RECLAMATION
Managing Water in the West

FINDING OF NO SIGNIFICANT IMPACT

Central Valley Project Interim Renewal Contracts for Panoche Water District and San Luis Water District 2013 – 2015

FONSI-12-055

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February 2013

Introduction

In accordance with section 102(2)(c) of the National Environmental Policy Act (NEPA) of 1969, as amended, the South-Central California Area Office of the Bureau of Reclamation (Reclamation), has determined that the renewal of two Central Valley Project (CVP) San Luis Unit interim renewal contracts for Panoche Water District (PWD) and San Luis Water District (SLWD) for the contract period March 1, 2013 through February 28, 2015 is not a major federal action that will significantly affect the quality of the human environment and an environmental impact statement is not required. This Finding of No Significant Impact (FONSI) is supported by Reclamation's Environmental Assessment (EA) Number EA-12-055, *Central Valley Project Interim Renewal Contracts for Panoche Water District and San Luis Water District 2013 – 2015*, and is hereby incorporated by reference.

Reclamation provided the public with an opportunity to comment on the Draft FONSI and Draft EA between October 23, 2012 and November 21, 2012. No comments were received.

Background

Section 3404(c)(1) of the Central Valley Project Improvement Act (CVPIA) authorizes and directs Reclamation to prepare appropriate environmental review before renewing an existing water service contract for a period of twenty-five years. Section 3404(c) of the CVPIA further provides for the execution of interim renewal contracts for contracts which expired prior to completion of the CVPIA Programmatic Environmental Impact Statement (PEIS). Interim renewal contracts have been and continue to be undertaken under the authority of the CVPIA to provide a bridge between the expiration of the original long-term water service contracts and the execution of new long-term water service contracts as required by the CVPIA. The interim renewal contracts reflect current Reclamation law, including modifications resulting from the Reclamation Reform Act and applicable CVPIA requirements. The initial interim contract renewals were negotiated in 1994 with subsequent renewals for periods of two years or less to provide continued water service. Many of the provisions from the interim contracts were assumed to be part of the contract renewal provisions in the description of the CVPIA PEIS Preferred Alternative.

The PEIS did not analyze site specific impacts of contract renewal but rather CVP-wide impacts of long-term contract renewal. Consequently, as contract renewal negotiations were completed, Reclamation prepared environmental documents that tiered from the PEIS to analyze the local effects of long-term contract renewals at the division, unit, or facility level. Tiering is defined as the coverage of general matters in broader environmental impact statements with site-specific environmental analyses for individual actions. Environmental analysis for the interim renewal contracts has also tiered from the PEIS to analyze site specific impacts. Consequently, the analysis in the PEIS as it relates to the implementation of the CVPIA through contract renewal and the environmental impacts of implementation of the PEIS Preferred Alternative are foundational and laid the groundwork for EA-12-055. The PEIS analyzed the differences in the environmental conditions between existing contract requirements (signed prior to CVPIA) and the No Action Alternative described in EA-12-055 which is reflective of minimum implementation of the CVPIA.

Proposed Action

In accordance with and as required by Section 3404(c) of the CVPIA, Reclamation proposes to execute two San Luis Unit interim renewal contracts beginning March 1, 2013 for PWD and SLWD. Both PWD and SLWD are currently on their second interim renewal contract and this Proposed Action will be their third. The two interim renewal contracts will be renewed for a two-year period from March 1, 2013 through February 28, 2015. In the event a new long-term water service contract is executed, the interim water service contract then-in-effect will be superseded by the long-term water service contract.

The Proposed Action will continue the existing interim renewal contracts, with only minor, administrative changes to the contract provisions to update the previous interim renewal contracts for the new contract period. No changes to the contractors' service areas or water deliveries are part of the Proposed Action. CVP water deliveries under the two proposed interim renewal contracts can only be used within each designated contract service area.

The two interim renewal contracts contain provisions that allow for adjustments resulting from court decisions, new laws, and from changes in regulatory requirements imposed through re-consultations. Accordingly, to the extent that additional restrictions are imposed on CVP operations to protect threatened or endangered species, those restrictions will be implemented in the administration of the two interim renewal contracts considered in this EA. As a result, by their express terms the interim renewal contracts analyzed herein will conform to any applicable requirements lawfully imposed under the Federal Endangered Species Act (ESA) or other applicable environmental laws.

Reclamation's finding that implementation of the Proposed Action will result in no significant impact to the quality of the human environment is supported by the following factors:

FINDINGS

Water Resources

The proposed execution of interim renewal contracts for PWD and SLWD will not change contract water quantities from the quantities in the existing contracts, and will not lead to any increased water use. Therefore, there will be no effect on surface water supplies or quality. As described under the No Action Alternative in EA-12-055, execution of two year interim renewal contracts will not change historical values in quantity, quality, or discharge of drainage emanating from or within PWD and SLWD. The Proposed Action will, in essence maintain the environmental status quo, i.e., the same amount of water will go to the same areas for the same uses (albeit under a different legal document); therefore, there are no adverse impacts to water resources as a result of the Proposed Action.

Land Use

The proposed execution of interim renewal contracts for PWD and SLWD will not provide for additional water supplies that could act as an incentive for conversion of native habitat or increased agricultural production acreage. Generally, lands within the San Luis Unit that are productive are farmed. In addition, the short terms of the interim renewal contracts do not provide sufficient certainty to permit municipal and industrial (M&I) development of land currently in agricultural production; therefore, land will continue to be used for existing purposes. Likewise, the interim renewal contracts will not change contract terms or conditions governing the allocation of CVP water during times of limited supply (i.e., drought), so will not provide additional water reliability conducive to conversion of land use from agricultural to M&I uses. Consequently, there will be no impact to land use as a result of the Proposed Action.

Biological Resources

No additional effects to special status species or critical habitats are associated with the Proposed Action. Existing and future environmental commitments addressed in Biological Opinions, including the CVPIA Biological Opinion (USFWS 2000) would be met under the Proposed Action, including continuation of ongoing species conservation programs.

Reclamation's biological impacts determination also takes into account the service area's compliance with applicable requirements of existing Biological Opinions, as described above in Section 3.2.1. The Proposed Action will not result in substantial changes in natural and semi-natural communities and other land uses that have the potential to occur within the study area and other portions of the San Luis Unit. Additionally, execution of interim renewal contracts under the Proposed Action will not involve construction of new facilities or installation of structures.

PWD and a portion of SLWD have drainage outside of their contract service areas that can reach the San Joaquin River via the Grassland Bypass Project (GBP). Reclamation, SLWD, and PWD are subject to water quality regulations for constituents with the potential to have an effect on the environment and have committed to the reduced discharge of agricultural drainwater through participation in a number of activities, including GBP. The GBP continues to provide environmental benefits in addition to the overall decrease in selenium and salts. Benefits are accomplished through the continued separation of unusable agricultural drainwater discharged from the Grassland Drainage Area from that of wetland water supply conveyance channels and mitigation for use of the Mud Slough footprint through the provision of off-site water supply and improvements, The GBP's careful regimen of drainage management maintains agriculture in the Grassland Drainage Area at the same time as it promotes the improvement in water quality in the San Joaquin River.

On January 15, 2013 Reclamation received a memorandum from USFWS Sacramento Field Office for the Proposed Action, concurring with Reclamation that effects of the Proposed Action are not likely to adversely affect San Joaquin kit fox, giant garter snake, and blunt-nosed leopard lizard and habitat (see Appendix B in Final EA-12-055).

Reclamation consulted with NMFS on impacts from the interim renewal of PWD and SLWD contracts, and on February 28, 2013, a Biological Opinion was issued by NMFS for the effects of agricultural drain water entering the San Joaquin River (see Appendix C of Final EA-12-055). They concluded the execution of interim renewal contracts were not likely to jeopardize the continued existence of the federally listed endangered Sacramento River winter-run Chinook salmon, threatened Central Valley spring-run Chinook salmon, threatened Central Valley steelhead, the threatened Southern distinct population segment (DPS) of North American green sturgeon, nor will it result in the destruction or adverse modification of designated critical habitat of Central Valley steelhead and the Southern DPS of North American green sturgeon. In addition, Reclamation consulted with NMFS on effects to Essential Fish Habitat (EFH) from the Proposed Action. NMFS concluded that the execution of the PWD and SLWD Interim Renewal Contracts will adversely affect the EFH of Pacific salmon in the action area and adopts certain terms and conditions of the incidental take statement and the ESA conservation recommendations of the Biological Opinion as the EFH conservation recommendations. Reclamation will comply with requirements of the Biological Opinion issued by NMFS.

Cultural Resources
There will be no impacts to cultural resources as a result of implementing the Proposed Action as the Proposed Action will facilitate the flow of water through existing facilities to existing users. No new construction or ground disturbing activities will occur as part of the Proposed Action. The pumping, conveyance, and storage of water will be confined to existing CVP facilities. Reclamation has determined that these activities have no potential to cause effects to historic properties pursuant to 36 CFR Part 800.3(a)(1).

Indian Sacred Sites
Reclamation has determined that there will be no impacts to Indian sacred sites as a result of the Proposed Action since the Proposed Action will not limit access to and ceremonial use of Indian sacred sites on Federal lands by Indian religious practitioners or significantly adversely affect the physical integrity of such sacred sites.

Indian Trust Assets
No physical changes to existing facilities are proposed and no new facilities are proposed. Continued delivery of CVP water to PWD and SLWD under an interim renewal contract will not affect any Indian Trust Assets because existing rights will not be affected; therefore, Reclamation has determined that the Proposed Action will not impact Indian Trust Assets.

Socioeconomic Resources
The proposed execution of interim renewal contracts with only minor administrative changes to the contract provisions will not result in a change in contract water quantities or a change in water use and will not adversely impact socioeconomic resources within the contractors' respective service areas.

Environmental Justice
The proposed execution of interim renewal contracts with only minor administrative changes to the contract provisions will not result in a change in contract water quantities or a change in water use. The Proposed Action will not cause dislocation, changes in employment, or increase flood, drought, or disease. The Proposed Action will not disproportionately impact economically disadvantaged or minority populations as there will be no changes to existing conditions.

Air Quality

The Proposed Action will not require construction or modification of facilities to move CVP water to PWD or SLWD. CVP water will be moved either via gravity or electric pumps along the Delta-Mendota Canal and San Luis Canal which will not produce emissions that impact air quality. The generating power plant that produces the electricity to operate the electric pumps does produce emissions that impact air quality; however, water under the Proposed Action is water that will be delivered from existing facilities under either alternative and is therefore part of the existing conditions. In addition, the generating power plant is required to operate under permits issued by the air quality control district. As the Proposed Action will not change the emissions generated at the generating power plant, no additional impacts to air quality will occur and a conformity analysis is not required pursuant to the Clean Air Act.

Global Climate Change

The Proposed Action will not involve physical changes to the environment or construction activities that could impact global climate change. Generating power plants that produce electricity to operate the electric pumps produce carbon dioxide that could potentially contribute to greenhouse gas emissions; however, water under the Proposed Action is water that will be delivered from existing facilities under either alternative and is therefore part of the existing conditions. There will be no additional impacts to global climate change as a result of the Proposed Action.

Cumulative Impacts

Cumulative impacts relating to diversion of water and CVP operations were considered in the CVPIA PEIS. Reclamation’s action is the execution of two interim renewal water service contracts between the United States and PWD and SLWD. Both PWD and SLWD have existing interim renewal contracts. It is likely that subsequent interim renewals will be needed in the future until long-term contract renewals are executed. The Proposed Action will, in essence maintain the environmental status quo, i.e., the same amount of water will go to the same areas for the same uses (albeit under a different legal arrangement). Because the renewals of interim contracts maintain the status quo of deliverable quantities and CVP operations, and in essence only change the legal arrangements of a continuing action, they do not contribute to cumulative impacts in any demonstrable manner.

Climate change is considered a cumulative impact and refers to changes in the global or a regional climate over time. Global climate change is expected to have some effect on the snow pack of the Sierra Nevada and the runoff regime. Current data are not yet clear on the hydrologic changes and how they will affect the San Joaquin Valley. Water allocations are made dependent on hydrologic conditions and environmental requirements. Since Reclamation operations and allocations are flexible, any changes in hydrologic conditions due to global climate change will be addressed within Reclamation’s operation flexibility and therefore surface water resource changes due to climate change will be the same with or without the Proposed Action. The Proposed Action does not involve physical changes to the environment or construction activities that could result in greenhouse gas emissions. In addition, deliveries of CVP water to PWD and SLWD are part of existing baseline conditions, and will therefore, not impact global climate change.

RECLAMATION
Managing Water in the West

Final Environmental Assessment

Central Valley Project Interim Renewal Contracts for Panoche Water District and San Luis Water District 2013-2015

EA-12-055

U.S. Department of the Interior
Bureau of Reclamation
Mid Pacific Region
South-Central California Area Office
Fresno, California

February 2013

Mission Statements

The mission of the Department of the Interior is to protect and provide access to our Nation's natural and cultural heritage and honor our trust responsibilities to Indian Tribes and our commitments to island communities.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

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Section 1 Introduction

The Bureau of Reclamation (Reclamation) provided the public with an opportunity to comment on the Draft Finding of No Significant Impact (FONSI) and Draft Environmental Assessment (EA) between October 23, 2012 and November 21, 2012. No comments were received. Changes from the draft EA that are not minor editorial changes are indicated by vertical lines in the left margin of this document.

1.1 Background

On October 30, 1992, the President signed into law the Reclamation Projects Authorization and Adjustment Act of 1992 (Public Law 102-575) which included Title 34, the Central Valley Project Improvement Act (CVPIA). The CVPIA amended previous authorizations of the Central Valley Project (CVP) to include fish and wildlife protection, restoration, and mitigation as project purposes having equal priority with irrigation and domestic water supply uses, and fish and wildlife enhancement as having an equal priority with power generation. Through the CVPIA, Reclamation is developing policies and programs to improve the environmental conditions that were affected by the operation and maintenance (O&M) and physical facilities of the CVP. The CVPIA also includes tools to facilitate larger efforts in California to improve environmental conditions in the Central Valley and the San Francisco Bay-Delta system.

Section 3404(c) of the CVPIA directs the Secretary of the Interior to renew existing CVP water service and repayment contracts following completion of a Programmatic Environmental Impact Statement (PEIS) and other needed environmental documentation by stating that:

> *… the Secretary shall, upon request, renew any existing long-term repayment or water service contract for the delivery of water … for a period of 25 years and may renew such contracts for successive periods of up to 25 years each ...* [after] *appropriate environmental review, including preparation of the environmental impact statement required in section 3409* [i.e., the CVPIA PEIS] … *has been completed.*

Reclamation released a Draft PEIS on November 7, 1997. An extended comment period closed on April 17, 1998. The U.S. Fish and Wildlife Service (USFWS) became a co-lead agency in August 1999. Reclamation and the USFWS released the Final PEIS in October 1999 (Reclamation 1999) and the Record of Decision (ROD) in January 2001. The CVPIA PEIS analyzed a No Action Alternative, 5 Main Alternatives, including a Preferred Alternative, and 15 Supplemental Analyses. The alternatives included implementation of the following programs: Anadromous Fish Restoration Program with flow and non-flow restoration methods and fish passage improvements; Reliable Water Supply Program for refuges and wetlands identified in the 1989 Refuge Water Supply Study and the San Joaquin Basin Action Plan; Protection and restoration program for native species and associated habitats; Land Retirement Program for willing sellers of land characterized by poor drainage; and CVP Water Contract Provisions for contract renewals, water pricing, water metering/monitoring, water conservation methods, and water transfers.

The CVPIA PEIS provided a programmatic evaluation of the impacts of implementing the CVPIA including impacts to CVP operations north and south of the Sacramento-San Joaquin River Delta (Delta). The PEIS addressed the CVPIA's region-wide impacts on communities, industries, economies, and natural resources and provided a basis for selecting a decision among the alternatives.

Section 3404(c) of the CVPIA further provides for the execution of interim renewal contracts for contracts which expired prior to completion of the CVPIA PEIS by stating that:

> *No such renewals shall be authorized until appropriate environmental review, including the preparation of the environmental impact statement required in section 3409 of this title, has been completed. Contracts which expire prior to the completion of the environmental impact statement required by section 3409* [i.e., the CVPIA PEIS] *may be renewed for an interim period not to exceed three years in length, and for successive interim periods of not more than two years in length, until the environmental impact statement required by section 3409 has been finally completed, at which time such interim renewal contracts shall be eligible for long-term renewal as provided above.*

Interim renewal contracts have been and continue to be undertaken under the authority of the CVPIA to provide a bridge between the expiration of the original long-term water service contracts and the execution of new long-term water service contracts as required by the CVPIA. The interim renewal contracts reflect current Reclamation law, including modifications resulting from the Reclamation Reform Act and applicable CVPIA requirements. The initial interim renewal contracts were negotiated in 1994 with subsequent renewals for periods of two years or less to provide continued water service. Many of the provisions from the interim renewal contracts were assumed to be part of the contract renewal provisions in the description of the PEIS Preferred Alternative.

The PEIS did not analyze site specific impacts of contract renewal but rather CVP-wide impacts of execution of long-term renewal contracts. Consequently, as long-term renewal contract negotiations were completed, Reclamation prepared environmental documents that tiered from the PEIS to analyze the local effects of execution of long-term renewal contracts at the division, unit, or facility level (see Section 1.1.1). Tiering is defined as the coverage of general matters in broader environmental impact statements with site-specific environmental analyses for individual actions. Environmental analysis for the interim renewal contracts has also tiered from the PEIS to analyze site specific impacts. Consequently, the analysis in the PEIS as it relates to the implementation of the CVPIA through contract renewal and the environmental impacts of implementation of the PEIS Preferred Alternative are foundational and laid the groundwork for this document. The PEIS analyzed the differences in the environmental conditions between existing contract requirements (signed prior to CVPIA) and the No Action Alternative described in this EA which is reflective of minimum implementation of the CVPIA.

In accordance with and as required by Section 3404(c) of the CVPIA, Reclamation proposes to execute two San Luis Unit interim renewal contracts beginning March 1, 2013 for Panoche Water District (PWD) and San Luis Water District (SLWD). The two interim renewal contracts listed in Table 1-1 would be renewed for a two-year period from March 1, 2013 through February 28, 2015. In the event a new long-term water service contract is executed, the interim renewal contract then-in-effect would be superseded by the long-term water service contract.

Table 1-1 Contractors, Existing Contract Amounts, and Expiration Dates

Contractor	Current Contract Number	Contract Quantity (acre-feet)	Expiration of Existing Interim Renewal Contract
Panoche Water District	14-06-200-7864A-IR2	94,000	2/28/2013
San Luis Water District	14-06-200-7773A-IR2	125,080	2/28/2013

Reclamation has prepared this EA, which tiers from the PEIS, to determine the site specific environmental effects of any actions resulting from the execution of these two interim renewal contracts.

The long-term contracts for PWD and SLWD expired December 31, 2008. In 2008, Reclamation executed the first interim renewal contracts for each of the contractors for up to two years and two months. In 2011, Reclamation executed the second interim renewal contracts for PWD and SLWD for up to two years. Previous interim renewal contract EAs, which tiered from the PEIS, have been prepared for these contracts and approved as follows:

- EA-10-070, *San Luis Water District's and Panoche Water District's Water Service Interim Renewal Contracts 2011-2013* (Reclamation 2010a) which covered contract years[1] 2011 through 2013
- EA-07-056, *San Luis Unit Water Service Interim Renewal Contracts – 2008-2011* (Reclamation 2007) which covered the contract years 2008 through 2011

These two previous documents are incorporated by reference into this analysis. Information from the previous EAs are summarized and updated, as needed into this EA.

This EA was developed consistent with regulations and guidance from the Council on Environmental Quality, and in conformance with the analysis provided in *Natural Resources Defense Council v. Patterson,* Civ. No. S-88-1658 (Patterson). In Patterson the Court found that "…[on] going projects and activities require NEPA [National Environmental Policy Act] procedures only when they undergo changes amounting in themselves to further 'major action'." In addition, the Court went further to state that the NEPA statutory requirement applies only to those changes. The analysis in this EA and the incorporated EAs finds in large part that the renewal of the interim contracts is in essence a continuation of the "status quo", and that although there are financial and administrative changes to the contracts, the contracts continue the existing use and allocation of resources (i.e., the contracts are for the same amount of water and for use on the same lands for existing/ongoing purposes). This EA is therefore focused on the potential environmental effects resulting to proposed changes to the contract as compared to the No Action Alternative.

[1] A contract year is from March 1 of a particular year through February 28/29 of the following year.

1.1.1 Long-Term Renewal Contracts

Reclamation completed long-term renewal contract environmental documentation in early 2001 for CVP contracts in the Friant Division, Hidden Unit, and Buchanan Unit of the CVP (Reclamation 2000a, 2001). Twenty-five of the 28 Friant Division long-term contracts were executed between January and February 2001, and the Hidden Unit and Buchanan Unit long-term renewal contracts were executed in February 2001. The Friant Division long-term renewal contracts with the City of Lindsay, Lewis Creek Water District, and City of Fresno were executed in 2005. In accordance with Section 10010 of the Omnibus Public Land Management Act of 2009 (Public Law 111-11), Reclamation entered into 24 Friant Division 9(d) Repayment Contracts by December 2010.

A Final Environmental Impact Statement (EIS) analyzing effects of the long-term renewal contracts for the Sacramento River Settlement Contracts and the Colusa Drain Mutual Water Company was completed in December 2004 (Reclamation 2004a). The 147 Sacramento River Settlement Contracts were executed in 2005, and the Colusa Drain Mutual Water Company contract was executed on May 27, 2005. A revised EA for the long-term renewal contract for the Feather Water District water-service replacement contract was completed August 15, 2005 and the long-term renewal contract was executed on September 27, 2005 (Reclamation 2005a).

Environmental documents were completed by Reclamation in February 2005 for the long-term renewal of CVP contracts in the Shasta Division and Trinity River Divisions (Reclamation 2005b), the Black Butte Unit, Corning Canal Unit, and the Tehama-Colusa Canal Unit of the Sacramento River Division (Reclamation 2005c). All long-term renewal contracts for the Shasta, Trinity and Sacramento River Divisions covered in these environmental documents were executed between February and May 2005. As Elk Creek Community Services District's long-term contract didn't expire until 2007 they chose not to be included at that time. Reclamation continues to work on long-term renewal contract renewal environmental documentation for Elk Creek Community Services District.

Reclamation completed long-term renewal contract environmental documents for the Delta Division (Reclamation 2005d) and the U.S. Department of Veteran Affairs (Reclamation 2005e). In 2005, Reclamation executed 17 Delta Division long-term renewal contracts.

Reclamation completed long-term renewal contract environmental documents for Contra Costa Water District (Reclamation 2005f) and executed a long-term renewal contract in 2005.

Reclamation completed long-term renewal contract environmental documents for the majority of the American River Division (Reclamation 2005g). The American River Division has seven contracts that are subject to renewal. The ROD for the American River long-term renewal contract EIS was executed for five of the seven contractors. Reclamation continues to work on long-term renewal contract environmental documentation for the other two remaining contractors.

On March 28, 2007, the San Felipe Division existing contracts were amended to incorporate some of the CVPIA requirements; however, the long-term renewal contracts for this division were not executed. The San Felipe Division contracts expire December 31, 2027. Reclamation continues to work on long-term renewal contract environmental documentation for the San Felipe Unit as well.

Cross Valley Contractors and San Luis Unit long-term renewal contract has not been completed as Endangered Species Act (ESA) consultation for the CVP/State Water Project (SWP) Coordinated Operations was remanded by the U.S. District Court without *vacatur* prior to completion of the long-term environmental analysis. As the CVP/SWP Coordinated Operations ESA consultation is still pending, Reclamation is pursuing completion of environmental compliance for the long-term contracts under separate environmental documentation.

1.1.2 Water Service Contracts within the San Luis Unit

CVP water service contracts in the San Luis Unit are between the United States and individual water users or districts and provide for an allocated supply of CVP water to be applied for beneficial use. Water service contracts are required for the receipt of CVP water under federal Reclamation law and among other things stipulate provisions under which a water supply is provided, to produce revenues sufficient to recover an appropriate share of capital investment, and to pay the annual O&M costs of the CVP.

Reclamation has completed negotiating the provisions of the long-form of the interim renewal contract with the San Luis Unit contractors; however, Reclamation has not yet completed environmental documentation for proposed long-term contracts within the San Luis Unit (West San Joaquin Division), including SLWD and PWD, in part due to pending litigation. With the exception of Pacheco Water District's long-term contract (which expires at the end of February 2024), the remaining San Luis Unit contractors have interim renewal contracts which expire at the end of February 2013 or February 2014.

Reclamation recognizes that the capacity to deliver CVP water has been constrained in recent years because of several hydrologic, regulatory, and operational uncertainties, and that these uncertainties may exist or become more constraining in the future as competing demands for water resources intensify. Therefore, the likelihood of contractors receiving the amount of water set out in the long-term renewal contract and the interim renewal contracts in any given year is uncertain, but likely similar to, or less than levels of historic deliveries.

1.2 Need for the Proposed Action

As described in Section 1.1.1 and 1.1.2, execution of long-term renewal contracts for San Luis Unit contractors is still pending. The purpose of the Proposed Action is to execute two interim contracts in order to extend the term of the contractors' existing interim renewal contracts for two years, beginning March 1, 2013 and ending February 28, 2015. Execution of these two interim contracts is needed to continue delivery of CVP water to these contractors, and to further implement CVPIA Section 3404(c), until their new long-term renewal contract can be executed.

Interim renewal contracts are needed to provide the mechanism for the continued beneficial use of the water developed and managed by the CVP and for the continued reimbursement to the federal government for costs related to the construction and operation of the CVP by the contractors. Additionally, CVP water is essential to continue agricultural production and municipal viability for these contractors.

1.3 Scope

The diversion of water is an on-going action and the current conditions of that diversion and operation of the CVP were analyzed in the PEIS (see Chapter III of the PEIS). As the diversion of water for delivery under the interim renewal contracts is an on-going action and the current conditions of that diversion are discussed in the PEIS, this EA covers the environmental analysis of fulfilling Reclamation's obligation to renew interim renewal contracts pending execution of their long-term renewal contract. Renewal of the contracts is required by Reclamation Law, including the CVPIA, and continues the current use and allocation of resources by CVP contractors, within the framework of implementing the overall CVPIA programs.

This EA has been prepared to examine the impacts on environmental resources as a result of delivering water to the contractors listed in Table 1-1 and shown in Figure 1-1 under the proposed interim renewal contracts. The water would be delivered for agricultural or municipal and industrial (M&I) purposes within Reclamation's existing water right place of use. The water would be delivered within the contractor service area boundaries using existing facilities for a period of up to two years.

Environmental reviews of CVP operations and other contract actions have been or are being conducted within the framework of the CVPIA PEIS. As discussed above, the long-term contract renewals for many CVP contractors both north and south of the Delta, other than the San Luis Unit, have already been executed following site-specific environmental review. Water resources north of the Delta including the Trinity, Sacramento and American rivers are not analyzed in this EA. Several environmental documents and associated programs, address north of Delta water resources including:

- The Bay Delta Conservation Plan (BDCP) that is being developed to provide the basis for the issuance of endangered species permits for the operation of the CVP and SWP. The BDCP is a long-term conservation strategy that addresses species, habitat and water resources that drain to the Delta.
- The Trinity River Restoration Program was developed to restore the Trinity River as a viable fishery. The 2001 Trinity River ROD issued for the program specifies four modes of restoration including: flow management through releases from Lewiston Dam, construction of channel rehabilitation sites, augmentation of spawning gravels, control of fine sediments and infrastructure improvements to accommodate high flow releases.
- The CVP Conservation Program was formally established to address Reclamation's requirements under the ESA. Over 80 projects have been funded by the CVP Conservation Program since its beginning and more recent budgets are allowing for funding of seven to fourteen projects annually.
- The Habitat Restoration Program was established under Title 34 of the CVPIA to protect, restore, and mitigate for past fish and wildlife impacts of the CVP not already addressed by the CVPIA.
- The CVPIA PEIS (described above).

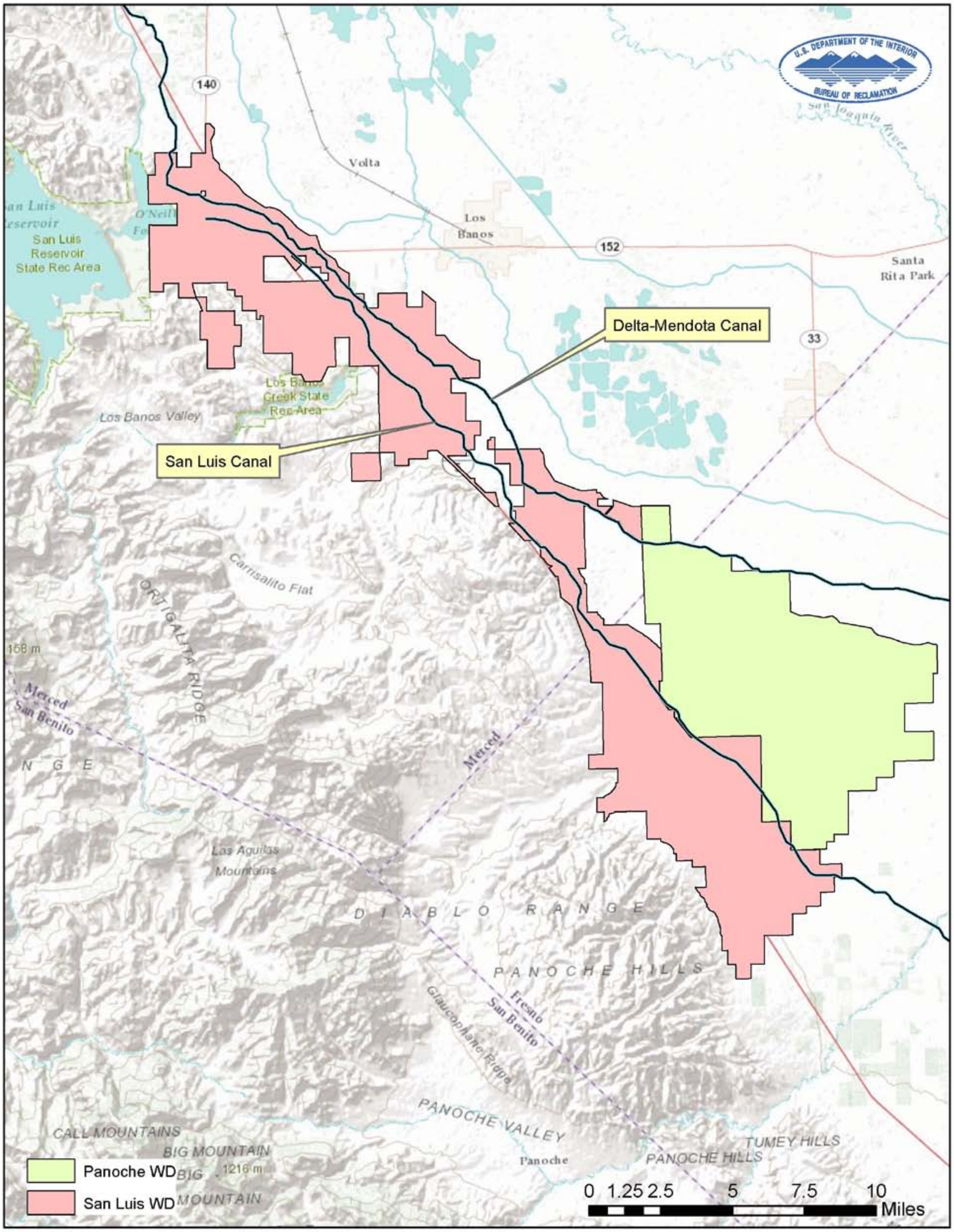

Figure 1-1 PWD and SLWD Service Areas

1.4 Issues Related to CVP Water Use Not Analyzed

1.4.1 Contract Service Areas

No changes to any contractor's service area are included as a part of the alternatives or analyzed within this EA. Reclamation's approval of a request by a contractor to change its existing service area would be a separate discretionary action. Separate appropriate environmental compliance and documentation would be completed before Reclamation approves a land inclusion or exclusion to any contractor's service area.

1.4.2 Water Transfers and Exchanges

No sales, transfers, or exchanges of CVP water are included as part of the alternatives or analyzed within this EA. Reclamation's approvals of water sales, transfers, and exchanges are separate discretionary actions requiring separate additional and/or supplementary environmental compliance. Approval of these actions is independent of the execution of interim renewal contracts. Pursuant to Section 3405 of the CVPIA, transfers of CVP water require appropriate site-specific environmental compliance. Appropriate site-specific environmental compliance is also required for all CVP water exchanges.

1.4.3 Contract Assignments

Assignments of CVP contracts are not included as part of the alternatives or analyzed within this EA. Reclamation's approvals of any assignments of CVP contracts are separate, discretionary actions that require their own environmental compliance and documentation.

1.4.4 Warren Act Contracts

Warren Act contracts between Reclamation and water contractors for the conveyance of non-federal water through federal facilities or the storage of non-federal water in federal facilities are not included as a part of the alternatives or analyzed within this EA. Reclamation's decision to enter into Warren Act contracts are separate actions and independent of the execution of interim renewal contracts. Separate environmental compliance would be completed prior to Reclamation executing Warren Act contracts.

1.4.5 Purpose of Water Use

Use of contract water for agricultural irrigation use or M&I use under the proposed interim renewal contracts would not change from the purpose of use specified in the existing contracts. Any change in use for these contracts would be separate, discretionary actions that require their own environmental compliance and documentation.

1.4.6 Drainage

This EA acknowledges ongoing trends associated with the continued application of irrigation water and production of drainage related to that water. It does not analyze the effects of Reclamation's providing agricultural drainage service to the San Luis Unit. The provision of drainage service is a separate federal action that has been considered in a separate environmental document, the *San Luis Drainage Feature Re-Evaluation Final Environmental Impact Statement* [SLDFR-FEIS] (Reclamation 2005h). The SLDFR-FEIS evaluated seven action alternatives in addition to the no action alternative for implementing drainage service within the San Luis Unit. The In-Valley/Water Needs Land Retirement alternative analyzed in the SLDFR-FEIS was chosen for implementation and documented in Reclamation's SLDFR ROD which was signed

March 9, 2007. Subsequently, Reclamation prepared the *San Luis Drainage Feature Re-Evaluation Feasibility Report* (Feasibility Report) to evaluate the feasibility of implementing the In-Valley/Water Needs Land Retirement alternative. The SLDFR-FEIS identified drainage areas within SLWD and PWD and incorporated the Westside Regional Drainage Plan (WRDP). WRDP components are currently being implemented through the ongoing Grassland Bypass Project (GBP). Reclamation and the San Luis & Delta-Mendota Water Authority prepared the *Grassland Bypass Project 2010-2019 Environmental Impact Statement and Environmental Impact Report* (Reclamation 2009) and Reclamation completed associated consultations under the ESA. Further, as part of the SLDFR-Feasibility Report, Reclamation is preparing to construct a Demonstration Treatment Facility near Firebaugh, California within Panoche Drainage District's San Joaquin River Improvement Project (SJRIP) reuse area within the Grasslands Drainage Area. Reclamation completed an EA for the facility (EA-10-030) entitled *San Luis Drainage Feature Reevaluation Demonstration Treatment Facility at Panoche Drainage District* on June 7, 2012 (Reclamation 2012). The primary purpose of the facility is to demonstrate and operate the reverse osmosis and selenium biotreatment technologies described in the Feasibility Report in order to collect cost and performance data required for final design of the corresponding full-scale drainage service treatment components to be constructed in Westlands Water District in accordance with Public Law 86-488 and the revised Control Schedule filed November 4, 2011 by the United States in *Firebaugh Canal Water District, et al. v United States of America, et. al.*, (CV-F-88-634 and CV-F-91-048 Partially Consolidated). The actions considered in this EA would not alter or affect the analysis or conclusions in the SLDFR-FEIS or its ROD.

1.5 Resources of Potential Concern

This EA will analyze the affected environment of the Proposed Action and No Action Alternative in order to determine the potential direct and indirect impacts and cumulative effects to the following resources:

- Water Resources
- Land Use
- Biological Resources
- Cultural Resources
- Indian Sacred Sites
- Indian Trusts Assets (ITA)
- Socioeconomic Resources
- Environmental Justice
- Air Quality
- Global Climate

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Section 2 Alternatives Including the Proposed Action

The No Action Alternative and the Proposed Action include the renewal of interim renewal contracts for PWD and SLWD. The two interim contracts, their contract entitlements, and purpose of use under both alternatives can be found in Table 2-1 below.

Table 2-1 Contracts, Contract Entitlements and Purpose of Use

Contractor	Contract number	Contract Quantity (acre-feet)	Purpose of Use
SAN LUIS UNIT			
Panoche Water District	14-06-200-7864A-IR2	94,000	Ag &/or M&I
San Luis Water District	14-06-200-7773A-IR2	125,080	Ag &/or M&I

For purposes of this EA, the following assumptions are made under each alternative:

A. Execution of each interim renewal contract is considered to be a separate action;
B. A two year interim renewal period is considered in the analysis, though contracts may be renewed for a shorter period.
C. The contracts would be renewed with existing contract quantities as reflected in Table 2-1;
D. Reclamation would continue to comply with commitments made or requirements imposed by applicable environmental documents, such as existing Biological Opinions including any obligations imposed on Reclamation resulting from re-consultations; and
E. Reclamation would implement its obligations resulting from Court Orders issued in actions challenging applicable Biological Opinions that take effect during the interim renewal period.

2.1 No Action Alternative

The No Action Alternative is the continued delivery of CVP water under the interim renewal of existing contracts which includes terms and conditions required by non-discretionary CVPIA provisions. The No Action Alternative, therefore, consists of the interim renewal of current water service contracts that were considered as part of the Preferred Alternative of the CVPIA PEIS (Reclamation 1999) adapted to apply for an interim period.

The CVPIA PEIS Preferred Alternative assumed that most contract provisions would be similar to many of the provisions in the 1997 CVP interim renewal contracts, which included contract terms and conditions consistent with applicable CVPIA requirements. In addition, provisions in the existing long-term contracts that are specific to the San Luis Unit contracts regarding O&M of certain facilities and drainage service under the 1960 San Luis Act would be incorporated into the No Action Alternative without substantial change.

Section 3405(d) of the CVPIA requires tiered pricing to be included in contracts greater than three years in duration. Consequently, if at least 80 percent of the contract total is delivered in any year for contracts greater than three years, in such year incremental charges based on the 80/10/10 pricing structure would be collected and paid to the Restoration Fund.

2.1.1 Other Contract Provisions of Interest

Several applicable CVPIA provisions which were incorporated into the Preferred Alternative of the Final PEIS and which are included in the No Action Alternative include tiered water pricing, defining M&I water users, requiring water measurement, and requiring water conservation. These provisions were also summarized in EA-07-56 (Reclamation 2007) and are incorporated by reference into EA-10-070 (Reclamation 2010a) and this EA.

In addition, the No Action Alternative includes environmental commitments as described in the Biological Opinion for the CVPIA PEIS (Reclamation 2000b).

2.2 Proposed Action

The Proposed Action evaluated in this document is the execution of two interim renewal water service contracts between the United States and the contractors listed in Table 2-1. These are the same two contracts included under the No Action Alternative. Both PWD and SLWD are currently on their second interim renewal contract and this Proposed Action would be their third. Drafts of the interim renewal contracts were released for public comment on October 11, 2012 and are available at the following website: http://www.usbr.gov/mp/cvpia/3404c/lt_contracts/2013_int_cts/index.html.

The Proposed Action would continue these existing interim renewal contracts, with only minor, administrative changes to the contract provisions to update the previous interim renewal contracts for the new contract period. In the event a new long-term water service contract is executed, the interim renewal contract then-in-effect would be superseded by the long-term water service contract.

No changes to the contractors' service areas or water deliveries are part of the Proposed Action. CVP water deliveries under the two proposed interim renewal contracts can only be used within each designated contract service area (see Figure 1-1). The contract service area for the proposed interim renewal contracts have not changed from the existing interim renewal contracts. If the contractor proposes to change the designated contract service area separate environmental documentation and approval will be required. The proposed interim renewal contract quantities (Table 2-1) remain the same as in the existing interim renewal contracts. Water can be delivered under the interim renewal contracts in quantities up to the contract total, although it is likely that deliveries will be less than the contract total. The terms and conditions of the 2011 interim renewal contracts analyzed within EA-07-56 (Reclamation 2007) and EA-10-070 (Reclamation 2010a) are incorporated by reference into the Proposed Action.

The two interim renewal contracts contain provisions that allow for adjustments resulting from court decisions, new laws, and from changes in regulatory requirements imposed through re-consultations. Accordingly, to the extent that additional restrictions are imposed on CVP operations to protect threatened or endangered species, those restrictions would be implemented in the administration of the two interim renewal contracts considered in this EA. As a result, by their express terms the interim renewal contracts analyzed herein would conform to any applicable requirements lawfully imposed under the Federal ESA or other applicable environmental laws.

2.2.1 Comparison of Alternative Differences

The primary difference between the Proposed Action and the No Action Alternative is that the Proposed Action does not include tiered pricing. Section 3405(d) of the CVPIA does not require tiered pricing to be included in contracts of three years or less in duration and negotiations between Reclamation and San Luis Unit contractors concluded with a form of contract which does not include tiered pricing. Consequently, if at least 80 percent of the contract total is delivered in any year during the term of the interim renewal contracts, in such year no incremental charges for water in excess of 80 percent of the contract total would be collected and paid to the Restoration Fund. The terms and conditions under the Proposed Action is a continuation of the terms and conditions under the first executed interim renewal contract excepting minor administrative changes.

2.3 Alternatives Considered but Eliminated from Further Analysis

2.3.1 Non-Renewal of Contracts

Section 1(4) of the “Administration of Contracts under Section 9 of the Reclamation Project Act of 1939” dated July 2, 1956 provided for the rights of irrigation contractors to a stated quantity of the project yield for the duration of their contracts and any renewals thereof provided they complied with the terms and conditions of those contracts and Reclamation law. Section 2 of the “Renewal of Water Supply Contracts Act of June 21, 1963” provided the same for M&I contractors. Therefore, Reclamation does not have the discretionary authority to not renew CVP water service contracts. Reclamation law mandates renewals at existing contract amounts when the water is being beneficially used. The non-renewal alternative was considered, but eliminated from analysis in this EA because Reclamation has no discretion not to renew existing water service contracts as long as the contractors are in compliance with the provisions of their existing contracts.

2.3.2 Reduction in Interim Renewal Contract Water Quantities

Reduction of contract water quantities due to the current delivery constraints on the CVP system was considered in certain cases, but eliminated from the analysis of the interim renewal contracts for several reasons:

First, the Reclamation Project Act of 1956 and the Reclamation Project Act of 1963 mandate renewal of existing contract quantities when beneficially used. Irrigation and M&I uses are beneficial uses recognized under federal Reclamation and California law. Reclamation has determined that the contractors have complied with contract terms and the requirements of applicable law. It also has performed water needs assessments for all the CVP contractors to identify the amount of water that could be beneficially used by each water service contractor. In the case of each interim renewal contractor, the contractor's water needs equaled or exceeded the current total contract quantity.

Second, the analysis of the PEIS resulted in selection of a Preferred Alternative that required contract renewal for the full contract quantities and took into account the balancing requirements of CVPIA (p. 25, PEIS ROD). The PEIS ROD acknowledged that contract quantities would remain the same while deliveries are expected to be reduced in order to implement the fish, wildlife, and habitat restoration goals of the Act, until actions under CVPIA 3408(j) to restore CVP yield are implemented (PEIS ROD, pages 26-27). Therefore, an alternative reducing contract quantities would not be consistent with the PEIS ROD and the balancing requirements of CVPIA.

Third, the shortage provision of the water service contract provides Reclamation with a mechanism for annual adjustments in contract supplies. The provision protects Reclamation from liability from the shortages in water allocations that exist due to drought, other physical constraints, and actions taken to meet legal or regulatory requirements. Reclamation has relied on the shortage provisions to reduce contract allocations to water service contractors in most years in order to comply with regulation requirements. Further, CVP operations and contract implementation, including determination of water available for delivery, is subject to the requirements of Biological Opinions issued under the Federal ESA for those purposes. If contractual shortages result because of such requirements, the Contracting Officer has imposed them without liability under the contracts.

Fourth, retaining the full historic water quantities under contract provides the contractors with assurance the water would be made available in wetter years and is necessary to support investments for local storage, water conservation improvements and capital repairs.

Therefore, an alternative reducing contract quantities would not be consistent with Reclamation law or the PEIS ROD, would be unnecessary to achieve the balancing requirements of CVPIA or to implement actions or measure that benefit fish and wildlife, and could impede efficient water use planning in those years when full contract quantities can be delivered.

Section 3 Affected Environment and Environmental Consequences

This section describes the service area for PWD and SLWD which receive CVP water from the Delta via the Delta-Mendota Canal and the San Luis Canal. The study area, shown in Figure 1-1, includes portions of Fresno and Merced Counties.

3.1 Water Resources

3.1.1 Affected Environment

Reclamation makes CVP water available to contractors for reasonable and beneficial uses, but this water is generally insufficient to meet all of the contractors' needs due to hydrologic conditions and/or regulatory constraints. In contractors' service areas, contractors without a sufficient CVP water supply may extract groundwater if pumping is feasible or negotiate water transfers with other contractors. Alternative supplies from groundwater pumping and/or transfers are accessed as supply sources when CVP surface water deliveries are inadequate for crop needs due to shortages imposed under the terms of the contracts or become more expensive than pumping or transfer costs.

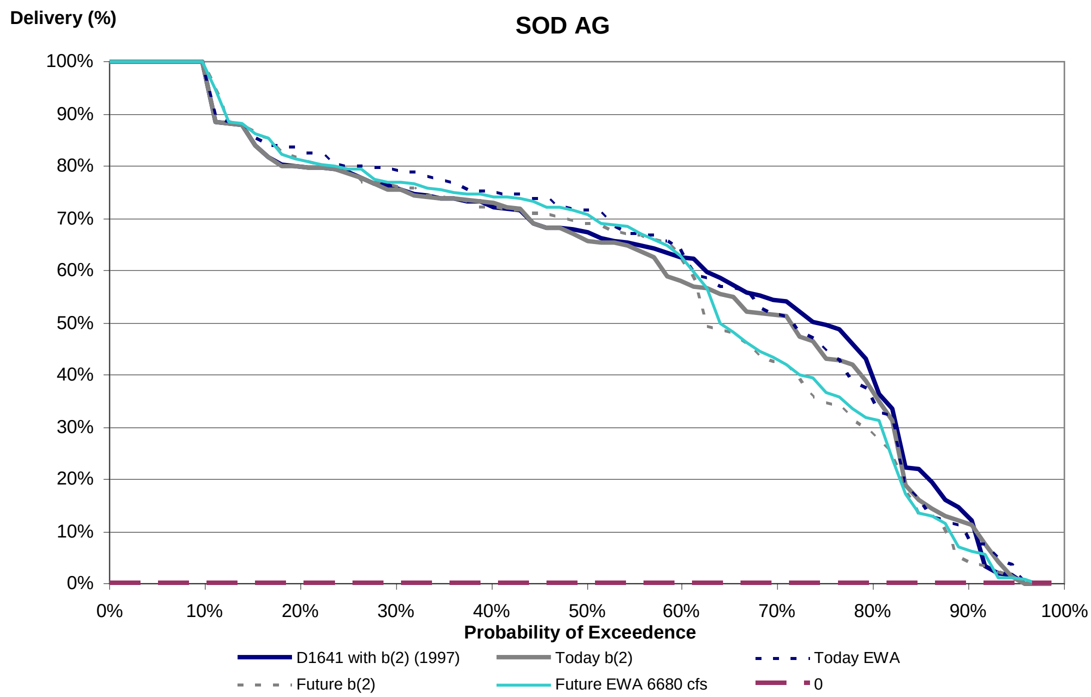
Water Delivery Criteria

The amount of CVP water available each year for contractors is based, among other considerations, on the storage of winter precipitation and the control of spring runoff in the Sacramento and San Joaquin River basins. Reclamation's delivery of CVP water diverted from these rivers is determined by state water right permits, judicial decisions, and state and federal obligations to maintain water quality, meet federal Endangered Species Act obligations or otherwise enhance environmental conditions, and prevent flooding. The CVPIA PEIS considered the effects of those obligations on CVP contractual water deliveries. Experience since completion of the CVPIA PEIS has indicated even more severe contractual shortages applicable to South-of-Delta (SOD) water deliveries (Reclamation 1999), and this information has been incorporated into the modeling for the current CVP/ SWP Coordinated Operations of the Delta (Reclamation 2004b).

Water Delivery Conditions under CVPIA Implementation Modeling done for the CVPIA PEIS predicted that, with the implementation of the CVPIA PEIS Preferred Alternative and under conditions in the late 1990s, SOD CVP agricultural water service contractors would receive an average of 59 percent of their current total contract amounts (Reclamation 1999). These conditions would result in the delivery of total contract amounts to agricultural water service contractors located SOD approximately 15 percent of the time. Minimum deliveries of zero would occur only in critically dry years.

Additionally, tables from the CVP/SWP Coordinated Operations Plan (Reclamation 2004b) also show that deliveries of over 80 percent of the contract total for agricultural purposes would occur between 22 and 24 percent of the time (Figure 3-1). Under these conditions, modeling predicts that tiered pricing (if it were required) would apply once every fourth or fifth year.

Figure 3-1 CVP SOD Agricultural Allocation Exceedance Chart



Source: Reclamation 2004a.

Contractor Water Needs Assessment

In 2003 a Water Needs Assessment was developed in order to identify the beneficial and efficient future water needs and demands for each interim renewal contractor (Appendix A). The demands were compared to available non-CVP water supplies to determine the need for CVP water. If the negative amount (unmet demand) was within 10 percent of the total supply for contracts greater than 15,000 acre feet (AF) per year (AFY), or within 25 percent for contracts less than or equal to 15,000 AFY, the test of full future need of the water supplies under the contract was deemed to be met. Because the CVP was initially established as a supplemental water supply for areas with inadequate supplies, the needs for most contractors were at least equal to the CVP water service contract and frequently exceeded the previous contract amount. Increased total contract amounts were not included in the needs assessment because such increases would require new contracts that CVPIA prohibits until specified future conditions are met. The analysis for the Water Needs Assessment did not consider that the CVP's ability to deliver CVP water has been constrained in recent years and may be constrained in the future because of many factors including hydrologic conditions and implementation of federal and state laws. The likelihood of contractors actually receiving the full contract amount in any given year is uncertain. No new water needs assessments are anticipated.

Panoche Water District's Water Use

PWD is located on the western side of the San Joaquin Valley in both Merced and Fresno Counties. PWD's conveyance system is composed of approximately 45 miles of canals and pipelines to serve its landowners. This includes approximately 15 miles of unlined canals, 22 miles of lined canals, and almost 8 miles of pipeline. PWD obtains CVP water through two diversion points on the Delta-Mendota Canal and five diversion points on the San Luis Canal.

PWD's water needs analysis completed by Reclamation in June 2003 estimated that there would be an unmet demand for 2025 of 1,136 AF (see Appendix A).

CVP Contracts On August 16, 1955, PWD entered into a long-term contract (Contract 14-06-200-7864) with Reclamation for 93,988 AF of CVP supply from the Delta-Mendota Canal (Reclamation 1955). This contract was amended on August 30, 1974 (Contract 14-06-200-7684A) to allow a maximum delivery of 94,000 AF of CVP supply from the Delta-Mendota Canal or San Luis Canal. This contract was further revised on January 13, 1986 and November 14, 1988 in amendatory contracts that revised some contract terms but did not revise the maximum quantity of CVP water to be supplied. The long-term contract expired December 31, 2008. An initial interim renewal contract (Contract 14-06-200-8033A-IR1) was issued in 2008 and expired February 28, 2011 (Reclamation 2008a). A second interim renewal contract (Contract 14-06-200-8033A-IR2) was issued March 1, 2011 and remains in effect until February 28, 2013 (Reclamation 2011a).

Other Available Water Supplies In addition to its CVP water, PWD has entered into a long-term water supply contract with the Central California Irrigation District and Firebaugh Canal Water District. This agreement provides 3,000 AFY in supplemental water to PWD through 2033. PWD has also entered into an agreement with San Luis Canal Company. This agreement provides up to 5,000 AFY of supplemental water to PWD through December 31, 2021. Both sources supplement anticipated ongoing shortages in the CVP contract supply that are imposed as described in Section 2.3.2 and provide that total deliveries to PWD cannot exceed the CVP contract total quantity.

Some groundwater is also used within PWD. There are 42 privately owned and operated groundwater wells in the district service area in addition to one district owned well. Because of its poor quality, groundwater is primarily used as a water shortage contingency water supply source.

San Luis Water District's Water Use

SLWD is located on the western side of the San Joaquin Valley near the City of Los Banos, in both Merced and Fresno Counties (see Figure 1-1). SLWD's current distribution system consists of 52 miles of pipelines, 10 miles of lined canals, and 7.5 miles of unlined canals. About 20,000 acres within the district, referred to as the Direct Service Area, receive CVP water from 39 turnouts on the Delta-Mendota Canal and 23 turnouts on the San Luis Canal. In addition to the Direct Service Area, three improvement districts are also served through distribution systems branching off the San Luis Canal. Both Improvement Districts 1 and 2 are primarily located within Fresno County; Improvement District 3 is located primarily in Merced County.

SLWD's water needs analysis completed by Reclamation in June 2003 estimated that there would be an unmet demand for 2025 of 5,830 AF (see Appendix A).

CVP Contracts On February 25, 1959, SLWD entered into a long-term contract (Contract 14-06-200-7563) with Reclamation for 93,300 AF of CVP supply from the Delta-Mendota Canal (Reclamation 1959). This contract was superseded by a contract executed on June 19, 1974 (Contract 14-06-200-7773A) for a maximum of 125,080 AF of CVP supply from the Delta-Mendota Canal and San Luis Canal which was further amended on January 13, 1986. This contract expired December 31, 2008. An initial interim renewal contract (Contract 14-06-200-8033A-IR1) was issued in 2008 and expired February 28, 2011 (Reclamation 2008b). A second interim renewal contract (Contract 14-06-200-8033A-IR2) was issued March 1, 2011 and remains in effect until February 28, 2013 (Reclamation 2011b).

Other Available Water Supplies CVP water is SLWD's only long-term water supply. The district does not own any groundwater wells and has no long-term contracts for surface water or groundwater supplies. There are 20 privately owned and operated groundwater wells that provide water to 6,000 acres in the Direct Service Area. There are no agricultural wells within the three improvement districts. The vast majority of the SLWD's water users do not have meaningful access to groundwater that can be used for irrigation, and therefore, supplementation of the CVP supply is nominal.

Although water deliveries by the SLWD historically have been almost exclusively used for agricultural use, substantial development in and around the cities of Los Banos and Santa Nella have resulted in a shift of some water supplies to M&I use. SLWD currently supplies approximately 800 AFY as a wholesaler (but not to end users) and approximately 40 AFY to end users as treated water. M&I use demands are expected to increase over time, but not during the term of the proposed interim renewal contracts.

Groundwater Resources

The San Joaquin River Hydrologic Region covers approximately 9.7 million acres (15,200 square miles) and includes all of Calaveras, Tuolumne, Mariposa, Madera, San Joaquin, and Stanislaus counties, most of Merced and Amador counties, and parts of Alpine, Fresno, Alameda, Contra Costa, Sacramento, El Dorado, and San Benito counties (DWR 2003). Tulare Lake Hydrologic Region covers approximately 10.9 million acres (17,000 square miles) and includes all of Kings and Tulare Counties and most of Fresno and Kern Counties (DWR 2003). PWD and SLWD fall within these two hydrologic regions. However, conditions within each of the regions vary significantly from location to location.

The California Department of Water Resources (DWR) estimates an annual overdraft of approximately 205,000 AF of groundwater within the San Joaquin Valley. This over-drafting of groundwater has caused ground subsidence since the mid-1920s. By 1970, 5,200 square miles of the valley were affected and maximum subsidence exceeded 28 feet in an area west of Mendota. Much of this area is now served by the CVP's San Luis Unit (DWR 2003; Reclamation 2005h). During the past 40 years, recharge increased dramatically as a result of imported irrigation water. Increased rates of recharge resulting from percolation of irrigation water, combined with the rapid post-1967 decrease in pumping, caused a rise in the height of the water table over much of the western valley (Belitz and Heimes 1990).

The large-scale groundwater use during the 1960s and 1970s, combined with the introduction of imported surface water supplies, has modified the natural groundwater flow pattern in some areas. Flow largely occurs from areas of recharge toward areas of lower groundwater levels due to groundwater pumping (Bertoldi et al. 1991). The vertical movement of water in the aquifer has also been altered in this region as a result of thousands of wells constructed with perforations above and below the Corcoran clay layer, which, where present, provide a direct hydraulic connection (Bertoldi et al. 1991).

Both PWD and SLWD have approved groundwater management plans.

General Impacts of Agriculture on Groundwater In 1989, Dubrovsky and Deverel concluded that percolation of irrigation water past crop roots, pumping of groundwater from deep wells, and imported surface water used for irrigation have combined to create large downward hydraulic-head gradients. The salts in the irrigation water, and soil salts leached from the unsaturated zone, increased salt and selenium concentrations in groundwater. In low-lying areas of the valley, and where the water table is within seven feet of land surface, evaporation from the shallow water table has further increased salt and selenium concentrations. A U.S. Geological Survey report indicated that irrigation had affected the upper 20 to 200 feet of the saturated groundwater zone (Dubrovsky and Deverel 1989). In some locations, this poor quality groundwater zone is moving downward in response to recharge from above the water table and pumping from deep wells.

Groundwater Quality Groundwater quality conditions vary throughout the San Joaquin Valley. Significant portions of the groundwater in the San Luis Unit exceed the California Regional Water Quality Control Board's recommended Total Dissolved Solids (TDS) concentration. Calcium, magnesium, sodium, bicarbonates, selenium, sulfates, and chlorides are all present in significant quantities as well (Reclamation 2005h). Groundwater zones commonly used along a portion of the western margin of the San Joaquin Valley have high concentrations of TDS, ranging from 500 milligrams per liter (mg/L) to greater than 2,000 mg/L (Bertoldi et al. 1991). The concentrations in excess of 2,000 mg/L commonly occur above the Corcoran clay layer. These high levels have impaired groundwater for irrigation and municipal uses in the western portion of the San Joaquin Valley.

The high TDS content of west side groundwater is due to recharge of stream flow originating from marine sediments in the Coast Range (DWR 2003). The high TDS content in the trough of the valley is the result of concentration of salts due to evaporation and poor drainage from naturally saline and high clay content soils, which restricts drainage. Nitrates may occur naturally or as a result of disposal of human and animal waste products and fertilizer. Boron and chloride are likely a result of concentration from evaporation near the valley trough (DWR 2003). Organic contaminants contributed by agriculture have been detected in groundwater throughout the region but primarily in areas east of the San Luis Unit where soil permeability is higher and depth to groundwater is shallower. In the central and west-side portions of the valley, where the Corcoran Clay confining layer exists, water quality is generally better beneath the clay than above it (DWR 2003).

Contractors in the San Luis Unit with drainage-impacted lands have developed aggressive programs to manage salts in the root zone and to minimize deep percolation through the use of high-efficiency irrigation techniques, such as sprinklers and advanced drip technologies, shortened rows, and the installation of groundwater monitoring wells. While PWD and the drainage-affected portions of SLWD have continued to have a drainage outlet, lack of a drainage outlet in some areas of the San Luis Unit has led to an increase in saline groundwater beneath some portions of the region.

Production of Drainage Water within PWD and SLWD The Northern Area of the San Luis Unit includes approximately 38,000 acres in PWD, 4,100 acres in Pacheco Water District and 3,882 acres of SLWD land located within Charleston Drainage District (Pacheco Water District is not included in the current interim renewal contract process as their contract does not expire until 2024). Approximately 30,000 acres within the Northern Area are presently improved with subsurface drainage systems (SLDFR Draft EIS Table C1-4) including approximately 24,000 acres between PWD and SLWD. Drainage water from irrigation within the Northern Area of the San Luis Unit is produced primarily through operation of subsurface tile and deep drain collector systems which remove subsurface water from the plant root zones. Drainage produced within the Northern Area may also result from uncontrolled groundwater intrusion from upslope irrigation, subterranean flows from the Coastal Range, and seepage from the California Aqueduct. Such inputs may be diffuse or highly localized and the quantities and effects within particular areas have not been fully documented. Each of the districts in the Northern Area encourage on-farm drainage management through policies to control surface water discharges, programs to support on-farm irrigation efficiency improvements, and mandatory water conservation planning. Drainage water is also reused within drainage service areas.

PWD and a portion of the SLWD are within the Grassland Drainage Area and participate in the GBP, which serves a total of 97,000 acres. At present, drainage that leaves each district’s boundaries is disposed of by reuse on the 6,000-acre SJRIP and/or discharged through the GBP into the San Luis Drain, Mud Slough North and ultimately, the San Joaquin River. This is the only route for drainage disposal for these service areas. Table 3-1 below lists the amount of drainage discharged between 1986 and 2011 by PWD (as Panoche Drainage District) and a portion of SLWD (SLWD lands contained within Charleston Drainage District). Load reduction requirements for selenium and salts for the GBP continue through 2019, and while there will continue to be annual variability based on water year types and load requirements, the Districts anticipate overall decreased discharges from the Grassland Drainage Area as they continue to work towards “zero” discharge. For example, for 2012, a dry/below normal year, PWD’s annual load of selenium leaving Panoche Drainage District (an area that contains all of PWD plus an additional 6,000 acres) is projected to be 235 pounds, compared to 1,003 in wet year 2011, and overall Grassland Drainage Area selenium load is approximately 65 percent below the dry year load target through July and projected to be at least 50 percent below the annual target for all of 2012.

Table 3-1 Discharges for PWD and SLWD from the Grassland Drainage Area

	Charleston Drainage District (includes SLWD)			PWD as Panoche Drainage District		
Year	Discharge (AF)	Salt Load (tons)	Selenium Load (pounds)	Discharge (AF)	Salt Load (tons)	Selenium Load (pounds)
1986	3,186	10,699	474	31,573	102,699	4,480
1987	4,769	19,023	946	35,229	111,435	4,990
1988	5,015	20,062	906	31,575	114,989	4,930
1989	2,799	12,068	519	24,075	92,633	4,032
1990	2,126	8,592	387	21,462	88,117	4,009
1991	781	3,161	227	14,092	60,414	2,558

Year	Charleston Drainage District (includes SLWD)			PWD as Panoche Drainage District		
	Discharge (AF)	Salt Load (tons)	Selenium Load (pounds)	Discharge (AF)	Salt Load (tons)	Selenium Load (pounds)
1992	730	3,279	153	12,658	58,766	2,824
1993	1,858	8,412	425	19,774	90,696	4,779
1994	3,199	14,330	808	19,265	85,959	4,083
1995	4,316	19,376	971	28,533	121,128	5,942
1996	3,897	14,771	609	24,538	103,384	5,276
1997	1,509	6,676	349	17,028	76,824	3,250
1998	1,674	8,100	456	19,268	82,142	3,662
1999	983	4,787	233	12,823	55,483	1,771
2000	869	4,210	256	13,047	53,487	1,790
2001	533	3,370	205	11,436	51,484	1,882
2002	1,179	6,653	327	9,351	42,097*	1,548
2003	943	5,172	271	9,928	44,694*	1,504
2004	1,180	6,111	399	9,003	40,531*	3,216
2005	2,056	10,890	554	13,825	62,236*	2,020
2006	1,748	8,381	330	8,189	36,868*	1,007
2007	1,482	8,218	423	6,583	29,638*	1,285
2008	213	372	45	6,298	28,353*	848
2009	310	1,123	69	6,615	29,780*	735
2010	171	908	43	6,829	31,468	806
2011	125	545	24	8,345	40,276	1,003
Average	1,833	8,050	400	16,205	66,753	2,855
Maximum	5,015	20,062	971	35,229	121,128	5,942
Minimum	125	372	24	6,298	28,353	735
*Amounts based on estimated values Source: PWD and SLWD						

As described previously, Reclamation issued the SLDFR FEIS and ROD analyzing the effects of implementing drainage service. The ROD reflects Reclamation's decision to implement the In-Valley/Water Needs Land Retirement alternative, which includes drainage reduction measures, drainage water reuse facilities, treatment systems, and evaporation ponds. It also includes retiring 194,000 acres of land from irrigated farming from the entire San Luis Unit.

Notwithstanding the requirements of the San Luis Act that the United States provide drainage service to the San Luis Unit and the issuance of the ROD, SLWD, PWD, Pacheco Water District and Westlands Water District have district-specific policies and methods for dealing with drainage (Pacheco Water District and Westlands Water District are located in the San Luis Unit but not included in the Proposed Action). Lack of a drainage outlet has led to an increase in saline groundwater beneath some portions of the San Luis Unit, but PWD and the Charleston Drainage District area of SLWD will continue to be drained through the GBP through 2019, well beyond the term of the proposed renewal of the interim renewal contracts for PWD and SLWD.

3.1.2 Environmental Consequences

No Action

Contract provisions under the No Action Alternative stipulate that a tiered pricing structure (80/10/10 tiered pricing) would be applied. Tiered pricing is mandated under the water conservation section of the CVPIA for contracts of more than three years. As described previously, model predictions indicate that the number of years when tiered pricing would be applicable would be limited to approximately 22 or 24 percent of the time (or one year out of four or five) for interim contracts greater than three years. Water supplies do not typically meet demands for most contractors and many contractors are very active on the water market purchasing water supplies. Areas within the San Luis Unit have been planted in permanent crops and the contractors from these areas, to make up for shortages and preserve their crop investment, have paid prices for water that exceed the maximum amount that would be paid if tiered pricing were applied. For that reason, increasing water prices due to tiered pricing would not likely change water use trends. In addition, some San Luis Unit contractors, such as PWD, have tiered pricing components under their own Water Management Plans, so tiered pricing as an incentive for conservation is already in effect.

For those areas where groundwater is of suitable quality and therefore available for irrigation, CVP water is considered to be a supplemental supply. Most agricultural contractors already rely on groundwater supplies and in some cases water transfers to meet on-farm needs. Alternate surface water supplies frequently are expensive and are not readily or reliably available. Thus, tiered pricing is unlikely to cause a grower to switch to alternate supplies. In areas within PWD and SLWD where groundwater is utilized to meet crop demands, farmers would have no alternative but to pay the additional tiered pricing costs as any further reduction in water supplies would lead to further overdraft and potentially subsidence. Water users within the service area of these contractors have been installing high efficiency irrigation systems without the incentive of CVPIA tiered pricing in order to manage drainage and to maximize available supplies during times of shortage. The systems are frequently utilized to sustain permanent crops, and it is unlikely that the systems would be abandoned on such crops even in years of full supplies. Much of the PWD and a portion of SLWD is drainage impacted, so high efficiency irrigation is implemented as a mechanism for reducing deep percolation and subsurface drainage production. Reclamation does not anticipate that implementation of tiered pricing through the No Action Alternative would cause any changes from historical values in the quantity, quality or discharge of drainage emanating from or within SLWD or PWD during the two years of the interim renewal contracts.

The contract provisions under the No Action Alternative also stipulate that a definition of M&I water would be applied. Having water use on a less than five acre parcel defined as M&I, rather than a two-acre parcel, would not result in a change in water use but would have an impact on the rates Reclamation collects. It is unlikely with the small number of parcels involved, the small size of the parcels, and the small quantities of water involved that changing this definition would have any effects on water resources.

PWD and SLWD would continue to operate and maintain facilities related to their individual water delivery activities, including turnouts from pumping stations on the San Luis Canal and Delta-Mendota Canal, on terms substantially the same as the existing long-term contracts. These activities relate to already constructed facilities on federal rights-of-way with no anticipated changes in activity level or use; therefore there would be no impact to CVP or district facilities.

Proposed Action

The proposed execution of interim renewal contracts for PWD and SLWD would not change contract water quantities from the quantities in the existing contracts, and would not lead to any increased water use. Therefore, there would be no effect on surface water supplies or quality. As described under the No Action Alternative, execution of two year interim renewal contracts would not change historical values in quantity, quality, or discharge of drainage emanating from or within PWD and SLWD. The Proposed Action would, in essence maintain the environmental status quo, i.e., the same amount of water would go to the same areas for the same uses (albeit under a different legal document); therefore, there are no adverse impacts to water resources as a result of the Proposed Action.

Cumulative Impacts

Reclamation's action is the execution of interim renewal contracts between the United States and PWD and SLWD under either the No Action alternative or the Proposed Action. PWD and SLWD have existing interim renewal contracts. It is likely that subsequent interim renewals would be needed in the future pending the execution of long-term renewal contracts. Because the renewals of interim renewal contracts maintain the status quo of deliverable quantities and CVP operations, and in essence can only change the legal documentation of a continuing action, they do not contribute to cumulative impacts in any demonstrable manner.

3.2 Biological Resources

3.2.1 Affected Environment

PWD's and SLWD's service areas are dominated by agricultural habitat that includes field crops, orchards, and pasture (CDC 2008, 2010). The ongoing intensive management of agricultural lands, including repetitive activities such as soil preparation, planting, irrigation, applying various chemicals, and harvesting disturbs the land surface and reduces the value of these habitat for wildlife.

In 2007, Reclamation initiated consultation with the USFWS on the issuance of the first interim renewal contracts for the San Luis Unit contractors, including PWD and SLWD (Reclamation 2008c). USFWS concurred with Reclamation's determination that the issuance of interim renewal contracts for 26 months to PWD and SLWD would not likely adversely affect (NLAA) the San Joaquin kit fox (*Vulpes macrotis mutica*) and the giant garter snake (*Thamnophis gigas*), with specific restrictions relating to drainage water (USFWS 2008a). Species impacts due to discharge of drainage water containing more than 2 parts per billion selenium from PWD and SLWD were addressed in the GBP Biological Opinion (USFWS 2009) and SLDFR Biological Opinion (USFWS 2006). The GBP Biological Opinion provided reasonable and prudent measures, and terms and conditions to address project effects. The execution of interim renewal contracts for PWD and SLWD were subjected to those terms and conditions.

In 2010, Reclamation re-consulted with USFWS for the renewal of PWD and SLWD interim renewal contracts for a period of 24 months, beginning March 1, 2011 and going through February 28, 2013 (Reclamation 2010b). The USFWS concurred with Reclamation's NLAA determination for the federally-listed San Joaquin kit fox, giant garter snake, and Delta smelt (*Hypomesus transpacijicus*), including Delta smelt designated critical habitat (USFWS 2010).

In 2008, Reclamation consulted with the National Marine Fisheries Service (NMFS) for potential effects to listed anadromous fish species and fish habitat resulting from approving the first PWD and SLWD interim renewal contracts and a Biological Opinion was issued (NMFS 2008). NMFS determined that the continued existence of listed anadromous fish species were not likely to be jeopardized nor would permanent destruction or adverse modification to designated or proposed critical habitat occur by renewing the interim renewal contracts. However, NMFS stated adverse impacts to Essential Fish Habitat (EFH) as defined under the Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. 38 §1801 et seq.), of Pacific salmon in the action area would occur from drainage water as a result of executing interim renewal contracts. NMFS requested the Biological Opinion's terms and conditions, and conservation recommendations be adopted to act as EFH Conservation Recommendations as well. NMFS also commented in the Biological Opinion on the benefits of the GBP to listed fish species and their habit by reducing drainage water into the San Joaquin River (NMFS 2009a).

Reclamation re-consulted with NMFS the second renewal of interim renewal contracts for PWD and SLWD, and NMFS issued a Biological Opinion on February 23, 2011 for the effects of drainage water entering the San Joaquin River (NMFS 2011). NMFS concluded the execution of interim renewal contracts would not likely jeopardize the continued existence of the federally listed endangered Sacramento River winter-run Chinook salmon (*Oncorhynchus tshawytscha*), threatened Central Valley spring-run Chinook salmon (*O. tshawytscha*), threatened Central Valley steelhead (*O. mykiss*), the threatened Southern distinct population segment (DPS) of North American green sturgeon (*Acipenser medirostrisi*), nor destroy or adversely modify designated critical habitat of Central Valley steelhead and the Southern DPS of North American green sturgeon. NMFS determined drainage water would cause adverse impacts to Pacific salmon EFH and provided specific terms and conditions to Reclamation for conservation. Reclamation has continued to comply with requirements of the Biological Opinion (NMFS 2011).

On September 6, 2012, Reclamation requested an official species list from the USFWS via the Sacramento Field Office's website: http://www.fws.gov/sacramento/ES_Species/Lists/es_species_lists-form.cfm (Document Number 120906041024; USFWS 2012). The list includes species identified from the following U.S. Geological Survey 7½ minute quadrangles surrounding the Proposed Action area including: Chounet Ranch, Dos Palos, Hammonds Ranch, Broadview Farms, Charleston School, Ortigalita Peak NW, Laguna Seca Ranch, Los Banos Valley, Volta, Los Banos, and San Luis Dam. Reclamation further queried the California Natural Diversity Database (CNDDB) for records of protected species within 10 miles of the project location as well as protected species records present downstream (CNDDB 2012). The two lists, in addition to other information within Reclamation's files were combined to create the following list (Table 3-2).

Table 3-2 Biological Species List for the Proposed Action, Including Fish Downstream

Species	***Status***[1]	***Effects***[2]	***Potential to occur and summary basis for ESA determination***[3]
Amphibians			
California red-legged frog (*Rana draytonii*)	T, X	NE	**Absent.** No CNDDB[4]-recorded occurrences in action area. Area is not within areas designated as critical habitat.
California tiger salamander (*Ambystoma californiense*)	T, X	NE	**Absent.** No CNDDB-recorded occurrences in action area. Area is not within areas designated as critical habitat.
Fish			
Central Valley spring-run Chinook salmon (*Oncorhynchus tshawytscha*)	T, X NMFS	MAA	**Present.** Suitable habitat and species are present downstream of the Proposed Action area and can be affected by agricultural drainage.

Species	***Status***[1]	***Effects***[2]	***Potential to occur and summary basis for ESA determination*** [3]
Central Valley steelhead (*Oncorhynchus mykiss*)	T, X NMFS	MAA	**Present.** Suitable habitat and species are present downstream of the Proposed Action area and may be affected by agricultural drainage water.
Delta smelt (*Hypomesus transpacificus*)	T, X	NE	**Present**. Natural waterways within the species' range have been addressed in CVP/SWP Coordinated Operations Biological Opinion and all Terms and Conditions will be followed; therefore, the Proposed Action would have no additional effect on this species.
Sacramento River winter-run Chinook salmon (*Oncorhynchus tshawytscha*)	E, X NMFS	MAA	**Present**. Suitable habitat and species are present downstream of the Proposed Action area and may be affected by drainage water.
Southern distinct population segment of North American green sturgeon (*Acipenser medirostrisi*)	T, X NMFS	MAA	**Present**. Suitable habitat and species are present downstream of the Proposed Action area and may be affected by drainage water.
Invertebrates			
longhorn fairy shrimp (*Branchinecta longiantenna*)	E	NE	**Absent**. No records or vernal pools in area of effect.
Valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*)	T	NE	**Absent.** No records in area of effect. No elderberry shrubs will be impacted by the proposed action.
Vernal pool fairy shrimp (*Branchinecta lynchi*)	T	NE	**Absent**. No records or vernal pools in area of effect.
Vernal pool tadpole shrimp (*Lepidurus packardi*)	E	NE	**Absent**. No records or vernal pools in area of effect.
Mammals			
Fresno kangaroo rat (*Dipodomys nitratoides exilis*)	E	NE	**Unlikely**. No CNDDB-recorded occurrences and managed agricultural lands are not expected to provide suitable habitat. No land use changes would occur as a result of this action, no conversion of habitat, and no new facilities.
giant kangaroo rat (*Dipodomys ingens*)	E	NE	**Unlikely**. No CNDDB-recorded occurrences and managed agricultural lands are not expected to provide suitable habitat. No land use changes would occur as a result of this action, no conversion of habitat, and no new facilities.
San Joaquin kit fox (*Vulpes mactotis mutica*)	E	NLAA	**Present**. There are several CNDDB-recorded occurrences in area and site could be used for movement and as foraging habitat. No land use changes would occur as a result of this action, no conversion of habitat, and no new facilities.
Plant			
San Joaquin woolly-threads (*Monolopia congdonii*)	E	NE	**Absent**. No CNDDB-recorded occurrences in action area.
Reptiles			
blunt-nosed leopard lizard (*Gambelia sila*)	E	NLAA	**Possible**. There are CNDDB-recorded occurrences located in the western section of SLWD along I-5. Agricultural lands do not provide suitable habitat No land use changes would occur as a result of this action, no conversion of habitat, and no new facilities.
Giant garter snake (*Thamnophis gigas*)	T	NLAA	**Possible**. CNDDB records are approximately 4 miles to east of SLWD on other side of Delta-Mendota Canal. Suitable habitat lacking in project area; potential impacts downstream in Mud Slough are currently being addressed under the GBP; water quality objectives in the San

Species	***Status***[1]	***Effects***[2]	***Potential to occur and summary basis for ESA determination***[3]
			Joaquin River provide protection to other downstream habitats.

1 Status= Status of federally protected species protected under ESA
E: Listed as Endangered
NMFS: Species under the Jurisdiction of the National Oceanic & Atmospheric Administration Fisheries Service
T: Listed as Threatened
X: Critical Habitat designated for this species
2 Effects = ESA Effect determination
MA: Proposed Action may affect this species and its critical habitat
NE: No Effect anticipated from the Proposed Action to federally listed species
NLAA: Proposed Action Not Likely to Adversely Affect federally listed species
3 Definition Of Occurrence Indicators
Present: Species recorded in area and suitable habitat present.
Possible: Species recorded in area and habitat suboptimal.
Unlikely: Species recorded in area but habitat marginal or lacking entirely.
Absent: Species not recorded in study area and suitable habitat absent.
4 CNDDB = California Natural Diversity Database 2012

Documents Addressing Potential Impacts of Actions of the CVP (Other than the Proposed Action) to Listed Species

Biological Opinions for Coordinated Operations of the CVP and SWP In December 2008, USFWS issued a Biological Opinion analyzing the effects of the coordinated long-term operation of the CVP and SWP in California (USFWS 2008b). The USFWS Biological Opinion concluded that "the coordinated operation of the CVP and SWP, as proposed, was likely to jeopardize the continued existence of the delta smelt" and "adversely modify delta smelt critical habitat". The USFWS Biological Opinion included a Reasonable and Prudent Alternative (RPA) for CVP and SWP operations designed to allow the projects to continue operating without causing jeopardy or adverse modification. On December 15, 2008, Reclamation provisionally accepted and then implemented the USFWS RPA.

NMFS issued a Biological Opinion analyzing the effects of the coordinated long-term operation of the CVP and SWP on listed salmonids, Southern DPS of North American green sturgeon and Southern resident killer whale (*Orcinus orca*) in June 2009 (NMFS 2009b). The NMFS Biological Opinion concluded that the long-term operation of the CVP and SWP, as proposed, was likely to jeopardize the continued existence of Sacramento River winter-run Chinook salmon, Central Valley spring-run Chinook salmon, Central Valley steelhead, Southern DPS of North American green sturgeon, and Southern Resident killer whales. Also the NMFS Biological Opinion concluded that the coordinated long-term operation of the CVP and SWP, as proposed, was likely to destroy or adversely modify designated critical habitat for these species. The NMFS Biological Opinion included an RPA designed to allow the projects to continue operating without causing jeopardy or adverse modification. On June 4, 2009, Reclamation provisionally accepted and then implemented the NMFS RPA.

However, since that time, the Eastern District Court of California remanded without *vacatur* both Biological Opinions and ordered Reclamation to comply with NEPA before accepting the RPAs. It is expected that once a new Proposed Action is selected through the NEPA process, Reclamation will request consultation with USFWS and NMFS. In the meantime RPA's from the two Biological Opinions, as modified for any specific time period or component by Court order, remain in effect.

Operation and Maintenance Program for the South-Central California Area Office
Reclamation has consulted under the ESA on the *Operation and Maintenance Program Occurring on Bureau of Reclamation Lands within the South-Central California Area Office*, resulting in a Biological Opinion issued by the USFWS (USFWS 2005). The opinion considers the effects of routine O&M of Reclamation's facilities used to deliver water to the study area, as well as certain other facilities within the jurisdiction of the South-Central California Area Office, on California tiger salamander (*Ambystoma californiense*), vernal pool fairy shrimp (*Branchinecta lynchi*), valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*), blunt-nosed leopard lizard (*Gambelia sila*), vernal pool tadpole shrimp (*Lepidurus packardi*), San Joaquin wooly-threads (*Monolopia congdonii*), California red-legged frog (*Rana draytonii*), giant garter snake, San Joaquin kit fox, and on proposed critical habitat for the California red-legged frog and California tiger salamander.

3.2.2 Environmental Consequences

No Action
Under the No Action Alternative, conditions of special status species and habitats would be the same as current conditions described in the Affected Environment. No additional effects to special status species or critical habitats are associated with this alternative. Existing and future environmental commitments addressed in Biological Opinions, including the CVPIA Biological Opinion (USFWS 2000) would be met under the No Action Alternative, including continuation of ongoing species conservation programs.

Proposed Action
No additional effects to special status species or critical habitats are associated with the Proposed Action. Existing and future environmental commitments addressed in Biological Opinions, including the CVPIA Biological Opinion (USFWS 2000) would be met under the Proposed Action, including continuation of ongoing species conservation programs.

Reclamation's biological impacts determination also takes into account the service area's compliance with applicable requirements of existing Biological Opinions, as described above in Section 3.2.1. The Proposed Action would not result in substantial changes in natural and semi-natural communities and other land uses that have the potential to occur within the study area and other portions of the San Luis Unit. Additionally, execution of interim renewal contracts under the Proposed Action would not involve construction of new facilities or installation of structures.

PWD and a portion of SLWD have drainage outside of their contract service areas that can reach the San Joaquin River via the GBP. Reclamation, PWD, and SLWD are subject to water quality regulations for constituents with the potential to have an effect on the environment and have committed to the reduced discharge of agricultural drainwater through participation in a number of activities, including but not limited to the GBP. The GBP continues to provide environmental benefits in addition to the overall decrease in selenium and salts. Benefits are accomplished through the continued separation of unusable agricultural drainwater discharged from the

Grassland Drainage Area from that of wetland water supply conveyance channels and mitigation for use of the Mud Slough footprint through the provision of off-site water supply and improvements, The GBP's careful regimen of drainage management maintains agriculture in the Grassland Drainage Area at the same time as it promotes the improvement in water quality in the San Joaquin River.

On January 28, 2013, Reclamation received a memorandum from USFWS Sacramento Field Office for the Proposed Action, concurring with Reclamation that effects of the Proposed Action are not likely to adversely affect San Joaquin kit fox, giant garter snake, and blunt-nosed leopard lizard and habitat (Appendix B). Previous concurrences have included the threatened Delta smelt and its designated critical habitat; however, based upon further species review, Reclamation recognizes that Delta smelt has existing coverage (described above). Also, USFWS has recommended blunt-nosed leopard lizard (*Gambelia sila*) be included in consultation requests because historically they have occurred within the boundaries of SLWD, and lands that are either classified as "barren" or "grassland" could serve as habitat to the lizard.

Reclamation consulted with NMFS on impacts from the interim renewal of PWD and SLWD contracts, and on February 28, 2013, a Biological Opinion was issued by NMFS for the effects of agricultural drain water entering the San Joaquin River (Appendix C). They concluded the execution of interim renewal contracts were not likely to jeopardize the continued existence of the federally listed endangered Sacramento River winter-run Chinook salmon, threatened Central Valley spring-run Chinook salmon, threatened Central Valley steelhead, the threatened Southern DPS of North American green sturgeon, nor will it result in the destruction or adverse modification of designated critical habitat of Central Valley steelhead and the Southern DPS of North American green sturgeon. Reclamation will comply with requirements of the Biological Opinion issued by NMFS.

Cumulative Impacts

Interim renewal contracts, when added to other past, present, and reasonably foreseeable future actions, represent a continuation of existing conditions which are unlikely to result in cumulative impacts on the biological resources of the study area and other portions of the San Luis Unit. Interim renewal contracts obligate the delivery of the same contractual amount of water to the same lands without the need for additional facility modifications or construction. As discussed in other sections of this EA, through local and on-farm activities, through the implementation of regional projects that increase irrigation efficiency and continued use of reuse areas for the application of drainwater to salt tolerant plants in accordance with existing permits, Reclamation expects that drainage production within the study area during the interim period would continue to be reduced, and discharges to the San Joaquin River would decrease. Thus, the interim renewal contracts, together with reasonably foreseeable future actions, would not incrementally contribute to any physical impacts to study area biological resources.

Interim renewal contracts occur within the context of implementation of the CVPIA by the United States Department of the Interior, including Reclamation and USFWS. Reclamation and the USFWS explained the CVPIA in a report entitled *CVPIA, 10 Years of Progress* (Reclamation 2002), as follows:

> The CVPIA has redefined the purposes of the CVP to include the protection, restoration, and enhancement of fish, wildlife, and associated habitats; and to contribute to the State of California's interim and long-term efforts to protect the San Francisco Bay/Sacramento-San Joaquin River Delta Estuary. Overall, the CVPIA seeks to "achieve a reasonable balance among competing demands for use of [CVP] water, including the requirements of fish and wildlife, and agricultural, municipal and industrial, and power contractors."

Finally, as explained above, interim renewal contracts would be subject to regulatory constraints imposed pursuant to section 7 of the ESA, regardless of whether those constraints exist today. Consequently, there would be no cumulative adverse impacts as a result of the Proposed Action.

3.3 Socioeconomic Resources

3.3.1 Affected Environment

The agricultural industry significantly contributes to the overall economic stability of the San Joaquin Valley. SLWD's and PWD's service areas are predominately rural and agricultural with numerous small cities and a few large communities, such as Los Banos. The regional economic indicators of social well being are all measures of the social conditions within a region. Demographic information for Fresno and Merced County are summarized in Table 3-3. In June 2012, unemployment rates for Fresno and Merced County were five to seven percent higher than the State, respectively.

Table 3-3 Demographics

Demographics	Fresno County	Merced County	California
Total Population (2011 estimate)	942,904	259,898	37,691,912
White, non-Hispanic	32.4%	31.3%	40.1%
Black or African American	5.9%	4.3%	6.2%
American Indian	3.0%	2.4%	1.0%
Asian	10.3%	7.9%	13.0%
Native Hawaiian/Pacific Islander	0.3%	0.4%	0.4%
Hispanic	50.9%	55.7%	37.6%
June 2012 Unemployment rate	15.3%	17.8%	10.7%
Source: U.S. Census Bureau 2012; California Employment Development Department 2012			

3.3.2 Environmental Consequences

No Action

Renewal of interim renewal contracts under the No Action alternative with only minor administrative changes to the contract provisions would not result in a change in contract water quantities or a change in water use; however, contract provisions which stipulate the tiered water pricing structure (80/10/10) for contracts greater than three years would place an additional financial burden on PWD and SLWD when tiered pricing is required. The tiered pricing structure stipulated in the contract would result in higher water prices for both agricultural and M&I contractors when second or third tier water is provided. Because the economy of the Central Valley is heavily dependent on these water supplies, this increased burden, may translate into economic impacts throughout the affected area. However, as discussed previously, the impact from tiered pricing would occur only when allocations are above 80 percent which has only occurred twice in the last 10 years (2005 and 2006). Therefore, any changes due to tiered pricing would likely be within the normal range of annual or seasonal variations.

Proposed Action

The proposed execution of interim renewal contracts with only minor administrative changes to the contract provisions would not result in a change in contract water quantities or a change in water use and would not adversely impact socioeconomic resources within the contractors' respective service areas.

Cumulative Impacts

The No Action alternative could have cumulatively adverse impacts socioeconomic resources when tiered pricing is required due to additional financial burdens placed on an already economically impacted area. The Proposed Action may have slight beneficial impacts to socioeconomic resources over the short-term due to the continued stability within the contractors' service area; however, the duration of the interim renewal period is only for up to two years or until the renewal of the long-term contracts has been executed whichever is sooner. Consequently, the Proposed Action would not have any long-term cumulative impacts to socioeconomic resources.

3.4 Environmental Justice

Executive Order 12898 (February 11, 1994) mandates Federal agencies to identify and address disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority and low-income populations.

3.4.1 Affected Environment

The Hispanic community within Fresno and Merced Counties is greater than the California average (see Table 3-3). The market for seasonal workers on local farms draws thousands of migrant workers, commonly of Hispanic origin from Mexico and Central America. The population of some small communities typically increases during late summer harvest.
Table 3-4 provides population percentages for the minority and poverty populations of the Fresno and Merced County. As shown in Table 3-4, both Counties minority population was nearly 70 percent in 2010 with more than 20 percent of their population living below the poverty level between 2006 and 2010.

Table 3-4 Project Area Minority and Poverty Profile

Place	2010Total Population	Percent of Total Population Identified as Minority in 2010	Percent of Total Population Below Poverty Level (2006-2010)
Fresno County	930,450	67.6	22.5
Merced County	255,793	68.7	21.8
Source: U.S. Census Bureau 2012			

3.4.2 Environmental Consequences

No Action

Renewal of interim renewal contracts under the No Action alternative with only minor administrative changes to the contract provisions would not result in a change in contract water quantities or a change in water use; however, contract provisions which stipulate the tiered water pricing structure (80/10/10) would place an additional financial burden on populations within PWD and SLWD when tiered pricing is required. Therefore, the No Action alternative could adversely impact minority and disadvantaged populations when tiered pricing is required. During those times, implementation of tiered pricing would increase the cost of water, which could reduce farming revenues and decrease land values. As previously described, tiered pricing could, but is not likely to result in changes in agricultural practices, including cropping patterns and land fallowing. M&I users may also be impacted by changes in water supply costs placing increased pressure on low income households. However, as discussed previously, the impact from tiered pricing would occur only when allocations are above 80 percent which has only occurred twice in the last 10 years (2005 and 2006). Therefore, any changes due to tiered pricing would likely be within the normal range of annual or seasonal variations.

Factors contributing to population change, employment, income levels, and unemployment rates in the affected area are closely tied to CVP water contracts through either agricultural or M&I dependence. Because no changes in water supplies or CVP operations would occur under this alternative, no changes in population and the various indicators of social well-being are expected. Additionally, the No Action Alternative would support continued agricultural production and would not directly result in changes to employment of minority and low-income populations; therefore, there would be no substantial adverse impacts due to this action alternative.

Proposed Action

The proposed execution of interim renewal contracts with only minor administrative changes to the contract provisions would not result in a change in contract water quantities or a change in water use. The Proposed Action would not cause dislocation, changes in employment, or increase flood, drought, or disease. The Proposed Action would not disproportionately impact economically disadvantaged or minority populations as there would be no changes to existing conditions.

Cumulative Impacts

Employment opportunities for low-income wage earners and minority population groups would be within historical conditions under either alternative. Neither alternative would subject disadvantaged or minority populations to disproportionate impacts, except when tiered pricing is required under the No Action alternative. The No Action alternative could have cumulatively adverse impacts to minority and disadvantaged populations when tiered pricing is required due to additional financial burdens placed on an already economically impacted area. The Proposed Action would not differ from current or historical conditions and would not disproportionately affect minority or low income populations in the future; therefore, there would be no adverse cumulative impacts as a result of the Proposed Action.

3.5 Resources Eliminated from Further Analysis

Reclamation analyzed the affected environment of the Proposed Action and No Action Alternative and has determined that there is no potential for direct, indirect, or cumulative effects to the following resources:

Land Use

The interim renewal contracts for PWD and SLWD under either alternative would not provide for additional water supplies that could act as an incentive for conversion of native habitat or increased agricultural production acreage. Generally, lands within the San Luis Unit that are productive are farmed. In addition, the short terms of the interim renewal contracts do not provide sufficient certainty to permit M&I development of land currently in agricultural production; therefore, land would continue to be used for existing purposes under either alternative. Likewise, the interim renewal contracts would not change contract terms or conditions governing the allocation of CVP water during times of limited supply (i.e., drought), so would not provide additional water reliability conducive to conversion of land use from agricultural to M&I uses. Consequently, there would be no impact to land use as a result of the Proposed Action or No Action alternative.

Cultural Resources

Cultural Resources is a broad term that includes prehistoric, historic, architectural, and traditional cultural properties. The National Historic Preservation Act (NHPA) of 1966 is the primary Federal legislation that outlines the Federal Government’s responsibility to cultural resources. Section 106 of the NHPA requires the Federal Government to take into consideration the effects of an undertaking on cultural resources listed on or eligible for inclusion in the National Register of Historic Places (National Register). Those resources that are on or eligible for inclusion in the National Register are referred to as historic properties.

There would be no impacts to cultural resources under the No Action alternative as conditions would remain the same as existing conditions. There would be no impacts to cultural resources as a result of implementing the Proposed Action as the Proposed Action would facilitate the flow of water through existing facilities to existing users. No new construction or ground disturbing activities would occur as part of the Proposed Action. The pumping, conveyance, and storage of water would be confined to existing CVP facilities. Reclamation has determined that these activities have no potential to cause effects to historic properties pursuant to 36 CFR Part 800.3(a)(1). See Appendix D for Reclamation’s determination.

Indian Sacred Sites

Sacred sites are defined in Executive Order 13007 (May 24, 1996) as "any specific, discrete, narrowly delineated location on Federal land that is identified by an Indian tribe, or Indian individual determined to be an appropriately authoritative representative of an Indian religion, as sacred by virtue of its established religious significance to, or ceremonial use by, an Indian religion; provided that the tribe or appropriately authoritative representative of an Indian religion has informed the agency of the existence of such a site." Executive Order 13007 requires Federal land managing agencies to accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners and to avoid adversely affecting the physical integrity of such sacred sites.

No impact to Indian sacred sites would occur under the No Action Alternative as conditions would remain the same as existing conditions. Reclamation has determined that there would be no impacts to Indian sacred sites as a result of the Proposed Action since the Proposed Action would not limit access to and ceremonial use of Indian sacred sites on Federal lands by Indian religious practitioners or significantly adversely affect the physical integrity of such sacred sites.

Indian Trust Assets

ITA are legal interests in assets that are held in trust by the United States Government for federally recognized Indian tribes or individuals. The trust relationship usually stems from a treaty, executive order, or act of Congress. The Secretary of the interior is the trustee for the United States on behalf of federally recognized Indian tribes. “Assets” are anything owned that holds monetary value. “Legal interests” means there is a property interest for which there is a legal remedy, such a compensation or injunction, if there is improper interference. Assets can be real property, physical assets, or intangible property rights, such as a lease, or right to use something. ITA cannot be sold, leased or otherwise alienated without United States’ approval. Trust assets may include lands, minerals, and natural resources, as well as hunting, fishing, and water rights. Indian reservations, rancherias, and public domain allotments are examples of lands that are often considered trust assets. In some cases, ITA may be located off trust land.

No impact to ITA would occur under the No Action Alternative as conditions would remain the same as existing conditions. No physical changes to existing facilities are proposed and no new facilities are proposed. Continued delivery of CVP water to PWD and SLWD under an interim renewal contract would not affect any ITA because existing rights would not be affected; therefore, Reclamation has determined that the Proposed Action would not impact ITA. See Appendix D for Reclamation’s determination.

Air Quality

Established under Clean Air Act section 176(c)(4), the General Conformity Rule requires Federal agencies to work with state, tribal and local governments in a nonattainment or maintenance area to ensure that federal actions conform to the air quality plans established in the applicable state or tribal implementation plan. Regulations under 43 CFR §93.150 through 43 CFR §93.165 require a conformity determination for each criteria pollutant or precursor where the total of direct and indirect emissions of the criteria pollutant or precursor in a nonattainment or maintenance area caused by a Federal action would equal or exceed a *de minimis* threshold.

Neither the No Action nor Proposed Action alternative would require construction or modification of facilities to move CVP water to PWD or SLWD. CVP water would be moved either via gravity or electric pumps along the Delta-Mendota Canal and San Luis Canal which would not produce emissions that impact air quality. The generating power plant that produces the electricity to operate the electric pumps does produce emissions that impact air quality; however, water under the Proposed Action is water that would be delivered from existing facilities under either alternative and is therefore part of the existing conditions. In addition, the generating power plant is required to operate under permits issued by the air quality control district. As the Proposed Action would not change the emissions generated at the generating power plant, no additional impacts to air quality would occur and a conformity analysis is not required pursuant to the Clean Air Act.

Global Climate

The Environmental Protection Agency (EPA) has issued regulatory actions under the Clean Air Act as well as other statutory authorities to address climate change issues (EPA 2011). In 2009, the EPA issued a rule (40 CFR §98) for mandatory reporting of greenhouse gases (GHG) by large source emitters and suppliers that emit 25,000 metric tons or more of GHG [as carbon dioxide equivalents per year] (EPA 2009). The rule is intended to collect accurate and timely emissions data to guide future policy decisions on climate change and has undergone and is still undergoing revisions (EPA 2011). In 2006, the State of California issued the California Global Warming Solutions Act of 2006, widely known as Assembly Bill 32, which requires the California Air Resources Board (CARB) to develop and enforce regulations for the reporting and verification of statewide GHG emissions. CARB is further directed to set a GHG emission limit, based on 1990 levels, to be achieved by 2020.

Neither the Proposed Action nor the No Action alternative would involve physical changes to the environment or construction activities that could impact global climate change. Generating power plants that produce electricity to operate the electric pumps produce carbon dioxide that could potentially contribute to GHG emissions; however, water under the Proposed Action is water that would be delivered from existing facilities under either alternative and is therefore part of the existing conditions. There would be no additional impacts to global climate change as a result of the Proposed Action.

Global climate change is expected to have some effect on the snow pack of the Sierra Nevada and the runoff regime. Current data are not yet clear on the hydrologic changes and how they will affect the San Joaquin Valley. CVP water allocations are made dependent on hydrologic conditions and environmental requirements. Since Reclamation operations and allocations are flexible, any changes in hydrologic conditions due to global climate change would be addressed within Reclamation's operation flexibility and therefore surface water resource changes due to climate change would be the same with or without either alternative.

Section 4 Consultation and Coordination

4.1 Public Review Period

Reclamation provided the public with an opportunity to comment on the Draft FONSI and Draft EA between October 23, 2012 and November 21, 2012. No comments were received.

4.2 Endangered Species Act (16 U.S.C. § 1531 et seq.)

Section 7 of the ESA requires Federal agencies, in consultation with the Secretary of the Interior and/or Commerce, to ensure that their actions do not jeopardize the continued existence of endangered or threatened species, or result in the destruction or adverse modification of the critical habitat of these species.

The Proposed Action would support existing uses and conditions. No native lands would be converted or cultivated with CVP water. The water would be delivered to existing homes or farmlands, through existing facilities, as has been done under existing contracts, and would not be used for land conversion.

Effects to Sacramento-San Joaquin River Delta species and critical habitats, such as the Delta smelt, salmonids, and green sturgeon which are the result of CVP operations, are addressed in the CVP/SWP Coordinated Operations consultation.

On January 28, 2013 Reclamation received a concurrence letter from USFWS Sacramento Field Office for the Proposed Action, concurring with Reclamation that effects of the Proposed Action are not likely to adversely affect San Joaquin kit fox, giant garter snake, and blunt-nosed leopard lizard (Appendix B). The execution of interim renewal contracts for PWD and SLWD will be subject to the terms and conditions as specified in the 2009 GBP Biological Opinion (USFWS 2009).

On February 28, 2013, NMFS issued a Biological Opinion which concluded that the execution of interim renewal contracts to PWD and SLWD were not likely to jeopardize the continued existence on federally listed endangered Sacramento River winter-run Chinook salmon, threatened Central Valley spring-run Chinook salmon, threatened Central Valley steelhead, the threatened Southern DPS of North American green sturgeon, nor will it result in the destruction or adverse modification of designated critical habitat of Central Valley steelhead and the Southern DPS of North American green sturgeon (Appendix C). The Biological Opinion includes non-discretionary terms and conditions of the incidental take statement which, Reclamation will comply with for the SLWD and PWD.

4.3 Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. § 1801 et seq.)

The Magnuson-Stevens Fishery Conservation and Management Act established a management system for national marine and estuarine fishery resources. This legislation requires that federal agencies consult with NMFS regarding actions or proposed actions permitted, funded, or undertaken that may adversely affect EFH. EFH is defined as "waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." The Magnuson-Stevens Fishery Conservation and Management Act states that migratory routes to and from anadromous fish spawning grounds are considered EFH. The phrase "adversely affect" refers to the creation of any impact that reduces the quality or quantity of EFH. Federal activities that occur outside of EFH but may have an impact on EFH must be considered in the consultation process. The Magnuson-Stevens Fishery Conservation and Management Act applies to Pacific salmon, groundfish, and several pelagic species found in the Pacific.

EFH for Pacific salmon does occur within the action area. Reclamation consulted with NMFS on effects to Essential Fish Habitat (EFH) from the Proposed Action. NMFS concluded that the execution of the PWD and SLWD Interim Renewal Contracts will adversely affect the EFH of Pacific salmon in the action area and adopts certain terms and conditions of the incidental take statement and the ESA conservation recommendations of the Biological Opinion as the EFH conservation recommendations.

Reclamation will comply with the requirements of NMFS' Biological Opinion for the PWD and SLWD interim renewal contracts including all terms and conditions (Appendix C).

Section 5 Preparers and Reviewers

Rain Healer, Natural Resources Specialist, SCCAO
Jennifer Lewis, Ph.D., Wildlife Biologist, SCCAO
William Soule, Archaeologist, MP-153
Patricia Rivera, ITA, MP-400
Eileen Jones, Repayment Specialist, TO-440 – reviewer
Chuck Siek, Supervisory Natural Resources Specialist, SCCAO – reviewer

Section 6 Acronyms and Abbreviations

AF	Acre-feet
AFY	Acre-feet per year
BDCP	Bay Delta Conservation Plan
CARB	California Air Resources Board
CNDDB	California Natural Diversity Database
CVP	Central Valley Project
CVPIA	Central Valley Project Improvement Act
Delta	Sacramento-San Joaquin River Delta
DPS	Distinct Population Segment
DWR	California Department of Water Resources
EA	Environmental Assessment
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ESA	Endangered Species Act
Feasibility Report	San Luis Drainage Feature Re-Evaluation Feasibility Report
FONSI	Finding of No Significant Impact
GBP	Grassland Bypass Project
GHG	Greenhouse gases
ITA	Indian Trust Asset
mg/L	Milligram per liter
M&I	Municipal and Irrigation
National Register	National Register of Historic Places
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NLAA	Not Likely to Adversely Affect
NMFS	National Marine Fisheries Service
O&M	Operation and maintenance
PEIS	Programmatic Environmental Impact Statement
PWD	Panoche Water District
Reclamation	Bureau of Reclamation
ROD	Record of Decision
RPA	Reasonable and Prudent Alternative

SJRIP	San Joaquin River Water Quality Improvement Project
SLDFR-FEIS	San Luis Drainage Feature Re-Evaluation Final EIS
SLWD	San Luis Water District
SOD	South-of-Delta
SWP	State Water Project
TDS	Total Dissolved Solids
USFWS	U.S. Fish and Wildlife Service
WRDP	Westside Regional Drainage Plan

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FINAL ENVIRONMENTAL ASSESSMENT (12-055)

CENTRAL VALLEY PROJECT INTERIM RENEWAL CONTRACTS FOR PANOCHE WATER DISTRICT AND SAN LUIS WATER DISTRICT 2013-2015

Appendix A
Contractor's Water Needs Assessments

February 2013

PANOCHE WD-DMC

Contractor ID: 202030

West San Joaquin

Water Needs Assessment

Contractor's Water Supply Sources and Quantities (acre-feet)

Date: 6/2/2003 8:27:14 A

Timeframe 1	Surface Water Supply: Reference Delivery 2	USBR Total Deliv/Max 3	SWP 4	Local 5	Local Source 6	Trsfr / Rtrn / Recycle In 7	Trsfr / Out 8	Groundwater Supply: District 9	Private 10	Safe Yield 11	Recharge 12	Total Supply 13
1989 WC Plan	86,081	91,887	0	0		1,792	42	0	0		0	93,637
1999	0	0										0
2025	94,000 *	94,000 *	0	0		0	48	0	0		0	93,952

Contractor's Agricultural Water Demands

Maximum ProductiveAcres: 35,786

Timeframe 1	Crop Water Requirement (acre-feet) 15	District Irrig. Efficiency (%) 16	Effective Precip (acre-feet) 17	Reference Effective Precip (acre-ft) 18	Calculated Net Crop Water Req (acre-feet) 19	USBR Net Crop Water Req (acre-feet) 20	Average Irrigated Acres (acres) 21	Reference Irrigated Acres (acres) 22	Calculated FDR (AF/acre) 23	USBR FDR (AF/acre) 24	Conveyance Loss (acre-feet) 25	Total Ag Demand (acre-feet) 26
1989	80,707	75	6,555	10,676	98,869	99,641	35,661	35,586	2.77	2.80	7,903	106,772
1999	81,443	75	10,859	10,859	94,112	94,112	36,197	36,197	2.60	2.60		
2025	85,916	85	11,430	11,430	87,630	87,630	38,100	38,100	2.30	2.30	5,186	92,816

Contractor's M&I Water Demands

Timeframe 1	Residential Water Demand: Population 28	Per Capita Demand (gpcd) 29	Total Demand (acre-feet) 30	Nonresidential Water Demand: Industrial (acre-feet) 31	Comm / Instit. (acre-feet) 32	Total Demand (acre-feet) 33	Loss: Unacc. / Distr. (acre-feet) 34	Ref Urban Per Capita Dmd (gpcd) 35	Calc Urban Per Capita Dmd (gpcd) 36	Total M&I Demand (acre-feet) 37	Total Ag + M&I Dmd (acre-feet) 38	Unmet Demand (acre-feet) 39
1989						0	0			0	106,772	13,135
1999						0	0			0	0	0
2025						0	0			0	92,816	-1,136

* Represents Maximum Contract Amount

Notes: In 1989 and 2025, USBR total supply includes 42 & 48 AF M&I; these supplies are shown as transfers out to make this solely an assessment of ag water need.

Water Needs Assessment

SAN LUIS WD-DMC
Contractor ID: 202100
Delta

Contractor's Water Supply Sources and Quantities (acre-feet)

Date: 6/2/2003 8:27:04 A

Timeframe 1	Surface Water Supply: Reference Delivery 2		USBR Total Deliv/Max 3		SWP 4	Local 5	Local Source 6	Trsfr / Rtrn / Recycle In 7	Trsfr / Out 8	Groundwater Supply: District 9	Private 10	Safe Yield 11	Recharge 12	Total Supply 13
1989 WC Plan	120,261		106,092		0	0		13,038	1,864	0	10,000		0	127,266
1998 WC Plan	125,080	*	70,409		0	0		4,458	2,894	0	10,000		0	81,973
1999	0		0											0
2025	125,080	*	125,080	*	0	0		0	4,894	0	5,000		0	125,186

Contractor's Agricultural Water Demands

Maximum ProductiveAcres: 50,523

Timeframe 1	Crop Water Requirement (acre-feet) 15	District Irrig. Efficiency (%) 16	Effective Precip (acre-feet) 17	Reference Effective Precip (acre-ft) 18	Calculated Net Crop Water Req (acre-feet) 19	USBR Net Crop Water Req (acre-feet) 20	Average Irrigated Acres (acres) 21	Reference Irrigated Acres (acres) 22	Calculated FDR (AF/acre) 23	USBR FDR (AF/acre) 24	Conveyance Loss (acre-feet) 25	Total Ag Demand (acre-feet) 26
1989	128,994	75	9,289	13,385	159,607	129,389	44,764	44,617	3.57	2.90	442	160,049
1998	104,656	75	33,107		95,399		47,924		1.99		1,906	97,305
1999	103,037	75	12,880	12,880	120,210	120,210	42,932	42,932	2.80	2.80		
2025	112,883	85	13,050	13,050	117,450	117,450	43,500	43,500	2.70	2.70	1,906	119,356

Contractor's M&I Water Demands

Timeframe 1	Residential Water Demand: Population 28	Per Capita Demand (gpcd) 29	Total Demand (acre-feet) 30	Nonresidential Water Demand: Industrial (acre-feet) 31	Comm / Instit. (acre-feet) 32	Total Demand (acre-feet) 33	Loss: Unacc. / Distr. (acre-feet) 34	Ref Urban Per Capita Dmd (gpcd) 35	Calc Urban Per Capita Dmd (gpcd) 36	Total M&I Demand (acre-feet) 37	Total Ag + M&I Dmd (acre-feet) 38	Unmet Demand (acre-feet) 39
1989	0	0.0	0	0	0	0	0	0.0	0.0	0	160,049	32,783
1998						0	0			0	97,305	15,332
1999						0	0			0	0	0
2025	0	0.0	0	0	0	0	0	0.0	0.0	0	119,356	-5,830

* Represents Maximum Contract Amount

Notes: Historic transfers out include M&I deliveries. Drainage water of 3,785 for 1989 and 2,621 for 1998 not included. In 2025, 2000 AF M&I water use included in transfers out due to increase in development of I-5 businesses.

FINAL ENVIRONMENTAL ASSESSMENT (12-055)

CENTRAL VALLEY PROJECT INTERIM RENEWAL CONTRACTS FOR PANOCHE WATER DISTRICT AND SAN LUIS WATER DISTRICT 2013-2015

Appendix B
U.S. Fish and Wildlife Service Concurrence Memorandum

February 2013

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Sacramento Fish and Wildlife Office
2800 Cottage Way, Room W-2605
Sacramento, California 95825-1846

In reply refer to:
08ESMF00-2013-I-0073

January 28, 2013

Memorandum

To: David Hyatt, Supervisory Biologist, Resources Management Division, Bureau of Reclamation, South-Central California Area Office, Fresno, California

From: Thomas Leeman, Chief, San Joaquin Valley Division, Endangered Species Program, Fish and Wildlife Service, Sacramento Fish and Wildlife Office, Sacramento, California

Subject: Consultation on the Interim Renewal of Water Service Contracts with San Luis Water District and Panoche Water District, 2013-2015

This memorandum transmits the U.S. Fish and Wildlife Service's (Service) concurrence with the U.S. Bureau of Reclamation's (Reclamation) January 10, 2013 determination that issuance of two Central Valley Project (CVP) Interim Renewal Contracts (IRCs), for the San Luis Water District (SLWD) and Panoche Water District (PWD), for a period of 24 months, beginning March 1, 2013 and going through February 28, 2015, may affect, but is not likely to adversely affect (NLAA) the federally-listed as endangered San Joaquin kit fox (*Vulpes macrotis mutica*) and blunt-nosed leopard lizard (*Gambelia sila*), and federally-listed as threatened giant garter snake (*Thamnophis gigas*). This response is provided pursuant to section 7(a)(2) of the Endangered Species Act of 1973 (Act) (16 U.S.C. 1531 *et seq)* and in accordance with the regulations governing interagency consultations (50 CFR §402). We received your initial request for concurrence memorandum for the SLWD and PWD IRCs via U.S. mail on October 25, 2012, and a revised and corrected concurrence memorandum via e-mail on January 15, 2013.

The proposed action is the execution of IRCs for SLWD and PWD from March 1, 2013 to February 28, 2015 in the amounts and to the acreages and purposes specified in Table 1. The IRCs provide delivery of "a maximum quantity of water subject to hydrological and regulatory constraints for up to the full contract amounts," as described in Reclamation's Memorandum and attachments on San Luis Unit (SLU) long term contract renewals dated September 27, 2005.

Table 1. CVP Interim Water Service Contract Amounts and Service Areas for Panoche and San Luis Water Districts

Contractor	Water Service Contract Amount (acre-feet)	Area (acres)	Primary Contract Use	Contract Period
Panoche Water District	94,000	39,936	Agriculture	03/01/13-02/28/15
San Luis Water District	125,080	66,458	Agriculture	03/01/13-02/28/15

Reclamation has determined that the proposed action will have no effect on the federally listed species or critical habitats identified in Table 2 below and is not requesting concurrence with those determinations.

Table 2. Threatened and endangered species and/or critical habitat potentially within the Action Area that Reclamation determined would not be affected by the proposed action.

Common Name	Scientific Name	Status[1]
San Joaquin woolly-threads	*Monolopia congdonii*	E
Valley elderberry longhorn beetle	*Desmocerus californicus dimorphus*	T
Longhorn fairy shrimp	*Branchinecta longiantenna*	E, H
Vernal pool fairy shrimp	*Branchinecta lynchi*	T, H
Vernal pool tadpole shrimp	*Lepidurus packardi*	E, H
California red-legged frog	*Rana aurora draytonii*	T, H
California tiger salamander	*Ambystoma californiense*	T, H
Fresno kangaroo rat	*Dipodomys nitratoides exilis*	E, H
Giant kangaroo rat	*Dipodomys ingens*	E
Delta smelt	*Hypomesus transpacificus*	T, H

The Service has reviewed your January 10, 2013 memorandum, the Draft Environmental Assessment titled, "Central Valley Project Interim Renewal Contracts for Panoche Water District and San Luis Water District 2013-2015" dated October 2012, information provided for the SLU long-term contract renewal consultation (2004 Biological Assessment, draft Environmental Impact Statement and Supplement, responses to insufficiency memoranda, and additional information generated by the Endangered Species Recovery Program), and additional sources of information in our office files. This information as well as the short duration of this project

[1] Status: (E) Endangered; (T) Threatened; (H) Designated Critical Habitat; (PH) Proposed Critical Habitat

provides sufficient biological basis for the Service to concur with Reclamation's determination that the IRCs for SLWD and PWD is NLAA any of the three species identified on page 1.

Although water deliveries by the SLWD historically have been almost exclusively used for agriculture use, substantial development in and around the cities of Los Banos and Santa Nella have resulted in a shift of some water supplies to Municipal and Industrial (M&I) use. SLWD currently supplies approximately 800 acre-feet/year (AFY) as a wholesaler (but to no end users) and approximately 40 AFY to end users as treated water. M&I use demands are expected to increase over time, but not during the term of the proposed interim renewal contracts.

The Service's concurrence with a NLAA determination for this action is also based in part on a commitment from the SLWD (Attachment A) stipulating that use of CVP water for new municipal and industrial uses will not occur until compliance with the Act has been confirmed. Such confirmation shall be consistent with a process elaborated in the Final Environmental Assessment/Initial Study for the 25-Year Transfer and Groundwater Pumping Project of the San Joaquin Exchange Contractors and the U.S. Bureau of Reclamation, pages F-29 through F-30 (Attachment B).

Background and Related Consultations

In 2004, Reclamation requested initiation of formal consultation under the Act for SLU long term contract renewals, including SLWD and PWD. Consultation on SLU long term contract renewals was suspended to allow completion of the consultation for the coordinated operations of the Central Valley Project and State Water Project Operations Criteria and Plan. In accordance with and as required by Section 3404(c) of the Central Valley Improvement Act (CVPIA) of 1992 (Public Law 102-575), IRCs are undertaken to provide a bridge between the expiration of the original long-term water service contracts and long-term renewal of those contracts. In 2007, Reclamation executed IRCs for the SLU. The Service issued a Biological Opinion on December 18, 2007 for five SLU IRCs (Westlands Water District, California Department of Fish and Game, and the Cities of Avenal, Coalinga, and Huron) (Service File No. 2008-F-0538). The SLWD and PWD IRCs were not included in that consultation based on the discussions between Reclamation and the Service relating to the extension of the Grassland Bypass Project. The long-term contracts for SLWD and PWD expired December 31, 2008. The Service completed informal consultations on previous IRCs for SLWD and PWD on December 22, 2008 and December 15, 2011 with a finding that this action may affect, but is NLAA the federally listed San Joaquin kit fox and giant garter snake (Service File Nos. 2008-I-0538-2 and 2008-I-0538-4, respectively). The Service also noted in the December 15, 2011 memo that because blunt-nosed leopard lizards have historically been found within the boundaries of SLWD, and based on the land use map for SLWD that Reclamation provided to the Service on November 23, 2010 showing some lands within SLWD that are either classified as "barren" or "grassland" and which could serve as habitat to the lizard, the Service recommended that the lizard would more appropriately fall under the 'may affect' category, with the subsequent required analysis of whether or not the project is likely to adversely affect the species.

Interim renewal contract deliveries have several components of potential effects on listed species (e.g., effects from agricultural drainage management and disposal, and changes to land use and cropping patterns, etc.). The effects of agricultural drainage management have been addressed in other consultations (e.g., the Service's consultation on the Grassland Bypass Project, Service File No. 2009- F-1036, San Luis Drainage Feature Re-evaluation, Service File No. 2006-F-0027 and San Luis Drainage Feature Re-evaluation Demonstration Treatment Facility at Panoche Drainage District, Service File No. 2011-I-0855). The effects of IRCs considered in this NLAA concurrence memo are related solely with the delivery of water and associated land use impacts.

In 2006 Reclamation completed an Environmental Impact Statement (EIS) and Record of Decision (ROD) under the National Environmental Policy Act (NEPA), and the Service completed a Biological Opinion and a Fish and Wildlife Coordination Act Report in accordance with the provisions of section 2(b) of the Fish and Wildlife Coordination Act (48 stat. 401, as amended; 16 U.S.C. 661, et seq.) on San Luis Drainage Feature Re-evaluation (SLDFR). The purpose of the SLDFR project is to meet Reclamation's obligations under the Federal San Luis Unit Act of June 3, 1960, Public Law 86-488, 74 Stat. 156, Section 5, to provide drainage service to drainage-impacted lands within the San Luis Unit (including drainage impacted lands within SLWD and PWD). Once fully implemented, Reclamation anticipated in the EIS and ROD that the drainage discharge from the San Luis Unit would be reduced to sufficient standards to meet the statutory and judicial requirements imposed. Congress has not yet acted to authorize and make appropriations to implement the SLDFR ROD, although Reclamation has the authority to complete some of the actions described in the EIS.

On December 18, 2009, the Service issued a Biological Opinion to Reclamation on the continued agricultural drainage management and disposal called the Grassland Bypass Project (GBP), involving seven agricultural water districts including SLWD and PWD. The Service concluded that the GBP is likely to adversely affect, but is not likely to jeopardize the continued existence of the giant garter snake and the San Joaquin kit fox, and not likely to adversely affect the Delta smelt (including Critical Habitat). The 2009 Biological Opinion provided reasonable and prudent measures and terms and conditions to implement those measures. The execution of Interim Renewal Contracts for SLWD and PWD will be subject to the terms and conditions as specified in the 2009 Biological Opinion.

On June 4, 2012 the Service completed informal consultation on the San Luis Drainage Feature Re-evaluation Demonstration Treatment Facility at Panoche Drainage District (Service File No. 2011-F-0855). The SLDFR Demo Facility will operate for up to 18 months testing the efficacy and operation of reverse osmosis treatment and selenium biotreatment technologies for agricultural drainage disposal. This facility will be built within the geographical boundaries of the existing Grassland Bypass Project's Drainage Reuse Area. Subsequently, Reclamation may elect to continue operating the Facility indefinitely or delegate it to their designated operating partner for treating reuse drainage. Disposition and operation of the facility after the 18-month time period is unknown at this time and would receive separate analysis under NEPA and the Act.

Needs for Future Interim or Long Term Contract Renewals

In order to facilitate future consultations on CVP IRCs or Long Term Contract Renewals the Service asks that the following be included with Reclamation's materials provided for initiation of consultation under the Act:

<u>Applicant Status or Change to Contract Language</u>
Article 3(e) of the IRC contracts for SLWD (Contract No. 14-06-200-7773A-IR1) and PWD (Contract No. 14-06-200-7864A-IR1) includes the following language with respect to consultation under the Act: "The Contractor shall comply with requirements applicable to the Contractor in biological opinion(s) prepared as a result of a consultation regarding the execution of this Contract undertaken pursuant to Section 7 of the Endangered Species Act of 1973 (ESA), as amended, that are within the Contractor's legal authority to implement." As a point of clarification, there can be no requirements applicable to the Contractor(s) unless the Contractor(s) are established as Applicants. The wording in Article 3(e) of the IRC contracts, although not explicitly stated, implies that the Contractor(s) are Applicants, and such ambiguity in the contract language may make Reclamation legally vulnerable. As a result, in order for the Service to conduct future consultations under the Act on future IRCs or Long Term Contract Renewals, Reclamation should complete one of the following:

- Ensure Applicant status from the Contractors involved, <u>or</u>,
- Amend the language in Article 3(e) of the CVP contract to include, "the Contractor shall notify the Service prior to delivery of Project Water to undeveloped land to verify compliance with the Endangered Species Act."

<u>Comprehensive Mapping Commitment from CVPIA BO</u>
In the CVPIA Programmatic biological opinion, dated November 2000 (Service File No. 98-F-0124), Reclamation and the Service committed to develop a Comprehensive Mapping Program to identify remaining natural habitats and cropping patterns within CVP Service Areas, and identify any changes within those habitats that have occurred from 1993 to 1999, and then every 5 years thereafter (pages 2-62 and 2-63). Reclamation completed a mapping assessment of habitat changes from 1993 to 1999 and 2005. The Service is unaware of any recent habitat/crop mapping efforts for CVP Service Areas completed by Reclamation since 2005. The Service therefore requests that prior to the next IRCs or Long Term Contract Renewals, this comprehensive mapping effort be updated with current imagery and compared with the previous mapping efforts to update the environmental baseline and to verify assumptions by Reclamation that the IRCs do not result in land use changes that could affect federally listed species.

<u>Water Supply Deliveries and Sources and Off-Site Conjuctive Use of CVP Water</u>
In order to better characterize the baseline conditions in the action area for future IRCs or Long Term Contract Renewals, the Service asks that Reclamation provide recent data on the following:

- Summary of recent water deliveries and sources under Reclamation's purview (e.g., CVP, water transfers, exchanges, etc.) for the contractors under consideration.
- Summary of off-site conjunctive use projects used to store CVP water supply (e.g., the amount of water stored, location and information on where the water was stored, used etc.).

Conclusion
The information Reclamation provided for this consultation, including the written commitment from SLWD in Attachment A, and the short duration of this project provides a sufficient biological basis for the Service to concur with Reclamation's determination that the IRCs for SLWD and PWD are NLAA the San Joaquin kit fox, blunt-nosed leopard lizard, or giant garter

snake. However, to facilitate future consultations on CVP IRCs or Long Term Contract Renewals and verify assumptions made for past IRC consultations, the Service asks that the additional information specified above be provided when Reclamation initiates consultation under the Act.

Our concurrence with your NLAA determination concludes this consultation for this action. Therefore, unless new information reveals effects of the proposed action that may affect listed species in a manner or to an extent not considered, or a new species or critical habitat is designated that may be affected by the proposed action, no further action pursuant to the Act is necessary. If you have questions regarding this action, please contact Thomas Leeman or Joy Winckel at (916) 414-6600.

Attachments

cc:
USBR, Sacramento, CA (Attn: Russ Grimes)

Attachment A.

MAY-03-2006 WED 01:08 PM GARY SAWYERS LAW OFFICE FAX NO. 5594381781 P. 02/02

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May 3, 2006

VIA FACSIMILE ONLY
(559) 487-5397

Ms. Kathy Wood
Chief, Resource Management Division
Bureau of Reclamation
South-Central California Area Office
1243 "N" Street
Fresno, CA 93721

Re: San Luis Water District
Our File No. 52120.001

Dear Kathy:

In connection with the pending Agreement for the Acquisition of Water by the United States, San Luis & Delta-Mendota Water Authority, and Madera Irrigation District from the San Joaquin River Exchange Contractor Water Authority, I understand that Reclamation requires certain confirmations from the San Luis Water District. As you know, I am general counsel to the District. On behalf of the District, I hereby confirm that the District will not deliver Central Valley Project water to development or converted habitat without confirmation from the Bureau of Reclamation or other evidence that compliance with the Endangered Species Act has occurred with respect to the subject land either through Section 7 or Section 10 of the Act.

If you have any questions or need further confirmation, please contact me.

Very truly yours,

Gary W. Sawyers

GWS:lj
cc: Mr. Martin McIntyre (via facsimile only)
Mr. Daniel Nelson (via facsimile only)

Attachment B.

Excerpt from the Final Environmental Assessment/Initial Study for the 25-Year Transfer and Groundwater Pumping Project of the San Joaquin Exchange Contractors and U.S. Bureau of Reclamation, pages 2-17 through 2-18 and copied for reference below:

Use of transferred water for new M&I uses will not occur until (1) compliance with CESA and with CEQA, including analysis and mitigation for other sensitive biological resources, has been confirmed with the DFG and (2) ESA compliance for such M&I uses has been demonstrated by one of the following methods:

1. A letter or memo from the Service stating that the use will not result in adverse effects on listed or proposed species or proposed or designated critical habitat.
2. An incidental take permit for the M&I use issued by the Service pursuant to section 10(a)(1)(B) of the ESA.
3. A non-jeopardy, non-adverse modification or destruction biological opinion, or a biological opinion with a reasonable and prudent alternative, or a memo/letter concurring with a "not likely to adversely affect" determination issued by the Service to the lead Federal agency having jurisdiction over the project(s) using the transferred water for M&I use.

A properly documented "no effect" determination made by the Federal agency(ies) having jurisdiction over the project(s) using the transferred water for M&I use. Commitment 8 on page 2-70 of the CVPIA Programmatic Biological Opinion requires Reclamation to "provide necessary information to the Service's SFWO Endangered Species Division" on Central Valley Project actions "where a determination of no effect has been made, sufficiently in advance, to enable the Service's review". Reclamation would accomplish this via the current SCCAO practice of immediately notifying Service of the availability of NEPA documents for public review and comment. Because any significant impacts from M&I use would be mitigated by the M&I projects before a water transfer is approved and water is actually provided, the proposed project has no significant impacts on the environment that are related to such transfers.

FINAL ENVIRONMENTAL ASSESSMENT (12-055)

CENTRAL VALLEY PROJECT INTERIM RENEWAL CONTRACTS FOR PANOCHE WATER DISTRICT AND SAN LUIS WATER DISTRICT 2013-2015

Appendix C
National Marine Fisheries Service Biological Opinion

February 2013

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Region
501 West Ocean Boulevard, Suite 4200
Long Beach, California 90802-4213

February 28, 2013

In response refer to:
2012/05021

David E. Hyatt
Supervisory Wildlife Biologist
U.S. Bureau of Reclamation
South-Central California Area Office
1243 N Street
Fresno, California 93721-1813

Dear Mr. Hyatt:

This letter transmits NOAA's National Marine Fisheries Service's (NMFS) biological opinion (BO) (Enclosure 1) based on our review of the San Luis Water District (SLWD) and Panoche Water District (PWD) Interim Renewal Contracts 2013-2015 (proposed action). The NMFS BO reviews their effects on federally listed endangered Sacramento River winter-run Chinook salmon (*Oncorhynchus tshawytscha*), threatened Central Valley spring-run Chinook salmon (*O. tshawytscha*), threatened California Central Valley (CCV) steelhead (*O. mykiss*), the threatened Southern distinct population segment (DPS) of North American green sturgeon (*Acipenser medirostris*), and the designated critical habitat of CCV steelhead and the Southern DPS of North American green sturgeon, in accordance with section 7(a)(2) of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C 1531 *et seq.*).

The information provided includes the October 24, 2012, request for consultation initiation letter, emails from the U.S. Bureau of Reclamation (Reclamation) dated November 1 and 9, 2012, January 3, 2013 and multiple emails and phone calls between Reclamation and NMFS during the consultation period. A complete administrative record of this consultation is on file at the Central Valley Area Office of NMFS.

Based on the best scientific and commercial information, the BO concludes that the 2013-2015 SLWD and PWD Interim Renewal Contracts, as presented by the Reclamation, are not likely to jeopardize the continued existence of the listed species or destroy or adversely modify designated critical habitat. NMFS has also included an incidental take statement with reasonable and prudent measures and non-discretionary terms and conditions that are necessary and appropriate to avoid, minimize, or monitor incidental take of listed salmonids and sturgeon associated with the project.

This letter also transmits NMFS' essential fish habitat (EFH) conservation recommendations for Pacific salmon as required by the Magnuson-Stevens Fishery Conservation and Management Act (MSA) as amended (16 U.S.C. 1801 *et seq.*; Enclosure 2). The document concludes that the execution of the SLWD and PWD Interim Renewal Contracts will adversely affect the EFH of Pacific salmon in the action area and adopts certain terms and conditions of the incidental take statement and the ESA conservation recommendations of the biological opinion as the EFH conservation recommendations.

Reclamation has a statutory requirement under section 305(b)(4)(B) of the MSA to submit a detailed response in writing to NMFS within 30 days of receipt of these conservation recommendations that includes a description of the measures proposed for avoiding, mitigating, or offsetting the impact of the activity on EFH (50 CFR 600.920 (k)). If unable to complete a final response within 30 days, Reclamation should provide an interim written response within 30 days before submitting its final response.

Please contact Ms. Leslie Mirise in our Central Valley Area Office at (916) 930-3638 or via email at Leslie.Mirise@noaa.gov, if you have any questions regarding this document or require additional information.

Sincerely,

For Rodney R. McInnis
Regional Administrator

Enclosures (2)

cc: Administrative File: 151422SWR2008SA00269
NMFS-PRD, Long Beach, CA
Joseph Dillon, NMFS-HCD, Santa Rosa, CA

Enclosure 1

BIOLOGICAL OPINION

ACTION AGENCY: U.S. Bureau of Reclamation

ACTIVITY: **San Luis Water District and Panoche Water District Interim Renewal Contracts 2013–2015**

CONSULTATION CONDUCTED BY: Southwest Region, National Marine Fisheries Service

TRACKING NUMBER: **151422SWR2008SA00269**

DATE ISSUED: **February 28, 2013**

This document transmits the NOAA's National Marine Fisheries Service (NMFS) biological opinion based on our review of the proposed San Luis Water District and Panoche Water District Interim Renewal Contracts 2013–2015 project located in Merced, Stanislaus, and San Joaquin counties in California in accordance with section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 et seq.). Your October 24, 2012 request for formal consultation was received on October 25, 2012. Consultation was initiated following the receipt of a complete consultation package on November 9, 2013.

This biological opinion is based on information provided in the October 2012 biological assessment (BA), the October 2012 draft environmental assessment (EA), telephone conversations with Bureau of Reclamation (Reclamation) staff listed below, and other sources of information. A complete administrative record of this consultation is on file at the NMFS Central Valley (CV) office.

Consultation History

On December 29, 2008, NMFS provided a biological opinion (BO) for the San Luis Water District (SLWD) and Panoche Water District (PWD) Interim Renewal Contracts (2008/04445) (SLWD and PWD Interim Renewal Contracts 2009-2011 BO) which covered the time period from January 1, 2009 through February 28, 2011.

On February 23, 2011, NMFS provided a BO for the San Luis Water District and Panoche Water District Interim Renewal Contracts (2010/04827) (SLWD and PWD Interim Renewal Contracts 2011-2013 BO) which covered the time period from March 1, 2011 through February 28, 2013.

On October 25, 2012, NMFS received your letter and BA dated October 24, 2012 requesting initiation of Endangered Species Act (ESA) section 7 consultation for the San Luis Water District and Panoche Water District Interim Renewal Contracts 2013-2015.

On November 1, 2012, NMFS received your email containing a link to environmental documents for the San Luis Drainage Re-evaluation Project.

Following a phone conversation on November 9, 2012, NMFS received an email on the same date from Rain Healer of Reclamation, containing the draft EA for the Central Valley Project (CVP) Interim Renewal Contract (IRC) for PWD and SLWD 2013-2015, as well as responses to comments prepared for other projects that relate to the Grasslands Bypass Project (GBP) and the San Joaquin River Improvement Project (SJRIP).

On December 21, 2012, Leslie Mirise left a message via telephone with Dr. Jennifer Lewis of Reclamation requesting a determination and analysis of effects to EFH, as they were not included in the BA. Dr. Lewis provided the requested information via email on January 3, 2013.

On January 16, 2013, NMFS provided a letter to Reclamation documenting that a complete consultation package was received on November 9, 2012. Therefore, the BO is expected to be complete no later than March 23, 2013.

I. DESCRIPTION OF THE PROPOSED ACTION

The proposed Federal action is the execution of the interim water service contracts for the delivery of water from the Central Valley Project (CVP) to the San Luis and Panoche water districts for a period of 24 months, beginning on March 1, 2013, and running through February 28, 2015. The project description in the SLWD and PWD Interim Renewal Contracts (IRC) 2011–2013 environmental assessment (EA) included language that drainage management for PWD and SLWD lands located within Charleston Drainage District (participants in the Grasslands Bypass Project (GBP)) are included within the GBP analysis and environmental commitments in the ROD; therefore, drainage management is not part of the proposed action within the EA. However, the drainage analysis performed in the GBP 3rd Use Agreement consultation (2009/04097) defers the drainage analysis back to the contributing water districts and the separate actions that would constitute permitting of water deliveries (and their associated drainage) to each water district. Therefore, this consultation includes a drainage analysis within the project description. It should be noted that the project description given in the biological assessment (BA) states, "NMFS analyzed species affects from the implementation of the GBP as part of the PWD and SLWD interim renewal contracts (NMFS 2008, 2011a)." It would be more accurate to state that NMFS analyzed species effects from exposure to agricultural drainage as a result of implementing the two previous SLWD and PWD interim renewal contracts (NMFS 2008, 2011a). The GBP is a separate action and its species effects were previously analyzed as described above. The SLWD and PWD IRC 2013-2015 BA states that the project operates under a "status quo" condition, including water amounts, uses, and locations. The previous two BAs for SLWD and PWD IRCs, covering the years 2009–2011 and 2011–2013, have been incorporated by reference into the SLWD and PWD IRC 2013–2015 BA project description.

Effects to the listed species and to designated and proposed critical habitat resulting from the combined operational effects of the CVP and State Water Project (SWP) (e.g., storing, pumping, and releasing water for agricultural and municipal and industrial uses) were consulted on separately in NMFS 2009 Biological Opinion on the long-term operations of the Central Valley Project and State Water Project (NMFS 2009b; Operations BO). Therefore, this BO (analyzing the effects of implementing the SLWD and PWD IRC 2013-2015) will not analyze the operational effects of the CVP and SWP to listed species and to designated critical habitat as part of the effects of this proposed action. In addition, this consultation will either analyze as part of the environmental baseline the effects of the following independent actions that have required separate permitting and consultations, or not analyze potential effects resulting from the following independent actions that would require separate permitting and consultations because they are not interrelated or interdependent to the proposed action of executing the SLWD and PWD IRC 2013-2015:

- Any future water assignments of CVP water service contracts involving San Luis Unit contractors.
- Water transfers and exchanges involving San Luis Unit contractors.
- Inclusion and exclusions to the district boundaries for the San Luis Unit contractors, including land annexations.
- Any changes in place or purpose of use.
- Renewal of long-term water service contracts.
- Other measures/activities that are considered as part of the environmental baseline, such as the Central Valley Habitat Monitoring Program, the Central Valley Project Conservation Program, the San Joaquin River Restoration Program (SJRRP), or Central Valley Project Implementation Act (CVPIA) activities designated in Section 3406 (b)(1) (other) which will also continue to achieve separate program-specific ESA compliance.
- Other programs in place under CVPIA or programs of the Delta Stewardship Council and Delta Conservancy (previously known as the CALFED Bay-Delta Program).

Instead, this consultation has as its primary focus the potential effects of the delivery of CVP water to SLWD and PWD, and the resulting discharge of agricultural drainage to streams in which listed species and designated critical habitats under NMFS' jurisdiction occur.

A. Project Activities

The interim water service contracts will provide for the continued delivery of the same quantities of CVP water contract amounts to the same lands previously covered under the long-term water service contracts. Like the long-term water service contracts for contractors in the San Luis Unit, the interim renewal contracts will authorize deliveries of CVP water from both the San Luis and Delta-Mendota canals, if those contractors have the capability to take CVP water via both canals. Water deliveries will be made through existing CVP facilities. The proposed action does not require the construction of any new facilities, the installation of any new structures, or the modification of any existing facilities; and the proposed action allows the CVP water to be beneficially used within the authorized place of use for the CVP water south of the Delta.

The execution of the SLWD and PWD IRC 2013–2015 will allow for the delivery of full contract amounts specifically detailed in the contracts and in the BA. Previous IRCs (incorporated by reference in the project description) contained a provision which authorizes Reclamation to impose shortages that result from hydrologic conditions and the requirements of laws and regulations. It is assumed that the same holds true for the SLWD and PWD IRC 2013–2015. Other contract terms include new provisions required by CVPIA for water measurements and conservation. The Operations BO describes in detail the hydrological, climatological, geological, statutory, and regulatory constraints placed upon the delivery and conveyance systems of the CVP limiting the ability of the CVP to convey water through project facilities, and in almost all years these preclude the delivery of full contract amounts to CVP contractors. Nevertheless, this consultation considers water deliveries up to the full contract amounts for the SLWD and PWD. Deliveries of water that would be over the contract amounts are not part of this action and would require separate environmental review under the ESA and the National Environmental Policy Act.

In an effort to meet water quality objectives established by the California Central Valley Regional Water Quality Control Board (RWQCB), primarily that of reducing the amount of selenium discharged into the San Joaquin River system over time, agricultural drainage is discharged from the PWD and the Charleston Drainage District of the SLWD (the sole source of drainage originating in the SLWD) to the GBP, which was developed for that purpose and has an existing agreement, the GBP 3rd Use Agreement, through December 31, 2019. NMFS issued a concurrence letter for the GBP 3rd Use Agreement on November 18, 2009 (2009/04097, ARN # 151422SWR2001SA5967) (NMFS 2009a).

On October 5, 2010, the Central Valley RWQCB (2010) adopted Resolution R5-2010-0046 amending the Sacramento River and San Joaquin River Basin Plan (Basin Plan) to modify the existing compliance schedule for the GBP selenium control plan to allow agricultural subsurface drainage discharges to the Lower San Joaquin River to continue through December 31, 2019. Since October 2005, the Basin Plan set the selenium objective at 5 ppb over a 4-day average in the San Joaquin River at the confluence of the Merced River. This same objective was used in the drainage analysis in the SLWD and PWD Interim Renewal Contract 2009-2011 and 2011-2013 BOs and is still in place over the same portion of the San Joaquin River for this project. This original objective was intended to extend up the San Joaquin River upstream of the Merced River to Sack Dam and Mud Slough (north) on October 1, 2009. The Resolution R5-2010-0046 delays that extension for a 2-mile portion of the San Joaquin River and 7-miles of Mud Slough (north) until 2019.

Both SLWD and PWD have also adopted the Westside Regional Drainage Plan (incorporated by reference into the 2013-2015 BA) that includes the following actions intended to reduce agricultural drainage to zero subsurface discharge:

- Lining District water delivery facilities to the extent that available funding will allow.
- Encouraging grower participation in programs to acquire and install high efficiency (*i.e.*, drip) irrigation systems.
- Operation of the PWD Russell Avenue Recirculation System which captures and re-circulates drainage generated within the PWD.

- Continuing drainwater displacement projects such as road wetting for dust control.
- Continuing to develop, manage, and utilize 6,000 acres of regional reuse facilities where collected subsurface drainage is applied to salt tolerant crops under monitored and controlled conditions.
- Participating in well installation and pumping activities of the Westside Regional Drainage Plan to reduce downslope migrations or hydraulic pressure on lower lying lands.

B. Description of the Action Area

The action area is defined as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR § 402.02). The action area described in the BA includes the consolidated subsurface drainage from the SLWD and PWD, through the GBP. The GBP conveys these drainage flows through the San Luis Drain. The water then flows through 6 miles of Mud Slough (north), and converges with the San Joaquin River upstream of the confluence with the Merced River. From there, the water flows through the San Joaquin River to the southern Sacramento – San Joaquin River Delta, including Old River and Middle River, which lie south of the City of Stockton.

For the purposes of this biological opinion, the action area includes the area described above as well as the following details from the previous SLWD and PWD IRC consultations (for years 2009–2011 and 2011–2013) incorporated by reference. As described above, the southern portion of the action area includes Old and Middle rivers. More specifically the action area extends down to the point where State and Federal pumping facilities divert a substantial portion of those waters to the California Aqueduct and the Delta-Mendota Canal, and thereby influence the direction of flow, at approximately the confluence with the Grant Line and Victoria canals, respectively. Operation of the State and Federal pumps combined with tidal influence causes a reverse (*i.e.*, upstream) flow in the mainstem San Joaquin River from the Delta to approximately the confluence with Old River just below Mossdale. Therefore, the waters of Mud Slough enter the San Joaquin River and flow downstream to Old River where they converge with waters flowing upstream in the San Joaquin River from the Delta and entering Old River as well. This segment of the San Joaquin River and the associated waterways described above pass through portions of Merced, Stanislaus, and San Joaquin counties. The direct and indirect effects of the proposed project are anticipated to encompass the entire width of the river channel from levee to levee, along the entire length of the reach defined above. The scope and sensitivity of these impacts will be discussed in the effects analysis section of the opinion.

II. STATUS OF THE SPECIES AND CRITICAL HABITAT

The following sections describe the status of each species administered by NMFS and presumed to be present in the action area, which includes the southern Distinct Population Segment (sDPS) of North American green sturgeon (*Acipenser medirostris*), California Central Valley (CCV) steelhead (*Oncorhynchus mykiss*) DPS, Sacramento River (SR) winter-run Chinook salmon (*O. tshawytscha*) Evolutionarily Significant Unit (ESU), and Central Valley (CV) spring-run Chinook salmon (*O. tshawytscha*) ESU. In addition, the action area falls within critical habitat for the green sturgeon sDPS and CCV steelhead DPS; for these two species, a discussion of critical habitat is included. All information in the following sections is organized by species.

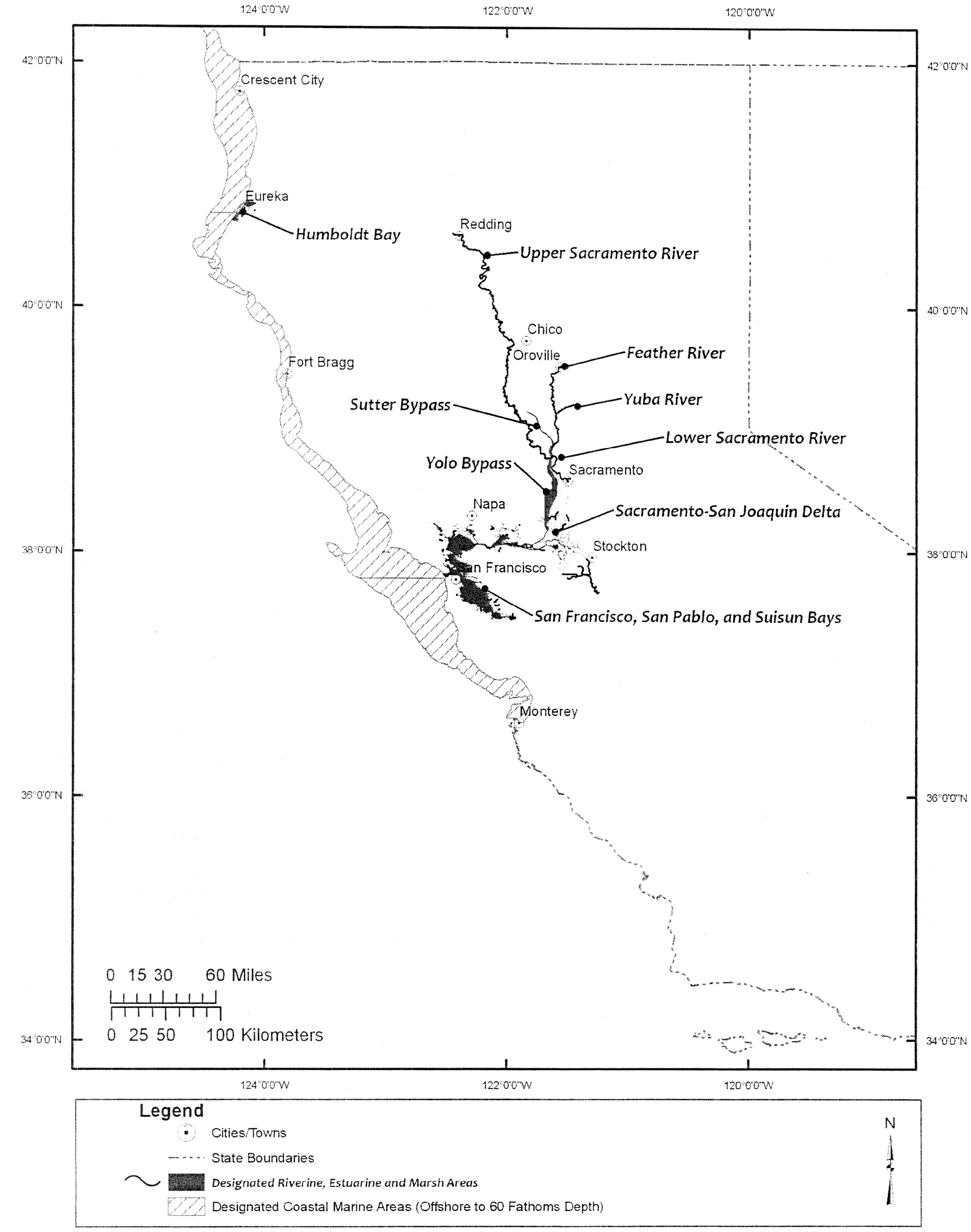
A. SOUTHERN DPS OF NORTH AMERICAN GREEN STURGEON

Listed as threatened (71 FR 17757; April 7, 2006)
Designated critical habitat (74 FR 52300; October 9, 2009)

A final rule for designation of critical habitat for the green sturgeon sDPS was published on October 9, 2009 (74 FR 52300). A full and exact description of all green sturgeon sDPS critical habitat, including excluded areas, can be found at 50 CFR 226.219. Critical habitat includes the waterways in the Sacramento – San Joaquin River Delta to the ordinary high water line, except for excluded areas listed at 50 CFR 226.219. Critical habitat also includes the main stem Sacramento River upstream from the I Street Bridge to Keswick Dam, and the Feather River upstream to the fish barrier dam adjacent to the Feather River Fish Hatchery. Coastal marine areas include waters out to a depth of 60 fathoms from Monterey Bay, California, to the Strait of Juan De Fuca, Washington. Coastal estuaries designated as critical habitat include San Francisco Bay, Suisun Bay, San Pablo Bay, and the lower Columbia River estuary. Certain coastal bays and estuaries in California (Humboldt Bay), Oregon (Coos Bay, Winchester Bay, Yaquina Bay, and Nehalem Bay), and Washington (Willapa Bay and Grays Harbor) are also included as critical habitat for the green sturgeon sDPS.

Final Critical Habitat for the
Southern DPS of Green Sturgeon

California



General Life History

Green sturgeon (*Acipenser medirostris*) are long lived, anadromous fish. Until recently, it was believed that the green sturgeon sDPS was composed of a single spawning population on the Sacramento River. However, recent research conducted by California Department of Water Resources (DWR) has revealed spawning activity on the Feather River, but it is not yet known what, if any, contribution these spawning efforts are making to the green sturgeon sDPS. Green sturgeon larvae hatch from fertilized eggs after approximately 169 hours at a water temperature of 59°F (Van Eenennaam *et al.* 2001, Deng *et al.* 2002). Studies conducted at the University of California, Davis by Van Eenennaam *et al.* (2005) indicated that an optimum range of water temperature for egg development ranged between 57.2°F and 62.6°F. Temperatures over 23 °C (73.4°F) resulted in 100 percent mortality of fertilized eggs before hatching. Eggs incubated at water temperatures between 63.5°F and 71.6°F resulted in elevated mortalities and an increased occurrence of morphological abnormalities in those eggs that did hatch. At incubation temperatures below 57.2°F, hatching mortality also increased significantly, and morphological abnormalities increased slightly, but not statistically so.

Young green sturgeon appear to rear for the first 1 to 2 months in the Sacramento River between Keswick Dam and Hamilton City (CDFG 2002). Juvenile green sturgeon first appear in USFWS sampling efforts at Red Bluff Diversion Dam (RBDD) in June and July at lengths ranging from 24 to 31 millimeters (mm) fork length indicating they are approximately two weeks old (CDFG 2002, USFWS 2002). Growth is rapid as juveniles reach up to 300 mm the first year and over 600 mm in the first 2–3 years (Nakamoto *et al.* 1995). Juvenile green sturgeon have been salvaged at the Federal and Stage pumping facilities in the South Sacramento-San Joaquin Delta (Delta), and sampled in trawling studies by the California Department of Fish and Game during all months of the year (CDFG 2002). The majority of these fish that were captured in the Delta area were between 200 and 500 mm indicating they were from 2 to 3 years of age based on Klamath River age distribution work by Nakamoto *et al.* (1995). The lack of a significant proportion of juveniles smaller than approximately 200 mm in Delta captures indicates juvenile sDPS green sturgeon likely hold in the mainstem Sacramento River for up to 10 months, as suggested by Kynard *et al.* (2005). Green sturgeon juveniles tested under laboratory conditions had optimal bioenergetic performance (*i.e.,* growth, food conversion, swimming ability) between 59°F and 66.2°F under either full or reduced rations (Mayfield and Cech 2004). This temperature range overlaps the egg incubation temperature range for peak hatching success previously discussed.

Information regarding the timing of when juveniles enter the ocean is limited. Laboratory experiments indicate juveniles may occupy fresh to brackish water at any age, but they are able to completely transition to salt water at around 1.5 years in age (Allen and Cech 2007). In the wild, sDPS green sturgeon may rear for up to several years in the Sacramento River and the Bay-Delta system. Nakamoto *et al*. (1995) indicated that juveniles spend from 1–4 years in fresh and estuarine waters and disperse into salt water at lengths of 300–750 mm.

Subadult and adult green sturgeon spend most of their time in coastal and estuarine waters. Based on their life history, the majority of the green sturgeon sDPS population is in the ocean at any given time. Adult green sturgeon return to their natal freshwater environment to spawn, and they are believed to spawn every 2 to 5 years (Beamesderfer *et al.* 2007). Adults begin their upstream spawning migrations into freshwater as early as late February with spawning occuring between March and July (CDFG 2002, Heublin 2006, Heublin *et al.* 2009, Vogel 2008). Peak spawning is believed to occur between April and June in deep, turbulent, mainstem channels over large cobble and rocky substrates with crevices and interstices.

Table 1. The temporal occurrence of (a) adult, (b) larval (c) juvenile and (d) subadult coastal migrant sDPS of green sturgeon. Locations emphasize the Central Valley of California. Darker shades indicate months of greatest relative abundance.

(a) Adult-sexually mature (≥145 – 205 cm TL for females and ≥ 120 – 185 cm TL old for males)

Location	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Upper Sac. River[a,b,c,i]	Low	Low	Medium	Medium/High	High	High/Medium	Medium	Medium	Medium	Low	Low	Low
SF Bay Estuary[d,h,i]	Low	Low	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Low	Low	Low

(b) Larval and juvenile (≤10 months old)

Location	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
RBDD, Sac River[e]					Medium	High	High	Medium				
GCID, Sac River[e]					Medium	High	High	Medium	Low	Low		

(c) Older Juvenile (> 10 months old and ≤3 years old)

Location	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
South Delta*[f]	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium
Sac-SJ Delta[f]	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium
Sac-SJ Delta[e]				Medium	Medium	Medium	Medium	Medium	Medium	Medium		
Suisun Bay[e]	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium

(d) Sub-Adult/non-sexually mature (approx. 75 cm to 145 cm for females and 75 to 120 cm for males)

Location	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Pacific Coast[c,g]	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium

Relative Abundance: High = High   Medium = Medium   Low = Low

* Fish Facility salvage operations

Sources: [a]USFWS (2002); [b]Moyle *et al*. (1992); [c]Adams *et al*. (2002) and NMFS (2005a); [d]Kelly *et al*. (2007); [e]CDFG (2002); [f]IEP Relational Database, fall midwater trawl green sturgeon captures from 1969 to 2003; [g]Nakamoto *et al*. (1995); [h]Heublein (2006); [i]CDFG Draft 2007 Sturgeon Report Card (CDFG 2008a)

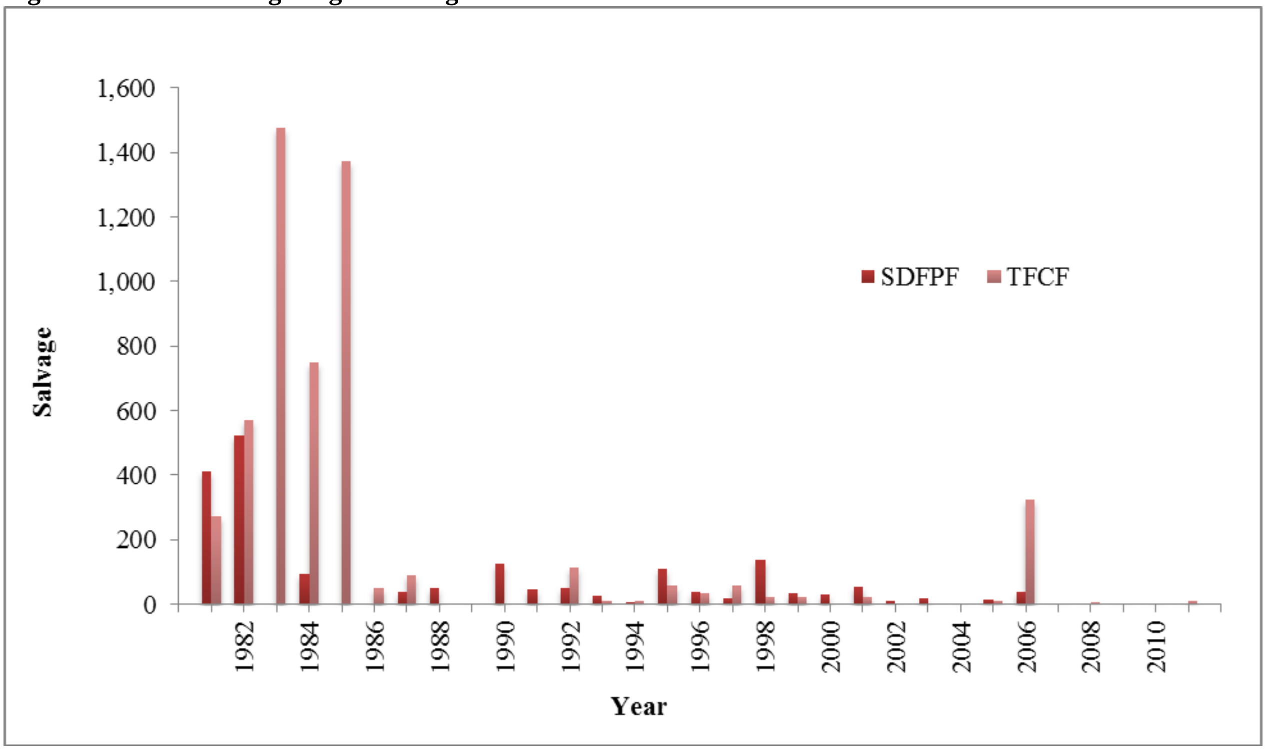
Viable Population Summary

a. Abundance

A robust estimate of sDPS green sturgeon abundance does not yet exist. However, the available data do indicate an alarming downward trend. A decrease in green sturgeon sDPS abundance has been inferred from the amount of take observed at the south Delta pumping facilities: the Skinner Delta Fish Protection Facility (SDFPF) and the Tracy Fish Collection Facility (TFCF) (Figure 1).

Adult spawning population estimates in the upper Sacramento River, using sibling based genetics, indicates 10-28 spawners per year between 2002-2006 (Israel and May 2010). Fish monitoring efforts at RBDD and Glen Colusa Irrigation District (GCID) on the upper Sacramento River have captured anywhere between 0 and 2,068 juvenile green sturgeon per year, between 1986 and 2000. (Adams *et al.* 2002).

Figure 1. Annual salvage of green sturgeon for the SDFPF and the TFCF from 1981 to 2011



Data source: ftp://ftp.delta.dfg.ca.gov/salvage

b. Productivity

Productivity and recruitment information for the green sturgeon sDPS is essentially unknown. Incidental catches of larval green sturgeon in the mainstem Sacramento River and of juvenile green sturgeon at the south Delta pumping facilities suggest that green sturgeon are successful at spawning, but that annual year class strength may be highly variable (Beamesderfer *et al.* 2007, Lindley *et al.* 2007). In general, sturgeon year class strength appears to be episodic with overall abundance dependent on a few successful spawning events (NMFS 2010a). It is unclear if the population is able to consistently replace itself.

c. Spatial Structure

Green sturgeon are known to range from Baja California to the Bering Sea along the North American continental shelf. During the late summer and early fall, subadults and nonspawning adult green sturgeon frequently can be found aggregating in estuaries along the Pacific coast (Emmett 1991, Moser and Lindley 2007). Based on genetic analyses and spawning site fidelity (Adams *et al.* 2002, Israel *et al.* 2004), green sturgeon are comprised of at least two DPSs.

1. A Northern DPS consisting of populations originating from coastal watersheds northward of and including the Eel River (*i.e.* Klamath, Rogue, and Umpqua Rivers)

2. A Southern DPS consisting of populations originating from coastal watersheds south of the Eel River.

Throughout much of their range, the sDPS and Northern DPS (nDPS) are known to co-occur, especially in northern estuaries and over-wintering grounds. Adams *et al.* (2007) summarizes information that suggests green sturgeon may have been distributed above the locations of present-day dams on the Sacramento and Feather Rivers. Additional habitat may have historically existed in the San Joaquin River basin; however, current and historic use of habitat in the San Joaquin River basin is unknown. The Sacramento – San Joaquin Bay Delta downstream to San Francisco Bay respresents an important rearing habitat for juveniles and migration corridor for adults.

d. Diversity

Recent studies have examined the genetic differentiation between the green sturgeon sDPS and the nDPS (Israel *et al.* 2004). However, little is known regarding how current levels of diversity (*e.g.*, genetic, life history) compare with historical levels. The reduction of the green sturgeon sDPS population to one extant population results in an elevated concern for the risk of extinction of the sDPS. Lindley *et al.* (2007), in discussing winter run Chinook salmon, states that a an ESU represented by a single population at moderate risk of extinction is at high risk of extinction over the long run. A single catastrophic event could have the potential to eliminate the run. Although Lindley *et al.* (2007) does not specifically mention the green sturgeon sDPS, it is reasonable to associate similar concerns for extinction. However, much of the work performed by Lindley on extinction risk focused on salmonids, which may spawn a single time in their lifespan; green sturgeon, being iteroperous, have the advantage of multiple spawning opportunities over a relatively long life span, and this fact may give the species some resilience to temporally isolated impacts.

B. CALIFORNIA CENTRAL VALLEY STEELHEAD

Listed as threatened (71 FR 834; January 5, 2006)
Designated critical habitat (70 FR 52488; September 2, 2005)

California Central Valley (CCV) steelhead were listed as threatened under the ESA on March 19, 1998 (63 FR 13347). On January 5, 2006, NMFS published a final listing determination for 10 steelhead DPSs, including CCV steelhead. This listing determination concluded that CCV steelhead will remain listed as threatened (71 FR 834). This DPS consists of naturally spawned steelhead populations in the Sacramento and San Joaquin River basins in California's Central Valley. The Coleman National Fish Hatchery and FRFH (Feather River Fish Hatchery) steelhead populations have been included as part of the listed CCV steelhead DPS in the most recent listing determination for the Central Valley steelhead (71 FR 834, January 5, 2006). Critical habitat was designated for CCV steelhead in the Central Valley on September 2, 2005 (70 FR 52488). Critical habitat includes the stream channels to the ordinary high water line within designated stream reaches such as those of the American, Feather, and Yuba rivers, and

Deer, Mill, Battle, Antelope, and Clear creeks in the Sacramento River basin; the San Joaquin River up to the confluence with the Merced River, the Merced River, the Calaveras, Mokelumne, Stanislaus, and Tuolumne rivers, and waterways of the Delta.

General Life History

CCV steelhead can be divided into two life history types, summer-run steelhead and winter-run steelhead, based on their state of sexual maturity at the time of river entry and the duration of their spawning migration, stream-maturing and ocean-maturing. Only winter-run steelhead currently are found in California Central Valley rivers and streams (McEwan and Jackson 1996). Summer-run steelhead have been extirpated due to a lack of suitable holding and staging habitat, such as coldwater pools in the headwaters of Central Valley streams, presently located above impassible dams (Lindley *et al.* 2006).

Unlike Pacific salmon, steelhead are iteroparous, or capable of spawning more than once before death, but it is rare for steelhead to spawn more than twice before dying; many that do so are females (Busby *et al.* 1996). Although one-time spawners are the great majority, Shapovalov and Taft (1954) reported that repeat spawners are relatively numerous (17.2 percent) in California streams. Hatchery steelhead may be less likely than wild fish to survive to spawn a second time (Leider et al. 1986).

CCV steelhead may remain in the ocean for up to four years before returning to their natal streams as adults to spawn (Shapovalov and Taft 1954), but most steelhead return to freshwater at ages two and three and range in size from two to twelve pounds (Reynolds *et al.* 1993). CCV steelhead generally leave the ocean between August and April (Busby *et al.* 1996) and enter freshwater from August to November. They typically spawn from December through April, with peaks from January though March, in small streams and tributaries where cool, well oxygenated water is available year-round (Williams 2006, Hallock *et al.* 1961, McEwan and Jackson 1996; Table 2). Timing of upstream migration is correlated with higher flow events, such as freshets or sand bar breaches at river mouths, and associated lower water temperatures. Some CCV steelhead hold in freshwater pools while maturing sexually, while others begin sexual maturation in the ocean and spawn within a few months after entering streams (Williams 2006). Female steelhead construct redds in suitable gravels, primarily in pool tailouts and at the head of riffles.

Post-spawning steelhead may migrate downstream to the ocean immediately after spawning or may spend several weeks holding in pools before outmigrating (Shapovalov and Taft 1954). Steelhead eggs hatch in three to four weeks at 50°F to 59°F (Moyle 2002). The length of time it takes for eggs to hatch depends mostly on water temperature. After hatching, alevins remain in the gravel for an additional two to five weeks while absorbing their yolk sacs, and emerge in spring or early summer (Barnhart 1986). Fry emerge from the gravel usually about four to six weeks after hatching, but factors such as redd depth, gravel size, siltation, and temperature can speed or retard this time (Shapovalov and Taft 1954). Newly emerged fry move to the shallow, protected areas associated with the stream margin (McEwan and Jackson 1996) and they soon move to other areas of the stream and establish feeding locations, which they defend (Shapovalov and Taft 1954). Optimal water temperatures for growth range from 59°F to 64°C (Moyle 2002).

Juvenile steelhead (parr) rear in freshwater for one to three years before outmigrating to the ocean as smolts (Moyle 2002). The time that parr spend in freshwater appears to be related to growth rate, with larger, faster-growing members of a cohort smolting earlier (Peven *et al.* 1994). Juveniles occupy a wide range of habitats, preferring deep pools, as well as higher velocity rapid and cascade habitats (Bisson *et al.* 1982, 1988). During periods of low temperatures (< 44.6° F) and high flows associated with the winter months, juvenile steelhead seek refuge in interstitial spaces in cobble and boulder substrates (Bustard and Narver 1975, Everest *et al.* 1986). Juveniles' winter hiding behavior reduces their metabolism and food intake requirements and minimizes their exposure to predation and high flows (Bustard and Narver 1975). Steelhead rearing during the summer takes place primarily in higher velocity areas in pools, although young-of-year also are abundant in glides and riffles. Productive steelhead habitat is characterized by complexity, primarily in the form of large and small woody debris. Cover is an important habitat component for juvenile steelhead both as velocity refugia and as a means of avoiding predation (Meehan and Bjornn 1991).

Emigrating steelhead use the lower reaches of a river and the Delta for rearing and as a migration corridor to the ocean. Juvenile CCV steelhead feed mostly on drifting aquatic organisms and terrestrial insects and will also take active bottom invertebrates (Moyle 2002). Some may utilize tidal marsh areas, non-tidal freshwater marshes, and other shallow water areas in the Delta as rearing areas for short periods prior to their final emigration to the sea. Hallock *et al.* (1961) found that juvenile steelhead in the Sacramento River basin migrate downstream during most months of the year, but the peak period of emigration occurred in the spring, with a much smaller peak in the fall. Nobriga and Cadrett (2003) also have verified these temporal findings based on analysis of captures at Chipps Island.

Table 2. The temporal occurrence of adult (a) and juvenile (b) CCV steelhead in the Central Valley. Darker shades indicate months of greatest relative abundance.

(a) Adult

Location	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
[1,3]Sac. River	L L	L L	L L	– –	– –	– L	L L	L M	M H	H M	L L	L L
[2,3]Sac R at Red Bluff	L L	L L	L L	L L	L L	L L	L L	L L	M M	H M	L L	L L
[4]Mill, Deer Creeks	– –	H M	M L	L L	L L	L L	– –	– –	– –	– H	H M	M M
[6]Sac R. at Fremont	L L	L L	– –	– –	– –	– –	– –	M M	H H	M M	L L	L L
[6]Sac R. at Fremont	L L	L L	– –	– –	– –	– –	– –	M M	H H	M M	L L	L L
[7]San Joaquin River	– –	– –	– –	– –	– –	– –	L L	L L	M M	M M	M M	H H

(b) Juvenile

Location	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
[1,2]Sacramento River	L L	L L	M M	M M	M M	M M	L L	L L	L L	M M	M M	L L
[2,8]Sac. R at Knights	L L	L L	H H	L L	L –	– –	– –	– –	– –	– –	– –	– L
[9]Sac. River @ KL	M M	M M	H H	H H	M M	– –	– –	– –	– –	– –	L L	L L
[10]Chipps Island (wild)	L L	L L	H H	H H	M M	M M	L L	– –	– –	L L	L L	L L
[8]Mossdale	– –	– –	– –	H H	H H	– –	– –	– –	– –	– –	– –	– –
[11]Woodbridge Dam	M M	M M	M M	M M	M M	M M	M M	– –	– –	– –	– –	– –
[12]Stan R. at Caswell	L L	M M	H H	M M	M M	M L	– –	– –	– –	– –	– –	– –
[13]Sac R. at Hood	L L	H H	H H	H H	H H	H –	– –	– –	– –	– –	L L	L L

Source: [1]Hallock et al. 1961; [2]McEwan 2001; [3]USFWS unpublished data; [4]CDFG 1995; [5]Hallock et al. 1957; [6]Bailey 1954;

[7]CDFG Steelhead Report Card Data; [8]CDFG unpublished data; [9]Snider and Titus 2000;

[10]Nobriga and Cadrett 2003; [11]Jones & Stokes Associates, Inc., 2002; [12]S.P. Cramer and Associates, Inc. 2000 and 2001; [13]Schaffter 1980, 1997.

Relative Abundance: = High = Medium = Low

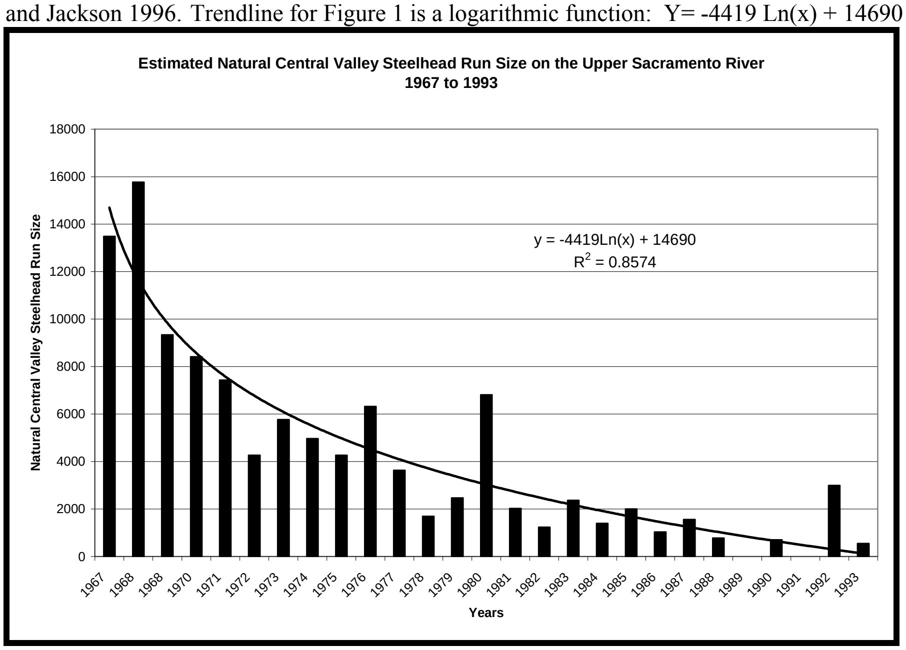
Viable Population Summary

a. Abundance

Historic CCV steelhead run sizes are difficult to estimate given the paucity of data, but may have approached 1 to 2 million adults annually (McEwan 2001). By the early 1960s the steelhead run size had declined to about 40,000 adults (McEwan 2001). The most recent status review of the CCV steelhead DPS (NMFS 2011b) found that the status of the population appears to have worsened since the 2005 status review (Good *et al*. 2005), when it was considered to be in danger of extinction. Although CCV steelhead abundance has been augmented by production at fish hatcheries, there is concern over the declining numbers of wild steelhead. Over the past 40 years, the naturally-spawned steelhead populations in the upper Sacramento River have declined substantially (Figure 2).

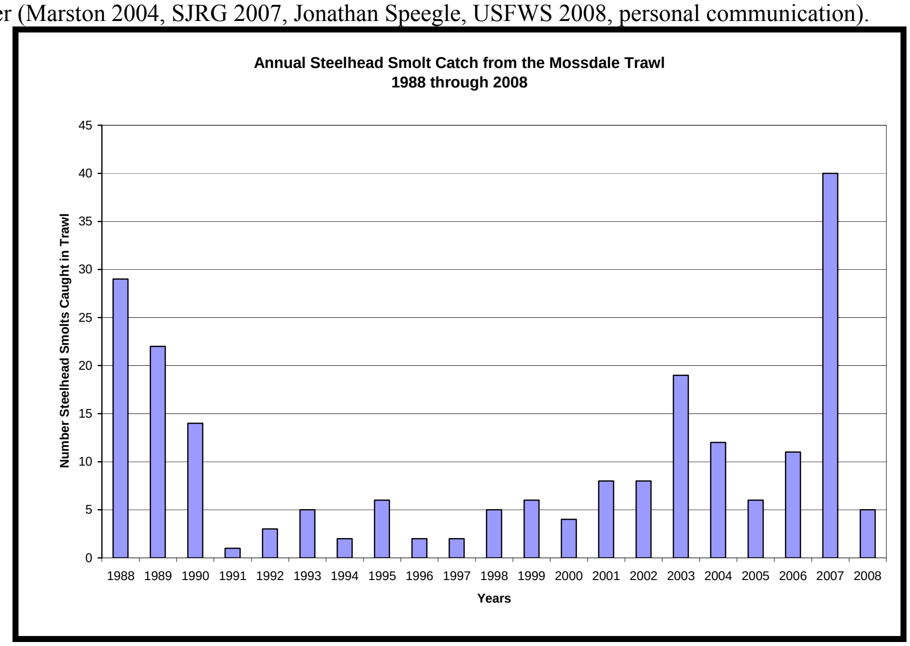
CCV steelhead counts at the RBDD declined from an average of 11,187 for the period of 1967 to 1977, to an average of approximately 2,000 through the early 1990s, with an estimated total annual run size for the entire Sacramento-San Joaquin system, based on RBDD counts, to be no more than 10,000 adults (McEwan and Jackson 1996, McEwan 2001). CCV steelhead escapement surveys at RBDD ended in 1993 due to changes in dam operations.

Figure 2: Estimated CCV natural steelhead escapement population in the upper Sacramento River based on RBDD counts. Source: McEwan and Jackson 1996. Trendline for Figure 1 is a logarithmic function: Y= -4419 Ln(x) + 14690 R^2= 0.8574



Note: Steelhead escapement surveys at RBDD ended in 1993

Figure 3: Annual number of CCV steelhead smolts caught while Kodiak trawling at the Mossdale monitoring location on the San Joaquin River (Marston 2004, SJRG 2007, Jonathan Speegle, USFWS 2008, personal communication).



b. Productivity

Nobriga and Cadrett (2003) compared CWT and untagged (wild) steelhead smolt catch ratios at Chipps Island trawl from 1998 through 2001 to estimate that about 100,000 to 300,000 steelhead juveniles are produced naturally each year in the Central Valley. In the Updated Status Review of West Coast Salmon and Steelhead (Good et al. 2005), the Biological Review Team (BRT) made the following conclusion based on the Chipps Island data:

> "If we make the fairly generous assumptions (in the sense of generating large estimates of spawners) that average fecundity is 5,000 eggs per female, 1 percent of eggs survive to reach Chipps Island, and 181,000 smolts are produced (the 1998-2000 average), about 3,628 female steelhead spawn naturally in the entire Central Valley. This can be compared with McEwan's (2001) estimate of 1 million to 2 million spawners before 1850, and 40,000 spawners in the 1960s".

An estimated 100,000 to 300,000 natural juvenile steelhead are estimated to leave the Central Valley annually, based on rough calculations from sporadic catches in trawl gear (Good *et al.* 2005). The Mossdale trawls on the San Joaquin River conducted annually by CDFG and USFWS capture steelhead smolts, although usually in very small numbers. These steelhead recoveries, which represent migrants from the Stanislaus, Tuolumne, and Merced rivers suggest that existing populations of CCV steelhead on these tributaries are severely depressed. In addition, the Chipps Island midwater trawl dataset from the USFWS provides information on the trend in the overall abundance of the CCV steelhead DPS (Williams *et al.* 2011). Updated through 2010, the trawl data indicate that the apparent decline in natural production of steelhead has continued since the 2005 status review. Catch-per-unit-effort has fluctuated over the past decade, but the proportion of the catch that is ad-clipped (100 percent of all hatchery produced steelhead have been ad-clipped since 1998) has steadily increased, exceeding 90 percent in recent years and reaching 95 percent in 2010 (Williams *et al.* 2011). Because hatchery releases have been fairly constant over the years, these data suggest that natural production of steelhead has been declining.

c. *Spatial Structure*

CCV steelhead appear to be well-distributed where found throughout the Central Valley (Good *et al.* 2005, NMFS 2011b). Existing wild steelhead stocks in the Central Valley are mostly confined to the upper Sacramento River and its tributaries, including Antelope, Deer, and Mill creeks and the Yuba River. Populations may exist in Big Chico and Butte creeks and a few wild steelhead are produced in the American and Feather rivers (McEwan and Jackson 1996). Snorkel surveys from 1999 to 2002 indicate that steelhead are present in Clear Creek (J. Newton, USFWS, pers. comm. 2002, as reported in Good *et al*. 2005). Because of the large resident *O. mykiss* population in Clear Creek, steelhead spawner abundance has not been estimated. In the San Joaquin River Basin, steelhead have been confirmed in all of the tributaries: Mokelumne, Calaveras, Stanislaus, Tuolumne, and Merced rivers. Zimmerman *et al.* (2008) used otolith microchemistry to show that *O. mykiss* of anadromous parentage occur in all three major San Joaquin River tributaries, but at low levels, and that these tributaries have a higher percentage of resident *O. mykiss* compared to the Sacramento River and its tributaries. On the Stanislaus

River, steelhead smolts have been captured in rotary screw traps at Caswell State Park and Oakdale each year since 1995 (S.P. Cramer and Associates Inc. 2009). A counting weir has been in place in the Stanislaus River since 2002 and in the Tuolumne River since 2009 to detect adult salmon, and have also detected *O. mykiss* passage. In 2012, 15 adult *O. mykiss* were detected passing the Tuolumne River weir and 82 adult *O. mykiss* were detected at the Stanislaus River weir (FishBio 2012a,b). Rotary screw trapping on the Merced River has occurred since 1999, however, a counting weir has not been installed on this river. Juvenile *O. mykiss* have not been reported on the Merced River until 2012.

CDFG staff has prepared Kodiak Trawl catch summaries for juvenile migrant CCV steelhead on the San Joaquin River near Mossdale, which represents migrants from the Stanislaus, Tuolumne, and Merced rivers (Figure 3). Based on trawl recoveries at Mossdale between 1988 and 2001, as well as rotary screw trap efforts in all three tributaries, Marston (2004) stated that it is "clear from this data that *O. mykiss* do occur in all the tributaries as migrants and that the vast majority of them occur on the Stanislaus River." Mossdale Kodiak Trawl catches continue to occur and are still being conducted by CDFG to this day. A total of 15 *O. mykiss* were caught during the 2012 season. The documented adult returns on the order of single fish in these tributaries and the low numbers of juvenile migrants captured suggest that existing populations of CCV steelhead on the Tuolumne, Merced, and lower San Joaquin rivers are severely depressed. The potential loss of these populations would severely impact CCV steelhead spatial structure and further challenge the viability of the CCV steelhead DPS.

d. Diversity

The distribution of CCV steelhead across a range of tributaries to the Sacramento River and across the San Joaquin River Basin gives the CCV steelhead DPS much improved spatial diversity as compared to other populations such as winter-run Chinook salmon. This spatial diversity gives CCV steelhead important buffers against localized adverse conditions and catastrophic events. However, significant concerns exist regarding the makeup of the population. All indications are that natural Central Valley steelhead have continued to decrease in abundance and in the proportion of natural fish over the past 25 years (Good et al. 2005, NMFS 2011b); the long-term trend remains negative. Analysis of data from the Chipps Island monitoring program indicates that natural steelhead production has continued to decline and that hatchery origin fish represent an increasing fraction of the juvenile production in the Central Valley. Since 1998, all hatchery produced steelhead in the Central Valley have been adipose fin clipped (ad-clipped). Since that time, the trawl data indicates that the proportion of ad-clip steelhead juveniles captured in the Chipps Island monitoring trawls has increased relative to wild juveniles, indicating a decline in natural production of juvenile steelhead. In recent years, the proportion of hatchery produced juvenile steelhead in the catch has exceeded 90 percent and in 2010 was 95 percent of the catch. Because hatchery releases have been fairly consistent through the years, these data suggests that the natural production of steelhead has been declining in the Central Valley.

Comprehensive steelhead population monitoring has not taken place in the Central Valley, despite 100 percent marking of hatchery steelhead since 1998. Efforts are underway to improve this deficiency, and a long term adult escapement monitoring plan is being considered (NMFS

2011b). Hatchery production and returns are dominant over natural fish and include significant numbers of non-DPS-origin Eel River steelhead stock. Salvage of juvenile steelhead at the CVP and SWP fish collection facilities has also shown a shift towards reduced natural production. The annual salvage of juvenile steelhead at the two facilities in the South Delta has fluctuated since 1993. In the past decade, there has been a marked decline in the total number of salvaged juvenile steelhead, with the salvage of hatchery produced steelhead showing the larger decline at the facilities in absolute numbers of fish salvaged. However, the percentage of wild fish to hatchery produced fish has also declined during the past decade. Thus, while the total number of salvaged hatchery produced fish has declined, naturally produced steelhead have also declined at a consistently higher rate than hatchery produced fish, thereby consistently reducing the ratio of wild to hatchery produced steelhead in the salvage data (NMFS 2011b).

C. SACRAMENTO RIVER WINTER-RUN CHINOOK SALMON (*ONCORHYNCHUS TSHAWYTSCHA*)

Listed as endangered (70 FR 37160; June 28, 2005)

A final rule listing SR winter-run Chinook salmon as threatened was published on November 5, 1990 (55 FR 46515). The ESU consists of only one population that is confined to the upper Sacramento River in California's Central Valley. The ESU was reclassified as endangered on January 4, 1994 (59 FR 440), due to increased variability of run sizes, expected weak returns as a result of two small year classes in 1991 and 1993, and a 99 percent decline between 1966 and 1991. The Livingston Stone National Fish Hatchery (LSNFH) population has been included in the listed SR winter-run Chinook salmon ESU (70 FR 37160; June 28, 2005).

The designated critical habitat for SR winter-run Chinook salmon includes the Sacramento River from Keswick Dam (RM 302) to Chipps Island (RM 0) at the westward margin of the Delta; all waters from Chipps Island westward to Carquinez Bridge, including Honker Bay, Grizzly Bay, Suisun Bay, and Carquinez Strait; all waters of San Pablo Bay westward of the Carquinez Bridge; and all waters of San Francisco Bay (north of the San Francisco/Oakland Bay Bridge) from San Pablo Bay to the Golden Gate Bridge (50 CFR § 226.204). In the Sacramento River, critical habitat includes the river water column, river bottom, and adjacent riparian zone used by fry and juveniles for rearing. In the areas westward of Chipps Island, critical habitat includes the estuarine water column and essential foraging habitat and food resources used by SR winter-run Chinook salmon as part of their juvenile emigration or adult spawning migration (58 FR 33212; June 16, 1993).

General Life History

Adult SR winter-run Chinook salmon enter San Francisco Bay from November through June (Hallock and Fisher 1985) and migrate past RBDD from mid-December through early August (NMFS 1997). The majority of the run passes RBDD from January through May, with the peak passage occurring in mid-March (Hallock and Fisher 1985). Spawning occurs primarily from mid-April to mid-August, with the peak activity occurring in May and June in the Sacramento River reach between Keswick Dam and RBDD (Vogel and Marine 1991). The majority of SR winter-run Chinook salmon spawners are 3 years old.

SR winter-run Chinook salmon fry begin to emerge from the gravel in late June to early July and continue through October (Fisher 1994). Emigration of juvenile SR winter-run Chinook salmon past RBDD may begin as early as mid-July, typically peaks in September, and can continue through March in dry years (Vogel and Marine 1991, NMFS 1997). Juvenile SR winter-run Chinook salmon occur in the Delta primarily from November through early May based on data collected from trawls in the Sacramento River at West Sacramento (RM 57; USFWS 2001a,b). The timing of migration may vary somewhat due to changes in river flows, dam operations, and water year type. SR winter-run Chinook salmon juveniles remain in the Delta until they reach a fork length of approximately 118 millimeters (mm) and are from 5 to 10 months of age, and then begin emigrating to the ocean as early as November and continue through May (Fisher 1994, Myers *et al.* 1998).

Table 3. The temporal occurrence of adult (a) and juvenile (b) Sacramento River winter-run Chinook salmon in the Sacramento River. Darker shades indicate months of greatest relative abundance.

a) Adult migration

Location	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Sac. River basin[a]	Medium	Medium	High	Medium	Medium	Medium	Medium					Medium
Sac. River[b]	Medium	Medium	Medium	Medium	Medium	Medium					Medium	Medium

b) Juvenile migration

Location	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Sac. River @ Red Bluff[c]	Low	Low	Low				Low / Medium	Medium	Medium	Medium	Medium	Medium
Sac. River @ Red Bluff[b]	Low	Low	Low				Low	Medium	Medium	Medium	Medium	Medium
Sac. River @ KL[d]	Medium	Medium	Medium	Low	Low			Low	Low	Low	High	High
Lower Sac. River (seine)e	High	High	Medium	Low	Low					Low	Medium	High
West Sac. River (trawl)e	Medium	Medium	High	Medium	Low						Low	Medium

KL = Knights Landing

Relative Abundance: = High = Medium = Low

Sources: [a]Yoshiyama *et al*. (1998); Moyle (2002); [b]Myers *et al*. (1998) ; Vogel and Marine(1991); [c]Martin *et al.* (2001); [d]Snider and Titus (2000); [e]USFWS (2001a, 2001b)

Viable Population Summary

a. Abundance

Historical SR winter-run Chinook salmon population estimates, which included males and females, were as high as near 100,000 fish in the 1960s, but declined to under 200 fish in the 1990s (Good et al. 2005). During the first part of the past decade, redd and carcass surveys as well as fish counts, suggested that the abundance of SR winter-run Chinook salmon was increasing since its listing. In fact, the 2006 run was the highest since the 1994 listing. However, the depressed 2007, 2008, 2009, and 2010 abundance estimates are an exception to this trend and may represent a combination of a new cycle of poor ocean productivity (Lindley et al. 2009) and recent drought conditions in the Central Valley. Population growth is estimated to be positive in the short-term trend at 0.26; however, the long-term trend is negative, averaging -0.14. Recent SR winter-run Chinook salmon abundance represents only 3 percent of the maximum post-1967, 5-year geometric mean, and is not yet well established (Good et al. 2005). The current annual and five year averaged cohort replacement rates (CRR) are both below 1.0. The annual CRR has been below 1.0 for the past four years and indicates that the SR winter-run population is not replacing itself.

Table 4. Winter-run Chinook salmon population estimates from RBDD counts (1986 to 2001) and carcass counts (2001 to 2006), and corresponding cohort replacement rates for the years since 1986 (CDFG Grand Tab March 2010).

Year	Population Estimate[a]	5-Year Moving Average of Population Estimate	Cohort Replacement Rate[b]	5-Year Moving Average of Cohort Replacement Rate	NMFS-Calculated Juvenile Production Estimate (JPE)[c]
1986	2596				
1987	2185				
1988	2878				
1989	696		0.27		
1990	430	1,757	0.20		
1991	211	1,280	0.07		40,100
1992	1240	1,091	1.78		273,100
1993	387	593	0.90	0.64	90,500
1994	186	491	0.88	0.77	74,500
1995	1297	664	1.05	0.94	338,107
1996	1337	889	3.45	1.61	165,069
1997	880	817	4.73	2.20	138,316
1998	2992	1,338	2.31	2.48	454,792
1999	3288	1,959	2.46	2.80	289,724
2000	1352	1,970	1.54	2.90	370,221
2001	8224	3,347	2.75	2.76	1,864,802
2002	7441	4,659	2.26	2.26	2,136,747
2003	8218	5,705	6.08	3.02	1,896,649
2004	7869	6,621	0.96	2.72	881,719
2005	15839	9,518	2.13	2.84	3,556,995
2006	17296	11,333	2.10	2.71	3,890,534
2007	2542	10,353	0.32	2.32	1,100,067
2008	2830	9,275	0.18	1.14	1,152,043
2009	4537[d]	8,609	0.26	1.00	1,144,860[e]
2010	1,596	5,760	0.63	0.70	332,012
median	2,542	1970	1.29	2.29	412,507

[a] Population estimates were based on RBDD counts until 2001. Starting in 2001, population estimates were based on carcass surveys.

[b] The majority of SR winter-run spawners are 3 years old. Therefore, NMFS calculated the CRR using spawning population of a given year, divided by the spawning population 3 years prior.

[c] JPE estimates were derived from NMFS calculations utilizing RBDD winter-run counts through 2001, and carcass counts thereafter for deriving adult escapement numbers. Only estimated to RBDD, does not include survival to the Delta.

[d]CDFG (2010)

[e]NMFS (2010b)

b. Productivity

ESU productivity has been positive over the short term, and adult escapement and juvenile production had been increasing annually (Good *et al.* 2005) until recently, with declining escapement estimates for the years 2007 through 2010. However, the long-term trend for the ESU remains negative. The most recent CRR estimates suggest a reduction in productivity for the three separate cohorts. The productivity of SR winter-run Chinook salmon is further compounded by the fact that only one spawning population exists.

c. Spatial Structure

The greatest risk factor for SR winter-run Chinook salmon lies with their spatial structure (Good *et al.* 2005). Historically, the distribution of SR winter-run Chinook salmon spawning and rearing was limited to the upper Sacramento River and its tributaries, where spring-fed streams provided cold water throughout the summer, allowing for spawning, egg incubation, and rearing during the mid-summer period (Slater 1963, Yoshiyama *et al.* 1998). The construction of Shasta Dam in 1943 blocked access to all of these waters except Battle Creek, which has its own impediments to upstream migration (*i.e.*, the fish weir at the Coleman National Fish Hatchery and other small hydroelectric facilities situated upstream of the weir) (Moyle *et al.* 1989, NMFS 1997, 1998a,b). The remnant population cannot access historical SR winter-run Chinook salmon habitat and must be artificially maintained in the Sacramento River by a regulated, finite cold-water pool behind Shasta Dam. Because of these conditions, SR winter-run Chinook salmon are more likely to be exposed to the impacts of drought in this lower basin environment. Most components of the SR winter-run Chinook salmon life history (*e.g.*, spawning, incubation, freshwater rearing) have been compromised by the habitat blockage in the upper Sacramento River. SR winter-run Chinook salmon are composed of a single population and it depends on cold-water releases from Shasta Dam, which could be vulnerable to a prolonged drought (Good *et al*. 2005).

d. Diversity

The second highest risk factor for the SR winter-run Chinook salmon ESU has been the detrimental effects on its diversity. The present SR winter-run Chinook salmon population has resulted from the introgression of several stocks that occurred when Shasta Dam blocked access to the upper watershed. A second genetic bottleneck occurred with the construction of Keswick Dam; and there may have been several others within the recent past (Good *et al.* 2005). Concerns of genetic introgression with hatchery populations are also increasing. Hatchery-origin SR winter-run Chinook salmon from LSNFH have made up more than 5 percent of the natural spawning run in recent years and in 2005, it exceeded 18 percent of the natural run. The average over the last 10 years (approximately 3 generations) has been 8 percent, still below the low-risk threshold for hatchery influence. Since 2005, the percentage of hatchery fish in the river has been consistently below 15 percent.

D. CENTRAL VALLEY SPRING-RUN CHINOOK SALMON (*ONCORHYNCHUS TSHAWYTSCHA*)

Listed as threatened (70 FR 37160; June 28, 2005)

CV spring-run Chinook salmon were listed as threatened on September 16, 1999 (64 FR 50394). This ESU consists of naturally spawned populations of CV spring-run Chinook salmon occurring in the Sacramento River basin. The Feather River Fish Hatchery (FRFH) spring-run Chinook salmon population has been included as part of the CV spring-run Chinook salmon ESU in the most recent listing determination for the CV spring-run Chinook salmon (70 FR 37160, June 28, 2005). Critical habitat was designated for CV spring-run Chinook salmon on September 2, 2005 (70 FR 52488). It includes stream reaches such as those of the Feather and Yuba rivers, Big Chico, Butte, Deer, Mill, Battle, Antelope, and Clear creeks, the main stem of the Sacramento River from Keswick Dam through the Delta; and portions of the network of channels in the northern Delta.

General Life History

Adult CV spring-run Chinook salmon leave the ocean to begin their upstream migration in late January and early February (CDFG 1998) and enter the Sacramento River between March and September, primarily in May and June (see Table 5 in text; Yoshiyama *et al.* 1998, Moyle 2002). Lindley *et al*. (2007) indicates adult CV spring-run Chinook salmon enter native tributaries from the Sacramento River primarily between mid-April and mid-June. Typically, CV spring-run Chinook salmon utilize mid- to high-elevation streams that provide appropriate temperatures and sufficient flow, cover, and pool depth to allow over-summering while conserving energy and allowing their gonadal tissue to mature (Yoshiyama *et al*. 1998).

CV spring-run Chinook salmon spawning occurs between September and October depending on water temperatures. Between 56 and 87 percent of adult CV spring-run Chinook salmon that enter the Sacramento River basin to spawn are 3 years old (Calkins *et al.* 1940, Fisher 1994). CV spring-run Chinook salmon fry emerge from the gravel from November to March (Moyle 2002) and the emigration timing is highly variable, as they may migrate downstream as young-of-the-year or as juveniles or yearlings. The modal size of fry migrants at approximately 40 mm between December and April in Mill, Butte, and Deer creeks reflects a prolonged emergence of fry from the gravel (Lindley *et al*. 2007). Studies in Butte Creek (Ward *et al*. 2002, 2003, McReynolds *et al*. 2005) found the majority of CV spring-run Chinook salmon migrants to be fry occurring primarily during December, January, and February; and that these movements appeared to be influenced by flow. Small numbers of CV spring-run Chinook salmon remained in Butte Creek to rear and migrated as yearlings later in the spring. Juvenile emigration patterns in Mill and Deer creeks are very similar to patterns observed in Butte Creek, with the exception that Mill and Deer creek juveniles typically exhibit a later young-of-the-year migration and an earlier yearling migration (Lindley *et al*. 2007).

Once juveniles emerge from the gravel they initially seek areas of shallow water and low velocities while they finish absorbing the yolk sac and transition to exogenous feeding (Moyle 2002). Many also will disperse downstream during high-flow events. As is the case in other salmonids, there is a shift in microhabitat use by juveniles to deeper faster water as they grow larger. Microhabitat use can be influenced by the presence of predators which can force fish to select areas of heavy cover and suppress foraging in open areas (Moyle 2002). The emigration period for CV spring-run Chinook salmon extends from November to early May, with up to 69 percent of the young-of-the-year fish outmigrating through the lower Sacramento River and Delta during this period (CDFG 1998). Peak movement of juvenile CV spring-run Chinook salmon in the Sacramento River at Knights Landing occurs in December, and again in March and April. However, juveniles also are observed between November and the end of May (Snider and Titus 2000). Based on the available information, the emigration timing of CV spring-run Chinook salmon appears highly variable (CDFG 1998).

Table 5. The temporal occurrence of adult (a) and juvenile (b) Central Valley spring-run Chinook salmon in the Sacramento River. Darker shades indicate months of greatest relative abundance.
Note: Yearling spring-run Chinook salmon rear in their natal streams through the first summer following their birth. Downstream emigration generally occurs the following fall and winter. Young of the year spring-run Chinook salmon emigrate during the first spring after they hatch.
Sources: [a]Yoshiyama *et al*. (1998); [b]Moyle (2002); [c]Myers *et al*. (1998); [d]Lindley *et al*. (2007); [e]CDFG (1998); [f]McReynolds *et al*. (2005); Ward *et al*. (2002, 2003); [g]Snider and Titus (2000)

(a) Adult migration

Location	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Sac.River basin[a,b]			Medium	Medium	High	High	Medium	Medium	Medium	Low		
Sac. River mainstem[c]	– / Low	Low	Medium	Medium	Medium	Medium	Medium	Low				
Mill Creek[d]			Low	Medium / High	High	High / Medium	Medium / Low	Low / –				
Deer Creek[d]			Low	Medium / High	High	High / Medium	Medium / –					
Butte Creek[d]		Medium	Medium	Medium / High	High	High / Medium	Low / –					
(b) Adult Holding		Medium	Medium	Medium / High	High	High	High	High	High / Medium	Medium / Low		
(c) Adult Spawning								Low / Medium	High	Medium / Low		

(d) Juvenile migration

Location	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Sac. River Tribs[e]	Medium	Medium	Medium							Medium	High	High
Upper Butte Creek[f]	High	High	Medium	Medium	Medium	Low				Low	Low	High
Mill, Deer, Butte Creeks[d]	High	High	Medium	Medium	Medium	Low				Low	Low	Low
Sac. River at RBDD[c]	High	Low	Low	Low	Low / –						High	High
Sac. River at KL[g]	Medium	Medium	High	High	Medium						Medium	High

Relative Abundance: = High = Medium = Low

Viable Population Summary

a. Abundance.

The Central Valley drainage as a whole is estimated to have supported CV spring-run Chinook salmon runs as large as 600,000 fish between the late 1880s and 1940s (CDFG 1998). Before the construction of Friant Dam, nearly 50,000 adults were counted in the San Joaquin River alone (Fry 1961). Historically the CV spring-run Chinook salmon were the second most abundant salmon run in the Central Valley (CDFG 1998). These fish occupied the upper and middle reaches (1,000 to 6,000 feet elevation) of the San Joaquin, American, Yuba, Feather, Sacramento, McCloud and Pit rivers, with smaller populations in most tributaries with sufficient habitat for over-summering adults (Stone 1874, Rutter 1904, Clark 1929). The Central Valley Technical Review Team (CVTRT) estimated that historically there were 18 or 19 independent populations of CV spring-run Chinook salmon, along with a number of dependent populations and four diversity groups (Lindley *et al.* 2004). Of these 18 populations, only three extant populations currently exist (Mill, Deer, and Butte creeks on the upper Sacramento River) and they represent only the northern Sierra Diversity group.

The CV spring-run Chinook salmon ESU has displayed broad fluctuations in adult abundance, for example ranging from 1,403 in 1993 to 24,903 in 1998. Sacramento River tributary populations in Mill, Deer, and Butte creeks are probably the best trend indicators for the CV spring-run Chinook salmon ESU as a whole because these streams contain the primary independent populations within the ESU. Generally, these streams have shown a positive escapement trend since 1991. Escapement numbers are dominated by Butte Creek returns, which have averaged over 7,000 fish since 1995. During this same period, adult returns on Mill Creek have averaged 778 fish, and 1,463 fish on Deer Creek. Although trends through the first half of the past decade were generally positive, annual abundance estimates display a high level of fluctuation, and the overall number of CV spring-run Chinook salmon remains well below estimates of historic abundance. The past several years (since 2005) have shown declining abundance numbers in most of the tributaries.

Table 6. Central Valley Spring-run Chinook salmon population estimates from CDFG Grand Tab (March 2010) with corresponding cohort replacement rates for years since 1986.

Year	Sacramento	FRFH	Tributary	5-Year	Trib	5-Year	5-Year	Basin	5-Year
1986	25,696	1,433	24,263						
1987	13,888	1,213	12,675						
1988	18,933	6,833	12,100						
1989	12,163	5,078	7,085		0.29			0.47	
1990	7,683	1,893	5,790	12,383	0.46		15,673	0.55	
1991	5,926	4,303	1,623	7,855	0.13		11,719	0.31	
1992	3,044	1,497	1,547	5,629	0.22		9,550	0.25	
1993	6,076	4,672	1,404	3,490	0.24	0.27	6,978	0.79	0.48
1994	6,187	3,641	2,546	2,582	1.57	0.52	5,783	1.04	0.59
1995	15,238	5,414	9,824	3,389	6.35	1.70	7,294	5.01	1.48
1996	9,083	6,381	2,702	3,605	1.92	2.06	7,926	1.49	1.72
1997	5,193	3,653	1,540	3,603	0.60	2.14	8,355	0.84	1.84
1998	31,649	6,746	24,903	8,303	2.53	2.60	13,470	2.08	2.09
1999	10,100	3,731	6,369	9,068	2.36	2.75	14,253	1.11	2.11
2000	9,244	3,657	5,587	8,220	3.63	2.21	13,054	1.78	1.46
2001	17,598	4,135	13,463	10,372	0.54	1.93	14,757	0.56	1.27
2002	17,419	4,189	13,230	12,710	2.08	2.23	17,202	1.72	1.45
2003	17,691	8,662	9,029	9,536	1.62	2.04	14,410	1.91	1.42
2004	13,982	4,212	9,770	10,216	0.73	1.72	15,187	0.79	1.35
2005	16,126	1,774	14,352	11,969	1.08	1.21	16,563	0.93	1.18
2006	10,948	2,181	8,767	11,030	0.97	1.29	15,233	0.62	1.20
2007	9,974	2,674	7,300	9,844	0.75	1.03	13,744	0.71	0.99
2008	6,420	1,624	4,796	8,997	0.33	0.77	11,490	0.40	0.69
2009	3,801	989	2,812	7,605	0.32	0.69	9,454	0.35	0.60
2010	3,792	1,661	2,131	5,161	0.29	0.53	6,987	0.38	0.49
Median	10,100	3,657	7,085	8,303	0.74	1.71	13,054	0.79	1.31

[a] NMFS included both the escapement numbers from the Feather River Fish Hatchery (FRFH) and the Sacramento River and its tributaries in this table. Sacramento River Basin run size is the sum of the escapement numbers from the FRFH and the tributaries. [b] Abbreviations: CRR = Cohort Replacement Rate, Trib = tributary

b. Productivity

The 5-year geometric mean for the extant Butte, Deer, and Mill Creek spring-run Chinook salmon populations ranges from 491 to 4,513 fish (Good et al. 2005), indicating increasing productivity over the short-term and was projected to likely continue into the future (Good et al. 2005). However, the last 5 years of adult escapement to these tributaries has seen a cumulative decline in fish numbers and the CRR has declined in concert with the population declines. The productivity of the Feather River and Yuba River populations and contribution to the CV spring-run ESU currently is unknown.

c. Spatial Structure

CV Spring-run Chinook salmon presence has been reported more frequently in several upper Central Valley creeks, but the sustainability of these runs is unknown. Butte Creek spring-run Chinook salmon cohorts have recently utilized all currently available habitat in the creek; and it is unknown if individuals have opportunistically migrated to other systems. The spatial structure of the CV spring-run Chinook salmon ESU has been reduced with the extirpation of all San Joaquin River basin CV spring-run Chinook salmon populations. An experimental population of CV spring-run Chinook salmon has been proposed, which would be reintroduced into the San Joaquin River below Friant Dam as part of the San Joaquin River Settlement Agreement (78 FR 3381; January 16, 2013). Its long term contribution to the CV spring-run Chinook salmon ESU is uncertain.

d. Diversity

The CV spring-run Chinook salmon ESU is comprised of two genetic complexes. Analysis of natural and hatchery CV spring-run Chinook salmon stocks in the Central Valley indicates that the Northern Sierra Nevada spring-run Chinook salmon population complex (Mill, Deer, and Butte creeks) retains genetic integrity. The genetic integrity of the Northern Sierra Nevada spring-run Chinook salmon population complex in the Feather River has been somewhat compromised. The Feather River CV spring-run Chinook salmon have introgressed with the CV fall-run Chinook salmon, and it appears that the Yuba River population may have been impacted by FRFH fish straying into the Yuba River. Additionally, the diversity of the CV spring-run Chinook salmon ESU has been further reduced with the loss of the San Joaquin River basin CV spring-run Chinook salmon populations.

E. CRITICAL HABITAT CONDITION AND FUNCTION FOR SPECIES' CONSERVATION

Critical habitat includes the stream channels in the designated stream reaches and the lateral extent as defined by the ordinary high-water line. In areas where the ordinary high-water line has not been defined, the lateral extent will be defined by the bankfull elevation (defined as the level at which water begins to leave the channel and move into the floodplain; it is reached at a discharge that generally has a recurrence interval of 1 to 2 years on the annual flood series) (Bain and Stevenson 1999; 70 FR 52488, September 2, 2005).

CCV steelhead Primary Constituent Elements

Within the areas of designated critical habitat for CCV steelhead, NMFS identified primary constituent elements (PCEs) that are essential to the conservation of the species. These PCEs identify sites necessary to support one or more life stages and, in turn, these sites contain the physical or biological features essential for conservation of the species. Following are the inland habitat types used as PCEs for CCV steelhead, as well as a description of the condition and function of these PCEs for species' conservation:

1. Spawning Habitat

PCEs include freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation, and larval development. Most spawning habitat in the Central Valley for CCV steelhead is located in areas directly downstream of dams containing suitable environmental conditions for spawning and incubation. Spawning habitat for CCV steelhead is similar in nature to the requirements of Chinook salmon, primarily occurring in reaches directly below dams (*i.e.*, above RBDD on the Sacramento River) on perennial watersheds throughout the Central Valley. These reaches can be subjected to variations in flows and temperatures, particularly over the summer months, which can have adverse effects upon salmonids spawning below them. Even in degraded reaches, spawning habitat has a high conservation value as its function directly affects the spawning success and reproductive potential of listed salmonids.

2. Freshwater Rearing Habitat

PCEs include freshwater rearing sites with water quantity and floodplain connectivity to form and maintain physical habitat conditions that support juvenile growth and mobility; water quality and forage supporting juvenile development; and natural cover such as shade, submerged and overhanging large woody material, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks. Both spawning areas and migratory corridors comprise rearing habitat for juveniles, which feed and grow before and during their outmigration. Non-natal, intermittent tributaries also may be used for juvenile rearing. Rearing habitat condition is strongly affected by habitat complexity, food supply, and the presence of predators of juvenile salmonids. Some complex, productive habitats with floodplains (*e.g.*, the lower Cosumnes River, Sacramento River reaches with setback levees [*i.e.*, primarily located upstream of the City of Colusa]) and flood bypasses (*i.e.*, Yolo and Sutter bypasses) remain in the system. However, the channelized, leveed, and riprapped river reaches and sloughs that are common in the Sacramento-San Joaquin system typically have low habitat complexity, low abundance of food organisms, and offer little protection from either fish or avian predators. Juvenile life stages of salmonids are dependent on the function of this habitat for successful survival and recruitment.

3. Freshwater Migration Corridors

PCEs include freshwater migration corridors free of migratory obstruction and excessive predation with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks, and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival. Migratory corridors are downstream of the spawning areas and include the lower mainstems of the Sacramento and San Joaquin rivers and the Delta. These corridors allow the upstream passage of adults, and the downstream emigration of outmigrant juveniles. Migratory habitat condition is strongly affected by the presence of barriers, which can include dams (*i.e.*, hydropower, flood control, and irrigation flashboard dams), unscreened or poorly screened diversions, degraded water quality, or behavioral impediments to migration. For successful survival and recruitment of salmonids, freshwater migration corridors must function sufficiently to provide adequate passage. For this reason, freshwater migration corridors are considered to have a high conservation value even if the migration corridors are significantly degraded compared to their natural state.

4. Estuarine Areas

PCEs include estuarine areas free of obstruction with water quality, water quantity, and salinity conditions supporting juvenile and adult physiological transitions between fresh and salt water; natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels; and juvenile and adult forage, including aquatic invertebrates and fishes, supporting growth and maturation. Estuarine areas are considered to have a high conservation value as they provide factors which function to provide predator avoidance and as a transitional zone to the ocean environment.

Green Sturgeon sDPS PCEs

The critical habitat for the green sturgeon sDPS includes PCEs within the defined area that are essential to the conservation of the species. This includes the estuarine waters of the Delta. Following are the PCEs for the green sturgeon sDPS in estuarine habitats as well as a description of the condition and function of these PCEs for species' conservation.

1. Food Resources

PCEs include abundant prey items within estuarine habitats and substrates for juvenile, subadult, and adult life stages. Prey species for juvenile, subadult, and adult sDPS green sturgeon within bays and estuaries primarily consist of benthic invertebrates and fish, including crangonid shrimp, callianassid shrimp, burrowing thalassinidean shrimp, amphipods, isopods, clams, annelid worms, crabs, sand lances, and anchovies. These prey species are critical for the rearing, foraging, growth, and development of juvenile, subadult, and adult green sturgeon within the bays and estuaries. Currently, the estuary provides these food resources, although annual fluctuations in the population levels of these food resources may diminish the contribution of one group to the diet of green sturgeon relative to another food source. The recent spread of the Asian overbite clam has shifted the diet profile of white sturgeon to this invasive species. The overbite clam now makes up a substantial proportion of the white sturgeon's diet in the estuary. NMFS assumes that green sturgeon have also altered their diet to include this new food source based on its increased prevalence in the benthic invertebrate community.

2. Water Flow

Within bays and estuaries adjacent to the Sacramento River (*e.g.*, the Sacramento-San Joaquin Delta and the Suisun, San Pablo, and San Francisco bays), sufficient flow into the bay and estuary to allow adults to successfully orient to the incoming flow and migrate upstream to spawning grounds are included in the PCEs. Sufficient flows are needed to attract adult sDPS green sturgeon to the Sacramento River from the bay and to initiate the upstream spawning migration into the upper river. Currently, flows provide the necessary attraction to sDPS green sturgeon to enter the Sacramento River. Nevertheless, these flows are substantially less than what would have been available historically to stimulate the spawning migration.

3. Water Quality

PCEs include water quality, including temperature, salinity, oxygen content, and other chemical characteristics, is necessary for normal behavior, growth and viability of all life stages. Suitable water temperatures for juvenile green sturgeon should be below 24°C (75°F). At temperatures above 24°C, juvenile green sturgeon exhibit decreased swimming performance (Mayfield and Cech 2004) and increased cellular stress (Allen *et al.* 2006). Suitable salinities in the estuary range from brackish water (10 ppt) to salt water (33 ppt). Juveniles transitioning from brackish to salt water can tolerate prolonged exposure to salt water salinities, but may exhibit decreased growth and activity levels (Allen and Cech 2007), whereas subadults and adults tolerate a wide range of salinities (Kelly *et al.* 2007). Subadult and adult green sturgeon occupy a wide range of DO levels, but may need a minimum DO level of at least 6.54 mg O_2/l (Kelly *et al.* 2007, Moser and Lindley 2007). As described above, adequate levels of DO are also required to support oxygen consumption by juveniles (ranging from 61.78 to 76.06 mg O_2 hr^{-1} kg^{-1}, Allen and Cech 2007). Suitable water quality also includes water free of contaminants (*e.g.*, pesticides, organochlorines, selenium, and elevated levels of heavy metals) that may disrupt the normal development of juvenile life stages, or the growth, survival, or reproduction of subadult or adult stages. In general, water quality in the Delta and estuary meets these criteria, but local areas of the Delta and downstream bays have been identified as having deficiencies. Water quality in the areas such as the Stockton turning basin and Port of Stockton routinely have depletions of DO and episodes of first flush contaminants from the surrounding industrial and urban watershed. Discharges of agricultural drain water have also been implicated in local elevations of pesticides, selenium, and other related agricultural compounds within the Delta and the tributaries and sloughs feeding into the Delta. Discharges from petroleum refineries in Suisun and San Pablo bays have been identified as sources of selenium to the local aquatic ecosystem (Linville *et al.* 2002).

4. Migratory Corridor

PCEs include a migratory pathway necessary for the safe and timely passage of sDPS green sturgeon within estuarine habitats and between estuarine and riverine or marine habitats. Within the waterways comprising the Delta, and bays downstream of the Sacramento River, safe and unobstructed passage is needed for juvenile sDPS green sturgeon during the rearing phase of their life cycle. Rearing fish need the ability to freely migrate from the river through the estuarine waterways of the Delta and bays and eventually out into the ocean. Passage within the bays and the Delta is also critical for adults and subadults for feeding and summer holding, as well as to access the Sacramento River for their upstream spawning migrations and to make their outmigration back into the ocean. Within bays and estuaries outside of the Delta and the areas comprised by Suisun, San Pablo, and San Francisco bays, safe and unobstructed passage is necessary for adult and subadult sDPS green sturgeon to access feeding areas, holding areas, and thermal refugia, and to ensure passage back out into the ocean. Currently, safe and unobstructed passage has been diminished by human actions in the Delta and bays. The CVP and SWP water projects alter flow patterns in the Delta due to export pumping and create entrainment issues in the Delta at the pumping and Fish Facilities. Power generation facilities in Suisun Bay create risks of entrainment and thermal barriers through their operations of cooling water diversions and discharges. Installation of seasonal barriers in the South Delta and operations of the radial gates in the DCC facilities alter migration corridors available to sDPS green sturgeon. Actions such as the hydraulic dredging of ship channels and operations of large ocean going vessels create additional sources of risk to sDPS green sturgeon within the estuary. Hydraulic dredging can result in the entrainment of fish into the dredger's hydraulic cutterhead intake. Commercial shipping traffic can result in the loss of fish, particularly adult fish, through ship and propeller strikes.

5. Water Depth

PCEs include a diversity of depths necessary for shelter, foraging, and migration of juvenile, subadult, and adult life stages. Subadult and adult green sturgeon occupy deep (≥ 5 m) holding pools within bays and estuaries as well as within freshwater rivers. These deep holding pools may be important for feeding and energy conservation, or may serve as thermal refugia for subadult and adult green sturgeon (Benson *et al*. 2007). Tagged adults and subadults within the San Francisco Bay estuary primarily occupied waters over shallow depths of less than 10 m, either swimming near the surface or foraging along the bottom (Kelly *et al*. 2007). In a study of juvenile sDPS green sturgeon in the Delta, relatively large numbers of juveniles were captured primarily in shallow waters from 3–8 feet deep, indicating juveniles may require shallower depths for rearing and foraging (Radtke 1966). Thus, a diversity of depths is important to support different life stages and habitat uses for sDPS green sturgeon within estuarine areas.

Currently, there is a diversity of water depths found throughout the San Francisco Bay estuary and Delta waterways. Most of the deeper waters, however, are comprised of artificially maintained shipping channels, which do not migrate or fluctuate in response to the hydrology in the estuary in a natural manner. The channels are simplified trapezoidal shapes with little topographical variation along the channel alignment. Shallow waters occur throughout the Delta and San Francisco Bay. Extensive "flats" occur in the lower reaches of the Sacramento and San Joaquin River systems as they leave the Delta region and are even more extensive in Suisun and San Pablo bays. In most of the region, variations in water depth in these shallow water areas occur due to natural processes, with only localized navigation channels being dredged (*e.g.*, the Napa River and Petaluma River channels in San Pablo Bay).

6. Sediment Quality

PCEs include sediment quality (*i.e*., chemical characteristics) necessary for normal behavior, growth, and viability of all life stages. This includes sediments free of contaminants (*e.g*., elevated levels of selenium, PAHs, and organochlorine pesticides) that can cause negative effects on all life stages of green sturgeon.

F. FACTORS IMPACTING LISTED SPECIES

1. Habitat Blockage

Hydropower, flood control, and water supply dams of the CVP, SWP, and other municipal and private entities have permanently blocked or hindered salmonid access to historical spawning and rearing grounds. Clark (1929) estimated that originally there were 6,000 linear miles of salmon habitat in the Central Valley system and that 80 percent of this habitat had been lost by 1928. Yoshiyama *et al.* (1996) calculated that roughly 2,000 linear miles of salmon habitat was actually available before dam construction and mining, and concluded that 82 percent is not accessible today.

As a result of migrational barriers, Sacramento River winter-run Chinook salmon, CV spring-run Chinook salmon, and CCV steelhead populations have been confined to lower elevation mainstems that historically were only used for migration. Population abundances have declined in these streams due to decreased quantity and quality of spawning and rearing habitat. Higher temperatures at these lower elevations during late-summer and fall are also a major stressor to adult and juvenile salmonids. According to Lindley *et al.* (2004), of the four independent populations of Sacramento River winter-run Chinook salmon that occurred historically, only one mixed stock of Sacramento River winter-run Chinook salmon remains below Keswick Dam. Similarly, of the 18 independent populations of CV spring-run Chinook salmon that occurred historically, only 3 independent populations remain in Deer, Mill, and Butte creeks. Dependent populations of CV spring-run Chinook salmon continue to occur in Big Chico, Antelope, Clear, Thomes, and Beegum creeks and the Yuba River, but are thought to rely on the three extant independent populations for their continued survival. CCV steelhead historically had at least 81 independent populations based on Lindley *et al.*'s (2006) analysis of potential habitat in the Central Valley. However, due to dam construction, access to 80 percent of the historically available habitat has been lost. Green sturgeon sDPS populations were also likely affected by barriers and alterations to the natural hydrology of Central Valley river systems. In particular, RBDD blocked access to a significant portion of the adult green sturgeon sDPS spawning run under the operational procedures prior to the Operations BO. Modifications to the operations of the RBDD as required under the Operations BO will substantially reduce the impediment to upstream migrations of adult sDPS green sturgeon. As of summer 2012, a new fish screen became operational, and the RBDD gates are required to remain open year round.

The Suisun Marsh Salinity Control Gates (SMSCG), located on Montezuma Slough, were installed in 1988, and are operated with gates and flashboards to decrease the salinity levels of managed wetlands in Suisun Marsh. The SMSCG are known to block or delay passage of adult Chinook salmon migrating upstream (Edwards *et al.* 1996, Tillman *et al.* 1996, DWR 2002). The effects of the SMSCG on sturgeon are unknown at this time.

2. <u>Water Development</u>

The diversion and storage of natural flows by dams and diversion structures on Central Valley waterways have depleted stream flows and altered the natural cycles by which juvenile and adult salmonids base their migrations. As much as 60 percent of the natural historical inflow to Central Valley watersheds and the Delta have been diverted for human uses. Depleted flows have contributed to higher temperatures, lower DO levels, and decreased recruitment of gravel and large woody debris (LWD). More uniform flows year round have resulted in diminished natural channel formation, altered food web processes, and slower regeneration of riparian vegetation. These stabilized flow patterns have reduced bed load movement (Mount 1995, Ayers 2001), caused spawning gravels to become embedded, and decreased channel widths due to channel incision, all of which has decreased the available spawning and rearing habitat below dams. The storage of unimpeded runoff in these large reservoirs also has altered the normal hydrograph for the Sacramento and San Joaquin River watersheds. Rather than seeing peak flows in these river systems following winter rain events (Sacramento River) or spring snow melt (San Joaquin River), the current hydrology has truncated peaks with a prolonged period of elevated flows (compared to historical levels) continuing into the summer dry season.

Water withdrawals, for agricultural and municipal purposes have reduced river flows and increased temperatures during the critical summer months, and in some cases, have been of a sufficient magnitude to result in reverse flows in the lower San Joaquin River (Reynolds *et al*. 1993). Direct relationships exist between water temperature, water flow, and juvenile salmonid survival (Brandes and McLain 2001). Elevated water temperatures in the Sacramento River have limited the survival of young salmon in those waters. Juvenile fall-run Chinook salmon survival in the Sacramento River is also directly related with June stream flow and June and July Delta outflow (Dettman *et al*. 1987).

Water diversions for irrigated agriculture, municipal and industrial use, and managed wetlands are found throughout the Central Valley. Thousands of small- and medium-size water diversions exist along the Sacramento and San Joaquin rivers, and their tributaries. Although efforts have been made in recent years to screen some of these diversions, many remain unscreened. Depending on the size, location, and season of operation, these unscreened diversions entrain and kill many life stages of aquatic species, including juvenile salmonids. For example, as of 1997, 98.5 percent of the 3,356 diversions included in a Central Valley database were either unscreened or screened insufficiently to prevent fish entrainment (Herren and Kawasaki 2001). Most of the 370 water diversions operating in Suisun Marsh are unscreened (Herren and Kawasaki 2001).

Outmigrant juvenile salmonids in the Delta have been subjected to adverse environmental conditions created by water export operations at the CVP and SWP facilities. Specifically, juvenile salmonid survival has been reduced by the following: (1) water diversion from the mainstem Sacramento River into the central Delta via the Delta Cross Channel; (2) upstream or reverse flows of water in the lower San Joaquin River and southern Delta waterways; (3) entrainment at the CVP/SWP export facilities and associated problems at Clifton Court Forebay; and (4) increased exposure to introduced, non-native predators such as striped bass (*Morone saxatilis*), largemouth bass (*Micropterus salmoides*), and sunfishes (*Centrarchidae* spp.). On June 4, 2009, NMFS issued a biological and conference opinion on the long-term operations of the CVP and SWP (NMFS 2009b). As a result of the jeopardy and adverse modification determinations, NMFS provided a reasonable and prudent alternative that reduces many of the adverse effects of the CVP and SWP resulting from the stressors described above.

3. Water Conveyance and Flood Control

The development of the water conveyance system in the Delta has resulted in the construction of more than 1,100 miles of channels and diversions to increase channel elevations and flow capacity of the channels (Mount 1995). Levee development in the Central Valley affects spawning habitat, freshwater rearing habitat, freshwater migration corridors, and estuarine habitat PCEs. As Mount (1995) indicates, there is an "underlying, fundamental conflict inherent in this channelization." Natural rivers strive to achieve dynamic equilibrium to handle a watersheds supply of discharge and sediment (Mount 1995). The construction of levees disrupts the natural processes of the river, resulting in a multitude of habitat-related effects.

Many of these levees use angular rock (riprap) to armor the bank from erosive forces. The effects of channelization, and riprapping, include the alteration of river hydraulics and cover along the bank as a result of changes in bank configuration and structural features (Stillwater Sciences 2006). These changes affect the quantity and quality of nearshore habitat for juvenile salmonids and have been thoroughly studied (USFWS 2000, Schmetterling *et al.* 2001, Garland *et al*. 2002). Simple slopes protected with rock revetment generally create nearshore hydraulic conditions characterized by greater depths and faster, more homogeneous water velocities than occur along natural banks. Higher water velocities typically inhibit deposition and retention of sediment and woody debris. These changes generally reduce the range of habitat conditions typically found along natural shorelines, especially by eliminating the shallow, slow-velocity river margins used by juvenile fish as refuge and escape from fast currents, deep water, and predators (Stillwater Sciences 2006).

Large quantities of downed trees are a functionally important component of many streams (NMFS 1996b). LWD influences stream morphology by affecting channel pattern, position, and geometry, as well as pool formation (Keller and Swanson 1979, Bilby 1984, Robison and Beschta 1990). Reduction of wood in the stream channel, either from past or present activities, generally reduces pool quantity and quality, and alters stream shading, which can affect water temperature regimes and nutrient input, and can eliminate critical stream habitat needed for both vertebrate and invertebrate populations. Removal of vegetation also can destabilize marginally stable slopes by increasing the subsurface water load, lowering root strength, and altering water flow patterns in the slope.

In addition, the armoring and revetment of stream banks tends to narrow rivers, reducing the amount of habitat per unit channel length (Sweeney *et al*. 2004). As a result of river narrowing, benthic habitat decreases and the number of macroinvertebrates, such as stoneflies and mayflies, per unit channel length decreases affecting salmonid food supply.

4. <u>Land Use Activities</u>

Land use activities continue to have large impacts on salmonid habitat in the Central Valley watershed. Until about 150 years ago, the Sacramento River was bordered by up to 500,000 acres of riparian forest, with bands of vegetation extending outward for 4 or 5 miles (California Resources Agency 1989). Starting with the gold rush, these vast riparian forests were cleared for building materials, fuel, and to clear land for farms on the raised natural levee banks. The degradation and fragmentation of riparian habitat continued with extensive flood control and bank protection projects, together with the conversion of the fertile riparian lands to agriculture outside of the natural levee belt. By 1979, riparian habitat along the Sacramento River diminished to 11,000 to 12,000 acres, or about 2 percent of historic levels (McGill 1987). The clearing of the riparian forests removed a vital source of snags and driftwood in the Sacramento and San Joaquin River basins. This has reduced the volume of LWD input needed to form and maintain stream habitat that salmon depend on in their various life stages. In addition to this loss of LWD sources, removal of snags and obstructions from the active river channel for navigational safety has further reduced the presence of LWD in the Sacramento and San Joaquin Rivers, as well as the Delta.

Increased sedimentation resulting from agricultural and urban practices within the Central Valley is one of the primary causes of salmonid habitat degradation (NMFS 1996a). Sedimentation can adversely affect salmonids during all freshwater life stages by: clogging or abrading gill surfaces, adhering to eggs, hampering fry emergence (Phillips and Campbell 1961), burying eggs or alevins, scouring and filling in pools and riffles, reducing primary productivity and photosynthesis activity (Cordone and Kelley 1961), and affecting intergravel permeability and DO levels. Excessive sedimentation over time can cause substrates to become embedded, which reduces successful salmonid spawning and egg and fry survival (Waters 1995).

Land use activities associated with road construction, urban development, logging, mining, agriculture, and recreation have significantly altered fish habitat quantity and quality through the alteration of stream bank and channel morphology; alteration of ambient water temperatures; degradation of water quality; elimination of spawning and rearing habitat; fragmentation of available habitats; elimination of downstream recruitment of LWD; and removal of riparian vegetation, resulting in increased stream bank erosion (Meehan 1991). Urban stormwater and agricultural runoff may be contaminated with herbicides and pesticides, petroleum products, sediment, *etc.* Agricultural practices in the Central Valley have eliminated large trees and logs and other woody debris that would otherwise be recruited into the stream channel (NMFS 1998a).

Since the 1850s, wetlands reclamation for urban and agricultural development has caused the cumulative loss of 79 and 94 percent of the tidal marsh habitat in the Delta downstream and upstream of Chipps Island, respectively (Conomos *et al.* 1985, Nichols *et al.* 1986, Wright and Phillips 1988, Monroe *et al.* 1992, Goals Project 1999). Prior to 1850, approximately 1400 km^2 (approximately 345,947 acres) of freshwater marsh surrounded the confluence of the Sacramento and San Joaquin Rivers, and another 800 km^2 (approximately 197,684 acres) of saltwater marsh fringed San Francisco Bay's margins. Of the original 2,200 km^2 (approximately 543,632 acres) of tidally influenced marsh, only about 125 km^2 (approximately 30,888 acres) of undiked marsh remains today. In Suisun Marsh, saltwater intrusion and land subsidence gradually has led to the decline of agricultural production. Presently, Suisun Marsh consists largely of tidal sloughs and managed wetlands for duck clubs, which first were established in the 1870s in western Suisun Marsh (Goals Project 1999). Even more extensive losses of wetland marshes occurred in the Sacramento and San Joaquin River Basins. Little of the extensive tracts of wetland marshes that existed prior to 1850 along the valley's river systems and within the natural flood basins exist today. Most has been "reclaimed" for agricultural purposes, leaving only small remnant patches.

Dredging of river channels to enhance inland maritime trade and to provide raw material for levee construction has significantly and detrimentally altered the natural hydrology and function of the river systems in the Central Valley. Starting in the mid-1800s, the U.S. Army Corps of Engineers (Corps) and other private consortiums began straightening river channels and artificially deepening them to enhance shipping commerce. This has led to declines in the natural meandering of river channels and the formation of pool and riffle segments. The deepening of channels beyond their natural depth also has led to a significant alteration in the transport of bed load in the riverine system as well as the local flow velocity in the channel (Mount 1995). At the turn of the nineteenth century, the Sacramento Flood Control Project ushered in the start of large scale Corps actions in the Delta and along the rivers of California for reclamation and flood control. The creation of levees and the deep shipping channels reduced the natural tendency of the San Joaquin and Sacramento Rivers to create floodplains along their banks with seasonal inundations during the wet winter season and the spring snow melt periods. These annual inundations provided necessary habitat for rearing and foraging of juvenile native fish that evolved with this flooding process. The armored riprapped levee banks and active maintenance actions of Reclamation Districts precluded the establishment of ecologically important riparian vegetation, introduction of valuable LWD from these riparian corridors, and the productive intertidal mudflats characteristic of the undisturbed Delta habitat.

Urban storm water and agricultural runoff may be contaminated with pesticides, oil, grease, heavy metals, polycyclic aromatic hydrocarbons (PAHs), and other organics and nutrients (Regional Board 1998) that can potentially destroy aquatic life necessary for salmonid survival (NMFS 1996a, b). Point source (PS) and non-point source (NPS) pollution occurs at almost every point that urbanization activity influences the watershed. Impervious surfaces (*i.e.*, concrete, asphalt, and buildings) reduce water infiltration and increase runoff, thus creating greater flood hazard (NMFS 1996a, b). Flood control and land drainage schemes may increase the flood risk downstream by concentrating runoff. A flashy discharge pattern results in increased bank erosion with subsequent loss of riparian vegetation, undercut banks and stream channel widening. In addition to the PS and NPS inputs from urban runoff, juvenile salmonids and sturgeon are exposed to increased water temperatures as a result of thermal inputs from municipal, industrial, and agricultural discharges.

Past mining activities routinely resulted in the removal of spawning gravels from streams, the straightening, and channelization of the stream corridor from dredging activities, and the leaching of toxic effluents into streams from mining operations. Many of the effects of past mining operations continue to impact salmonid and sturgeon habitat today. Current mining practices include suction dredging (sand and gravel mining), placer mining, lode mining and gravel mining. Present day mining practices are typically less intrusive than historic operations (hydraulic mining); however, adverse impacts to salmonids and sturgeon habitat still occur as a result of present-day mining activities. Sand and gravel are used for a large variety of construction activities including base material and asphalt, road bedding, drain rock for leach fields, and aggregate mix for concrete to construct buildings and highways.

Most aggregate is derived principally from pits in active floodplains, pits in inactive river terrace deposits, or directly from the active channel. Other sources include hard rock quarries and mining from deposits within reservoirs. Extraction sites located along or in active floodplains present particular problems for anadromous salmonids. Physical alteration of the stream channel may result in the destruction of existing riparian vegetation and the reduction of available area for seedling establishment (Stillwater Sciences 2002). Loss of vegetation impacts riparian and aquatic habitat by causing a loss of the temperature moderating effects of shade and cover, and habitat diversity. Extensive degradation may induce a decline in the alluvial water table, as the banks are effectively drained to a lowered level, affecting riparian vegetation and water supply

(NMFS 1996b). Altering the natural channel configuration will reduce salmonid habitat diversity by creating a wide, shallow channel lacking in the pools and cover necessary for all life stages of anadromous salmonids. In addition, waste products resulting from past and present mining activities, include cyanide (an agent used to extract gold from ore), copper, zinc, cadmium, mercury, asbestos, nickel, chromium, and lead.

Juvenile salmonids are exposed to increased water temperatures in the Delta during the late spring and summer due to the loss of riparian shading, and by thermal inputs from municipal, industrial, and agricultural discharges. Studies by DWR on water quality in the Delta over the last 30 years show a steady decline in the food sources available for juvenile salmonids and sturgeon and an increase in the clarity of the water due to a reduction in phytoplankton and zooplankton. These conditions have contributed to increased mortality of juvenile Chinook salmon, steelhead, and sturgeon as they move through the Delta.

5. Water Quality

The water quality of the Delta has been negatively impacted over the last 150 years. Increased water temperatures, decreased DO levels, and increased turbidity and contaminant loads have degraded the quality of the aquatic habitat for the rearing and migration of salmonids and sturgeon. The Regional Board, in its 1998 Clean Water Act §303(d) list, characterized the Delta as an impaired water body having elevated levels of chlorpyrifos, dichlorodiphenyltrichlor (*i.e.* DDT), diazinon, electrical conductivity, Group A pesticides (aldrin, dieldrin, chlordane, endrin, heptachlor, heptachlor epoxide, hexachlorocyclohexanes (including lindane), endosulfan and toxaphene), mercury, low DO, organic enrichment, and unknown toxicities (Regional Board 1998, 2001).

In general, water degradation or contamination can lead to either acute toxicity, resulting in death when concentrations are sufficiently elevated, or more typically, when concentrations are lower, to chronic or sublethal effects that reduce the physical health of the organism, and lessen its survival over an extended period of time. Mortality may become a secondary effect due to compromised physiology or behavioral changes that lessen the organism's ability to carry out its normal activities. For example, increased levels of heavy metals are detrimental to the health of an organism because they interfere with metabolic functions by inhibiting key enzyme activity in metabolic pathways, decrease neurological function, degrade cardiovascular output, and act as mutagens, teratogens, or carcinogens in exposed organisms (Rand *et al*. 1995, Goyer 1996). For listed species, these effects may occur directly to the listed fish or to its prey base, which reduces the forage base available to the listed species.

In the aquatic environment, most anthropogenic chemicals and waste materials including toxic organic and inorganic chemicals eventually accumulate in sediment (Ingersoll 1995). Direct exposure to contaminated sediments may cause deleterious effects to listed salmonids or green sturgeon. This may occur if a fish swims through a plume of the resuspended sediments or rests on contaminated substrate and absorbs the toxic compounds through one of several routes: dermal contact, ingestion, or uptake across the gills. Elevated contaminant levels may be found in localized "hot spots" where discharge occurs or where river currents deposit sediment loads. Sediment contaminant levels can thus be significantly higher than the overlying water column concentrations (EPA 1994). However, the more likely route of exposure to salmonids or sturgeon is through the food chain, when the fish feed on organisms that are contaminated with toxic compounds. Prey species become contaminated either by feeding on the detritus associated with the sediments or dwelling in the sediment itself. Therefore, the degree of exposure to the salmonids and green sturgeon depends on their trophic level and the amount of contaminated forage base they consume. Response of salmonids and green sturgeon to contaminated sediments is similar to water borne exposures.

Low DO levels frequently are observed in the portion of the Stockton deep-water ship channel (DWSC) extending from Channel Point, downstream to the Turner and Columbia Cuts. Over a 5-year period, starting in August 2000, a DO meter has recorded channel DO levels at Rough and Ready Island (Dock 20 of the West Complex). During this time period, there have been 297 days in which violations of the 5 mg/l DO criteria for the protection of aquatic life in the San Joaquin River between Channel Point and Turner and Columbia Cuts have occurred during the September through May migratory period for salmonids. The data derived from the California Data Exchange Center files indicate that DO depressions occur during all migratory months, with significant events occurring from November through March when listed CCV steelhead adults and smolts would be utilizing this portion of the San Joaquin River as a migratory corridor. Levels of DO below 5 mg/L have been reported as delaying or blocking fall-run Chinook salmon in studies conducted by Hallock *et al.* (1970).

6. <u>Hatchery Operations and Practices</u>

Five hatcheries currently produce Chinook salmon in the Central Valley and four of these also produce steelhead. Releasing large numbers of hatchery fish can pose a threat to wild Chinook salmon and steelhead stocks through genetic impacts, competition for food and other resources between hatchery and wild fish, predation of hatchery fish on wild fish, and increased fishing pressure on wild stocks as a result of hatchery production (Waples 1991). The genetic impacts of artificial propagation programs in the Central Valley primarily are caused by straying of hatchery fish and the subsequent interbreeding of hatchery fish with wild fish. In the Central Valley, practices such as transferring eggs between hatcheries and trucking smolts to distant sites for release contribute to elevated straying levels [Department of the Interior (DOI) 1999]. For example, the primary steelhead broodstock at Nimbus Hatchery on the American River originated from the Eel River basin. One of the recommendations in the Joint Hatchery Review Report (NMFS and CDFG 2001) was to identify and designate new sources of steelhead brood stock to replace the current Eel River origin brood stock.

Hatchery practices as well as spatial and temporal overlaps of habitat use and spawning activity between spring- and fall-run fish have led to the hybridization and homogenization of some subpopulations (CDFG 1998). As early as the 1960s, Slater (1963) observed that early fall- and spring-run Chinook salmon were competing for spawning sites in the Sacramento River below Keswick Dam, and speculated that the two runs may have hybridized. The FRFH spring-run Chinook salmon have been documented as straying throughout the Central Valley for many years (CDFG 1998), and in many cases have been recovered from the spawning grounds of fall-run Chinook salmon, an indication that FRFH spring-run Chinook salmon may exhibit fall-run life history characteristics. Although the degree of hybridization has not been comprehensively determined, it is clear that the populations of spring-run Chinook salmon spawning in the Feather River and counted at RBDD contain hybridized fish.

The management of hatcheries, such as Nimbus Hatchery and FRFH, can directly impact spring-run Chinook salmon and steelhead populations by oversaturating the natural carrying capacity of the limited habitat available below dams. In the case of the Feather River, significant redd superimposition occurs in-river due to hatchery overproduction and the inability to physically separate spring- and fall-run Chinook salmon adults. This concurrent spawning has led to hybridization between the spring- and fall-run Chinook salmon in the Feather River. At Nimbus Hatchery, operating Folsom Dam to meet temperature requirements for returning hatchery fall-run Chinook salmon often limits the amount of water available for steelhead spawning and rearing the rest of the year.

The increase in Central Valley hatchery production has reversed the composition of the steelhead population, from 88 percent naturally produced fish in the 1950s (McEwan 2001) to an estimated 23 to 37 percent naturally produced fish currently (Nobriga and Cadrett 2003). The increase in hatchery steelhead production proportionate to the wild population has reduced the viability of the wild steelhead populations, increased the use of out-of-basin stocks for hatchery production, and increased straying (NMFS and CDFG 2001). Thus, the ability of natural populations to successfully reproduce and continue their genetic integrity likely has been diminished.

The relatively low number of spawners needed to sustain a hatchery population can result in high harvest-to-escapements ratios in waters where fishing regulations are set according to hatchery population. This can lead to over-exploitation and reduction in the size of wild populations existing in the same system as hatchery populations due to incidental bycatch (McEwan 2001). Currently, hatchery produced fall-run Chinook salmon comprise the majority of fall-run adults returning to Central Valley streams. Based on a 25 percent constant fractional marking of hatchery produced fall-run Chinook salmon juveniles, adult escapement of fin clipped fish greater than 25 percent in Central Valley tributaries indicates that hatchery produced fish are the predominate source of fish in the spawning population.

Hatcheries also can have some positive effects on salmonid populations. Artificial propagation has been shown to be effective in bolstering the numbers of naturally spawning fish in the short term under specific scenarios. Artificial propagation programs can also aid in conserving genetic resources and guarding against catastrophic loss of naturally spawned populations at critically low abundance levels, as was the case with the Sacramento River winter-run Chinook salmon population during the 1990s. However, relative abundance is only one component of a viable salmonid population.

7. Over Utilization

a. *Ocean Commercial and Sport Harvest – Chinook Salmon and Steelhead*

Extensive ocean recreational and commercial troll fisheries for Chinook salmon exist along the Northern and Central California coast, and an inland recreational fishery exists in the Central Valley for Chinook salmon and steelhead. Ocean harvest of Central Valley Chinook salmon is estimated using an abundance index, called the Central Valley Index (CVI). The CVI is the ratio of Chinook salmon harvested south of Point Arena (where 85 percent of Central Valley Chinook salmon are caught) to escapement. CWT returns indicate that Sacramento River salmon congregate off the California coast between Point Arena and Morro Bay.

Since 1970, the CVI for Sacramento River winter-run Chinook salmon generally has ranged between 0.50 and 0.80. In 1990, when ocean harvest of winter-run Chinook salmon was first evaluated by NMFS and the Pacific Fisheries Management Council (PFMC), the CVI harvest rate was near the highest recorded level at 0.79. NMFS determined in a 1991 biological opinion that continuance of the 1990 ocean harvest rate would not prevent the recovery of Sacramento River winter-run Chinook salmon. In addition, the final rule designating winter-run Chinook salmon critical habitat (58 FR 33212, June 16, 1993) stated that commercial and recreational fishing do not appear to be significant factors for the decline of the species. Through the early 1990s, the ocean harvest index was below the 1990 level (*i.e.*, 0.71 in 1991 and 1992, 0.72 in 1993, 0.74 in 1994, 0.78 in 1995, and 0.64 in 1996). In 1996 and 1997, NMFS issued a biological opinion which concluded that incidental ocean harvest of Sacramento River winter-run Chinook salmon represented a significant source of mortality to the endangered population, even though ocean harvest was not a key factor leading to the decline of the population. As a result of these opinions, measures were developed and implemented by the PFMC, NMFS, and CDFG to reduce ocean harvest by approximately 50 percent. In 2001 the CVI dropped to 0.27, most likely due to the reduction in harvest and the higher abundance of other salmonids originating from the Central Valley (Good *et al*. 2005). In April 2010, NMFS reached a jeopardy conclusion regarding the ongoing Fisheries Management Plan (FMP) for west coast ocean salmon fishery in regards to its impacts on the continued survival of the winter-run Chinook salmon population (NMFS 2010b).

Ocean fisheries have affected the age structure of CV spring-run Chinook salmon through targeting large fish for many years and reducing the numbers of 4- and 5-year-old fish (CDFG 1998). Sacramento River winter-run spawners have also been affected by ocean fisheries, as most spawners return as 3-year olds. As a result of very low returns of fall-run Chinook salmon to the Central Valley in 2007 and 2008, there was a complete closure of commercial and recreational ocean Chinook salmon fishery in 2008 and 2009, respectively. Salmon fisheries were again restricted in 2010 with a limited fishing season due to poor returns of fall-run Chinook salmon in 2009. The Sacramento River winter-run Chinook salmon population increased by approximately 60 percent in 2009, but declined again in 2010 to 1,596 fish. However, contrary to expectations, even with the 2 years of ocean fishery closures, the CV spring-run Chinook salmon population continues to decline. Ocean harvest rates of CV spring-run Chinook salmon are thought to be a function of the CVI (Good *et al*. 2005). Harvest rates of CV spring-run Chinook salmon ranged from 0.55 to nearly 0.80 between 1970 and 1995 when harvest rates were adjusted for the protection of Sacramento River winter-run Chinook salmon. The drop in the CVI in 2001 as a result of high fall-run escapement to 0.27 also reduced harvest of CV spring-run Chinook salmon. There is essentially no ocean harvest of steelhead.

b. *Inland Sport Harvest –Chinook Salmon and Steelhead*

Historically in California, almost half of the river sport fishing effort was in the Sacramento-San Joaquin River system, particularly upstream from the City of Sacramento (Emmett *et al.* 1991). Since 1987, the Fish and Game Commission has adopted increasingly stringent regulations to reduce and virtually eliminate the in-river sport fishery for Sacramento River winter-run Chinook salmon. Present regulations include a year-round closure to Chinook salmon fishing between Keswick Dam and the Deschutes Road Bridge and a rolling closure to Chinook salmon fishing on the Sacramento River between the Deschutes River Bridge and the Carquinez Bridge. The rolling closure spans the months that migrating adult Sacramento River winter-run Chinook salmon are ascending the Sacramento River to their spawning grounds. These closures have virtually eliminated impacts on Sacramento River winter-run Chinook salmon caused by recreational angling in freshwater. In 1992, the California Fish and Game Commission adopted gear restrictions (all hooks must be barbless and a maximum of 5.7 cm in length) to minimize hooking injury and mortality of winter-run Chinook salmon caused by trout anglers. That same year, the Commission also adopted regulations which prohibited any salmon from being removed from the water to further reduce the potential for injury and mortality.

In-river recreational fisheries historically have taken CV spring-run Chinook salmon throughout the species' range. During the summer, holding adult CV spring-run Chinook salmon are easily targeted by anglers when they congregate in large pools. Poaching also occurs at fish ladders, and other areas where adults congregate; however, the significance of poaching on the adult population is unknown. Specific regulations for the protection of CV spring-run Chinook salmon in Mill, Deer, Butte, and Big Chico creeks and the Yuba River have been added to the existing CDFG regulations. The current regulations, including those developed for Sacramento River winter-run Chinook salmon provide some level of protection for CV spring-run Chinook salmon (CDFG 1998).

There is little information on CCV steelhead harvest rates in California. Hallock *et al.* (1961) estimated that harvest rates for Sacramento River CCV steelhead from the 1953-1954 through 1958-1959 seasons ranged from 25.1 percent to 45.6 percent assuming a 20 percent non-return rate of tags. The average annual harvest rate of adult CCV steelhead above RBDD for the 3-year period from 1991-1992 through 1993-1994 was 16 percent (McEwan and Jackson 1996). Since 1998, all hatchery steelhead have been marked with an adipose fin clip allowing anglers to distinguish hatchery and wild steelhead. Current regulations restrict anglers from keeping unmarked CCV steelhead in Central Valley streams. Overall, this regulation has greatly increased protection of naturally produced adult CCV steelhead; however, the total number of CCV steelhead contacted might be a significant fraction of basin-wide escapement, and even low catch-and-release mortality may pose a problem for wild populations (Good *et al*. 2005).

c. *Green Sturgeon*

Commercial harvest of white sturgeon results in the incidental bycatch of green sturgeon primarily along the Oregon and Washington coasts and within their coastal estuaries. Oregon and Washington have recently prohibited the retention of green sturgeon in their waters for commercial and recreational fisheries. Adams *et al*. (2002, 2007) reported harvest of green sturgeon from California, Oregon, and Washington between 1985 and 2001. Total captures of green sturgeon in the Columbia River Estuary by commercial means ranged from 240 fish per year to 6,000. Catches in Willapa Bay and Grays Harbor by commercial means combined ranged from 9 fish to 2,494 fish per year. Emmett *et al*. (1991) indicated that averages of 4.7 to 15.9 tons of green sturgeon were landed annually in Grays Harbor and Willapa Bay respectively. Overall, captures appeared to be dropping through the years; however, this could be related to changing fishing regulations. Adams *et al*. (2002, 2007) also reported sport fishing captures in California, Oregon, and Washington. Within the San Francisco Estuary, green sturgeon are captured by sport fisherman targeting the more desirable white sturgeon, particularly in San Pablo and Suisun bays (Emmett *et al*. 1991). Sport fishing in the Columbia River, Willapa Bay, and Grays Harbor captured from 22 to 553 fish per year between 1985 and 2001. Again, it appears sport fishing captures are dropping through time; however, it is not known if this is a result of abundance, changed fishing regulations, or other factors. Based on new research by Israel (2006) and past tagged fish returns reported by CDFG (2002), a high proportion of green sturgeon present in the Columbia River, Willapa Bay, and Grays Harbor (as much as 80 percent in the Columbia River) may be sDPS green sturgeon. This indicates a potential threat to the green sturgeon sDPS population. Beamesderfer *et al.* (2007) estimated that sDPS green sturgeon will be vulnerable to slot limits (outside of California) for approximately 14 years of their life span. Fishing gear mortality presents an additional risk to the long-lived sturgeon species such as the green sturgeon (Boreman 1997). Although sturgeon are relatively hardy and generally survive being hooked, their long life makes them vulnerable to repeated hooking encounters, which leads to an overall significant hooking mortality rate over their lifetime. An adult green sturgeon may not become sexually mature until they are 13 to 18 years of age for males (152-185cm), and 16 to 27 years of age for females (165-202 cm) (Van Eenennaam 2006). Even though slot limits "protect" a significant proportion of the life history of green sturgeon from harvest, they do not protect them from fishing pressure.

sDPS green sturgeon are caught incidentally by sport fisherman targeting the more highly desired white sturgeon within the Delta waterways and the Sacramento River. New regulations which went into effect in March 2007, reduced the slot limit of sturgeon from 72 inches to 66 inches, and limit the retention of white sturgeon to one fish per day with a total of 3 fish retained per year. In addition, a non-transferable sturgeon punch card with tags must be obtained by each angler fishing for sturgeon. All sturgeon caught must be recorded on the card, including those released. All green sturgeon must be released unharmed and recorded on the sturgeon punch card by the angler. In 2010, further restrictions to fishing for sturgeon in the upper Sacramento River were enacted between Keswick Dam and the Highway 162 bridge over the Sacramento River near the towns of Cordora and Butte City. These regulations are designed to protect sDPS green sturgeon in the upper Sacramento River from unnecessary harm due to fishing pressure (CDFG freshwater fishing regulations 2010-2011).

Poaching rates of sDPS green sturgeon in the Central Valley are unknown; however, catches of sturgeon occur during all years, especially during wet years. Unfortunately, there is no catch, effort, and stock size data for this fishery which precludes making exploitation estimates (USFWS 1995a). Areas just downstream of Thermalito Afterbay outlet and Cox's Spillway, and several barriers impeding migration on the Feather River may be areas of high adult mortality from increased fishing effort and poaching. The small population of sturgeon inhabiting the San

Joaquin River experiences heavy fishing pressure, particularly regarding illegal snagging, and it may be more than the population can support (USFWS 1995a).

8. Disease and Predation

Infectious disease is one of many factors that influence adult and juvenile salmonid survival. Salmonids are exposed to numerous bacterial, protozoan, viral, and parasitic organisms in spawning and rearing areas, hatcheries, migratory routes, and the marine environment (NMFS 1996a, 1996b, 1998a). Specific diseases such as bacterial kidney disease, C*eratomyxosis shasta* (C-shasta), columnaris, furunculosis, infectious hematopoietic necrosis, redmouth and black spot disease, whirling disease, and erythrocytic inclusion body syndrome are known, among others, to affect steelhead and Chinook salmon (NMFS 1996a, 1996b, 1998a). Very little current or historical information exists to quantify changes in infection levels and mortality rates attributable to these diseases; however, studies have shown that wild fish tend to be less susceptible to pathogens than are hatchery-reared fish. Nevertheless, wild salmonids may contract diseases that are spread through the water column (*i.e*., waterborne pathogens) as well as through interbreeding with infected hatchery fish. The stress of being released into the wild from a controlled hatchery environment frequently causes latent infections to convert into a more pathological state, and increases the potential of transmission from hatchery reared fish to wild stocks within the same waters.

Accelerated predation also may be a factor in the decline of Sacramento River winter-run Chinook salmon and CV spring-run Chinook salmon, and to a lesser degree CCV steelhead. Human-induced habitat changes such as alteration of natural flow regimes and installation of bank revetment and structures such as dams, bridges, water diversions, piers, and wharves often provide conditions that both disorient juvenile salmonids and attract predators (Stevens 1961, Decato 1978, Vogel *et al.* 1988, Garcia 1989).

On the mainstem Sacramento River, high rates of predation are known to occur at the Anderson-Cottonwood Irrigation District's (ACID) diversion dam, GCID's diversion facility, areas where rock revetment has replaced natural river bank vegetation, and at south Delta water diversion structures (*e*.g., Clifton Court Forebay; CDFG 1998). Historically, predation at RBDD and in Lake Red Bluff on juvenile Sacramento River winter-run Chinook salmon was high. Now the gates at RBDD are open year round; therefore, predation should be greatly reduced. Some predation is still likely to occur due to the physical structure of the dam remaining in the water way, even with the gates in the open position.

USFWS found that more predatory fish were found at rock revetment bank protection sites between Chico Landing and Red Bluff than at sites with naturally eroding banks (Michny and Hampton 1984). From October 1976 to November 1993, CDFG conducted 10 mark/recapture studies at the SWP's Clifton Court Forebay to estimate pre-screen losses using hatchery-reared juvenile Chinook salmon. Pre-screen losses ranged from 69 percent to 99 percent. Predation by striped bass is thought to be the primary cause of the loss (Gingras 1997, DWR 2009).

Predation on juvenile salmonids has increased as a result of water development activities which have created ideal habitats for predators and non-native invasive species (NIS). Turbulent conditions near dam bypasses, turbine outfalls, water conveyances, and spillways disorient juvenile salmonid migrants and increase their predator avoidance response time, thus improving predator success. Increased exposure to predators has also resulted from reduced water flow through reservoirs; a condition which has increased juvenile travel time. Other locations in the Central Valley where predation is of concern include flood bypasses, post-release sites for salmonids salvaged at the CVP and SWP Fish Facilities, and the SMSCG. Predation on salmon by striped bass and pikeminnow at salvage release sites in the Delta and lower Sacramento River has been documented (Orsi 1967, Pickard *et al.* 1982); however, accurate predation rates at these sites are difficult to determine. CDFG conducted predation studies from 1987 to 1993 at the SMSCG to determine if the structure attracts and concentrates predators. The dominant predator species at the SMSCG was striped bass, and the remains of juvenile Chinook salmon were identified in their stomach contents (Edwards *et al.* 1996, Tillman *et al.* 1996, NMFS 1997).

Avian predation on fish contributes to the loss of migrating juvenile salmonids by constraining natural and artificial production. Fish-eating birds that occur in the California Central Valley include great blue herons (*Ardea herodias*), gulls (*Larus spp*.), osprey (*Pandion haliaetus*), common mergansers (*Mergus merganser*), American white pelicans (*Pelecanus erythrorhynchos*), double-crested cormorants (*Phalacrocorax spp*.), Caspian terns (*Sterna caspia*), belted kingfishers (*Ceryle alcyon*), black-crowned night herons (*Nycticorax nycticorax*), Forster's terns (*Sterna forsteri*), hooded mergansers (*Lophodytes cucullatus*), and bald eagles (*Haliaeetus leucocephalus*) (Stephenson and Fast 2005). These birds have high metabolic rates and require large quantities of food relative to their body size.

Mammals can also be an important source of predation on salmonids within the California Central Valley. Predators such as river otters (*Lutra canadensis*), raccoons (*Procyon lotor*), striped skunk (*Mephitis mephitis*), and western spotted skunk (*Spilogale gracilis*) are common. Other mammals that take salmonid include: badger (*Taxidea taxus*), bobcat (*Lynx rufus*), coyote (*Canis latrans*), gray fox (*Urocyon cinereoargenteus*), long-tailed weasel (*Mustela frenata*), mink (*Mustela vison*), mountain lion (*Felis concolor*), red fox (*Vulpes vulpes*), and ringtail (*Bassariscus astutus*). These animals, especially river otters, are capable of removing large numbers of salmon and trout from the aquatic habitat (Dolloff 1993). Mammals have the potential to consume large numbers of salmonids, but generally scavenge post-spawned salmon. In the marine environment, pinnipeds, including harbor seals (*Phoca vitulina*), California sea lions (*Zalophus californianus*), and Steller's sea lions (*Eumetopia jubatus*) are the primary marine mammals preying on salmonids (Spence *et al*. 1996). Pacific striped dolphin (*Lagenorhynchus obliquidens*) and killer whale (*Orcinus orca*) can also prey on adult salmonids in the nearshore marine environment, and at times become locally important. Although harbor seal and sea lion predation primarily is confined to the marine and estuarine environments, they are known to travel well into freshwater after migrating fish and have frequently been encountered in the Delta and the lower portions of the Sacramento and San Joaquin rivers. All of these predators are opportunists, searching out locations where juveniles and adults are most vulnerable, such as the large water diversions in the south Delta.

9. Environmental Variation

Natural changes in the freshwater and marine environments play a major role in salmonid abundance. Recent evidence suggests that marine survival among salmonids fluctuates in response to 20- to 30-year cycles of climatic conditions and ocean productivity (Hare *et al*. 1999, Mantua and Hare 2002). This phenomenon has been referred to as the Pacific Decadal Oscillation. In addition, large-scale climatic regime shifts, such as the El Niño condition, appear to change productivity levels over large expanses of the Pacific Ocean. A further confounding effect is the fluctuation between drought and wet conditions in the basins of the American west. During the first part of the 1990s, much of the Pacific Coast was subject to a series of very dry years, which reduced inflows to watersheds up and down the west coast.

"El Niño" is an environmental condition often cited as a cause for the decline of West Coast salmonids (NMFS 1996b). El Niño is an unusual warming of the Pacific Ocean off South America and is caused by atmospheric changes in the tropical Pacific Ocean (Southern Oscillation-ENSO) resulting in reductions or reversals of the normal trade wind circulation patterns. The El Niño ocean conditions are characterized by anomalous warm sea surface temperatures and changes to coastal currents and upwelling patterns. Principal ecosystem alterations include decreased primary and secondary productivity in affected regions and changes in prey and predator species distributions. Cold-water species are displaced towards higher latitudes or move into deeper, cooler water, and their habitat niches are occupied by species tolerant of warmer water that move upwards from the lower latitudes with the warm water tongue.

A key factor affecting many West Coast stocks has been a general 30-year decline in ocean productivity. The mechanism whereby stocks are affected is not well understood, partially because the pattern of response to these changing ocean conditions has differed among stocks, presumably due to differences in their ocean timing and distribution. It is presumed that survival in the ocean is driven largely by events occurring between ocean entry and recruitment to a sub-adult life stage.

10. Ecosystem Restoration

a. *California Bay-Delta Authority*

Two programs included under the California Bay-Delta Authority (CBDA), the Ecosystem Restoration Program (ERP) and the Environmental Water Account (EWA), were created to improve conditions for fish, including listed salmonids, in the Central Valley (CALFED 2000). Restoration actions implemented by the ERP include the installation of fish screens, modification of barriers to improve fish passage, habitat acquisition, and instream habitat restoration. The majority of these actions address key factors affecting listed salmonids and emphasis has been placed in tributary drainages with high potential for steelhead and spring-run Chinook salmon production. Additional ongoing actions include new efforts to enhance fisheries monitoring and directly support salmonid production through hatchery releases. Recent habitat restoration initiatives sponsored and funded primarily by the CBDA-ERP Program have resulted in plans to restore ecological function to 9,543 acres of shallow-water tidal and marsh habitats within the

Delta. Restoration of these areas primarily involves flooding lands previously used for agriculture, thereby creating additional rearing habitat for juvenile salmonids. Similar habitat restoration is imminent adjacent to Suisun Marsh (*i.e.*, at the confluence of Montezuma Slough and the Sacramento River) as part of the Montezuma Wetlands project, which is intended to provide for commercial disposal of material dredged from San Francisco Bay in conjunction with tidal wetland restoration.

A sub-program of the ERP called the Environmental Water Program (EWP) has been established to support ERP projects through enhancement of instream flows that are biologically and ecologically significant in anadromous reaches of priority streams controlled by dams. This program is in the development stage and the benefits to listed salmonids are not yet clear. Clear Creek is one of five priority watersheds in the Central Valley that has been targeted for action during Phase I of the EWP.

The EWA is designed to provide water at critical times to meet ESA requirements and incidental take limits without water supply impacts to other users, particularly South of Delta water users. In early 2001, the EWA released 290 thousand acre feet of water from San Luis Reservoir at key times to offset reductions in south Delta pumping implemented to protect winter-run Chinook salmon, delta smelt, and splittail (*Pogonichthys macrolepidotus*). However, the benefit derived by this action to winter-run Chinook salmon in terms of number of fish saved was very small. The anticipated benefits to other Delta fisheries from the use of the EWA water are much higher than those benefits ascribed to listed salmonids by the EWA release. Under the long term operations of the CVP and SWP, EWA assets have declined to 48 thousand acre feet after carriage water costs. The RPA actions developed within the 2009 NMFS Operations BO are designed to minimize or remove the adverse impacts associated with many of the OCAP project related stressors. Within the Delta, stressors such as the Delta Cross Channel (DCC) gates and export operations have been modified to reduce the hydraulic changes created by the project operations. Earlier closures of the DCC gates prevent early emigrating listed salmonids from entering the Delta interior through the open DCC gates. Management of the Old and Middle River flows prevents an excessive amount of negative flow towards the export facilities from occurring in the channels of Old and Middle River. When flows are negative, water moves in the opposite direction than would occur naturally, drawing fish into the south Delta and towards the export facilities or delaying their migration through the system.

b. *Central Valley Project Improvement Act*

The CVPIA, implemented in 1992, requires that fish and wildlife get equal consideration with other demands for water allocations derived from the CVP. From this act arose several programs that have benefited listed salmonids: the Anadromous Fish Restoration Program (AFRP), the Anadromous Fish Screen Program (AFSP), and the Water Acquisition Program (WAP). The AFRP is engaged in monitoring, education, and restoration projects geared toward recovery of all anadromous fish species residing in the Central Valley. Restoration projects funded through the AFRP include fish passage, fish screening, riparian easement and land acquisition, development of watershed planning groups, instream and riparian habitat improvement, and gravel replenishment. The AFSP combines Federal funding with State and private funds to prioritize and construct fish screens on major water diversions mainly in the upper Sacramento

River. The goal of the WAP is to acquire water supplies to meet the habitat restoration and enhancement goals of the CVPIA and to improve the DOI's ability to meet regulatory water quality requirements. Water has been used successfully to improve fish habitat for spring-run Chinook salmon and steelhead by maintaining or increasing instream flows in Butte and Mill Creeks and the San Joaquin River at critical times.

c. *Iron Mountain Mine Remediation*

The U.S. Environmental Protection Agency's Iron Mountain Mine remediation involves the removal of toxic metals in acidic mine drainage from the Spring Creek Watershed with a state-of-the-art lime neutralization plant. Contaminant loading into the Sacramento River from Iron Mountain Mine has shown measurable reductions since the early 1990s (see Reclamation 2004 Appendix J). Decreasing the heavy metal contaminants that enter the Sacramento River should increase the survival of salmonid eggs and juveniles. However, during periods of heavy rainfall upstream of the Iron Mountain Mine, Reclamation substantially increases Sacramento River flows in order to dilute heavy metal contaminants being spilled from the Spring Creek debris dam. This rapid change in flows can cause juvenile salmonids to become stranded or isolated in side channels below Keswick Dam.

d. *State Water Project Delta Pumping Plant Fish Protection Agreement (Four-Pumps Agreement)*

The Four Pumps Agreement Program has approved about $49 million for projects that benefit salmon and steelhead production in the Sacramento-San Joaquin basins and Delta since the agreement inception in 1986. Four Pumps projects that benefit spring-run Chinook salmon and steelhead include water exchange programs on Mill and Deer creeks; enhanced law enforcement efforts from San Francisco Bay upstream to the Sacramento and San Joaquin rivers and their tributaries; design and construction of fish screens and ladders on Butte Creek; and screening of diversions in Suisun Marsh and San Joaquin tributaries. Predator habitat isolation and removal, and spawning habitat enhancement projects on the San Joaquin tributaries benefit steelhead (see Reclamation 2004 Chapter 15).

e. *San Joaquin River Restoration Program (SJRRP)*

In 1988, a coalition of environmental groups, led by the Natural Resources Defense Council (NRDC), filed a lawsuit challenging the renewal of long-term water service contracts between the United States and the CVP Friant Division Contractors. After more than 18 years of litigation of this lawsuit, known as *NRDC, et al. v. Kirk Rodgers, et al.*, a settlement was reached. On September 13, 2006, the Settling Parties, including NRDC, Friant Water Users Authority, and the U.S. Departments of the Interior and Commerce, filed a stipulation of the terms and conditions of the settlement (Settlement), which was subsequently approved by the U.S. District Court, Eastern District of California, on October 23, 2006. The Settlement establishes restoration and management goals. The Restoration Goal is to restore and maintain fish populations in "good condition" in the mainstem San Joaquin River below Friant Dam to the confluence with the Merced River, including naturally reproducing and self-sustaining of salmon and other fish. The Water Management Goal is to reduce or avoid water supply impacts to all of the Friant Division long-term contractors that may result from the Interim and Restoration Flows provided for in the Settlement. President Obama signed the San Joaquin River Restoration Settlement Act on March 30, 2009, which authorized implementation of the Settlement, as part of the Omnibus Public Land Management Act of 2009 (Act; Pub. L. No. 111-11, 123 Stat.991).

To achieve the Restoration Goal, the Settlement calls for a combination of channel and structural modifications along the San Joaquin River below Friant Dam, releases of water from Friant Dam to the confluence of the Merced River, and the reintroduction of Chinook salmon, *O. tshawytscha* no later than December 31, 2012, consistent with applicable law. Title X, section 10011(b) of the Act states that spring-run Chinook salmon shall be reintroduced in the San Joaquin River below Friant Dam pursuant to section 10(j) of the ESA, provided that a permit for the reintroduction may be issued pursuant to section 10(a)(1)(A) of the ESA. In addition, Title X, section 10011(c)(2) of the Act states that the Secretary of Commerce shall issue a final rule pursuant to section 4(d) of the ESA governing the incidental take of reintroduced Central Valley spring-run Chinook salmon prior to the reintroduction. Furthermore, Title X, section 10011(c)(3) of the Act states that the rule issued under paragraph 2 shall provide that the reintroduction will not impose more than *de minimus* water supply reductions, additional storage releases, or bypass flows on unwilling third parties due to such reintroduction. Third parties, in this context, are defined as persons or entities delivering or receiving water pursuant to applicable State and Federal laws and shall include CVP contractors outside of the Friant Division of the CVP and the SWP. On January 16, 2013 (78 FR 3381), a proposed rule was published in the Federal Register to address these statutory requirements related to designation of an experimental population of CV spring-run Chinook salmon under ESA section 10(j); the experimental population would be reintroduced into the San Joaquin River below Friant Dam. NMFS plans to issue a final rule in 2013.

f. *San Joaquin River Improvement Project (SJRIP)*

In December of 2000, Panoche Drainage District began implementation of the SJRIP as a tool to help manage subsurface drainage water generated throughout the Grasslands Drainage Area. Drainage flows collected from the Grasslands Drainage Area are removed from the Grasslands Bypass Project and used to irrigate salt tolerant crops within the approximately 6,000-acre SJRIP which has reduced the volume of agricultural subsurface drain water discharged to the San Joaquin River. Water that is brought in from the Grassland Drainage Area to the SJRIP remains within the SJRIP and is, therefore, considered a closed system.

g. *San Luis Drainage Feature Re-evaluation Demonstration Treatment Facility at Panoche Drainage District*

Reclamation will construct, operate, and maintain for 18 months a facility for drainage treatment within the geographical boundaries of the existing SJRIP reuse area after receiving easement(s) from Panoche Drainage District. A Finding of No Significant Impact was signed for the project in June of 2012; therefore, the operation of the pilot facility will likely overlap the majority of the proposed project's 24-month duration. The facility will occupy a rectangular area approximately 4 acres in size, adjacent to and immediately north and east of Panoche Drainage

District's existing perpendicular drainage distribution canals. Pipelines will be constructed to convey drainage water from the seven existing reuse sumps to the facility. Drainage water treatments will include reverse osmosis, microfiltration, and ultrafiltration, a proprietary biological treatment system for selenium removal, and potentially up to two innovative technologies.

11. Non-Native Invasive Species (NIS)

As currently seen in the San Francisco estuary, NIS can alter the natural food webs that existed prior to their introduction. Perhaps the most significant example is illustrated by the Asiatic freshwater clams *Corbicula fluminea* and *Potamocorbula amurensis*. The arrival of these clams in the estuary disrupted the normal benthic community structure and depressed phytoplankton levels in the estuary due to the highly efficient filter feeding of the introduced clams (Cohen and Moyle 2004). The decline in the levels of phytoplankton reduces the population levels of zooplankton that feed upon them, and hence reduces the forage base available to salmonids transiting the Delta and San Francisco estuary which feed either upon the zooplankton directly or their mature forms. This lack of forage base can adversely impact the health and physiological condition of these salmonids as they emigrate through the Delta region to the Pacific Ocean.

Attempts to control the NIS also can adversely impact the health and well-being of salmonids within the affected water systems. For example, the control programs for the invasive water hyacinth (*Eichhornia crassipes*) and Brazilian Elodea (*Egeria densa*) plants in the Delta must balance the toxicity of the herbicides applied to control the plants to the probability of exposure to listed salmonids during herbicide application. In addition, the control of the nuisance plants can have negative effects on certain physical parameters that must be accounted for in the treatment protocols, particularly the decrease in DO resulting from the decomposing vegetable matter left by plants that have died.

12. Summary

For SR winter-run Chinook salmon, CV spring-run Chinook salmon, and CCV steelhead, the construction of high dams for hydropower, flood control, and water supply resulted in the loss of vast amounts of upstream habitat (*i.e.*, approximately 80 percent, or a minimum linear estimate of over 1,000 stream miles), and often resulted in precipitous declines in affected salmonid populations. For example, the completion of Friant Dam in 1947 has been linked with the extirpation of CV spring-run Chinook salmon in the San Joaquin River upstream of the Merced River within just a few years. The reduced populations that remain below Central Valley dams are forced to spawn in lower elevation tailwater habitats of the mainstem rivers and tributaries that were previously not used for this purpose. This habitat is entirely dependent on managing reservoir releases to maintain cool water temperatures suitable for spawning, and/or rearing of salmonids. This requirement has been difficult to achieve in all water year types and for all life stages of affected salmonid species. Steelhead, in particular, seem to require the qualities of small tributary habitat similar to what they historically used for spawning - habitat that is largely unavailable to them under the current water management scenario. All salmonid species considered in this consultation have been adversely affected by the production of hatchery fish associated with the mitigation for the habitat lost to dam construction (*e.g.*, from genetic impacts, increased competition, and exposure to novel diseases).

Land-use activities such as road construction, urban development, logging, mining, agriculture, and recreation are pervasive and have significantly altered fish habitat quantity and quality for Chinook salmon and steelhead through alteration of streambank and channel morphology; alteration of ambient water temperatures; degradation of water quality; elimination of spawning and rearing habitat; fragmentation of available habitats; elimination of downstream recruitment of LWD; and removal of riparian vegetation resulting in increased streambank erosion. Human-induced habitat changes, such as: alteration of natural flow regimes; installation of bank revetment; and building structures such as dams, bridges, water diversions, piers, and wharves, often provide conditions that both disorient juvenile salmonids and attract predators. Harvest activities, ocean productivity, and drought conditions provide added stressors to listed salmonid populations. In contrast, various ecosystem restoration activities have contributed to improved conditions for listed salmonids (*e.g.*, various fish screens). However, some important restoration activities (*e.g.*, Battle Creek Restoration Project) have not yet been completed and benefits to listed salmonids from the EWA have been less than anticipated.

Similar to the listed salmonids, the green sturgeon sDPS has been negatively impacted by hydroelectric and water storage operations in the Central Valley which ultimately affect the hydrology and accesibility of Central Valley rivers and streams to anadromous fish. Anthropogenic manipulations of the aquatic habitat, such as dredging, bank stabilization, and waste water discharges have also degraded the quality of the Central Valley's waterways for the green sturgeon sDPS.

H. EXISTING MONITORING PROGRAMS

Salmonid-focused monitoring efforts are taking place throughout the Sacramento and San Joaquin River basins and the Suisun Marsh. Many of these programs incidentally gather information on steelhead but a focused, comprehensive steelhead monitoring program has not been funded or implemented in the Central Valley. The existing salmonid monitoring efforts include data from the following programs and regulatory applications:

- Interagency Ecological Program's (1999) Steelhead Project Work Team report on monitoring, assessment, and research on steelhead: status of knowledge, review of existing programs, and assessment of needs;
- Comprehensive Monitoring Plan for Steelhead in the California Central Valley, California Department of Fish and Game, 2010;;
- U.S. Forest Service Sierra Nevada Framework monitoring plan (http://www.fs.usda.gov/goto/r5/SNFPA);
- ESA section 10 and section 4(d) scientific research permit applications;
- Trinity River Restoration Program biological monitoring (http://www.trrp.net/); and
- Suisun Marsh Monitoring Program (http://www.water.ca.gov/suisun/restoration/).

Studies focused on the life history of green sturgeon are currently being implemented by researchers at academic institutions such as University of California, Davis. Future plans include radio-telemetry studies to track the movements of green sturgeon within the Delta and Sacramento River systems. Additional studies concerning the basic biology and physiology of green sturgeon are also being conducted to better understand the fish's niche in the aquatic system.

III. ENVIRONMENTAL BASELINE

The environmental baseline "includes the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in process" (50 CFR §402.02).

A. Status of the Species and Critical Habitat in the Action Area

1. Status of the Species within the Action Area

The action area functions primarily as a migratory corridor for adult and juvenile CCV steelhead. All adult CCV steelhead originating in the San Joaquin River watershed will have to migrate through the action area in order to reach their spawning grounds and to return to the ocean following spawning. Likewise, all CCV steelhead smolts originating in the San Joaquin River watershed will have to pass through the action area during their emigration to the ocean. The waterways in the action area are expected to provide some rearing benefit to emigrating CCV steelhead smolts as they move through the action area. The action area also provides some use as a migratory corridor and rearing habitat for juvenile SR winter-run Chinook salmon and CV spring-run Chinook salmon, as well as CCV steelhead from the Sacramento River watershed, that are drawn into the Central and south Delta by the actions of the CVP and SWP water diversion facilities, and must therefore emigrate towards the ocean through the lower San Joaquin River system. The action area also functions as migratory, holding, and rearing habitat for adult and juvenile sDPS green sturgeon.

a. *Sacramento River Winter-Run Chinook Salmon*

The temporal occurrence of SR winter-run Chinook salmon smolts and juveniles in the action area is best described by the salvage records of the CVP and SWP fish handling facilities. Based on salvage records covering between 1999 and 2009 at the CVP and SWP fish collection facilities (Reclamation 2011), juvenile SR winter-run Chinook salmon are typically present in the south Delta action area starting in December. Their presence peaks in March and then rapidly declines from April through June. Nearly 50 percent of the average annual salvage of SR winter-run Chinook salmon juveniles occurs in March (50.667 percent). Salvage in April accounts for only 2.8 percent of the average annual salvage and falls to less than 1 percent for May and June combined (Table 8). The presence of juvenile SR winter-run Chinook salmon in the south Delta is a function of river flows on the Sacramento River, where the fish are spawned, and the demands for water diverted by the SWP and CVP facilities. When conditions on the Sacramento River are conducive to stimulating outmigrations of juvenile SR winter-run Chinook salmon, the draw of the CVP and SWP pumping facilities pulls a portion of these emigrating fish through the waterways of the Central and southern Delta from one of the four access points originating on the Sacramento River (Georgiana Slough, the Delta Cross Channel, Three Mile Slough, and the San Joaquin River via Broad Slough). The combination of pumping rates and tidal flows moves these fish towards the southwestern corner of the Delta. When the combination of pumping rates and fish movements are high, significant numbers of juvenile SR winter-run Chinook salmon are drawn into the south Delta.

b. *Central Valley Spring-Run Chinook salmon*

Like the SR winter-run Chinook salmon, the presence of juvenile CV spring-run Chinook salmon in the action area is under the influence of the CVP and SWP water diversions and the flows on the Sacramento River and its tributary watersheds. Currently, all known populations of CV spring-run Chinook salmon inhabit the Sacramento River watershed. The San Joaquin River watershed populations have been extirpated, with the last known runs on the San Joaquin River being extirpated in the late 1940s and early 1950s by the construction of Friant Dam and the opening of the Kern-Friant irrigation canal. Due to the actions of the SJRRP, CV spring-run Chinook salmon have been proposed to be reintroduced to the San Joaquin River upstream of the confluence with the Merced River (and therefore into the proposed project's action area) during the 24-month duration of the proposed project. A proposed rule has been published to designate an experimental population for the reintroduction and to establish protective regulations under ESA section 4(d) for the proposed experimental population (78 FR 3381; January 16, 2013). NMFS plans to issue a final rule in 2013. Depending on the outcome of the final rule, this consultation may need to be reinitiated for Reclamation to confer with NMFS regarding impacts of the proposed action to reintroduced CV spring-run Chinook salmon.

Juvenile CV spring-run Chinook salmon first begin to appear in the action area in January. A significant presence of fish does not occur until March (12.361 percent of average annual salvage) and peaks in April (54.380 percent of average annual salvage) (Table 8). By May, the salvage of CV spring-run Chinook salmon juveniles declines (29.481 percent of average annual salvage) and essentially ends by the end of June (3.585 percent of average annual salvage).

Table 8: Summary table of monthly SR winter-run and CV spring-run Chinook salmon loss, and Combined total salvage and loss of CCV steelhead at the CVP and SWP fish collection facilities from water year 1999-2000 to water year 2011-2012. Data from CVO web site: (http://www.usbr.gov/mp/cvo/). Note: Data listed for water year 2009-2010 through water year 2011-2012 is preliminary.

Fish Facility Salvage Records (Loss)													
						Winter-Run (loss)							
Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Sum
2011-2012	0	0	0	318	867	1870	161	76	0	NA	NA	NA	3292
2010-2011	0	0	1119	866	1516	2262	58	4	0	NA	NA	NA	5825
2009-2010	0	0	3	1206	1582	1183	46	4	0	NA	NA	NA	4024
2008-2009	0	0	8	55	210	1654	21	0	0	NA	NA	NA	1948
2007-2008	0	0	0	164	484	628	40	0	0	NA	NA	NA	1316
2006-2007	0	0	87	514	1678	2730	330	0	0	NA	NA	NA	5339
2005-2006	0	0	649	362	1016	1558	249	27	208	NA	NA	NA	4069
2004-2005	0	0	228	3097	1188	644	123	0	0	NA	NA	NA	5280
2003-2004	0	0	84	640	2812	4865	39	30	0	NA	NA	NA	8470
2002-2003	0	0	1261	1614	1464	2789	241	24	8	NA	NA	NA	7401
2001-2002	0	0	1326	478	222	1167	301	0	0	NA	NA	NA	3494
2000-2001	0	0	384	1302	6014	15379	259	0	0	NA	NA	NA	23338
1999-2000	0	0				1592	250	0	0	NA	NA	NA	1842
Sum	0	0	5149	10616	19053	38321	2118	165	216	0	0	0	75638
Ave	0	0	429	885	1588	2948	163	13	17				5818
%WrYr	0.000	0.000	7.375	15.205	27.289	50.664	2.800	0.218	0.286				
						Spring-Run (loss)							
Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Sum
2011-2012	0	0	0	0	0	624	1528	530	3	NA	NA	NA	2685
2010-2011	0	0	0	23	0	747	15862	31635	5030	NA	NA	NA	53297
2009-2010	0	0	0	0	0	403	2319	3270	160	NA	NA	NA	6152
2008-2009	0	0	0	0	0	333	5912	2604	4	NA	NA	NA	8853
2007-2008	0	0	0	0	15	315	6918	4673	87	NA	NA	NA	12008
2006-2007	0	0	0	0	7	190	4700	365	0	NA	NA	NA	5262
2005-2006	0	0	0	0	104	1034	8315	3521	668	NA	NA	NA	13642
2004-2005	0	0	0	0	0	1856	10007	1761	639	NA	NA	NA	14263
2003-2004	0	0	0	25	50	4646	5901	960	0	NA	NA	NA	11582
2002-2003	0	0	0	46	57	11400	27977	2577	0	NA	NA	NA	42057
2001-2002	0	0	0	21	8	1245	10832	2465	19	NA	NA	NA	14590
2000-2001	0	0								NA	NA	NA	0
1999-2000										NA	NA	NA	0
Sum	0	0	0	115	241	22793	100271	54361	6610	0	0	0	184391
Ave	0	0	0	10	22	2072	9116	4942	601				16763
%WrYr	0.000	0.000	0.000	0.062	0.131	12.361	54.380	29.481	3.585				
						Steelhead (combined salvage and loss, clipped and non-clipped)							
Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Sum
2011-2012	0	0	7	45	176	911	352	33	20	NA	NA	NA	1544
2010-2011	7	0	3	244	801	496	275	301	560	NA	NA	NA	2687
2009-2010	0	0	7	568		1288	221	190	158	NA	NA	NA	2432
2008-2009	0	0	0	40	571	1358	210	68	13	7	NA	NA	2267
2007-2008	0	0	0	624	4639	717	300	106	24	15	NA	NA	6425
2006-2007	0	0	10	81	1643	4784	2689	113	20	NA	NA	NA	9340
2005-2006	0	0	0	129	867	3942	337	324	619	NA	NA	NA	6218
2004-2005	0	20	70	120	1212	777	687	159	116	NA	NA	NA	3161
2003-2004	0	12	40	613	10598	4671	207	110	0	NA	NA	NA	16251
2002-2003	0	0	413	13627	3818	2357	823	203	61	NA	NA	NA	21302
2001-2002	0	0	3	1169	1559	2400	583	37	42	NA	NA	NA	5793
2000-2001	0	0	89	543	5332	5925	720	69	12	NA	NA	NA	12690
1999-2000	3	60				1243	426	87	48	NA	NA	NA	1867
Sum	10	92	642	17803	31216	30869	7830	1800	1693	22	0	0	91977
Ave	1	7	54	1484	2838	2375	602	138	130	11			7075
%WrYr	0.011	0.100	0.756	20.969	40.110	33.562	8.513	1.957	1.841	0.155			

c. *California Central Valley Steelhead*

The CCV steelhead DPS occurs in both the Sacramento River and the San Joaquin River watersheds. However the spawning population of fish is much greater in the Sacramento River watershed and accounts for nearly all of the DPS' population. Like SR winter-run Chinook salmon, Sacramento River CCV steelhead can be drawn into the south Delta by the actions of the CVP and SWP water diversion facilities. Small, remnant populations of CCV steelhead are known to occur on the Stanislaus, Tuolumne, and Merced rivers (McEwan 2001, Zimmerman *et al*. 2008). This indicates the possibility of small numbers of CCV steelhead to be in the San Joaquin River below the confluence of the Merced River section of the action area. Currently, CCV steelhead are viewed as extirpated from the San Joaquin River upstream of the confluence with the Merced River (Eilers *et al.* 2010), owing to the lack of continuity of flow and resulting poor habitat in long reaches above this point. Suitable, but presently inaccessible, habitat exists in the San Joaquin River near Friant Dam.

Due to poor habitat conditions in the San Joaquin River upstream of the Merced River confluence, the CDFG has operated the Hills Ferry Barrier since 1992 to redirect fall-run Chinook salmon to the Merced River, or other suitable habitat. The annual monitoring reports for 2005 to 2008 submitted to NMFS by CDFG indicate that no juvenile or adult CCV steelhead were detected during the HFB operations (CDFG 2006, 2007. 2008b, 2009).

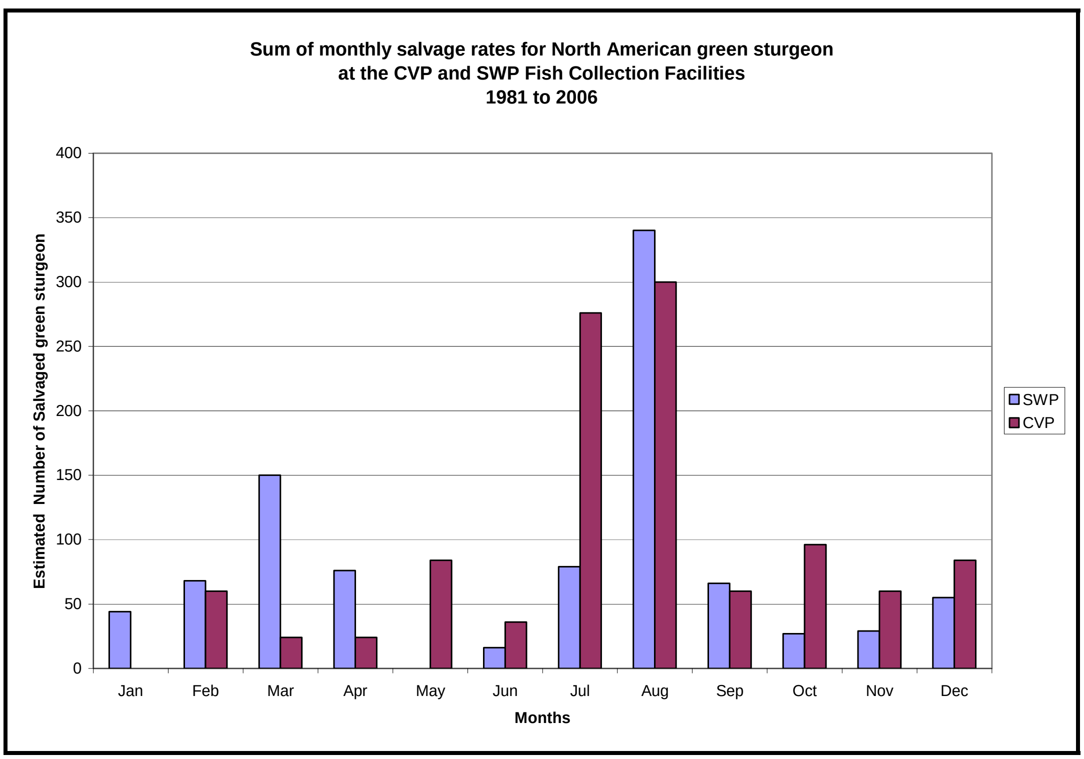
In October 2009, the SJRRP began the release of Interim flows, which occur in the fall to early spring. When these flows are sufficient to reach the Merced River, they could attract adult CCV steelhead into the portion of the action area in the San Joaquin River upstream of the confluence of the Merced River. During the timeframe that the Hills Ferry Barrier is operated, CCV steelhead occupying that reach could be detected and potentially redirected or trapped. In 2009, one adult fall-run Chinook salmon was detected above the Hills Ferry Barrier but no CCV steelhead detections were made (CDFG 2010). In the fall of 2010, a trap was installed by CDFG and operated by Reclamation, Denver Technical Services Center to assess the barrier's effectiveness. Approximately 30 fall-run Chinook salmon were able to pass the barrier during the 2010 Interim Flow period (Portz *et al.* 2011). No steelhead were detected at HFB in 2010; however, bar spacing on the trap could allow steelhead that are smaller and slimmer than salmon to escape. The SJRRP Steelhead Monitoring Plan in 2011 did not detect the presence of CCV steelhead above the Hills Ferry Barrier after the barrier's removal in mid-December (Portz *et al.* 2012).

Kodiak trawls conducted by the USFWS and CDFG on the mainstem of the San Joaquin River upstream from the City of Stockton routinely catch low numbers of outmigrating CCV steelhead smolts from the San Joaquin basin during the months of April and May. CCV steelhead smolts first start to appear in the action area as early as October based on the records from the CVP and SWP fish salvage facilities (Table 8). Their presence increases through December and January (20.969 percent of average annual salvage) and peaks in February (40.110 percent) and March (33.562 percent) before rapidly declining in April (8.513 percent). By June, the emigration has essentially ended, with only a small number of fish being salvaged through the summer at the CVP and SWP.

d. *Southern DPS of North American Green Sturgeon*

Juvenile sDPS green sturgeon are routinely collected at the SWP and CVP salvage facilities throughout the year. However, numbers are considerably lower than for other species of fish monitored at the facilities. Based on the salvage records from 1981 through 2006, green sturgeon may be present during any month of the year, and have been particularly prevalent during July and August (Figure 6). The sizes of these fish are less than 1 meter and average 330 mm with a range of 136 mm to 774 mm. The size range indicates that these are sub-adult fish rather than adult or larval/juvenile fish. It is believed that these sub-adult fish utilize the Delta for rearing for up to a period of approximately 3 years. The action area is located off of the main migratory route that juvenile sDPS green sturgeon utilize to enter the Delta from their natal areas upstream on the upper Sacramento River and off the main migratory route utilized by adult sDPS green sturgeon to access the spawning grounds in the upper Sacramento River. However, collections at the CVP and SWP facilities and their proximity to the action area would indicate that sub-adult sDPS green sturgeon have a strong potential to be present within the action area.

Figure 6:
Estimated number of sDPS of North American green sturgeon salvaged monthly from the State Water Project and the Central Valley Project fish collection facilities.
Source: CDFG 2002, unpublished CDFG records.



2. <u>Status of Critical Habitat Within the Action Area</u>

The action area is predominately within the Middle San Joaquin – Lower Merced – Lower Stanislaus and the San Joaquin Delta hydrologic units (HU) (18040002 and 18040003, respectively). Designated critical habitat for the green sturgeon sDPS (74 FR 52300; October 9, 2009) occurs within the Sacramento-San Joaquin Delta which includes the San Joaquin Delta HU. Designated critical habitat for CCV steelhead (70 FR 52488; September 2, 2005) includes the San Joaquin Delta HU and the Middle San Joaquin-Lower Merced-Lower Stanislaus HU. Although SR winter-run Chinook salmon occupy the San Joaquin Delta HU, designated critical habitat for SR winter-run Chinook salmon (58 FR 33212, June 16, 1993) does not occur in the action area so impacts to this species' critical habitat will not be analyzed in this BO. Similarly, CV spring-run Chinook salmon occupy the San Joaquin Delta HU, but designated critical habitat for CV spring-run Chinook salmon (September 2, 2005, 70 FR 52488) does not occur in the San Joaquin Delta HU or any other HU within the action area, so impacts to this species' critical habitat will not be analyzed in this BO. The action area includes the portion of the San Joaquin River from the confluence of the Merced River upstream to Mud Slough (north), which is not critical habitat for CCV steelhead. This opinion will focus on the mainstem San Joaquin River as well as those waterways in the southern portions of the Delta, which are expected to show expressions of water quality characteristics influenced by discharges originating in the GBP.

The San Joaquin Delta HU is in the southwestern portion of the CCV steelhead DPS range and includes portions of the south Delta channel complex. The San Joaquin Delta HU encompasses approximately 938 square miles, with 455 miles of stream channels (at 1:100,000 hydrography). The critical habitat analytical review team (CHART) identified approximately 276 miles of occupied riverine/estuarine habitat in this hydrologic subunit area (HSA) that contained one or more PCEs for the CCV steelhead DPS (NMFS 2005b). The PCEs of CCV steelhead critical habitat within the action area include freshwater rearing habitat, freshwater migration corridors, and estuarine areas, which are described in greater detail in 50 CFR 226.211 and the *Status of the Species and Critical Habitat* section of this biological opinion.. The PCEs of CCV steelhead critical habitat within the action area relate to the following: sufficient water quantity and floodplain connectivity to form and maintain physical habitat conditions necessary for salmonid development and mobility, sufficient water quality, food and nutrients sources, natural cover and shelter, migration routes free from obstructions, natural levels of predation, holding areas for juveniles and adults, and shallow water areas and wetlands. Habitat within the action area is primarily utilized for freshwater rearing and migration by CCV steelhead juveniles and smolts and for adult upstream migration. No spawning of CCV steelhead occurs within the action area.

The section of the San Joaquin River upstream of the Merced River confluence presently provides generally poor salmonid habitat conditions and is not included as CCV steelhead designated critical habitat because CCV steelhead do not occupy this reach. Physical barriers, reaches with poor water quality or no surface flow, and the presence of false migration pathways have reduced habitat connectivity. Much of the surface flow in this section is from agriculture return drains or high groundwater seepage. Habitat complexity in the action area is reduced, with limited side-channel habitat or instream habitat structure, and highly altered riparian vegetation. Bypasses receive water sporadically, as necessary for flood control. Most aquatic habitat in the bypasses is therefore temporary, and its duration depends on flood flows; the bypasses are largely devoid of aquatic and riparian habitat because of efforts to maintain hydraulic conveyance for flood flows (McBain and Trush 2002).

In regards to the designated critical habitat for the green sturgeon sDPS, the action area includes PCEs concerned with: adequate food resources for all life stages utilizing the Delta, water flows sufficient to allow adults, subadults, and juveniles to orient to flows for migration and normal behavioral responses, water quality sufficient to allow normal physiological and behavioral responses, unobstructed migratory corridors for all life stages utilizing the Delta, a broad spectrum of water depths to satisfy the needs of the different life stages present in the estuary, and sediment with sufficiently low contaminant burdens to allow for normal physiological and behavioral responses to the environment.

The general condition and function of freshwater rearing and migration habitats has already been described in the *Status of the Species and Critical Habitat* section of this BO. The substantial degradation over time of several of the essential features of these PCEs has diminished the function and condition of the critical habitat in the action area. It has only rudimentary functions compared to its historical status. The channels of the Delta have been heavily riprapped with coarse rock slope protection on artificial levee banks and these channels have been straightened to facilitate water conveyance through the system. The extensive riprapping and levee construction has precluded river channel migrations and the formation of natural riverine/estuarine features in the Delta's channels. The natural floodplains have essentially been eliminated, and the once extensive wetlands and riparian zones have been cleared for farming. Little riparian vegetation remains in the Delta, limited mainly to tules growing along the foot of artificial levee banks. Numerous artificial channels also have been created to bring water to irrigated lands that historically did not have access to the river channels (*i.e.*, Victoria Canal, Grant Line Canal, Fabian and Bell Canal, Woodward Cut, *etc*.). These artificial channels have disturbed the natural flow of water through the Delta. As a byproduct of this intensive engineering of the Delta's hydrology, numerous irrigation diversions have been placed along the banks of the flood control levees to divert water from the area's waterways to the agricultural lands of the Delta's numerous "reclaimed" islands. Most of these diversions are not screened adequately to protect migrating fish from entrainment. Sections of the Delta have been routinely dredged by DWR to provide adequate intake depth for these agricultural water diversions, particularly in the south Delta. Likewise, the main channels of the San Joaquin River and the Sacramento River have been routinely dredged by the Corps to create an artificially deep channel to provide passage for ocean going commercial shipping to the Port of Stockton and the Port of Sacramento.

Water flow through the Delta is highly manipulated to serve human purposes. Rainfall and snowmelt is captured by reservoirs in the upper watersheds, from which its release is dictated primarily by downstream human needs. The SWP and CVP pumps draw water towards the southwest corner of the Delta which creates a net upstream flow of water towards their intake points. Fish, and the forage base they depend upon for food, represented by free floating phytoplankton and zooplankton, as well as larval, juvenile, and adult forms, are drawn along with the current towards these diversion points. In addition to the altered flow patterns in the Delta, numerous discharges of treated wastewater from sanitation wastewater treatment plants (*e.g.*, Cities of Tracy, Stockton, Manteca, Lathrop, Modesto, Turlock, Riverbank, Oakdale, Ripon, Mountain House, and the Town of Discovery Bay) and the untreated discharge of numerous agricultural wasteways are emptied into the waters of the San Joaquin River and the channels of the Delta. This leads to cumulative additions to the system of thermal effluent loads as well as cumulative loads of potential contaminants (*i.e.*, selenium, boron, endocrine disruptors, pesticides, biostimulatory compounds, *etc*.).

Even though the habitat has been substantially altered and its quality diminished through years of human actions, its conservation value remains high for SR winter-run Chinook salmon, CV spring-run Chinook salmon, CCV steelhead, and the green sturgeon sDPS. Some of the juvenile winter-run and spring-run Chinook salmon, CCV steelhead, and sDPS green sturgeon that originate in the Sacramento River basin pass into and through the San Joaquin Delta HU to reach the lower Delta and ocean. In addition, all of the those CCV steelhead smolts originating in the San Joaquin River basin must pass into and through the San Joaquin Delta HU to reach the lower Delta and the ocean. All CCV steelhead juveniles originating in the San Joaquin River must pass through the other HUs described earlier in this section. Likewise, some SR winter-run Chinook salmon, CV spring-run Chinook salmon, CCV steelhead and green sturgeon sDPS adults migrating upstream to spawn will pass through San Joaquin Delta HU to reach their upstream spawning areas on the tributary watersheds or main stem Sacramento River. All migrating adult CCV steelhead moving into the San Joaquin River will pass through all of the HUs described here. In addition, if an experimental population of CV spring-run Chinook salmon is introduced to the San Joaquin River as part of the restoration program, those fish will utilize all of the HUs in the action area to fulfill their life cycle. Therefore, it is of critical importance to the long-term viability of the SR winter-run Chinook salmon ESU, CV spring-run Chinook salmon ESU, green sturgeon sDPS, and CCV steelhead DPS to maintain a functional migratory corridor and freshwater rearing habitat through the action area.

B. Factors Affecting the Species and Habitat in the Action Area

The action area encompasses a small portion of the area utilized by the SR winter-run Chinook salmon and CV spring-run Chinook salmon ESUs, CCV steelhead DPS, and the green sturgeon sDPS. Many of the factors affecting these species throughout their range are discussed in the *Status of the Species and Critical Habitat* section of this biological opinion, and are considered the same in the action area. This section will focus on the specific factors in the action area that are most relevant to the proposed execution of the SLWD and PWD Interim Renewal Contracts 2013–2015.

The magnitude and duration of peak flows during the winter and spring are reduced by water impoundment in upstream reservoirs affecting listed salmonids in the action area. Instream flows during the summer and early fall months have increased over historic levels for deliveries of municipal and agricultural water supplies. Overall, water management now reduces natural variability by creating more uniform flows year-round. Current flood control practices require peak flood discharges to be held back and released over a period of weeks to avoid overwhelming the flood control structures downstream of the reservoirs (*i.e.,* levees) and low lying terraces under cultivation (*i.e.*, orchards and row crops) in the natural floodplain along the basin tributaries. Consequently, managed flows in the mainstem of the river often truncate the peak of the flood hydrographs and extend the reservoir releases over a protracted period. These actions reduce or eliminate the scouring flows necessary to mobilize sediments and create natural riverine morphological features within the action area. Furthermore, the unimpeded river flow in the San Joaquin River basin is severely reduced by the combined storage capacity of the different reservoirs located throughout the basin's watershed. Very little of the natural hydrologic input to the basin is allowed to flow through the reservoirs to the valley floor sections of the tributaries leading to the Delta. Most is either stored or diverted for anthropogenic uses. Elevated flows on the valley floor are typically only seen in wet years or flood conditions, when the storage capacities of the numerous reservoirs are unable to contain all of the inflow from the watersheds above the reservoirs.

High water temperatures also limit habitat availability for listed salmonids in the lower San Joaquin River. High summer water temperatures in the lower San Joaquin River frequently exceed 72°F (CDEC database), and create a thermal barrier to the migration of adult and juvenile salmonids (Myers *et al*. 1998). In addition, water diversions at the dams (*i.e.* Friant, Goodwin, La Grange, Folsom, Nimbus, and other dams) for agricultural and municipal purposes have reduced in-river flows below the dams. These reduced flows frequently result in increased temperatures during the critical summer months which potentially limit the survival of juvenile salmonids (Reynolds *et al*. 1993) in these tailwater sections.

Levee construction and bank protection have affected salmonid habitat availability and the processes that develop and maintain preferred habitat by reducing floodplain connectivity, changing riverbank substrate size, and decreasing riparian habitat and shaded riverine aquatic (SRA) cover. Such bank protection generally results in two levels of impacts to the environment: (1) site-level impacts which affect the basic physical habitat structure at individual bank protection sites; and (2) reach-level impacts which are the cumulative impacts to ecosystem functions and processes that accrue from multiple bank protection sites within a given river reach (USFWS 2000). Revetted embankments result in loss of sinuosity and braiding and reduce the amount of aquatic habitat. Impacts at the reach level result primarily from halting erosion and controlling riparian vegetation. Reach-level impacts which cause significant impacts to fish are reductions in new habitats of various kinds, changes to sediment and organic material storage and transport, reductions of lower food-chain production, and reduction in LWD.

The use of rock armoring limits recruitment of LWD (*i.e.*, from non-riprapped areas), and greatly reduces, if not eliminates, the retention of LWD once it enters the river channel. Riprapping creates a relatively clean, smooth surface which diminishes the ability of LWD to become securely snagged and anchored by sediment. LWD tends to become only temporarily snagged along riprap, and generally moves downstream with subsequent high flows. Habitat value and ecological functioning aspects are thus greatly reduced, because wood needs to remain in place for extended periods to generate maximum values to fish and wildlife (USFWS 2000). Recruitment of LWD is limited to any eventual, long-term tree mortality and whatever abrasion and breakage may occur during high flows (USFWS 2000). Juvenile salmonids are likely being impacted by reductions, fragmentation, and general lack of connectedness of remaining near shore refuge areas.

Point and non-point sources of pollution resulting from agricultural discharge and urban and industrial development occur upstream of, and within the action area. The effects of these impacts are discussed in detail in the *Status of the Species and Critical Habitat* section. Environmental stresses as a result of low water quality can lower reproductive success and may account for low productivity rates in fish (*e.g.* green sturgeon, Klimley 2002). Organic contaminants from agricultural drain water, urban and agricultural runoff from storm events, and high trace element (*i.e.,* heavy metals) concentrations may deleteriously affect early life-stage survival of fish in the Central Valley watersheds (USFWS 1995b). The high number of diversions in the action area in the San Joaquin River and in the south Delta are also potential threats to listed fish. Other impacts to adult migration present in the action area, such as migration barriers, water conveyance facilities, water quality, NIS, *etc.*, are discussed in the *Status of Species and Critical Habitat* section.

IV. EFFECTS OF THE ACTION

A. Approach to the Assessment

Pursuant to section 7(a)(2) of the ESA (16 U.S.C. §1536), Federal agencies are directed to ensure that their activities are not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of critical habitat. To evaluate whether an action is likely to result in jeopardy to a listed species or result in the destruction or adverse modification of designated critical habitat, this biological opinion considers the combination of the status of the species and critical habitat, the environmental baseline, the effects of the action, and the cumulative effects of non-Federal actions that are reasonably certain to occur within the action area. Regulations that implement section 7 of the ESA provide that the "effects of the action" refers to the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline (50 CFR 402.02). This BO does not rely on the regulatory definition of "destruction or adverse modification" of critical habitat at 50 CFR 402.02, which was invalidated be Gifford Pinchot Task Force v. USFWS, 378 F.3d 1059 (9th Cir. 2004), amended by 387 F.3d 968 (9th Cir. 2004). Instead, we have relied upon the statutory provisions of the ESA to complete the following analysis with respect to critical habitat. NMFS will evaluate destruction or adverse modification of critical habitat by determining if the action reduces the value of critical habitat for the conservation of the species. This BO assesses the effects of the proposed action on the endangered SR winter-run Chinook salmon ESU, threatened CV spring-run Chinook salmon ESU, threatened CCV steelhead DPS, threatened sDPS of North American green sturgeon, and designated critical habitat for the CCV steelhead DPS and sDPS of North American green sturgeon.

In the *Description of the Proposed Action* section of this BO, NMFS provided an overview of the proposed action. In the *Status of the Species* and *Environmental Baseline* sections of this BO, NMFS provided an overview of the threatened and endangered species and critical habitat that are likely to be adversely affected by the activity under consultation.

NMFS generally approaches the "jeopardy" and critical habitat adverse modification analyses in a series of steps. First, NMFS evaluates the available evidence to identify direct and indirect physical, chemical, and biotic effects of the proposed action on individual members of listed species or aspects of the species' environment (these effects include direct, physical harm or injury to individual members of a species; modifications to something in the species' environment - such as reducing a species' prey base, enhancing populations of predators, altering its spawning substrate, altering its ambient temperature regimes; or adding something novel to a species' environment - such as introducing exotic competitors or a sound). Once NMFS has identified the effects of the action, the available evidence is evaluated to identify a species' probable response (including behavioral responses) to those effects to determine if those effects could reasonably be expected to reduce a species' reproduction, numbers, or distribution (for example, by changing birth, death, immigration, or emigration rates; increasing the age at which individuals reach sexual maturity; or decreasing the age at which individuals stop reproducing). The available evidence is then used to determine if these reductions, if there are any, could reasonably be expected to appreciably reduce a species' likelihood of surviving and recovering in the wild. In a similar manner, once NMFS has identified the effects of the action, the available evidence is evaluated to identify the probable response of PCEs of critical habitat to those effects to determine if those effects could reasonably be expected to reduce the value of critical habitat for the conservation of the species.

1. Information Available for the Assessment

To conduct the assessment, NMFS examined evidence from a variety of sources. Detailed background information on the status of these species and critical habitat has been published in a number of documents, including peer-reviewed scientific journals, primary reference materials, governmental and non-governmental reports, the BA for this project, and scientific meetings as well as the supplemental material provided by BOR in response to questions asked by NMFS.

2. Assumptions Underlying This Assessment

In the absence of definitive data or conclusive evidence, NMFS must make a logical series of assumptions to overcome the limits of the available information. These assumptions will be made using sound, scientific reasoning that can be logically derived from the available information. The progression of the reasoning will be stated for each assumption, and supporting evidence cited.

B. Assessment

The proposed action is the execution of interim water service contracts for the continued delivery of the same quantities of CVP water to the same lands currently covered under the previous long-term water service contracts and current interim renewal contracts for the San Luis and Panoche Water Districts. The new interim contracts would extend these agreements for a period of up to 24 months. The proposed action does not require the construction of any new facilities, the installation of any new structures, or the modification of existing facilities, but operational aspects of these continued water deliveries may adversely affect several life stages of SR winter-run Chinook salmon, CV spring-run Chinook salmon, CCV steelhead, and the sDPS of North American green sturgeon in the action area. Adverse effects to these species and their habitat may result from changes in water quality resulting from the discharge of subsurface agricultural drainage water originating from within the San Luis and Panoche water districts. The execution of the Interim Renewal Contracts includes continuing implementation of the Westside Regional Drainage Plan and participation in programs such as the Grasslands Bypass Project, SJRIP, and San Luis Drainage Feature Re-evaluation Demonstration Treatment Facility at Panoche Drainage District, with the overall objective of reducing the amount of selenium entering the waterways of the San Joaquin Valley over time and thereby minimizing the potential impacts to water quality associated with agricultural drainage discharges to the San Joaquin River.

1. <u>Presence of Listed Salmonids and sDPS of North American Green Sturgeon in the Action Area</u>

Adult SR winter-run and CV spring-run Chinook salmon migrate through the Delta on their way to upstream spawning sites in the Sacramento River and its tributaries. Adult SR winter-run Chinook salmon are most likely to be present in the action area, specifically in the Delta, between November and May while CV spring-run Chinook salmon adults are most likely to occur there from late January through May. Timing of juvenile emigration for both species through the action area on their way to the sea is highly variable depending on water flows and temperatures, but the highest occurrence of rearing juveniles of both ESUs in the Delta generally occurs between November and May. Therefore, both adult and juvenile SR winter-run and CV spring-run Chinook salmon pass through the action area and will be exposed to project-related effects for a brief period during either their migration to upstream spawning sites or out to sea. The project-related effects, namely selenium exposure originating from SLWD and PWD agricultural runoff, are present in the Delta where SR winter-run and CV spring-run Chinook salmon are known to occur; however, the selenium levels in the areas where SR winter-run and CV spring-run Chinook salmon are known to occur are diluted to levels of 0.4 ppb or less, according to the supplemental information provided by Reclamation. Due to the fact that adults migrating upstream do not forage, and the juveniles that enter the action area do not remain there for more than a short period of time and have likely been diverted off their typical migration route to sea, it is unlikely that project related effects will result in adverse effects to either of these ESUs.

As indicated above in the *Environmental Baseline* section of this biological opinion, a proposed rule has been published to designate an experimental population of CV spring-run Chinook salmon that would be reintroduced into the upper reaches of the San Joaquin River as part of the SJRRP (78 FR 3381; January 16, 2013). The re-introduction of CV spring-run Chinook salmon and the specific processes therein are still under development. Pursuant to ESA section 10(j), with limited exceptions, each member of an experimental population shall be treated as a threatened species. However, the proposed rule includes proposed protective regulations under ESA section 4(d) that would provide specific exceptions to prohibitions under ESA section 9 for taking CV spring-run Chinook salmon within the experimental population area. In addition, ESA section 7 applies differently to experimental populations, requiring a conference rather than consultation in most cases for nonessential experimental populations (see ESA section 10(j)(2)(C); see also 78 FR 3381, January 16, 2013). As indicated above in the *Environmental Baseline* section, NMFS plans to issue a final rule in 2013. Depending on the outcome of the final rule, this consultation may need to be reinitiated for Reclamation to confer with NMFS regarding impacts of the proposed action to reintroduced CV spring-run Chinook salmon juveniles that may be present in the San Joaquin River and within the action area (*i.e.*, between Mud Slough and the confluence of the Merced River) during the 24-month period of this IRC.

Adult CCV steelhead begin to migrate into the region's watersheds (San Joaquin, Stanislaus, Tuolumne, and Merced rivers) during the period between September and the end of December, particularly when increased flows are being released from San Joaquin River reservoirs to enhance fall-run Chinook salmon spawning habitat in the San Joaquin River tributaries or when early winter rains cause increased flows in the system. The peak of juvenile Central Valley steelhead emigration from their tributaries in the San Joaquin Valley occurs during the period between February and May. There are, however, larger steelhead smolts that migrate at other times of the year, including the fall and early winter period (S.P. Cramer and Associates 2005), and thus may be exposed to the project-related effects during their passage through the action area as well. Depending on Hills Ferry Barrier operations, it is reasonable to assume that CCV steelhead may have access to the San Joaquin River upstream of the confluence of the Merced River, as a result of the SJRRP, within the time period of this IRC.

Low numbers of sDPS green sturgeon are anticipated to be present in the action area throughout the year, and in the case of rearing juveniles they may be present for up to 3 or 4 years before emigrating to the ocean. Although information on the density of sDPS green sturgeon in the action area is not currently available, their infrequent occurrence in sampling studies targeting other fish species indicates that they may be present throughout the year within the mainstem of the San Joaquin River and thus vulnerable to the adverse effects of the project.

2. <u>Effects of the Action on Listed Species</u>

The San Luis and Panoche Water Districts discharge subsurface drainwater into drainage district conveyance facilities owned and operated by the Charleston and Panoche Drainage Districts, respectively. Both drainage districts prohibit the discharge of surface return flows into their systems, but occasionally storm events generate substantial surface runoff from agricultural areas that will enter regional conveyances and eventually reach natural streams, including Mud Slough, the San Joaquin River, and the Delta. The RWQCB issued waste discharge requirements for the GBP that conveys the subsurface drainage delivered by the Charleston and Panoche Drainage Districts into natural waterways, establishing a performance goal of 5 ppb monthly mean selenium for the San Joaquin River below the Merced River for critical, dry, and below normal water year types, and 5 parts per billion (ppb) 4-day average during normal and wet years. In addition, the RWQCB adopted Resolution Number R5-2010-0046 on October 5, 2010, which extended the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins (Basin Plan) upstream beyond the previous point on the San Joaquin River at the confluence with the Merced River. The resolution provides an interim performance measure of 15 ppb monthly average through December 31, 2015, for the San Joaquin River at the confluence of the Merced River upstream to Mud Slough (north). By December 31, 2019, the 5 ppb 4-day average must be met in Mud Slough (north) and the San Joaquin River above the confluence of the Merced River. The 5 ppb RWQCB performance criteria for selenium may exceed toxic effect levels for listed salmonids and sturgeon (Beckon 2008a, 2008b); therefore, listed species may also be negatively affected by the 15 ppb monthly average interim performance criteria.

Since its inception in 1996, the GBP has been successful in helping to achieve RWQCB goals of reducing selenium inputs to the San Joaquin River by consolidating, storing, reusing, and ultimately reducing subsurface drainage waters from the participating water districts. Nevertheless, selenium concentrations in the San Joaquin River and Delta continue to rise over time due to its prevalence in the soils derived from organic-rich shales throughout the semi-arid San Joaquin Valley, as well as the persistent and additive nature of this element once it enters the aquatic environment.

Selenium efficiently bioaccumulates through aquatic food webs, and strongly biomagnifies into many components of the food web including primary producers, invertebrates, bivalves, fish, and birds. Dietary uptake of selenium through lower trophic level prey species and progressive biomagnification through the food web is the primary pathway for the disproportionately large bioaccumulation of selenium to higher trophic level predator species. Selenium is an essential element necessary for the production and proper functioning of important enzymes; however, it rapidly surpasses required concentrations becoming toxic and resulting in dysfunctional enzymes and disrupted proteins that can lead to reproductive failure and teratogenesis (*i.e.*, deformities in developing young), and in cases of extreme contamination can lead to death of adult organisms. Concentrations of selenium greater than 3 µg/g in the diet of fish result in deposition of elevated concentrations in developing eggs, particularly in the yolk, and dietary selenium concentrations of 5 to 20 µg/g load eggs beyond the teratogenic threshold (Luoma and Presser 2000). In experiments conducted by Silvestre *et al*. (2010), larval green sturgeon were significantly more sensitive to temperature and selenium stress than white sturgeon. Different predator species have variable accumulation rates of dietary selenium, probably due to the types of prey they consume. Generally, benthic feeding fish have higher selenium concentrations than predators that feed from the water column. Of particular concern are benthic feeding predators that consume bivalves in their diet, especially the Asian clam *Potamocorbula amurensis*, an invasive species that has displaced several other resident species of bivalve in the Delta, and exhibits concentrations of selenium that regularly exceed the thresholds for chronic toxicity in the food of birds and fish (i.e., > 10 µg/g).

There is no information available on the concentration of selenium in listed salmonids and sDPS green sturgeon tissue in the action area, and no way of determining to what extent the drainwater contributed by the irrigation returns from the San Luis and Panoche Water Districts might contribute to those selenium levels. However, given the fact that the drainwater from these districts is known to contain elevated levels of selenium, and the listed species occur (and feed) in the area where this drainwater is discharged into critical habitat, NMFS must make the assumption that the continuation of this situation, made possible by the proposed execution of interim water service to the San Luis and Panoche Water Districts for a period of 24 months, will result in adverse effects on listed salmonids and sDPS green sturgeon. Given the data previously described on the general effects of elevated selenium levels on fish (Luoma and Presser 2000), NMFS concludes that the response of CCV steelhead and sDPS green sturgeon to the effects of the proposed action are likely to include physiological stress to the extent that the normal behavior patterns (*e.g.*, feeding, sheltering and migration) of affected individuals may be disrupted. Overall, an increased availability of selenium in prey items is expected to affect reproductive success, juvenile survival, and behavioral responses that may lead to decreased swimming performance and increased predation rates for juveniles. Because sDPS green sturgeon may spend a period of years in the action area rearing before migrating to the ocean, are demersal fish closely associated with the bottom substrate, feed by taste and feel with their barbels, and even shovel up sediment with their snouts when searching for food, it is likely that they would be subjected to a higher risk of exposure to the effects of increased selenium in their diet.

Implementing the RWQCB performance criteria of 5 ppb over a 4-day average on the San Joaquin River below the confluence with the Merced River is a good-faith effort to reduce selenium concentration in the San Joaquin Basin and Delta; however, it does not eliminate the potential for take to occur to listed species within the action area. The continued participation in the GBP, SJRIP, pilot projects such as the San Luis Drainage Feature Re-evaluation Demonstration Treatment Facility at Panoche Drainage District, and implementation of the strategies developed in the Westside Regional Drainage Plan minimize the amount of selenium entering the San Joaquin River as a result of agricultural drainage.

3. Impacts to Critical Habitat

There are no suitable spawning sites within the project's action area for CCV steelhead or sDPS green sturgeon. Therefore, the PCEs of CCV steelhead designated critical habitat that will be affected by the execution of the SLWD and PWD IRCs are freshwater rearing habitat, freshwater migration corridors, and estuarine areas. The PCEs of critical habitat for green sturgeon sDPS that will be affected by the execution of the SLWD and PWD IRCs are estuarine food resources, water quality, and sediment quality. Any continued contributions of selenium from agricultural subsurface drainage and occasional storm flow runoff will be additive to the available load already present in the water, sediment, and prey items of the south Delta for both juvenile and adult CCV steelhead and green sturgeon sDPS during the course of the two-year period that the contracts would authorize continued water deliveries to the water districts.

Due to the relatively short time period (*i.e.*, two years) for which the IRCs would authorize continued deliveries of water to the San Luis and Panoche water districts, and the degree to which selenium contributions would be made from agricultural subsurface drainage and occasional storm flow runoff from these two districts relative to the contributions of other watersheds throughout the region, the above described impacts from the execution of the SLWD and PWD IRCs to food resources, water quality, and sediment quality are not expected to significantly impact or appreciably reduce the value of the designated critical habitat for the conservation of the listed species in the action area.

V. CUMULATIVE EFFECTS

For purposes of the ESA, cumulative effects are defined as the effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation (50 CFR §402.02). Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultations pursuant to section 7 of the ESA.

A. Agricultural Practices

Agricultural practices in and upstream of the San Joaquin River may adversely affect riparian and wetland habitats through upland modifications of the watershed that lead to increased siltation or reductions in water flow in stream channels flowing into the San Joaquin River. Agricultural practices in the Delta may adversely affect riparian and wetland habitats through upland modifications of the watershed that lead to increased siltation or reductions in water flow in stream channels flowing into the Delta. Unscreened agricultural diversions throughout the Delta entrain fish including juvenile salmonids. Grazing activities from dairy and cattle operations can degrade or reduce suitable critical habitat for listed salmonids by increasing erosion and sedimentation as well as introducing nitrogen, ammonia, and other nutrients into the watershed, which then flow into the receiving waters of the San Joaquin River and Delta. Stormwater and irrigation discharges related to both agricultural and urban activities contain numerous pesticides and herbicides that may adversely affect listed salmonid and sDPS green sturgeon reproductive success and survival rates (Dubrovsky *et al.* 1998, 2000; Daughton 2003).

B. Increased Urbanization

The Delta, East Bay, and Sacramento regions, which include portions of Contra Costa, Alameda, Sacramento, San Joaquin, Solano, Stanislaus, and Yolo counties, are expected to increase in population by nearly 3 million people by the year 2020. Increases in urbanization and housing developments can impact habitat by altering watershed characteristics, and changing both water use and stormwater runoff patterns. For example, the General Plans for the cities of Stockton, Brentwood, Lathrop, Tracy and Manteca and their surrounding communities anticipate rapid growth for several decades to come. City of Manteca (2012) observed a 32.4 percent population increase between 2001 and 2011. The projected population for 2013 is 74,915 (http://www.ci.manteca.ca.us/biz/). According to City of Lathrop website (updated in 2011), the current population was listed at 17,469 and estimated to reach a population level of 20,000 by 2012, with an expected “build out” population of 70,000 (http://www.ci.lathrop.ca.us/about/). The anticipated growth will occur along both the I-5 and US-99 transit corridors in the east and Highway 205/120 in the south and west. Increased growth will place additional burdens on resource allocations, including natural gas, electricity, and water, as well as on infrastructure such as wastewater sanitation plants, roads and highways, and public utilities. Some of these actions, particularly those which are situated away from waterbodies, will not require Federal permits, and thus will not undergo review through the ESA section 7 consultation process with NMFS.

Increased urbanization also is expected to result in increased recreational activities in the region. Among the activities expected to increase in volume and frequency is recreational boating. Boating activities typically result in increased wave action and propeller wash in waterways. This potentially will degrade riparian and wetland habitat by eroding channel banks and mid-channel islands, thereby causing an increase in siltation and turbidity. Wakes and propeller wash also churn up benthic sediments thereby potentially re-suspending contaminated sediments and degrading areas of submerged vegetation. This in turn would reduce habitat quality for the invertebrate forage base required for the survival of juvenile salmonids and green sturgeon moving through the system. Increased recreational boat operation on the San Joaquin River and south Delta is anticipated to result in more contamination from the operation of gasoline and diesel powered engines on watercraft entering the water bodies of the San Joaquin River and south Delta. In addition to recreational boating, commercial vessel traffic is expected to increase with the redevelopment plans of the Port of Stockton. Portions of this redevelopment plan have already been analyzed by NMFS for the West Complex (formerly Rough and Ready Island) but the redevelopment of the East Complex, which currently does not have a Federal action associated with it, will also increase vessel traffic as the Port becomes more modernized. Commercial vessel traffic is expected to create substantial entrainment of aquatic organisms through ship propellers as the vessels transit the shipping channel from Suisun Bay to the Port and back again. In addition, the hydrodynamics of the vessel traffic in the confines of the channel will create sediment re-suspension, and localized zones of high turbulence and shear forces. These physical effects are expected to adversely affect aquatic organisms, including both listed salmonids and sDPS green sturgeon resulting in death or injury.

C. Global Climate Change

The world is about 1.3°F warmer today than a century ago and the latest computer models predict that, without drastic cutbacks in emissions of carbon dioxide and other gases released by the burning of fossil fuels, the average global surface temperature may rise by two or more degrees in the 21st century (Intergovernmental Panel on Climate Change [IPCC] 2001). Much of that increase likely will occur in the oceans, and evidence suggests that the most dramatic changes in ocean temperature are now occurring in the Pacific (Noakes 1998). Using objectively analyzed data Huang and Liu (2000) estimated a warming of about 0.9°F per century in the Northern Pacific Ocean.

Sea levels are expected to rise by 0.5 to 1.0 meters in the northeastern Pacific coasts in the next century, mainly due to warmer ocean temperatures, which lead to thermal expansion much the same way that hot air expands. This will cause increased sedimentation, erosion, coastal flooding, and permanent inundation of low-lying natural ecosystems (*e.g.*, salt marsh, riverine, mud flats) affecting listed salmonid and green sturgeon sDPS PCEs. Increased winter precipitation, decreased snow pack, permafrost degradation, and glacier retreat due to warmer temperatures will cause landslides in unstable mountainous regions, and destroy fish and wildlife habitat, including salmon-spawning streams. Glacier reduction could affect the flow and temperature of rivers and streams that depend on glacier water, with negative impacts on fish populations and the habitat that supports them.

Summer droughts along the South Coast and in the interior of the northwest Pacific coastlines will mean decreased stream flow in those areas, decreasing salmonid survival and reducing water supplies in the dry summer season when irrigation and domestic water use are greatest. Global warming may also change the chemical composition of the water that fish inhabit: the amount of oxygen in the water may decline, while pollution, acidity, and salinity levels may increase. This will allow for more invasive species to overtake native fish species and impact predator-prey relationships (Peterson and Kitchell 2001, Stachowicz *et al.* 2002).

In light of the predicted impacts of global warming, the Central Valley has been modeled to have an increase of between +2°C and +7°C by 2100 (Dettinger *et al.* 2004, Hayhoe *et al.* 2004, Van

Rheenen *et al.* 2004, Dettinger 2005), with a drier hydrology predominated by rainfall rather than snowfall. This will alter river runoff patterns and transform the tributaries that feed the Central Valley from a spring/summer snowmelt dominated system to a winter rain dominated system. It can be hypothesized that summer temperatures and flow levels will become unsuitable for salmonid survival. The cold snowmelt that furnishes the late spring and early summer runoff will be replaced by warmer precipitation runoff. This should truncate the period of time that suitable cold-water conditions exist below existing reservoirs and dams due to the warmer inflow temperatures to the reservoir from rain runoff. Without the necessary cold water pool developed from melting snow pack filling reservoirs in the spring and early summer, late summer and fall temperatures below reservoirs, such as Lake Shasta, could potentially rise above thermal tolerances for juvenile and adult salmonids (*i.e.* SR winter-run Chinook salmon and CCV steelhead) that must hold below the dam over the summer and fall periods.

Within the context of the brief period over which the proposed project is scheduled to be operated, however, the near term effects of global climate change are unlikely to result in any perceptible declines to the overall health or distributions of the listed populations of anadromous fish within the action area that are the subject of this consultation.

VI. INTEGRATION AND SYNTHESIS

This section integrates the current conditions described in the environmental baseline with the effects of the proposed action and the cumulative effects of future actions. The purpose of this synthesis is to develop an understanding of the likely short-term and long-term responses of listed species and critical habitat to the proposed project.

A. Summary of Current Conditions and Environmental Baseline

The *Status of Species and Critical Habitat* and *Environmental Baseline* sections show that past and present impacts to the Sacramento and San Joaquin river basins and the Delta have caused significant salmonid and green sturgeon sDPS habitat loss, fragmentation and degradation. This has significantly reduced the quality and quantity of freshwater rearing sites and the migratory corridors within the lower valley floor reaches of the Sacramento and San Joaquin rivers and the south Delta region for these listed species. Additional loss of freshwater spawning sites, rearing sites, and migratory corridors have also occurred upstream of the Delta in the upper main stem and tributaries of the Sacramento and San Joaquin River basins.

The San Joaquin River basin historically contained numerous independent populations of CCV steelhead and CV spring-run Chinook salmon (Lindley *et al*. 2006, 2007). The green sturgeon sDPS may have been present in these watersheds prior to anthropogenic changes. The suitability of these watersheds to support these runs of fish changed with the onset of human activities in the region. Human intervention in the region initially captured mountain runoff in foothill reservoirs which supplied water to farms and urban areas. As demand grew, these reservoirs were enlarged or additional dams were constructed higher in the watershed to capture a larger fraction of the annual runoff. San Joaquin Valley agriculture created ever greater demands on the water captured by these reservoirs, diminishing the flow of water remaining in the region's rivers, and negatively impacting regional populations of salmonids (and likely green sturgeon too). Reclamation actions eliminated vast stretches of riparian habitat and seasonal floodplains from the San Joaquin River watershed and Delta through the construction of levees and the armoring of banks with rock riprap for flood control. Construction of extensive water conveyance systems and water diversions altered the flow characteristics of the Delta region. These anthropogenic actions resulted in substantial degradation of the functional characteristics of the aquatic habitat in the watershed upon which the region's salmonids (and potentially green sturgeon) depended on to maintain healthy populations.

Both adult and juvenile SR winter- and CV spring-run Chinook salmon pass through the action area and will be exposed to project-related effects for a brief period during either their migration to upstream spawning sites or out to sea. However, selenium levels are expected to remain at low concentrations and may decrease for the duration of the proposed action in the areas that SR winter- and CV spring-run Chinook salmon are known to occur. Due to the fact that adults migrating upstream do not forage, and the juveniles that enter the action area do not remain there for more than a short period of time and have likely been diverted off their typical migration route to sea, it is unlikely that project related effects will result in adverse effects to either of these ESUs.

Presently, populations of CV spring-run Chinook salmon have been functionally extirpated from the San Joaquin River basin. Populations of CCV steelhead in the San Joaquin River basin have been substantially diminished to only a few remnant populations in the lower reaches of the Stanislaus, Tuolumne, and Merced rivers below the first foothill dams. The green sturgeon sDPS has not been documented utilizing the San Joaquin River as a spawning river in recorded history but human alterations, which have been ongoing for over 100 years in the watershed, may have extirpated these populations before accurate records were maintained. However, fish survey records indicate that juvenile and sub-adult sDPS green sturgeon make use of the lower San Joaquin River for rearing purposes during the first several years of their life. Since the viability of small remnant populations of CCV steelhead in the San Joaquin River basin is especially tenuous and such populations are susceptible to temporally rapid decreases in abundance and possess a greater risk of extinction relative to larger populations (Pimm *et al.* 1988, Berger 1990, Primack 2004), activities that reduce quality and quantity of habitats, or that preclude formation of independent population units (see the representation and redundancy rule cited by Lindley *et al*. 2007), are expected to reduce the viability of the overall DPS if individual populations within the larger metapopulation become extinct (McElhany *et al.* 2000). Therefore, if activities have significant impacts on CCV steelhead populations or destroy necessary habitat, including designated critical habitat, within these San Joaquin populations, they could have significant implications for the DPS as a whole.

California Central Valley Steelhead

Estimates of adult escapement of steelhead to these watersheds are typically only a few dozen per year. This is reflected by the low number of smolts captured by monitoring activities throughout the year in different tributaries (*i.e.*, rotary screw traps on the Stanislaus, Tuolumne, Merced, and Calaveras rivers, and the Mossdale trawls on the San Joaquin River below the confluence of these three east side tributaries) in which only a few dozen smolts to several hundred smolts are collected each year (Marston 2004, S.P. Cramer and Associates 2005). These capture numbers have been extrapolated to estimate an annual population of only a few thousand juvenile steelhead smolts basin-wide in the San Joaquin River region. The Stanislaus River weir, which is used to count adult salmonids passing through the counting chamber or dead carcasses floating back onto the weir, has only recorded a few adult CCV steelhead each year it has been in use. This is indicative of the low escapement numbers for adult CCV steelhead in this watershed (S.P. Cramer and Associates 2005). The other San Joaquin tributaries are thought to have similar or even lower numbers based on the superiority of the Stanislaus River in terms of habitat and water quality for CCV steelhead.

Unlike current spawning populations of SR winter- and CV spring-run Chinook salmon, adult CCV steelhead will travel further within the action area, through the mainstem San Joaquin River to reach spawning habitat in the major tributaries (outside the action area), the Stanislaus, Tuolumne, and Merced rivers. Both adult and juvenile CCV steelhead will be exposed to selenium within the action area; however, the amount of exposure is expected to be brief during upstream and/or downstream migration periods. CCV steelhead are expected to spend more time within the San Joaquin tributaries where overall habitat conditions are more favorable. CCV steelhead are currently extirpated on the San Joaquin River upstream of the confluence with the Merced River (Eilers *et al*. 2010); however, it is possible that they may be attracted to the area due to agricultural return water and SJRRP Interim and Restoration flows. Selenium levels are expected to remain low especially in the downstream portions of the action area, as a result of dilution, and may decrease for the duration of the proposed action in the areas that CCV steelhead are known to occur. Although many measures are in place to reduce selenium levels, it is possible that some CCV steelhead will be affected by the proposed action. Over the long term, it is expected that selenium concentrations in areas CCV steelhead are known to occur will continue to decrease as a result of irrigation practices, other projects (*e.g.*, SJRIP, SJRRP, etc), and regulatory milestones.

Southern DPS of North American Green Sturgeon

Little is known about the migratory habits and patterns of adult and juvenile sDPS green sturgeon in the San Joaquin watershed. The basic pattern described for adult green sturgeon sDPS migrations into the Delta region from the San Francisco Bay estuary is that fish enter the Delta region starting in late winter or early spring and migrate upstream towards the stretch of the Sacramento River between Red Bluff and Keswick Dam. After spawning, adults return downstream and re-enter the Delta towards late summer and fall (based on behavior of sturgeon in the Klamath and Rogue River systems). Juvenile and larval sDPS green sturgeon begin to show up in rotary screw trap catches along the Sacramento River starting in summer (Beamesderfer *et al.* 2004) and could be expected to reach the Delta by fall. The extent and duration of these fish entering and remaining in the San Joaquin River within the action area is unclear, but because of the habitat similarities and lack of barriers between the action area and documented sturgeon habitat in the Delta, NMFS believes that sDPS green sturgeon, including sub-adults, could be found at low densities during any month of the year within the action area. Both adult and juvenile sDPS green sturgeon feed on benthic invertebrates and would therefore have an increased potential to be adversely affected by exposure to increasing concentrations of dietary selenium in their prey base through a portion of their rearing habitat for a period of up to three years. However, because sDPS green sturgeon are only known to spawn in the Sacramento River, a small proportion of the overall DPS is expected to occur in the San Joaquin River drainage and be exposed to the adverse effects of the project.

Designated Critical Habitat

As described in the *Environmental Baseline* section, past and present activities within the San Joaquin River basin and waters of the south Delta have caused significant habitat loss, degradation, and fragmentation. This has significantly reduced the quality and quantity of the remaining freshwater rearing sites and the migratory corridors within the lower valley floor reaches of the San Joaquin River and the south Delta for the populations of CCV steelhead and sDPS green sturgeon that utilize this area. Alterations in the geometry of the south Delta channels, removal of riparian vegetation and shallow water habitat, construction of armored levees for flood protection, changes in river flow created by demands of water diverters, and the influx of contaminants from agricultural and urban dischargers have also substantially reduced the functionality of the region's waterways. Additional losses of freshwater spawning sites, rearing sites, and migratory corridors have occurred upstream of the action area in the tributaries of the San Joaquin and Sacramento River basins, but are outside of the action area of this consultation.

Summary

It is unlikely that SR winter-run or CV spring-run Chinook salmon will experience adverse effects as a result of the proposed project. This is due to the low concentrations of selenium in parts of the action area where these species are known to occur and the fact that adults migrating upstream do not forage, and the juveniles that enter the action area do not remain there for more than a short period of time and have likely been diverted off their typical migration route to sea. In general, indirect, project-related, adverse effects to CCV steelhead and green sturgeon sDPS in the San Joaquin River and southern Delta will be in the form of degraded sediment and water quality, as well as by contribution to the amount of selenium available to these species through prey items found in the action area. In this area, adult and juvenile CCV steelhead are primarily expected to begin entering the action area during late November and December, when cool and rainy weather is likely to promote upstream migration by adults, and in March and April, when juveniles are emigrating downstream through the action area. As a result, the exposure time of CCV steelhead to project-related effects are expected to be limited to a period of weeks to months as they pass through the Delta on their way to upstream spawning locations and as juveniles are emigrating to the ocean. sDPS Green sturgeon presence within the action area is considered to be year-round, with juveniles entering the Delta during the late summer and fall and potentially rearing there for several months to years before migrating to the ocean.

B. Effects of the Proposed Action on Listed Species

As a result of executing the proposed SLWD and PWD IRC, adverse impacts to the sDPS of North American green sturgeon and CCV steelhead stemming from the contamination of rearing and migrating habitat and food resources are expected to occur. These impacts may cause physiological stress to the extent that the normal behavior patterns (*e.g.*, feeding, sheltering and migration) of affected individuals may be disrupted. Overall, the changes in water quality associated with this project are expected to adversely affect listed species primarily by low-level alteration of habitat conditions, which may contribute to an increased availability of selenium in prey items potentially affecting reproductive success, juvenile survival, and behavioral responses that may lead to decreased swimming performance and increased predation rates for juveniles. Because sturgeon may spend a period of years in the action area rearing before migrating to the ocean, are demersal fish closely associated with the bottom substrate, feed by taste and feel with their barbels, and even shovel up sediment with their snouts when searching for food, it is likely that they would be subjected to a higher risk of exposure to the effects of increased selenium in their diet expected to be produced by the proposed project. Potential impacts are expected to be minimized by Reclamation meeting water quality objectives for agricultural subsurface drainage entering the San Joaquin River; Reclamation's 3rd Use Agreement for the GBP that authorizes the use of the GBP for agricultural drainwater discharges originating from the SLWD and PWD to the San Joaquin River, Panoche Drainage District's implementation of the SJRIP, Reclamation's pilot projects such as the San Luis Drainage Feature Re-evaluation Demonstration Treatment Facility at Panoche Drainage District; and Reclamation requiring that the SLWD and PWD implement the strategies developed in the Westside Regional Drainage Plan for reducing the amount of selenium entering the San Joaquin River as a result of agricultural drainage.

C. Effects of the Proposed Action on Listed Species Likelihood of Survival and Recovery

1. California Central Valley Steelhead

NMFS anticipates that the proposed project will result in the exposure of adult and juvenile CCV steelhead to increased levels of selenium in the waters and prey items of the south Delta where they migrate and rear. Exposure to this contaminant is expected to adversely affect a small number of individuals for a relatively short duration of time because the fish do not spend more than a few weeks to months in the action area during their life time. Adverse effects directly attributable to the proposed action will be minimized because contributions of drainage from these water districts meet RWQCB standards, and because the interim renewal contracts authorize these continued discharges from the SLWD and PWD for a period of not more than 24 months. It should be noted that RWQCB standards may not provide adequate protection to migrating steelhead if they will have access above the confluence of the Merced River and below Mud Slough (north). Currently the Hills Ferry Barrier (HFB) is operated by the California Department of Fish and Wildlife to keep fall-run Chinook salmon out of this reach; therefore, it also functions to exclude most of the migrating adult steelhead. Following the removal of the HFB each December, Reclamation conducts the Steelhead Monitoring Program, as part of the SJRRP, to detect the presence of CCV steelhead in the San Joaquin River upstream of the confluence of the Merced River that may be present due to Interim and Restoration flows. An effectiveness study of the HFB was performed in 2010 and 2011, and no CCV steelhead were detected (Portz et al. 2011). Since implementing the Steelhead Monitoring Program in 2011, no CCV steelhead have been observed in this reach (Portz *et al.* 2012). The recently adopted interim performance measure (15 ppb monthly average through December 31, 2015) for the section of the San Joaquin River between the confluence of the Merced River and Mud Slough (north) is above toxicity thresholds for steelhead. Small numbers of direct mortality of juvenile or adult fish may occur in this section of the San Joaquin River if individuals remain in that reach of the river for a long time period. The elevated stress levels may degrade the fish's health and the reproductive potential of adults, and increase the potential of juveniles to be preyed upon by striped bass or other large predators due to impaired behavioral and physiological responses. Individuals that appear different in their behavior attract predators, and thus experience higher mortality due to predator attraction. Even so, given the uncertain nature of the actual effects of the proposed project on CCV steelhead in the action area, it is expected that these short-term effects, when considered in the context of the current baseline and likely future cumulative effects, would not appreciably reduce the likelihood of survival and recovery of the CCV steelhead DPS throughout its range.

2. <u>Southern DPS of North American Green Sturgeon</u>

Due to the lack of general abundance information regarding the green sturgeon sDPS, a variety of estimates must be utilized to determine the range of potential effects resulting from the take of green sturgeon due to the proposed action. Compared to the estimated population sizes suggested by the CDFW tagging efforts (CDFG 2002), juvenile and sub-adult captures passing Red Bluff Diversion Dam, and past IEP sampling efforts, the low level of take estimated from the proposed project would impact a small proportion of the adult and sub-adult sDPS green sturgeon in the Sacramento River watershed. Captures of juvenile and sub-adult sDPS green sturgeon passing Red Bluff Diversion Dam have exceeded 2,000 individuals in some years. Execution of the proposed SLWD and PWD IRCs would only authorize continued discharges of agricultural subsurface drainage to the San Joaquin River for a period of 24 months. Incidental take of both adult and juvenile sDPS green sturgeon is expected to represent a small proportion of the standing population and is not expected to appreciably reduce the likelihood of survival and recovery of the green sturgeon sDPS.

C. Effects of the Proposed Action on Critical Habitat

The PCEs of designated CCV steelhead critical habitat that will be affected by the execution of the SLWD and PWD IRC 2013–2015 are freshwater rearing habitat, freshwater migration corridors, and estuarine areas.

The PCEs of proposed critical habitat for the sDPS of North American green sturgeon that will be affected by the proposed action include the food resources, water quality, and sediment quality of estuarine systems where juveniles rear for a period of up to 3 years, and through which both adults and juveniles migrate.

These effects to the PCEs of critical habitat may result in increased exposure of listed fish to selenium concentrations in the south Delta where they spend a portion of their life rearing and feeding before entering the ocean. However, NMFS expects that nearly all of the adverse effects to critical habitat from this project will be minimal in scope while RWQCB standards on the San Joaquin River downstream from the confluence of the Merced River are being met, when combined with the observed levels of dilution downstream of tributary inputs. In addition, there is a declining trend of selenium loading to the system in the future, including the time period of these Interim Renewal Contracts. Furthermore, due to the minimal amounts of agricultural subsurface drainage originating from the San Luis and Panoche water district lands, and the limited period of 24 months that those discharges would be permitted, the adverse effects that are anticipated to result from the proposed project are not of the type, duration, or magnitude that would be expected to adversely affect critical habitat to the extent that it could lead to an appreciable reduction in the function and value of the affected habitat for the conservation of these species.

VII. CONCLUSION

After reviewing the best available scientific and commercial information, the current status of the SR winter-run Chinook salmon ESU, CV spring-run Chinook salmon ESU, CCV steelhead DPS, and the sDPS of North American green sturgeon, the environmental baseline, the effects of the proposed execution of the San Luis Water District and Panoche Water District Interim Renewal Contracts, and the cumulative effects, it is NMFS' biological opinion that the implementation of the SLWD and PWD IRCs, as proposed, is not likely to jeopardize the continued existence of the SR winter-run Chinook salmon ESU, CV spring-run Chinook salmon ESU, CCV steelhead DPS or the sDPS of North American green sturgeon, nor will it result in the destruction or adverse modification of designated critical habitat for the CCV steelhead DPS or sDPS of North American green sturgeon.

VIII. INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and Federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by NMFS as an act which kills or injures fish or wildlife. Such an act may include significant habitat modification or degradation where it actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including breeding, spawning, rearing, migrating, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not the purpose of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by Reclamation so that they become binding conditions of any contracts or permits, as appropriate, for the exemption in section 7(o)(2) to apply. Reclamation has a continuing duty to regulate the activity covered by this incidental take statement. If Reclamation (1) fails to assume and implement the terms and conditions or (2) fails to require the San Luis and Panoche Water Districts to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the contracts or permits, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, BOR and/or the San Luis and Panoche Water Districts must report the progress of the action and its impact on the species to NMFS as specified in the incidental take statement (50 CFR §402.14(i)(3)).

A. Amount or Extent of Take

NMFS anticipates incidental take of CCV steelhead and green sturgeon sDPS in the San Joaquin River and south Delta as a result of increased selenium contamination in those waters through which they migrate and where juveniles of the species rear. Specifically, NMFS anticipates that juvenile and adult CCV steelhead and sDPS green sturgeon may be adversely affected by increasing exposure to elevated levels of selenium which may impair the reproductive success, growth, and survival of these species in the wild.

NMFS cannot, using the best available information, specifically quantify the anticipated amount of incidental take of individual CCV steelhead and sDPS green sturgeon because of the variability and uncertainty associated with the response of listed species to the effects of the project, the varying population size of each species, annual variations in the timing of spawning and migration, and individual habitat use within the project area. However, it is possible to designate ecological surrogates for the extent of take anticipated to be caused by the project, and to monitor those surrogates to determine the level of take that is occurring. The most appropriate ecological surrogates for the extent of take caused by the project are the measured concentrations of selenium in Mud Slough and the San Joaquin River, and the continued participation by the San Luis and Panoche water districts in the Grasslands Bypass Project, SJRIP, and San Luis Drainage Feature Re-evaluation Demonstration Treatment Facility at Panoche Drainage District.

1. Ecological Surrogates

- The analysis of the effects of the proposed project anticipates that measured selenium concentrations in Mud Slough and the San Joaquin River will continue to meet the RWQCB Basin Plan waste discharge requirements for the Grasslands Bypass Project identified in the *Effects of the Action* section, and that occurrences exceeding those thresholds will be limited to the influence of overland flow resulting from major storm events.

- The analysis of the effects of the proposed project anticipates that the San Luis and Panoche water districts will continue to participate in the Grasslands Bypass Project, the SJRIP, and the San Luis Drainage Feature Re-evaluation Demonstration Treatment Facility at Panoche Drainage District throughout the life of the contracts (or for 18 months in the case of the latter project), thereby minimizing the volume and concentrations of selenium introduced into the habitat of listed species as a result of agricultural discharges from their districts.

If the specific parameters of these ecological surrogates are not met, the proposed project will be considered to have exceeded anticipated take levels, triggering the need to reinitiate consultation on the project.

B. Effect of the Take

In the accompanying biological opinion, NMFS determined that this level of anticipated take is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat.

C. Reasonable and Prudent Measures

NMFS has determined that the following reasonable and prudent measures (RPMs) are necessary and appropriate to minimize the incidental take of listed anadromous fish. These reasonable and prudent measures also would minimize adverse effects on designated critical habitat.

1. Measures shall be taken to minimize the amount of agricultural subsurface drainage discharged to the San Joaquin River from the San Luis and Panoche water districts.

2. Measures shall be taken to ensure the continued participation in the Grasslands Bypass Project, the SJRIP, and the San Luis Drainage Feature Re-evaluation Demonstration Treatment Facility at Panoche Drainage District for the duration of the Interim Renewal Contract Project (or for 18 months in the case of the latter project). This shall be done in order to ensure that anticipated take levels of listed species do not exceed those described above in A.1. Ecological surrogates.

3. Measures shall be taken to protect CCV steelhead from high selenium pulses in the San Joaquin River above the confluence with the Merced River through coordination with CDFW and the operation of the Hills Ferry Barrier at least during the September to December time period.

4. Measures shall be taken to assess and monitor the concentrations of selenium within the waters, sediments, vegetation, and invertebrates of the San Joaquin River as well as in the mouths of Salt Slough and Mud Slough (north) to assess the selenium contributions from each pathway. This shall be done in order to demonstrate that the proposed action does not exceed anticipated take levels related to selenium waste discharge requirements in the RWQCB Basin Plan described above in A.1. Ecological Surrogates.

D. Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, Reclamation must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary and must be incorporated as binding conditions of any contracts or permits between Reclamation and the San Luis and Panoche water districts.

1. Measures shall be taken to minimize the amount of agricultural subsurface drainage discharged to the San Joaquin River from the San Luis and Panoche water districts.

   a. Reclamation shall require the water districts' continued participation in the Westside Regional Drainage Plan, which employs actions leading to zero discharge of subsurface drainage water beyond the boundaries of regional drainage management facilities, including but not limited to:

      i. Recirculating tailwater on-farm;

      ii. Employing micro irrigation and drip irrigation systems to the maximum extent practical;

      iii. Lining district water delivery facilities to the maximum extent practical;

      iv. Applying collected subsurface drainage water to salt tolerant crops and other drainwater displacement projects (such as road wetting for dust control); and

      v. Converting any remaining furrow and flood agricultural practices to contoured row agriculture employing micro, drip, or overhead sprinkler irrigation wherever feasible.

2. Measures shall be taken to ensure the continued participation in the Grasslands Bypass Project, the SJRIP, and the San Luis Drainage Feature Re-evaluation Demonstration Treatment Facility at Panoche Drainage District for the duration of the Interim Renewal Contract Project (or for 18 months in the case of the latter project). This shall be done in order to ensure that anticipated take levels of listed species do not exceed those described above in A.1. Ecological surrogates.

   a. Reclamation shall require the San Luis and Panoche water districts' continuing participation in the Grasslands Bypass Project, the SJRIP, and San Luis Drainage Feature Re-evaluation Demonstration Treatment Facility at Panoche Drainage District.

3. Measures shall be taken to protect CCV steelhead from high selenium pulses in the San Joaquin River above the confluence with the Merced River through coordination with CDFW and the operation of the Hills Ferry Barrier at least during the September to December time period.

   a. Reclamation shall coordinate with the CDFW and create an action plan to protect CCV steelhead from high selenium pulses in the San Joaquin River above the confluence with the Merced River through the operation of the Hills Ferry Barrier at least over the September to December time period.

4. Measures shall be taken to assess and monitor the concentrations of selenium within the waters, sediments, vegetation, and invertebrates of the San Joaquin River, and at the mouths of Salt Slough and Mud Slough (north) to assess the contributions of selenium from each pathway. This shall be done in order to demonstrate that the proposed action

does not exceed anticipated take levels related to selenium waste discharge requirements in the RWQCB Basin Plan described above in A.1. Ecological Surrogates

a. Reclamation shall design and initiate a plan for sampling the selenium concentrations in the waters, sediment, vegetation, and invertebrates of the San Joaquin River at the mouth of Mud Slough and above the confluence with the Merced River. .

b. Reclamation shall design and initiate a plan for sampling the selenium concentrations in the waters, sediment, vegetation, and invertebrates of the San Joaquin River at the mouth of Salt Slough and just upstream of the mouth of Mud Slough.

c. Reclamation shall provide an annual report to NMFS summarizing the results of the sampling conducted in accordance with the plans described above.

Updates and reports required by these terms and conditions are due to NMFS no later than June 1, 2014, (covering the March 1, 2013, through February 28, 2014, period) and June 3, 2015, (covering the March 1, 2014, through February 28, 2015, period). These updates and reports shall be submitted to:

Supervisor
Central Valley Office
National Marine Fisheries Service
650 Capitol Mall, Suite 5-100
Sacramento CA 95814
FAX: (916) 930-3629
Phone: (916) 930-3600

IX. CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs Federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on a listed species or critical habitat or regarding the development of pertinent information.

1. Reclamation should support and promote aquatic and riparian habitat restoration within the Delta region, and encourage practices that avoid or minimize negative impacts to salmon, steelhead, and green sturgeon.

2. Reclamation should support anadromous salmonid monitoring programs throughout the Sacramento-San Joaquin Delta to improve the understanding of migration and habitat utilization by salmonids and green sturgeon in this region.

3. Reclamation should provide a monitoring plan in order to gather information about baseline selenium levels in waters, sediment, vegetation, and invertebrates in the San Joaquin River between the confluence of the Merced River and continuing just upstream of Salt Slough.

In order for NMFS to be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats, NMFS requests notification of the implementation of any conservation recommendations.

X. REINITIATION OF CONSULTATION

This concludes formal consultation on the actions outlined in the request for consultation received from Reclamation for the San Luis Water District and Panoche Water District Interim Renewal Contracts 2013–2015. As provided for in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of taking specified in any incidental take statement is exceeded, (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not previously considered, (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the biological opinion, or (4) a new species is listed or critical habitat is designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, formal consultation shall be reinitiated immediately.

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Enclosure 2

Magnuson-Stevens Fishery Conservation and Management Act

ESSENTIAL FISH HABITAT CONSERVATION RECOMMENDATIONS

I. IDENTIFICATION OF ESSENTIAL FISH HABITAT

The Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA), as amended (16 U.S.C. § 1801 et seq.), requires that essential fish habitat (EFH) be identified and described in Federal fishery management plans (FMPs). Federal action agencies must consult with NOAA's National Marine Fisheries Service (NMFS) on any activity which they fund, permit, or carry out that may adversely affect EFH. NMFS is required to provide EFH conservation recommendations to the Federal action agencies.

EFH is defined as those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. For the purpose of interpreting the definition of EFH, "waters" includes aquatic areas and their associated physical, chemical, and biological properties that are used by fish, and may include areas historically used by fish where appropriate; "substrate" includes sediment, hard bottom, structures underlying the waters, and associated biological communities; "necessary" means habitat required to support a sustainable fishery and a healthy ecosystem; and "spawning, breeding, feeding, or growth to maturity" covers all habitat types used by a species throughout its life cycle (50 CFR 600.10). The action area of the San Luis Water District (SLWD) and Panoche Water District (PWD) Interim Renewal Contracts 2013-2015 is within the area identified as EFH for Pacific Coast Salmon species identified in Amendment 14 of the Pacific Salmon FMP [Pacific Fishery Management Council (PFMC) 1999].

PFMC (1999) has identified and described EFH, and has identified adverse impacts and recommended conservation measures for salmon in amendment 14 to the Pacific Coast Salmon FMP. Freshwater EFH for Pacific salmon in the California Central Valley includes waters currently or historically accessible to salmon within the Central Valley ecosystem as described in Myers et al. (1998). SR winter-run Chinook salmon (*Oncorhynchus tshawytscha*), CV spring-run Chinook salmon (*O. tshawytscha*), and CV fall-/late fall-run Chinook salmon (*O. tshawytscha*) are species managed under the Pacific Coast Salmon FMP that occur in the CV.

A. Life History and Habitat Requirements

General life history information for CV fall-/late fall-run Chinook salmon is summarized below. Information on SR winter-run and CV spring-run Chinook salmon life histories is summarized in the preceding biological opinion for the proposed project (enclosure 1). Further detailed information on Chinook salmon evolutionarily significant units (ESUs) are available in the NMFS status review of Chinook salmon from Washington, Idaho, Oregon, and California (Myers *et al.* 1998), and the NMFS proposed rule for listing several ESUs of Chinook salmon (63 FR 11482; March 9, 1998).

CV fall-run Chinook salmon enter the San Joaquin River from July through December, and late fall-run enter between October and March. Fall-run Chinook salmon generally spawn from October through December, and late fall-run fish spawn from January to April [U.S. Fish and Wildlife Service (USFWS) 1998]. The physical characteristics of Chinook salmon spawning beds vary considerably. Chinook salmon will spawn in water that ranges from a few centimeters to several meters deep provided that there is suitable sub-gravel flow (Healey 1991). Spawning typically occurs in gravel beds that are located in marginally swift riffles, runs and pool tails with water depths exceeding one foot and velocities ranging from one to 3.5 feet per second. Preferred spawning substrate is clean loose gravel ranging from one to four inches in diameter with less that 5 percent fines (Reiser and Bjornn 1979).

Egg incubation occurs from October through March, and juvenile rearing and smolt emigration occur from January through June (Reynolds *et al.* 1993). Shortly after emergence, most fry disperse downstream towards the Sacramento-San Joaquin Delta and estuary while finding refuge in shallow waters with bank cover formed by tree roots, logs, and submerged or overhead vegetation (Kjelson *et al.* 1982). These juveniles feed and grow from January through mid-May, and emigrate to the Delta and estuary from mid-March through mid-June (Lister and Genoe 1970). As they grow, the juveniles associate with coarser substrates along the stream margin or farther from shore (Healey 1991). Along the emigration route, submerged and overhead cover in the form of rocks, aquatic and riparian vegetation, logs, and undercut banks provide habitat for food organisms, shade, and protect juveniles and smolts from predation. Smolts generally spend a very short time in the Delta and estuary before entering the ocean.

II. PROPOSED ACTION

Reclamation proposes to execute interim water service contracts that would authorize the continued delivery of water from the Central Valley Project to the San Luis and Panoche water districts for a period of 24 months beginning on March 1, 2013, and continuing through to February 28, 2015. The proposed action is described in the *Description of the Proposed Action* section of the preceding biological opinion (Enclosure 1).

III. EFFECTS OF THE PROPOSED ACTION

The effects of the proposed action on Pacific Coast salmon EFH would be similar to those discussed in the *Effects of the Proposed Action* section of the preceding biological opinion (Enclosure 1) for threatened CCV steelhead. A summary of the effects of the proposed action on Chinook salmon habitat are discussed below.

Adverse effects to Chinook salmon habitat will result from the execution of interim renewal contracts authorizing continued water deliveries to the SLWD and PWD lands which discharge agricultural subsurface drainage that contributes selenium to the waters, sediment, vegetation, and biota of the San Joaquin River and the Delta. The effects of the proposed action are likely to include physiological stress to the extent that the normal behavior patterns (e.g., feeding sheltering, migration) of affected individuals may be disrupted. An increased availability of selenium in prey items is expected to affect reproductive success, juvenile survival, and behavioral responses that may lead to decreased swimming performance and increased predation rates for juveniles.

IV. CONCLUSION

Upon review of the effects of the SLWD and PWD Interim Renewal Contracts 2013-2015, NMFS believes that execution of the contracts will result in adverse effects to the EFH of Pacific salmon protected under the MSFCMA.

V. EFH CONSERVATION RECOMMENDATIONS

Considering that the habitat requirements of fall-run Chinook salmon within the action area are similar to the federally listed species addressed in the preceding biological opinion (Enclosure 1), NMFS recommends that all the Terms and Conditions as well as all the Conservation Recommendations in the preceding biological opinion prepared for the CCV steelhead ESU be adopted as EFH Conservation Recommendations.

VI. ACTION AGENCY STATUTORY AND REGULATORY REQUIREMENTS

Section 305(b)(4)(B) of the MSA and Federal regulations (50 CFR § 600.920) to implement the EFH provisions of the MSA require Federal action agencies to provide a detailed written response to NMFS, within 30 days of its receipt, responding to the EFH conservation recommendations. The response must include a description of measures adopted by the Agency for avoiding, mitigating, or offsetting the impact of the project on Pacific salmon EFH. In the case of a response that is inconsistent with NMFS' recommendations, the Agency must explain their reasons for not following the recommendations, including the scientific justification for any disagreements with NMFS over the anticipated effects of the proposed action and the measures needed to avoid, minimize, mitigate, or offset such effects (50 CFR 600.920(k)).

VII. LITERATURE CITED

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FINAL ENVIRONMENTAL ASSESSMENT (12-055)

CENTRAL VALLEY PROJECT INTERIM RENEWAL CONTRACTS FOR PANOCHE WATER DISTRICT AND SAN LUIS WATER DISTRICT 2013-2015

Appendix D
Reclamation's Cultural and Indian Trust Asset Determinations

February 2013

Healer, Rain L

From: Soule, William E
Sent: Monday, August 20, 2012 2:18 PM
To: Healer, Rain L
Subject: RE: 12-SCAO-254 Section 106 Review Closeout Email

Rain:

Re: 12-SCAO-254 Water Service Interim Renewal Contracts for the San Luis Water District and Panoche Water District 2013-2015 (EA-12-055).

Reclamation's proposed action of executing two San Luis Unit interim renewal contracts beginning March 01, 2012 is the type of action that does not have the potential to cause effects to historic properties, should such properties be present, pursuant to 36 CFR Part 800.3(a)(1). Each of the proposed interim contracts would be renewed for a two-year period beginning March 01, 2013 and ending February 28, 2015. The purpose is to insure delivery of CVP water to these contractors until a new long-term contact can be executed. There are no changes that provide for a contractor to modify its existing service area and no sales, transfers, or exchanges of Central Valley Water (CVP) are included. The difference between the No-Action and Proposed-Action Alternatives is that the Proposed-Action has minor administrative changes to contract provisions.

This email is intended to convey the completion of the Section 106 review process for this undertaking. I concur with the inclusion of language in EA-12-055 that states that this proposed action, including both the No Action Alternative and the Proposed Action Alternative, has no potential to cause effects to historic properties pursuant to 36 CFR Part 800.3(a)(1). Please retain a copy of this email with the administrative record for this NEPA action. Thank you for providing the opportunity to comment.

Sincerely,

Bill

William E. Soule, M.A., Archaeologist
U.S. Bureau of Reclamation, Mid-Pacific Region
2800 Cottage Way, MP-153
Sacramento, CA 95825
Phone: 916-978-4694
Fax: 916-978-5055
Email: wsoule@usbr.gov

From: Healer, Rain L
Sent: Monday, August 20, 2012 1:47 PM
To: Soule, William E
Subject: RE: 12-SCAO-254 Section 106 Review Closeout Email

Bill,

Shouldn't this be "Reclamation's" proposed action rather than Recreation's? For clarification, both alternatives involve minor administrative changes to contract provisions. The difference between the two is that the No Action involves tiered pricing in contracts over 3 years and is based off the Preferred Alternative from the CVPIA PEIS.

From: Soule, William E
Sent: Monday, August 20, 2012 11:29 AM
To: Healer, Rain L
Cc: BOR MPR Cultural Resources Section
Subject: 12-SCAO-254 Section 106 Review Closeout Email

Rain:

Re: 12-SCAO-254 Water Service Interim Renewal Contracts for the San Luis Water District and Panoche Water District 2013-2015 (EA-12-055).

Recreation's proposed action of executing two San Luis Unit interim renewal contracts beginning March 01, 2012 is the type of action that does not have the potential to cause effects to historic properties, should such properties be present, pursuant to 36 CFR Part 800.3(a)(1). Each of the proposed interim contracts would be renewed for a two-year period beginning March 01, 2013 and ending February 28, 2015. The purpose is to insure delivery of CVP water to these contractors until a new long-term contact can be executed. There are no changes that provide for a contractor to modify its existing service area and no sales, transfers, or exchanges of Central Valley Water (CVP) are included. The difference between the No-Action and Proposed-Action Alternatives is that the Proposed-Action has minor administrative changes to contract provisions.

This email is intended to convey the completion of the Section 106 review process for this undertaking. I concur with the inclusion of language in EA-12-055 that states that this proposed action, including both the No Action Alternative and the Proposed Action Alternative, has no potential to cause effects to historic properties pursuant to 36 CFR Part 800.3(a)(1). Please retain a copy of this email with the administrative record for this NEPA action. Thank you for providing the opportunity to comment.

Sincerely,

Bill

William E. Soule, M.A., Archaeologist
U.S. Bureau of Reclamation, Mid-Pacific Region
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From: Healer, Rain L
Sent: Friday, August 17, 2012 2:56 PM
To: BOR MPR Cultural Resources Section
Subject: Project Description for reivew (EA-12-055)

Good morning,

I have attached the project description for interim renewal contracts for Panoche Water District and San Luis Water District for your review.

Cost authority: A10-0805-8943-332-76-0-0

Rain L. Healer, M.S.
Natural Resources Specialist
United States Department of the Interior
Bureau of Reclamation
1243 N Street,   SCC 413
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(559) 487-5196
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Healer, Rain L

From: Rivera, Patricia L
Sent: Monday, September 10, 2012 2:39 PM
To: Healer, Rain L
Subject: RE: EA-12-055 Project Description

Rain,

I reviewed the proposed action to execute two San Luis Unit interim renewal contracts beginning March 1, 2013 for San Luis Water District (SLWD) and Panoche Water District (PWD). The two interim renewal contracts listed in Table 1-1 would be renewed for a two-year period from March 1, 2013 through February 28, 2015. In the event a new long-term water service contract is executed, the interim water service contract then-in-effect would be superseded by the long-term water service contract.

Table 1-1 Contractors, Existing Contract Amounts, and Expiration Dates

Contractor	Current Contract Number	Contract Quantity (acre-feet)	Expiration of Existing Interim Renewal Contract
San Luis Water District	14-06-200-7773A-IR2	125,080	2/28/2013
Panoche Water District	14-06-200-7864A-IR2	94,000	2/28/2013

The Proposed Action would continue these existing interim renewal contracts, with only minor, administrative changes to the contract provisions to update the previous interim renewal contracts for the new contract period. In the event that a new long-term water contract is executed, that interim renewal contract would then expire.

No changes to the contractors' service areas or water deliveries are part of the Proposed Action.

The proposed action does not have a potential to affect Indian Trust Assets.

Rain, I sent my determination to you shortly after receipt - I did not have the exact location of the nearest ITA so I sent a determination with explanation that my determination is determinative. I also updated the request with the location after receiving it from Ellie (Ellie was out of office at time of request and I did not wish to delay a determination and impact your action on timeliness).

This is the second transmission-I do not have a copy of the determination of the nearest ITA.