historical data will be at old value so conversion factors will be needed to compare old and new data. The Rio Vista stage will also be revised.

Q: Will the emergency responders know of the change?
A: The Fremont and Sacramento Weirs will stay the same so it does not affect flood stage assessment.

Update on Yolo County Integrated Regional Water Management Planning Process (IRWMP)

Jacques DeBra, City of Davis Public Works and Chair of the IRWMP Technical Advisory Committee described the IRWMP. The IRWMP is an update to the 1984/1982 Yolo County Water Plans. It is funded in part through Proposition 50. The project is managed by the Yolo County Water Resources Association (WRA). The scope includes Yolo County watersheds and the surrounding areas. There has been a lot of stakeholder involvement. Robin Kulakow, Dave Feliz, Marianne Kirkland, Chuck Dudley and Jack DeWitt participated in stakeholder meeting. Jacques presented information on the planning process and where they will be going next. Many different actions have been proposed by groups all over Yolo County. These projects have been grouped into integrated projects when appropriate. He suggested that the Yolo Bypass Working Group could get involved in the implementation of the Yolo Bypass Integrated Project. In order to do this he anticipates that the Working Group would have to adopt of more formal structure and a process for decision making. Dave Ceppos noted that at past Working Group meetings a more formal structure for the group has been discussed. No action was taken as a result of past discussions. People liked the current ad hoc structure. Dave suggested putting the issue on the next Working Group meeting agenda. Dave Feliz asked Jacques to describe some of the proposed Yolo Bypass actions. DFG has submitted some proposed actions relating to the Yolo Bypass Wildlife Area. Selby Mohr stated that there needs to be people at the table that can make decisions for their agencies and organizations. Dave Ceppos noted that this is not a five minute discussion and it is important to schedule a meeting to talk it over.

Yolo Bypass Wildlife Area Management Planning Process Update

Dave Feliz described the public involvement process for developing the plan. There was a public scoping meeting in December 2005. There were 5 stakeholder focus meetings in March and April 2006. All of these meetings have resulted in a draft plan. The goal is to have a public draft Land Management Plan out for a 30-day public for comment this summer. The Plan will be on the Yolo Basin Foundation and DFG websites around June 14. CDS will be available as well. Chris Fulster asked about hunting south of the old Sacramento Northern train trestles on the Tule Ranch. He wants a closed zone next to the levee. He asked about ditch repairs at the south end of the Wildlife Area. DFG will repair flood damage to the ditch. Dave asked people to read the draft plan when it is available and send comments to his email.

Proposed Delta Vision Process

Linda Fiack gave out a handout for discussion purposes only. The Little Hoover Commission Review of the California Bay Delta Authority (CBDA) prompted discussion of a Delta vision. This is an attempt to create a 100 year vision for the Delta in general not just for CBDA implementing

agencies. DPC is getting landowners involved in the discussions. The co-leaders of the visioning process are the Secretary of Resources, Mike Chrisman and Secretary of Business, Housing and Transportation, Sunne McPeak. A Blue Ribbon panel is evolving. Information on the Delta Visioning process is posted on the DPC website. Linda anticipates that the governor will come out with a directive to start a 100-year vision. Counties are doing general plans the State Department of Parks and Recreation is doing a plan for a Central Valley vision: these are all underway. The groups need to share their visions.

Steve Macaulay noted that there is strong interest for a Delta vision process among a wide range of stakeholders. The upcoming Delta Vision Conference at UOP is sponsored by Delta water agencies, DWR, and many others. A Delta Vision process, initiated by the Schwarzenegger Administration, is likely to be very comprehensive in scope, covering water, fisheries, land use, utility corridors, etc. Jack Palmer noted that this process is more important than any other that the Working Group has addressed. What happens in the Delta will have long term effects on the entire Central Valley.

Linda Fiack and Dave Ceppos and Steve Macaulay described the upcoming Delta Vision Conference. Linda also gave an update on Senator Torlakson's bill on creating a Great Delta Trail network connecting existing public facilities. It passed off Senate floor. See the DPC website for stakeholder comments on the trail idea. It would be a network of public access opportunities. Dave Ceppos gave kudos to Linda for taking a leadership role for many issues and noted that there is a lot going on. Dave Feliz seconded what Dave said. He recently gave a presentation to the Delta Protection Commission on the Yolo Bypass Wildlife Area Land Management Plan and the Commissioners asked insightful questions. Steve Macaulay told the group that Tom Zuckerman who represents the Central Delta Water Agency is involved in the Delta Vision discussion and they should consider inviting him to the next Working Group meeting.

Update on Lower Yolo Bypass Collaborative Stakeholder Planning Process

Dave Ceppos discussed this effort. The process is going to happen however there are some additional contracting steps that need to be done. It's being sponsored by YBF, DFG, and DPC. Robin and Linda will be taking a leadership role. The Working Group will be a direct conduit for public input and particularly for duck club participation. The process will likely seek the focused participation of 2 duck club representatives to sit at table as negotiators. They will report back to Working Group since there is no formal waterfowl association in the Bypass like the Butte Sink and Suisun RCD groups For the purpose of the project, the Lower Bypass is defined as extending from the DFG Yolo Wildlife Area down to Rio Vista. Including levees on both sides and the RDs associated with those levees. Linda Fiack stated they are looking forward to starting the process and Robin confirmed the Foundation's commitment to keep everyone informed. Brad Burkholder from DFG echoed these comments

2006 Flood Season and Impacts to Bypass Landowners / Managers

The full group discussed this. The Wildlife Area is open now. Field work is going on. The Area lost about 1,000 acres of rice and about 2/3 of rice income worth about $100,000k. Tomatoes are in and will hopefully be productive. Food plots are going in. Safflower won't be ready for dove season maybe for pheasant season. Sudan grass will be available.

Draft Minutes
Yolo Bypass Working Group
Meeting 38

September 18, 2006
10:00 to 1:00.

Yolo Wildlife Area Headquarters
45211 County Road 32B, Davis

IN ATTENDANCE: Robin Kulakow, Yolo Basin Foundation (Foundation)
Dave Ceppos, Center for Collaborative Policy (CCP)
Cesar Blanco, US Fish and Wildlife Service (USFWS), Anadromous Fish Restoration Program
Casey Walsh Cady, California Department of Food and Agriculture
Debra Chase, Tuleyome
Regina Cherovsky, Conaway Ranch, RD 2035
Jacques DeBra, City of Davis, Public Works
Jack DeWit, DeWit Farms
Chuck Dudley
Linda Fiack, Delta Protection Commission
Dave Feliz, Dept. of Fish and Game (DFG) Yolo Wildlife Area
Erin Gable, Office of Senator Torlakson
Dick Goodell, Glide In Ranch
Mike Hall, Conaway Ranch
Mark Kearney, Landowner
Dave Kohlhorst, Glide-In Ranch
Marianne Kirkland, Department of Water Resources (DWR)
Mick Klasson, Consultant
Dean Kwasny, DFG
John Legakis, Senator Outing
Steve Macaulay, California Urban Water Agencies
Steve Mahnke, DWR
Betsy Marchand, Foundation
Julia McIver, Yolo County
Robert Moore, CBH/SAA
James Navicky, DFG
Jennifer Navicky, DFG
Michael Perrone, DWR
Dave Pratt
Paul Robins, Yolo County Resource Conservation District
Ken Rood, Northwest Hydraulics Consultants
Bob Schneider, Tuleyome
Tom Schroyer, DFG CALFED Grant Management
Mary Scruggs, DWR, Division of Planning and Local Assistance (DPLA)-Conjunctive Water Management Branch
Don Stevens, Glide-in Ranch
Ed Towne, Bullsprig Outing

Tasmin Eusuff, DWR, DPLA
Greg Weber, CCP

Meeting Introduction

Dave Ceppos opened the meeting by welcoming everyone and noting the passing of Ruth McCormack and Selby Mohr's father. Introductions were made. Dave reviewed the previous meeting summary and asked if there were any proposed revisions. Steve Macauley commented on the Delta Vision notes in the minutes for meeting 37. He said that the farmers are participating in the exercise, not leading it as implied in the draft minutes. He gave Robin comments to use in making his requested edits to the minutes. Dave Feliz asked that we strike the line on page 6 about losing 25% of grazing income as that is not accurate. Dave Ceppos stated that these revisions would be made and that the revised summary would be then added into the project record as final.

Yolo Bypass Conceptual Aquatic Restoration Opportunities

James Navicky led this presentation. The Yolo Bypass Interagency Working Group (YBIWG) includes the DFG, DWR, the National Marine Fisheries Service and USFWS. The mission of the group is to improve conditions for native fish in the Yolo Bypass; and keep users of the Yolo Bypass whole by maintaining or improving existing conditions. The YBIWG has agreed upon a conceptual list of prioritized aquatic restoration opportunities in the Yolo Bypass. All of the necessary studies are not done.

The presentation today is step one of stakeholder outreach. The next step will be to seek stakeholder input to guide further actions. The third step is to work in concert with stakeholders, develop an appropriate restoration plan that maintains or improve conditions in the Bypass for native fish and Bypass users. The group will seek stakeholder input to guide the proposed projects down the road. James distributed a form to get participants' comments.

The focus of the YBIWG discussions to-date is north of Little Holland Tract. James reviewed a list of key issues including agricultural operations, flood control, educational activities, public and private waterfowl management operations, water quality, Yolo Wildlife Area infrastructure investments, Wildlife Area management operations, recreation, vector control, and benefits to fish. There are five potential opportunities: Putah Creek realignments, Lisbon Weir improvements, additional multi-species habitat, Tule Canal/Toe Drain improvements, and improved fish passage facilities at the Fremont Weir.

Putah Creek – The project proposes stream realignment, floodplain restoration and fish passage improvement. The project ideas may have benefit for agriculture through improved water management opportunities and elimination of some nuisance flooding. This project will be on public lands of the Yolo Wildlife Area.

Lisbon Weir – The project is proposed to modify or replace the weir, improve the weir to benefit fish, wildlife and agriculture, and reduce maintenance and operation. Adjustments could be made to address fish passage issues.

Additional multi-species habitat development: On public or private lands (with landowner cooperation). Project ideas could include putting in set back levees of 100 feet or more. This is not a proposal to flood farmland anymore than is happening now. It would provide for controlled localized

seasonal inundation on more frequent intervals. The goal would be to identify areas of opportunity on the Wildlife Area and other existing public lands, and private lands where cooperative agreements with willing land owners would provide mutual benefits.

Tule Canal / Toe Drain connectivity: Some complete blockages exist in the Tule Canal. The goal would be to identify passage impediments and work with land owners to develop the best options for improving fish passage and ensure continued water diversion capability. This study would remove passage impediments –road crossings as fish may be getting trapped but would seek to support land owner / manager access to do their business.

Multi species fish passage structure at Fremont Weir: The current structure designed in 1955 was for salmon only. With the listing of green sturgeon there is the need to look at additional species and structural improvements. The goal would be to improve fish passage at the Fremont Weir when the weir is already flooding and evaluate the feasibility of constructing a new fish passage structure operated to ensure continued flood conveyance capacity. No substantial changes in timing, volume, and/or duration flow with minimal disturbance to existing land use and agricultural practices.

All the above ideas are in the conceptual stage. No studies have been done. The YBIWG wants comments from stakeholders and wants to focus on having future discussions. How can these actions improve things for landowners?

Contact information for James: jnavicky@dfg.ca.gov, (916)358-2926.

Q: What about endangered species? It is important not to encourage fish in the Yolo Bypass at the wrong times.

Regina Cherovsky with Conaway Ranch said that she appreciates hearing what James has to say. Landowners often hear rumors about things in the middle of a project.

Betsy Marchand raised the issue of flood control. It is the priority use of the Yolo Bypass. Will more flood easements be purchased as part of these projects? James did not have an answer at this time.

Casey Walsh of the California Department of Food and Agriculture said that she is concerned that not many landowners are present. Casey asked if there is a way to communicate with more of the landowners? Dave reminded participants that meeting minutes will be sent out. YBIWG is committed to communicating with the landowners and will continue to do so.

Would this plan be part of the Yolo County HCP or NCCP? Yolo NCCP doesn't include aquatic habitat. This would fit in the Delta NCCP that will encompass the Yolo Bypass. There is an effort going to get a Bay Delta conservation plan started.

California Flood Legislation - Current Options and Next Steps

Alf Brandt Water Resources Advisor to State Assemblywoman Lois Wolk led this discussion. Assemblywoman Wolk was not able to attend due to a previous engagement. The staff reported that very little substantial flood related legislation passed this year. Lois did get one flood bill through. Her work with the Yolo Basin Foundation and DFG in the Bypass has played an important role in her development of flood legislation. Lois represents this area. She recognized the flood control issues

when she came to office and put a package together of flood bills before Hurricane Katrina. Alf Brandt was staff to the flood legislation in his role as attorney for the Assembly Water, Parks and Wildlife Committee. He has brought legislators out to see the flooded Yolo Bypass. They had no idea how big and important it is. When the Bypass is flooded it is a good visual reminder of how important flood control is in the Sacramento Valley. The Bypass provides an example of what can be done when they work on San Joaquin issues. A bond for levee repair is on the November ballot.

AB 1899 proposed that land use be tied to floodplain development. They tried to get people to focus on how to get more protection. It is not just about building bigger levees but other ways to get more protections such as set back levees and bypasses. A number of other bills passed the Assembly and made it to the Senate rules committee. AB 1665 was the Administration's flood package. There was a liability piece for local governments, a general plan piece and safety planning. Senator Flores' bill addressed Reclamation Board decision-making. AB 1665 had wording added at the last minute about local governments taking on all liability for flood protection improvements. That bill didn't make it out of committee as a result.

Susan Treabess, staff to Assemblywoman Wolk lead this part of the discussion. Two propositions are on the November ballot to address funding for flood protection. What is planned for the future? Flood related land use legislation and liability legislation will come back. Due to a court decision (Paterno) the state is responsible for what happens behind levees but has no control on what is built there. That is a problem for the state. It is a huge financial liability. The Administration wants to say it's the liability of local government. Lois believes that the solution to the liability issue is somewhere in the middle. If locals have achieved certain standards –state can take the liability. If those standards are not met then the locals have all of the liability. There will also be a flood insurance bill. Flood insurers are opposed to universal flood control insurance. How can state require higher protections if no funds are available? If the bonds do not pass, future assessment of beneficiaries may be needed Southern California residents could be assessed because they benefit from the water supply from Northern California. SACOG and SAFCA are interested in flood issues. Northern California people are much more advanced and aware of flood issues because it happens locally. Residents of Southern California don't know enough about these issues and are not necessarily inclined to focus on them.

Chuck Dudley asked if legislators are aware that flood control and water storage work together.

Alf Brandt: I worked on water issues on the federal level before my current work. The issues that need to be addressed include: What kind of storage? Where is it? What does it cost? AB 802 required water supply considerations in flood protection actions. The answer may or may not be dams. It may be underground storage. There is a lack of partners on water supply projects. Beneficiaries don't want to share cost. All players and payers must work together. The Yolo County Integrated Regional Water Management Plan (IRWMP) is part of this process.

Chuck Dudley asked if levees have to have partners like water storage? Yes

In conclusion there must be local support of flood related legislation. Flood protection vs. flood control; there is a range of ways to get to flood protection without building bigger levees.

A Proposal for Yolo Bypass Stakeholder Involvement –
the Yolo Integrated Regional Water Management Plan

Jacques DeBra with the City of Davis Public Works and the IRWMP Technical Advisory Committee Chair lead off the discussion. The 1992 county-wide water plan updates were static and had no implementation plan. We need to work together to get water related projects implemented. He mentioned the Water Resources Association of Yolo County (WRA) website to keep updated. The WRA is a nine-member agency. WRA is interested in being a collaborative partner to help people get projects done in Yolo County. They do not want to get in the way. On Oct. 25 a public workshop is scheduled to review the IRWMP.

Jacques asked that people read through the plan. He described the plan list of actions as of September. 2006. It's not a static list. Actions come from throughout the county including the Working Group. He showed a flow chart of how the WRA anticipates implementation of the IRWMP. There are 8 integrated actions. The Yolo Bypass integrated project is where the Working Group's contribution fits in. The plan is meant to empower watershed groups that already are working in their watershed. The WRA will rely on them to take the lead. The only other way to implement the plan is to create a water agency. The WRA doesn't think that Yolo County is ready or necessarily needs that approach. The WRA wants the Working Group to support discussions about IRWMP implementation by getting directly involved. The WRA is behind Working Group efforts. Jacques said that he is impressed with range of stakeholders. The WRA is trying to position itself for funding opportunities. Integrated projects are the way the funding world is going. WRA will stay out of the way of watershed groups. There are already established dialogues on all Yolo watersheds.

Robin Kulakow commented on the need for a subcommittee of the Working Group and how structure and membership would be determined.

Dave Ceppos described how CCP is in the role of helping to organize the subcommittee (should it be deemed appropriate and feasible to do so). A contract between CCP and DWR is not signed yet but there is a draft scope of work. The Working Group has been talking about some of the actions proposed in the IRWMP for 7 years. This is where "the rubber meets the road" for projects in the future. Funding opportunities come up all the time. The Water Bond on ballot will create funding for potential projects in the Bypass. Funding agencies are looking for grouped proposals, projects that have been prioritized locally. Unified, multi benefit projects are preferred. Yolo County needs focused buy in if special funding comes up. The WRA is asking if the Working Group is the place to start?

After today, CCP will start working on recommendations of how to structure subcommittee. This subcommittee will rely on input from the Working Group. It won't replace it. The Working Group is the essential venue for the proposed Subcommittee to hear public ideas and a place to vet potential projects. Dave asked if there are people here that are willing to convene in a focused meeting the 2nd week of October. Dave would propose some structure, rules of engagement. Who would like to be seated at the table? How do we decide how many duck clubs should be on the subcommittee for instance? Show of hands of who here is interested in a focused meeting. Many people are interested.

Mary Scruggs with DWR spoke. They need local help. They can't prioritize all projects statewide. "We are here to support you". The State needs the WRA and local groups to get water supply stability for the state.

The last IRWMP public meeting is Oct 25th at the Heidrick Museum. The draft IRWMP is online and available at public libraries. IRWMP public review process is 45 days and was initiated October 6. They will be taking agency and public comments during that time.

West Nile Virus Conditions and Regional Vector Control

There were 300 acres of wetlands flooded in Sept. –Dave Feliz worked this out this with SYMVD, John Fritz was not able to attend the meeting.

Yolo Bypass Wildlife Area Management Planning Process and Upcoming Waterfowl Season

Dave Feliz showed a series of photographs taken from an airplane on September 15th. which showed aerial views of duck clubs, and recent construction projects on the Yolo Bypass Wildlife Area. His photos depicted vegetation management activities completed, including mowing. Mr. Feliz described that mowing removes a lot of hydraulic roughness which support flood conveyance. H Pond worked with the mosquito district for early flooding this year. The District likes the mowing that has been done to reduce joint grass. NAWCA projects are underway on the Tule Ranch unit of the Wildlife Area. All new ponds are designed to flood in a few days and feature a large number of islands and swales and micro topography. Dave showed a photograph of restoration work on the Pacific Flyway Center site. He showed two other potential sites for this education and visitor center. Tour route ponds are starting to flood. Dave started to pump water to fill the ponds in early September. He showed a picture of mowing for cocklebur. Late spring flooding earlier in the year resulted in nearly 4,000 acres of cocklebur on the Wildlife Area. There are now large areas with infrastructure for rice production. These fields have proven to be very versatile for providing diverse habitat types including mudflats, watergrass fields and food plots.. He showed the new pond adjacent to I-80 near the west side of the Yolo Bypass. DFG used restoration funds to make the pond and make a ditch for agricultural uses. There are currently 3 permanent DFG field staff. Consequently, a lot of the fieldwork is done by DeWit Farms, Los Rios Farms, and the Sacramento Yolo Mosquito and Vector Control District, illustrating the strength and depth of the working partnership established at the Wildlife Area. The problem with getting funding is within DFG. On the opening day of dove hunting there were 61 hunters that shot 147 birds. There was no safflower, no mature seed in the Bypass this year due to the spring flooding. Timing of migration worked for hunters with a fair number of birds passing through the area on September 1st. Prospects look better for the later dove season.

October 21 is the opening of waterfowl season except on the Wildlife Area, the opening day is delayed until Oct 28 because of the late rice harvest. Duck bag limits: 7 ducks up to 7 mallards, not more than 2 hen mallards, 1 pintail, 4 white geese, 4 white-fronted geese and 7 Canada Geese.

The joint proposal from DFG and the Foundation on mercury research on rice rotation and mercury cycling was not funded. Mercury research is being done now with DFG funds on site in cooperation with other agencies. Dave is working with the DFG Marine Lab at Moss Landing and Chris Foe at the Central Valley Regional Water Quality Control Board (RWQCB). The effects of rice production and wetland management on the methylation of mercury will be studied. The effects of spring drawdown and fall flood up of seasonal wetlands on methyl-mercury production will be studied. Research in other wetlands shows that there is a spike in methyl mercury production with fall flood up, after which the methylation rate slows down. We're trying to see if this spike in mercury cycling rate is happening at the Wildlife Area. The removal of vegetation will be investigated to determine

if this practice helps reduce methyl-mercury production by creating more aerated water. or perhaps allowing more sunlight to penetrate the water column. DFG is working closely with RWQCB to satisfy some of the research needs for the upcoming TMDL (total maximum daily load).

The base soils may have an effect. The characteristic banding patterns of floodwaters observed in the Yolo Bypass which depict specific flows from Cache Creek, Willow Slough, Putah Creek and the Sacramento River will be sampled and correlated with soil sampling to determine if these patterns also occur in the form of on the ground deposition patterns of elemental mercury. Methyl-mercury production will later be measured within these bands. They are also sampling in rice production areas for the first time. Since rice production is proposed to be a long term land management action on the Yolo Bypass Wildlife Area, it is important to understand its impact on methyl-mercury production.

Yolo Bypass Wildlife Area Land Management Plan

DFG is reviewing the administrative draft of the plan. The review is almost done then it will be out for public review.

Dave Ceppos and Betsy commented on how much Dave Feliz and his staff get so much done with so little staff.

Betsy suggested that Dave give a report at the next Working Group meeting on how operations are funded. Dave commented that this would be an appropriate time since the LMP is almost done and it has a chart showing how much staff is needed for proposed actions.

Delta Vision Process

Linda Fiack is the Executive Director of the Delta Protection Commission and often attends Working Group meetings. The DPC acts as a liaison on many issues of interest to Yolo Bypass stakeholders. Linda described the Delta Visioning process. The objective is to create an integrated vision and strategy that will provide for the environmental and economic stability of the Delta, as a resource of local, State and national significance. The DPC is a state agency that looks beyond county borders. The DPC said that the Delta Visioning process needs to involve more than the California Bay Delta Implementing agencies. They insured that there is a local stakeholder component Look at DPC website for updates. Mike Chrisman, State Resources Secretary, is head of process. Part of visioning process might be the recently initiated Bay Delta Conservation Plan, a very large Federal Habitat Conservation Plan (HCP), and State-level Natural Communities Conservation Plan. Aquatic resources are on a fast track to get done. DPC will be facilitating monthly meetings to make sure regional government HCP efforts are involved and that there can be a local benefit. Most of the nearby regional HCPs are terrestrial species based. Two plans do include fisheries. This process also needs a delta wide focus.

Delta Trail

Linda introduced Erin Gable from Senator Tom Torlakson's office and described the idea of The Great California Delta Trail. Senator Torlakson was one of the original members of the DPC. He recognized that creation of the trail should be a stakeholder process. Before his bill, SB 1556 passed stakeholder meetings were held to discuss recreation issues. Erin was the staff person for SB 1556, which is on the Governor's desk to be signed into law.

This would be a recreational trail for biking and walking. It is a conceptual corridor. There is no alignment yet. It would be connected and very similar to the San Francisco Bay trail that ends in Benicia and Martinez. Senator Torlakson was a biology teacher and is an avid cyclist. He often bikes to work–67 miles to the State Capitol. There is very little safe access for bikes to access Delta recreational and natural resources. SB 1556 was introduced to start the process for a stakeholder planning process to develop the trail concept.

DPC will head up the planning effort. Does it make sense? It is an ambitious concept inspired by the similar Bay Area Trail which is 40% complete and is an exceptional example of how local stakeholders can work together to build a trail. As for the Delta Trail, there is no line on the ground. This is a planning process. It may turn out to be a network of access trails. When the process is complete it will be taken to each county and it will be up to them to implement the trail. They are taking into consideration the Yolo Wildlife Area LMP and the Yolo County Parks Plan.

Regina Cherovsky noted that pedestrian access through agricultural fields is a problem. The California Farm Bureau is opposed to the concept. People who work the land should be included in initial discussions. Farming is part of the picture that people want to see but can't exist with too much public access. Erin stated that issue is very important to the Senator.

Dick Goodell said that he rode his bike from Minnesota to New Orleans along the Mississippi River. It is important to remember that the Bypass floods and Bypass lands are therefore not appropriate for a trail. Hate to see you waste the money on something that can't be maintained.

Erin agreed with Dick. The first step in planning is to look at local trail plans and to develop a short term and a long-term plan. Ultimately it might be possible to ride a bike from San Jose to Sacramento if proved feasible and appropriate. Ideally it will be continuous trail but if it can't, it won't be.

Linda mentioned the US Army Corps of Engineers Delta Trail proposal from several years ago. DPC won't approach this trail plan like the Corps did. DPC voted to support the bill. DPC members did not want funding to be taken from flood protection, habitat restoration and public health and safety planning. Safety is first but they want the trail to be part of the discussion.

Chuck Dudley noted that this looks like a pretty intrusive project on agriculture and hunting. Need to consider the liability of trail and need iron clad agreement on liability to protect current land uses.

Erin agreed. Hunting is specifically mentioned.

Linda – it would good to check out the DPC website for more information on the trial concept. She went on to discuss DPC involvement in the methyl mercury TMDL issue. The Mercury Collaborative was organized by DPC to protect Delta interests in development of the TMDL. They have written two letters to the RWQCB regarding mercury TMDL. They have hired two consultants – in water quality and economics to assist them. They are encouraging the RWQCB to avoid using isolated data. The Collaborative is educating people about the mercury issue.

The DPC strategic plan is now on website.

Bob Schneider spoke up in his position as Chair of the RWQCB. He discussed the TMDL of impaired water bodies. Staff is required to look at methyl-mercury. They are not charged with

tradeoff of benefits. It is an interagency issue. Participation in the process is important. Staff does not want to stop wetlands restoration but they have their mandate. TMDL is a CEQA equivalent process.

RWQCB Agricultural Waiver Water Quality Issues

John Currey was not able to attend but gave Dave Ceppos an update. The RWCB has set December 31, 2006 as the deadline for all irrigators to join a watershed group. If irrigators don't join they could be subject to a fine. Irrigators were given a chance to approach the Board as individuals or join a watershed coalition. John's issues so far: They have found some toxicity readings. They are looking into whether or not these readings are erroneous. They will look upstream in the watershed to see where the source is. They are getting hits of e coli but don't know if it is coming from water pollutants, plants or feral animals? Trying to assess where application took place. The Board is sending out enforcement letters to Yolo Bypass landowners. There are quite a few irrigators in this area that are not involved yet.

Bob Schneider -Yolo and Solano have done as good as a job as anyone. The Ag Waiver is almost a permit. It is not truly a "waiver." They have asked for enrollment lists. He supports a five-year renewal process. They should get on with water quality improvement rather than the waiver. Use time to develop Best Management Practices. Ag has to tell the story. Under the Porter Cologne Act people can't sue individual landowners. Agriculture needs to let public know what they have been doing to improve water quality.

Lower Yolo Bypass Collaborative Stakeholder Planning Process

Dave Ceppos announced that this process is still happening. Yolo Basin Foundation, CCP and DPC are working on contracting for the project. The kick off will be a big tour of the South Bypass. The tour will go along the eastside of the Bypass. They will look at Prospect and Ryer Islands, federal levees. They will take a boat to the lower Yolo Bypass to check out Cache Slough and the Shagg Slough and the Liberty Island Bridge. This tour will be part of the process for people to get familiar with what the islands look like. Dave will be working to set up the number of seats for certain stakeholders. We still need to get contracting done before the trip can be planned. If winter comes then the field trip might have to wait until spring. Working Group participants will be kept up to date. The lower Yolo Bypass Collaborative process will rely on the Working Groups as a venue to get public input.

Draft Minutes
Yolo Bypass Working Group
Meeting 39

December 15, 2006
10:00 to 12:00.

Yolo Wildlife Area Headquarters
45211 County Road 32B, Davis

IN ATTENDANCE: Robin Kulakow, Yolo Basin Foundation (Foundation)
Dave Ceppos, Center for Collaborative Policy (CCP)
Carol Atkins, Department of Fish and Game (DFG)
Mike Bradford, Hunter / Outdoorsman"
Joel Buettner, Sacramento Yolo Mosquito and Vector Control District (SYMVCD)
Regina Cherovsky, Conaway Ranch, RD 2035
Jack DeWit, DeWit Farms
Mike DeWit, DeWit Farms
Robert Eddings, California Waterfowl Association (CWA)
Tasmin Eusuff, Deptartment of Water Resources (DWR), Division of Planning and Local Assistance
Linda Fiack, Delta Protection Commission
Dave Feliz, DFG, Yolo Wildlife Area
Paul Forsberg, DFG
Chris Fulster Jr., Glide In Ranch
Dick Goodell, Glide In Ranch
Andrea Jones, Yolo County Board of Supervisors, Office Supervisor Yamada
Dave Kohlhorst, Glide-In Ranch
Greg Kukas, US Army Corps of Engineers (USACE)
Teresa Le Blanc, DFG, Lands Program
John Legakis, Senator Outing
Rick Martinez, Farmer, Triad Farms
Zoltan Matica, DWR
Julia McIver, Yolo County
Selby Mohr, Mound Farms
Robert Moore, California Bow Hunters, SAA
Bob Schneider, Tuleyome
Julie Simpson, Larry Walker Associates
Ted Sommer, DWR
Don Stevens, Glide-in Ranch
Jeanette Wrysinski, Yolo County Resource Conservation District

1. Introductory Comments

Dave Ceppos, Facilitator from CCP noted that this meeting marks the end of CALFED funding for the Yolo Bypass Working Group (Working Group). CALFED has funded the group for eight years. Dave asked for comments on the minutes of the previous meeting. Don Stevens noted a correction

that needs to be made: the Canada goose limit is four not seven. The minutes were adopted as final with the one correction**.**

2. Completing the Yolo Wildlife Area Land Management Plan (LMP) – Current Status and Final Steps (Dave Feliz, DFG)

The LMP sets the framework for long-term management of the Yolo Wildlife Area (YWA). DFG staff at the regional level are still reviewing the LMP administrative draft. The Lands and Facilities Branch has reviewed it and now all that is needed is the blessing of the Regional Manager. DFG is reorganizing its regions for the first time in many years. Region 3, the Central Coast Region is merging with the Bay Delta Office. The new Region 3 will include the San Francisco Bay, Suisun Marsh/Grizzly Island and the YWA. The new regional manager needs to review the LMP before it goes out for public review.

Dave highlighted some features of the plan. There is a long list of planning influences that DFG needs to coordinate with. Flood control efforts and policies have all been looked at and incorporated in the LMP. The management setting includes previous commitments to the Sacramento River Flood Control Project, the YWA's Memorandum of Understanding regarding management for flood control and endangered species, Glide Ranch commitments, the DFG/Foundation MOU regarding public access programs, and agreements with the Dixon Resource Conservation District and the SYMVCD. The plan is organized by elements, goals, and tasks to carryout the goals. There are ten elements including biological resources, public use, and fire. The Operations and Maintenance section includes tasks needed to carry out all of the management goals. This section is used to develop the budget needed to achieve the LMP goals. Dave referred to the shorebird management goals as an example. The LMP includes a matrix with tasks and hours needed to do them. This is a way of calculating personnel needs. It details what it will take to implement the plan. Paul Forsberg asked if this is something new for YWA? Dave said yes and that he did a similar exercise at San Jacinto Wildlife Area in 1989. He doesn't know if other wildlife areas go through this exercise. The plan calls for approximately 14 permanent staff. Currently the YWA is operating with 3 permanent staff.

Chris Fulster asked Dave to define closed zone versus sanctuary. The public is not allowed access to the sanctuary area. The closed zone is closed to hunting but open to wildlife watching. There area about 500 acres currently set aside for wildlife viewing, 3,000 acres open for hunting, and 400 acres of sanctuary. Pintails are concentrating in 400 acres of rice adjacent to I-80. What you are seeing from I-80 is a narrow area next to the freeway. There is a proposed closed zone at the south end of the YWA adjacent to the duck clubs. There is a NAWCA project planned for next year next to that south ditch. That area won't be hunted. A participant asked if dredging of the ditch just south of I-80 is still in the plan? Yes, the construction of this ditch will continue, although it will probably be built with scrapers, rather than excavators.

Selby Mohr asked how will the plan be implemented? What can this group to help you? Dave noted that funding is needed to implement the LMP. Farming income is $300,000 in a good year. The YWA budget includes about $100,000 from the Cigarette Tax, $250,000 from the environmental license plate fund and $187,000 from the Pitman Robertson tax on ammunition. That makes total funding about $800,000/year. Dave Ceppos asked if an advocacy group were to try to generate a letter or letters of support for the needed budget---would that be helpful? Dave Feliz said would be very helpful during implementation later in the year. The Working Group has a lot of credibility within DFG. Dave Ceppos suggested that we should have a meeting of the Working Group after the plan comes out to plan strategy to support the LMP. Don Stevens, a retired DFG employee noted that the State Department of Finance is key to getting funding. Theresa Le Blanc commended Dave Feliz

for putting together the LMP, noting that it is a huge effort. The LMP is needed to justify positions. Every year DFG goes to the Department of Finance with budget proposals. Robin Kulakow and Dave Ceppos said that they can work on a strategy for support letters. Robin Kulakow pointed out that comments can be positive. They don't have to be all negative. Linda Fiack said that getting word out about the public comment period is important for getting support from the Delta Protection Commission. Support has to come from stakeholders. Selby Mohr asked if we can sign as stakeholders of the group. He suggested that a topic for the next Working Group meeting is how do we as stakeholders sign letters supporting the LMP. Can we sign as a group since it is hard to get signatures?

Dave Feliz reviewed recent waterfowl survey data. Overall there were more ducks in the Sacramento Valley in 2005 than 2004. Surveys are indicating that there are more ducks in the Valley in 2006. Please see the attached survey data for more information.

Dave Feliz also reviewed the current hunting program at the YWA. The Northern Pintail is the Pacific Flyway bird. The YWA is open 2 hours before shoot time, which is now about 4:30. Hunters can get reservations by mail, lottery from night before, and sweat line. This has been a very poor pheasant year all over. Less than 100 birds. Blinds are the best hunting. Rice fields north and east of Greens Lake is open for hunting. Please see the attached document for recent hunting results for the YWA.

Dave Feliz discussed a research project that DFG and SYMVCD worked on last year. The study looked at different types of vegetation removal versus no removal and the associated effects on mosquito populations. The data showed that mosquito populations were lower where there was less vegetation. These same ponds had more midge larvae, which are a beneficial food source for waterfowl and shorebirds. The study results will be published in a vector control research journal.

According to Dave Feliz the LMP does not have a map of changes in land use. The maps and descriptions are at a more conceptual level. They don't show where every pond is going to be etc. The LMP identifies priorities. Things are falling in place for managing the YWA for the long term. Current rice fields will probably stay in rice infrastructure. The infrastructure is very versatile and DFG and the farmers have invested a lot on money in it. DFG is planning to widen the wildlife viewing loop. This will give people the chance to see the rice fields and associated water bird use. The food plot/irrigated area will stay for income or food and will be in the hunt area. DFG will maintain cattle leases in the vernal pool area of the Tule Ranch. On the Tule Ranch there will be areas dedicated for irrigated pasture. This creates good nesting habitat for ground nesting birds and high value forage for cattle. There is a tidal area at the southeast corner, which is creating a freshwater tidal marsh. This marsh will be enhanced with constructed sloughs, swales and varying topographic features. A re-routing of Putah Creek is planned to enhance salmon passage. Farmers are using much of the route already for irrigation. Some riparian restoration along Putah Creek will be proposed. DFG will continue to grow safflower for doves. No irrigation system exists in the safflower fields. One field on the Tule Ranch had sunflowers planted and irrigated. This was followed by the placement of cows in this field for grazing. The cows knocked down most of the sunflower which then became available for dove and dove hunters.

Jeanette Wrysinski asked if there will be any movement away from managing invasive species like water grass. Dave Feliz said that he is not sure what ducks fed on in the undisturbed natural state, possibly Santa Barbara sedge, bulrush, creeping wild rye. DFG does manage for these natives. They also work with farmers on weed control. The shorebird rotation grows invasive weeds and then they are disced in before they set seed. DFG is definitely working with farmers. The natural hydrology

doesn't exist so its hard to manage for what was once here. Most of wetland management is managing invasive species that are good waterfowl food. Natural hydrology couldn't be recreated unless people move out of the floodplain. Jeanette said that much of the Yolo County RCD's work is managing nonnative invasive weeds. Water grass plots could be converted to natives for example. Dave said that he is not sure how to get rid of water grass/swamp timothy since the ducks plant it every year and the flooding brings it in. One example of native plant management is the late summer flooding of fallow rice fields, which seems to encourage the proliferation of alkali bulrush. In 2006, this practice resulted in large numbers of snow geese using these fields.

3. The Yolo Integrated Regional Water Management Plan (IRWMP) Subcommittee (Dave Ceppos, CCP and Working Group members)

The IRWMP was initiated by the Water Resources Association of Yolo County (WRA) with funding from DWR Division of Planning and Local Assistance (DPLA). Tasmin Eusuff is representing DPLA. There is a lot of regional competition for DWR funding. In the past there has been no regional coordination. DWR was being put in the position to make regional decisions but they thought that should be a local decision. The IRWMP process was started to address the need for regional cooperation on funding requests. In the Yolo County IRWMP there are different integrated projects based on subregions / watersheds in the county. An integrated project is a collection of proposed projects/ideas within a specific subregion. WRA recognized that there are already localized stakeholder groups such as the Working Group and therefore came to Robin Kulakow because of the success of the group. They asked if the Working Group could prioritize projects within the Bypass. Dave Ceppos and Robin Kulakow advised that it could be done if there was a formal decision making process for the Group. CCP has a contract with DWR so they were asked to help organize a subcommittee of the Working Group that is able to make IRWMP-related recommendations.

Dave Ceppos distributed the IRWMP executive summary and portions of the chapters that relate specifically to the Yolo Bypass Integrated Project. The plan is to create an equitable group of stakeholders with fair decision-making abilities for one stop "shopping" for the IRWMP. The Working Group Subcommittee does not replace the Working Group. It will rely on the Working Group. Subcommittee meetings will be coordinated with Working Group meetings. Subcommittee members will listen to Working Group stakeholder concerns on proposed projects, then the Subcommittee will meet to prioritize projects. Priorities can change over time. Please see the handout describing consensus with accountability. He reviewed some aspects of the proposal such Subcommittee commitment to communicate with other similar implementation partnerships. He also reviewed a proposed stipulation that allows any stakeholder the option to pursue Bypass actions independent of the Subcommittee if deemed necessary after sufficient collaboration. For example DFG has certain regulatory mandates they have to follow. The Subcommittee can't force any entity to participate in projects that do not meeting regulatory authorities. The Subcommittee membership proposal was reviewed by Dave Ceppos. The group attending the focused Working Group meeting on this topic held November 28, 2007, approved his proposal.

Regina Cherovsky, Ron Tadlock, Tom Schene, Dick Goodell, Selby Mohr, Phil Martinelli, Mike Hardesty, Heidi Rooks from DWR Environmental Services, DFG Fisheries, Dave Feliz, Robin Kulakow and a representative from CWA and Ducks Unlimited will make up the Sub-membership. Yolo County said that they will try to get someone there.

Bob Schneider wants to see representatives of the California Sports Fishing Alliance, Tuleyome, Yolo Audubon, Sierra Club, and an environmental justice group represented on the subcommittee. Tuleyome looks at recreation, etc. Dave Ceppos asked if would Bob would agree to having

additional Yolo Bypass stakeholders participate on the Cache Creek group to provide equal balance. He said no because they are already represented. Julia McIver with Yolo County said that WRA has directed co-leads to prioritize projects within Yolo Bypass integrated project. Once this is done prioritization goes to the next level to either the WRA Technical Committee or the WRA Board of Directors. Selby Mohr asked if this next level is the step where larger interests, beyond the Yolo Bypass, get involved. What is the balancing act between local versus larger interests? Dave Ceppos noted that the WRA has created implementation projects but the next step is not defined yet. Julia McIver said that what Bob Schneider is addressing is the next step after the geographic group meets. That has not been defined by the WRA. Dave Ceppos wants to find an equitable solution. He said he was glad that Tasmin is here to hear this discussion. He will talk with the WRA and DWR about how to handle Bob's concerns.

4. The "State of the Bypass" – "Where we are…where we've been…where we're going" (Dave Ceppos and Everyone)

Robin Kulakow had the idea for a "State of Bypass" discussion as a way to do a report back to the Working Group summarizing what issues have been discussed at Working Group meetings and what the status of the issues is. The Working Group meets about quarterly and we have not done a summary in quite a while. Dave distributed a draft State of the Bypass report saying that it is only a start and not intended to be comprehensive. We intend to send another version. Several people attending this meeting will update the group on their specific issues and this information will be incorporated into the draft report.

<u>Two Dimensional (2D) Hydraulic Model of the Yolo Bypass</u>
Greg Kukas with the USACE gave a short report on the status of the 2D hydraulic model for the Yolo Bypass. The USACE has an operational model now and is working to test it on a case study located on the YWA. The modeling effort has a long history. Six years ago the USACE applied for grant funding to develop a 2D model for improved planning, design, and permitting of Yolo Bypass projects. This is considered to be the best way to optimize land use decisions. Work on the model started a few years ago. The USACE now has a model that is available for use. They need to complete a users' manual and case study. This is a tool for optimizing restoration and flood control.

It can convey localized hydraulics of a grid section by looking at the existing water surface elevations and then analyzing the potential affects of proposed changes, modeled and then compared to existing conditions. The Working Group gave a lot of support for the effort by providing stakeholder input to the needs of project proponents. Some technical challenges with the model remain. Staff changes at the USACE means that the model is about 6 months behind time. A case study analyzed by EDAW was used in development of the LMP. DFG or others can use this model by hiring an engineering consultant with the expertise to run such a model. USACE staff has been working with the State Reclamation Board staff to make sure it fits permitting needs. In response to a question, Greg confirmed that RMA2 (the specific model for the 2D) does allow for water quality applications. Dave Ceppos noted that development of the model is a milestone. This model is a good example of how the Working Group has been able to give landowners multiple tools for land management decisions. This means better business applications. Surface water elevation is probably the most important factor for analyzing effects of proposed projects. The USACE hopes to finish the model and the instruction booklet in the spring. The USACE has been meeting with the Modeling Technical Advisory Committee facilitated by the Yolo Basin Foundation to make sure the model meets the needs of project engineers.

<u>Conaway Ranch</u>

Regina Cherovsky gave an update on the Conaway Ranch. The Ranch partners settled the lawsuit with Yolo County on September 7. The Ranch will stay in private hands. Regina said this is a great thing for private landowners and for working with governmental agencies. The settlement requires that Conaway work more closely with Yolo County. For the first time in the 16 years that she has worked there the Ranch in the best position for moving forward. Current landowners have made a big investment for the future. They are interested in preservation. The main thing about this is that it is still a rice farm. Selby Mohr asked about the long range use of the Ranch's water. Existing regulations covering water sales will be followed. Conaway Ranch is a partner with the City of Davis and UC Davis for surface water in the future if there is extra water. The Yolo County website has the complete settlement document. Regina encouraged people to look at the website. At this point they are still farming but more dialogue will take place.

Delta Protection Commission

Linda Fiack, Executive Director of the DPC is looking forward to further collaboration with the Working Group on a variety of topics including the mercury TMDL and the Lower Bypass Collaborative Process. The Delta Protection Act and the Commission's Management Plan support ag conservation easements in the Delta to promote permanent protection in the Primary Zone. The development of a Bay Delta Conservation Plan is underway by the Resources Agency. The DPC is working to ensure that county plans are taken into consideration in the development of the Bay Delta Plan.

Linda gave a short update on the Delta Vision process. The Executive Cabinet has met. A Blue ribbon task force will be announced. Members will be appointed by the Governor. There is a stakeholder group being put together also. DPC has been involved in the governance structure and providing names for committees. This should all be announced in the near future. DPC applied for working landscapes grant for projects throughout the Delta. These will be pilot projects to highlight wildlife friendly agriculture.

The Governor signed the Delta Trail Bill this fall. Stakeholder meetings have started including agriculture and water, habitat and environment, local interests and private industry. The planning process will start when funding is in place. Formation of a technical advisory group and stakeholder group will start soon. Delta Trail network: What are opportunities and challenges? Linda asks participants to email her with any concerns (lindadpc@citlink.net)

A Discover the Delta nonprofit has been formed. They are doing a visitor center. Exhibits will highlight projects/groups throughout the Delta. Groundbreaking will be soon.

A Mercury collaborative is underway to look at technical aspects of the proposed mercury TMDL for the Delta and to provide comments to the Regional Board. DPC is not a permitting agency but serves as an appeal body.

Earth Justice and the Concerned Citizens of Clarksburg have appealed approval of the Sugar Mill project approval by Yolo County. There will be a Jan 25th hearing to look at consistency with the Commission's Management Plan. DWR is having stakeholder meetings on how to spend bond money.

DRAFT Meeting Summary
Yolo Bypass Working Group
Meeting 41

June 5, 2007
10:00 to 1:00.

Yolo Wildlife Area Headquarters
45211 County Road 32B, Davis

IN ATTENDANCE: Robin Kulakow, Yolo Basin Foundation (Foundation)
Dave Ceppos, Center for Collaborative Policy (CCP)
Joel Buettner, Sacramento Yolo Mosquito and Vector Control District (SYMVCD)
Jennifer Benito, SYMVCD
Marianne Kirkland, DWR Division of Ecological Services
Dave Feliz, DFG, Yolo Wildlife Area
Dave Kohlhorst, Glide-In Ranch
Ron Tadlock, Yolo Bypass Farmer / Landowner
Dick Goodell, Glide in Ranch
Dean Ongaro, H Pond
Chris Fulster, Glide In Ranch
Ed Penny, DFG
Mark Herold, DWR Division of Flood Management (DFM)
Eric McGrath, DWR DFM
Tracy Sheehan, Yolo County
John Curry, Dixon Resource Conservation District
Selby Mohr, Mound Farms
Paul Phillips, California Waterfowl Association
Don Stevens, Glide-in Ranch
Andy Englis, UDC WFCB
Mary Menconi, DFG
Mick Klasson, Consultant – SAFCA
Tony Lucchesi, Wildlands, Inc.

1. Introductory Comments

Dave Ceppos and Robin Kulakow opened the meeting. They reminded the group that all meetings are now funded through a combination of funds from the DWR Division of Planning and Local Assistance, Integrated Regional Water Management Planning (IRWMP) Program, and the soon to be funded DFG Lower Yolo Bypass (LYB) Collaborative Planning Process.

2. Review of previous action items, and adoption of previous meeting minutes as final

The meeting summary from January 30, 2007 was adopted as final with no changes.

3. Update on Yolo Wildlife Area Management Area

Dave Feliz, DFG discussed two categories: New Restoration Activities, and Impacts to Wildlife and Agriculture from this year's water and flow conditions

Dave described the previous winter as one of driest years on record. He explained that fortunately, the Bypass is naturally moist because of its low elevation and location at the north end of the Delta. Therefore, the Widlife Area was not adversely affected by lack of rain. He stated that as a result of the minimal rain and no flood flows, there was an increase of ground nesting birds, and a chance for rodents to invade the Bypass, thus providing more winter food source for raptors.

He explained that without extensive flooding, the naturally occurring vegetation turns into sweet clover which is beneficial as it fixes nitrogen in the soils and provides good forage for cattle. Another benefit from low water was rice farmers were able to get in their fields early and set their crops on time. Flood years mean a loss of agricultural income for the Yolo Wildlife Area (Wildlife Area). For example, the floods of 2006 resulted in a loss of 1,500 acres white rice and wild rice, 100 acres of safflower, and 50 acres corn and milo for wildlife. The Wildlife Area received $286,000 from FEMA for 2006 flood damage. This is being used to repair levees, ditches, and gravel roads in north end. He explained they are trying to extend usable roads on the Tule Ranch for winter hunting and to perhaps extend roads down to the trestles area.

Regarding current agricultural practices, the Wildlife Area continues to run cattle to knock down some vegetation and earn grazing fees. These areas then become available for hunting geese and ducks. They have 400 acres of organic tomatoes and are rotating some organic fields with annual rye to support organically raised cattle as well.

The Wildlife Area received $407,000 from California Wildlife Conservation Board's, Habitat Conservation Fund. They are replacing a submersible pump station with a convention long shafted low lift system. They have also been working on a 350 acre wetland restoration near Greens Lake. This area will be available for hunting.

Phase 3 of North American Waterfowl Conservation Act (NAWCA) funds are being implemented by the California Waterfowl Association (CWA). New projects include the Parker and PG&E parcels. NAWCA funds are federal and are matched by state money used to purchase the Glide Ranches. Ducks Unlimited (DU) is also implementing NAWCA funded habitat restoration. More restoration is slated for next year on the Parker and PGE parcels as well. Additional work includes: restoring flow to an old branch of Putah Creek above the existing check dam; creation of swales and high ground, installation of pumps, and other efforts. Dave described the new wetlands near the I-80 Causeway. A new delivery ditch was built and the dirt was used to build levees for the wetland cell. The site is being managed as a brood pond.

In the southern Wildlife Area, work has been done on the main supply canal on the boundary of the Glide In Ranch.. There has been restoration of wetlands in the the old Martin's Pond . This restoration totaled about 400 acres. It is anticipated that the southern portion of this wetland will not be hunted in order to hold more birds for the adjacent duck clubs and for the Wildlife Area. Combined with adjacent planned wetland restoration projects, a total of 530 acres is being held for no hunting. Chris Fulster raised a concern that 530 acres does not translate into enough distance if the intent of DFG is to hold birds. He would like to see more buffer such as 500-1,000 feet. Dave Feliz

stated that there is about a 2,000 foot buffer and that the intent is to improve hunting for both clubs and DFG.

Regarding other activities, DFG received AB 1982 funds a few years ago to look at managing vegetation to prevent mosquito production. They have been discing joint grass and spraying to prevent mosquito production and providing labor for maintenance activities. The partnership between the Wildlife Area and the Sacramento Yolo Mosquito Vector Control District (District) to prevent mosquito production has been very successful.

Dave described that Eric Hansen has been doing giant garter snake (GGS) surveys. They have found that the area along the west Bypass levee reflects some of the densest populations of GGS known anywhere in the Sacramento Valley; up to 98 snakes per kilometer. GGS have been documented on both sides of the levee. The snakes use the levees as refuge during floods. A participant asked if and how they are tracking / tagging the snakes. Dave described that they install a microchip that they can scan later, similar to chips used on pets to track their location. GGS feed on fish and small vertebrates, invertebrate larvae, shiners, and mosquito fish.

Dave described the USGS mercury study that was started last week. The first thing being looked at is potential methyl mercury (MeHg) production in rice fields. MeHg is only dangerous if ingested since it is the organic version of mercury and is therefore biologically available to accumulate in food chains. There is documentation that nesting Caspian terns are being affected by MeHG and that there is bioaccumulation in their food chain. Dave described the sampling points for the USGS study and described that samples will be taken for the next 3 months. DFG is doing additional study on seasonal and permanent wetlands to study MeHG production. Initial data shows that water from seasonal wetlands looses MeHg when it moves thru a permanent pond. Work will continue next year on this study. DFG is completing a proposal to CALFED with the Yolo Basin Foundation to continue studies looking at wetland production of MeHg. The goal is to find best practices for wetland management that can support habitat development and species productivity while minimizing exposure to MeHg.

Chris Fulster asked about target hunting areas for 2007-2008. Dave Feliz stated that the DFG will keep what was hunted last year and that if access is improved in time, hunting areas may move south. Dick Goodell asked Dave to clarify if the goal of the southern Wildlife Area wetlands is to provide sanctuary. Dave stated the goal is to improve hunting for clubs and DFG. He said they may flood the Fireman's Club near Midway Road, which would be used for junior hunting only.

4. Update on Yolo Bypass Working Group IRWMP Subcommittee Activities

Robin Kulakow described that the Subcommittee met on May 21. The purpose of the Subcommittee is to support the Water Resources Association of Yolo County in their IRWMP efforts and to ensure that Yolo Bypass stakeholders have a voice in subsequent County-wide water resources decisions. The intent is to have different watershed-level groups in the County coordinate and minimize competition for funding of water resources projects. The Subcommittee met in March to define projects for the WRA to include in, and complete their IRWMP. The Subcommittee has created draft formal operating rules to make future decisions to recommend projects. Parts of the operating rules describe the target representatives on the Subcommittee. There have been continuing requests from some stakeholders that a non-agency fishing representative be included on the Subcommittee. The Subcommittee has discussed this and feels there is adequate representation of fishing interests in their

group and that other interested stakeholders always have the opportunity to attend the Subcommittee meetings and provide input that the Subcommittee must consider.

Regarding the list of projects the Subcommittee provided to the WRA (for inclusion in the IRWMP), Tulyome (a regional environmental advocacy group) proposed a new project that was submitted after the IRWMP was finalized. The new proposal is for improvements to Fremont Weir access to allow public opportunities to recreate in that location in the Bypass. Currently the east levee road to the Weir is gated to prevent access to the levee and to adjacent private property. Access from County Road 16 ultimately crosses land owned by the Sacramento – San Joaquin Drainage District (the precursor to the State Reclamation Board). The perspective of Tulyome is that this is state land and that some accommodation should be made to support public access. Tony Lucchesi of Wildlands (current landowner adjacent to part of the area in question) questioned the appropriateness of this suggestion as it increases the likelihood of public dumping and other illicit activities along a rural, unmonitored road. They are not fundamentally opposed to public use of the state land. Don Stevens asked what the purpose of the public access would be. DFG runs pheasant hunting activities periodically on this land, apparently through a minimal lease arrangement with DWR. Dave Feliz stated that the Fremont Weir Wildlife Area (FW Wildlife Area) is between the Fremont Weir and the Sacramento River and that access is provided from the west side of the Bypass. Marianne Kirkland and others stated that it is difficult to park there but there have been recent improvements for parking. Access into the FW Wildlife Area is on foot. Further discussion between participants indicated a difference of opinion between Wildlands and Tulyome regarding the appropriateness of gating portions of Road16.

Wildlands has requested a gate but the County did not approve it. Tony stated that there are differences of opinion about how access is defined in DFG regulations. Wildlands asserts that FW Wildlife Area use is a "Type C" access and not requiring constant access. Other participants raise other concerns. Poaching is a problem; DFG Wardens have spotted and caught poachers several times poaching fish and deer. There have also (reportedly) been numerous trespass issues, including trespass thru Wildlands property. Some participants stated that it is good Pheasant habitat but not compatible with, or appropriate for nature trails. Dave Feliz stated people should not assume public access is a bad thing and that field conditions depend on how property is managed.

5. Presentation on Liberty Island Conservation Easement Agreement

Tom Cannon described that working with the Trust for Public Lands (TPL) and other representatives of Reclamation District 2093 (Liberty Island), Wildlands is creating a conservation bank. Wildlands has a contract on the Kerry Property on the island; this represents approximately 1,000 acres of land on the northern edge of the island. Delta smelt are known to spawn in the tidal area immediately south of this higher non-inundated land. The Kerry property is only flooded during Bypass floods and through ditches during extremely high tides. The entire island was originally intended to be part of the proposed North Delta Wildlife Refuge. TPL was to have held the land for a short time and then deed it over to the US Fish and Wildlife Service (FWS) however the proposed refuge became problematic, was not approved and TPL has been left holding the land for over eight years.

Current land use of the Liberty Island for flooded and non-flooded areas is essentially passive restoration. TPL is not and has not pursued active restoration. TPL allows public access for hunting and they and Wildlands try to manage with public uses in mind. There have been vandalism problems because the area is so isolated (i.e., littering and dumping, illicit drug activity, etc.) Wildlands' goal would be to flood some more area, and preserve the existing wetlands. Their project

ideas cover a few phases. The first phase would be to remove the interior east-west levees that impede flood flows coming down the Bypass. This would allow water to come onto the site, improve Bypass flow conveyance, and minimize backflow conditions upstream of Liberty Island. Additional phases would focus on active habitat restoration in key areas. Dave Feliz stated that he's heard the soils on the island are alkali and that there could be an endangered lily. He questioned if that had been reported or confirmed. Tom had not heard about this and did not have an answer as there have been no recent comprehensive plant surveys on the island.

Selby Mohr asked what the schedule is for Wildlands' plans. Tom stated that they still need title to the Kerry property. He said that subsequent restoration efforts would have to be worked out with the FWS and other agencies through standard environmental compliance steps and collaborative efforts. They don't expect any construction in 2007. He said they would like support from the Working Group for the easement efforts. Selby asked how this can be used as mitigation since nothing can be built on the island and since much of Liberty Island was purchased with public funding. Tom stated that conservation banking can be done with preservation and still adhere to a "no net loss" policy.

Don Stevens asked if the concept is that this would be mitigation for water projects or private projects. Tom stated this would be mitigation for small projects such as boat docks, etc. Don expressed concern that credit could be given for habitat that might not help really help sustain target Delta species (e.g. splittail). He stated that it should be proven that mitigation is successful before habitat credits are given. The Biological Opinion for Delta pumps should include Liberty Island and specifically look at smelt habitat; and associated monitoring. If FWS doesn't feel the project is actually mitigating losses, FWS should not approve mitigation. Tom explained that credits are based on habitat types. Liberty Island provides spawning area not rearing habitat. Projects have to replace habitat, not actually result in increased smelt populations.

Tom explained that TPL's obligation at this point is to protect its own interests and to ensure that the rest of Liberty Island is sold to a private entity, then CALFED should be paid back. Wildlands is hoping to create an endowment with the sale of the Kerry property (and potential other island parcels) to Wildlands.

Dave Feliz asked Mike Hardesty about the history of reclaimed lands in the Bypass, particularly whether reclamation proceeded flood control projects and what type of agreements were made regarding restricted height levees like those on Liberty. Mike's understanding is that reclaimed areas were incorporated into flood control projects. Further group discussion took place about the "Stairstep", the unique levee feature of the northern Liberty Island that created an impediment to flood flow in the Bypass. A general question was asked about what would happen if the Stairstep were removed. Selby stated that it would likely relieve pressure upstream. Another comment was that a flooded Liberty Island saves upstream lands somewhat. The Stairstep has a hydraulic impact on early floods; redirecting a lot of energy from center of the Bypass channel to levees and creating an adverse impact.

6. Update on Vector Control and West Nile Virus for Summer 2007

Joel Buettner described that the District has been preparing best management practices (BMP) for water application on lands for the current season to prevent mosquito production. Water that stands for more than 72 hours in summertime produces mosquitoes. The District Board passed a resolution to use land management that reduces mosquito production before resorting to chemicals. District BMPs are an attempt to create middle ground options for land managers. Inspection procedures

would identify areas that are more or less problematic and to provide a menu/framework of possible management actions to minimize mosquito production with minimal chemical application. The BMPs were adopted in April 2007 and this is the first season to try them.

Dick Goodell referred to previous years where the District has made equipment available to help landowners; mowers, backhoes, etc., to disc, clean ditches.. He asked if this will continue in the future. Joel stated that the District wants to expand this for more land owners, perhaps through a grant program. The District is funded with public money so they want to distribute resources/services as equitably as possible and to minimize costly efforts like chemical usage when there are better alternatives.

Dave Ceppos asked if there is a template agreement for landowners in the Bypass and if it would be possible to get a pilot project with a few landowners to start off. Joel stated that the District has a handful of these agreements. Joel wants to develop a BMP template based on experience from this year. Dave offered that he and/or Robin could work with the District to get templates going

Joel discussed an incentive program to encourage later season flood-up and he provided a hand-out providing more detail. The goal is to minimize assessed fees on landowners that are willing to flood their clubs late in the season. The handout is on the District's website. Selby asked if Joel wants feedback from landowners about the proposed incentives. Joel stated they'd like feedback within 4 weeks, preferably in writing. He also encouraged landowners to call him anytime.

7. Presentation on Riparian Habitat and Species Monitoring Project

Andy Englis described the UCD Museum of Wildlife & Fisheries Biology and its current efforts regarding the Bypass. They have been working for some time on lower Putah Creek; conducting bio monitoring along the reach downstream of Lake Solano. They have also done similar work throughout the state, and with private clubs, state parks, etc. Most of the monitoring is done on private land and is used to confirm the presence or absence of species, rather than to rely on speculation. An additional future phase (after initial monitoring is largely completed) is to study species population, frequency, etc. changes over time as a result of changes in land use. They use a variety of field methods to assess overall population diversity (particularly but not exclusively of avian species) and to also track conditions for key species. An example of valuable data from their efforts includes Putah Creek conditions. Previous studies by other groups speculated that Putah Creek had very low riparian habitat value due to an assessment done at a creek-side park in Winters. New data conversely show that lower Putah Creek is very diverse and that habitat along it deserves protection.

Andy explained that they want to have the same understanding of the Yolo Bypass to aid future management decisions. He is hoping to generate interest from private landowners to have his staff conduct assessments for a range of species and under various seasonal conditions in the Bypass. Dave Ceppos suggested that Andy speak with representatives from Conaway Ranch regarding their early efforts to create a conservation plan. He said there might be some mutually beneficial opportunities to be explored.

DRAFT Meeting Summary
Yolo Bypass Working Group
Meeting 42

December 6, 2007
10:30 to 1:30.

Yolo Wildlife Area Headquarters
45211 County Road 32B, Davis

IN ATTENDANCE: Robin Kulakow, Yolo Basin Foundation (Foundation)
Dave Feliz, Department of Fish and Game (DFG)
Sam Magill, Center for Collaborative Policy (CCP)
Don Stevens, Glide In Ranch
Dick Goodell, Glide in Ranch
Zoltan Matica, Department of Water Resources (DWR)
Selby Mohr, Mound Farms
Yemi Okupe**,** DWR
Marika Herold, DWR
Robert Eddings, California Waterfowl Association (CWA)
Linda Fiack, Delta Protection Commission (DPC)
Kimberly Bellows, Yolo County Supervisor Helen Thomson's Office
Steve Macaulay, California Urban Water Agencies (CUWA)
Bob Schneider, Tuleyome
Mick Klasson, Sacramento Area Flood Control Agency (SAFCA)
Jeanett Wrysinski, Yolo County Resource Conservation District (Yolo RCD)
Stephen McCord, Larry Walker Associates
Tom Schene, Glide Tule
John Curry, Dixon Resource Conservation District (Dixon RCD)
Robert Moore, California Bowman Hunters/ State Archery Association
Julia McIver, Yolo County
Peter Perrine, Wildlife Conservation Board
John Legakis, Senator Outing
Marianne Kirkland, DWR
Mike Hardesty, Reclamation District (RD) 2068
Ken Trott, California Department of Food and Agriculture (CDFA)
Butch Hodgkins, Reclamation Board
Rick Martinez, Triad Farms
Mark Kearney, landowner
Chris Fulster Jr., Glide In Ranch
Betsy Marchand, Yolo Basin Foundation
John Brennan, Knaggs Farming
Tony Lucchesi, Wildlands Inc.
Regina Cherovsky, RD 2035
Tovey Giezentanner, Conaway Ranch
Ed Towne, Bull Sprig Outing
John McNerney, City of Davis

1. Action Items

Tovey Giezentanner committed to providing the Conaway Ranch Floodway Project study to a number of participants, including Betsy Marchand, Robin Kulakow, and Sam Magill.

2. Introductory Comments

Robin Kulakow opened the meeting and noted that Dave Ceppos, project facilitator from CCP, was unable to attend the meeting. She then invited group members to introduce themselves.

3. Review of previous action items, and adoption of previous meeting minutes as final

The meeting summary from June 5, 2007 was reviewed and adopted. Bob Schneider asked for clarification and Robin confirmed that the Wildlands Inc. proposal to acquire conservation easements on Liberty Island failed. Wildlands will submit a similar proposal in December.

4. Conaway Ranch Conservation Planning Process

Tovey Giezentanner and Regina Cherovsky delivered a presentation on the Conaway Ranch (Ranch) Conservation Process, beginning with a brief history of recent Ranch issues. Regina stated that they spent the last year putting together a long term conservation plan. Tovey has been affiliated since the ownership change in 2005 and is currently working with SAFCA and other resource-related agencies to create a conservation plan. Currently, they are considering a proposal to expand conservation easements on the Ranch for agricultural, flood, and wildlife preservation.

Tovey stated that the planning process is focused on creating additional flood conveyance for the Sacramento River and obtaining new easements. Portions of the Ranch in the Yolo Bypass and the Cache Creek Settling Basin are already covered by Williamson Act easements. The Conaway Ranch Preservation Group (Preservation Group) is currently pursuing easement possibilities that will be flexible enough to preserve wildlife values on the Ranch while allowing for future agricultural and resource management opportunities. However, the amount of public money available for agriculture easement purchases is limited at this time, and Tovey stated that standard habitat easements are not flexible enough to allow for resource management and expanded agriculture. The Preservation Group is working to complete a conservation easement strategy by the close of the year.

A key component of the easement strategy will include increased land for flood conveyance. Tovey said that the Preservation Group has completed a study to construct a new weir at the north end of the Ranch with drainage south through the Toe Drain. The project would be designed to accommodate excess floodwater from the Sacramento River during the largest flooding events 50,000 acre feet. For the project to proceed, a span of railroad track north of I-5 would have to be re-built or re-rerouted. Don Stevens asked if natural features in the Ranch would restrain flood flows. Tovey responded that a combination of natural elevations, previously constructed berms, and a new levee would keep flood flows in place.

Don Stevens, Chris Fulster, and others asked if rerouting floodwaters could result in longer flood events in the Bypass. Tovey responded that while the duration of events could be extended, it would not increase the actual flow levels in the Bypass. Several people raised a concern that this could negatively impact duck clubs, farmers and other landowners needing to access their lands as soon as

possible after a flood. Tovey described that before the project can move forward, feasibility studies and all necessary environmental permitting will have to take place and that this concern would be noted and studied. While this project is not intended to solve all of Sacramento's flood issues, Tovey commented that it will provide critical relief during a peak flood event. Moreover, given the singular ownership of the land, the project would be relatively easy to implement.
Don also asked which years were used to study the flood capabilities of the proposed project. Tovey responded? that the 1997 event was the model year, during which the Sacramento Weir was not even triggered. The proposed project would only divert flood flows during events larger than this. Don and others commented that the Preservation Group should also study the floods of 1986, 2005, and the potential effect of increased flood flows through the Lisbon Weir. Tovey stated that the Preservation Group and state flood agencies are in the process of researching everything right now.

Selby Mohr asked if the new flood control project was being designed so that developments on the east side of the river could be expanded. Tovey commented that right now, there is no tie between the flood project on the Ranch and development plans across the river.

Tony Luchessi asked if there would be any impacts to other lands west of the river including Cache Creek. Tovey commented that the project is still in the study phase, and wasn't sure at this point. Regina remarked that ongoing discussions over the last six years have looked at the effect of Sacramento flood improvements on Yolo County. These conversations are ongoing and taking Yolo's concerns into account.

Chris commented that the project needs to focus on what happens at the bottom of the Bypass during a flood event. He suggested that widening the confluence of the Bypass and the Sacramento River could be more beneficial than creating an alternative flood conveyance through Conaway. Tovey responded that a number of alternatives would be looked at in the feasibility study.

Mike Hardesty suggested that the State should focus on fixing current flood operations in the Bypass before creating a new system through private property. He also stated that the Preservation Group could encounter some resistance from landowners if flood operations at the south end of the Bypass are not improved as well.

Finally, Tovey committed to providing Betsy Marchand, Robin Kulakow, and Sam Magill with copies of the Conaway Ranch Floodway Project study **(see Action Item #1).**

5. Update and Discussion of Management Efforts at the Yolo Bypass Wildlife Area

Dave Feliz opened the discussion with an update on mourning dove banding activities in the Yolo Bypass Wildlife Area (Wildlife Area). Recently banded doves have been found as far south as Guadalajara, Mexico and various Southern California locations. This evidence seems to suggest that the doves have a very extensive range and migrate to numerous locations.

He then commented that the public auto tour route would be expanded during 2008 in conjunction with new restoration projects and some rice farming expansion. Rice fields in the Wildlife Area switch between white and wild rice, and are allowed to lay fallow every third year.

Hunting areas were expanded in 2007 to include new parking lots south of Putah Creek for a total of six hunting-specific lots. An additional 400 acres of hunting marsh were also added for junior hunters. Throughout 2007, 2,372 hunters used the Wildlife Area and brought down 2,941 birds for an

average of 1.24 birds per hunter. At any one time, 50 free-roam and 64 hunters using four-seater blinds were allowed in the area. Hunters using blinds typically averaged slightly better than free-roaming hunters. The vast majority of birds shot in the Wildlife Area were ducks, but geese and pheasant were also hunted.

Chris Fulster asked how the current pheasant numbers compare to past years and whether there have been any predators such as raccoons and skunks within the Wildlife Area. Far fewer pheasants were killed this year: in 2004, hunters shot over 600 birds versus less than 200 this year. Dave did know of any major predation in the area.

Dave then discussed problems with hunting violations within the Wildlife Area. In 2007, there were a few poaching issues and some birds such as grebes and swans shot illegally. The largest problem for the Wildlife Area, however, was (and still is) speeding violations by hunters on surface roads.

Dave then discussed the Wildlife Area Management Plan (Plan). The Plan is expected to be completed in early 2008. The Foundation website has the most recent version of the draft and can be found at http://www.yolobasin.org/management.cfm. He closed by saying that 2008 should be a very productive year for the Wildlife Area. In addition to more hunting opportunities, restoration projects have been planned for most of the unused acreage.

Robin Kulakow also gave a brief update on the Foundation's recent activities. Over 1,000 people participated in the Foundation's "Bat Talk and Walk" to see the daily bats fly out. Public field trips are available through the Yolo Basin Foundation, with a new self-guided auto tour route planned for opening later in December. Finally, the Foundation's school program has been a resounding success: in the near term, the program's schedule is completely full except for four days. The Foundation is also providing bus service to transport disadvantaged youth to/from the Wildlife Area.

6. Discussion of the Delta Vision Process

Linda Fiack led the group in an overview and discussion of the Delta Vision process. She stated that six of DPC's commissioners have been appointed to the Delta Vision Stakeholder Coordination Group (SCG).

In June of 2006, Governor Schwarzenegger released Executive Order S-17-06, mandating the creation of the Delta Vision Blue Ribbon Task Force (Task Force). The Task Force is a six person panel of "objective" experts in flood safety, public policy, environmental issues, etc. convened to create a draft vision for the future of the Delta. While the Task Force is charged with delivering independent recommendations to the Governor, it is informed by the SCG and the Delta Vision Committee (Committee), a group comprised of State cabinet secretaries and the president of the California Public Utilities Commission.

The SCG came up with four scenarios for the future management of the Delta and was able to narrow them down to a single, unified vision. The Task Force has adopted most of this plan into the proposed Vision and is in the process of submitting it to the Committee for final review before it goes to the Governor. After a Vision is approved by the Governor, the Task Force will reconvene to formulate a strategic implementation plan.

Two major sections of the Task Force's Vision are the idea of a "dual conveyance" system (that is, using both through-Delta water transport and a smaller version of the Peripheral Canal) and the need

to revise Delta governance and create a single entity with authority throughout the Delta. Currently, there are over 200 entities with governance authority within the Delta. DPC, the California Coastal Commission, and the Tahoe Regional Planning Association have all been identified as potential models for the new body.

Linda stressed that local involvement in Delta Vision is very important and urged Working Group participants to comment on the draft vision. Comments can be sent directly to the Task Force by email at dv_context@calwater.ca.gov or by mail to:

Delta Vision
650 Capitol Mall
Sacramento, CA 95814

The Delta Vision website also has copies of all comments submitted on the Vision thus far. This information can be accessed at http://www.deltavision.ca.gov/DeltaVisionCorrespondence.shtml.

In addition to individual comments, Linda stated that Solano and Yolo Counties are expressing increased interest in becoming major stakeholders in the process. Representatives from both counties already take part in the SCG. The final SCG meeting of 2007 will be held on December 17th at the Holiday Inn in Downtown Sacramento.

Steve Macaulay commented that he believes this is not another effort like CALFED. Task Force Chairman Phil Isenberg has repeatedly mentioned the dysfunction of all agencies involved in managing the Delta; a problem that must be remedied before the Vision can be implemented. The strategic plan will address ecological and water supply concerns as coequal interests, and emphasize that the Delta is an area of statewide concern. Furthermore, as Linda pointed out, the final Delta Vision may also suggest a statewide moratorium on any new water allocations. None of the recommendations in the Vision or the strategic plan are expected to be single issues, but rather part of a "package deal."

Ken Trott stated that there is a series of issue specific "context memos," including one on Delta agriculture. He expressed some concern that the agriculture community has not addressed subsidence thoroughly enough and stated that the final Delta Vision strategic plan must include the agricultural perspective. Linda reiterated this point and stated that the Water Education Foundation has put on several workshops on Delta Vision, and agricultural participation has been minimal.

One of the key differences between Delta Vision and other groups in the past is that it specifically recommends "letting go" of some islands (that is, allow the levees to degrade and focus on other, higher priority areas). Some of these are in Yolo and Solano Counties, presumably in the Bypass. Mike Hardesty suggested that the Lower Yolo Bypass could be one area where major tidal restoration takes place or levees are allowed to degrade for increased habitat. Several Working Group members expressed concern over this idea, noting that other lands could be compromised by simply allowing levees to be destroyed. John McNerney suggested that this type of action would require a change of the Constitution and the California Environmental Quality Act (CEQA).

Dave Feliz asked how Delta Vision will interface with other existing plans and expressed concern that the Yolo Wildlife Area Management Plan could be overshadowed. Linda responded that this concern is one reason that everyone should comment on the draft vision and take part in the strategic planning process.

To keep the Working Group updated on Delta Vision progress, Robin Kulakow suggested that the IRWMP Yolo Bypass Subcommittee take up the issue at their next meeting. Linda also suggested that private citizens should call SCG members directly. A full list of the stakeholders is available online at http://www.deltavision.ca.gov/StakeholderMembers.shtml.

7. Update and Discussion about the Delta Emergency Response and Preparedness Planning Process

Linda Fiack delivered an update on DPC efforts to put together a Delta-wide emergency planning and response initiative. Delta Vision identified emergency response in the Delta as one of several critical, short term actions that should take place immediately. While all five Delta counties and several state agencies have emergency response plans in place, most of them focus on flood fighting and technical response capabilities. The DPC plan focuses more on the societal aspects of disaster, including where to shelter people, taking care of pets/livestock, etc.

Last year, DPC sponsored a summit of the five Delta county emergency response managers. An agreement was signed to create a Delta-wide (instead of jurisdictional) plan. DPC is currently working with several entities to address societal issues in a Delta-wide plan. Mike Hardesty raised the concern that this effort might not pay enough attention to local reclamation districts and other on-the-ground entities. He then recounted an instance in 1997 when locals were ordered to evacuate a high ground area by county officials; had they consulted local reclamation districts, they would have found out that this was actually one of the safest places to be during a flood. Linda assured the group that this is a good example of what the new plan will address. It will be informed by a wide variety of stakeholders, including local, county, and state organizations.

8. Lower Yolo Bypass Project Update

Robin Kulakow and Linda Fiack delivered an update on the Lower Yolo Bypass Project, stating that the contract to proceed will be in place in early 2008. Robin then discussed the assessment report completed by CCP in 2005. The report gives an overview of the project objectives, identifies key stakeholder concerns, and describes the desired outcome of the project. The entire assessment report can be read online at http://www.csus.edu/ccp/publications/LYB_Feasibility_Assessment_Report_Final_For_Web_(8-24-05).pdf

Don Stevens asked what the northern boundary of the project area will be. The assessment report proposes the Lower Yolo Bypass project area as the area (and land owners) immediately south of the Wildlife Area downstream to the City of Rio Vista and the east and west lands and land owners of adjacent RDs (including Prospect and Ryer Islands, Egbert Tract, and potentially Hastings and Little Hastings Tracts).

Robin then invited meeting attendees to speak with Sam Magill if they were interested in joining the Lower Yolo Bypass stakeholder group after the meeting.

Linda Fiack described the funding mechanism for the project. DFG is providing funding through their Proposition 84 funds. DPC and the Foundation are co-sponsors of the effort to provide a "cross-jurisdictional" face.

Betsy Marchand expressed her support, and stated that the Yolo Basin Foundation board of directors would also like to support the project.

9. Yolo Bypass Integrated Regional Water Management Plan Update

Robin Kulakow explained that the Yolo County Integrated Regional Water Management Plan (IRWMP) was approved by the Water Resources Association of Yolo County in July. A technical committee has met monthly to design the IRWMP and identify state funds that could be used. The committee is working on finishing some projects funded by Proposition 50 and trying to secure additional grant money from Proposition 84.

In addition to the technical committee, the Yolo Basin Foundation manages a Bypass Working Group IRWMP subcommittee. The Subcommittee will have its last meeting of 2007 on Tuesday, December 11th from 4:00 to 6:00 pm. In addition to the normal IRWMP discussion, Robin suggested that the Subcommittee should also discuss how this plan could relate to and inform the Delta Vision process. If any decision is reached, it will be brought back to the full Working Group for approval. All regular Working Group members are invited to attend.

10. Closing Discussion and Final Remarks

Bob Schneider commented that DWR IRWMP guidelines for Proposition 84 funding could change in the near term, and raised the concern that this could set the Bypass IRWMP effort back.

Selby Mohr asked if Liberty Island has been purchased from the Trust for Public Land. Tony Lucchesi was unaware of a purchase by Wildlands Inc. at this time. However, a proposal will be submitted later in December to create a conservation easement on the island.

Linda Fiack stated that the US Bureau of Reclamation is in the process of selling Prospect Island. The Island will first be offered to federal agencies and then to state agencies. If no buyer is found, it will be put on the open market. Linda said that the recent fish kill on Prospect could delay the sale.

Finally, Selby Mohr expressed a desire to have representatives from Wildlands Inc. attend the next Working Group meeting to discuss their potential purchase of Liberty Island.

11. Questions Submitted for Discussion at the Next Working Group Meeting

Dave Feliz submitted several questions on the Conaway Ranch flood project to be discussed at the next Working Group meeting. Specifically, he asked:

- Which fish species will benefit from the floodplain inundation?
- Who has shown interest in judging each of the proposed projects?
- What are the predicted water levels at Lisbon during the outflow period when water west of the levee is released?
- What is the flow rate into the storage area? How does this affect water surface elevation in the Yolo Bypass?

DRAFT Meeting Summary
Yolo Bypass Working Group
Meeting 45

February 4, 2010
2:00 – 4:00 PM
Yolo Wildlife Area Headquarters
45211 County Road 32B, Davis

IN ATTENDANCE:
Robin Kulakow, Yolo Basin Foundation (Foundation)
Dave Feliz, Department of Fish and Game (DFG)
Merritt Rice, Department of Water Resources (DWR)
Selby Mohr, Mound Farms
Paul Phillips, California Waterfowl Association (CWA)
Bob Schneider, Tuleyome
Jeanette Wrysinski, Yolo County Resource Conservation District (Yolo RCD)
John Currey, Dixon Resource Conservation District (Dixon RCD)
Jim Provenza, Board of Supervisors, Yolo County
Warren Westrup, Yolo County
Peter Perrine, Wildlife Conservation Board
Mike Hardesty, Reclamation District (RD) 2068
Tovey Giezentanner, Conaway Ranch
James Navicky, Department of Fish and Game (DFG)
Jeff Stoddard, Department of Fish and Game (DFG)
Ed Towne, Bull Spring Outing
Dennis Kilkenny, Dawsons
Marty Schell, Sacramento-Yolo Mosquito and Vector Control District
Phil Pogledich, Yolo County
Tanis Toland, United States Corps of Army Engineers (USACE)
David Katz, David Katz & Associates
Donna Gentile, Water Resources Association of Yolo County (WRA)
Ron Tadlock, Farmer
Mick Klasson, Self
Dan Engstrom, Swanston Property
Ed Burns, National Resource Conservation Service (NRCS)
Bruce Boyd, City of Davis
Jacques DeBra, City of Davis Public Works
Melanie Truan, UC Davis, Wildlife, Fish and Conservation Biology
Janis Cooke, Central Valley Regional Water Quality Control Board
Rebecca Nieto, Chief of Staff, Office of Assembly Member Mariko Yamada
Karla Nemeth, California Resources Agency, Bay Delta Conservation Plan
Tim O'Halloran, Yolo Flood Control & Water Conservation District

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1. Introductory Comments – Robin Kulakow, YBF
Robin Kulakow opened the 45th meeting of the Yolo Bypass Working Group with a few welcoming comments on behalf of Yolo Basin Foundation, which, in the absence of a contract with the Center for Collaborative Policy (CCP), was facilitating the meeting. She recognized the Water Resources Association of Yolo County (WRA) for funding this meeting. Kulakow introduced YBF associates Ann Brice and Margaret Kralovec, who would be serving as the speakers' timekeeper and meeting recorder, respectively. She noted a minor agenda change, requested attendees to sign in, and then asked participants to introduce themselves.

Kulakow reminded attendees that the purpose of the meeting was to update stakeholders on the numerous and varied efforts underway that directly affect the Yolo Bypass. The ambitious agenda, with 12 speakers making 10 minute presentations, reflected the attempt to present highlights of many of the current activities of different entities. More in-depth treatment of efforts of particular interest to the Working Group, or the integration of several efforts could constitute the agenda for future Working Group meetings. In the interest of keeping to the established meeting timeframe, she encouraged participants to keep their presentations short, and to ask questions of speakers only if time permitted or to hold questions until after the meeting.

2. Yolo Bypass Working Group Evolution and Future – Dave Feliz, DFG
Dave Feliz, DFG Manager of the Yolo Bypass Wildlife Area (YBWA), provided a brief history of the Wildlife Area, whose conceptual plan was developed in 1990, and of the Yolo Bypass Working Group, initiated by Yolo Basin Foundation in 1998 under a CalFed Ecosystem Grant. The Working Group was formed to ensure that diverse Yolo Bypass public and private stakeholders could actively participate in decision-making processes regarding the Yolo Bypass, which is principally managed as a flood control waterway in the lower Sacramento Valley, but which also contains significant agricultural, recreational, and environmental resources. Feliz reviewed the contributions of the Working Group to the development of the Yolo Bypass Management Strategy (2000), the development of the YBWA Land Management Plan (2006), the work of the Water Resource Association of Yolo County (WRA) which produced the Integrated Regional Water Management Plan (2007), containing the Yolo Bypass Integrated Project whose stakeholder group is the Working Group's IRWMP subcommittee. He also noted the 2000 Governor's Environment/Economy Leadership Award to Yolo Basin Foundation in recognition for the Yolo Bypass Working Group's contributions to environmental restoration and rehabilitation. Feliz also mentioned ongoing stakeholder involvement in the Lower Yolo Bypass Planning Forum which addresses issues specific to that area.

3. Yolo Bypass Wildlife Area – Dave Feliz, DFG
Yolo Bypass Wildlife Area Manager Feliz gave a brief history and status report on the YBWA. He noted that the 16,000-acre Wildlife Area is part of the Sacramento-San Joaquin Delta, and contains one of the largest wetlands and associated habitat restoration areas (over 8,000 acres restored) in the nation, managed by the California Department of Fish & Game to increase waterfowl and other populations, while at the same time contributing to the local economy. The YBWA contains both seasonal and permanent

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wetlands that attract waterfowl and shorebirds in the Pacific Flyway, and agricultural leases in partnership with the Dixon Resource Conservation District. These leases include rice production areas which provide rich habitat for migratory ducks, geese and shorebirds.

Managed wetlands offer the opportunity to develop "Best Management Practices" to maximize habitat value while minimizing some of the potentially harmful influences of wetlands including the methylation of mercury, the production of mosquito populations and the proliferation of riparian vegetation which could impact the flow of flood waters in the Yolo Bypass.

Feliz highlighted the work of Yolo Basin Foundation's *Discover the Flyway* K-12 program which has brought more than 40,000 students to the YBWA since 1997, and public tour programs that have brought an additional 30,000 people to the Wildlife Area. He also noted the success of the Wildlife Area bat tours, which have encouraged more than 500 people annually to view the spectacle of the daily flyouts of hundreds of thousands of Mexican free-tail bats on summer evenings. Feliz invited stakeholders to the upcoming Duck Days events on February 19-20, 2010, and to the Yolo Vernal Pools Open House which would be occurring in late March or early April. He finished his presentation with information about waterfowl bands collected at the Wildlife Area this year.

4. Yolo Natural Heritage Program – Maria Wong, ED Yolo Habitat JPA

Maria Wong described the Yolo Natural Heritage Program (YNHP) as a county-wide Natural Communities Conservation Plan/Habitat Conservation Plan (NCCP/HCP), led by the Yolo County NCCP/HCP Joint Powers Authority, made up of representatives from the Yolo County Board of Supervisors; city councils of Winters, Woodland, Davis, West Sacramento; and an ex-officio representative for UC Davis. The NCCP/HCP are expected to be incorporated into the Conservation and Open Space Element of the Yolo County General Plan, currently under revision. Wong reported that the JPA was involved in a complex, iterative process to develop the Yolo Natural Heritage Program. Initial draft chapters of the YNHP Plan have been posted on its website (www.yolo conservationplan.org) for public comment and review. The program protects the habitat of county species, particularly those whose numbers are declining or those who are designated as endangered species, through conservation of open spaces and protected habitats, land use planning, and permitting requirements of participating jurisdictions. Conservation strategies are being launched for six habitat categories: Woodlands/Forests, Riparian/Wetlands, Shrublands/Scrub, Grasslands/Prairie, Agriculture, Barren/Urban.

Wong indicated that the practices of the Yolo Bypass Working Group had been incorporated into the YNHP approach, such as the emphasis on strong partnership relations and the adoption of effective policies. The Yolo Bypass is within the boundaries of the Yolo Natural Heritage Program Plan. The YNHP is increasing its public outreach through an interactive, traveling kiosk.

5. Woodland Davis Clean Water Supply Project – Jacques DeBra, City of Davis

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Jacques DeBra provided an update on this project designed to secure Sacramento River water rights for purposes of meeting anticipated water needs for the Cities of Woodland and Davis to 2040. The project is operating as a Joint Powers Authority with a governing board made up of two elected officials, two city council members from both cities, and a non-voting UC Davis representative. UC Davis has not formally committed to participating in the project. The project recognizes the need to move quickly on developing an early design for a Sacramento River intake, which would consist of a large pipeline to a regional facility east of Woodland, where water would receive advanced treatment before being conveyed to both Woodland and Davis. The conveyance structure cost to the cities is expected to be about $325 million, with Davis' share estimated to be between $150-$180 million.

Meeting attendee Jim Provenza asked how taking water from the Sacramento River helps with water supply when water needs are year around. DeBra confirmed that the Sacramento River water rights being sought were from October to May. He explained the plan was to enter into an agreement with a base summer water right. In place of it, they will use well water.

Mike Hardesty noted that there are both long-term and short-term contracts, and that some have water use permits that run through 2045. In response to Hardesty's question about the cost basis of water, DeBra explained that the basis of water cost now is figured at $300 per acre foot, but is expected to be $600 per acre foot in the future. He also noted that current water costs from existing well sources must include home treatment costs to soften otherwise hard water. Surface water from the Woodland Davis Clan Water Supply would eliminate the need for water softener costs, a cost offset approximated to be $18 per month per household.

6. Yolo County Integrated Regional Water Management Plan – Donna Gentile, WRA
Gentile provided members with the Executive Summary of the Yolo County IRWMP that was adopted in 2007 by all member agencies, a result of many years of planning, development, and public participation. The plan contains eight key integrated projects, including the Yolo Bypass Integrated Project, for which Yolo Basin Foundation is identified as the lead partner. The WRA Technical Committee and the WRA member organizations continue to provide updates in order to keep the IRWMP a current, living document. Foundational actions include assessment and monitoring of groundwater, surface water, subsidence, and habitat. The next step is to compile the information obtained in these foundational actions and then update the document accordingly.

Proposition 84, as interpreted now, requires regional water management plans to incorporate broader geographical areas, and the Yolo County IRWMP will be incorporated into a larger plan that covers other counties as well. Gentile noted that Jacques DeBra was the Chair of the Technical Committee, and that Robin Kulakow was helping to formulate actions within the Bypass.

7. Delta Methylmercury TMDL Collaborative Stakeholder Process – Janis Cooke, Central Valley RWQCB

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Cooke explained that when water bodies do not meet standards for total maximum daily loads (TMDLs) for specific pollutants, states and tribes are required to develop a plan to achieve those limits. Collaborative stakeholders from Clear Lake, Cache Creek, and Yolo Bypass are working on a plan to reduce methylmercury loads by reducing inorganic mercury from a number of sources. On April 22, 2010 Earth Day, they will present a Methylmercury TMDL to the Central Valley Regional Water Quality Control Board that will consist of a phased approach, addressing wetlands and flooded fields where inorganic mercury is methylated. Bob Schneider indicated that half of the region's mercury source is from the headwaters of Cache Creek, and this TMDL is going to have significant regional impact because all solutions are going to involve both the Cache Creek Settling Basin and the Yolo Bypass. He noted that it is a major public health issue affecting regional fishing, with particularly high impact on subsistence fishers. Tanis Toland, US Army Corps of Engineers, asked if there were BMPs for methylmercury. It was noted that the US Geological Survey and DFG worked with rice farmers in the Yolo Bypass on what could be done to reduce methylmercury. A participant asked if the Bay Delta Conservation Plan was involved with the methylmercury TMDL process, and Cooke responded that the BDCP had only minimally addressed the issue. Yolo Bypass and the Cosumnes watershed contribute the highest levels of methylmercury to the Delta and the TMDL could require a 75% reduction. It remains unknown whether a significant reduction in elemental mercury can result in this much reduction of methylmercury. DFG is developing methylmercury BMP's and another study is underway to measure its reduction when moved through a permanent wetland.

8. FloodSAFE Yolo – Tim O'Halloran, Yolo County Flood Control & Water Conservation District

O'Halloran presented a brief history and update on FloodSAFE Yolo on behalf of Program Manager Fran Borcalli who could not be present. Yolo County, the City of Woodland, and the Yolo County Flood Control & Water Conservation District have developed a cooperatively funded two-year effort (later extended to three years) to create a sustainable, regional approach to flooding that backs up at the Cache Creek Settling Basin, and which poses a particular flood threat to the City of Woodland. FloodSAFE Yolo has taken a geographic perspective to assess the Cache Creek flood system, the natural and constructed canals and sloughs, and the floodplains. The Settling Basin is affected by mercury issues, however the project is not authorized for mercury control. In addition, the Settling Basin is filling with sediment, and is already at least half full. Solutions have been advanced to raise the weir to increase basin capacity, but Woodland is concerned that solution will increase backwater flooding at the Yolo Bridge. The group is asking the US Army Corps of Engineers for more funding to study potential solutions.

Tanis Toland, USACE, asked how the Cache Creek Settling Basin works. O'Halloran described it as a built levee to hold water in, but which also keeps water from flowing out. It increases flooding where I-5 meets Cache Creek. Flood modeling demonstrates that I-5, a major transportation corridor, could be made impassable by floodwaters. Bob Schneider, Tuleyome, noted that the solution of opening up the flood corridor accommodates large flood events. Warren Westrup, Yolo County, noted that CalTrans has altered adjacent roads since the construction of the Settling Basin, and there is a need to be concerned.

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9. Lower Yolo Bypass Planning Forum – Robin Kulakow, Yolo Basin Foundation
Kulakow reported that the Lower Yolo Bypass Planning Forum addresses a whole set of unique issues and areas not otherwise addressed, including Liberty Island and Prospect Island. She announced that the next meeting of the Forum will occur on February 26, 2010. The last meeting, held in June 2009, addressed issues related to the Yolo Bypass and the Bay Delta Conservation Plan's proposed modification of the Fremont Weir. Planning Forum comment letters, proposed conservation measure and meeting summaries are posted at www.yolobypass.net. The group lost funding for almost a year, but stakeholders raised money to continue meetings for a few months. Bond funding was recently restored so the Forum is up and running again with an extended contract end date . The Planning Forum is an example of a good stakeholder effort that is a direct result of the Yolo Bypass Working Group. Mike Hardesty added a caveat that though stakeholders worked hard on the last document, and it had promise, it was not finished. Kulakow noted that the Forum's working document provides a good place to continue further discussions on the BDCP.

10. Central Valley Flood Protection Plan – Merritt Rice, DWR Statewide Flood Planning Office
The CVFPP is one part of FloodSafe California, an integrated flood management plan for California. FloodSAFE California recognizes the state's liability, and the inadequacy of the system in light of other national flood disasters such as Mississippi River flooding and Hurricane Katrina. The CVFPP is to become effective on January 1, 2012, and updated every five years. Its intent is to create a broadly supported plan for improving flood management in the Central Valley, promoting understanding of integrated flood management from a variety of jurisdictional and other perspectives, and developing new data that can be shared for a variety of purposes. The CVFPP scope is to describe the Sacramento-San Joaquin River Flood Management System and its issues and challenges, recommend actions to improve flood protection, and focus first on flood management and public safety, while integrating ecosystem restoration and other efforts. Rice provided participants with an overview of the plan's schedule and next steps. The CVFMPP website is at www.water.ca.gov/cvfmp.

11. Bay Delta Conservation Plan – Karla Nemeth, CA Resources Agency, BDCP
Nemeth introduced the BDCP as an ambitious Habitat Conservation Plan (HCP) and a California Natural Community Conservation Plan (NCCP) that addresses 11 aquatic species and 45 plant and wildlife species. She indicated that the BDCP has had a bumpy road because some of its individual aquatic measures, such as the notching of the Fremont Weir to allow for 3,000-6,000 cubic feet per second (cfs) of water flow through the Yolo Bypass from December through April, are in conflict with existing uses. The BDCP is hopeful that it can engage stakeholders in the process in order to minimize land use conflicts, and are considering a proposal to establish a local group for the Yolo Bypass and Suisun Marsh. The participants are looking for ways that habitat restoration plans can offer multi-beneficial approaches, and ways to incorporate input from stakeholders in the process. BDCP has been in discussions with DWR, USACE, CVFP and the Yolo Natural Heritage Program about topics such as mitigation for terrestrial habitat losses and reduction

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of losses as much as possible. The public draft of the plan is scheduled to be released in Fall 2010.

Mike Hardesty, Resource District 2068, asked how BDCP biological measures would be reconciled with current biological opinions (B.O.s) Nemeth indicated that this plan will replace B.O.s as currently described, and confirmed that resource agencies have bought in to the plan. Concern was expressed about the extent of modeling of the Yolo Bypass, and the challenge of channelizing proposed flows. There is a sense of impending unresolvable conflict, and a need to explore design changes that can mitigate or avoid potential problems. Nemeth expressed a desire to use the Yolo Bypass Working Group as a forum to discuss Delta issues with local landowners.

Dave Feliz, DFG, summarized a set of fish management alternatives, including modifying the Fremont Weir and how it could increase floodplain productivity by being flooded on a regular basis. Feliz presented the potential benefits of a different set of alternatives which include consistent passage up the Toe Drain and Tule Canal, realignment of Putah Creek to spill into the Toe Drain, the potential to create a freshwater tidal marsh at the confluence of the realigned Putah Creek and the Toe Drain, control of fish movement at the Lisbon Weir, including permitting their passage through when the Fremont Weir is open or routing salmon to Putah Creek. The Yolo Bypass Wildlife Area has approximately 700 acres that could be lowered in elevation to expand the freshwater tidal area. Feliz reminded the participants that the Yolo Bypass Wildlife Area is first and foremost part of the floodway, but it has been successfully managed to provide tremendous productivity for wildlife, fish, and agriculture.

Feliz presented an alternative conveyance option which is centered around modifying the Fremont Weir on the west end and bringing water down the west side of the Yolo Bypass in a canal. From this side, water could gravity feed into existing rice fields and managed wetlands for fish rearing. This alternative of rearing young salmon in a managed scenario would leave landowners whole and able to continue with their existing land use practices.

Feliz expressed his belief that these important ideas deserve study, and are consistent with the need to keep the floodplain clear and existing land uses intact.

Selby Mohr, Mound Farms, asked if there was money available through the Water Resources Control Board that Yolo County might not be benefiting from. Mike Hardesty noted that a western canal through the Bypass was proposed in 1943, but the idea was never developed. Mohr asked if there is a map of the 11,000-21,000 acres to be flooded. Feliz indicated he could put together a map of the Westside option to distribute to the group.

Participants asked Nemeth to ask the BDCP to consider smaller scale options and to build a larger overall plan from those rather than create an entirely new plan for the Bypass that imposes actions on areas that have already been actively designing and implementing successful management projects. A larger plan could learn from existing project implementations, but would require time and money. Nemeth conceded that the BDCP

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has produced a suite of measures directed at habitat conservation, starting in the Bypass, but that approach was losing steam, in part because of different opinions around the steering committee table.

Working Group members again noted that the Yolo Bypass offers the best opportunity for restoring salmon and steelhead runs which have suffered steep declines, while at the same time provide solutions that benefit agencies, agriculture, and landowners to the south. Mike Hardesty noted that the Yolo Bypass is the largest single component in the Central Valley flood control system, and as such, should not be considered a blank slate for new ideas, but rather, provides an opportunity to fix existing problems. Feliz reiterated the potential to move additional waters through the Yolo Bypass from west to east, and hopes to stimulate discussions and questions on this possibility. Jim Provenza, Yolo County, observed that the habitat concepts were moving ahead of flood protection. Nemeth expressed appreciation for Yolo Bypass Working Group comments, and indicated she would be communicating today's discussion with the BDCP Steering Committee.

Meeting adjourned.

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Yolo Bypass Working Group
Meeting Summary
Meeting 47
Thursday May 23, 2013
10 AM – 12:30 PM
Yolo Wildlife Area Headquarters
45211 County Road 32B, Davis

IN ATTENDANCE:
Robin Kulakow, Yolo Basin Foundation (Foundation)
Ann Brice, Foundation
Selby Mohr, Mound Farms
Bob Schneider, Tuleyome
Jeanette Wrysinski, Yolo County Resource Conservation District (Yolo RCD)
John Currey, Dixon Resource Conservation District (Dixon RCD)
Gina Daleiden, Representing Jim Provenza, District 4, Board of Supervisors, Yolo Co.
Mike Hardesty, Reclamation District (RD) 2068
Jeff Stoddard, Department of Fish and Game (CDFW)
Jason Roberts, Water Branch, CDFW
Marty Scholl, Sacramento-Yolo Mosquito and Vector Control District (SYMVCD)
Ron Tadlock, Farmer
Mick Klasson, Self
Karla Nemeth, California Resources Agency, Bay Delta Conservation Plan
Mike Lear, Swanston Ranch
Melinda Terry, North Delta Water Agency
Ray Thompson, Sky Rakers
Cindy Tuttle, Yolo County
Erik Vink, Trust for Public Land
Julie Spezia, Consultant for Metropolitan Water District
Paterea Marchand, Consero Solutions/Consultant to Yolo County
Russ Liebig, Stillwater Sciences
Bruce Orr, Stillwater Sciences
Chris Unkel, American Rivers
John Brennan, Knaggs Ranch, LLC
Tim Washburn, Sacramento Area Flood Control Agency (SAFCA)
Chris Bowles, cbec eco engineering
Jack Kuechler, RD 2060
Sally Negroni, Natural Resources Conservation Service
Stephen McCord, McCord Environmental Engineering
Matt Williams, Yolo County Citizen
Peter Buck, SAFCA
Alex Guender, SAFCA
Doug Brown, Douglas Environmental
Don Stevens, Glide In Ranch
Ric Reinhardt, MBK
Bob Webber, RD999

Vanessa Schmoker, RD999
Aaron Will, Ducks Unlimited
Eric Poncelet, Kearns & West
John Downs, CDFW, Water Branch
Tom Schroyer, CDFW, Water Branch
Kent Calfee, landowner
Craig Denisoff, Craig Denisoff Consulting
Earl Byron, Aquatic Scientist
Craig Isola, US Fish and Wildlife Service
Stuart Siegel, Wetlands & Water Resources
Chris Campbell, cbec
Stu Greenberg, H Pond
Dean Ongaro, H Pond
Dick Goodell, Glide In Ranch
Dave Kohlhorst, Glide In Ranch
Gris Fulster, Glide In Ranch
Steve Jannings, Channel Ranch
Dennis McEwan, CA Department of Water Resources (CDWR)
Dan Riordan, CDWR

1. Introductory Comments (Robin Kulakow, Executive Director, Yolo Basin Foundation)

Robin welcomed everyone and started introductions. She noted that the meeting was funded by a grant from the Water Resources Association of Yolo County. Ann Brice was the note taker.

2. Bay Delta Conservation Plan (BDCP)– Yolo Bypass Fish Enhancement Plan Next Steps (Karla Nemeth, BDCP Coordinator, CA Resources Agency)

Karla described the status of the Bay Delta Conservation Plan. The public draft of the plan will be released in October. The Yolo Bypass Fish Enhancement Planning Team meets regularly and will be the forum to start the project specific planning once the BDCP EIR/EIS is approved. Karla distributed a copy of BDCP Conservation Measure 2, Yolo Bypass Fisheries Enhancement. She encouraged meeting participants to provide input to the October plan. She described the adjustments to Conservation Measure 2 over the last two years due to input from stakeholders and Yolo County studies through the YB Fish Enhancement Planning Team. The current draft of the BDCP calls for a 4 phase timeline of actions after approval of the plan in 2015-2016.

Years 1-5: Projects to address fish stranding, fish passage up stream, and Putah Creek improvements.
Years 5-10 Install operable gates on Fremont Weir
Years 10-15 Design work done and construction beginning?
Years 15 and beyond Research and monitoring of earlier projects

Yolo County has done a study on potential impacts to agriculture and Ducks Unlimited has done a study of potential impacts to waterfowl. The Resources Agency is working with American Rivers, Ducks Unlimited and Yolo County to further refine the design process. The 10-17,000 acres-exact foot-print is not refined yet. More details will emerge during the project specific planning stage.

BOR beginning design work, have issued NOP and NOI. Scope narrower in terms of species, just for winter run and spring run salmon races. The BDCP looks at Split tail and terrestrial species. BOR has incorporated all of BDCP plans in their process. Their plan will have many similar activities. Bi-Op process has leapfrogged BDCP now.

Karla encouraged people to contact her with any questions (916-996-0002) For more information go to:
http://baydeltaconservationplan.com/Home.aspx

3. Lower Sacramento/Delta North Regional Flood Management Plan (Cindy Tuttle, Manager of Natural Resources, Yolo County & Ric Reinhardt, MBK)

This plan is now referred to "Flood Protect" http://www.floodprotectplan.com/index.php to make communication easier. It is a merger of the Lower Sacramento and Delta North regions based on previous maps published by CDWR. Cindy gave a brief history of the Central Valley Flood Protections Plan effort. The CDWR put together a flood protection strategy a year ago. Now they are looking at system-wide feasibility studies. Regional flood management plans are now a local planning effort. This region submitted a funding proposal to DWR in cooperation with Yolo County, West Sacramento Flood Agency, SAFCA, Downey Brand and MBK Engineers. The proposal was successful and the group was awarded $1.5 to do the regional plan. There is a West Side and East Side coordinating committee that are currently in the problem identification and developing a financing plan. The two groups meet in plenary sessions as needed. They have also created focus groups. There is one for the Yolo Bypass and meeting participants are invited to join that. Contact Cindy or Ric if you have questions.

Ric Reinhardt discussed planning elements such as improvement to levees, and the emergency response system. Improvements include actions like widening of Fremont Weir, removal of the Shortline Railroad, vegetation management, installing a weir connecting the Deep Water Ship Channel to the Bypass, widening the Sacramento Bypass and other things downstream. They will be coordinating with the US Army Corps of Engineers on actions like widening of the Bypass. The Central Valley Flood Protection Plan will contain a habitat mitigation plan most likely proposing 150,000-200,000 acres to be converted to habitat. One of their objectives is to look at how to keep land in ag and still achieve environmental objectives.

4. Yolo Bypass Drainage Study (Petrea Marchand, Consero Solutions, consultant to Yolo County)

Petrea began by defining the Yolo County Board of Supervisors (BOS) interest in protecting agriculture, wetlands and flood control in the Yolo Bypass. The BOS wants to assure that any changes in how the Bypass functions will benefit the landowners, wetland managers and farmers. The study is funded by Yolo County with money from Conaway Ranch. The goal is to have a list of priority projects and studies that the state and federal government will fund. The BOS will also be looking into getting funding for the drainage improvements in the new water bond.

The study team, Yolo County, Douglas Environmental, cbec eco engineering, and Yolo Basin Foundation, have developed a draft list of improvements that were assembled after extensive conversations with Yolo Bypass land managers. The list includes actions to improve agriculture and wetland management crossing, maintenance of existing canals, improvements to existing canals, and vegetation control. The study also funded collection of cross section data on the Knights Landing Ridge Cut, the Tule Canal/Toe Drain and some crossings. The final report will also contain recommendations for future operations and maintenance of canals throughout the Bypass. The project team is also coordinating with Solano County for proposed projects.

It was suggested that the project team contact Kennedy Jenks to coordinate the proposed actions with the Westside Integrated Regional Water Management Plan. The goal is for actions to be flood neutral or to improve flood protection.

Melinda Terry asked Petrea about toe drain. Would expansion and crossings increase capacity or not? Petrea will talk to Karla.

5. Fish Restoration Program Agreement (FRPA) with emphasis on Yolo Bypass (Dennis McEwan, Chief, and Dan Riordan, Senior Environmental Scientist, both with DWR's Mitigation and Restoration Branch)

Dennis gave a power point presentation about FRPA and some potential projects http://www.dwr.water.ca.gov/environmentalservices/frpa.cfm The group was especially interested in a map showing potential projects in the Yolo Bypass. FRPA is a joint program between DWR and CDFW and was established to address DWR habitat restoration obligations to cover the effects of the current operation of the State Water Project pumps. These are the actions required by the current USFWS and NMFS Biological Opinions for Delta smelt and other salmonids. FRPA also addresses requirements by the CDFW Longfin Smelt Incidental Take Permit. A map of potential projects can be found at the website above under Restoration Projects Map (FRPA & Other).

FRPA Goals:

- Restore 8,000 acres of tidal habitat.
- Restore functions and processes that promote productivity and nutrient export.
- Increase amount and quality of salmonid rearing habitat.
- Include other agencies, stakeholders and public.
- Monitor and adaptively manage restoration sites.
- Maintain consistency with other Delta Plans and programs.

FRPA is not part of BDCP but it does have a tie-in. The current focus is on the 1,600-acre Prospect Island restoration project and on developing a regional restoration strategy for the Cache Slough Complex. These actions are all connected to the Yolo Bypass floodplain.

John Currey asked if lands have already been designated for the 8000 acres? Dennis replied that about half are already accounted for in current projects. They need another 4000 acres. They are looking for willing sellers, mostly in Solano County -- Suisun Marsh and Cache Slough Complex.

Dan Riordan is the Prospect Island Restoration project manager. More information on the Prospect Island Restoration Project is available at http://www.dwr.water.ca.gov/environmentalservices/frpa_prospect_restoration.cfm The goal is to breach levees to get tidal action to improve conditions for fish. There are 1-4 breaches proposed on Prospect Island.

Prospect Island has less subsidence than other islands in the Delta. The surrounding waterways have comparatively high turbidity relative to other Delta regions, which is a beneficial condition for delta smelt and other natives fishes, which are present near the site. A meeting participant noted that FRPA implementation will result in additional lands being placed in public ownership and asked if the public will have access to hunting on those lands. Dennis responded that there will be public access after restoration is completed and, for Prospect Island, there is currently no hunting or agriculture permitted.

Current Prospect Island issues include:

- DWR access
- Property owner easements
- Study on seepage
- And others

The CEQA Notice of Preparation (NOP) was released on May 17.th On June 10th the public scoping meeting will be held, from 7-9 pm at the West Sacramento Community Center. The comment period on the NOP will close June 21st.

A meeting participant asked who will manage Prospect Island after the restoration is complete. Dennis McEwan responded that it will most likely be CDFW, the Delta Conservancy, or some other state agency.

Bob Webber commented that there is a problem with the cross levee on north side of Prospect Island. He indicated the levee is not a full-height flood protection levee and could overtop from a restored Prospect Island.

6. Other updates

a. Putah Creek Re-alignment ERP Project – Robin Kulakow

Robin gave a general description of the Putah Creek project to improve salmon passage. One goal is to avoid Lisbon Weir and the associated passage issues. Robin is the project manager for a team of consultants led by Stuart Siegel with Wetlands and Water Resources. This project is named in the salmon biological opinion. The purpose of this project is to create the planning and designs needed to construct the Lower Putah Creek Channel. CEQA documentation and permitting for construction will also be provided by this grant. Stuart gave a more detailed description.

Selby Mohr asked about the effect on moving the mouth of the cree below Lisbon Weir in terms of flood forecasting. Chris Campbell said he didn't think that the realignment will have an impact. The project team will look further into this issue. Mike Hardesty said that there could be impacts upstream. That project team is looking into this issue already. Stuart noted that the creek is currently designed to overflow in the YBWA.

b. Yolo Bypass Wildlife Area (YBWA) activities – Jeff Stoddard, YBWA Manager, CDFW

Jeff described the summer activities that are going on: discing and mowing of the wetlands. He referred to the issue of using farm lease payments for managing the YBWA and send that funding is starting to be available. He will have more money for management when the new FY begins on July 1. They continue to coordinate vector control with the SYMVCD. He was asked if he will be able to meet the vegetation control for flood control with the reduced budget and he said yes.

c. Liberty Island Land Management Plan – Jeff Stoddard

Jeff gave a short report since Ryan Carothers, who is coordinating the plan is out of town. The planning process is just beginning to start. They will be having a series of focused meetings on various issues. No deadlines for the process have been set. A public scoping meetings will be scheduled. Contact Ryan Carrothers at David.carrothers@wildlife.ca.gov or 530-757-1813.

d. SYMVD update – Marty Scholl

Marty briefly described the District's wetland management program. Their goal is to control the mosquito population using mechanical vegetation control, improving drainage, and larvacides. He said that mosquitoes are early this year. They are about 2 weeks early in the rice fields. The District is participating a mosquito fish research project on Knaggs Ranch in the coming year.

e. Knaggs Ranch – John Brennan

John gave a brief description of the salmon growth study now going into its third year. They are working in a partnership with California Trout, DWR, UCD, Bureau of Reclamation and NOAA on the study to document the growth of young salmon in rice fields. They use hatchery fish and some wild fish from a DWR screw trap on the Sacramento River. The fish all grew well and it appeared that the fish on the stomped rice stubble did the best. While the warm days produced excellent growth rates (better than last year) they caused some problems toward the end of the study. Next year's study will focus on depredation and temperature tolerance. He suggested that people with questions contact him. He also encouraged people to attend one of the Monday field trips that will be planned next year to observe the research ponds when the salmon are present. Robin will send out a trip schedule to the Working Group listserv when it is available. More information can be found at: http://caltrout.org/tag/knaggs-ranch.

7. Wrap up

Robin thanked everyone for attending and encouraged anyone to contact her if they have questions or suggestions for other meeting topics.

Yolo Bypass Working Group
Meeting Summary
Meeting 49
March 27, 2014
1:00 PM to 3:00 PM
Yolo Wildlife Area Headquarters
45211 County Road 32B, Davis

In attendance:

Robin Kulakow, Yolo Basin Foundation
Jeff Stoddard, CA Department of Fish and Wildlife (CDFW)
Jeffrey Volberg, California Waterfowl
Marc Commandatore, CA Department of Water Resources, (DWR) Fish Passage
Craig Isola, US Fish and Wildlife Service (USFWS)
John Currey, Dixon Resource Conservation District
Andrew Benware, Assemblymember Yamada
John McNerney, City of Davis, Public Works
Ryan Carrothers, CDFW
Daniel Huang, Delta Stewardship Council
Shakoora Azimi-Gaylon, Delta Conservancy
Kelly Briggs, DWR, Flood Management
Cindy Tuttle, Yolo County
Brian Murphy, DWR
Tim Washburn, Sacramento Area Flood Control Agency
Ric Reinhardt, MBK
Ricardo Pineda, DWR, Floodplain Management
Don Stevens, Glide In Ranch
Steve Jennings, Channel Ranch
Dave Kohlhorst, Glide In Ranch
Mike Lear, Swanston Ranch
Marty Scholl, Sacramento-Yolo Mosquito and Vector Control District
Chris Foe, Central Valley Regional Water Quality Control Board
Eva Olin, DWR, Environmental Services
Julie Spezia, Metropolitan Water District
Mike Hardesty, Reclamation District 2068
Erin Aquino-Carhart, CDFW
Bill Fleenor, Center for Watershed Sciences, UC Davis
Tara Beltran, State and Federal Contractors Water Agency
Sally Negroni, Natural Resources Conservation Service
Chris Bowles, cbec eco engineering
Ray McDowell, DWR, FloodSAFE Environmental Stewardship and Statewide Resources Office
Lynn Moquette, DWR Central Valley Flood Protection Office
Stuart Siegel, Wetlands and Water Resources
Jacob Byers, USFWS

I. **Introductions**: Robin Kulakow welcomed everyone. Introductions were made around the table. She stated the purpose of the meeting and introduced Cindy Tuttle with Yolo County to start the meeting.

The purpose of the meeting is to provide an update on the Regional Flood Management Plan and to begin to discuss an integrated solution in the Yolo Bypass that includes agriculture sustainability, flood protection, habitat and water supply.

II. **Introduction and background on the Lower Sacramento River/Delta North Regional Flood Management Plan**;
Cindy Tuttle, Intergovernmental Relations Manager, Yolo County

Ms. Tuttle gave an update on the Lower Sacramento Delta North Regional Flood Management Plan (RFMP) that was discussed at the previous Working Group meeting. The RFMP is one of the implementation components of the Central Valley Flood Protection Plan that was adopted in 2012. The planning area for the RFMP includes Yolo, Sacramento and parts of Solano and Sutter counties. It is funded through a grant from DWR. The purpose of the RFMP is to identify regional flood related problems; propose potential solutions and develop a financing and implementation plan.

The problem identification and regional improvements portions of the plan have been completed and the group is now entering the third and final phase of the planning effort. With the other planning processes going on, there needs to be an integrated approach that includes flood management, water quality, water supply and conservation planning

The Yolo County Board of Supervisors charged Ms. Tuttle with finding a way to work with all interests to develop an integrated plan.

Ms. Tuttle stated that something very unexpected happened over the past 12 months. The RFMP planning process has led to a strong partnership being developed among the local flood management interests in the region. This is something that we have not really seen in the past. Working together the group has come to realize that with the multiple state and federal initiatives being considered for the region including the Biological Opinion (BiOps), coupled with the flood work being undertaken as part of the RFMP, our interests will be best served by working together to develop an integrated water management plan that addresses the problems in a way that can be supported at the local level. The solutions should include local interests. The bottom line is that over the past year we have shifted to the offense. We find ourselves in a position where the local agencies have begun to outline a plan that could include the following elements:

1. Flood management – This includes structural and nonstructural projects that address National Flood Insurance Program rate concerns for the rural areas and small communities like Clarksburg and Knights Landing. This means providing 200-year protection for the urban areas including West Sacramento and Woodland in Yolo County.
2. Agricultural sustainability – This means avoiding and minimizing impacts to agriculture when possible, but also working with the agricultural community to identify where strategic

investments in agricultural infrastructure, coupled with developing a long term funding stream, could promote the long-term sustainability of the industry. It also means recognizing the importance of agriculture to the regional economy and flood management system.

3. Conservation – This means development of locally acceptable environmental enhancements to the Sacramento River and Yolo Bypass that achieve the objectives of the US Bureau of Reclamations/CA DWR's BiOp actions and CVFPP Conservation Strategy.
4. Water Supply – The plan should include elements that increase the reliability of the existing water supply system where there is a nexus with a conservation or flood management action.

III. Specifics on what is being considered for the Yolo Bypass;
Ric Reinhardt, Consulting Engineer, MBK

Mr. Reinhardt discussed specific actions proposed for the Yolo Bypass that integrate the goals of BiOps, and flood management.

The current opportunities report for the RFMP proposes providing 100 year protection for Knights Landing and the town of Yolo. Clarksburg is more difficult to identify cost effective solutions to provide 100 year protection. As an alternative to improving the levees, FEMA's flood insurance rate map Zone D is being investigated as a possibility to provide relief to Clarksburg. The RFMP also proposes flood infrastructure elements for Rio Vista Our goal is to attract funding for the region that we would not otherwise be able to secure by developing an integrated water management plan that includes widening of the Yolo Bypass.

The RFMP as well as the US Army Corps of Engineers are both looking at the potential solutions associated with widening of the Sacramento Weir. The RFMP is also evaluating the possibility of relocating the Sierra Northern Railway and California Northern Railway. The RFMP team is currently pursuing a grant from the federal economic development agency to advance this effort.

The RFMP is evaluating alternatives to provide 200-year protection for the cities of Woodland , West Sacramento and Sacramento.

The RFMP also proposes an ag sustainability fund. There could be an impact fee associated with RFMP projects to ensure that the ag economy is maintained and improved. The RFMP will also be looking at implementing projects proposed in the Yolo Bypass Drainage and Infrastructure Study. They are looking at long term funding needs to operate and maintain flood protection facilities.

CA DWR is currently working on a Basin Wide Feasibility Study. This effort will show plans for the Yolo Bypass, including an expansion. This study is looking at actions from a statewide perspective.

A question was asked whether proposed future actions would increase the frequency and duration of flooding in the Bypass. According to Mr. Reinhardt the flood stage in the

Bypass would actually decrease through a combination of setting back levees and building a weir into the Deep Water Ship Channel.

There was discussion about expanding the Yolo Bypass footprint by widening the Sacramento Weir by making a setback levee at Elkhorn. Would there be a benefit to fish by opening up the Elkhorn area to flooding? Another option is to look at expanding the Fremont Weir by about 5,000 feet.

There was a question about whether the RFMP was looking at the economic loss associated with more flooding during waterfowl hunting season.

Sharing the landscape was discussed. Local government and landowners need to stand together to deal with water contractors, DWR and BOR.

Next steps were discussed. According to Mr. Reinhardt they are currently having discussions with DWR and the BOR. They are also having discussions with Elkhorn landowners.

Why expand the Yolo Bypass? Regional improvements would help Woodland and Knights Landing and the urban and rural areas along the Feather and Sacramento Rivers.

Would there be increased velocities? Mr. Reinhardt said that he didn't think so, but that modeling will be done in the future. He said that there could be a 1 ½ to 2½ foot lowering of flood stages at I St. Bridge, which is very significant.

A comment was made that it is extended low flows that cause the most damage. The low flows also encourage more vegetation to grow.

In summary an integrated RFMP would build momentum with many different programs including bond funding. DWR is giving signals to encourage the partnership approach to the RFMP.

Yolo Bypass Working Group Meeting Summary
Meeting 50
December 8, 2015

Introductions and Attendance

Rebekah Bergkoetter – CA Dept. Fish and Wildlife (CDFW); Yolo Bypass Wildlife Area (YWA)
Chris Bowles, cbec ecoengineering
Doug Brown – Douglas Environmental
Mike Eakin – CDFW, Water Branch
Henry Estrada – Sac Yolo Mosquito and Vector Control District (SYMVCD)
Judy Fisher – Kueneman Consultancy
Dick Goodell – Glide In Ranch
Mike Hardesty – Reclamation District 2068
Alley Keller – McCord Environmental
Eric Kueneman – Kueneman Consultancy
Mike Lear – Swanston Ranch
Betsy Marchand – Yolo Basin Foundation
Petrea Marchand – Consero Solutions representing Yolo County and Yolo Habitat Conservancy
Stephen McCord – McCord Environmental
Selby Mohr – Mound Farms
Heather Nichols – Yolo County Resource Conservation District (YCRCD)
David Okita – CA Resources Agency, EcoRestore
Martha Ozonoff – Yolo Basin Foundation
Paul Phillips – CA Waterfowl Association
Steven Ramos – SYMVCD
Marty Scholl – SYMVCD
Tom Schene – Tule Ranch
Greg Schmid – Tule Ranch
Jeff Stoddard – CDFW, Manager, YWA
Nicole Velleneuve – CDFW, YWA
Leanne Villa – Yolo Basin Foundation
Tim Washburn – Sacramento Area Flood Control Agency (SAFCA)
Aaron Will – Ducks Unlimited

Integrating flood protection and fisheries habitat improvements

Chris Bowles with cbec engineering has worked in the Bypass for about 15 years. Chris presented a list of recent and ongoing studies/projects in the Bypass and modeling that his company has done to evaluate the outcome of these projects. Modeling showed that west side tributaries provide significant water inundation; more than originally expected.

The National Marine Fisheries Service (NMFS) Biological Opinion requires agencies to maximize floodplain rearing habitat for salmon. To this end, state and federal agencies need to figure out how to get fish onto and off the floodplain. Their initial solution is to maximize inundation while minimizing impacts to landholders. A number of projects are being considered including notching the Fremont Weir

to allow upstream adult fish passage and reduce stranding; improving passage through the toe drain; modifying agricultural crossings in the Tule Canal and Toe Drain.

Chris modeled different size and shaped notches for the Fremont Weir to see how it would affect fish and downstream land uses. State and federal fisheries biologists' assumption is that "more water equals more fish passage," however, this doesn't account for fish behavior. The modeling also showed that the date of closure does not affect the number of fish entering the system but does create a large impact to agriculture. The later the date of closure, the greater the economic impact to farmers. Landowners north of I-80 noted that the Bypass is not a natural system and proposed bladder dams/vertical weirs to manage inundation. These weirs would be operated during non-agricultural operations. More inundation in the north would create little impact to areas south of Interstate 80 because water is held in the north. Results from 2003 supported this (there was more inundation with less water if bladder dams were used). The US Bureau of Reclamation (BOR) wants a more natural system so how do you maximize fish passage in and out of the floodplain. Some farmers are recommending starting with a small notch and then see what happens and increase the size as needed.

The Knights Landing Outfall Gates were retrofitted recently to prevent adult salmon in the Sacramento from entering the Knights Landing Ridgecut and the Colusa Basin Drain. This project was completed quickly due to collaboration.

The Wallace Weir berm structure is old and has to be redone every year. The State is on board with the goal to reconstruct the structure next year to provide benefit to land owners. The Biological Opinion "team" is on also on board as this will block fish passage up the Colusa Drain, will not alter existing water operations of the weir, will improve agricultural water delivery, and will not increase flood risk.

The final project discussed was the Elkhorn Basin widening in the northern and southern portions of the Bypass north of the Sacramento Weir. The northern widening is looking at a seven-year timeline; the southern portion is 5-7 years. Prior to the construction of the Bypass, the northern Elkhorn area was a low spot with heavy inundation. It was determined that this was a good spot to widen to decrease peak flood stage. This will provide huge benefits for flood protection and relief, floodplain habitat generation, connectivity, and greater late season inundation. There may be potential benefits to agriculture. Components of this project include set backs of agricultural berms, widening the Fremont Weir, and another weir on east side to allow water back into the Bypass.

Mike Hardesty stated that the widening at Elkhorn would be part of multiple projects. Mitigation would be necessary downstream due to an increase of 60,000 cfs entering up north.

Steve McCord mentioned the entrainment of fish migrating downstream. Right now, there is more focus on juveniles getting into Bypass than fish leaving the floodplain. They are tracking fish behavior north of Fremont Weir and the assumption that "more water equals more fish" is being refined. There is a problems with gate sizing – the small size creates water velocities that are too fast. A wider notch in Fremont Weir would allow for increased fish passage.

There was general discussion relating to the closure date of the Fremont Weir notch and how this date will affect landowners. Petrea Marchand stated that March 15 seems to be the more accepted end date

for all parties. Models are improving and state and federal agencies are respecting local input. Robin Kulakow mentioned that Yolo County has advocated for local stakeholders and the wetlands

Drainage and infrastructure improvements

Petrea outlined what Yolo County is doing in the Bypass. Over the past five years, Yolo County met with stakeholders and asked what they would want to see for drainage and infrastructure improvements. In preparation for projects and grants that would be coming, twelve projects were prioritized based on the outcome of meetings with stakeholders. Prop 1 grant funding is being pursued for priority projects. Four grants were pursued to improve the Wildlife Area for wetland management and farming, water supply conveyance, utilize South Davis drain water, and improve public access. One grant written by Ducks Unlimited, Yolo Basin Foundation and Yolo County is for construction funding. The second is a planning grant for ag crossing replacement and/or improvements with rail car bridges. The planning will identify what crossings to focus on and what type of structures to utilize. The third grant is for west side tributary flow monitoring; Department of Water Resources, US Army Corps of Engineers (ACOE) and Yolo County need to identify data gaps. The last grant with Delta Conservancy is to develop more coordination for operations and maintenance associated with changes in flood flows.

There was a brief discussion about water quality and what was being done to study and/or address this issue. Petrea stated that this was for future consideration.

Aaron Will stated that they will be seeking other funding because projects will cost more than the grants provide.

ACOE says that every project will need a 408 permit. The projects will not affect the levee so only district level not Headquarters approval is required. They have started working with ACOE.

EcoRestore

David Okita represents the State's EcoRestore project which was created at the end of April to replace the habitat portions of the Bay Delta Conservation Plan. The plan includes restoring 30,000 acres of delta habitat in the next 3 to 4 years. 17,000 acres is proposed to be restored in the Bypass for floodplain and 9,000 in Cache Slough for tidal and sub-tidal habitat restoration. The State is committed to the projects including addressing local concerns. To accommodate the projects, easements must be changed but the State will not use eminent domain; there are many stakeholders. Most of the projects are in the Delta and Suisun Marsh. The Knights Landing outfall gates project was fast tracked and completed in 2015. The Wallace Weir and Tule Canal Ag crossings will be done in 2016 and the Fremont Weir notch in 2017. The EcoRestore program will also help with the Prop 1 Yolo projects that Petrea presented.

USACOE Sacramento River Flood Control Project Reauthorization

Tim Washburn discussed the Central Valley Flood Protection Plan of 2012 and its reauthorization. Department of Water Resources must increase water conveyance and decrease flood risk by increasing the area of bypasses. The Yolo Bypass is the greatest opportunity in the near term to achieve this end. The new plan must go to the Sacramento Valley Flood Protection Board in 2017. A major component is to increase the diversion capacity in the north section with the Fremont Weir; various options were proposed/discussed by Chris Bowles. If you increase the capacity, however, how do you offset the

increase in water. This can be achieved by setting levees back on the west side and south side in Cache Slough, and notch deep water ship channel. This will lower elevations in the Sacramento River by one foot or more during peak floods.

Tim went on to discuss other issues and potential questions: how do urban benefits affect agriculture, the need to improve levees, and the need for an improved flood wall for Rio Vista. Potential adverse impacts will need to be addressed and public engagement is essential to hone in on alternatives that are agreeable. Tim stressed that coordination was paramount at the local level between SAFCA, counties, reclamation districts, and water agencies to present a united voice to the State. The Central Valley Flood Control Plan reauthorization needs to integrate with State plans. SAFCA is communicating local interests to the State. These interests include: farmers in the north are proposing raising fish and growing rice for economic benefit. The stakeholders in the middle section of the Bypass do not want what happens up north to negatively affect them. In the south (Cache Slough area), tidal marsh habitat and infrastructure could experience problems due to requirements for fish passage. This southern group needs to coalesce. There are unique issues for each area and his group mediates between them and the State.

ACOE requires a 404 permit for any project using public money. SAFCA is working to build a relationship with ACOE to minimize time and costs related to permitting. By building this relationship, the ACOE can use its authority to approve projects regionally, instead of requiring high level ACOE approval. SAFCA is working on an MOA with DWR and ACOE to be at the table and represent local interests.

Selby Mohr stated that in the last 20 years, there has been significant land alteration in the lower Bypass. The alterations have not been properly permitted. He wondered how you can improve flow, particularly at the bottle neck in the lower Bypass, since this is not how the Bypass was originally designed. There was discussion of putting more water in the Ship Channel to increase water conveyance and lower the Sacramento River, but what is practical and equitable.

Betsy Marchand said that we need to speak with one voice at the local level and wanted to know who the leaders were. Tim stated that Yolo County, Solano County, SAFCA, City of West Sacramento are all involved.

Yolo Bypass Wildlife Area

Jeff Stoddard reported that the five-year farm leases are finalized for grazing (Tom Schene) and rice (Jack DeWit). Leases are competitive and handled under contract by YCRCD.

The flood up was delayed this year. This delay required less water but provided more food for waterfowl. The managed areas are 90 percent flooded.

Hunting season for upland birds and water fowl is in full swing. Take numbers are increasing

The Putah Creek realignment project is part of the EcoRestore program. The southern realignment will tie into tidal wetlands. Department of Fish and Wildlife is working with Department of Water Resources who will implement the project plan.

Yolo Bypass Working Group
May 24, 2016 (Meeting 51); 10 am to noon,
Yolo Bypass Wildlife Area Conference Room

Meeting Summary

Meeting Participants

Jeremy Arrich – CA Department of Water Resources (DWR)
Lewis Bair – Reclamation District 108
Pete Bontadelli – Yolo Basin Foundation/Analytical Environmental Services
Doug Brown – Douglas Environmental
Kent Calfee--landowner
Chris Campbell - cbec ecoengineering
Tom Chapman – HDR Engineering
Mark Cowan – US Army Corps of Engineers (USACOE)
John Currey – Dixon Resource Conservation District
Mike Eakin – CA Department of Fish and Wildlife (CDFW), Water Branch
Henry Estrada – Sac Yolo Mosquito and Vector Control District (SYMVCD)
Judy Fisher – Kueneman Consultancy
Chris Fulster Jr. – Glide In Ranch
Dick Goodell – Glide In Ranch
Larry Jahn – Los Rios Farm
Alley Keller – McCord Environmental
Dave Kohlhorst – Glide In Ranch
Robin Kulakow –Yolo Basin Foundation
Mike Lear – Swanston Ranch
Betsy Marchand – Yolo Basin Foundation
Petrea Marchand – Consero Solutions representing Yolo County
Stephen McCord – McCord Environmental
John McNerney – City of Davis
Selby Mohr – Mound Farms
Tara Morin – Consero Solutions
Eric Nagy – MBK Engineers
Heather Nichols – Yolo County Resource Conservation District (YCRCD)
Martha Ozonoff – Yolo Basin Foundation
Thomas Pate – Solano County Water Agency
Paul Phillips – CA Waterfowl Association
Mike Roberts – DWR
Elisa Sabatini – Yolo County
Marty Scholl – SYMVCD
Sara Schultz – USACOE
Bjarni Serup - CDFW
Tom Schene – Tule Ranch
Greg Schmid – Tule Ranch
Jeff Stoddard – CDFW, Manager, Yolo Bypass Wildlife Area
Kris Tjernel – CA Natural Resources Agency
Lily Tomkovic – UC Davis

Eric Tsai – DWR
Leanne Villa – Yolo Basin Foundation

I. Introductions:

The group was welcomed by Jeff Stoddard and Robin Kulakow. Meeting participants introduced themselves. Robin Kulakow facilitated the meeting.

II. US ACOE/CA DWR – Sara Schultz and Mark Cowan

The USACOE is preparing the Sacramento River General Reevaluation Report (GRR). The question was asked: What are the needs of the Sacrament River flood control system and what is required to meet those needs. The ACOE is trying to get input from all parties but they are still not hearing from some stakeholders. The ACOE primary goals are reducing flood risk while seeking habitat restoration opportunities. Other system benefits include water supply and recreation.

The study area was from Knight's Landing to Collinsville. The feasibility study identified the future without project condition, which is everything that would reasonably happen if the project was not implemented. This was the baseline. This baseline will change over time as things change or projects are identified. Alternatives were then outlined.

For the evaluation phase, USACOE will use modeling to analyze economic and environmental benefits of the alternatives and see which rise to the top. Which alternatives provide the most benefit for the cost?

The Plan will be made available to the public. Today's discussion was to present broad concepts and they are currently only at a conceptual level. They want to make things more efficient regardless of the benefit and/or constraints. The study will require CEQA and NEPA compliance. The process was originally supposed to take 3 years but due to the large study area and number of stakeholders and project groups, it will likely take much longer.

Please see Attachment A for the presentation by USACOE.

III. Regional Flood Management Plan for Lower Sacramento River/North Delta (Yolo Bypass) – Eric Nagy

DWR started the regional flood management planning program to stimulate the conversation between local flood control agencies as well as with other water resource stakeholders. There are an extremely diverse set of interests and many stakeholders, including rural, agricultural, urban, and at least 40 levee maintaining agencies within this region. A Regional Flood Management Plan was submitted to DWR in July 2014. Since then the following six agencies came together to focus the region's attention on the Yolo Bypass and Cache Slough areas: Yolo County, Solano County, SAFCA, West Sacramento Area Flood Control Agency (WSAFCA), RD 2068 and Solano County Water Agency. This team has tried to progress the Corridor Management Framework (CMF), adopted in February 2015, to provide a common set of regional goals and objectives when interacting with state and federal agencies concerning planned water resource projects in the region. The goals are to reduce flood risk, preserve and improve habitat

function, promote a vibrant agricultural economy, establish a sustainable approach to operations and maintenance for both flood and habitat projects, and improve water supply and drainage infrastructure. The CMF attempts to treat federal, state, and local interests equally and create long term, constructive relationships with agencies on all levels.

IV. Salmon Biological Opinion: Yolo Bypass, Timeline for developing alternatives for US Bureau of Reclamation/ DWR CEQA/NEPA Analysis – Kris Tjernel

In 2009, National Marine Fisheries Service issued the Biological Opinion for salmon. In 2012, DWR and Bureau of Reclamation adopted a formal implementation plan for the Yolo Bypass which includes fish passage and floodplain restoration. In 2013, studies, planning, and design work began. There has been significant progress in 2016. The near-term fish passage projects are: 1. Wallace Weir which will construct a permanent facility that crosses just downstream of the existing weir and allow for the same flows. Salmon will be collected and moved to the Sacramento River instead of getting lost; 2. Fremont Weir fish ladder will likely be done in 2018. The plan is to widen and deepen the current fish ladder. This design will allow for only 1000 cubic feet per second (cfs) so there will be little impact on surrounding area; 3. agricultural road crossings which should be implemented in 2017. Existing culverts don't work for fish so they are working with landowners to identify what to do here to help fish passage but retain agricultural operations; 4. Lisbon weir - the timeline not yet determined but probably 2018. The question remains of how to improve the facility for fish but retain current operations for agriculture and CDFW Yolo Bypass Wildlife Area use. Fish passage must work both directions with adult salmon moving up through system into the Sacramento River and juvenile fish leaving the Bypass to the Delta then ocean. The Biological Opinion also requires floodplain restoration. The ultimate goal would be to increase the frequency and duration of shallow inundations mostly for juvenile fish, create additional fish passage improvements, yet find ways that work for beneficial uses including agriculture, hunting, wildlife habitat, education, water supply, and more.

There has been significant stakeholder engagement with participation by over 100 land owners, land managers, non-governmental organizations, and local governments. All future outreach will be efficient, honest and purposeful. They hope to coordinate with ongoing flood management efforts so there is only one footprint.

The question was asked about modeling for different cfs levels. The current models are for 6000 cfs but they plan to model different levels including 3000 cfs. This modeling is in the works.

V. Yolo Bypass Cache Slough MOU – Doug Brown

In September 2015, 15 entities came together and created the Yolo Bypass Cache Slough Memorandum of Understanding (MOU). The MOU spells out how the agencies will work together. The 10-year agreement is non-binding and aims to develop trust. There are many projects going on in the Bypass (Ecorestore, Yolo County projects through Prop 1 funding, Central Valley Flood Protection Plan, Yolo/Solano HCP, Regional Trails Initiative) and the

MOU hopes to integrate all of these efforts by creating a structure to oversee all these projects. See Attachment B for MOU.

The principles of the MOU are as follows:

1. – concerns of all parties will be considered and are important.

2.– Primary function of Yolo Bypass is flood control, all projects must improve or maintain status quo

3. – identify ways to enhance other Bypass benefits

4. – can't modify regulatory requirements

5.– connect all agency levels with locals and consider all interests

VI. Proposed Projects in the Yolo Bypass for Proposition 1 funding: Update – Petrea Marchand

Petrea discussed the proposed projects in the Yolo Bypass under Prop 1 funding. See Attachment C for further information.

Yolo Bypass drainage and water infrastructure improvement study was funded by Conaway Ranch and Yolo County and asked "what do stakeholders need in relation to proposed projects?" The 2014 passage of Prop 1 allowed the projects identified in this study to be funded, however, more funding is needed, to complete the projects.

The projects include:

1. Drainage/conveyance for water supply

2. Maintenance program for drainage (sedimentation and invasive species)

3. Weir improvements.

4. Monitoring west side tributaries.

VII. Yolo Bypass Wildlife Area – Wildlife Area Corridors Plan – Heather Nichols

Heather Nichols with the Yolo County Resource Conservation District manages the agriculture permits and leases in the Yolo Bypass Wildlife Area. In an effort to protect wildlife during flood events, they looked at what habitat enhancements could be done to provide cover for wildlife during these events but wouldn't impede agriculture or other projects. Two sites were selected and will be improved by removing noxious plants and planting native species. Please see Attachment D for project description, goals, and tasks.

Attachments:

A. USACOE presentation on GRR
B. Yolo Bypass Cache Slough MOU
C. Proposed Projects in the Yolo Bypass for Proposition 1 funding
D. Yolo Bypass Wildlife Area – Wildlife Area Corridors Plan

Yolo Bypass Working Group
January 10, 2017(Meeting 52); 1 PM to 3 PM,
Yolo Bypass Wildlife Area Conference Room,
45211 County Road 32b, Davis, CA

Draft Meeting Summary

Meeting Participants

Jeremy Arrich – CA Department of Water Resources (DWR)
Peter Blodgett, US Army Corps of Engineers (USACOE)
Chris Bowles, cbec eco engineering
Mariah Brunbaugh, USACOE
Ryan Carrothers, CDFW
Jack DeWit, DeWit Farms
Mike DeWit, Tenant Farmer
Jonathon Howard, Assembly District 4Larry Jahn – Los Rios Farm
Campbell Ingram, Delta Conservancy
Marge Kolar, Yolo Basin Foundation
Rhiannon Kucharski, USACOE
Robin Kulakow –Yolo Basin Foundation
Corey Lasso, DWR
Mike Lear – Swanston Ranch
Linda Leeman, Yolo Basin Foundation
Betsy Marchand – Yolo Basin Foundation
Petrea Marchand – Consero Solutions representing Yolo County
Stephen McCord – McCord Environmental
John McNerney – City of Davis
Selby Mohr – Mound Farms
Andrew Muha, USACE
Eric Nagy – Larsen Wurzel Associates
Meegan Nagy, Reclamation District 108
James Newcomb, DWR
Martha Ozonoff – Yolo Basin Foundation
Michael Perrone, DWR
Paul Phillips – CA Waterfowl Association
Mike Roberts – DWR
Nancy Sandburg, USACOE
Bjarni Serup - CDFW
Greg Schmid – Tule Ranch

Yolo Bypass Working Group
January 10, 2017(Meeting 52); 1 PM to 3 PM,
Yolo Bypass Wildlife Area Conference Room,
45211 County Road 32b, Davis, CA

Kara Smith, Yolo Basin Foundation
Julie Spezia, Metropolitan Water District
Don Stevens, Glide In Ranch
Jeff Stoddard – CDFW, Manager, Yolo Bypass Wildlife Area
Eric Tsai – DWR
Leanne Villa – Yolo Basin Foundation
Melissa Weymiller, USACOE

Introductions:

The group was welcomed by Jeff Stoddard and Robin Kulakow. Meeting participants introduced themselves. Robin Kulakow facilitated the meeting.

1. **Sacramento River General Reevaluation Study,** Rhiannon Kucharski, **US Army Corps of Engineers, (refer to Attachment A)**

Study Background

The goal of the reevaluation is to look at the multiple needs of the Bypass system, primarily ecosystem restoration and flood management. The conclusions for the first evaluation came from the Central Valley Integrated Flood Management Watershed Study however ecosystem restoration opportunities were not originally envisioned. The study area for this reevaluation is Knight's Landing to Collinsville which encompasses the bottom third of the Bypass system (726 square miles). The ultimate goal is to improve the flood system by improving flood control thereby reducing risk, and restoring ecosystems and habitat. Improving recreational access is also an ancillary objective.

Status Update

At the Yolo Bypass Working Group meeting in December 2016, the Army Corps of Engineers (the Corps) had reached the Alternative Formulation and Analysis milestone. They are currently in the Tentatively Selected Plan process. Seven alternatives have been identified with the potential for an eighth if a locally preferred plan (LPP) is added. The Corps uses different methods to analyze flood

risk management and ecosystem restoration. Flood risk management uses a benefit cost analysis where the benefit must outweigh the risk from an economic standpoint. Ecosystem restoration uses a cost effective analysis which is based on the significance of resources and ecosystem output (what is the lowest annual cost per acre). Any restored land must be Corps land and cannot be mitigation. The "future without project condition" does assume that many actions would be in place. The Corps tried to identify all possible ecosystem restoration measures and gathered information from current projects.

The flood risk management analysis identified areas with potential flood damages, flood risk management system features, and non-structural elements. Sixty potential features were identified and some dependencies existed. Examples of features that were identified: setback levees (remove existing levees, construction of new setback levees, restore lands within floodway, account for lands already restored); restore habitat within Bypass (identify land already in conservation ownership, restoration of wetland or riparian habitat based on elevation); Deep Water Ship Channel (use to convey flood flows, construct notch and closure structure, improve east levee); setback levee along the Sacramento River main stem (remove all or a portion of a levee, construct setback levee and restore habitat).

For ecosystem restoration, the analysis is based on acreage; for flood risk the analysis is based on stage reduction. They then focused on best buy plans. Alternatives 1-3 focus on ecosystem restoration first then layered flood risk. Alternatives 4 and 5 started with flood risk then considered ecosystem restoration. Alternatives 6 and 7 are less land intensive alternatives. Alternative 7 is west side levees as opposed to the Deep Water Ship Channel. Department of Water Resources (DWR) would provide the LPP which must be submitted by April. If federally supportable, the LPP would be the plan ultimately recommended. DWR is working with the Corps to potentially avoid needing to do an LPP.

Next Steps

The next step would be to select the final array of alternatives, hopefully 4-5 maximum. To choose the final array of alternatives, the Corps will quantify flood

risk management benefits, perform a tradeoff analysis between project purposes, identify federal interest plans (basis for cost share), and develop a LPP if necessary. Additional meetings will be scheduled to present the final alternatives beginning in Summer 2017. The Environmental review will occur after the final alternatives have been identified.

Questions/Comments – Stephen McCord asked if the alternatives considered each other or if they could be layered. *Response* - any restoration should be self-sustaining (using native species where applicable) that provides the most benefit. Selby Mohr asked how the state's proposed tunnel project would interact with components of the Corps project. *Response* - the tunnels were included in modeling for future conditions without project. Federal and state agencies need to consider each other's projects. Additionally, the tunnels are outside of this project's study area and are for water supply not flood control.

1. **Lower Elkhorn Basin Levee Setback Project, Corey Lasso (refer to Attachment B)**

Study Background

DWR has reached out to many state and federal agencies regarding this project. The project is the result of the Central Valley Flood Protection Act of 2008 which leads to the Central Valley Flood Protection Plan (CVFPP) update. The CVFPP leads to a Basin-wide Feasibility Study, then the Yolo Bypass, then this project. This is a system wide effort. Typically, you start at the bottom of system and work your way up to prevent duplicating effort in case effects are caused downstream. Many project/planning efforts via local, state, and federal agencies were considered; everything had to be coordinated. The Lower Elkhorn project is a near term project that will occur between 2015 and 2022. There is also funding for this project through Proposition 1E, however this money must be committed prior to June 2020.

Status Update

This year is 65% 408 design and EIR/EIS public review. The project features include creating seven miles of setback levee, maintaining agriculture in the Yolo

Bypass, degrading existing levee with portions preserved for habitat and wind/wave protection, maintaining areas for expansion of the east side Tule Canal, preserving and enhancing vegetation for habitat and wind/wave protection, grading and improving drainage. Proposition 1E money is for flood control and this project will reduce flood stage but this project provides additional benefits of ecosystem vitality and agricultural sustainability. Alternatives are proposed.

Questions/Comments - Won't this project increase flood stage height and/or the duration of inundation downstream. *Response* - there will be a minimal increase downstream for 200-year event but will maintain the same amount of freeboard. Any significant impacts would be mitigated; however, this has not been identified as a significant impact. DWR is required to address any negative hydraulic impact.

The issues of land ownership and management were also discussed. Ideally, the state would own the land under the levee in fee simple but does not want to own the remainder. However, there are different options available.

2. Fremont Weir Adult Fish Passage Modification Project, James Newcomb (refer to Attachment C)

The purpose of the proposed project is to improve fish passage at the Fremont Weir and within the Tule Canal. The project would modify an existing fish ladder at the Fremont Weir and improve fish passage within the channel both upstream and downstream of the Fremont Weir. In addition, one downstream agricultural road crossing would be removed and another such crossing would be replaced with a structure that provides improved fish passage within the Tule Canal. Construction is scheduled to begin in the summer of 2017.

DWR and US Bureau of Reclamation propose to:

- Modify the existing Fremont Weir fish ladder to provide improved upstream passage for salmonids and sturgeon when the Sacramento River overtops Fremont Weir and immediately after the Sacramento River recedes below Fremont Weir.

•Improve fish passage conditions in the channel that extends from the existing fish ladder upstream to the Sacramento River.

•Improve fish passage conditions in the scour channel that extends from the existing fish ladder downstream to an existing deep pond.

•Remove one earthen agricultural road crossing (Agricultural Road Crossing 3) and replace one earthen agricultural road crossing (Agricultural Road Crossing 2) with a structure that allows for improved fish passage through the Tule Canal and continued agricultural utility.

The existing Fremont Weir fish ladder and upstream and downstream adjoining channels would be widened and deepened to increase depth and decrease velocity for salmonids and sturgeon. In addition, the maximum target flow through the fish passage structure would be limited to approximately 1,100 cubic feet per second (cfs)when the Sacramento River reaches an elevation of 31.8 feet, the point at which Fremont Weir begins to overtop. This flow target would minimize impacts on existing downstream land uses in the Yolo Bypass and avoid impacts on water diverters along the Sacramento River

The public draft of the environmental planning documents will be available in mid-January.

Yolo Bypass Working Group
June 12, 2017 (Meeting 53); 1:30 PM – 4:00 PM
Yolo Bypass Wildlife Area Conference Room

Meeting Summary

Meeting Participants

Sarah Ross Arrouzet – US Army Corps of Engineers (USACE)
Manny Bahia - CA Department of Water Resources (DWR)
Mila Berry - DWR
Peter Blodgett – USACE
Chris Bowles – cbec ecoengineering
John Brennan – Knaggs Ranch
Doug Brown – Douglas Environmental
Carrie Buckman – CDM Smith
Mike Deas – Yolo Basin Foundation (YBF)
Nick Dedien – Glide In Ranch
Karen Enstrom - DWR
Robert Fowler – Sacramento Yolo Mosquito and Vector Control District (SYMVCD)
Dick Goodell – Glide In Ranch
Jonathan Howard – Assembly District 4
Patrick Huber - City of Davis Natural Resources Commission
Steve Jennings – Channel Ranch
Chris Fulster Jr. – Glide In Ranch
David Katz – Nigiri Project/Cal Marsh
Mike Kleary – Duck Hunting
David Kohlhorst – Glide In Ranch
Robin Kulakow –YBF
Mike Lear – Swanston Ranch
Aric Lester –DWR
Chido Macharaga –YBF
Betsy Marchand –YBF
Petrea Marchand - Consero Solutions representing Yolo County
Gayle Margarite – Rising Wings Duck Club
Gus Margarite – Rising Wings Duck Club
Analisa Martinez –DWR
Selby Mohr – Mound Farms
Eric Nagy – LWA
Ben Nelson – US Bureau of Reclamation (USBR)
James Newcomb –DWR
Heather Nichols – Yolo County Resource Conservation District (RCD)
Martha Ozonoff – YBF
Paul Phillips – California Waterfowl Association (CWA)
Tom Schene – Glide Tule Ranch
Marty Scholl – SYMVCD
Sara Schultz – USACE
Bjarni Serup – California Department of Fish and Wildlife (CDFW)

Don Stevens – Glide In Ranch
Jeff Stoddard –CDFW
David te Velde – Farmer
Jeffrey Volberg – CWA
Lindsay Weston – YBF
Jeanette Wrysinski – Yolo County RCD
David Zezulak – CDFW

Welcome – Jeff Stoddard and Robin Kulakow 1:31pm

Meeting Purpose: Yolo Bypass Salmonid Habitat Restoration and Fish Passage Project presentation of six alternatives for modifying the Fremont Weir.

A. **Project purpose and goals – Kris Tjernell 1:42pm**

This decade long project aims to lower the elevation of a section of the Fremont Weir so that the Yolo Bypass floods for a greater part of the season. The project has evolved over the years, and state and public agencies have not been able to provide a detailed analysis of their findings and what these changes will mean for stakeholders. Through this working group, and a series of meetings going forward, presenting parties hope to restart communications at a greater level of detail leading to resolution. The main goal of the project is to keep current land use while managing resources and improving habitat for fish. This sparks a conversation around aiding/enhancing land use for fisheries in a way that works for all stakeholders of the bypass.

Years after the state and federal water infrastructure was built, research showed that the reservoirs and pumps were adversely impacting ecosystems, accelerating the decline of populations of certain fish species. In 2009, a Biological Opinion explored different concepts to combat the negative impacts from state and federal Central Valley water operation projects. This project addresses two actions included in the suite of habitat restoration actions from the Biological Opinion's Reasonable and Prudent Alternatives (RPA):

- RPA Action I.6.1 – Increase seasonal floodplain inundation in the lower Sacramento River Basin (limit = space… look at systems of bypasses as they are already used for floodplains, agriculture, and education etc.).
- RPA Action I.7 Improve fish passage throughout the Yolo Bypass (acknowledges that there are obstructions in Tule Canal for adult fish).

This working group meeting will focus on how the Fremont Weir can be manipulated so that a section is low enough to allow fluid movement for fish (by reducing migratory delays and loss of fish) while addressing on-the-ground issues. This discussion will concern not only benefits for fish, but how the project could possibly benefit all stakeholders impacted by this project.

The project team's work has been accelerated to not only aid fish populations, but to also show good faith to the groups impacted by project goals. Specifically, the team has been working on smaller projects that target RPA I.7 objectives, including:

- Wallace Weir Fish Rescue Facility – New concrete structure (DWR is working with Reclamation District 108)
- Fremont Weir Adult Fish Passage– This project will be making the existing ladder slightly wider and deeper over the summer. They will be update the existing fish ladder with new technology.

Questions:

Doug Brown-- Do you have an update on Swanston Ranch?
Manny Bahia - Construction was originally for 2018. "Oroville effort" cut funds. The construction has been pushed back to 2019. Working w/Mike Lear on a couple of the concepts out there, but there is no selected concept at this time.
James Newcomb - And that's the same for Lisbon Weir where we're looking at making modifications for fish passage while retaining its current function

Chris Fulster -- A lot more salmon are stuck in the basin when they go up the DeepWater Ship Channel. Why not open the gates to let the salmon go through to the Sacramento River? Instead of spending all this money in the Yolo Bypass, you could just open the gates about a foot, a foot and a half and you'll see more salmon than this project you're working on now.
Kris--We are looking at the Ship Channel but that is mostly driven by flood interests. We can't get into details about that at this meeting. The DeepWater Ship Channel ends in the Port of Sacramento. DWR is going to be working with our federal partners to explore creating a connection between the Yolo Bypass and the DeepWater Ship Channel to increase the ability of the Yolo Bypass to convey floodwater. There may be a similar outcome but a different point of bringing the water in.

Where is the connection going to be?
Kris –This is more conceptual at this point. We couldn't pinpoint a location on the map yet.

Dave Kolhurst—This is confusing. We're obviously missing something here. We have a gate that already exists at the head of the DeepWater Channel. So why aren't we using that to get the salmon into the river instead of working on a new project? Is there a reason the gates can't be open?
*Note: question tabled for another discussion.

B. Environmental Analysis Process – Carrie Beckman 2:10pm

The point of this process is to look at a range of alternatives and consider the potential impact of those alternatives and ways to reduce the impacts. Data and information will then be reported in an environmental document. We have been working on a draft

Environmental Impact Statement (EIS) and a draft Environmental Impact Report (EIR) to evaluate impacts and identify mitigation measures. The Draft EIS/EIR will be released for public review in Oct 2017. In 2018, the team will look at public comments, respond to comments, make any changes necessary in the environmental document and then create a final decision document based on that environmental document. The goal of this environmental analysis is to provide information so that decision-makers can understand the impacts before implementation.

Permitting activities will begin in 2017. These will happen in partnership with the state and federal fisheries and wildlife agencies in order to look at endangered species.
The project will create seasonal (winter) floodplain habitat for juvenile salmonids. The Yolo Bypass will only be inundated when the Sacramento River is high enough to spill over the Fremont Weir, in an effort to work with the natural hydrograph. The team is working to provide a project that maintains current land use.

Alternatives:

1.East side – gated notch can be opened or closed, connecting to Tule Canal while providing levee protection

2.Central location - gated notch can be opened or closed, connecting to Tule Canal while providing levee protection

3.West Side – gated notch can be opened or closed, connecting to Tule Canal while providing levee protection

*Alt 1,2,3: Flows up to 6,000 cfs through gated notch. Rising river levels = notch opens when river exceeds 17’ at eastern location - 3' over the bottom of notch, providing optimal passage for fish. Falling river – notch closes when river goes below 14’. Open November 1 to March 15.

4.Managed Flow – Same structural configuration as Alt 3. Manages 3,000 cfs of flow while moving down bypass, controlled release of water from North of I-80.

5.Multiple Gated Notch - Multiple gates (3 groups of gates) different depths for gates to operate in tandem 3,400 cfs working together to accommodate flow

6.Large notch - Large facility that will allow 12,000+ cfs

Questions:

As far as this water going back to the Toe Drain, what is the capacity of the Toe Drain?

Carrie - That varies as you go down the Bypass.

Manny - North of I-5 the capacity is 1,200 cfs and south I-80 4-5000 cfs

Carrie - We shouldn't directly compare to flows coming in at Fremont weir. Often times there are other sources of inflow into the Bypass with water coming from the westside tributaries - Cache Creek and Putah Creek in particular.

Do you know the water level below Lisbon Weir for this event?
Manny - It varies. But all of this information will be present in the EIR/EIS that we are releasing, and will also be in the graphics we go over. Each rate of flow is going to be different, but when the Fremont Weir overtops, that's what drives the inundation. It's hard to pinpoint the flow rate unless you have a specific question.

How much below 32 ft. will this be?
Manny - Most of the alternatives go down 18 ft. deeper, so an elevation of 14ft.
James - You're asking specifically about the water elevation down at Lisbon Weir though?

Tom - We're down near the Southern end, so we always look at Lisbon to gage water levels in terms of when to move livestock out, and at a certain level, we know how far the water is going to back up into the pastures around us.
James - We can get that answer but we don't have it. The way we can get that answer is to compare the 16 years we used in the model and we have existing conditions and can look at those changes over the years.

Martha Ozonoff– How often is the river at 14 ft.?
Carrie - River would spill until 17 ft. Manny will elaborate on this further next.

Petrea Marchand– Is there a preferred alternative? And when will you develop a preferred alternative?
Carrie - No, there is not. We are going to be working on developing one between now and end of 2017, but we don't anticipate on picking one until we see public comments on the draft EIS/EIR before making those decisions.

Petrea – Is the March 7 gate closure date still a part of Alt 4?
Carrie - Yes, it is important to note that Alt 1,2,3,5, 6 all have a potential end date of March 15th. Alt 4 has an alternative closure deadline of March 7 as well, so it has data for both.

Doug - Can you describe the supplemental fish passage and how that differs from the developed fish passage?
Carrie - Alt 1 was the starting point. We're working at a fish passage here after an overtopping event fish get stuck in the splash basin in the Fremont Weir. We included a supplemental fish passage on the westside. Planning is still in progress. It would only be activated after an overtopping event
James – It does not have a flow through component

Is there a cost estimate?
Carrie - Yes, we will be able to present them at some point

Don – You're talking about adding water into the Bypass that isn't floodwater? The easements are for flood event. What are the steps to protect entities that don't want the extra water?
Carrie - We don't have any estimates. Maybe government agencies might have more information. We'd appreciate any suggestions on how to prevent negative impacts to duck clubs.

Chris - You do understand that the duck season is Oct 22. What is your funding mechanism?
Kris - Through the annual budget process

Petrea – State has a contract with Ducks Unlimited to update data.

Jeff Volberg – There will be an impact to the resources for migratory fowl (can't compensate for ducks and geese). When Lisbon gets to 11 feet, property begins to flood. At 12 feet, I'm flooded. If you raise the level at the Lisbon gauge a lot of people will be flooded.

Dave – So this 5000 cfs is not on top of water flowing over the Bypass, it is in addition?
Carrie – Yes.
James - Trapezoid flow. Shape doesn't provide uniform flooding

Gus -- Does that mean that the flooding and inundation will affect the flow valleys on the chart?
Manny - it depends on the rain year

Huber-- There exponential growth of salmon in Putah Creek, will this affect these efforts?
Carrie – We are not sure about Putah Creek, but we will look into this

C. Environmental Impacts – Manny Bahia. 2:36pm

Hydraulic modeling for impact analyses – In 2014 assembled a team of modeling experts to determine what software, engine, etc. should be used. Developed a 2d model of Yolo Bypass. Assimilated daily testing (500x500ft grid cells) data was sent to Ducks Unlimited to process impacts on waterfowl. Period of record: 1997-2012. Compared percentages of 16year record and compared it to larger 44-year record (which matched up well).

Questions:

What is the 500x500 metric?
Manny - feet

Huber -- One model just split two ways (referring to presentation graphic)?
Manny - Yes, this was split up two ways for presentation purposes

Petrea --What year was this model looking at 2010 or 2011? The scaling would be helpful for the model. Models don't catch every variable. There needs to be a mechanism, where maybe annually you compare data from the model from the year's variables to work on easements, or revisions etc.

Dave -- Was the model you had for 2011? Was 2011 the only year that you have aerial footage? It looks like the model is underestimating the actual effects of flooding…

David Katz -- Who is going to manage the operation of some of the mechanized gates? What is the responsibility of Bypass members?
Manny – If the flooding is between Nov 1 and March 7th or 15th, the operational window, then the gates would operate. How we work with land managers on the ground will be done case by case in terms of easements, impacts, etc. in which individualized contracts and parcels are made

Selby Mohr – In the southern end of the Bypass, the drainage depends on the tides. Consider climate change and sea-water levels for example, that's going to affect the run-off and drainage.
Manny - Those are great considerations. the model range goes to Rio Vista and catches tidal influence, so tides were included into consideration in the models. We have also evaluated climate change and have worked that in.

Selby - Building of the DeepWater Channel negatively impacted the flood carrying capacity of the Bypass.
Manny - All that information is there, but I will look at different models that look at high flow implementation.

Mike Deas – (model specific) The metric you're exploring to quantify your model should look at all the variables and errors. Models should reflect errors or adjustments from model to model and models should highlight what was closely accurate to the aerial frame etc. We need to see uncertainty of each model metric. How does the model quantify volume?
Manny - I believe that has been taken into consideration. We didn't want to have our models be the limiting factor so we took a lot of that into thought.

Nick Dedion – Have you layered reservoir storage into any of the modeling?
Manny - Yes, we looked at gauge data. meaning that reservoir operation was built into

Selby – Make a note to look at 1964 water year.
Manny - I agree, it's going to look different. The models catch data within a 16-year time period.

Betsy Marchand - Look at 1997 as well. That one's accounted for in the model.

Huber – As a trained geologist, I would note that dark blue should represent wet/flooded areas and brown should show the dry spots – not the other way around.
Manny - That makes sense. We had that on a previous image, but I will note to change that.

Can water control structures limit inundation? From the graphics it is not looking like there is a big difference?

Petrea – Is this on average over 16 years?
Manny - This graph is looking at the rates of the different alternatives over the course of 16 yrs. The graph captures the increase in consecutive days of wetted areas (greater than or lower 20,000 acres)

Martha - Are the models predicting a pattern of dry and wet?
Manny - It depends on the year.

Selby - Looking at the percentage increase – those are the numbers we are interested in.

Doug – With the graphs, is it possible to split between upper and lower Bypass so you can look at effects of Alt 4 for example?
Manny - Yes, we have all the information and it's a matter of putting them into a format for Alt 4 for specific property owners in the north and south Bypass

Dave - If you take a look at the instances where 20,000 acres are consecutively wet, those percentages are quite big in terms of impact.

David – To continue with that, you guys measure from Nov-March, you should measure Jan-March.

Chris – What about impact on nesting?
Jeff – Ducks Unlimited is looking at food resources needed by waterfowl

James - In the study landowners will be able to see effects on their property

Petrea – The scale is confusing for some of the graphs
Manny - Units for scaling were done over two different graphs because of sizing

Petrea – Zoom in on "case study" years to show the worst case for each year.

Martha – Does the EIS/EIR go into other uses of the Bypass. For YBF we have a school program and folks that enjoy the bypass recreationally.
Manny - Yes

D. Follow-up and Next Steps – Ben Nelson 3:42pm

The team will consider how inundations (timing/location) affect waterfowl, recreation, education etc. They will be looking at construction impacts, and they encourage engagement and input from all stakeholder groups. The Bypass production model estimates economic effects to agriculture. The agencies want to maintain existing land use and will be back for future presentations and discussions.

Next steps –

Public Meeting June 29 at 6pm (Headquarters)
Meeting with subgroups
Meeting with Yolo Bypass Working Group in early fall before the release of the draft EIS/EIR

Follow Up Questions/Comments:

TeVelde: Having years w/out floods would be bad. Control of excess water of flooding would be good for fish AND also the landowners.

Robin – Will mitigation be open for discussion once we know the impacts? Will mitigation be in the report because easements and monetary returns don't work for everyone.

Action Items

1. Next Yolo Bypass Working Group meeting agenda should have an update on the Adult Fish Passage Project
2. Manny will get the water surface elevations at Lisbon Weir
3. DWR will work on graphics for individual landowners
4. DWR will document model error margins
5. DWR will look into questions related to letting fish use the Deep Water Ship Channel

Exhibit M

YOLO BYPASS WILDLIFE AREA



LAND MANAGEMENT PLAN

JUNE 2008

RESOURCES AGENCY CALIFORNIA DEPARTMENT FISH & GAME

EDAW

yolo basin foundation

PWA
PHILIP WILLIAMS & ASSOCIATES
CONSULTANTS IN HYDROLOGY

Yolo Bypass Wildlife Area



Land Management Plan

Prepared for:

California Department of Fish and Game
Yolo Bypass Wildlife Area
45211 County Road 32B
Davis, CA 95618

Contact: Dave Feliz
Area Manager
530/757-2431

Prepared By:

California Department of Fish and Game
Contact: Dave Feliz

Yolo Basin Foundation
Contact: Robin Kulakow

In Association with:

EDAW
2022 J Street
Sacramento, California 95811

Contact: Chris Fitzer
916/414-5800

June 2008

FINAL
LAND MANAGEMENT PLAN
FOR THE
YOLO BYPASS WILDLIFE AREA

PREPARED FOR:

California Department of Fish and Game
Bay Delta Region
7329 Silverado Trail
Napa, CA 94558

PREPARED BY:

EDAW, Inc.
2022 J Street
Sacramento, CA 95814
Phone: (916) 414-5800

APPROVED BY:

Regional Manager, Bay Delta Region — Date: 5/28/08

Deputy Director of Regional Operations — Date: 6-3-08

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ACRONYMS AND ABBREVIATIONS

2002 Farm Bill	Farm Security and Rural Investment Act of 2002
^{o}F	Fahrenheit
A-P	Agricultural Preserve
Accord	May 2000 Putah Creek Water Accord
ADA	Americans with Disabilities Act
afa	acre-feet per annum
af/acre	acre-foot per acre
Basin	Yolo Basin
Basin Plan	Sacramento-San Joaquin River Basin Plan
BIT	Biennial Inspection of Terminals
BMP	best management practices
CALFED	CALFED Bay-Delta Program
CALFED Final PEIS/EIR	*CALFED Final Programmatic Environmental Impact Statement and Environmental Impact Report*
Caltrans	California Department of Transportation
CBDA	California Bay-Delta Authority
CDF	California Department of Forestry and Fire Protection
Central Valley RWQCB	Central Valley Regional Water Quality Control Board
CEQA	California Environmental Quality Act
CESA	California Endangered Species Acts
cfs	cubic feet per second
CHRIS	California Historical Resources Information System
cm	centimeters
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
Comprehensive Study	Sacramento and San Joaquin River Basins California Comprehensive Study
CR	County Road
CRHR	California Register of Historical Resources
CSP	Conservation Security Program
CVHJV	California Central Valley Habitat Joint Venture
CVJV	Central Valley Joint Venture
CVP	Central Valley Project
CWA	California Waterfowl Association
CWA	Clean Water Act

Acronyms and Abbreviations *(continued)*

Delta	Sacramento–San Joaquin River Delta
DFG	California Department of Fish and Game
Dixon RCD	Dixon Resource Conservation District
DOC	California Department of Conservatio
DPC	Delta Protection Commission
Drain	Colusa Basin Drain
DU	Ducks Unlimited
DUHU	Diverse Upland Habitat Unit
DWR	California Department of Water Resources
EFH	Essential Fish Habitat
ERP	CALFED Ecosystem Restoration Program
ERPP	Ecosystem Restoration Program Plan
EPA	Environmental Protection Agency
ESA	Federal Endangered Species Acts
ESA/CESA	Federal or California Endangered Species Acts
Estuary	San Francisco Estuary
ESU	Evolutionarily Significant Unit
FMMP	Farmland Mapping and Monitoring Program
FOC	State-Federal Flood Operations Center
Forum	Sacramento River Corridor Planning Forum
Foundation	Yolo Basin Foundation
FSA	Farm Services Agency
GIS	geographic information system
GRCD	Grasslands Resource Conservation District
HCP	Habitat Conservation Plan
HCP/NCCP	Habitat Conservation Plan/Natural Communities Conservation Plan
hp	horsepower
I-5	Interstate 5
I-80	Interstate 80
ICS	Incident Command System
IRWMP	Integrated Water Management Plan
IS	Initial Study

Acronyms and Abbreviations *(continued)*

kg/yr	kilograms/year
LMP	Land Management Plan
LPCCC	Lower Putah Creek Coordinating Committee
m	meters
MCL	Maximum concentration levels
mg/L	milligrams per liter
MND	Mitigated Negative Declaration
MOU	Memorandum of Understanding
MSCS	Multi-Species Conservation Strategy
NASR	National Association of Shooting Ranges
NAWCA	North American Wetlands Conservation Act
NAWMP	North American Waterfowl Management Plan
NCCP	Natural Communities Conservation Plan
NIWQP	National Irrigation Water Quality Program
NMFS	National Oceanic and Atmospheric Administration, National Marine Fisheries Service
NOA	Notice of Applicability
NOI	Notice of Intent
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NWIC	Northwest Information Center
NWR	National Wildlife Refuges
NWS	National Weather Service
O&M	operation and maintenance
PDD	Putah Creek Diversion Dam
PFMC	Pacific Fishery Management Council
PG&E	Pacific Gas and Electric Company
Plan	Land Use and Resource Management Plan for the Primary Zone of the Delta
POC	pollutants of concern
Putah Creek Accord	Putah Creek Settlement Agreement
RCD	Resource Conservation District
RD	Reclamation District
regional plan	Primary Zone of the Delta
RMA2	two-dimensional hydraulic model
ROD	Record of Decision

Acronyms and Abbreviations *(continued)*

RWQCB	Regional Water Quality Control Board
SAAMI	Sporting Arms and Ammunition Manufacturers' Institute
SACOG	Sacramento Area Council of Government
SAFCA	Sacramento Area Flood Control Agency
SCWA	Solano County Water Agency
SHPO	State Historic Preservation Officer
SMUD	Sacramento Metropolitan Utilities District
SNRR	Sacramento North Railroad
SPRR	Southern Pacific Railroad
SRFCP	Sacramento River Flood Control Project
SSO	site-specific objectives
State Reclamation Board	California Department of Water Resources
SVWQC	Sacramento Valley Water Quality Coalition
SWP	State Water Project
SWRCB	State Water Resources Control Board
SYMVCD	Sacramento-Yolo Mosquito and Vector Control District
TMDL	total maximum daily load
UCD	University of California, Davis
UPRR	Union Pacific Railroad
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USDA NRCS	U.S. Department of Agriculture Natural Resources Conservation Service
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WA	State Wildlife Areas
WCB	Wildlife Conservation Board
WDR	waste discharge requirements
WAHC	Wildlife Area Habitat Committee
WMAP	Watershed Management Action Plan
Working Group	Yolo Bypass Working Group
WRP	Wetland Reserve Program
YBIWG	Yolo Bypass Interagency Working Group
YCWMA	Yolo County Weed Management Area

EXECUTIVE SUMMARY

The Yolo Bypass Wildlife Area (Wildlife Area) comprises approximately 16,770 acres of managed wildlife habitat and agricultural land within the Yolo Bypass (Bypass). The Bypass conveys seasonal high flows from the Sacramento River to help control river stage and protect the cities of Sacramento, West Sacramento, and Davis and other local communities, farms, and lands from flooding. Substantial environmental, social and economic benefits are provided by the Yolo Bypass, benefiting the people of the State of California.

The California Department of Fish and Game (DFG), as part of the Resources Agency of the State of California, has the following mission to guide its planning and operations: *"The mission of the Department of Fish and Game is to manage California's diverse fish, wildlife, and plant resources, and the habitats upon which they depend, for their ecological values and for their use and enjoyment by the public."*

The stated purpose of the Yolo Bypass Wildlife Area Land Management Plan (LMP) is to:

- guide management of habitats, species, appropriate public uses, and programs to achieve DFG's mission;
- direct an ecosystem approach to managing the Yolo Bypass Wildlife Area in coordination with the objectives of the CALFED Ecosystem Restoration Program (ERP);
- identify and guide appropriate, compatible public-use opportunities within the Yolo Bypass Wildlife Area;
- direct the management of the Yolo Bypass Wildlife Area in a manner that promotes cooperative relationships with adjoining private-property owners;
- establish a descriptive inventory of the sites and the wildlife and plant resources that occur in the Yolo Bypass Wildlife Area;
- provide an overview of the Yolo Bypass Wildlife Area's operation, maintenance, and personnel requirements to implement management goals, and serve as a planning aid for preparation of the annual budget for the Bay-Delta Region (Region 3); and
- present the environmental documentation necessary for compliance with state and federal statutes and regulations, provide a description of potential and actual environmental impacts that may occur during plan management, and identify mitigation measures to avoid or lessen these impacts.

This LMP was prepared through a partnership between DFG and the Yolo Basin Foundation (Foundation) and with the benefit of an extensive public-input program. DFG provided overall guidance to the planning process and was responsible for all decisions regarding the content of the LMP. The Foundation was responsible for coordinating substantial stakeholder outreach and facilitating stakeholder input in the LMP development. The Foundation was instrumental in the development of environmental education and interpretation programs at the Yolo Bypass Wildlife Area and helped facilitate the documentation of these programs in this plan.

The public-outreach program featured six focus group meetings conducted before initiation of LMP development (2002); a total of 37 Yolo Bypass Working Group Meetings (1999 to 2006; updates on developments at the Yolo Bypass Wildlife Area have been a frequent topic of discussion); one advertised public meeting for initial input (December 12, 2005, in Davis, attended by 30 persons); five additional focus group meetings to receive input on the Preliminary Draft LMP (March and April, 2006), one advertised public meeting for input on the Draft LMP and Initial Study. Appendix A provides a summary of the comments received at the public meetings and examples of the various communication devices that were used to publicize the planning process.

An environmental analysis pursuant to the California Environmental Quality Act (CEQA) was conducted concurrently with plan development to identify the potential environmental impacts of operating the Yolo Bypass Wildlife Area under the provisions of this LMP. As described in the Initial Study/Negative Declaration (IS/ND) prepared for the plan under CEQA, implementing the plan would not have a significant impact on the environment. The IS/ND is included in the LMP as Appendix H.

The following sections provide a summary of the LMP and of the CEQA analysis of its potential environmental impacts.

HISTORY OF ACQUISITIONS

The Wildlife Conservation Board (WCB) approved DFG's original acquisition of approximately 2,917 acres, establishing the Yolo Bypass Wildlife Area. Subsequent expansions resulted in the 16,770-acre Wildlife Area by 2005.

The largest acquisition consisted of two separate ownerships, the Glide Ranch and Los Rios Farms, totaling approximately 13,062 acres in 2001.

PROPERTY DESCRIPTION AND MANAGEMENT SETTING

The Yolo Bypass Wildlife Area is located within the historic Yolo Basin of the Sacramento Valley and is part of the DFG's Bay-Delta Region. It lies almost entirely within the Yolo Bypass in Yolo County, between the cities of Davis and West Sacramento. The Yolo Bypass Wildlife Area is composed of 17 separate management units throughout its approximately 16,770 acres.

The northern boundary of the Yolo Bypass Wildlife Area is generally formed by the Union Pacific Railroad (UPRR) (formerly Southern Pacific Railroad) tracks that run parallel to and north of Interstate 80 (I-80). The eastern boundary is shaped largely by the East Toe Drain, which runs inside of the east levee of the Yolo Bypass (which is also the west levee of the Sacramento River Deep Water Ship Channel. The western boundary of the Yolo Bypass Wildlife Area is generally defined by the west levee of the Yolo Bypass, except that the boundary also encompasses two properties outside of the Bypass levee. The southern boundary is approximately 8.7 miles south of I-80 on the east side and approximately 10 miles south of I-80 on the west side of the Wildlife Area.

The primary entrance to the Yolo Bypass Wildlife Area, which can be reached via the East Chiles Road (County Road 32B) exit of I-80, is approximately 2 miles east of Davis and 4 miles west of West Sacramento. The entry driveway intersects Chiles Road at the west levee of the Yolo Bypass, immediately west of the west end of the Yolo Causeway.

MANAGEMENT SETTING

The current management of the Yolo Bypass Wildlife Area operates under several legal constraints and existing agreements. These constraints and agreements include: Sacramento River Flood Control Project—Project Modification Agreement, Agreement under Section 8618 of the California Water Code, several agreements and commitments conveyed through the 2001 acquisition of the Glide Ranch and Los Rios Farms, memoranda of understanding regarding threatened and endangered species, memorandum of understanding between DFG and the Foundation, Fish And Game Code 1602 Streambed Alteration Agreement, coordination with the Sacramento-Yolo Mosquito And Vector Control District, management agreement with Dixon Resource Conservation District, programs through the Farm Service Agency, and coordination/cooperation associated with the Putah Creek Water Accord.

ENVIRONMENTAL SETTING

PLANNING INFLUENCES AND CONSIDERATIONS

Planning influences include the Sacramento River Flood Control Project; CALFED Bay-Delta Program; Sacramento and San Joaquin River Basins Comprehensive Study; Central Valley Regional Water Quality Control Board; Sacramento Area Flood Control Agency; Yolo County General Plan; Colusa Basin Drain planning; Delta Protection Commission's Land Use and Resource Management Plan for the Primary Zone of the Delta and Delta Recreation Plan; North American Waterfowl Management Plan; Yolo County Habitat Conservation Plan/Natural Community Conservation Plan; Agricultural/Irrigated Lands Conditional Waiver Program; Natural Resources Conservation Service Programs; Yolo Bypass Fish Passage and Fish Habitat Improvement Planning; Sacramento Area Council of Government's Regional Bicycle, Pedestrian, and Trails Master Plan; City Of Davis' General Plan, Comprehensive Bicycle Plan, and Open Space Program; City Of West Sacramento's General Plan and Access and Bike Plan; and the Lower Putah Creek Watershed Management Action Plan.

Yolo Basin Foundation

The Foundation is a community-based nonprofit organization dedicated to the appreciation and stewardship of wetlands and wildlife through education and innovative partnerships. It was founded in 1990 to assist in the establishment of the then approximately 3,700-acre Yolo Bypass Wildlife Area.

One of the principal goals of the Foundation is the facilitation of environmental education in the Yolo Bypass Wildlife Area. Foundation staff, interns and volunteers assist students and visitors with hands on learning activities in the Demonstration Wetlands and lead exploratory walks on the Wildlife Area.

The Foundation also is the sponsoring non-profit organization for California Duck Days, publishes the Yolo Flyway Newsletter, brings wetland education to classrooms with "Wild about Wetlands" learning kits, introduces the public to natural places in the community through public field trips, and hosts the popular Flyway Nights speaker series. The Foundation also hosts and facilitates the Yolo Bypass Working Group, which provides an opportunity for farmers, landowners and agencies with interests in the Yolo Bypass to discuss Bypass related issues as well as provide guidance and opinions on such issues.

AGRICULTURAL RESOURCES

The nearly annual floods that flow through the Yolo Bypass severely limit the kinds of crops that can be grown. The proximity of the Yolo Bypass to the San Francisco Bay system brings a prevailing wind from the south during summer evenings. Although the daily appearance of this Delta Breeze makes life bearable in the Sacramento area, it limits the production of rice to wild rice, or special varieties that are more adapted to the climate.

A small percentage of the land in the Wildlife Area is designated as prime farmland. DFG wildlife area managers commonly grow agricultural crops for the benefit of wildlife. The Yolo Bypass Wildlife Area utilizes agriculture to manage habitats while providing important income for the management and operation of the property. Many innovative, natural resource-compatible agricultural practices occurring in the Yolo Bypass Wildlife Area provide valuable habitat for a diverse assemblage of wildlife species. Rice is grown, harvested, and flooded to provide food for thousands of waterfowl. Corn fields are harvested to provide forage for geese and cranes. Crops such as safflower are cultivated and mowed to provide seed for upland species such as ring-necked pheasant and mourning dove. Much of the grassland in the southern portion of the Yolo Bypass Wildlife Area is managed with cattle grazing, resulting in spectacular blooms of wildflowers during the spring months.

GEOLOGY, SOILS, TOPOGRAPHY, AND CLIMATE

CLIMATE

Yolo County has a Mediterranean climate characterized by hot, dry summers and temperate, wet winters. However, the county receives a marine air influence from the Delta regions to the south that moderates the temperature extremes of the Central Valley. During the summer months (June–August), average daily high temperatures are in the mid-90s Fahrenheit (ºF) and average daily low temperatures are in the mid-50s. During the winter months (December–February), average high temperatures are in the 50s and average lows are 38–40ºF. Virtually all precipitation falls as rain, between November and April in most years. Annual rainfall typically ranges from 16 to 22 inches, and the average annual air temperature is 60–62°F. The frost-free season is 230–280 days throughout the year.

GEOLOGY

The Yolo Bypass Wildlife Area is located in the Yolo Basin on the west side of the Sacramento Valley, in the Great Valley geomorphic province of California. Most of the surface of the Great Valley is covered with alluvium of Holocene and Pleistocene age, composed primarily of sediments from the Sierra Nevada and the Coast Ranges that were carried by rivers and deposited on the valley floor. These sediments are primarily fine grained silts and clays.

TOPOGRAPHY

Historic landforms in the Yolo Bypass Wildlife Area include the floodplains and natural levees along the Sacramento River; the historic delta and distributary channels of Putah Creek; a remnant oxbow lake (Green's Lake); the closed depression formations of the Putah Creek Sinks; the edge of the alluvial fan of Putah Creek extending into the Basin; and the Yolo Basin rims within and around its borders.

SOILS

Six general soil associations have been identified in the Yolo Bypass Wildlife Area. A soil association is a landscape that has a distinctive proportional pattern of soil types. The soil associations include: Yolo-Brentwood Association, Rincon-Marvin-Tehama Association, Sycamore-Tyndall-Valdez Association, Willows-Pescadero-Riz Association, Capay-Sacramento-Clear Lake Association, and Corning-Hillgate Association.

GEOMORPHOLOGY, HYDROLOGY, AND WATER QUALITY

GEOMORPHOLOGY

The historic Yolo Basin was a natural depression formed on the Sacramento Valley floor after the last Ice Age. The trough of the Basin did not function as a true floodplain that directly interacted with the Sacramento River as it rose and fell during the winter and spring. Instead it formed a vast mosaic of wetlands that transitioned from seasonal wetlands in the north, through willow thickets, tule marshes, and backwater ponds, to the freshwater tidal marshes and slough channels of the estuary to the south.

During the 1800s, floods from the Sacramento River inundated large portions of the Sacramento Valley leading to the planning and implementation of the Sacramento River Flood Control Project that converted the natural Yolo Basin into the weir regulated Yolo Bypass. The Bypass is 41 miles long and is surrounded completely on the east and partially on the west by levees constructed by the U.S. Army Corps of Engineers (USACE). Levee construction began in 1917 and the weirs were completed in 1917 (Sacramento Weir) and 1924 (Fremont Weir). In 1963, a deep water ship channel was constructed along the eastern edge of the Bypass.

HYDROLOGY

During periods of high snowmelt and rainfall, much of the Central Valley became inundated, forming an extensive inland sea that took months to drain downstream to the Bay-Delta system. In moderate flood years, the river frequently overtopped it banks spilling into the Yolo Basin. The southerly portions of the Basin likely remained inundated until late spring. The Sacramento River historically was the largest watercourse affecting the Yolo Basin from the north and east. Cache Creek, Putah Creek, and Willow Slough were the major tributaries inflowing to the basin from the west. Flows slowly drained towards the south through a vast array of wetlands and non-tidal marshes into the tidal marshes of the north Delta. Permanent bodies of water persisted in the Cache Creek Sink and Putah Creek Sinks.

In 1911 the State Reclamation Board was assigned to coordinate a basin wide plan for flood control for the entire Sacramento Valley. This project included the construction of a bypass capable of delivering 500,000 cubic feet per second (cfs) of water through Cache Slough in the north delta and increasing the Sacramento River capacity to 100,000 cfs from Sacramento to Cache Slough. Levees were constructed along both sides of the Yolo Bypass with project completion in 1948. The Yolo Bypass is the largest flood control bypass in California.

In 1957 the U.S. Bureau of Reclamation constructed Monticello Dam on Putah Creek, located 10 miles upstream of Winters, California. The large capacity of the reservoir (Lake Berryessa) has decreased the 100-year peak flow from 90,000 cfs (pre-dam) to 32,300 cfs (post-dam). The large decrease in peak flows and annual discharge has decreased sediment influx and capacity, essentially dried out the Putah Creek Sinks and prevented additional alluvial fan formation.

Cache Creek drains approximately 1,290 square miles as it travels nearly 80 miles from its natural outlet from Clear Lake to its confluence with the Yolo Bypass. Flows have been controlled by the Indian Valley Reservoir on the north fork of Cache Creek since 1974 and by the Clear Lake Dam since 1913.

The Colusa Drain was connected to the Bypass via the artificial overflow channel Knights Landing Ridge Cut. The Drain has a watershed area of 130 square miles, receiving input from all the creeks flowing from the Coast Range between Knights Landing and Stony Creek. The Ridge Cut drains into the Sacramento River near Knight's Landing, except during high flows, when it empties into the Yolo Bypass.

The Yolo Bypass provides a direct path for Sacramento and Feather River flows to enter the Sacramento River Delta. Flow is diverted from the Sacramento River into the Bypass when the stage exceeds 33.5 feet (corresponding to 56,000 cfs at Verona). During large flood events, up to 80% of the Sacramento River flows are diverted into the Bypass. In high flow years, additional water can enter the Bypass via the Sacramento Weir. Water leaves the Yolo Bypass either via the Toe Drain at Prospect Slough or over the southern end of Liberty Island to Cache Slough.

The timing of inundation is of utmost importance to agricultural interests within the Bypass. Inundation in late spring or early fall, although very rare, can have disastrous impacts on unharvested or newly planted crops.

WATER QUALITY

Mercury

One water quality variable of particular concern regarding management activities at the Yolo Bypass Wildlife Area is methylmercury. Mercury occurs as a result of both natural and anthropogenic sources in the environment and continually cycles in the aquatic environments of the Sacramento River and San Joaquin River basins and Delta. The cycle involves different chemical forms of mercury as a result of both chemical and biological reactions in aerobic and anoxic microenvironments. A large proportion of the loads of mercury and methyl

mercury in San Francisco Bay and the Delta are thought to originate in Cache Creek and pass through the Yolo Bypass.

Methylation of mercury is the key step in the entrance of mercury into the food web. The rates of methylation are influenced by the bioavailability of inorganic mercury to methylating bacteria, the concentration and form of inorganic mercury, and the distribution and activity of methylating (i.e., sulfate-reducing) bacteria. Sediments appear to be a net source of methylmercury into the water column. Sinks or losses of total mercury and methylmercury include volatilization, sequestration (i.e., storage) in local soil, and biological uptake (i.e., accumulation in organisms' tissues). Demethylation of methylmercury is considered likely to be the major loss mechanism for this form.

Wetlands support methylation processes and may export methylmercury to surrounding channels, however, recent research shows that there is still much to learn about methylmercury production and export processes from wetlands. Recent studies in the Delta indicate that some wetlands import and some export methylmercury.

The Central Valley Water Quality Control Board identified the Delta as impaired by mercury because Delta fish have elevated levels of methylmercury that pose a risk for human and wildlife consumers. The Central Valley Water Board's development of a water quality attainment strategy to resolve the mercury impairment in the Delta has two components: the methylmercury total maximum daily load (TMDL) for the Delta and the amendment of the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins (the Basin Plan) to implement the TMDL program.

Other Water Quality Issues

Toxic chemicals including pesticides have impaired water quality in many Central Valley and Delta waterways and have recently been studied in the Yolo Bypass. High concentrations of some metals from point and nonpoint sources appear to be ubiquitous in these waterways. In addition to mercury, high levels of other metals (i.e., aluminum, copper, cadmium, and lead) in Central Valley and Delta waters are also of concern. Additionally, in localized areas of the Delta, fish tissues contain elevated levels of dioxin as a result of industrial discharges.

BIOLOGICAL RESOURCES

Two-hundred-eighty terrestrial vertebrate species are known to use the Yolo Bypass Wildlife Area at some point during their annual life cycles, over 95 of which are known to breed in the Yolo Bypass Wildlife Area. The Yolo Bypass Wildlife Area also provides suitable habitat for 23 additional species that may occur on site but have not yet been observed there. The Yolo Bypass Wildlife Area is also known to support 38 special-status wildlife species, and many more are locally rare or have specialized habitat requirements that the Wildlife Area provides. The Wildlife Area also provides seasonal or permanent aquatic habitat for 44 species of fish, 8 of which are special-status species. Hundreds of invertebrate species also inhabit the Wildlife Area, including five special-status invertebrates.

VEGETATION COMMUNITIES

Common vegetation communities found within the Yolo Bypass Wildlife Area include seasonal and permanent wetlands, annual grasslands, riparian scrub and woodlands, vernal pools and swales, and row crop-seasonal wetlands.

Managed Seasonal and Permanent Wetlands

Wetlands have evolved as dynamic ecosystems, constantly changing due to the physical and chemical processes associated with floods, drought, and fire. Today, the Yolo Bypass is an engineered floodway; managed wetlands in the Yolo Bypass Wildlife Area are now enclosed by levees and berms, and flooded with water from irrigation

conveyance systems. Whereas natural wetland hydrology was very dynamic, flooding cycles now used for wetlands can be predictable through strategic and innovative management.

Permanent wetlands are flooded year round. They are generally relatively deep (~4 feet) and constructed with islands and shallow underwater shelves. Seasonal wetlands are drained April 1st and flooded September 1st. The management of productive wetland habitat requires dynamic water management, as well as periodic soil and vegetation disturbances. Adequate water conveyance systems are essential for meeting water management objectives, thus pumps, delivery ditches, water control structures, and drainage systems must be maintained in functional condition. Discing and mowing are used to interrupt the natural evolution of wetland habitats, setting back plant succession to a point which is the most productive of those elements required by waterfowl and other wetland-dependent species.

Annual Grasslands

Grasslands are found across the majority of the 9,000-acre Tule Ranch unit and in scattered locations within other management units. Like much of California, these habitats are dominated by a variety of naturalized, nonnative grasses and forbs. Species composition in this community varies widely in response to a variety of micro-scale factors such as soil moisture, soil fertility, disturbance (e.g., gopher mounds), and soil depth. Most grasslands in the Yolo Bypass are dominated by Italian (annual) rye grass.

Community composition in wetter sites is similar to vernal pools on shallower soils grasses generally become less dominant and native forbs are more common. Annual grasslands may occasionally contain small areas of remnant perennial native grasses are important components of the grassland community. The Tule Ranch grasslands are grazed with cattle as a primary management strategy. This strategy has been proven to be successful with resulting spectacular wildflower blooms in recent years.

Riparian Woodland

Riparian woodland and associated riparian scrub habitats are primarily found adjacent to Green's Lake, Putah Creek, and along the East Toe Drain within the Yolo Bypass Wildlife Area Riparian scrub is typically dominated by phreatophytes (i.e., water-loving plants) representative of early to mid successional stage vegetation communities within riparian areas in California's Central Valley. Typical species include native plants such as creek dogwood, California rose, Sandbar willow, buttonbush, and arroyo willow, along with nonnative invasive species such as Himalayan blackberry, arundo, and tamarisk. Native trees such cottonwood, alder, and Oregon ash are occasionally found overtopping the shrub layer. Riparian woodland is a tree-dominated community found adjacent to riparian scrub on older river terraces where flooding frequency and duration is less. Common native overstory species in riparian communities include cottonwood, alder, valley oak, Oregon ash, black willow, California sycamore, box elder, and northern California black walnut hybrids (northern California black walnut readily hybridizes with cultivated English walnut). The understory is typically sparse in this community; although, native species such as California rose, California grape, Santa Barbara sedge, mulefat, blue elderberry, California barley, and creeping wildrye may be common in tree canopy openings.

Vernal Pool and Swale

Vernal pools and swales within the Yolo Bypass Wildlife Area are primarily found within the southwest portion of the Tule Ranch Unit. A recent survey of this area (Witham 2003) documented approximately 1,600 acres of vernal pool grassland as well as the presence of a distinct vernal pool subtype, playa pools. Vernal pools typically support a suite of mostly endemic and sometimes rare plants in several genera including *Lasthenia, Plagiobothrys, Navarretia, Psilocarphus, Downingia,* and *Limnanthes*, among others. The nonnative Italian ryegrass is also widely distributed in vernal pools. The margins of playa pools support many of the same species as smaller vernal pools. Additionally, several rare grasses, including Colusa grass and Crampton's tuctoria, although not confirmed to be present in Yolo Bypass Wildlife Area, have the potential to occur on the pool

bottoms, which are otherwise typically sparsely vegetated. Developing a refined grazing plan for the vernal pool areas throughout the Tule Ranch is a high priority for future management.

Row Crop-Seasonal Wetland

Row crop-seasonal wetland communities are found across the northern and central portions of the Yolo Bypass Wildlife Area (e.g., Causeway Ranch and 1,000 Acre units). These are generally agricultural plant communities comprising various annual row crops in the spring and summer months. The primary crop is rice but a variety of other crops are produced including grains (e.g., corn, millet, and milo [grain sorghum]). The fields are typically managed as flooded open water habitat in the winter months. During the winter months few, if any, plants are likely encountered except for residual stubble and other by-products remaining after crop harvesting. During the summer months, non-crop plants are limited primarily to agricultural weeds unless fields are fallowed or flooded to shallow depths as a shorebird habitat enhancement strategy. In these cases beneficial wildlife plants such as swamp timothy and the related swamp grass may be common.

Special-Status Plant Species

Based on queries of the California Natural Diversity Database (CNDDB 2006) and the California Native Plant Society (CNPS) Inventory of Rare and Endangered Plants of California (CNPS 2001), there are 24 special-status plant species known from the vicinity of the Yolo Bypass Wildlife Area (Table 3.5-2). Special-status plants are those plants listed as threatened or endangered under either the Federal or California Endangered Species Acts (ESA/CESA). Botanical surveys conducted in 2004 verified the occurrence of several rare plants on the Tule Ranch unit of the Wildlife Area.

WILDLIFE RESOURCES

The Yolo Bypass Wildlife Area supports a diverse assemblage of communities that provide valuable wildlife habitat for a variety of species guilds.

Species Guilds

Waterfowl

A significant feature of the Yolo Bypass Wildlife Area is the abundance and variety of wintering waterfowl that migrate down the Pacific Flyway each year. Large numbers of ducks, geese, and swans winter in the Wildlife Area after migrating from northern breeding areas. Waterfowl populations are a highly valued and diversified biological resource. They are of high interest to a variety of recreational users of the Wildlife Area, particularly hunters and bird watchers. Species that occur in high abundance include northern pintail, northern shoveler, mallard, gadwall, American wigeon, cinnamon and green-winged teal, lesser scaup, tundra swan, snow goose, and white-fronted goose. Some species, such as mallard, gadwall, and Canada goose are year-round residents and breed locally in wetlands and nearby uplands.

Seasonal flooding of wetlands is the primary wetland management strategy in the Yolo Bypass Wildlife Area for migratory waterfowl. Grazing, upland cover plantings, and maintenance of properly spaced brood ponds are strategies used for nesting waterfowl. In addition, agricultural activities result in high quality foraging habitat for some waterfowl species.

Shorebirds and Wading Birds

The Yolo Bypass Wildlife Area has become an important shorebird area in the Central Valley. These species are a significant component of the Wildlife Area and are of high interest to recreational bird watchers. Shorebirds and wading birds that breed in or nearby the Wildlife Area include American avocet, black-necked stilt, killdeer, spotted sandpiper, Virginia rail, white-faced ibis, black-crowned night heron, great blue heron, and snowy and

great egret. Since the opening of the Wildlife Area, a heronry (nesting colony of herons and egrets) has become established. In addition large numbers of ibis from nesting colonies elsewhere in the region use the Wildlife Area during summer months, feeding primarily on crayfish. Large numbers of black-crowned night herons also roost on the Wildlife Area. Many diverse species of shorebirds rely on the Wildlife Area to provide habitat during migration and winter. Species regularly observed during these periods include western and least sandpiper, long- and short-billed dowitchers, dunlin, greater and lesser yellowlegs, whimbrel, long-billed curlew, and Wilson's and red-necked phalaropes.

Managed seasonal wetlands with complex diverse topography combined with innovative rice/shorebird habitat rotations in the Wildlife Area provide critical foraging, nesting, and loafing habitat for an abundance of shorebird and wading bird species.

Neotropical Migratory Birds

Many species of neotropical migratory birds migrate through or breed in the Yolo Bypass Wildlife Area. The neotropical migratory bird guild includes species that breed in North America and winter in Central and South America. Representative species that breed and/or migrate through the Wildlife Area include western kingbird, western wood-pewee, tree swallow, barn swallow, Bullock's oriole, Wilson's warbler, yellow warbler, and blue grosbeak.

Management of upland habitat to provide variations in height and density of vegetation, food crops, and water has proven to be beneficial to many neotropical migratory song birds.

Raptors

A wide variety of wintering and/or breeding raptors utilize the Yolo Bypass Wildlife Area, including red-tailed hawk, white-tailed kite, rough-legged hawk, ferruginous hawk, prairie falcon, peregrine falcon, kestrel, barn owl, great horned owl, short-eared owl, and northern harrier. Of these, Swainson's hawk, red-tailed hawk, kestrel, northern harrier, white-tailed kite, barn owl, burrowing owl and great horned owl are known to nest in the Wildlife Area.

All of these raptor species can be seen foraging and hunting for prey in recently flooded wetlands and in fresh cut alfalfa fields. Management strategies for raptors include optimizing foraging opportunities by managing for a food base consisting of rodents and large insects. Discing, mowing, and summer irrigations attract large numbers of Swainson's hawks feeding on grasshoppers.

Cavity-nesting Birds

Cavity-nesting birds, such as kestrels, tree swallows, and wood ducks can be seen throughout the Wildlife Area. Providing nesting boxes for these cavity-nesters benefits these species in the Wildlife Area.

Upland Game Birds

The Yolo Bypass Wildlife Area provides habitat for several upland game birds of great interest to recreational hunters. The primary upland game bird species that utilize the Wildlife Area are mourning dove and ring-neck pheasant. Tenant farmers grow fields of safflower that provide abundant foraging opportunities. Safflower is also left unharvested and mowed to provide additional foraging prospects for these species. These management strategies have resulted in improved upland game bird hunting throughout the Wildlife Area. Spring floods can significantly affect pheasant nesting and recruitment success thereby limiting populations in subsequent years.

Bat Colony

An additional important feature of the Wildlife Area is its breeding colony of over 100,000 Mexican free-tailed bats. These bats roost each summer under the Yolo Causeway and prey on insects throughout Yolo and Sacramento counties. The location of this colony in a protected Wildlife Area will help to ensure its long-term success.

Wildlife Habitats

Open Water (Floodwater Inundation)

Winter floodwaters in the Yolo Bypass support thousands of migratory waterbirds each year. These birds are distributed according to water depth and include American white pelican, double-crested cormorant, and diving ducks, such as canvasback at depths averaging 3–9 feet; dabbling ducks, such as northern pintail at depths averaging 6–10 inches; wading birds, such as great egret at depths averaging 4 inches; and greater sandhill crane and shorebirds, such as black-necked stilt at depths less than 3 inches. The quality of this open water habitat is increased for dabbling ducks and geese by the pre-flood planting of seed crops and managed growth of swamp timothy, which provides high-quality forage underneath the shallow waters. Shorebirds and cormorants also benefit from roosting islands amidst the open water, which are provided by the infrastructure for the flooded agricultural crops. The abundant waterfowl and shorebirds onsite in turn attract many raptors, including American peregrine falcon.

After floodwaters recede, smaller areas of open water habitat remain in the Yolo Bypass Wildlife Area's perennial wetlands and ponds. These areas support foraging waterbirds and raptors throughout the year, including species which breed in the on-site uplands and marshes, such as pied-billed grebe, mallard, gadwall, American avocet, and black-necked stilt. The perennial ponds also support many reptiles such as northwestern pond turtle, and red-eared sliders, which forage in the open water and breed in adjacent uplands, and amphibians such as Pacific treefrog frog, and the nonnative bullfrog, which forage and breed in the open water and its emergent marsh margins.

Mudflat

Mudflats are present throughout managed seasonal wetlands and in the Wildlife Area's rice rotation that contains a fallow stage specifically managed to support shorebirds. Shorebirds forage exclusively in mudflat/sandflat and shallow open water habitats. The on-site mudflats support abundant invertebrate populations, and thus provide important foraging habitat for large numbers of migrating and wintering shorebirds along the Pacific Flyway, including least sandpiper, western sandpiper, long-billed dowitcher, and dunlin. Some dabbling ducks such as cinnamon teal also forage by skimming the mudflats' surface, and raptors such as American peregrine falcon prey upon the shorebirds and waterfowl in this habitat. Reptiles such as northwestern pond turtle and red-eared sliders also use the mud banks of perennial ponds for basking and thermoregulation.

Managed Seasonal and Permanent Wetlands

Only a small portion of the historical distribution of freshwater marsh remains in California, due to widespread conversion of wetlands to agriculture. Managed seasonal and permanent wetland habitat in the Wildlife Area is especially important to migratory waterfowl which utilize this habitat in tremendous numbers. Other species in the managed wetlands include resident American bittern, terns, Virginia rail, marsh wren, moorhens, grebes, ruddy ducks, and common muskrat, which forage and breed on site exclusively in wetland habitat; northern harrier, tricolored, yellow-headed and red-winged blackbirds, western aquatic garter snake, and Pacific tree frog, which breed in marshes and other habitats on site; and black-crowned night-heron, green heron, great-blue heron, great egrets, and snowy egret, which do not breed on site but commonly forage in the Wildlife Area's wetlands.

Natural Seasonal Alkali Marsh and Seasonal Disturbed Wetland

Portions of alkali marsh containing alkali-adapted plants are structurally similar to seasonal disturbed wetlands. Both plant communities provide lower quality habitat for wildlife than other wetland communities such as freshwater marsh or vernal pool, as they lack the hydrology and vegetation structure necessary to support most wetland-dependent wildlife species. The vegetated alkali marsh and seasonal disturbed wetlands on site do support more generalist wildlife, however, that are capable of breeding and foraging in both upland and wetland communities. These species include common garter snake, savannah sparrow, and California vole.

Agricultural Crops

Agricultural lands at the Wildlife Area are actively managed to benefit wildlife. This management results in the use of safflower fields by foraging mourning doves and ring-necked pheasants; use of corn, milo, and millet fields by foraging sandhill cranes and waterfowl, use of grain fields by foraging waterfowl; and use of grain fields by some grassland bird species. In addition, the on-site rice fields support foraging white-faced ibis,; and tomato fields also support foraging Swainson's hawks and other raptors, which prey on the small mammals made more accessible by grading and harvesting activities. Post harvest flooding of rice fields attracts thousands of waterfowl and shorebirds on an annual basis. The governmental programs that encouraged the flooding of rice have lessened the impacts of wetland loss in the Central Valley.

Ditch

Wildlife use of the ditches on site varies according to each ditch's pattern of water conveyance. Ditches that remain inundated throughout the summer months and are connected to rice fields or permanent wetlands provide very important habitat for giant garter snake. This aquatic species commonly travels through irrigation ditches, forages for amphibians and small fish, which may be present, and uses the dry associated banks for basking and thermoregulation. The connectivity function of ditches is also extremely important for waterfowl and their young during the breeding season. Ditches with suitable hydrology also support the foraging of other aquatic wildlife such as western aquatic garter snake, Pacific treefrog, otters, muskrat and beaver.

Riparian Woodland and Scrub

Although relatively small areas of riparian woodland and scrub communities are present on site, these areas provide very important habitat to a number of wildlife species, many of which are restricted to riparian communities. Wildlife species known to forage in the on-site riparian communities include Cooper's hawk, sharp-shinned hawk, red-shouldered hawk, king fisher, yellow warbler, willow flycatcher, western grey squirrel, and western aquatic garter snake. Recently, tricolored blackbird breeding colonies have also occurred in an on-site patch of buttonwillow trees.

Vernal Pool and Swale

Vernal pools are a unique, rare, and rapidly declining community in California. Because of the limited distribution of this community in the state and its continued decline due to land conversion for development and other uses, many vernal pool-associated wildlife species receive state or federal protection or are considered species of concern. The vernal pools at the Wildlife Area provide high-quality habitat for these species, due to the diversity in pool size, long inundation periods, and active vegetation management through grazing. Vernal pool species known to breed in the Wildlife Area include vernal pool tadpole shrimp, vernal pool fairy shrimp, conservancy fairy shrimp, midvalley fairy shrimp, and California linderiella. The vernal pools at the Wildlife Area also provide suitable habitat for California tiger salamander and possibly western spadefoot toad, although these species have not been documented on site.

Annual Grassland

The grassland community in the Yolo Bypass Wildlife Area's Tule Ranch are important for grasshopper sparrow, northern harrier, California horned lark, savannah sparrow and western meadowlark. Historically, pronghorn antelope and tule elk grazed the grassland plants. However, today, grazing cattle provide this function and control nonnative competing grasses while providing income, which funds management of the Yolo Bypass Wildlife Area. Grasslands also provide important breeding and foraging habitat for upland game birds such as mourning dove and ring-necked pheasant, as well as nesting habitat for resident waterfowl such as mallard, cinnamon teal, and gadwall. Grasslands also support abundant small mammals, which in turn attract many avian, mammalian, and reptilian predators. Large flocks of snow geese and white fronted geese are also attracted to winter grasslands on the Tule Ranch.

Special-status Wildlife Species

Special-status wildlife species are legally protected or are otherwise considered sensitive by federal, state, or local resource conservation agencies and organizations. Special-status wildlife species that occur or have the potential to occur on the Yolo Bypass Wildlife Area include 5 species of invertebrates, 2 species of reptiles, 2 amphibian species, 32 species of birds, and 2 mammal species. Of all the special-status wildlife species, the vernal pool tadpole shrimp, vernal pool fairy shrimp, conservancy fairy shrimp, giant garter snake, California tiger salamander, bald eagle, Swainson's hawk, American peregrine falcon, greater sandhill crane, little willow flycatcher, and bank swallow are listed as a state or federally threatened or endangered species. The remaining species are considered Species of Special Concern by DFG and/or federal Species of Concern by U.S. Fish and Wildlife Service (USFWS).

FISHERIES RESOURCES

Historically, seasonal flooding covered various lands adjacent to the Sacramento River and tributaries and provided important spawning and rearing habitat for many fish species, including Sacramento splittail and juvenile Chinook salmon and steelhead. Levee and flood control facility (i.e., Fremont Weir and Sacramento Weir) construction has caused a reduction in the overall amount of seasonal flooding and shallow-water habitat in the Sacramento River system. In winter and spring, however, agricultural fields and wetland habitats throughout the Yolo Bypass often flood during high flows and are used by Sacramento splittail for spawning and rearing, and by Chinook salmon and steelhead for rearing. Altered flow regimes, flood control, and floodwater conveyance activities along much of the Yolo Bypass have affected available habitat and ecological processes.

Primary aquatic habitats throughout the Yolo Bypass Wildlife Area include the Yolo Bypass floodplain during seasonal flooding events, Putah Creek, East Toe Drain, and permanent wetlands.

Yolo Bypass Floodplain

Similar to other Sacramento-San Joaquin Delta habitats, there are more introduced species than native species in the Yolo Bypass floodplain. Introduced species are one of the major environmental issues in the Delta, where they frequently dominate the fauna on a year-round basis and in fact make up approximately 90 percent of the biomass in the Delta. However, unlike other Sacramento-San Joaquin Delta habitats, this floodplain is seasonally dewatered during late spring for agricultural production. This prevents introduced fish species from establishing year-round dominance except in perennial water sources. Moreover, many of the native fish are adapted to spawn and rear in winter and early spring during the winter flood pulse.

Recent surveys demonstrate that the Yolo Bypass provides habitat for a wide variety of fish species. Sampling to date has shown that the floodplain is used by at least 42 fish species including seasonal fish and fish that are year-round residents in perennial water sources. Examples include federal and state-listed species (steelhead trout, delta smelt, spring-run and winter-run Chinook salmon) and sport fish (striped bass and white sturgeon).

The native minnow Sacramento splittail is perhaps the most floodplain-dependent species in the Sacramento-San Joaquin Delta. Studies by Sommer et al. (1997) demonstrated that the Yolo Bypass provides some of the most important habitat for this species. Their sampling data indicated that adults move onto the floodplain in winter and early spring to forage and spawn among flooded vegetation.

The results published by Sommer et al. (2001) indicated that this seasonal floodplain habitat seems to provide better rearing conditions for Chinook salmon than the adjacent Sacramento River channel. Another important attribute of floodplain habitat is an enhanced food web. Sommer et al. (2001) found that drift insects (primarily chironomids) were 10 to 100 times more abundant in the floodplain than the adjacent Sacramento River channel during 1998 and 1999 flood events.

Although these results suggest that several measures of habitat variables demonstrate their benefit to young salmon in the Yolo Bypass, floodplain habitat carries stranding risks. The relative importance of stranding mortality is difficult to evaluate because there is currently no reliable estimate of the total number of salmon which migrate through the Sacramento River and its tributaries. However, the Yolo Bypass floodplain has been graded for agriculture which promotes successful emigration of young salmon.

Recent analysis of juvenile salmon utilizing the Bypass indicates higher methylmercury levels in these fish when compared to juvenile salmon that used the Sacramento River to reach the Delta. Further study is needed as well as analysis of methylmercury levels in splittail using the Yolo Bypass. Splittail spend their entire lives within the Bay-Delta ecosystem and therefore may have a higher propensity to contribute towards the bioaccumulation of methylmercury in the food chain.

Other Benefits of Floodplain to Aquatic Communities

Floodplain inundation may also provide benefits to organisms downstream in the brackish portion of the Delta (i.e., estuary). At the base of the estuarine food web, phytoplankton are responsible for most of the primary production in the estuary. Modeling studies by Jassby and Cloern (2000) suggest that phytoplankton produced in the Yolo Bypass may be an important source of organic carbon to the Delta, at least during flood events. Moreover, Yolo Bypass is probably also a major pathway for detrital material, an important additional source of organic carbon to the food web of the phytoplankton-deficient Delta.

Putah Creek

The reach of Putah Creek within the Yolo Bypass Wildlife Area (i.e., Putah Creek Cross Channel) consists of an unnatural ditch that is seasonally dammed by the Los Rios Check Dam. The Los Rios Check Dam is a 12-foot-high, 30-foot-long concrete box that serves as a seasonal check dam in the Yolo Bypass to create a head of water for irrigation pumping for neighboring agricultural lands and to flood the seasonal wetlands in the Yolo Bypass Wildlife Area. The Los Rios Check Dam is currently being managed to facilitate the migration of fall-run Chinook salmon into lower Putah Creek by removing boards in fall/winter in conjunction with pulse flow releases from the Putah Creek Diversion Dam (PDD).

Habitat and fisheries conditions in this reach of lower Putah Creek have been affected and shaped by several factors, including historic agricultural activities in the Yolo Bypass, upstream flood control grading and vegetation removal, construction and operation of the Solano Water Project, and, in May 2000, settlement and implementation of the historic Putah Creek Water Accord (Accord). The purpose of the Accord is to create as natural a flow regime as feasible and to maintain a living stream for the benefit of fish, wildlife, and plants from the PDD to the connection at the East Toe Drain in the Yolo Bypass.

Fisheries response to the Accord flow releases is currently being evaluated; however, based on initial data, several improvements have been noted. The most noteworthy result of the new flow releases is that fall-run Chinook salmon are migrating up Putah Creek to spawn. An estimated 70 adult fall-run Chinook salmon migrated up lower Putah Creek in the of fall 2003, resulting in the largest salmon run in more than 40 years.

East Toe Drain

The tidally influenced East Toe Drain provides perennial aquatic habitat for several fish species. The East Toe Drain is characterized by a wide (50 to 1,500 feet) and fairly deep (more than 5 feet) channel with no canopy and little bank or overhead vegetation. Portions of the Toe Drain bank bordering the Yolo Bypass Wildlife Area are riprapped. The channel is homogeneous with little habitat complexity and having generally low fish habitat value. The Lisbon Weir is located in the East Toe Drain adjacent to the Tule Ranch Unit. The Lisbon Weir is a rock weir used to capture water at high tide to maintain a higher elevation pool for irrigation source water.

Fish studies in the East Toe Drain show that this aquatic feature likely functions as year-round habitat for resident species, as a migration corridor (e.g., fish movement into Putah Creek and onto the seasonally inundated floodplain), and potentially as spawning habitat for striped bass and American shad. Resident species are primarily nonnative and include common carp, channel catfish, white catfish, striped bass, threadfin shad, black crappie, white crappie, Sacramento blackfish, and Sacramento sucker.

Permanent Wetlands

Permanent wetlands in the Yolo Bypass Wildlife Area provide perennial aquatic habitat for a diverse assemblage of fish species (dominated by nonnative species). Three of the permanent wetland ponds in the Yolo Bypass Wildlife Area were surveyed in 2001 to examine the functional role of perennial floodplain ponds for fishes in a regulated and highly invaded temperate river-floodplain system (Feyrer et al. 2004). Fish sampling resulted in the collection of 18 different species, all of which were nonnative with the exception of one native fish species, Sacramento blackfish.

Special-Status Fish Species

A total of nine special-status fish species occur or have the potential to occur in the Yolo Bypass and/or lower Putah Creek and are described below. Of the nine species, Central Valley steelhead Evolutionarily Significant Unit (ESU), Central Valley spring-run Chinook salmon ESU, Sacramento River winter-run ESU, green sturgeon, and delta smelt are listed as a federally threatened or endangered species. The USFWS de-listed Sacramento splittail from its federally threatened status on September 22, 2003. National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NMFS) determined that listing is not warranted for Central Valley fall-/late fall-run Chinook salmon ESU. However, it is still designated as a Species of Concern because of concerns over specific risk factors. The two remaining species (hardhead and Sacramento perch) are considered Species of Special Concern by DFG.

CULTURAL RESOURCES

The Yolo Basin is rich in cultural history. From the earliest Native American inhabitants to those farming and residing there in recent times, the Yolo Basin has been an important part of people's being and livelihood.

The Yolo Basin is within the ethnographic territory of the Patwin. The word "Patwin" literally means "the people" in the native tongue. Although native people did not identify themselves as Patwin, this name is used to describe a series of linguistically and culturally related groups who occupied a portion of the lower Sacramento Valley west of the Sacramento River and north of Suisun Bay. The southern group or Pooewin claimed the Yolo Basin, however, no known ethnographic village locales are within this area. Because of reoccurring seasonal flooding, the area would have most likely been used during the drier summer months.

An early settler was J. H. Glide who purchased a large portion of land in the Yolo Bypass in the 1870s. Much of this property was held by this family until 2001.

Several cultural resources surveys have been conducted within and directly adjacent to the Yolo Bypass Wildlife Area. With the exception of a few all have been linear surveys which have resulted in the inventory of only a very small percentage of the area. These investigations have resulted in the identification of five resources (two prehistoric archaeological sites, an historic farmhouse with associated outbuildings, the remains of the historic Sacramento Northern Railroad, and the route of the Southern Pacific Railroad) within the Yolo Bypass Wildlife Area. While not formerly documented, other resources located within the Yolo Bypass Wildlife Area include the "Umbrella Barn" in the southern portion of the Tule Ranch Unit, and two locales, the "Tree House" and another known as " The Fireman's Club" also located in the Tule Ranch Unit.

RECREATION AND PUBLIC USE

Since the inception of the Yolo Bypass Wildlife Area, tens of thousands of visitors from throughout the region have used the area for hunting, fishing, walking, hiking, wildlife viewing, nature photography, and a broad range of environmental education activities for all ages of students, and the general public. A trail and road network present in the Yolo Bypass Wildlife Area supports these activities.

The Yolo Bypass Wildlife Area is managed by the DFG with education programs and public outreach provided by the Foundation. This mutually beneficial partnership was memorialized in June of 1997 when the Foundation and DFG signed a Memorandum of Understanding (MOU) with DFG recognizing their long-term partnership to provide public outreach and educational programs. The MOU allows the Foundation to use DFG facilities for a base for programs related to the Yolo Bypass Wildlife Area.

ENVIRONMENTAL EDUCATION AND INTERPRETIVE PROGRAMS

Environmental education and interpretive programs for school children and the general public are an important component of the Yolo Bypass Wildlife Area's existing public use activities. The Foundation and DFG collaborate in managing and staffing a wide variety of environmental education and interpretation programs including the Discover the Flyway program, Marsh Madness Youth Days, Nature Bowl, public tours, docent program, Flyway Nights lecture series, California Duck Days, Project Wet, and other workshops. Yolo Basin Foundation is the primary organization for developing, establishing, and acquiring funding for Yolo Bypass Wildlife Area's education and interpretation programs. DFG provides facilities, staff support, and expertise towards the education program in its shared role with the Foundation.

HUNTING

Hunting is one of the main forms of recreation currently available within the Yolo Bypass Wildlife Area. Waterfowl and pheasant hunting are the most popular, however, visitors also participate in hunting of other upland game species including dove. The Yolo Bypass Wildlife Area currently maintains 16 duck blinds and one fully accessible blind on the approximate 3,000 acres available for waterfowl hunting. DFG currently allows 40 hunters to free roam plus up to 16 parties in designated blinds on any given hunting day. With the recent acquisition of additional lands, the Wildlife Area will someday have a capacity of over 200 hunters, with 38 acres per hunter at any one time, to ensure a safe, high quality hunting experience. Pheasant hunting is currently allowed on approximately 5,000 acres of the Yolo Bypass Wildlife Area. Five designated parking lots are available for use by hunters. Hunters are allowed to use shotguns and archery for hunting.

FISHING

Fishing is also popular and several opportunities are provided within the Yolo Bypass Wildlife Area. Primary game species present include sturgeon, catfish, black bass, and striped bass. Primary fishing locations include the East Toe Drain and along Putah Creek near the Los Rios Check Dam. Access can be obtained through parking Lot F (Toe Drain) and Lot G (Putah Creek). The East Toe Drain can also be reached from outside the Yolo Bypass Wildlife Area on the West Sacramento (east) side of the drain. Sturgeon and striped bass are both

anadromous fish (i.e., fish that spend all or part of their adult life in salt water and return to freshwater streams and rivers to spawn) that can be caught in the Toe Drain during their upstream migration from San Francisco Bay.

WILDLIFE VIEWING

Many species of birds and mammals may be observed in the Yolo Bypass Wildlife Area. Visitors may see a multitude of birds of prey, shorebirds, waterfowl and other migratory birds with over 200 known species having been identified within the area. Typical species include ibis, pelicans, cormorants, great blue herons, orioles, blue grosbeaks, and western kingbirds. Mammals that can be seen in the area include coyotes, raccoons, gray fox, mule deer, beaver, mink, and river otters. The extensive water system maintained on the Yolo Bypass Wildlife Area also harbors large numbers of fish, amphibians, and invertebrates.

Public wildlife viewing is currently allowed along the existing auto tour route and along existing open trails as well as through scheduled tours and educational programs. Wildlife viewing is also permitted within designated hunting areas during non-hunting seasons.

RESEARCH ACTIVITY

Yolo Bypass Wildlife Area has been the site of several research projects in recent years, as the scientific community has focused a tremendous amount of interest and effort on learning about the biological conditions and processes in the Yolo Bypass. Examples of recent study topics include: native fish use of seasonal floodplains, floodplain processes and productivity, effects of vegetation removal on mosquito production, effects of mowing on native forb communities and investigations about mercury methylation in wetlands. The Wildlife Area strongly supports high school science classes, colleges and universities getting involved in conducting field studies and research at the Yolo Bypass Wildlife Area.

MANAGEMENT GOALS

In the LMP, the current and planned management of the Yolo Bypass Wildlife Area is described using the terminology that is part of DFG's standardized format for management plans. This terminology includes the terms element, goal, and task, which are defined below.

Element: refers to any biological unit, public use activity, or facility maintenance or management coordination program, as defined below, for which goals have been prepared and presented within this plan.

Goal: is a statement describing management and its intended long-term results for an element.

Task: an individual project or work element that implements the goals and is useful in planning operation and maintenance budgets.

This LMP contains 10 elements; the biological element contains 7 sub-elements. They are:

- Biological Resources
  - Management for Species Guilds
  - Special-Status Species
  - Nonnative Invasive Species
  - Seasonal and Permanent Wetland Communities
  - Riparian Communities
  - Grassland and Upland Communities
  - Aquatic Ecosystems
- Agricultural Resources
- Cultural Resources

- Authorized Public Use
- Unauthorized Public Use
- Facilities
- Administration
- Fire Management
- Scientific Research and Monitoring
- Management Coordination

For these elements and sub-elements, the LMP has 45 goals and 300 tasks.

It is important to note that implementation of many of the tasks identified in the LMP is dependent upon the availability of the necessary staff and an adequate operations and maintenance budget. Thus, additional resources may be required to accomplish the tasks identified in the LMP.

OPERATIONS AND MAINTENANCE

Additional staffing and resources will be required to perform all the tasks described in this LMP. Thus, it will require a commitment of additional budgetary resources if the goals of this plan are to be achieved.

FUTURE REVISIONS

To prevent this LMP from becoming outdated, a process will be implemented to accommodate minor revisions. The minor revision requires approval by the Regional Manager.

Major revisions or a new LMP could occur if new policy direction requires a procedure comparable to the LMP planning process. A major revision or new plan requires recommendation by the Regional Manager and approval by the Director of DFG.

An exhaustive review of the achievement of the goals of the LMP will be prepared every five years following the date of adoption of this LMP. A status report documenting this review will be prepared by the Area Manager. It will be submitted to the Regional Manager and to the Director of DFG. This report will serve as a basis for revision of this LMP and appropriate adjustments to ongoing management practices.

ENVIRONMENTAL REVIEW

The management goals and tasks described in this LMP were evaluated for their potential impact on the environment in accordance with the provisions of the CEQA. An IS, which is included herein as Appendix H, was prepared in accordance with the State CEQA Guidelines. This IS concluded that this LMP, as proposed, would not have any significant or potentially significant impacts on the environment. Accordingly, a proposed Negative Declaration (ND) has been prepared for adoption with a finding that the project will not have a significant impact on the environment.

This CEQA document analyzes impacts resulting from the programmatic implementation of this LMP. The details of specific projects that may be developed consistent with this LMP are not yet known. Any future projects that may involve environmental effects will need to be evaluated in light of the IS/ND to determine if additional project-specific CEQA document preparation is necessary. Permits, consultations and/or approval actions may also be required to approve specific future projects. Examples of potential future permit requirements include the following:

- **U.S. Army Corps of Engineers (USACE)** – Section 404 of the Clean Water Act (CWA), permit for discharge of fill in waters of the U.S.; Section 10 Rivers and Harbors Act permit for work in navigable waters of the U.S.; approval of modification of USACE levees.

- **California Department of Fish and Game** – streambed alteration agreement (Section 1602 of Fish and Game Code);

- **California Department of Water Resources (State Reclamation Board)** – encroachment permit to work on or adjacent to levees and in designated floodways, approval/authorization of new or restored levees;

- **Regional Water Quality Control Board** – National Pollutant Discharge Elimination System construction stormwater permit (Notice of Intent to proceed under the statewide General Construction Permit), potential discharge permit for wastewater, general order for dewatering, CWA Section 401 certification if a Section 404 permit is required.

1 INTRODUCTION

The **Yolo Bypass** (Bypass) is a unique resource that provides substantial environmental, social, and economic benefits to the people of the state of California. It is located in Yolo and Solano counties, west of the Sacramento River. The Bypass conveys seasonal high flows from the Sacramento River to control river stage and protect the cities of Sacramento, West Sacramento, and Davis and other local communities, farms, and lands from flooding (Exhibit 1-1). This Land Management Plan (LMP) addresses a key area of the Bypass, the California Department of Fish and Game's (DFG) **Yolo Bypass Wildlife Area** (Wildlife Area) (Exhibit 1-2). The Yolo Bypass Wildlife Area comprises approximately 16,770 acres of managed wildlife habitat and agricultural land within the Yolo Bypass, an area dedicated to providing flood protection to the Sacramento Valley. The Yolo Bypass Wildlife Area is unique in the way agriculture, wildlife habitat and flood protection objectives are achieved in a highly compatible manner while also providing ample opportunities for public access, recreation, and natural resource education.

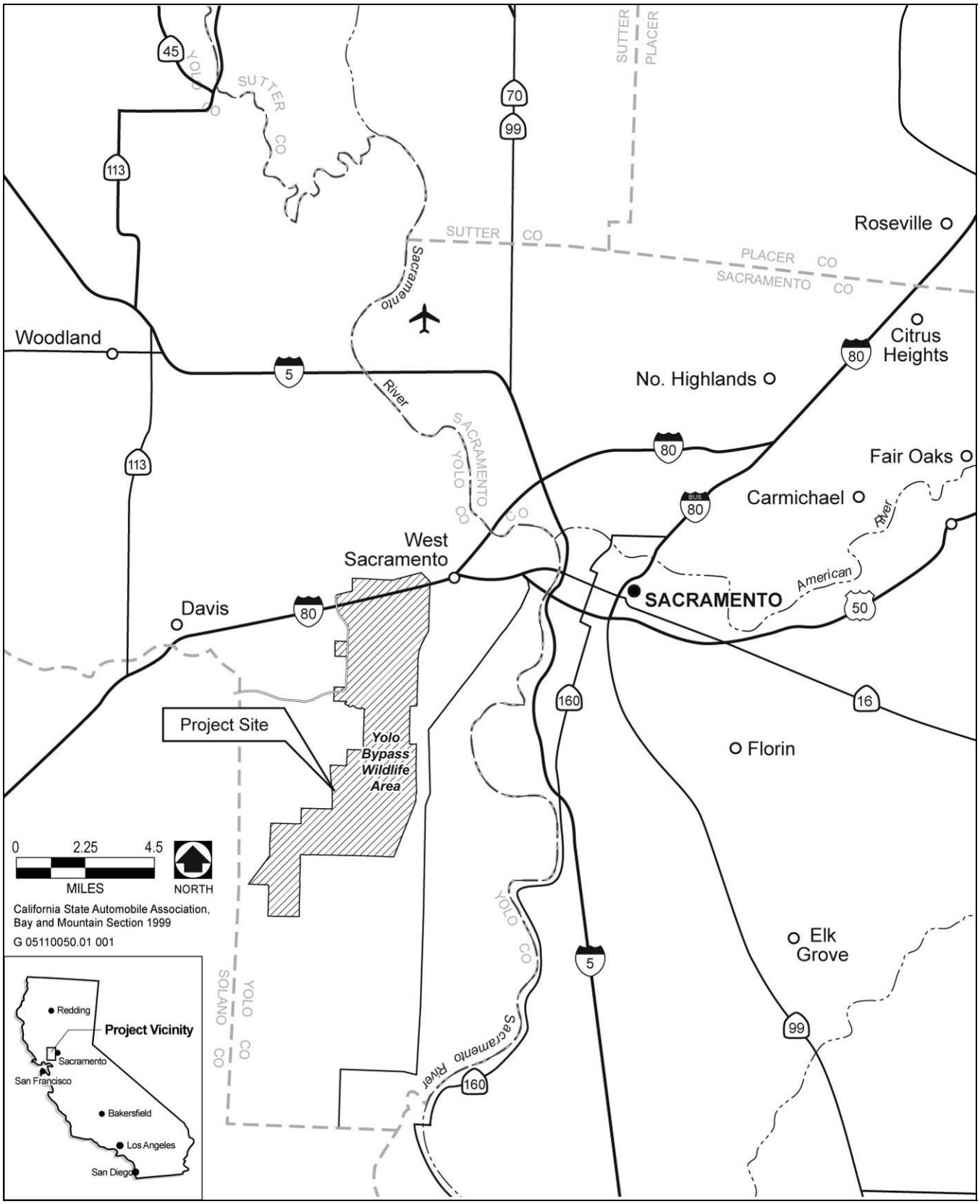
The **Yolo Basin** is the name of the natural basin that for thousands of years has been receiving flood waters from the Sacramento River. Within this Basin lies the Yolo Bypass, a flood control channel constructed in the early part of the 20th century to direct these flood waters to the Sacramento-San Joaquin Delta and away from reclaimed farmland and Sacramento Valley settlements. The U.S. Army Corps of Engineers (USACE) project to restore wetlands in the Yolo Bypass was called the **Yolo Basin Wetlands**. This restoration project was renamed the **Vic Fazio Yolo Wildlife Area** in honor of the Northern California Congressman who helped make the project a reality. The official name of the Wildlife Area established in 1997 remains the Yolo Bypass Wildlife Area. This title is used throughout this document.

HISTORY OF THE YOLO BASIN

The Yolo Basin was once a nearly 80,000-acre wetland teeming with wildlife, from herds of tule elk roaming its marshes to dense clouds of migratory waterfowl seeking winter food and shelter (Exhibit 1-3). Yolo was one of several basins located within the Sacramento River floodplain. All the basins received water during high winter and spring flows as a normal occurrence. Migratory birds came from the far north to feed on seeds and invertebrates produced in the wetlands. Several native fish species used the seasonally inundated floodplain for vital spawning and rearing habitat. The resources found in the Yolo Basin also sustained many small groups of Native Americans through the winter and spring months. The seasonal presence of waterfowl and fish provided food, while the wetlands provided materials for cultural use and building, such as willow and tules. To this day, the seasonal hydrological and other conditions of the Yolo Basin drive its use by people and wildlife (Yolo Basin Foundation and California Department of Fish and Game 2007).

Over time the Yolo Basin ecosystem has been profoundly altered by human activity. Beginning in 1860, the adverse effects of hydraulic mining for gold upstream in the Sierra Nevada (which caused tremendous accumulation of sediment in rivers and on floodplains downstream of the mining) and the increased amount of lands reclaimed for use in agriculture led to the implementation of large-scale flood control projects to protect private lowlands. Large levees were eventually constructed along both sides of the Yolo Basin from Cache Slough north to the Fremont Weir (Thompson 1957). The construction of these levees and flood control structures, including the Sacramento Weir, formed what is now known as the Yolo Bypass.

In more recent history, the majority of lands within the Bypass have been used for grazing and farming with limited wetland management taking place on private waterfowl hunting club lands. The historic culture of waterfowl hunting on private clubs continues to this day on properties neighboring the Yolo Bypass Wildlife Area. The goals of reestablishing wetland habitat for water birds and other wildlife in the Yolo Bypass, while still maintaining the agricultural character and flood control function, are at the core of the Yolo Bypass Wildlife Area's mission.



Regional Location of the Yolo Bypass Wildlife Area **Exhibit 1-1**