United States Department of the Interior

FISH AND WILDLIFE SERVICE
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In Reply Refer to:
08ESMF00-
2015-F-0116

JUN - 4 2015

Memorandum

To: Anastasia Leigh, Regional Environmental Officer, Mid-Pacific Regional Office, Bureau of Reclamation, Sacramento, California

From: Jennifer M. Norris, Field Supervisor, U.S. Fish and Wildlife Service, Sacramento Fish and Wildlife Office, Sacramento, California

Subject: Reinitiation of Programmatic Formal Consultation for Bureau of Reclamation's Proposed Central Valley Project Long Term Water Transfers (2015-2024) with Potential Effects on the Giant Garter Snake within Sacramento Valley, California

On May 13, 2015, the U.S. Fish and Wildlife Service (Service) received an email from the Bureau of Reclamation (Reclamation) requesting that the April 30, 2015 *Programmatic Formal Consultation for the Bureau of Reclamation's Proposed Central Valley Project Long Term Water Transfers (2015-2024) with Potential Effects on the Giant Garter Snake within Sacramento Valley, California*, be revised to reflect changes and corrections to the Conservation Measures related to cropland idling transfers within the Description of the Action. Reclamation also requested that the Service consider revising Term and Condition #3 to remove the reference to buffer zones and to require a report within 60 days instead of once every month. Reclamation indicated that a report within 60 days following the approval of transfers each year should capture all idling transfers taking place for the year and provide the Service adequate assurance that conservation measures are being implemented for the various parcels being idled.

This memorandum is in response to Reclamation's November 4, 2014, request for formal consultation with the Service on the proposed Long-Term Water Transfer Program from 2015 to 2024 (proposed project) which Reclamation has determined may affect, and is likely to adversely affect, the threatened giant garter snake (*Thamnophis gigas*) (snake). Your request, which included a biological assessment (BA), was received by the Service on November 18, 2014. This response is provided under the authority of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*) (Act), and in accordance with the implementing regulations pertaining to interagency cooperation (50 CFR §402).

The federal action we are consulting on is Reclamation's approval of the transfer of water from willing sellers to Central Valley Project (CVP) contractors. This includes transfers that involve CVP water supplies or require the use of CVP or State Water Project (SWP) facilities over a 10-year period (2015-2024) and are subject to approval by Reclamation on an individual basis annually. Reclamation is requesting this consultation on behalf of the contractors that would be selling or buying water as part of the proposed project. For the purposes of this analysis this program will be referred to collectively as "long-term water transfers". Transfers will be from willing sellers upstream of the Sacramento-San Joaquin River delta (Delta), to buyers in the Sacramento River basin (north-to-north transfers), the San Francisco Bay area and to buyers that export water from

the Delta (north-to-south transfers).

Pursuant to 50 CFR §402.12(j), you submitted a BA for our review and requested concurrence with the findings presented therein. The Service concurs with your findings that the proposed project may affect, and is likely to adversely affect the snake. The proposed project is not within designated or proposed critical habitat for any federally-listed species.

In considering your request, we evaluated the following: (1) your November 4, 2014 letter initiating consultation and the October 2014 *Long-Term Water Transfers* BA, received by the Service on November 18, 2014; (2) your March 12, 2015 letter providing additional information regarding the Formal Consultation for the Proposed Long Term Water Transfers from 2015 to 2024, received by the Service on March 17, 2015; (3) your April 2, 2015 letter amending the project description for the Proposed Long-term Water Transfers Formal Consultation, received by the Service on April 8, 2015; (4) email and telephone correspondence between the Service and Reclamation; and (5) other information available to the Service. A complete administrative record of this consultation is on file in the Service's Sacramento Fish and Wildlife Office.

The Service has consulted with Reclamation, both informally and formally, eight times since 2000 on various forbearance agreements and proposed water transfers for which water is made available in the Sacramento Valley by fallowing rice (and other crops), substituting other crops for rice, or substituting groundwater for surface supplies. Although transfers of this nature were anticipated in our 2004 biological opinion on the Environmental Water Account (EWA; Service File 03-F-0321), that program expired in 2007 and, to our knowledge, no water was ever made available to EWA from rice fallowing or rice crop substitution.

As a result of discussions during consultation for the 2009 Drought Water Bank (DWB) between Reclamation, California Department of Water Resources (DWR) and the Service (along with representatives from the potential buyer and seller communities), a commitment was made to work together to identify long-term solutions for future water transfers. As a result, Reclamation and San Luis Delta Mendota Water Authority (SLDMWA) have prepared a joint EIS/EIR (Reclamation 2014b) to analyze the effects of water transfers from water agencies in northern California to water agencies south of the Delta and in the San Francisco Bay Area over a 10-year period (2015-2024). The EIS/EIR evaluates transfers of CVP water and non-CVP water supplies that require use of CVP or State Water Project (SWP) facilities to convey the transferred water and are the subject of this programmatic consultation. Scoping has been completed for this project and all of the scoping information is available on Reclamation's website at http://www.usbr.gov/mp/cvp/ltwt/. Subsequently, Reclamation and the Tehama Colusa Canal Authority (TCCA) prepared a joint Environmental Assessment/Initial Study (EA/IS) addressing potential effects of selling of water to TCCA members, all north of the Delta, which is also included in this biological opinion (Reclamation 2015).

We have evaluated the information contained in the BAs/consultations for respective interim and long-term water service contracts of the south of Delta buyers (1) Westlands Water District (Service file 14-F-0035); (2) Cities of Avenal, Coalinga, and Huron (Service file 12-I-0652); (3) San Luis Water District and Panoche Water District (Service file 13-I-0073); and (4) Banta-Carbona Irrigation District, Broadview Water District, Byron-Bethany Water District, Del Puerto Water District, Eagle Field Water District, James Irrigation District, Laguna Water District, Mercy Springs Water District (unassigned portion), Oro Loma Water District, Patterson Irrigation District, Reclamation District # 1606, Tranquillity Irrigation District, The West Side Irrigation District, West Stanislaus Irrigation District (Service file 04-I-0707) and it is our determination that the effect of these transfers on San Joaquin kit fox were included in those consultations. We do not anticipate additional adverse effects

to San Joaquin kit fox or an increase in the incidental take authorized, beyond what was evaluated in the biological opinions for the respective interim and long-term water service contracts of the potential south of Delta buyers.
In addition, based on a review of the information contained in the December 15, 2008, biological opinion for the Coordinated Operations of the CVP and SWP, it is our determination that the effects of these transfers on delta smelt and its critical habitat were included in that consultation (Service 2008). We do not anticipate additional adverse effects to delta smelt or its critical habitat, or an increase in the incidental take authorized, beyond what was evaluated in our December 15, 2008, biological opinion.

The remainder of this document provides our programmatic biological opinion on the effects of the proposed project on the snake.

Consultation History

March 4, 2014 – Meeting held between the Service, DWR, U.S. Geological Survey (USGS), and California Department of Fish and Wildlife (CDFW) focused on draft environmental commitments to conserve the snake. Reclamation recommended that the environmental commitments for water transfers in 2014 should reflect new information published since the 2010 biological opinion. USGS concurred that their data supported revision to the environmental commitments and provided refinements to the technical analysis used to depict areas of highly suitable habitat which likely contained snake populations. Reclamation asked for feedback on the draft language and agreed to modify the technical analysis used to depict snake priority habitat areas.

April 21, 2014 – The Service issued Biological Opinion for the snake to Reclamation for 2014 Water Transfers (Reference No. 08ESMF00-2014-F-0359) (Service 2014)

November 18, 2014 – The Service received Reclamation's request for formal consultation for the Proposed Long-term Water Transfers from 2015 to 2024.

February 10, 2015 – The Service requested that Reclamation provide additional information regarding proposed conservation measures for the snake.

March 17, 2015 – The Service received Reclamation's memorandum with additional information regarding snake research and monitoring and proposed conservation measures.

April 8, 2015 – The Service received Reclamation's memorandum amending the description of the proposed project to include eight additional sellers, increase the proposed transfer amounts of three existing sellers and adding one buyer, TCCA. Reclamation also revised total maximum potential transfer amount which was incorrect in the November 2014 BA.

April 23, 2015 – The Service and Reclamation met to discuss the preparation of a programmatic biological opinion with annual appendages and incidental take statements for the remainder of the program.

May 13, 2015 – The Service received Reclamation's email requesting revisions and corrections to the Service's April 30, 2015 Programmatic Biological Opinion.

Description of the Action

The proposed project consists of water transfers to CVP contractors over which Reclamation has approval authority, including any transfers that involve CVP water supplies or require the use of CVP facilities, for a 10-year period (2015-2024). These transfers may result from forbearance[1] actions taken by the sellers and may include Base Supply and Project Water from willing sellers located upstream of the Sacramento-San Joaquin Delta (Delta). Water transfers included in the proposed project represent only a portion of the expected overall transfers between 2015 and 2024. The remaining transfers (SWP) are not dependent on Reclamation's approval; this biological opinion considers these transfers in the context of cumulative effects.

The proposed project consists of making up to 565,614 acre-feet (AF) of water available for transfer each water year (2015 through 2024) through cropland idling/shifting, reservoir releases, conservation measures or groundwater substitution and assumes 100 percent supply is allocated (Tables 1 and 2). The CVP contractors identified in Tables 1 and 2 are the most likely participants through the duration of the proposed project. However, all CVP contractors North of the Delta have the opportunity to participate in the proposed project, subject to Reclamation's review and approval of all transfer proposals[2]. Annual transfer maximums authorized under the proposed project will not exceed the maximum transfer volume of 565,614 AF nor will the maximum annual cropland idling acreages, by region, exceed the values included in Table 4.

Procedures for Appending to the Programmatic Biological Opinion

This programmatic biological opinion addresses the effects of Reclamation's 10-year water transfer program and will be appended annually to include an incidental take statement that is consistent with the specifics of that year's proposed transfers. Because Reclamation is proposing specific actions that will affect the snake in 2015, this document also issues an incidental take statement for 2015 actions. In future years, we expect changes in the amount of anticipated take based on a variety of factors including willing sellers and buyers, water year type, amounts of land idled, crop shifting, habitat conditions for the snake and biological information from snake and habitat monitoring. For water transfers in years 2016-2024 (including multi-year transfers) Reclamation will prepare a description of the proposed action for the calendar year (sellers/buyers, conservation measures, etc.), provide detailed monitoring reports for the previous years actions, and submit this information to the Service no later than January 31 of each year.

Additionally, Reclamation will provide to the Service for review a report containing the following:

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[1] For purposes of this BA, the term "forbear" or "forbearance" will refer to both the Base Supply and Project Water made available under the respective Sacramento River Settlement Contract, although, it is understood the Base Supply will be forborne, while the Project Water will be transferred. Base Supply and Project Water Supply are terms of art from the Sacramento River Settlement Contract which is available at http://www.usbr.gov/mp/cvpia/3404c/lt_contracts/2005_exec_cts_sac_river/index.html. Base Supply shall mean the quantity of Surface Water established in Articles 3 [refers to Exhibit A: Schedule of Monthly Diversions of Water] and 5 [Constraints on the Availability of Water] which may be diverted by the Contractor from its Source of Supply each month during the period April through October of each Year without payment to the United States for such quantities diverted. Project Water shall mean all Surface Water diverted or scheduled to be diverted each month during the period April through October of each Year by the Contractor from its Source of Supply which is in excess of the Base Supply.

[2] Guidance for preparation of water transfer proposals is revised annually to reflect how transfers would be implemented and includes the prescribed measures in project-specific CEQA/NEPA and section 7 documents that cover the area where tranfsers are proposed. The environmental commitments approved in Reclamation's EIS/EIR and this biological opinion will be used to establish guidance for future water transfers proposals.

- all available information including monitoring reports from previous transfers that address amount and locations of fallowed lands;

- giant garter snake and habitat monitoring data; and

- environmental conditions from the previous year(s) and those expected in the coming year.

The annual monitoring reports will include detailed information in the action area (narrative and GIS spatial analysis) on implementation of the conservation measures, land idling/fallowing, hydrologic conditions, presence/absence/not found surveys for the snake, recent reports prepared on the snake, implementation of the conservation measures, and any other information that is relevant to snake impacts and conservation.

Reclamation proposes an adaptive approach to implementation of the water transfer program to ensure that prior to finalizing the water transfer agreements each year, Reclamation can make adjustments to the program. Adjustments would be made in response to new information about the status of the snake, effectiveness of conservation measures, environmental conditions, and population responses of the snake. By February 28 of each year Reclamation, the Service, the California Department of Fish and Wildlife (CDFW), and USGS meet to discuss the annual monitoring report, evaluate results of snake monitoring and research, evaluate the implementation of conservation measures and consider other relevant information. The Service, CDFW, and Reclamation, in consultation with USGS scientists, will identify any changes needed to snake conservation measures for the current year's water transfer program to assure continued conservation of the snake based on the joint evaluation of the most current scientific information. In addition the agencies will discuss water transfers anticipated for the current year and the extent and location of proposed crop idling (up to the stated maximum acreage).

By March 30 of each year, following the joint meeting and review of available information, the Service will provide additional analysis in support of an Incidental Take Statement for the current year's water transfers that will be appended to this programmatic biological opinion. It is expected that the total amount of water transferred which results in impacts to the snake (crop idling/crop shifting) will not exceed what is identified in the BA; however, Reclamation anticipates that the location of these impacts in the landscape will shift annually based on willing sellers, water year type, and other uncertainties.

The Service will append this biological opinion each year over the 10-year life of the proposed action with an Incidental Take Statement based on the specific and current information available to Reclamation and the Service. The purpose of this programmatic consultation is to allow Reclamation to take an adaptive approach to implementation of the water transfer program due to the degree of uncertainty in water availability, annual farming decisions, and natural variability associated with snakes, their habitat, and their responses to the proposed action.

Table 1 Maximum Potential Transfer by Seller Based on 100% Supply (2015)

Water Agency	Maximum Potential Transfer (AF)
Sacramento River Area of Analysis	
Anderson-Cottonwood Irrigation District	5,225
Burroughs Farms	2,000
Canal Farms	1,000
Conaway Preservation Group	35,000
Cranmore Farms	8,000
Eastside Mutual Water Company	2,230
Glenn-Colusa Irrigation District	91,000
Maxwell Irrigation District (max. transfer would be under a 75% supply scenario)	7,500
Natomas Central Mutual Water Company	30,000
Pelger Mutual Water Company	4,670
Pelger Road 1700, LLC	3,400
Pleasant Grove-Verona Mutual Water Company	18,000
Princeton-Cordora-Glenn Irrigation District	8,000
Provident Irrigation District	9,000
Reclamation District 108	35,000
Reclamation District 1004	19,675
River Garden Farms	15,000
Sutter Mutual Water Company	18,000
Sycamore Mutual Water Company	20,000
T&P Farms	1,200
Te Velde Revocable Family Trust	7,094
American River Area of Analysis	
City of Sacramento	5,000
Placer County Water Agency	47,000
Sacramento County Water Agency	15,000
Sacramento Suburban Water District	30,000
Yuba River Area of Analysis	
Browns Valley Irrigation District	8,100
Cordua Irrigation District	12,000
Feather River Area of Analysis	
Butte Water District	17,000
Garden Highway Mutual Water Company	14,000
Gilsizer Slough Ranch	3,900
Goose Club Farms and Teichert Aggregates	10,000
South Sutter Water District	15,000
Tule Basin Farms	7,320
Merced River Area of Analysis	
Merced Irrigation District	30,000
Delta Region Area of Analysis	
Reclamation District 2068	7,500
Pope Ranch	2,800
Total	**565,614**

Source: Reclamation 2014a

Table 2 Transfer Types by Water Agency (AF; Upper Limits) (2015)

Water Agency	April – June (AF)				July –September (AF)			
	Groundwater Substitution	Cropland Idling/Crop Shifting	Stored Reservoir Release	Conservation	Groundwater Substitution	Cropland Idling/Crop Shifting	Stored Reservoir Release	Conservation
Sacramento River Area of Analysis								
Anderson-Cottonwood Irrigation District	2,613				2,613			
Burroughs Farms	1,000				1,000			
Canal Farms	575	235			425	400		
Conaway Preservation Group	21,550	7,900			13,450	13,450		
Cranmore Farms	5,140	925			2,860	1,575		
Eastside Mutual Water Company	1,067	683			1,163	1,163		
Glenn-Colusa Irrigation District	12,500	24,420			12,500	41,580		
Maxwell Irrigation District	1,330	888			2,270	1,512		
Natomas Central Mutual Water Company	15,000				15,000			
Pelger Mutual Water Company	2,151	939			2,670	1,599		
Pelger Road 1700, LLC	1,700				1,700			
Pleasant Grove-Verona Mutual Water Co.	8,000	3,330			10,000	5,670		
Princeton-Cordura-Glenn Irrigation District	2,000	1,110			3,000	1,890		
Provident Irrigation District	3,000	1,110			3,000	1,890		
Reclamation District 108	7,500	7,400			7,500	12,600		
Reclamation District 1004		4,625			7,175	7,875		
River Garden Farms	4,000	5,550			5,000	9,450		
Sutter Mutual Water Company		6,600				11,340		
Sycamore Mutual Water Company	7,500	3,700			7,500	6,300		
T&P Farms	650	330			550	560		
Te Velde Revocable Family Trust	2,700	2,581			4,394	4,394		
American River Area of Analysis								
City of Sacramento					5,000			
Placer County Water Agency							47,000	
Sacramento County Water Agency					15,000			
Sacramento Suburban Water District	15,000				15,000			
Yuba River Area of Analysis								
Browns Valley Irrigation District							5,000	3,100
Cordua Irrigation District					12,000			
Feather River Area of Analysis								
Butte Water District	2,750	5,750			2,750	5,759		
Garden Highway Mutual Water Company	6,500				7,500			
Gilsizer Slough Ranch	1,500				2,400			
Goose Club Farms and Teichert Aggregates	4,000	3,700			6,000	6,300		
South Sutter Water District							15,000	
Tule Basin Farms	3,800				3,520			
Merced River Area of Analysis								
Merced Irrigation District							30,000	
Delta Region Area of Analysis								
Reclamation District 2068	2,250	2,775			2,250	4,725		
Pope Ranch	1,400				1,400			
Total (AF)[1]	**134,426**	**84,551**	**0**	**0**	**176,590**	**140,032**	**97,000**	**3,100**

[1] These totals cannot be added together. Agencies could make water available through groundwater substitution, cropland idling, or a combination of the two; however, they would not make the full quantity available through both methods. This table reflects the total upper limit for each agency.

Source: Reclamation 2014a

Table 3 identifies potential buyers who may be interested in participating in the long-term water transfers. Not all of these potential buyers may purchase transfer water. Purchase decisions depend on a number of factors, including hydrology, water demands, availability of other supplies, and transfer costs.

Table 3 Potential Buyers (2015)

Tehama Colusa Canal Authority Member Units
Colusa County Water District
Corning Water District
Cortina Water District
Davis Water District
Dunnigan Water District
4-M Water District
Glenn Valley Water District
Glide Water District
Kanawha Water District
Orland-Artois Water District
Westside Water District
San Luis & Delta-Mendota Water Authority Participating Members
Byron-Bethany Irrigation District
Del Puerto Water District
Eagle Field Water District
Mercy Springs Water District
Pacheco Water District
Panoche Water District
San Benito County Water District
San Luis Water District
Santa Clara Valley Water District
Westlands Water District
Contra Costa Water District
East Bay Municipal Utility District

Reclamation approves transfers consistent with provisions of the Central Valley Project Improvement Act (CVPIA) that protect against injury to third parties as a result of water transfers. Several important CVPIA principles include requirements that the transfer will not violate the provisions of Federal or State law, will have no significant adverse effect on the ability to deliver CVP water, will be limited to water that would have been consumptively used or irretrievably lost to beneficial use, will have no significant long-term adverse impact on groundwater conditions, and will not adversely affect water supplies for fish and wildlife purposes. Reclamation will not approve any water transfer for which these basic principles have not been adequately addressed (Reclamation and DWR 2013).

Additional information about water rights protection and water transfers is located at http://www.waterrights.ca.gov/watertransferguide.pdf in a SWRCB staff document titled "A Guide to Water Transfers".

Reservoir Release

Some buyers will acquire water by purchasing surface water stored in reservoirs owned by entities (Placer County Water Agency, Browns Valley Irrigation District, South Sutter Water District and Merced Irrigation District) not part of the CVP or SWP (non-Project entities) (Reclamation 2014a). To ensure that purchasing this water would not affect downstream users, Reclamation will limit transferred water from these sources to what would not have otherwise been released downstream. Refer to Reclamation 2014a for additional information about reservoir releases.

Cropland Idling

Cropland idling will make available for transfer water that would have been used for agricultural production. Water would be available on the same pattern throughout the growing season as it would have been consumed had a crop been planted. The irrigation season generally lasts from April through October for most crops in the Sacramento Valley.

Under the proposed project, cropland idling transfers could occur in Glenn, Colusa, Butte, Yolo, Solano, and Sutter Counties in the Seller Service Area. Table 4 shows the maximum acreages that could be idled in a year. Cropland idling transfers during a single year would likely affect less than the maximum acreages listed in the table.

Table 4 Maximum Annual Rice Cropland Idling Acreages

Region	Rice (acres)
Sacramento Region	49,924
Feather Region	10,769
Delta Region	-
Total	**60,693**

Landowners could annually choose whether to idle their fields to transfer water, and landowners could place fields back into production the following season. The quantity of water made available for transfer through cropland idling would be calculated based on the evapotranspiration of applied water (ETAW). ETAW is the portion of applied surface water that is used by the crop and evaporated from the soil and plant surfaces. For rice, the estimated ETAW is 3.3 AF of water/acre (Reclamation and DWR 2013).

Rice has been the crop idled most frequently in previous water transfer programs because rice is an annual crop that provides the largest amount of transfer water per acre. The Sacramento Valley contains most of California's rice production; therefore, crop idling acquisitions are likely to take place in this region. See Table 5 for estimated acres of rice production ranging from a low of 369,600 acres in 1992 to a high of 562,300 acres in 2004 with an annual average of 487,429 acres. No water was transferred under federal actions during any of these years.

Table 5 Estimated Sacramento Valley Rice Production (acres) from 1992-2013 by County

Year	Butte	Colusa	Glenn	Sacramento	Sutter	Yolo	Yuba	Total	Total Annual Change
1992	76,300	94,800	65,800	8,900	73,100	19,000	31,700	369,600	--
1993	79,300	112,000	74,500	10,400	81,000	21,400	31,300	409,900	40,300
1994	88,000	123,000	81,000	11,500	90,000	26,700	34,000	454,200	44,300
1995	83,000	122,000	79,000	10,300	82,000	27,000	32,000	435,300	-18,900
1996	97,000	136,000	87,000	8,800	86,000	21,600	34,000	470,400	35,100
1997	97,000	137,000	89,000	9,400	90,000	24,000	35,000	481,400	11,000
1998	88,000	121,000	83,000	9,100	91,000	20,400	37,300	449,800	-31,600
1999	102,500	135,000	88,000	9,700	104,500	30,000	39,200	508,900	59,100
2000	98,000	145,000	87,500	9,000	108,000	35,500	39,000	522,000	13,100
2001	86,800	126,300	78,300	7,800	87,700	26,000	37,100	450,000	-72,000
2002	100,000	138,500	87,500	8,200	101,700	31,500	36,000	503,400	53,400
2003	87,800	138,000	82,500	8,100	96,900	32,300	35,400	481,000	-22,400
2004	105,800	156,400	90,300	9,600	124,000	41,900	34,300	562,300	81,300
2005	96,800	145,600	87,100	7,900	101,800	29,200	33,300	501,700	-60,600
2006	99,100	145,900	87,500	3,700	106,600	28,900	33,200	504,900	3,200
2007	102,000	155,000	86,500	3,700	106,000	23,800	33,700	510,700	5,800
2008	96,500	152,000	84,700	2,500	97,300	27,300	35,200	497,500	-13,200
2009	106,400	150,400	85,700	3,120	115,300	35,900	38,000	534,820	37,320
2010	93,800	153,000	85,600	4,184	116,000	41,000	38,700	532,284	-2,536
2011	111,000	154,000	88,600	3,200	123,000	41,000	39,000	561,000	28,716
2012	93,000	157,000	86,000	5,899	119,000	40,461	39,400	540,760	-20,240
2013	104,000	164,000	80,000	8,363	117,000	33,200	37,500	544,063	3,303
Avg.	**95,095**	**139,177**	**83,868**	**7,426**	**100,814**	**29,912**	**35,650**	**492,088**	**--**

Source: U.S. Department of Agriculture 2015; Sacramento County Agricultural Commissioner's annual Stock and Livestock Reports 2015; Yolo County Agricultural Commissioner's 2013 Agricultural Crop Report

Groundwater Substitution

In this case, transferred water will be substituted by groundwater withdrawals to facilitate continued agricultural production. See the BA (Reclamation 2014a) for a description of groundwater substitution.

Crop Shifting and Conservation

For crop shifting transfers, water is made available when farmers shift from growing a higher water use crop to a lower water use crop. Conservation transfers must include actions to reduce the diversion of surface water by the transferring entity by reducing irrecoverable water losses. Refer to Reclamation 2014a for more information.

Transfer Quantities

Table 1 provides a list of entities that could potentially sell water for transfers in 2015. Table 2 specifies maximum quantities that each agency could make available through different transfer mechanisms. Adding these maximum quantities produces a total of 565,614 AF, but multiple other factors may limit the transfers to a smaller amount. Annual transfer maximums authorized under the proposed project will not exceed the maximum transfer volume of 565,614 AF nor will the maximum annual cropland idling acreages, by region, exceed the values included in Table 4. Refer to Reclamation 2014a for more information.

It is anticipated that water transfers would be implemented during critically dry years when CVP and SWP water service contractors' allocations are low. Calculating a baseline for critically dry years can be challenging because it is difficult to determine the actions that may be taken to accommodate reduced water allocations. Sellers may increase groundwater pumping, increase cropland idling/crop shifting, or utilize a combination of pumping and cropland idling/crop shifting to address reductions in allocations. For example, Glenn Colusa Irrigation District estimates that about 15 percent of rice in the service area would be idled if they were to receive 75 percent allocation from the CVP (Reclamation 2014a).

Consolidated Place of Use

Reclamation and DWR petitioned the State Water Resources Control Board (SWRCB) to temporarily consolidate the CVP and SWP places of use, and the SWRCB granted that consolidation in 2014. Reclamation is currently filing another petition for 2015 as the current order expires in April 2015. Approval of a consolidated place of use would allow transfers from CVP contractors contemplated in this document to SWP contractors south of Banks or Barker Slough Pumping Plants which are outside the CVP authorized place of use. Reclamation will not approve any CVP water transfers to buyers outside of the CVP place of use unless the SWRCB approves a Petition for Change (either through a joint petition to consolidated the CVP and SWP places of use or through individual petitions for change) authorizing the delivery of water outside the CVP place of use. The joint point of diversion authorization contained in D-1641 allows the CVP and SWP to use the other's facilities to divert or convey water under certain terms and conditions, but it does not allow delivery of that water to outside that Project's existing authorized place of use. Without SWRCB approval of a Petition for Change, CVP water could only be delivered within the CVP authorized place of use.

Risk and Uncertainty

Transferring water from north of the Delta to south of the Delta would involve uncertainty and risk. The CVP and SWP would move this water using the Jones and Banks Pumping Plants, but the CVP and SWP must first meet regulatory requirements and the needs of their users. CVP and SWP operations are governed by the criteria contained in D-1641, the 2008 Service and 2009 National Marine Fisheries Service biological opinions, and all other regulatory restrictions governing operations.

Buyers and sellers would typically negotiate transfers during the wet season before hydrologic conditions are clear. Late season precipitation could increase the amount of available water for the CVP and SWP and reduce or eliminate available capacity for transfers. The CVP and SWP may not know the capacity in advance and would not guarantee available capacity; any uncertainty regarding capacity would rest with the buyers and sellers.

Transfers, particularly transfers involving cropland idling, could be heavily affected by this uncertainty. Growers would need to idle crops at the beginning of the growing season, which typically occurs in April or May. The possibility exists that buyers and sellers would negotiate a cropland idling transfer at the beginning of April, the seller would leave fields idle, and late-season rains could reduce excess capacity at the Delta pumps and prevent this water from being transferred. This risk would typically fall on the buyers after the contracts are negotiated.

A major concern to potential buyers in the Export Service Area is the ability to deliver the purchased water through the Delta to the buyer's service area. Export of the transfer water through the Delta is dependent on availability of capacity at the CVP or SWP pumping facilities and subject to other operational requirements. Available CVP and SWP capacity is severely limited due to operational and regulatory restrictions. The pumping window for transfers is currently July through September. Pumping within this window can be further reduced or expanded based on specific hydrologic conditions and regulatory compliance or water quality issues. Reclamation and DWR cannot guarantee that a specific quantity of transfer capacity would be available.

Transfer Length

Buyers and sellers may negotiate transfers that last one year or multiple years. Sellers and buyers can negotiate the terms of a single year transfer during the wet season and would generally finalize an agreement after the hydrologic conditions are understood well enough to establish available pumping capacity.

Sellers and buyers could also negotiate multi-year transfers. In this type of transfer, a long-term agreement would generally give the buyer the first right of refusal for water that a seller makes available. The buyer could pay the seller a fee every year to reserve the water, whether the buyer uses it or not. In years where adequate capacity exists to move water through the Delta, the buyer would have priority to buy the water at an established price. If the buyer does not want the water in a year when capacity is available, the seller could negotiate a one-year transfer with another buyer.

Conservation Measures

The proposed project would incorporate conservation measures consistent with the Central Valley Project 2014 Water Transfers Biological Opinion (reference no. 08ESMF00-2014-FO359) and the Draft Technical Information for Water Transfer Proposals in 2014 (Reclamation and DWR 2013). Commitments that broadly restrict idling across the service area were refined to focus on cropland idling restrictions in areas where snakes have a high likelihoood of occurrence. Giant garter snake priority habitat areas have been identified by USGS and maps have been developed (Attachment A) for each water district using the information on habitat use, known populations, and historic tule marsh zones (see also USFWS 2014). The purpose of these maps is to identify areas with the highest probability of snake occurrence so that water transfer actions can be avoided within these areas. Reclamation is implementing a conservation strategy that requires water be maintained in areas most important to snakes and that water not be transferred from habitat priority conservation areas (e.g., Natomas).

The following actions to protect snakes would be incorporated into contracts between Reclamation and the water sellers:

All Transfer Methods

- Carriage water (a portion of the transfer that is not diverted in the Delta and becomes Delta outflow) will be used to maintain water quality in the Delta.

Cropland Idling/Shifting Transfers

- As part of the approval process for long-term water transfers, Reclamation will have access to the land to verify how the water transfer is being made available and to verify that actions to protect the snake are being implemented.

- Reclamation will provide a map(s) to the Service in June of each year showing the parcels of riceland that are idled for the purpose of transferring water for that year. These maps will be prepared to comport to Reclamation's geographic information system (GIS) standards.

- Movement corridors for aquatic species (including pond turtle and snake) include major irrigation and drainage canals. The water seller will keep adequate water in major irrigation and drainage canals[3]. Canal water depths should be similar to years when transfers do not occur or, where information on existing water depths is limited, at least two feet of water will be considered sufficient.

- Districts proposing water transfers made available from idled rice fields will ensure that adequate water is available for priority habitat with a high likelihood of giant garter snake occurrence. The determination of priority habitat will be made through coordination with giant garter snake experts, GIS analysis of proximity to historic tule marsh, and GIS analysis of suitable habitat. The priority habitat areas are indicated on the priority habitat maps for participating water agencies and will be maintained by Reclamation. As new information becomes available, these maps will be updated in coordination with the Service and CDFW. As appropriate, map updates will be provided to the Service along with the related GIS data. In addition, fields abutting or immediately adjacent to federal wildlife refuges will be considered priority habitat.

- Maintaining water in smaller drains and conveyance infrastructure supports key habitat attributes such as emergent vegetation for snake for escape cover and foraging habitat. If crop idling/shifting occurs in priority habitat areas, Reclamation will work with contractors to document that adequate water remains in drains and canals in those priority areas. Documentation may include flow records, photo documentation, or other means of documentation agreed to by Reclamation and the Service.

- Areas with known priority snake populations will not be permitted to participate in cropland idling/shifting transfers. Water sellers can request a case-by-case evaluation of whether a specific field would be precluded from participating in long-term water transfers. These areas include lands adjacent to naturalized lands and refuges and corridors between these areas such as:

[3] The term "adequate water" is used in the environmental commitments along with objectives of what must be accomplished with this water. Reclamation will review each transfer proposal to make sure that the seller meets these objectives. These other terms describe agricultural water conveyance and drainage facilities, and are also considered during review of each transfer proposal. (D. Cordova, pers. comm. 2015)

  - Fields abutting or immediately adjacent to Little Butte Creek between Llano Seco and Upper Butte Basin Wildlife Area (WA), Butte Creek between Upper Butte Basin and Gray Lodge WAs, Colusa Basin drainage canal between Delevan and Colusa National Wildlife Refuges (NWR), Gilsizer Slough, Colusa Drainage Canal, the land side of the Toe Drain along the Sutter Bypass, Willow Slough and Willow Slough Bypass in Yolo County, Hunters and Logan Creeks between Sacramento and Delevan NWRs; and

  - Lands in the Natomas Basin.

- Sellers will continue to voluntarily perform snake best management practices, including educating maintenance personnel to recognize and avoid contact with snakes, cleaning only one side of a conveyance channel per year, and implementing other measures to enhance habitat for snakes.

- In order to limit reduction in the amount of over-winter forage for migratory birds, including greater sandhill crane, cropland idling transfers will be minimized near known wintering areas in the Butte Sink.

- At the end of each water transfer year, Reclamation will prepare a monitoring report that contains the following:

  - Maps of all cropland idling actions that occurred within the range of potential transfer activities affected by this program;

  - Results of current scientific research and monitoring pertinent to water transfer actions; and

  - A discussion of conservation measure effectiveness.

  - The report will be submitted to the Service and CDFW by January 31, prior to the next year of potential transfers.

- Reclamation will establish annual meetings with the Service to discuss the contents and findings of the annual report. These meetings will be scheduled following the distribution of the monitoring report and prior to the next transfer season.

- If, upon review of monitoring reports or other scientific literature, it appears that the proposed project is having unanticipated effects on snakes, Reclamation will initiate contact with the Service to discuss the information available and effectiveness of conservation measures.

Action Area

The action area is defined in 50 CFR §402.02, as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action." For the proposed project, the action area includes those areas of California that might receive water from the long-term water transfer actions or areas potentially affected by the long-term water transfers because they serve as a site for water acquisition or conveyance (Figures 1, 2, and 3).

The overall action area includes specific areas of analysis for each resource that may be directly or indirectly affected by potential water transfers. In a general sense, these areas of analysis comprise: (1) watersheds of rivers that may participate in cropland idling/shifting; (2) rivers used to convey transfer water; (3) lands that may be used for cropland idling/shifting and adjacent lands; (4) district, on-farm and CVP or SWP conveyance facilities; and (5) storage and conveyance facilities in areas that would receive water from transfers. The action area consists of the following areas and features:

- Major watersheds and numerous minor watersheds within the Sacramento River Basin consisting of the following water bodies:
    - Sacramento River from Lake Shasta to the Delta;
    - Numerous small tributaries to the Sacramento River and other smaller creeks;
    - Feather River, including and downstream of Lake Oroville and its tributaries the Yuba River, including and downstream of New Bullards Bar Reservoir, and the Bear River, including and downstream of Camp Far West Reservoir; and
    - Middle Fork American River downstream of Hell Hole and French Meadows Reservoirs.
- Within the San Joaquin River watershed, potentially affected water bodies in the Seller Service Area, specifically;
    - San Joaquin River downstream of the Merced River.
    - Merced River, including and downstream of Lake McClure.
- Portions of the CVP and the SWP systems;
- San Luis Reservoir;
- Agricultural lands in the Sacramento Valley (Colusa, Glenn, Sutter, Butte, Solano and Yolo Counties) in which farmers participate in cropland idling/shifting.

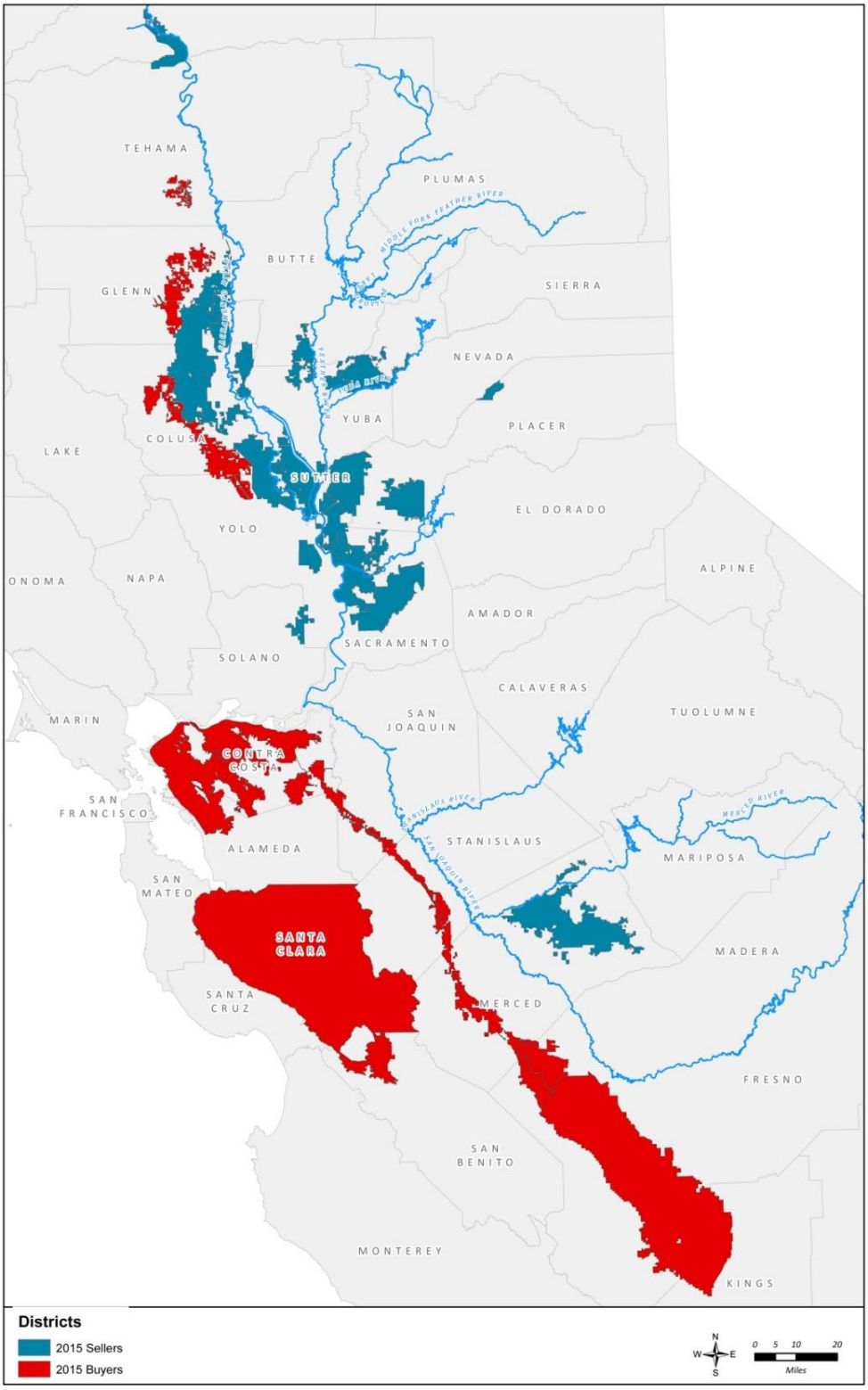

Figure 1 Action Area

Figure 2 Locations of Potential Sellers (2015)

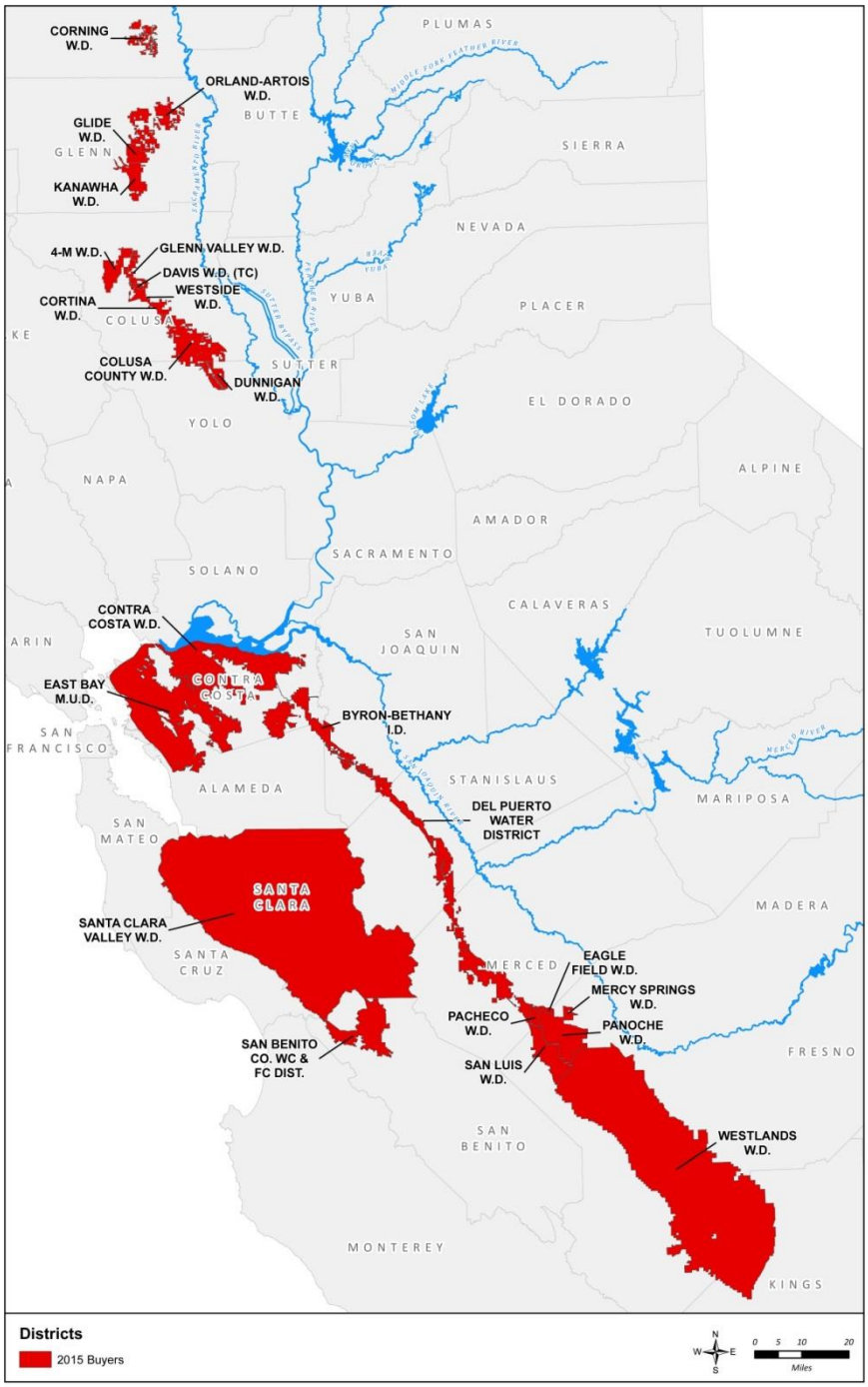

Figure 3 Locations of Potential Buyers (2015)

Analytical Framework for the Jeopardy Analysis

In accordance with policy and regulation, the jeopardy analysis in this biological opinion relies on four components: (1) the *Status of the Species*, which evaluates the snake's range-wide condition, the factors responsible for that condition, and their survival and recovery needs; (2) the *Environmental Baseline*, which evaluates the condition of the snake in the action area, the factors responsible for that condition, and the relationship of the action area to the survival and recovery of the snake; (3) the *Effects of the Action*, which determines the direct and indirect effects of the proposed federal action and the effects of any interrelated or interdependent activities on the snake; and (4) the *Cumulative Effects*, which evaluates the effects of future, non-Federal activities in the action area on the snake.

In accordance with the implementing regulations for section 7 of the Act and Service policy, the jeopardy determination is made in the following manner: the effects of the proposed Federal action are evaluated in the context of the aggregate effects of all factors that have contributed to the current status of the snake. Additionally, for non-Federal activities in the action area, we will evaluate those actions likely to affect the species in the future, to determine if implementation of the proposed action is likely to cause an appreciable reduction in the likelihood of both its survival and recovery in the wild.

The jeopardy analysis in this biological opinion places an emphasis on consideration of the range-wide survival and recovery needs of the snake and the role of the action area in the survival and recovery of the snake as the context for evaluating the significance of the effects of the proposed Federal action, taken together with cumulative effects, for purposes of making the jeopardy determination.

Status of the Species

For the most recent comprehensive assessment of the range-wide status of the snake, please refer to the *Giant Garter Snake (Thamnophis gigas) Five-year Review: Summary and Evaluation* (Five-year Review, Service 2012). No change in the snake's listing status was recommended in the review. Threats to the snake discussed in the review have continued, with loss of habitat being the most significant effect. While there continue to be losses of snake habitat throughout its range, to date no project has proposed a level of effect for which the Service has issued a biological opinion of jeopardy for the snake.

Following are the nine recovery units for the snake (Service 2012): (1) Butte Basin, extending from Red Bluff in the north to the Sutter Buttes in the south; (2) Colusa Basin, extending from Red Bluff in the north to Cache Creek in the south and bounded by the Sacramento River on the east and the Coast Range foothills on the west; (3) Sutter Basin, extending south from the Sutter Buttes to the confluence of the Feather and Sacramento rivers; (4) American Basin, extending south from Oroville to the confluence of the Sacramento and American rivers; (5) Yolo Basin, extending from Cache Creek in the north to the Sacramento-San Joaquin River Delta in the south; (6) Cosumnes Mokelumne Basin, bordered by the City of Sacramento and the Cosumnes River to the north, Sierra Nevada foothills to the east, Interstate 5 to the west, and the Mokelumne River to the south; (7) Delta Basin, extends from just south of the confluence of the Sacramento and American rivers south to the Stanislaus River; (8) San Joaquin Basin, extending from the Stanislaus River in the north to the San Joaquin River in the south and bordered by the Coast Ranges on the west and the Sierra Nevadas to the east; and (9) Tulare Basin, extending from the southern San Joaquin River south to the Buena Vista and Kern lakebeds. The action area includes all or part of each of these recovery units described in the Five-year Review.

Snake Research Associated with CVP/SWP Conservation Programs

The EWA biological opinion stated that Implementing Agencies (i.e. Service, CDFW) shall develop a Conservation Strategy for the snake through the Ecosystem Restoration Program (ERP). The Implementing Agencies did not complete the Conservation Strategy through the ERP. However, research and monitoring have continued to support a more comprehensive approach to snake conservation in the Sacramento Valley. In 2009, DWR developed a snake Baseline Monitoring and Research Strategy to help quantify and evaluate the response of the snakes to rice land idling. Since 2009, DWR developed fundamental information about the snake's ecology as it relates to the potential impacts from rice land idling. DWR is in the third year of working with the USGS Western Ecological Research Center (WERC) on the study of snakes in the Sacramento Valley. The broad objective of this research effort is to provide scientific information to the Service in support of identifying the effects of rice land idling for the purpose of water transfers on the snake. Ultimately, the goal is to design conservation measures that will avoid and minimize effects to the snake from rice land idling for water transfers.

Up until now the study has focused on foundational studies, including distribution analysis of the snake in the Sacramento Valley. USGS WERC has suggested that the probability of occurrence decreases as distance from historic tule marsh increases and that the intervening historic habitat also affects this relationship (i.e., probability of snake occurrence remains higher as you move into California prairie, where smaller marshes were likely, as opposed to other habitats like blue oak savanna or riparian forest, where snakes were historically less likely to occur) (Halstead pers. comm. 2014).

Radiotelemetry studies conducted by USGS WERC have examined snake habitat use in several areas in the Sacramento Valley. At the Gilsizer Slough study site in Sutter County, snakes were located in rice fields 19 to 20 percent of observations, marsh habitat 20 to 23 percent of observations, and in canal and waterway habitat 50 to 56 percent of observations (Service 1999). At the Colusa NWR study site, snakes used rice field in 19 percent of observations, marsh in 20 percent of observations, and canals in 50 percent of observations. USGS WERC also examined a study site in the Natomas Basin where only rice and canal habitat was available. Once rice was emergent in the rice fields, snakes used rice fields 39 to 60 percent of the time and canals 40 to 61 percent of the time (Wylie and Casazza 2000a, 200b). Thus both rice fields and canals are important habitats for the snake.

USGS WERC estimated the home range size of snakes at four study sites. Home range (area of daily activity) averages about 0.1 mile (25 hectares) in both the Natomas Basin and the Colusa NWR (Wylie 1998; Wylie *et al.* 2002a; Wylie *et al.* 2002b). Home range estimates for snakes near the restored wetlands at Colusa NWR were generally smaller than previously found at the refuge when the lands were managed for waterfowl and in other off-refuge study areas (Wylie *et al.* 2000a). It is believed that maintaining water in the restored wetlands and nearby habitat provided sufficient conditions to meet the biological requirements of the snakes; thus, individuals were less likely to move further distances as in previous years when conditions were drier and water was not maintained specifically to benefit snakes (Wylie *et al.* 2000a). These managed areas apparently met the biological needs of the snakes, thereby reducing their movements. The Badger Creek area also appeared to be an example of where permanent wetland and sufficient habitat reduces snake movements. There the home range (N=8) was estimated to be 10 to 203 acres for an area 580 acres in size.

USGS WERC has also estimated home range sizes for snakes and determined median home ranges that are generally less than 100 acres in size, demonstrating that snakes typically use relatively small areas, even though they are capable of moving longer distances (up to five miles in a few days). Home range sizes for snakes at the Gilsizer Slough study site varied from approximately five acres to 212 acres with a median of 39.5 acres. In the Natomas Basin, home range sizes varied from 32 acres to 214 acres with a median of 86 acres. USGS WERC has also studied snakes at the Colusa NWR where home range sizes were found to be highly variable. Home range sizes estimated for year 2000 ranged from 2.5 to 81.5 acres with a median of 42 acres and for 2001 from 7.4 to 427.5 acres with a median of 59.3 acres. These home ranges are about half the size of those estimated for the study period 1996-97 (home ranges varied from 3.2 acres to 2,792 acres with a median of 103.8 acres). USGS-WERC concluded that home range sizes decreased as more summer water became available to the snake on the refuge in the later study period.

Restored areas that provided summer water were more effective in meeting the habitat needs of the snake in 2000-2001 study periods; therefore, snakes did not have to venture as far as in previous years to find aquatic habitat during their active period. This was also found to be true for monitoring conducted during 2005. Sampling of the restored areas in Colusa NWR during the summers of 2002 and 2003 continued to document use of the restored wetland area as the habitat quality improves. The aquatic component of the habitat is important because the snake forages on frogs, tadpoles and fish. Most of the radio-marked snakes were captured along the water's edge of the wetlands (Wylie *et al.* 2005). USGS WERC also concluded that reduced movements indicated that snakes were less exposed to mortality factors such as predators and vehicles (Service 1999, Wylie and Casazza 2000a, Wylie et al 2002a).

Other work has centered on improving trapping techniques for the snake. The level of precision for trapping requires an increase in detection and capture probabilities, which USGS WERC has achieved in modified traps. Snake behavior is the primary cause of remaining low capture probabilities (Halstead pers. comm. 2014).

USGS WERC has completed a comprehensive literature review and conceptual model of snake ecology and conservation (Halstead pers. comm. 2014). From this information DWR will develop a research framework to guide the research. DWR will do this in cooperation with a technical review committee made of internal and external (to DWR) scientists (pers comm. Vargas 2014).

Habitat suitability modeling is a valuable exercise to support the conservation of species about which little is known. It can inform conservation by defining the habitat relationships of species and identifying locations at which a species is likely to occur. These locations can be used to direct future survey effort, and identify sites suitable for establishment of reserves or repatriation of extirpated populations. (Halstead et. al 2010) Also, based on studies undertaken by USGS, proximity to historic habitat appears to be the most important variable for predicting the probability of ocurrernce of snakes in the Sacramento Valley at the landscape scale. The occurrence of rice agriculture, its supporting network of irrigation and drainage canals, and the restoration of marsh habitats currently provide suitable habitat throughout the area of inference. Their research demonstrates, however, that snakes have not been able to disperse into all suitable habitats, and are largely restricted to areas near locations at which they were likely historically abundant (Halstead et al. 2013).

Due to the need for several baseline studies (including a study to improve trap design) during the years following the issuance of the 2009 Biological Opinion, the first year of study specifically addressing the relationship between idling and snakes was in 2014. According to USGS WERC, the 2014 snake trapping effort did not occur until after many fields were dried. Therefore, there was limited opportunity to observe snake behavior and spatial ecology among sites with varying degrees of idling (Reclamation 2015).

DWR has in place $9,000,000 of funding to support the research work to be completed by USGS WERC on snakes and task orders utilizing these funds are being executed to supplement the current knowledge of snake populations and habitat use. Most recently, five tasks orders in 2012 were funded to support snake research, these include:

- Distribution of Giant Garter Snake (*Thamnophis gigas*) and the probability the species occurs at a given location, in the Sacramento Valley, California.
- Assessment of Distribution of the Giant Garter Snake (*Thamnophis gigas*), in the Sacramento Valley, California;
- Assessment of Trap Modifications to Increase Capture and Detection Probabilities of the Giant Garter Snake (*Thamnophis gigas*);
- Review and Development of a Conceptual Model of Giant Garter Snake (*Thamnophis gigas*) Ecology and Conservation, in the Sacramento Valley, California; and
- Assessment of Realized Giant Garter Snake (*Thamnophis gigas*) Detection and Capture Probabilities using Modified Floating Aquatic Funnel Traps, in the Sacramento Valley, California.

Central Valley Project Conservation Program (CVPCP) and Central Valley Project Improvement Act Habitat Restoration Program (HRP)

The Central Valley Project Conservation Program (CVPCP) was developed during the section 7 consultation process for the implementation of CVPIA. Accordingly, the CVPCP implements actions to protect, restore, and enhance special status species populations and habitats affected by the CVP, with special emphasis on federally listed species. The CVPIA HRP was established under Title XXXIV, Section 3406 (b) (1) "other" of the CVPIA under the "Fish and Wildlife Restoration Activities" section. The HRP also implements actions to improve conditions for species impacted by operation of the CVP. Reclamation and the Service coordinate administration of these two grant programs based on the authority established in the Fish and Wildlife Coordination Act, as amended, 16 U. S.C. Section 661 et seq of 1956; the Fish and Wildlife Act of 1956, 16 U. S. C. 742(a-j); and the CVPIA of 1992, Public Law No. 102-575. Title XXXIV, Section 3406(b)(1). Jointly, CVPCP and HRP provide financial support for research on various aspects of biology, ecology, genetics, as well as, habitat improvements for special status species in the Central Valley.

One of CVPCP and HRP Priority Actions supports snake research and habitat improvements. In order to identify the highest priority needs to which grant funds are directed each year, CVPCP and HRP managers work directly with the Service to identify Priority Actions. The Service identifies research and habitat improvement priorities based on recovery actions identified in recovery plans for federally listed species and expert opinion on which CVP-impacted federally listed species having the greatest recovery needs and/or which species face the greatest risk of extinction. Research and habitat improvement proposals which most closely align with the Priority Actions receive preference and are more likely to be funded by the CVPCP and HRP programs. Since the inception of the CVPCP and HRP in the mid-1990s, research yielding information on snakes has routinely been identified as a top Priority Action and been funded (Table 6).

Table 6 CVPCP and HRP Funded Giant Garter Snake Grants

Year	Project	Funding ($)
2014	Giant Garter Snake Environmental DNA Research – Colusa, Sutter and Sacramento counties	149,915
2009	Giant Garter Snake Distribution/Modeling - Butte County	180,000
2009	Giant Garter Snake Surveys, White Slough	122,648
2008	Giant Garter Snake Habitat Restoration, Cosumnes Preserve, Badger Creek	142,225
2007	Giant Garter Snake Genetic Study	60,210
2007	Giant Garter Snake Surveys, Merced and Fresno Counties	157,655
2004	Giant Garter Snake Surveys Colusa NWR	88,619
2004	Giant Garter Snake Surveys San Luis NWR	237,879
2003	Giant Garter Snake Surveys Colusa NWR	70,900
2002	Giant Garter Snake Surveys at Colusa NWR	38,060
2002	Giant Garter Snake – Surveys San Luis NWR (Grasslands)	53,200
2002	Giant Garter Snake – Surveys Grasslands Water District	157,760
2001	Giant Garter Snake Monitoring	67,570
2000	Giant Garter Snake Census	38,000
1997	Giant Garter Snake – Multi-year Surveys Colusa NWR	486,500

Source: D. Cordova pers. comm. 2015

Environmental Baseline

Known snake populations within the action area occur in freshwater marsh wetland or rice land areas which have tight clay soils such that there is standing surface water for long periods of the year.

The USGS has been conducting a study of the life history and habitat use of the snake since 1995. Results of these studies have provided basic understanding of the preferential habitat use by the snake. This information is used to define important habitat components for management of the snake and demonstrates that: (1) in the active summer season, snakes predominately can be found in aquatic habitat; (2) irrigation canals are commonly used by giant garter snakes; (3) giant garter snakes use active rice fields in the summer; (4) giant garter snakes are most often f ound under vegetative cover; and (5) in the summer, snakes are most often found under aquatic vegetative cover. (Service 2012)

The known range of the snake in the Sacramento Valley has changed little since the 1993 listing and 2006 Five-year review. A summary of recent surveys and sightings for each population since the previous status review follows (Service 2012):

Butte Basin. The northernmost locality record of the snake is found five miles west of the City of Chico where at least four snakes have been found (Kelly pers. comm. 2006, Gallaway in litt. 2008, cited in Service 2012). In 2009 and 2010, the USGS surveyed rice fields in Butte County near Butte Sink and found snakes near the City of Nelson and at the Butte Sink WMA (Halstead in litt. 2011, cited in Service 2012). Surveys in 2008 to 2010 by USGS have found snakes at several new locations in southwest Butte County (USGS 2011, cited in Service 2012). Two sightings of snakes were reported in May and October of 2011 on the south perimeter of the Thermolito After Bay just east of State Route 99 (R. Martin in litt. 2012, cited in Service 2012).

Colusa Basin. USGS and USFWS NWR staff observed snakes at each of the Federal NWRs (Colusa, Delevan, and Sacramento) that make up the Sacramento NWR Complex (Wylie et al. 2005, 2006, cited in Service 2012). In addition, snakes occur outside Refuge lands in the adjacent rice production areas. In 2010 snakes were found in Glenn County six miles southwest of the Chico Water Pollution Control Plant (Swaim in litt. 2010, cited in Service 2012). Snakes were found at the Colusa Basin Drainage Canal near the City of Knight's Landing by walking and trapping surveys from spring through summer during the years 2003, 2004 and 2006 (Wylie et al. 2008, cited in Service 2012).

Sutter Basin. A trapping survey in 2005 found snakes at Gilsizer Slough (Wylie 2008, cited in Service 2012). At the Sutter Basin Conservation Bank, Hansen (2007, cited in Service 2012) caught 37 snakes in an investigation of snake use of surrounding ricelands. In 2007, six conservation areas in Yolo, Sutter, Colusa and Sacramento counties were surveyed but snakes were found only at the Gilsizer Slough South Conservation Bank in Sutter County (Wildlands 2008, cited in Service 2012).

American Basin. Snakes have been observed among the rice fields in the area within and around the Natomas Basin where the greatest number of surveys has occurred. The Natomas Basin property managed by the Natomas Basin Conservancy has been monitored for snakes since 2000 and surveys show that snakes persist in the Basin and continue occupying both restored habitat and rice fields. Outside of the Basin, other areas where snakes have been found include the area immediately north of the Natomas Cross Canal (E. Hansen 2003a, 2004a, 2005, 2006b, 2007b, and 2008b, cited in Service 2012). The areas around Marysville and northward have not been comprehensively surveyed for snakes and their status in this region remains unknown.

Yolo Basin. Snakes have been documented within the Yolo Bypass WA and adjacent rice lands within the Yolo Bypass, and at the Willow Slough Bypass in Yolo County (E. Hansen 2006a, 2007c, 2008c, cited in Service 2012). Occurrences at Ridgecut Slough near the City of Dunnigan were also recently described by Wylie and Martin (2005b, cited in Service 2012). A snake was found near the Pope Ranch Conservation Bank south of the Yolo Bypass WA (E. Hansen 2009a, cited in Service 2012) and in 2009, snakes were found during surveys conducted on the Conaway Ranch bordering Willow Slough (E. Hansen 2009b, cited in Service 2012). The population at Liberty Farms that was listed as extant in1993 appears to have been extirpated (Service 1993, E. Hansen 2008c, cited in Service 2012). Wylie and Martin (2004, 2005a, cited in Service 2012) conducted trapping surveys at 15 locations in Solano County for two consecutive years in order to confirm historic records; they did not find snakes at any of the 15 locations (Wylie and Martin 2004, 2005a, cited in Service 2012).

Cosumnes-Mokelumne Watershed. Snakes have been detected at the Badger Creek sub-unit of the Cosumnes River Preserve, in the southern portion of Sacramento County (Wylie et al. 1997, E. Hansen 2001, 2003b, E. Hansen et al. 2010, cited in Service 2012). A baseline survey conducted in 2008 revealed a large population of snakes at the Badger Creek sub-unit area called "Snake Marsh" (E. Hansen et al. 2010, cited in Service 2012).

Delta Basin. The Delta Basin includes portions of Sacramento, Yolo, Solano, Contra Costa and San Joaquin counties. Although the presence of snakes in this area remains unknown, suitable habitat for the snake is known to exist in this area (G. Hansen 1986, 1988, DWR 2010, cited in Service 2012). No snakes were trapped or observed during a 2009 survey (DWR 2010, cited in Service 2012). Hansen captured three snakes at White Slough WA in 2009 and four snakes (three were road mortalities) were photographed near Little Connection Slough (ESA in litt. 2010, cited in Service 2012).

San Joaquin Basin. Snakes currently occur in the northern and central San Joaquin Basin within the northern and southern Grassland Wetlands. Trapping surveys conducted by Hansen in 2006 and 2007 within the Grasslands Ecological Area both south and east of the San Joaquin River and in the Mendota WA resulted in only 10 captures in the two year study, with the majority of snakes being found in the Los Banos Creek corridor between the San Joaquin River and the City of Los Banos, a wetland supply channel for the private wetlands in the northern reach of the Grasslands Ecological Area (E. Hansen 2008a, cited in Service 2012). CDFW trapped in the Volta and Los Banos WAs in 2006 in order to monitor populations and found snakes only at the Volta WA (Sousa 2007, cited in Service 2012). Low numbers of snakes in the San Joaquin Valley populations places these populations at high risk of extirpation (Paquin et al. 2006, E. Hansen 2008a, cited in Service 2012).

Tulare Basin. The southern San Joaquin Valley includes portions of Fresno, Kings, Tulare, and Kern counties. Agricultural and flood control activities are presumed to have extirpated the snake from this portion of its historic range in the former wetlands associated with the Buena Vista, Tulare and Kern lake beds (G. Hansen and Brode 1980, R. Hansen 1980, G. Hansen 1986, 1988, cited in Service 2012). A survey of the historic documented localities of the snake in the southern San Joaquin Valley was conducted by USGS in 2006 (Wylie and Amarello 2007, cited in Service 2012), including Buena Vista Lake bed, Fresno Slough, Kern NWR, King's River, and North King's River, resulting in no snakes.

The giant garter snake is highly aquatic but also occupies a terrestrial niche (Service 1999; Wylie *et al.* 2004a). The snake typically inhabits small mammal burrows and other soil and/or rock crevices during the colder months of winter (*i.e.,* October to April) (Hansen and Brode 1993; Wylie *et al.* 1996; Wylie *et al.* 2003a), and also uses burrows as refuge from extreme heat during its active period (Wylie *et al.* 1997; Wylie *et al.* 2004a). Snakes can be communal in their habits, sharing burrows during the colder months and when escaping extreme heat (E. Hansen 2008 pers. comm.). While individuals usually remain in close proximity to wetland habitats, Wylie *et al.* (1997) documented snakes using burrows as much as 165 feet (50 meters) away from the marsh edge to escape extreme heat; and as far as 820 feet (250 meters) from the edge of marsh habitat for over-wintering habitat.

In studies of marked snakes in the Natomas Basin, snakes moved about 0.25 to 0.5 miles (0.4 to 0.8 kilometers) per day (Hansen and Brode 1993). Total activity, however, varies widely between individuals. Individual snakes have been documented to move up to 5 miles (8 kilometers) over a few days in response to dewatering of habitat (Wylie *et al.* 1997) and more than 8 miles (12.9 kilometers) of linear aquatic habitat over the course of a few months. Estimated home ranges in the Natomas Basin and Colusa NWR of snakes have averaged about 0.1 mile (25 hectares) in both the Natomas Basin and the Colusa NWR (Wylie 1998a; Wylie *et al.* 2002a; Wylie *et al.* 2002b). Home range estimates for giant garter snakes near the restored wetlands at Colusa NWR were generally smaller than previously found at the refuge when the lands were managed for waterfowl and in other off-refuge study areas (Wylie *et al.* 2000a). Wylie hypothesized that maintaining water in restored wetlands and nearby habitat provided sufficient conditions to meet the biological requirements of the giant garter snakes; individuals were less likely to move further distances as in previous years

when conditions were drier and water was not maintained specifically to benefit giant garter snakes (Wylie *et al.* 2000a).

Factors Affecting the Snake within the Action Area

As noted in the *Giant Garter Snake Five-year Review: Summary and Evaluation* (Service 2012), the overall status of the snake has not improved since its listing. The Colusa Basin sub-population supports a better documented, relatively larger, and more stable snake sub-population (Wylie *et al.* 2004; Wylie and Martin 2004); its continued healthy persistence is, therefore, extremely valuable for survival and recovery of the snake. Yet, the Colusa Basin sub-population continues to be impacted by past and present Federal, State, private, and other human activities.

Urban and commercial development results in direct habitat loss and also may expose snakes to secondary effects including water pollution from urban run-off and increased vehicular mortality, both of which act in concert with direct habitat loss and degradation to further threaten the snake.

Although rice fields and agricultural waterways can provide valuable seasonal foraging and upland habitat for the snake, agricultural activities such as waterway maintenance, weed abatement, rodent control, and discharge of contaminants into wetlands and waterways can degrade snake habitat and increase the risk of snake mortality (Service 1993). On-going maintenance of agricultural waterways can also eliminate or prevent establishment of snake habitat, eliminate food resources for the snake, fragment existing habitat, and prevent dispersal of snakes (Service 1993).

Flood control and maintenance activities which can result in snake mortality and degradation of habitat include levee construction, stream channelization, and rip-rapping of streams and canals (Service 1993). Flood control programs are administered by the U.S. Army Corps of Engineers (Corps) and the Corps has typically consulted on previous projects and is expected to continue to do so for future projects. The ongoing nature of these activities and the administration under various programs, however, makes it difficult to determine the continuing and cumulative effects of these activities.

Other projects affecting the environment in and around the action area include transportation projects with Federal, county, or local involvement. The Federal Highway Administration and/or the Corps have consulted with the Service on the issuance of wetland fill permits for several transportation-related projects within basins that affected snake habitat. The direct effect of these projects is often small and localized, but the effects of transportation projects, which improve access and therefore indirectly affect snakes by facilitating further development of habitat in the area and by increasing snake mortality via vehicles, are not quantifiable.

In the final rule listing snakes as threatened (October 20, 1993, 58 FR 54053), fluctuations in rice production and changes in water management including reduction in water availability due to drought and water transfers were cited as threats to the continued existence of the snake. The Service concluded that these factors in combination with other threats put the Butte, Colusa, and Sutter Basin populations of snakes at risk of moving from the status of threatened to endangered (all other areas were considered to be at risk of extirpation.) In addition, the *Draft Recovery Plan for the Giant Garter Snake* (Service 1999) considers the maintenance of rice cultivation to be important to the continued existence of the species. In addition to restoration of wetland habitat, the Draft Recovery Plan proposes recovery tasks to protect rice lands, to develop methods to assure water deliveries to support snakes, and promote maintenance of cropping patterns that benefit the snake.

The Five-year Review concluded that by far the most serious threats to snakes continues to be loss and fragmentation of habitat from urban and agricultural development and loss of habitat associated with changes in rice production. Although some snakes have been discovered in several southern populations that were thought to be extirpated, these populations remain in danger of extirpation because their numbers remain very low and discontinuous, and they are located on isolated patches of limited quality habitat. Activities such as water management that are associated with habitat loss are also of particular concern because they exacerbate the losses from development and from loss of rice production. Populations range-wide are largely isolated from one another and from remaining suitable habitat. Without hydrologic links to suitable habitat during periods of drought, flooding, or diminished habitat quality, the snake's status will decline (Service 2012).

Sacramento Valley populations of the snake depend on agricultural croplands, leaving them vulnerable to wide-scale habitat loss in the event of changes in agricultural management such as changes in crops or fallowing large areas of rice fields (Paquin et al. 2006). Long-term fallowing can reduce or eliminate habitat, yet short-term fallowing can ultimately improve rice agriculture and associated habitat components and sustain them over the long term while reducing chemical inputs and discharges (J. Roberts in litt. 2011, referenced in Service 2012). When rice fields are left out of production there is a substantial reduction or elimination in the use of the surrounding and nearby water conveyance structures by snakes where water supply is dependent upon surface or ground water from non-adjacent or on-site sources (Service 2012). Radio tracked snakes are known to leave previously occupied rice land sites when fallowing is continued for more than one season (Wylie pers. comm. 2008, E. Hansen 2008). If rice fields are planted with a rotation crop, especially one that is irrigated, essential habitat components for the snake may be maintained, and the long-term values may be enhanced if the rice crop is made more sustainable where it otherwise might be eliminated (Service 2012). Fallowing fields alternately in a 'checkerboard' pattern may minimize the impacts to snakes (Service in litt. 2008, referenced in Service 2012).

Recent studies have concluded that snakes have adapted to the mosaic of seasonal wetlands and upland habitats that rice cultivation mimics, and use flooded rice fields for foraging, and irrigation dikes for basking sites (Service 2012). Regular long-term water transfers have the potential to reduce significantly the amount of rice lands and the temporary and artificial wetlands they produce (Service 2012). Impacts may be especially severe in those areas adjacent to State and Federal wildlife refuges which may function as the core habitat to lead recovery efforts (Service 2012).

Habitat degradation or alteration that benefits non-native species may increase the vulnerability of snakes to predation. Introduced game fish such as largemouth bass (*Micropterus salmoides*) and catfish (*Ictalurus* species) prey upon snakes and have been responsible for eliminating many species of native fishes and aquatic vertebrates in the western United States (Service 2012). Brood areas free of predatory fish may be important in that these areas allow juvenile snakes to grow large enough to avoid predation by game fish (G. Hansen pers. comm. 1998). Introduced predatory fish may also compete with snakes for smaller forage fish (G. Hansen 1986, 1992). G. Hansen (1986) observed that nearly all snakes captured and examined showed scars or recent injuries, presumably acquired during attacks by predators. R. Hansen (1980) concluded that the abundance and diversity of predators suggested that predation pressure probably is severe. However, predation is not believed to be a limiting factor in areas that provide abundant cover, high concentrations of prey items, and connectivity to a permanent water source (Wylie *et al.* 1997).

Past Water Transfer Programs

Reclamation and DWR facilitated similar transfers in water years 2009 through 2014 (see Table 7). For 2010 and 2011 water transfers, the Service issued a biological opinion on these transfer program for effects on the snake. Only federal, CVP-related, water transfers were considered in the biological opinion and corresponding Environmental Assessment and Finding of No Significant Impact in 2010 and 2011. In 2012, Reclamation did not receive any 'north to south' water transfer proposals, and in 2013, only water made available via groundwater substitution was transferred. Since these 2013 transfers were made available by pumping groundwater, no effect on snakes or snake habitat was expected (Reclamation 2014a). In 2014, Reclamation completed a biological assessment and the Service issued a biological opinion for effects on the snake from proposed cropland idling as part of 2014 water transfers (Service 2014).

Table 7 Water Transfer Quantities 2009 to 2014 (AF) and Acreage of Rice Fallowed

Water Year	Actual Water Made Available (AF)		
	Crop Idling	Groundwater Substitution	Acreage of Rice Fallowed
2009	21,045	58,881	5,946
2010	0	0	0
2011	0	0	0
2012	No Reclamation Water Transfers Proposed	No Reclamation Water Transfers Proposed	No Reclamation Water Transfers Proposed
2013	0	31,406	0
2014	40,650	10,289	15,694

Source: Reclamation 2014a, D. Cordova pers. comm. 2015 and B. Hubbard pers. comm. 2015

During the 2014 transfer season, Reclamation conducted monitoring in compliance with the *Endangered Species Consultation on the Bureau of Reclamation's Proposed Central Valley Project 2014 Water Transfers* (2014 Biological Opinion). During the 2014 transfer season, 23,120.3 acres within five water districts were idled under the program. During the transfer season, Reclamation personnel monitored transfer acreage for compliance with the conservation measures of the 2014 Biological Opinion. Monitoring confirmed that all transfers were conducted in compliance with the 2014 Biological Opinion (Reclamation 2014a).

Effects of the Action

The proposed project will result in fallowing a maximum of 60,693 acres of rice land each year for 10 years if the full amount of 224,583 AF of surface water is transferred as a result of cropland idling/crop shifting. Maximum fallowing as a result of the proposed project would be approximately 12.3% (60,693/492,088) of the average annual rice acreage grown in the Sacramento Valley from 1992 to 2012. This reduction in habitat will likely result in increased stress on snakes that must disperse further to find suitable habitat, a likely reduction in prey base due to less available habitat, the potential displacement of individual snakes, increased risk of predation on snakes, and the potential for reduced reproduction and recruitment. All of these factors may result in the loss of individual snakes through increased mortality or reduced or forgone reproduction by snakes in affected areas. However, Reclamation has proposed a conservation strategy that will maintain important snake habitat throughout the program area. Areas with known priority snake habitat adjacent to naturalized lands and wildlife refuges and corridors between these areas will not be available for transfer, ensuring that these areas are protected and that suitable habitat will be available to the snake.

The draft Recovery Plan for giant garter snakes concluded that maintenance of rice cultivation is important to the continued existence of the species. In addition, the draft Recovery Plan proposes recovery tasks to protect rice lands, to develop methods to assure water deliveries to support snakes, and to develop programs to promote maintenance of historic cropping patterns that benefit the snake (Service 1999). As was noted in the Drought Water Bank and Environmental Water Account biological opinions (Service File Nos. 08-F-1596-1 and 03-F-0321, respectfully), fallowing of rice fields reduces the amount and availability of habitat, including summer water for the snake.

The proposed idling or crop shifting of up to 60,693 acres of rice fields to alternate crops which would occur in the action area will reduce the availability of consistently available wetland areas, including ricelands and canals/ditches, available each year which are important to snake populations. The importance of consistently available wetlands was reported in the 2005 Monitoring Report for the Colusa NWR that concluded that, "The management of the Colusa Refuge for snakes, which began with the restoration of Tract 24, has clearly benefitted the snakes in the restored wetlands and other habitats by maintaining and increasing stable summer water habitats for the snakes, maintaining connectivity among wetland habitats and carefully managing marsh vegetation." (Wylie *et al* 2005).

The proposed idling or shifting to alternate crops of up to 60,693 acres of rice fields within the action area may reduce foraging success for snakes that have left their home range in search of shallow summer aquatic habitat due to lack of familiarity with the area, increased foraging effort because of more widely dispersed prey resources, increased competition for prey items with resident snakes or other displaced snakes, and reduced prey resources that are also dependent on rice land habitats. Effects associated with reduced available summer water and rice field habitat also include displacement of individual snakes from familiar habitat areas and result in snakes foraging over a wider area. Snakes may move to other areas of suitable habitat, but will encounter increased mortality from vehicles, exposure to temperature extremes, predation, and human disturbance while migrating to new areas. Dispersing snakes or snakes using a larger foraging area may displace resident snakes or compete for food and shelter resources with resident snakes. This will result in reduced survivorship and fecundity of both resident and immigrant snakes. Fallowing will also result in reduced prey availability by reducing the acreage of flooded rice fields which act as seasonal marshes in producing high numbers of tadpoles, frogs and mosquitofish for the snake to feed on (E. Hansen 2008, pers. comm.).

Repeated episodes of fallowing riceland may also result in reduced survivorship or fecundity when females are displaced from familiar retreats and basking sites. Abundant food resources are also essential for females to both recover body mass after giving birth and to survive the overwintering period when the snakes do not forage, and for young snakes which rely on smaller prey items most typical of rice fields. Fallowing rice fields will not only temporarily remove suitable habitat, but may adversely affect reproduction, recruitment, and survival of snakes. The Service estimates a generation time of about five years for snakes to reach maturity (D. Kelly, pers. comm. 2015).

Adverse effects from the proposed idling or shifting to alternate crops of up to 60,693 acres of rice fields within the action area may be greatest for juvenile snakes due to the loss of rice fields and wetland areas suitable for forage. Abundant food resources are also essential for females to both recover body mass after giving birth and to survive the overwintering period when the snakes do not forage. Abundant food resources are also essential to the survival of juveniles and neonates. Snakes typically double their weight in the first year, with rapid growth likely necessary to reach a size class no longer susceptible to predation by non-native predatory fish and bullfrogs. Small prey items are particularly important to snakes that are less than two years old because they physically cannot feed on larger items. Lack of small prey would inhibit growth and result in delayed sexual maturation of

snakes, resulting in decreased births and recruitment of individuals into the population, potentially skewing the age structure of the population to older snakes. Juveniles and neonates also rely on developing sufficient body mass prior to overwintering in order to survive long periods without foraging.

The proposed idling or shifting to alternate crops of up to 60,693 acres of rice fields within the action area may result in an increased risk of predation on individual snakes when they leave a fallowed field in search of a suitable location after emerging from overwintering. Rice fields provide cover for snakes to escape predators. Ditches, canals, and other agricultural conveyances typically provide limited cover in the form of emergent vegetation. Predators such as large fish, egrets, and herons are more prevalent in ditches and canals and are known to prey on snakes.

To the extent that reducing the available habitat can affect the likelihood of survival and reproduction of individual snakes if individuals are unable to assimilate in to remaining suitable habitat, this occurrence on a large scale may have population-level effects, particularly if the quantity of available habitat is reduced persistently, over time, or undergoes annual fluctuations of high magnitude. Should this occur, it can affect the population beyond the duration of the proposed project. Fallowing of land appears to reduce or eliminate snake capture success in adjacent canals (Wylie *et al.* 2004). It is unknown to what extent snakes will successfully relocate and assimilate into adjacent or nearby habitat when rice lands are fallowed. Trapping efforts in the "Snake Alley" area of the Natomas Basin have resulted in fewer snakes being trapped in years when much of the rice fields in this area were fallowed (E. Hansen, pers. comm. 2008). Habitat conditions in "Snake Alley" are similar to what is found in much of the action area in the Sacramento Valley; that is a matrix of agricultural fields and canals and ditches. Snakes can move considerable distances in days or months when resources are limited, suggesting that adult snakes may disperse widely in search of shallow summer aquatic habitat, such as rice, if it is not available when they emerge from overwintering. However, the time and effort that is expended even travelling relatively short distances to find suitable aquatic habitat may reduce the fecundity of female snakes who would otherwise be expending that effort on breeding, feeding, and other essential life functions (G. Wylie, pers. comm. 2008). In addition, snakes exhibit some level of site fidelity, despite their fairly large range (E. Hansen, pers. comm. 2008); suggesting that fallowing their habitat would result in additional stress on individual snakes.

The proposed conservation strategy ensures that most or all canals and waterways, which make up a portion of snake aquatic habitat, will remain wetted during the summer months, thereby providing refuge to snakes. The conservation measures, as proposed by Reclamation, will minimize the effects of the proposed project by providing assurances that in specific high priority snake habitat areas, as shown in Attachment A, conservation measures will be implemented. In other areas where high quality snake habitat exists and snakes are known to occursellers will be required to maintain habitat features (ditches, drains, conveyance structures, etc.) in an aquatic condition that can be used by snakes, thus providing habitat across the action area.

These measures were developed using the best available science on snake biology, habitat use and suitability, and known occurrences (Halstead et al 2013, Halstead 2010). The measures focus conservation in the most important areas for snakes, considering high quality habitat and known use by snakes. One of the main goals is to maintain water in canals and ditches known to be suitable for snakes and that represent 85% of the known snake occurrence (USFWS 2014). Maintaining water in drains and conveyance structures in these areas will also maintain emergent cover for snake foraging and escape habitat over the action area. Other measures, implemented during water conveyance structure maintenance, will also be important minimization measures and include cleaning only one

side of the conveyance channel per year and when mowing allowing sufficient remaining vegetation to avoid direct mortality to snakes.

Implementation of these conservation measures is expected to reduce the severity of some of the adverse effects described previously, such as loss or reduction of consistently available wetted areas and isolation of snakes in islands of idled cropland with no movement corridor to enable them to leave the area. By requiring crop idling/substitution to occur away from high priority habitat and areas with high likelihood of snake occurrence, and by maintaining movement corridors for snakes in areas where crop idling occurs, it is expected that snakes will be able to reach suitable habitat despite drying due to crop idling. However, there is some uncertainty that snakes will respond as anticipated, that the areas identified as priority habitat are sufficiently well distributed or have the capacity to maintain a large proportion of the resident snake population. These expected responses, while supported by science, have not been validated by monitoring. The adaptive approach proposed by Reclamation is important to address this uncertainty and enable Reclamation to work with the Service, CDFW, and snake researchers to adapt the program as new scientific information becomes available.

Cumulative Effects

Cumulative effects include the effects of future State, Tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

Water transfers may also be made by other water contractors not included in the proposed project considered in this biological opinion. It is estimated that up to about 86,940 AF of water could be made available from SWP sellers via cropland idling/crop shifting (D. Cordova pers. comm. 2015).

After rice is harvested, fields can be flooded in the late summer to the early winter period to aid in the decomposition of the remaining vegetative material (rice straw). These flooded fields can provide important foraging and rearing habitat for snakes (Sterling and Buttner 2011). The acreage of rice straw decomposition is not formally tracked but some estimates have been made in recent years (2007 to current) and range from 270,000 acres (Miller et al 2010) and 357,000 acres on the high end (D. Frisk pers. comm. 2015, R. Grimes pers. comm. 2015 and Service 2006) to 100,000 acres on the low end (D. Frisk pers. comm. 2015). It is possible that fewer acres will be flooded for rice straw decomposition as fewer acres of rice is grown because of decreased water allocations, decreased availability of groundwater, and changing market conditions for rice.

Conclusion

After reviewing the current status of the snake, environmental baseline for the action area, effects of the proposed project, cumulative effects, and proposed conservation measures, it is the Service's biological opinion that the Long-term Water Transfers (2015-2024) as proposed, are not likely to jeopardize the continued existence of the snake.

The proposed project will likely result in the loss of an unknown number of snakes as a result of increased mortality from temporal loss of habitat, increased competition for resources, reduced reproductive rates, and increased mortality from predation. We expect that crop idling and shifting will temporarily remove suitable snake habitat and may also reduce reproduction, recruitment, and survival of the snakes and these effects will extend beyond the project time frame.

However, Reclamation is implementing a comprehensive conservation strategy that is based on recent research that focuses on maintaining suitable habitat conditions in priority areas throughout the action area. Water will be maintained in areas most important to snakes and water will not be transferred from priority conservation areas (e.g., Natomas). In addition, Reclamation will identify where idling has occurred, collect and verify habitat conditions, synthesize species data and implement adaptive management measures to assure effective implementation of the conservation measures.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harass is defined by FWS regulations at 50 CFR 17.3 as an intentional or negligent act or omission which creates the likelihood of injury to a listed species by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering. Harm is defined by the same regulations as an act which actually kills or injures wildlife. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, 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 intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with this Incidental Take Statement. This incidental take statement does not authorize any incidental take of listed species resulting from related actions that are not part of or controllable by Reclamation, long-term water transfer water sellers, or long-term water transfer water purchasers, and that are not included in the project description of this biological opinion.

The measures described below are non-discretionary, and must be implemented by Reclamation so that they become binding conditions of any agreement, contract, grant or permit issued to the applicant, as appropriate, in order 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 applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to any agreement, contract, permit, or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, Reclamation must report the progress of the action and its impact on the snake to the Service as specified in the incidental take statement [50 CFR §402.14(i)(3)].

Amount or Extent of Take for 2015

The Service anticipates incidental take of snakes will occur. The Service is unable to quantify an exact number of snakes that will be taken as a result of the proposed action because it is impossible to know how many individuals may be present in the action area. Since take is expected to result from effects to habitat, the quantification of habitat affected becomes a direct surrogate for the species that will be taken. Snakes are secretive and sensitive to human activities and individual snakes are difficult to detect unless they are observed, undisturbed, at a distance. Adverse effects to snakes are additionally difficult to quantify due to seasonal fluctuations in their numbers, random environmental events, or additional environmental disturbances. In instances in which the total number of individuals anticipated to be taken cannot be determined, the Service may use the amount of habitat impacted as a surrogate. Since the take of individuals anticipated will result from

the acreage of cropland idled by the proposed action, the quantification of habitat lost as a result of the proposed action serves as a direct surrogate for the snakes that will be lost.

Based on our analysis presented in the *Environmental Baseline* and *Effects of the Proposed Action* sections, which describe how the majority of the action area, both under current and proposed land management, is considered to be snake habitat, we anticipate that snakes are likely to be exposed to adverse effects from the proposed rice field fallowing and crop shifting. The incidental take is expected to be in the form of harm as displaced snakes may be taken by predators or may die or suffer reproductive failure if they cannot successfully relocate and utilize suitable habitat on or adjacent to a field fallowed as a result of implementation of this water transfer program in 2015 in and around the 60,693 acres of rice fields that are idled or have alternative crops.

The proposed fallowing or crop shifting on up to 60,693 acres of rice fields in 2015 will result in the loss of an undetermined number of individual snakes through increased mortality levels of adults and juveniles due to decreased prey availability and/or reduced reproduction by snakes, and mortality of snakes that may move out of areas subject to crop idling and shifting due to predation

Effect of the Take

In the accompanying biological opinion, the Service has determined that the level of anticipated take is not likely to result in jeopardy to the snake because the conservation measures, as proposed by Reclamation, will minimize the effects of the proposed project by providing assurances that transfers will not occur in areas where high quality snake habitat exists and snakes are known to occur, and sellers will be required to maintain habitat features (ditches, drains, canals, etc.) in a condition that can be used by snakes, thus providing habitat across the action area. In addition, Reclamation has proposed an adaptive approach to the water transfer program so that information collected through monitoring and research will be reviewed annually with the wildlife agencies and giant garter snake scientists. This approach will enable Reclamation to make adjustments to snake conservation measures prior to finalizing each annual transfer program.

Reasonable and Prudent Measures

Measures to avoid or minimize effects on the snake resulting from implementing long-term water transfers have been incorporated into the proposed project's conservation measures. Therefore, the Service believes the following Reasonable and Prudent Measure is necessary and appropriate to minimize incidental take of the snake:

1. Subject to adaptive management as described below, all conservation measures, as described in the revised biological assessment and restated here in the Project Description section of this biological opinion, shall be fully implemented, adhered to and validated as to their effectiveness. Further, this Reasonable and Prudent Measure shall be supplemented by the Terms and Conditions below.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, Reclamation must ensure compliance with the following terms and conditions, which implement the Reasonable and Prudent Measure described above. These terms and conditions are nondiscretionary.

1. For lands where cropland idling or crop shifting will occur, Reclamation shall condition the contracts between them and potential water sellers to include the conservation measures contained in the project description and the terms and conditions including access by Reclamation and Service personnel to said lands to validate their implementation.

2. No later than December 31, 2015, Reclamation shall submit to the Service a supplement to the

conservation measures which will establish performance measures and metrics to evaluate their effectiveness. This supplement shall identify the data needed to produce estimates of change or trends in snake reproduction, numbers, and distribution in the action area.

3. Reclamation shall submit a compliance report to the Service's Sacramento Fish and Wildlife Office sixty (60) calendar days following water transfer contract execution each year. This report shall detail (i) acreage and location of seller's parcels affected by crop idling/crop substitution and maps of where the cropland idling or cropland shifting occurred; (ii) confirmation that, where appropriate, water levels are being maintained in ditches around affected fields; (iii) occurrences of incidental take of any snakes including an updated occurrence map based on the most recent data available; (iv) an explanation of failure to meet such measures, if any; and (v) other pertinent information. GIS shape files of the parcels that were fallowed will be in projected coordinate system NAD 1983 Zone 10 N.

4. At the end of each water transfer year, Reclamation will submit to the Service a monitoring report that contains the following: (i) maps and GIS shape files of all cropland idling or cropland shifting actions that occurred within the range of potential transfer activities affected under this program; (ii) results of current scientific research and monitoring pertinent to water transfer actions; (iii) a discussion of conversation measure effectiveness; (iv) maps and GIS shape files indicating where rice was grown; (v) results of annual snake monitoring; (vi) snake detections; (vii) a cumulative history of the location and extent of crop idling/crop shifting; and (viii) report on water districts/sellers participation in voluntary best management practices. GIS shape files of the parcels that were fallowed will be in projected coordinate system NAD 1983 Zone 10 N. The report will be submitted to the Service no later than January 31 following each transfer year. Reclamation and the Service will establish annual meetings no later than February 28 of each year to discuss the contents and findings of the annual report and develop additional conservation measures if necessary.

Reporting Requirements

For water transfers in years 2016-2024 (including multi-year transfers) Reclamation will prepare a description of the proposed action for the calendar year (sellers/buyers, conservation measures, etc.), provide detailed monitoring reports for the previous years actions, and submit this information to the Service no later than January 31 of each year. By February 28 of each year, the Service will review the description of the proposed action and monitoring reports and meet with Reclamation regarding the proposed action. The annual monitoring reports will include detailed information in the action area (narrative and GIS spatial analysis) on implementation of the conservation measures, land idling/fallowing, hydrologic conditions, presence/absence/not found surveys for the snake, recent reports prepared on the snake, and any other information that is relevant to snake impacts and conservation.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act 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 listed species or critical habitat, to help implement recovery plans, or to develop information. The Service recommends the following actions:

1. Reclamation should assist the Service in implementing recovery actions identified in the *Draft Recovery Plan for the Giant Garter Snake* (Service 1999) or any final recovery plan for the giant garter snake issued during the transfer action.

2. Reclamation should work with the Service, DWR, and water contractors to investigate the long-term response of snake individuals and local populations to annual fluctuations in habitat from fallowing rice fields.

3. Reclamation should support the research goals of the Giant Garter Snake Monitoring and Research Strategy for the Sacramento Valley proposed in the project description of this biological opinion.

4. Reclamation should work with the Service to create and restore additional stable perennial wetland habitat for snakes in the Sacramento Valley so that they are less vulnerable to market-driven fluctuations in rice production. The CVPIA (b)(1) other and CVPCP conservation grant programs would be appropriate for such work.

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

REINITIATION - CLOSING STATEMENT

This concludes formal consultation on the long-term water transfers from 2015 to 2024. As provided in 50 CFR §402.16, reinitiation of formal consultation is required and shall be requested by the Federal agency or by the Service where discretionary Federal agency involvement or control over the action has been retained or is authorized by law and:

(a) If the amount or extent of taking specified in the incidental take statement is exceeded;

(b) If new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered;

(c) If the identified 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

(d) If a new species is listed or critical habitat designated that may be affected by the identified action.

If you have any questions regarding this biological opinion, please contact Ken Sanchez at the letterhead address or (916) 414-6600.

cc:
California Department of Fish and Wildlife, Paul Forsberg, Sacramento, CA
National Marine Fisheries Service, Bruce Oppenheim, Sacramento, CA
California Department of Water Resources, Tom Filler, Sacramento, CA
Bureau of Reclamation, Russ Grimes, Brad Hubbard, Dan Cordova, Sacramento, CA

Attachment
GGS Priority Habitat Maps

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ATTACHMENT A
GIANT GARTER SNAKE PRIORITY HABITAT MAPS