United States Department of the Interior

FISH AND WILDLIFE SERVICE

Sacramento Fish and Wildlife Office
2800 Cottage Way, Room W-2605
Sacramento, California 95825

14 April 2009

In reply refer to:
81420-2008-F-1596-1

Memorandum

To: Richard Woodley, Regional Resources Manager, Mid-Pacific Regional Office, Bureau of Reclamation, Sacramento, California

From: for Susan Moore, Field Supervisor, U.S. Fish and Wildlife Service, Sacramento Fish and Wildlife Office, Sacramento, California

Subject: Endangered Species Consultation on the Proposed 2009 Drought Water Bank for the State of California

This is in response to your March 2009, request for concurrence with your determination that the proposed 2009 Drought Water Bank (DWB) Project transfer a maximum of 370,935 acre-feet of water from 34 entities in the Sacramento Valley (Figure 1) to agricultural and urban users who are generally located south of the Delta (Figure 2) "may effect, but is not likely to adversely affect" the federally-listed threatened delta smelt (*Hypomesus transpacificus*), the threatened San Joaquin kit fox (*Vulpes macrotis mutica*); and may adversely affect the threatened giant garter snake (*Thamnophis gigas*). This response has been prepared pursuant to section 7 of the Endangered Species Act of 1973 (Act), as amended (16 U.S.C. 1531 *et seq.*), and in accordance with the regulations governing interagency consultations (50 CFR §402). The Bureau of Reclamation (Reclamation) is requesting this consultation on behalf of the State of California, Department of Water Resources (DWR) and the local agencies (water districts) that will be selling or buying water as part of the proposed action.

This office has consulted with Reclamation, both informally and formally, approximately one-half dozen times over the past 8 years on various forbearance agreements and proposed water transfers for which water is made available for delivery south of the delta by fallowing rice (and other crops) or substituting other crops for rice in the Sacramento Valley. Although transfers of this nature were anticipated in our biological opinion on the Environmental Water Account, that program expired in 2007 and, to our knowledge, no water was ever made available to EWA from rice fallowing or rice substitution. The need to consult with such frequency on transfers involving water made available from rice fallowing or substitution suggests to us a need for programmatic environmental compliance documents, including a programmatic biological opinion that addresses the additive effects on giant garter snakes of repeated fallowing over time, and the long-term effects of potentially large fluctuations and reduction in the amount and

distribution of rice habitat upon which giant garter snakes in the Sacramento Valley depend. Such a programmatic consultation would enable us to collaboratively develop the elements of a program that would streamline environmental compliance and administration of such transfers, as well as address the conservation needs of the giant garter snake under such a program consistent with Central Valley Project Improvement Act (CVPIA) and our November 2000 Programmatic Biological Opinion on Implementation of the CVPIA and Continued Operation and Maintenance of the CVP (Service File No. 1-1-98-F-0124) and Endangered Species Act sections 7(a)(1) and 7(a)(2).

We have evaluated the information contained in: (1) your March 2009, Biological Assessment, *Consideration of Impacts to the Giant Garter Snake From a One-Year Drought Water Bank and Resulting Water Operations*; (2) the March 2009, Draft Environmental Assessment 2009 Drought Water Bank, prepared by Reclamation; (3) the March 4, 2009, *Addendum to the Environmental Water Account Environmental Impact Statement/Environmental Impact Report Re: 2009 Drought Water Bank Transfers*, prepared by The Resources Agency, Department of Water Resources (DWR); (4) the November 9, 2008, *Sacramento Valley Giant Garter Snake Conservation Strategy*, prepared by DWR; (5) e-mail and telephone conversations between the Bureau of Reclamation and the Service; and (6) other information available to the Service and concur with your determination that the transfer of the water to contractors south of the delta is not likely to adversely affect the San Joaquin kit fox. The one year transfer of up to 370,935 acre-feet of water would not lead to the conversion of annual crops to permanent (woody) crops because the water transferred can only be used to irrigate lands/crops that were under irrigation over the last 3-year period, 2006 through 2008, to ensure it is applied only to currently-cultivated lands.

After completing a review of the information contained in the above referenced documents and the December 15, 2008, Biological Opinion for the Coordinated Operations of the Central Valley Project (CVP) and State Water Project (SWP), it is our determination that the effects of these transfers on delta smelt and its critical habitat were included in that consultation. 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.

Critical habitat has not been designated for the giant garter snake; therefore, none will be affected.

PROJECT DESCRIPTION

Last fall, the state of California activated its DWB program for the first time since 1994, following Governor Schwarzenegger's June 2008 declaration of a statewide drought and proclamation of emergencies in nine California counties related to the drought. The Governor of California requested emergency drought assistance under the Reclamation States Emergency Drought Relief Act of 1991 (Drought Act), Public Law 102-250, as amended. The Commissioner of the Bureau of Reclamation (Reclamation) has determined that emergency drought assistance is merited. The Mid Pacific Region of Reclamation would participate in the DWB pursuant to Section 101 of the Drought Act, to ensure that operations of the two projects can be coordinated

effectively to maximize the ability of the DWB to move water from willing sellers to buyers to address critical water needs.

To implement the DWB, DWR would purchase water from willing sellers upstream of the Sacramento-San Joaquin Delta (Delta). This water would be conveyed, using SWP or CVP facilities, to water users that are at risk of experiencing water shortages in 2009 due to drought conditions and that require supplemental water supplies to meet anticipated demands. DWR will purchase water from willing sellers (CVP contractors, SWP contractors, and other water supply entities) upstream of the Sacramento-San Joaquin Delta. Water acquired by the 2009 Drought Water Bank would be available for purchase by public and private water suppliers in California based on needs criteria developed by DWR.

The Proposed Action consists of making up to 370,935 acre-feet of water to the DWB by crop idling, crop substitution, groundwater substitution, and reservoir re-operation. The maximum amount of water made available by CVP contractors from idled rice land will be 120,635 acre-feet, which involves the idling of a maximum of 36,556 rice acres (120,635 acre-feet/3.3 acre-feet per acre Evapo-Transpiration Rate of Applied Water) (Reclamation 2008). A maximum of 69,250 acre-feet of water would be made available by CVP contractors from substituting pumped groundwater for surface water to irrigate crops on lands primarily planted in rice, and a maximum of 10,000 acre-feet of water would be made available from re-operating Reclamation's Stony Gorge Reservoir. The total amount of water made available to the DWB from CVP contractors would be up to 199,885 acre-feet. Up to 62,750 acre-feet of water from SWP and other non-CVP contractors would be made available to the DWB from idling a maximum of 19,015 acres of rice lands. In addition, a maximum of approximately 48,300 acre-feet of water from SWP and non-CVP contractors would be made available by substituting pumped groundwater for surface water to irrigate crops on lands historically planted in rice, and up to 35,000 acre-feet of water would be made available from re-operating non-CVP reservoirs on the Feather/Yuba River watershed and an additional 25,000 acre-feet of non-CVP water would be made available by re-operating a reservoir controlled by Merced Irrigation District. The total amount of water made available to the DWB from SWP and non-CVP sources would be up to 171,050 acre-feet.

In light of the fact that the Federal and State government are coopering to provide drought relief under the Drought Water Bank, which involves both Federal and State water contractors engaging in willing seller/willing buyer water transactions under the same set of rules, and which requires the use of both Federal and State storage and conveyance facilities, we will address the Drought Water Bank as a whole in this consultation.

The DWB is currently is planned for 2009 only. However, if drought conditions persist the DWB may continue beyond 2009. In the event the DWB extends beyond 2009, additional consultation will be required.

Allocation of DWB Water. DWB water will be allocated by DWR in accordance with priority of need, with health and safety considerations paramount. Under critically dry conditions DWR (administering the DWB) will use the following priorities for allocating water to buyers:

Health and safety needs, including indoor residential and institutional and emergency uses;

Preservation of existing high-value assets such as survival of existing permanent crops (trees and vines that have been irrigated during each of the last 3 years), minimum deliveries to existing commercial and industrial customers;

Deliveries sufficient to meet up to 60 percent of existing normal urban demands; deliveries sufficient to meet up to 25 percent of existing normal agricultural demands (http://www.water.ca.gov/drought/docs/2009water_bank_faq.pdf).

Cropland Idling and Crop Shifting. Crop idling will transfer water that would have otherwise been used for agricultural production. Crop idling acquisitions in the DWB would pay farmers to idle land that would have otherwise been placed in production. These acquisitions would be retained in upstream reservoirs until they could be transferred through the Delta and pumped south. While rice is the most likely crop that would be idled, other crops such as alfalfa may also be idled during a portion of the growing season.

Rice provides the largest amount of transfer water per acre and is less labor intensive than other crops. The Sacramento Valley contains most of California's rice production; therefore crop idling acquisitions are likely to take place in this region. See Table 1 for the general location and amounts of rice grown in the Sacramento Valley during the past 10 years.

Table 1. Estimated Sacramento Valley Rice Production (acres) from 1995-2006 by County[1]

Year	Sutter	Butte	Yuba	Sacramento	Basin Sub-total	Colusa	Glenn	Yolo	Basin Sub-total	Total
1995	82,000	83,000	32,000	10,300	207,300	122,000	79,000	27,000	228,000	435,300
1996	86,000	97,000	34,000	8,800	225,800	136,000	87,000	21,600	244,600	470,400
1997	90,000	97,000	35,000	9,400	231,400	137,000	89,000	24,000	250,000	481,400
1998	91,000	88,000	37,300	9,100	225,400	121,000	83,000	20,400	224,400	449,800
1999	104,500	102,500	39,200	9,700	255,900	135,000	88,000	30,000	248,000	508,900
2000	108,000	98,000	39,000	9,000	254,000	145,000	87,500	35,500	268,000	522,000
2001	87,700	86,800	37,100	7,800	219,400	126,300	78,300	26,000	230,600	450,000
2002	101,700	100,000	36,000	8,200	245,900	138,500	87,500	31,500	257,500	503,400
2003	96,900	87,800	35,400	8,100	228,200	138,000	82,500	32,300	252,800	481,000
2004	124,000	105,800	34,300	9,600	273,700	156,400	90,300	41,900	288,600	562,300
2005	101,800	96,800	33,300	7,900	239,800	145,600	87,100	29,200	261,900	501,700
2006	106,600	99,100	33,200	3,700	242,600	145,900	87,500	28,900	262,300	504,900
Average	98,350	95,150	35,483	8,467	237,450	137,225	85,558	29,025	251,808	489,258

[1] California Field Crop Statistics, 1996-2007, California Agricultural Service.

Crop idling transfers consist of water that would otherwise have been used for agricultural production. For crop idling acquisitions, DWR would pay farmers to idle land that they would otherwise have placed in production. Crop idling acquisition assets would be retained in reservoirs upstream from the selling water agencies until they could be transferred through the Delta and pumped south. Payment by DWR for water transferred would be computed based on pre-agreed consumptive use values, which may be refined as the science for generating these

values improves. DWR is considering purchasing water primarily from idled rice crops in the Upstream of Delta Region for several reasons:

- Rice provides the largest amount of water per acre idled (approximately 3.3 acre-feet per acre);
- Rice crops are less labor-intensive than other potential crops, requiring approximately 2.7 full-time labor equivalents per 1000 acres;
- Rice farmers have expressed interest and have participated in idling programs in the past; and
- Like other small grain crops, rice is not a permanent crop and brings in less revenue than permanent horticultural crops (e.g., fruits and nuts), so farmers would likely be more willing to idle lands.

Crop substitution is another potential method to purchase water for the DWB. Crop substitution acquisitions will pay farmers to substitute a crop with one that uses less water, and the surplus water will be purchased for transfer. That associated decrease in water use would then be purchased by the DWB. Since crop substitution has similar effects to crop idling, it will be included in the crop idling discussion for the remainder of this document.

The DWB may purchase water through crop idling/substitution transfers from the following contractors: Amaral Ranch, Butte Water District (WD) Glenn-Colusa Irrigation District (ID), Goose Club Farms, Maxwell ID, Meridian Farms, Parrott Investment Company, Pelger Mutual Water Company (MWC), Pinnacle Land Venture LLC (Broomieside Farms), Pleasant Grove-Verona MWC, Plumas MWC, Princeton-Codora-Glenn ID, Provident ID, Reclamation District (RD) 108, RD 1004, Richvale ID, Sacramento River Ranch, Sutter MWC, Sutter Extension WD, Sycamore MWC, and Western Canal WD.

Crop idling water would be available at the beginning of the season as soon as the crop is not planted. Releases from Lake Shasta would probably need to be maintained during April and May to meet downstream temperature and flow requirements. Therefore, water acquired from sellers on the Sacramento River could not be backed up into Lake Shasta and cannot be transferred until the Delta pumps are available. Typically, surface water made available through groundwater substitution is stored upstream until the Delta pumps have the capacity available (except on the Sacramento River where water often cannot be held in Lake Shasta because of downstream temperature and flow requirements). Transfer water under the proposed project would be moved through the Delta from July through September.

Groundwater Substitution. Groundwater substitution transfers occur when users forego their surface water supplies and pump an equivalent amount of groundwater as an alternative supply. Because the potential groundwater substitution transfers are from agricultural users, the water from this acquisition method would be available during the irrigation season of April through October. Typically, surface water made available through groundwater substitution is stored upstream until the Delta pumps have the capacity available for DWB assets (except on the Sacramento River, as described later).

Groundwater substitution transfers would withdraw additional water from the groundwater basin below the participating users, so this option could only be used in basins that are not in a state of

groundwater overdraft, or in areas where the water supplier determines that the water transfer would not contribute to the groundwater overdraft.

DWB water acquired through groundwater substitution would be released later in the irrigation season, during July through September, at times when through-Delta conveyance capacity is available. The change in reservoir elevations as the water is released would depend on the Delta conveyance capacity available. If the conveyance capacity were available constantly throughout the period of July through September, then the reservoir elevations would slowly return to the without-DWB levels. If more conveyance capacity were available in July than later in the summer, then the DWB could borrow water from the storage facility and release additional water at those times that the conveyance capacity is available.

The DWB may engage in groundwater substitution transfers with the following contractors: Amaral Ranch, Butte WD, Carter MWC, the City of Sacramento, Garden Highway MWC, Lewis Ranch, Maxwell ID, Meridian Farms, Natomas Central MWC, Pelger MWC, Pinnacle Land Ventures LLC (Broomieside Farms), Plumas MWC, Pleasant Grove-Verona MWC, Princeton-Codora-Glenn ID, Provident ID, RD 108, RD 1004, River Garden Farms, Sacramento River Ranch, Sacramento Suburban WD, Sutter Extension WD, Upper Swanston Ranch, and Sycamore MWC.

Before beginning transfer operations, the water transfer proponent will develop a groundwater substitution transfer proposal and provide it to the Project Agencies. The proposal will include a detailed description of any transfer-related changes to water management operations and a description of the facilities used in the operation. The details of the proposed water management operations will be included as contractual commitments in the water purchase agreement with DWR.

Reservoir Re-operation. DWR could acquire water by purchasing surface water stored in reservoirs owned by non-Project entities (those that are not part of the CVP or SWP). To ensure that purchasing this water would not affect downstream users, DWR would limit assets (the purchased water) to water that would not have otherwise been released downstream. In most cases, the stored reservoir water sellers could demonstrate that they would have maintained water in storage without the transfer.

When DWR purchases stored reservoir water, these reservoirs would be drawn down to lower levels than without the DWB. To refill the reservoir, a seller must prevent some flow from going downstream. Sellers must refill the storage at a time when downstream users would not have otherwise captured the water, either in downstream project reservoirs or with project pumps in the Delta. In these cases, instream flow caused by refill would decrease during the wet season, but would not decrease below minimum flow requirements. Stored reservoir water is released in addition to reservoir water that would be released without the DWB, thereby increasing flows in downstream waterways.

DWR may purchase stored reservoir water from Black Butte Reservoir via the Orland Unit Water Users Association on the Sacramento River (CVP); Brown's Valley ID and South Sutter WD on the Yuba River, Placer County Water Agency (French Meadows and Hell Hole Reservoirs) on the American River, and Merced Irrigation District on the Merced River.

Movement of the Water. Water transfers involving conveyance through the Delta would be pumped via the CVP's Jones Pumping Plant or the SWP's Banks Pumping Plant in the South Delta. Through Delta transfers would be implemented within the operational parameters of the Biological Opinions on the Continued Long-term Operations of the CVP/SWP (Opinions) and any other regulatory restrictions in place at the time of implementation of the water transfers. Current operational parameters applicable to conveyance of transfer water for the DWB include: a maximum amount of 600,000 acre feet per year is allowed for all types of water transfers; and transfer water will be conveyed during July through September only. Contract provisions of the SWP and CVP will be honored in determining access to Delta pumping capability if this capacity becomes constrained. Water transfers to areas downstream of the Delta would include an assumed 20 percent loss of total amount of water obtained from the Sacramento River and its tributaries as carriage losses (water required to meet water quality standards) in the Delta.

Conservation Measures.

The 2009 DWB will adopt the crop idling conservation measures from the Environmental Water Account (EWA) Biological Opinion (2004) with some modifications, described below. The following actions to protect the giant garter snake will be incorporated into contracts between DWR and the water seller. As part of the contract, DWR will have access to the land to verify how the water transfer is being made available and to verify that the actions to protect the giant garter snake are being implemented. In their March 2009 Biological Assessment, Reclamation has made the following commitments to avoid effects to giant garter snake;

- The water seller will maintain a depth of at least two feet of water in the major irrigation and drainage canals to provide movement corridors;
- Water will not be purchased from a field fallowed during the two previous years (water may be purchased from the same parcel in successive years).
- Water transfer actions will be limited so that no more than 20 percent of rice fields are idled in any one County, parcels idled will be no more than 320 acres in size, and will be distributed across the landscape in a checkerboard pattern (idled parcels will not be adjacent to each other). Having the fallowed/idled rice acreage spread throughout the Sacramento Valley is Reclamation's effort to assure that the total water conveyance system remains in its normal year wetted-up condition. The 320 acre blocks will not be located on opposite sides of a canal or other waterway, and will not be immediately adjacent to another fallowed parcel. The 20 percent limitation also helps alleviate potential socioeconomic effects and is based on California Water Code. California Water Code Section 1745.05 (b) states that: "The amount of water made available by land fallowing may not exceed 20 percent of the water that would have been applied or stored by the water supplier in the absence of any contract entered into pursuant to this article in any given hydrological year, unless the agency approves, following reasonable notice and a public hearing, a larger percentage."
- Parcels participating in crop idling for the 2009 DWB will not include: lands between refuges that serve as corridors: lands adjacent to Hunters and Logan Creeks between Sacramento National Wildlife Refuge (NWR) and Delevan NWR; the Colusa Basin

drainage canal between Delevan and Colusa NWR's; Little Butte Creek between Llano Seco (NWR unit) and Upper Butte Basin WA; and Butte Creek between Upper Butte Basin and Gray Lodge WA; lands adjacent to Butte Creek, Colusa Drainage Canal, Gilsizer Slough, the land side of the Toe Drain along the Sutter Bypass, Willow Slough and Willow Slough Bypass in Yolo County, and lands in the Natomas Basin (groundwater substitution is proposed for this area);

- In addition, DWB sellers will continue to voluntarily perform giant garter snake best management practices (BMP's), including educating all district personnel to recognize and avoid contact with giant garter snakes, clean only one side of a conveyance channel per year, provide rock-basking habitat in the system's water prisms, and raise flail mower blades to at least 6 inches above the canal operation and maintenance road surfaces.
- Reclamation, with DWR's assistance, will provide a map(s) to the Service in June 2009 showing the parcels of rice land that are fallowed for the purpose of transferring water to the 2009 DWB.
- As described below, as part of a Giant Garter Snake Baseline Monitoring and Research Strategy (Monitoring Strategy) for the development of a Giant Garter Snake Conservation Strategy, in addition to the measures described above, DWR and Reclamation are proposing research goals to help quantify and evaluate the response of the giant garter snake to rice land idling. The focus of the Monitoring Strategy will be in the Colusa, Butte, Sutter, and Yolo Basins. The overall goal of the Monitoring Strategy is to develop actions that will contribute to the recovery of giant garter snake populations in the Sacramento Valley by providing recommendations for avoidance and mitigation measures for actions involving crop idling and crop substitution of rice lands.

As part of their participation in the DWB, DWR is developing a Giant Garter Snake Monitoring and Research Strategy for the Sacramento Valley (Monitoring Strategy) to implement portions of the Draft Recovery Plan (Service 1999). The Monitoring Strategy proposes to develop and implement a set of broad monitoring and research goals that will contribute to the recovery of giant garter snake populations in the Sacramento Valley. These monitoring and research activities include both short and long term studies to identify the distribution and population levels of giant garter snake across the Sacramento Valley and Mid-Valley Recovery Units.

Potential study sites identified include a variety of Federal and State lands, either managed by California Department of Fish and Game or as part of the Sacramento NWR complex. Public lands were identified to conduct the monitoring and research studies because they would be easily accessible over the 5 and 10-year study periods proposed; and neither DWR nor Reclamation are able to guarantee access to any of the private lands in the action area.

Giant Garter Snake Distribution and Abundance During or prior to the spring of 2010, DWR will initiate giant garter snake monitoring on a minimum of two sites within both the Sacramento Valley and Mid Valley Recovery Units. (10 years)

Baseline Surveys for the Giant Garter Snake in the Sacramento Valley. The goal of these surveys is to obtain baseline data of the occurrence and distribution of the giant garter snake

on rice land throughout the Sacramento Valley. This will be accomplished through trapping and visual surveys. (10 years)

Rice land Study. With the data from the first year of implementation and the resulting relationships that will be formed with landowners, the specific locations of a rice land idling study will be determined. Ideally, the study will be replicated at a minimum of two locations, one in the Sacramento Valley Recovery Unit and one in the Mid Valley Recovery Unit. (5 years)

Specific research goals of the Monitoring Strategy include:

1. Implement a radio telemetry study for a minimum of five years,
2. Quantify and evaluate the response (*e.g.*, movement patterns and survival) of giant garter snakes to changes in habitat conditions and landscape cropping patterns,
3. Quantify and evaluate the response of giant garter snakes to crop idling including a specific experimental design to evaluate different block sizes and landscape patterns,
4. Examine the relationship of giant garter snake habitat use in relation to habitat availability and surrounding land use using GIS technologies, and
5. Quantify giant garter snake survival and population fecundity (*e.g.*, number of immature to adults) in relation to changing environmental and habitat conditions and identify variables that may be important correlates of survival and fecundity,
6. Quantify minimum size of buffer zone between idled rice fields and suitable habitat, and
7. Provide recommendations for adaptive management of giant garter snakes with respect to water transfers.

ACTION AREA

The action area includes:

Upstream dams and reservoirs on the Sacramento, Feather, Yuba, American, and Merced Rivers where water may be acquired including: Lake Shasta (Sacramento River); Hell Hole, French Meadows, and Folsom Reservoirs (American River); Lake McClure (Merced River); Stony Gorge Reservoir (Sacramento) New Bullards Bar Reservoir (Yuba) Camp Far West Reservoir (Yuba); and Collins Lake (Yuba);

Water bodies downstream from the above reservoirs, including: Sacramento River; South Fork Feather River, Middle Fork Feather River (downstream from the South Fork), and the lower Feather River; Yuba River; Middle Fork American River, North Fork American River (downstream from the Middle Fork), and the lower American; Merced and San Joaquin Rivers;

The Sacramento-San Joaquin Delta; Portions of the CVP and the SWP systems; San Luis Reservoir; Two terminal DWR reservoirs in which the Metropolitan WD controls a portion of the storage: Perris and Castaic; Metropolitan WD facilities; and Santa Clara Valley WD facilities including Anderson Reservoir.

The following water users may participate in the DWB as potential water sellers:

CVP Contractors— Carter MWC (Colusa), Glenn-Colusa ID (Glenn and Colusa), Princeton-Codora-Glenn ID (Glenn and Colusa), Provident ID (Glenn and Colusa), Reclamation (via Orland Unit Water User's Association) (Glenn), Lewis Ranch (Colusa), Maxwell ID (Colusa), RD 108 (Colusa and Yolo), RD 1004 (Colusa), River Garden Farms (Yolo), Sacramento River Ranch (Yolo), Sycamore MWC (Colusa), Parrot Investment Company (Butte), Pinnacle Land Ventures, LLC (Broomieside Farms) (Sutter), Meridian Farms (Sutter), Pelger MWC (Sutter), Pleasant Grove-Verona MWC (Sutter), Natomas Central MWC (Sutter and Sacramento), Sutter MWC (Sutter), City of Sacramento (Sacramento).

Non-CVP Agencies— Amaral Ranch (Sutter), Butte WD (Butte and Sutter), Brown's Valley ID (Yuba), Garden Highway MWC (Sutter), Goose Club Farms (Sutter), Merced ID (Merced), Richvale ID (Butte), Sutter Extension WD (Sutter), South Sutter WD (Sutter and Placer), Plumas Mutual Water Company (Yuba), Placer County WA (Placer,), Sacramento Suburban WD (Sacramento), Upper Swanston Ranch (Yolo), and Western Canal WD (Butte and Glenn).

The following water users have committed to participate in the DWB as potential water buyers south of the Delta:

San Luis & Delta Mendota Water Authority— consisting of: Byron Bethany ID, Del Puerto WD, Eagle Field WD, James ID, Laguna WD, Mercy Springs WD, Oro Loma WD, Pacheco WD, Panoche WD, Patterson ID, RD 1606, San Benito County WD, Santa Clara Valley WD, Tranquility ID, West Side ID, West Stanislaus ID, Westlands WD, City of Avenal, City of Coalinga, City of Huron, Avenal State Prison, Broadview WD, and Banta Carbona ID.

Alameda County WD, Antelope Valley East Kern Water Authority (WA), Castaic Lake WA, Central Coast WA, Contra Costa WD, Desert WA, Dudley Ridge WD, East Bay Municipal Utility District, Kern County WA, Metropolitan WD of Southern California, Mojave WA, Oak Flat WD, Palmdale WD, San Bernardino Valley Municipal WD, San Diego County WA, Tulare Lake Basin Water Storage District, and Walnut Valley WD.

Upstream from the Delta Region: Bella Vista WD, Dunnigan WD, Tehama Colusa Canal Authority; City of Yuba City, and Napa County Flood Control and Water Conservation District.

The Central Valley is divided into four recovery units for the giant garter snake. These are (1) the Sacramento Valley Unit, extending from the vicinity of Red Bluff south to the confluence of the Sacramento and Feather Rivers; (2) the Mid-Valley Unit, extending from the American and Yolo Basins south to Duck Slough near the City of Stockton; (3) the San Joaquin Valley Unit, extending south of Duck Slough to the Kings River; and (4) the South Valley Unit, extending south of the Kings River to the Kern River Basin (FWS 1999). The action area includes all or part of each of these recovery units described in the Draft Recovery Plan.

Consolidated Place of Use. Many of the potential water buyers are located outside of the sellers' place of use authorized by the State Water Resources Control Board (SWRCB). DWR has petitioned the SWRCB for a consolidated place of use for the CVP and SWP service areas. The Governor of the State of California has declared a state of emergency regarding drought conditions, and has directed that the SWRCB shall expedite the processing and consideration of

the request by DWR for approval of a temporary revision to the consolidation of the places of use and points of diversion for the SWP and CVP to allow flexibility among the projects and to facilitate water transfers and exchanges for the 2009 DWB. It is anticipated that the SWRCB will approve a consolidated place of use for the CVP and SWP in order to facilitate these transfers.

Since the outcome of this petition may not be known for a few months, water from the DWB would be allocated in one of the following ways:

If the SWRCB approves the petition for a consolidated place of use for the CVP and SWP, then DWR would allocate DWB water to CVP and SWP users alike based solely on application of their needs criteria priorities, and thus the majority of the DWB water would be allocated to meet health and safety needs, as it is the top priority considered in DWR's needs criteria.

However, if the SWRCB does not approve the petition for a consolidated place of use for the CVP and SWP, then the amount of water acquired from CVP sellers would need to be allocated to CVP users and the amount of water acquired by SWP sellers would need to be allocated to SWP users. DWR would then apply their needs criteria priorities within these bounds.

In addition, CVP and SWP contractors who propose to transfer their settlement water supplies (senior water rights water) would be required to obtain individual approval from the SWRCB to change the place of use prior to transferring water to the DWB.

CONSULTATION HISTORY

July 2008 – The Governor of California requested emergency drought assistance under the Reclamation States Emergency Drought Relief Act of 1991 (Act), Public Law 102-250, as amended. The Commissioner of Reclamation determined that emergency drought assistance is merited.

September 12, 2008 – Meeting conducted between Reclamation, DWR, and FWS to discuss how to work together to consult on the DWB. Reclamation and DWR wanted to know if the Service could simply amend the BO issued for the Environmental Water Account (EWA) (FWS file number 1-1-03-F-0321) and have DWR issue CEQA documents to provide State coverage or for the State to adopt the EWA CEQA documents and Reclamation would use that process to cover their NEPA obligation. It was explained that neither of these options was viable because the EWA BO was for a set period and had expired in 2007; and that project purpose for the proposed DWB was to prove water for municipal and industrial or agricultural purposes and not for environmental benefits. Reclamation and DWR noted that the same group of water districts who had participated in the EWA program expressed an interest in participating in the DWB. FWS advised Reclamation and DWR that if the project parameters were generally the same as those consulted on in 2004 for the EWA, that the consultation for the DWB shouldn't be too complicated. It was also noted that there is no baseline information available for the giant garter snake from which to assess effects in areas that potentially could provide water for the DWB.

September 17, 2008 – DWR conducted a 'webinar' to determine level of interest in the potential water sellers and buyers for participating in a DWB. Potential participants expressed significant concerns about some of the Conservation Measures that were included in the 2004 Opinion (the 160-acre parcel size limitation; the 1-mile buffers around the Refuges and corridors between the Refuges; waterways serving as corridors; and other designated core areas).

October 8, 2008 – DWR submits a tentative draft Project Description to Reclamation and FWS.

September thru December 2008 – Bi-weekly meetings/teleconferences conducted between DWR, Reclamation, and FWS. The primary focus of these meetings were to develop and refine the project description and define a set of Conservation or Avoidance Measures that would be acceptable to potential participants in the DWB while still providing an acceptable level of protection for the species and to assist DWR in developing a long-term conservation strategy for the giant garter snake.

September thru December 2008 – DWR conducted periodic meetings with potential water sellers to negotiate the price to be paid for an acre foot of water and to define the criteria which would apply to the sale of water and to keep them informed on the progress being made on preparing the project description.

December 17, 2008 – DWR Files Addendum to the Environmental Water Account Environmental Impact Statement/Environmental Impact Report (See FWS file 1-1-03-F-0321).

January thru April 2009 – Frequent meetings/teleconferences were conducted between DWR, Reclamation, and FWS to continue to define the Project Description (location of potential sellers and quantities of water made available) and to refine Conservation or Avoidance Measures that would be included in the project and continue to assist DWR in developing a long-term conservation strategy for the giant garter snake.

February 27, 2009 – Governor Schwarzenegger proclaimed a State of Emergency for drought conditions.

March 9, 2009 – DWR Files Notice of Exemption under CEQA, adopting the Environmental Water Account Environmental Impact Statement/Environmental Impact Report (See FWS file 1-1-03-F-0321).

March 6, 2009 – Request for Initiation of Formal Consultation on the 2009 Drought Water Bank was received from Reclamation.

March 20, 2009 – DWR files a petition for a change to consolidate the State Water Project, the Central Valley Project, and the Friant Authorized Places of Use.

March 30, 2009 – Project Description Revisions/Clarifications on project description for the Formal Consultation on the 2009 Drought Water Bank received from Reclamation.

STATUS OF THE SPECIES

Giant Garter Snake

Listing. The Service published a proposal to list the giant garter snake as an endangered species on December 27, 1991 (Service 1991) (56 **FR** 67046). The Service reevaluated the status of the snake before adopting the final rule, which was listed as a threatened species on October 20, 1993 (Service 1993) (58 **FR** 54053). The period immediately preceding the listing included California's most recent multi-year statewide drought – 1987-1992.

Description. The giant garter snake is one of the largest garter snakes species reaching a total length of approximately 64 inches (162 centimeters). Females tend to be slightly longer and proportionately heavier than males. Generally, the snakes have a dark dorsal background color with pale dorsal and lateral stripes, although coloration and pattern prominence are geographically and individually variable (Hansen 1980; Rossman *et al.* 1996).

Historical and Current Range. Giant garter snakes formerly occurred throughout the wetlands that were extensive and widely distributed in the Sacramento and San Joaquin Valley floors of California (Fitch 1940; Hansen and Brode 1980; Rossman and Stewart 1987). The historical range of the snake is thought to have extended from the vicinity of Chico, Butte County, southward to Buena Vista Lake, near Bakersfield, in Kern County (Fitch 1940; Fox 1948; Hansen and Brode 1980; Rossman and Stewart 1987). Early collecting localities of the giant garter snake coincide with the distribution of large flood basins, particularly riparian marsh or slough habitats and associated tributary streams (Hansen and Brode 1980). Loss of habitat due to agricultural activities and flood control have extirpated the snake from the southern one third of its range in former wetlands associated with the historic Buena Vista, Tulare, and Kern lake beds (R. Hansen 1980; Hansen and Brode 1980).

Upon federal listing in 1993, the Service identified 13 separate populations of giant garter snakes, with each population representing a cluster of discrete locality records (Service 1993). These 13 populations largely coincide with historical flood basins and/or tributary streams throughout the Central Valley: (1) Butte Basin, (2) Colusa Basin, (3) Sutter Basin, (4) American Basin, (5) Yolo Basin/Willow Slough, (6) Yolo Basin/Liberty Farms, (7) Sacramento Basin, (8) Badger Creek/Willow Creek, (9) Caldoni Marsh/White Slough, (10) East Stockton—Diverting Canal & Duck Creek, (11) North and South Grasslands, (12) Mendota, and (13) Burrel/Lanare. Population clusters 1 through 4 above were associated with rice production areas, especially channels and canals that delivered or drained agricultural irrigation water. These populations were determined to be extant in 1993. Population clusters at Butte, Sutter, and Colusa Basins (1, 2, and 3) were determined to be not imminently threatened with extirpation. Populations 4 though 13 were determined to be threatened with extirpation. The area covered by these populations (4 though 13) included the San Joaquin Valley, portions of the eastern fringes of the Delta, and the southern Sacramento Valley; an area encompassing about 75 percent of the species' known geographic range (Service 1993).

The known range of the giant garter snake has changed little since the time of listing. The northern-most population of giant garter snakes was found 5 miles west of the city of Chico at

the Chico Water Pollution Control Plant in 2005 (Kelly 2007). At that time three snakes were located during random surveys, the species identification confirmed by Eric Hansen, and the snakes pit-tagged for future reference. The presence of this population was confirmed in the spring of 2008 during a herpetological survey conducted during the initial phases of a construction project at the Chico Water Pollution Control Plant (J. Galloway, Galloway Consulting, in litt. 2008). The southernmost known occurrence is at the Mendota Wildlife Area in Fresno County. No sightings of giant garter snakes south of Mendota Wildlife Area within the historic range of the species have been made since the time of listing (E. Hansen 2002).

Essential Habitat Components. Endemic to wetlands in the Sacramento and San Joaquin valleys, the giant garter snake inhabits marshes, sloughs, ponds, small lakes, low gradient streams, and other waterways and agricultural wetlands, such as irrigation and drainage canals, rice fields and the adjacent uplands (Service 1999). Essential habitat components consist of: (1) wetlands with adequate water during the snake's active season (early-spring through mid-fall) to provide food and cover; (2) emergent, herbaceous wetland vegetation, such as cattails and bulrushes, for escape cover and foraging habitat during the active season; (3) upland habitat with grassy banks and openings in waterside vegetation for basking; and (4) higher elevation uplands for over-wintering habitat with escape cover (vegetation, burrows) and underground refugia (crevices and small mammal burrows) (G.E. Hansen 1988). Summer aquatic habitat is essential because it supports the frogs, tadpoles, and small fish on which the giant garter snake preys. Rice and natural wetlands adjacent to the ditches and canals may serve as vital nursery habitat for young giant garter snakes and as "way stations" for snakes as they make their way through systems of ditches and canals. Females will often give birth in rice fields and the newly born snakes will feed on the small prey items that are prevalent in rice fields, but are rare or absent from other permanent aquatic habitat types E. (Hansen 2008, pers comm.). Snakes are typically absent from larger rivers and other bodies of water that support introduced populations of large, predatory fish, and from wetlands with sand, gravel, or rock substrates (G.E. Hansen 1988; Hansen and Brode 1980; Rossman and Stewart 1987). Riparian woodlands do not provide suitable habitat because of excessive shade, lack of basking sites, and absence of prey populations (G.E. Hansen 1988). Giant garter snakes require water during the active phase of their life cycle in the summer (Paquin *et al.* 2006).

Foraging Ecology. Giant garter snakes are the most aquatic garter snake species and are active foragers, feeding primarily on aquatic prey such as fish and amphibians such as Pacific chorus frogs (*Pseudacris regilla*) (Fitch 1941). As long as there are abundant prey species present, giant garter snakes share wetland areas communally, and only extend into other areas when the prey base declines (E. Hansen 2008, pers comm.). Because the giant garter snakes historic prey species are either declining, extirpated, or extinct, the predominant food items are now introduced species such as carp (*Cyprinus carpio*), mosquito-fish (*Gambusia affinis*), larval and sub-adult bullfrogs (*Rana catesbiana*) (Fitch 1941; G.E. Hansen 1988; Hansen and Brode 1980, 1993; Rossman *et al.* 1996).

Reproductive Ecology. The giant garter snake breeding season begins in March and April, and females give birth to live young from late July through early September (Hansen and Hansen 1990). For giant garter snake the breeding season for the giant garter snake begins soon after

emergence from overwintering sites and extends from March into May, and resumes briefly during September (G. Hansen pers. comm. 1998). Males immediately begin searching for mates after emerging (G. Hansen pers. comm. 1991). Females brood young internally, and typically give birth to live young from late July through early September (Hansen and Hansen 1990). Young immediately scatter into dense cover and absorb their yolk sacs, after which they begin feeding on their own (FWS 1993).Although growth rates are variable, young typically more than double in size by one year of age, and sexual maturity averages three years in males and five years for females (Service 1993).

Movements and Habitat Use. 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.* 1995; 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). Giant garter snakes are some what 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, USGS-WERC has 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 (Wylie *et al.* 1997).

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 to use up to more than 8 miles (12.9 kilometers) of linear aquatic habitat over the course of a few months. Home range (area of daily activity) averages about 0.1 mile^2 (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 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). It is believed that maintaining water in the restored wetlands and nearby habitat provided sufficient conditions to meet the biological requirements of the giant garter 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 giant garter snakes (Wylie *et al.* 2000a).

Recent studies provide limited information on the use of agricultural wetlands by giant garter snakes. Wylie *et al.* (1997) found that giant garter snake densities were highest, and average home range was smallest, in permanent wetlands (Badger Creek, Sacramento County) compared to agricultural wetlands (Gilsizer Slough, Sutter County) or managed marshes (Colusa National Wildlife Refuge, Colusa County). However, Wylie *et al.* (2000) reported that in wetlands managed specifically to benefit giant garter snakes, home range estimates were smaller than for those areas lacking comparable management (wetlands managed for waterfowl). Wylie (1998) also documented 14 captures and recaptures of giant garter snakes using natural channels or sloughs in the Grasslands Wetlands Wildlife Area, Merced County, compared to four captures

and recaptures of snakes using irrigation canals. These observations may indicate that the giant garter snakes may concentrate in the best habitat when all other surrounding habitat has been eliminated or highly degraded. It also may indicate that habitat in agricultural wetlands and some managed marshes are meeting some of their biological needs, but not to the fullest extent possible.

As noted in Draft Recovery Plan (Service 1999), giant garter snakes use rice lands extensively and depend on them for habitat. Giant garter snake seasonal activity associated with rice cultivation occurs as follows:

> **Spring**: Rice is planted and the fields are flooded with several inches of water. Rice fields that contain prey species such as small fish or frogs attract giant garter snakes.
>
> **Summer**: While the rice grows, garter snakes continue to use rice fields as long as their prey is present in sufficient densities.
>
> **Late Summer/Fall**: The water is drained from the rice fields and garter snakes move off the fields to other adjacent habitats. Rice is harvested at this time and female garter snakes have just borne young and need food to regain their body weight. In August and September the snakes can get a good supply of food from the rice lands because prey animals are concentrated in the rice drains. The dry-down of the rice fields in fall is thought to be important because prey, which have been proliferating, are concentrated in the remaining pockets of standing water where snakes can gorge prior to the period of winter inactivity.
>
> **Winter**: Giant garter snakes are dormant in the winter and rice fields are fallow.

Giant garter snakes require water during the active phase of their life cycle in the summer; and this summer aquatic habitat is essential because it supports the frogs, tadpoles, and small fish on which the giant garter snake preys (Paquin *et al.* 2006). Rice fields have become important habitat for giant garter snakes, particularly associated canals and their banks for both spring and summer active behavior and winter hibernation (Hansen 2004; Wylie 1998). While within the rice fields, snakes forage in the shallow water for prey, using rice plants and vegetated berms dividing rice checks for shelter and basking sites (Hansen and Brode 1993). If there is a shallow warm water wetland available to a gravid female as the time for birth approaches, she will move into that area to give birth. These shallow wetland areas (either a natural area or a rice field) are very productive during the July – August timeframe when the young of the year are born (E. Hansen 2008 pers. comm.). The presence of persistent shallow summer wetlands are vital for the survival of neo-nates to juvenile and adult (E. Hansen 2008 pers. comm.) because these wetlands provide ideal forage in the very productive water column and shelter areas in the dense vegetation present.

In the Natomas Basin, habitat used consisted almost entirely of irrigation ditches and established rice fields (Wylie 1998; Wylie *et al.* 2004b), while in the Colusa NWR, snakes were regularly found on or near edges of wetlands and ditches with vegetative cover (Wylie *et al.* 2003a).

Telemetry studies also indicate that active snakes use uplands extensively, particularly where (wetland) vegetative cover exceeds 50 percent in the area (Wylie 1998).

Reasons for Decline and Threats to Survival. The current distribution and abundance of the giant garter snake is much reduced from former times (Service 1999). Prior to reclamation activities beginning in the mid- to late-1800s, about 60 percent of the Sacramento Valley was subject to seasonal overflow flooding providing expansive areas of snake habitat (Hinds 1952). Now, less than 10 percent, or approximately 319,000 acres (129,000 hectares), of the historic 4.5 million acres (1.8 million hectares) of Central Valley wetlands remain (U.S. Department of Interior 1994), of which very little provides habitat suitable for the giant garter snake. Loss of habitat due to agricultural activities and flood control have extirpated the snake from the southern one-third of its range in former wetlands associated with the historic Buena Vista, Tulare, and Kern lakebeds (R.W. Hansen 1980; Hansen and Brode 1980).

Valley floor wetlands are now subject to cumulative effects of upstream watershed modifications, water storage and diversion projects, as well as urban and agricultural development. The Central Valley Project (CVP), the largest water management system in California, created an ecosystem altered to such an extent that remaining wetlands depend on highly managed water regimes (U.S. Department of Interior 1994). Further, the implementation of CVP has resulted in conversion of native habitats to agriculture, and has facilitated urban development through the Central Valley (Service 1999). For instance, on-going residential and commercial growth with the Central Valley between 1990 and 2004 is consuming an estimated 10,646 acres of Central Valley farmland each year (American Farmland Trust 2007), with an estimated additional loss of 821,046 acres by the year 2050 (American Farmland Trust 2007). Environmental impacts associated with urbanization include loss of biodiversity and habitat, alteration of natural fire regimes, fragmentation of habitat from road construction, and degradation due to pollutants. Further, encroaching urbanization can inhibit rice cultivation (J. Roberts pers. comm. 2006). Rapidly expanding cities within the snake's range include Chico, Marysville, Yuba City, Galt, Stockton, Gustine, Los Banos and the cities of the Sacramento metropolitan area.

The primary threats to the giant garter snake continue to be habitat loss and degradation. For example, the American Farmland Trust (2007) projects a loss of more than one million acres of Central Valley farmland to urbanization by the year 2040 if current rate of change in land use continue. This farmland subject to development includes land that is presently cultivated in rice. The relatively abundant populations of giant garter snake in the Sacramento Valley may reflect the expansion of available habitat that is provided from rice cultivation. Dependence of the Sacramento Valley populations on agricultural croplands leaves the giant garter snake vulnerable to wide-scale habitat loss in the event of changes in agricultural management such as a change in crops or fallowing large areas of rice fields (Paquin *et al.* 2006) or encroaching urbanization, which may inhibit rice cultivation (J. Roberts pers. comm. 2008). Giant garter snakes found in rice fields or agricultural canals are threatened by conversion of rice crops to non-agricultural land uses and other crops such as grape-producing vineyards, fruit or nut producing orchards, or annual row crops (e.g., wheat or cotton). Unlike flood irrigated rice fields, other agricultural cropping systems do not hold sufficient water for long enough time periods to create artificial,

temporary wetlands. Giant garter snakes in the San Joaquin Valley are threatened by a lack of summer surface water in wetlands and fields, and the age structure of populations in this part of the range seems to be senescing (skewed toward older individuals), because summer water is especially important for young snakes to survive and grow (E. Hansen pers. comm 2008).

Ongoing maintenance of aquatic habitats for flood control and agricultural purposes eliminates or prevents the establishment of habitat characteristics required by snakes (G. Hansen 1988). Such practices can fragment and isolate available habitat, prevent dispersal of snakes among habitat units, and adversely affect the availability of habitat required to produce the snake's food items (G. Hansen 1988; Brode and Hansen 1992). For example, tilling, grading, harvesting and mowing may kill or injure giant garter snakes (Wylie *et al.* 1997). Biocides applied to control aquatic vegetation reduce cover for the snake and may harm prey species (Wylie *et al.* 1995). Rodent control threatens the snake's upland estivation habitat (Wylie *et al.* 1995; Wylie *et al.* 2004a). Restriction of suitable habitat to water canals bordered by roadways and levee tops renders snakes vulnerable to vehicular mortality (Wylie *et al.* 1997). Rolled erosion control products, which are frequently used as temporary berms to control and collect soil eroding from construction sites, can entangle and kill snakes (Stuart *et al.* 2001; Barton and Kinkead 2005). Livestock grazing along the edges of water sources degrades water quality and can contribute to the elimination and reduction of available quality snake habitat (G. Hansen 1988; E. Hansen pers. comm. 2008), and giant garter snakes have been observed to avoid areas that are grazed by cattle (E. Hansen 2003). Fluctuation in rice and agricultural production affects stability and availability of habitat (Paquin *et al.* 2006; Wylie and Casazza 2001; Wylie *et al.* 2003b, 2004b).

Other land use practices also currently threaten the survival of the snake. Recreational activities, such as fishing, may disturb snakes and disrupt thermoregulation and foraging activities (E. Hansen pers. comm. 2008). While large areas of seemingly suitable snake habitat exist in the form of duck clubs and waterfowl management areas, water management of these areas typically does not provide the summer water needed by the species (Beam and Menges 1997; Dickert 2005; Paquin *et al.* 2006).

Nonnative predators, including introduced predatory game fish, bullfrogs, and domestic cats, can threaten snake populations (Dickert 2003; G. Hansen 1986; Service 1993; Wylie *et al.* 1995; Wylie *et al.* 2003c). Nonnative competitors, such as the introduced water snake (*Nerodia fasciata*) in the American River and associated tributaries near Folsom, may also threaten the giant garter snake (Stitt *et al.* 2005). Giant garter snake appear absent from features supporting permanent populations of these species (Service 2006). Observations made during fish kills and episodic drying of ditches and canals throughout the study area (E. Hansen 2008b) suggests that the composition and population structure of potential predatory fishes in the San Joaquin Valley differ from those noted in the rice growing regions of the Sacramento Valley. Striped bass frequently exceeding 3-5 pounds were common to all permanent ditches and drains observed throughout the San Joaquin Valley study area (E. Hansen 2008b). In addition to striped bass, channel catfish and black basses from 2-8 pounds were not uncommon (E. Hansen 2008b). Striped bass are not observed where giant garter snakes persist in rice growing regions (E. Hansen 2005).

In rice growing regions, irrigation systems are dried down at the end of each growing season, preventing predatory fish from becoming large enough to consume giant garter snake. Because much of the water conveyance infrastructure in San Joaquin Valley is also used to divert tile and surface drainage and to provide water for overwintering waterfowl, the water in San Joaquin Valley is more permanent. Subsequently, unlike their counterparts in rice growing regions, predatory fishes in San Joaquin Valley likely grow through multiple seasons and attain larger sizes. Because much of the available wetlands in San Joaquin Valley are drained for moist soil management during the giant garter snake active season, giant garter snake are likely forced to inhabit the permanent drainages and waterways that form the foundation of the irrigation system, perhaps exposing themselves to elevated rates of predation by these larger fish (E. Hansen 2008b).

The disappearance of giant garter snakes from much of the west side of the San Joaquin Valley was approximately contemporaneous with the expansion of subsurface drainage systems in this area, providing circumstantial evidence that the resulting contamination of ditches and sloughs with drainwater constituents (principally selenium) may have contributed to the demise of giant garter snake populations. Dietary uptake is the principle route of toxic exposure to selenium in wildlife, including giant garter snakes (Beckon *et al.* 2003). Many open ditches in the northern San Joaquin Valley carry subsurface drainwater with elevated concentrations of selenium, and green sunfish (*Lepomis cyanellus*) have been found to have concentrations of selenium within the range of concentrations associated with adverse affects on predator aquatic reptiles (Hopkins *et al.* 2002; Saiki 1998). Studies on the effects of selenium on snakes suggest that snakes with high selenium loads in their internal organs can transfer potentially toxic quantities of selenium to their eggs garter snake (Hopkins *et al.* 2004) and also demonstrate higher rates of metabolic activity than uncontaminated snakes (Hopkins *et al.* 1999).

Status with Respect to Recovery. The draft recovery plan for the giant garter snake subdivides its range into four proposed recovery units (Service 1999): (1) Sacramento Valley Recovery Unit; (2) Mid-Valley Recovery Unit; (3) San Joaquin Valley Recovery Unit; and (4) South Valley Recovery Unit.

The Sacramento Valley Unit at the northern end of the species' range contains sub-populations in the Butte Basin, Colusa Basin, and Sutter Basin (Service 1999; Service 2006). Protected snake habitat is located on State refuges and refuges of the Sacramento National Wildlife Refuge (NWR) Complex in the Colusa and Sutter Basins. Suitable snake habitat is also found in low gradient streams and along waterways associated with rice farming. This northernmost recovery unit is known to support relatively large, stable sub-populations of giant garter snakes (Wylie *et al* 1995; Wylie *et al.* 1997; Wylie *et al.* 2002; Wylie *et al.* 2003a; Wylie *et al.* 2004a). Habitat corridors connecting subpopulations, however, are either not present or not protected, and are threatened by urban and agricultural encroachment; or changes in cropping patterns.

Studies by USGS-WERC are underway at the Colusa NWR and in the Colusa Basin Drainage Canal (Wylie 2000, 2003; Wylie and Martin 2004; Wylie *et al.* 1997; Wylie *et al.* 2002; Wylie *et al.* 2003a, 2004a). Density estimates range from 58 to 152 snakes per mile (36 to 95 snakes per kilometer) depending on the trapping location (Wylie *et al.* 2004a). The size distributions found

in the Colusa NWR continue to reflect a healthy population of giant garter snakes with successful recruitment of young (Wylie *et al.* 2004a). The Colusa NWR represents a stable, relatively protected sub-population of snakes within the Colusa Basin. Outside of protected areas, however, snakes in these Basin clusters are still subject to all threats identified in the final rule, including habitat loss due to development, maintenance of water channels, and secondary effects of urbanization. As reported in the Five Year Review (Service 2006), the abundance and distribution of giant garter snakes have not changed significantly since the time of listing. 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. Further, the available information indicates a tenuous connection between sub-populations clustered at the northern and the southern end of the Basin.

Stony, Logan, Hunters, and Lurline Creeks, as well as the Colusa Drain, and Glenn-Colusa, Tehama-Colusa, and Colusa Basin Drainage Canals, Little Butte Creek between Llano Seco (NWR unit) and Upper Butte Basin WA; and Butte Creek between Upper Butte Basin and Gray Lodge WA; Lands adjacent to Butte Creek, Colusa Drainage Canal, Gilsizer Slough, the land side of the Toe Drain along the Sutter Bypass, Willow Slough and Willow Slough Bypass in Yolo County, and associated wetlands, are important as snake habitat and movement corridors for the animal. These waterways and associated wetlands provide vital permanent aquatic and upland habitat for snakes in areas with otherwise limited habitat.

The Mid-Valley Unit includes sub-populations in the American, Yolo, and Delta Basins (Service 1999; Service 2006). The status of Mid-Valley sub-populations is very uncertain; each is small, highly fragmented, and located on isolated patches of limited quality habitat that is increasingly threatened by urbanization (E. Hansen 2002, 2004; Service 1993; Wylie 2003; Wylie and Martin 2004; Wylie *et al.* 2004b; Wylie *et al.* 2005; G. Wylie pers. comm. 2005).

The San Joaquin Valley Unit, which includes sub-populations in the San Joaquin Basin, formerly supported large snake populations, but numbers have severely declined, and recent survey efforts indicate numbers are extremely low compared to Sacramento Valley sub-populations (Dickert 2002, 2003; G. Hansen 1988; Williams and Wunderlich 2003; Wylie 1998). Giant garter snakes currently occur in the northern and central San Joaquin Basin within the Grassland Wetlands of Merced County and the Mendota Wildlife Area of Fresno County; however, these sub-populations remain small, fragmented, and unstable, and are probably decreasing (Dickert 2003, 2005; G. Wylie pers. comm., 2006).

The South Valley Unit included sub-populations in the Tulare Basin, however, agricultural and flood control activities are presumed to have extirpated the snake from the Tulare Basin (G. Hansen 1995). Comprehensive surveys for this area are lacking and where habitat remains, the giant garter snake may be present. Currently, there are no habitat conservation banks in the San Joaquin Valley.

The draft recovery criteria require multiple, stable sub-populations within each of the recovery units, with sub-populations well-connected by corridors of suitable habitat. This entails that corridors of suitable habitat between existing snake sub-populations be maintained or created to

enhance sub-population interchange to offset threats to the species (Service 1999). Currently, only the Sacramento Valley Recovery Unit is known to support relatively large, stable giant garter snake populations.

It is important to note that habitat corridors connecting sub-populations, even in the Sacramento Valley Recovery Unit, are either not present or not protected. Overall, the future availability of habitat in the form of canals, ditches, and flooded fields are subject to market-driven crop choices, agricultural practices, and urban development, and are, thus, uncertain and unpredictable.

ENVIRONMENTAL BASELINE

The environmental baseline is an analysis of past and ongoing human and natural factors leading to the current status of the species, and critical habitat within the action area. The baseline includes State, tribal, local, and private actions already affecting the species or that will occur at the same time as this consultation. The ongoing actions associated with the long-term renewal of the CVP water contracts for the Sacramento River Division, the Shasta Division, the Trinity River Division, and the Sacramento River Settlement Contractors are considered in the baseline. The action area includes the entire range of the giant garter snake. However, the adverse effects to the snake result from rice land fallowing in the Sacramento Valley to provide water to the DWB; we do not anticipate that the delivery of DWB water south of the delta will adversely affect the giant garter snake sub-populations found in the San Joaquin Valley. The action area of the proposed action is quite large and includes the entire range of the giant garter snake. However, the adverse effects of the DWB occur in the Sacramento Valley in the Colusa Basin, Sutter Basin, Butte Basin, Yolo Basin, and American Basin subpopulations of the giant garter snake as a result of rice fallowing and crop substitution to provide water to the DWB. We do not expect adverse effects to giant garter snake sub-populations south of the delta. The environmental baseline will therefore focus on the status of the giant garter snake in the Sacramento Valley, and its importance to the survival and recovery of the species, even though south of delta sub-populations are also within the action area.

Since 1995, USGS-WERC has studied snake sub-populations at the Sacramento, Delevan, and Colusa NWR's and in the Colusa Basin Drain within the Colusa Basin; at Gilsizer Slough within the Sutter Basin, at the Badger Creek area of the Cosumnes River Preserve within the Badger Creek/Willow Creek area of the Delta Basin, and in the Natomas Basin within the American Basin (E. Hansen 2003, 2004; Wylie 1998, 2003; Wylie *et al.* 1995; Wylie *et al.* 2002; Wylie *et al.* 2003a, 2004a; Wylie *et al.* 2003b, 2004b). These protected and managed areas contain the largest extant giant garter snake sub-populations.

Outside of protected areas, however, garter snakes are still subject to all of the threats identified in the final rule to one degree or another. The other sub-populations are distributed discontinuously in small, isolated patches, and are vulnerable to extirpation by stochastic environmental, demographic, and genetic processes (Goodman 1987).

The Sacramento Valley is generally rural in nature, with expanses of agricultural lands surrounding small towns. The lands within the action area that are going to be affected by the

crop idling or groundwater substitution is normally maintained as agricultural fields with irrigation and drainage canals between the fields. The primary crops grown include rice (including white, wild and organic rice), with a mix of row or grain crops and orchards in the higher elevations. The canals have narrow growths of tules or similar types of wetland plants, and there is a narrow band of riparian vegetation (willow and small cottonwood) adjacent to the flood control levees toe drains inside the Sutter and Yolo Bypass. In the Sacramento Valley, rice fields and the associated waterways make up the majority of the habitat available for the giant garter snake. Within the Sacramento Valley, canals and irrigation waterways not associated with rice or wetlands typically do not support giant garter snakes. The snake is also found in native and restored wetlands on State and Federal lands, but these wetland habitats are not distributed evenly across the Sacramento Valley landscape.

Many areas within the Sacramento Valley contain little protected wetland habitat. For example, the southern end of the Colusa Basin, the Sutter Basin, and the American Basin including the Natomas Basin and southern American Basin between the Bear River and Natomas Cross Canal have no or few Federal or state refuges and wildlife areas. In these areas, giant garter snakes are entirely dependant on rice agriculture and its associated waterways for their survival and do not have core wetland habitat areas to buffer against the effects of fluctuations in rice production. The Natomas Basin Conservancy has created approximately 3,130 acres of managed marsh habitat and protected rice habitat in the Natomas Basin as mitigation under the Natomas Basin Habitat Conservation Plan (John Roberts 2008, pers comm.). (Total acreage of Federal and state lands known to support giant garter snakes within Butte, Colusa, Sutter, and American Basins = 44,184; includes Sacramento, Colusa, Delevan, Sutter, and Butte Sink NWR's, Upper Butte Basin WA, Graylodge WA, Gilsizer Slough CE)

The giant garter snake currently occupies these remnant native marshes and sloughs, restored wetlands, low gradient streams, and agricultural wetlands including irrigation and drainage canals, and rice fields and the adjacent upland habitats. The loss of wetland ecosystems and suitable habitat has resulted in the use by the giant garter snake of highly modified and degraded habitats. Located among cultivated farm lands, these areas include irrigation ditches, drainage canals, rice fields, and their adjacent uplands (Service 1999). As described above, there are known populations of giant garter snake found on the Federal and State refuge or preserve areas in the Sacramento Valley, and it has been documented that garter snake are also know to be present in rice fields (Service 1999). Some recent studies have concluded that giant garter 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 1999). Giant garter snakes have been captured in ditches with apparent poor habitat and lack of vegetative cover, but were immediately adjacent to and presumably benefitted from nearby rice fields (Wylie *et al.* 2002b). Snakes in canals are subject to predation at a slightly greater level due to the fact that wetlands and rice fields have such dense cover that escape from most predators is quite easy. Neo-nates and juveniles are safer in rice fields than in canals because of the density of the cover provided by the vegetation, and the lack of the edge effect found in canals. The neo-nates will remain in the shallow wetland feeding on tadpoles, invertebrates, and very small mosquitofish until the rice field is drawn down or until it is time to hibernate in the

fall. The presence of a shallow wetland is vital for the survival of the neo-nates to adulthood (Wylie 2008 pers comm.)

Fallowing rice lands as part of forbearance or water transfer program was proposed in 2001, 2003, 2005, and 2008. It is not known how much of the water actually was delivered to users south of the delta. Data regarding fallowed rice acreage within the western portion of the Sacramento Valley in 2001, 2003, and 2005 there were 13,899 acres, 29,985 acres (Service files 1-1-03-I-1079 and 1386), and 18,181 acres (Service file 1-1-05-I-0941) fallowed respectively for prior transfer program purposes. During 2008, Conaway Preservation Group transferred 22,552 acre-feet of CVP water to the San Luis and Delta Mendota Water Authority which resulted in the fallowing of 3,500 acres of rice land (Service file 81420-2008-F-1596-1). During 2008, the following non-federal districts located in Butte County transferred up to 61,172 acre-feet of water fallowing approximately 18,537 acres of rice land: Richvale ID, Biggs garter snake West Gridley WD, Butte WD, Sutter Extension WD, and Western Canal WD (these transfers were not consulted on with the Service). During the time that the Environmental Water Account was in effect (2001 – 2007), an average of 192,640 acre feet of water was purchased for the various environmental purposes (primarily fisheries related) being served by the EWA, although none of this water was obtained by idling rice fields.

Colusa Basin Sub-population. The action area includes the Colusa Basin snake sub-population, in the Sacramento Valley Recovery Unit as defined in the draft Giant Garter Snake Recovery Plan (U.S. Fish and Wildlife Service (Service) 1999). Twenty-nine California Natural Diversity Database (CNDDB, 2007) records are known from the Colusa Basin. These records include the Delevan NWR, Glenn-Colusa Canal, Colusa Drain, several tributary streams between the towns of Williams and Maxwell, and other locations within the Basin.

Within the Colusa Basin, the U.S. Geological Survey (USGS) has conducted trapping surveys of giant garter snakes at the Sacramento NWR Complex (Wylie *et al.* 1997b, 2000, 2002b). Wylie, in conjunction with Refuge staff, observed giant garter snakes at each of the Federal wildlife refuges (Colusa, Delevan, and Sacramento) that comprise the Sacramento NWR complex. Wylie *et al.* (2000a, 2002a) located 81 and 102 giant garter snakes, respectively, in the years 2000 and 2001 within the Colusa National Wildlife Refuge. It is likely that giant garter snakes occur outside of Refuge lands in the adjacent rice production areas.

Studies by USGS - Western Ecological Center (WERC) (formerly Biological Resources Division) are underway at the Colusa NWR and in the Colusa Basin Drainage Canal (Wylie 2000, 2003; Wylie and Martin 2004; Wylie *et al.* 1997; Wylie *et al.* 2002; Wylie *et al.* 2003a, 2004a; 2005). Density estimates range from 58 to 152 snakes per mile (36 to 95 snakes per kilometer) depending on the trapping location (Wylie *et al.* 2004a) and in 2005, the population estimate in Colusa NWR ranged from 97 snakes per kilometer in the Glenn-Colusa Canal to 126 snakes per kilometer in the T24.11 cells; and in 2005, the population estimate in Sacramento NWR at Logan Creek was 31 snakes per kilometer (Wylie *et al* 2005). The size distributions found in the Colusa NWR continue to reflect a healthy population of giant garter snakes with successful recruitment of young (Wylie *et al.* 2004a, 2005). Results of a study conducted in 2005 to identify key snake habitats and use areas on the Sacramento NWR complex indicate the

presence of snake populations at Delevan NWR (9 individuals captured); Sacramento NWR (45 individuals captured) and Colusa NWR (75 individuals captured). At Colusa NWR, 35 of the snakes were captured in previous years; which indicates to Wylie that giant garter snakes are increasing their use of the restored wetlands (Tract 24). At Sacramento NWR, the captures and recaptures occurred throughout the refuge indicating that this unit provides valuable habitat for the snake (Wylie *et al.* 2005). The Colusa NWR represents a stable, relatively protected sub-population of snakes within the Colusa Basin.

Outside of protected areas, however, snakes in the Colusa Basin clusters are still subject to all threats identified in the final rule, including habitat loss due to development, fluctuations in the number of acres in rice production, maintenance of water channels, and secondary effects of urbanization. Restored areas that provided summer water were more effective in meeting the habitat needs of the snake in the 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 forage on frogs, tadpoles and fish. Most of the radio-marked snakes were capture along the waters edge of the wetlands (Wylie *et al* 2005). USGS-WERC also concluded that reduced movements indicated that giant garter snakes were less exposed to mortality factors such as predators and vehicles. (Service 1999, Wylie and Casazza 2000, Wylie et al 2002)

The 2005 Monitoring Report for the Colusa NWR (Wylie *et al* 2005) concluded that, "The management of the Colusa Refuge for giant garter 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."

Stony, Logan, Hunters, and Lurline Creeks, as well as the Colusa Drain, and Glenn-Colusa, Tehama-Colusa, and Colusa Basin Drainage Canals, and associated wetlands, are important as snake habitat and movement corridors for giant garter snake. These waterways and associated wetlands provide vital permanent aquatic and upland habitat for snakes in areas with otherwise limited habitat (Wylie *et al.* 2005).

A habitat conservation bank has been established east of Williams in Colusa County in part for the purpose of selling giant garter snake credits to developers or others who need to compensate for environmental impacts to the species from their projects. Dolan Ranch, a 251-acre ranch in Colusa County, has sold all of their giant garter snake credits, ensuring that the habitat on the site is managed for the benefit of the species and protected in perpetuity. Although the giant garter snake has not yet been observed on the bank, known occurrences of the snake are located within five miles of Dolan Ranch Conservation Bank. Other giant garter snake habitat has also been preserved, created, or restored in the action area as a result of section 7 consultations between the Service and other Federal agencies.

Sutter and Butte Basin Sub-populations. The action area includes the Sutter and Butte Basin sub-populations in the Sacramento Valley Recovery Unit (Service 1999). In 1996, Wylie *et al.* (1997b) surveyed rice fields in the Butte Basin near Butte Sink (Butte County) but failed to find giant garter snakes. Though the Butte Basin has not been comprehensively surveyed, giant garter snakes have been reported from the State Gray Lodge Waterfowl Management Area and other locations. Three occurrences of the snake have been reported in the vicinity of the City of Chico in Butte County (E. Hansen pers. comm. 2006, D. Kelly pers. comm. 2006, Galloway 2008). The northernmost sighting extends the extant range of the species to the north by approximately 9.5 miles. Giant garter snake occurrences were documented in the wetlands and canals within the Sutter Basin in the 1990's and in 2005, in portions of Gilsizer Slough, Sutter County (Wylie *et al.* 1997b, CNDDB 2007). Within the Sutter Basin, portions of Gilsizer Slough, Sutter County were surveyed by walking the canal and ditch banks and were captured either by hand or using floating minnow traps in both 1995 and 1996. Approximately 145 giant garter snake occurrences were documented in rice fields, wetlands, and canals during both years (Wylie *et al.* 1997b). In addition, the Service has authorized the establishment of the 397 acre Sutter Basin Conservation Bank southwest of Yuba City in Sutter County.

USGS-WERC has conducted studies at Gilsizer Slough, surrounding lands, and associated irrigation canals (Wylie *et al.* 1995; Wylie *et al.* 1997). Giant garter snakes were shown to use canal, marsh, and rice habitat (Wylie *et al.* 1995; Wylie *et al.* 1997). Giant garter snakes were particularly associated with irrigated canals that had thickly vegetated slopes. Fifty-five percent of telemetered giant garter snakes used rice fields at some time (Wylie *et al.* 1997). Because of few recaptures and no clearly defined capture/recapture events, estimation of total numbers of giant garter snakes in the Gilsizer area was not possible; however, USGS-WERC speculates that numbers may be in the hundreds. Much of the Gilsizer Slough area is protected by the State. Also, 162 acres (66 hectares) of the Slough is protected as a result of mitigation for the Wild Goose Gas Pipeline and State Route 70-Algodon Road Interchange projects.

Yolo Basin Sub-population. The action area includes the Yolo Basin sub-population in the Mid-Valley Recovery Unit (Service 1999). Thirty-three CNDDB (2007) records for giant garter snake are known from within eight miles of the action area. However, 28 of these records are from the Natomas Basin, which is separated from the Yolo Basin by the Sacramento River and serves to isolate the populations. The five remaining records are located inside the DWB footprint.

We do not have a clear understanding of the baseline population for giant garter snake within the Yolo Basin. Giant garter snake are known to be present in the action area; however their distribution within the landscape is unknown at this time since the available habitat is not uniformly distributed throughout DWB; they may be evenly distributed throughout the suitable habitat (rice fields) or they may be limited to the areas closest to publicly controlled lands such as the Sacramento NWR complex, Gray Lodge Waterfowl Management Area, and the Yolo Wildlife Area.

The status of giant garter snake in the Yolo Basin is not well known because no surveys have been conducted to determine the extent of the population. CNDDB records are in areas that are located along public roadways or other areas open to the public. As a result of this limited access

to potential garter snake habitat, there is very limited information available concerning population levels of garter snake within the Yolo Basin. These records indicate that giant garter snakes are present inside the Conaway Ranch, which is located south of Woodland and east of Davis, but the level and distribution of that population is not known.

As an active floodway, the Yolo Bypass' dynamic hydrology may also play a role in population structure. Genetic analyses of tissue samples collected from giant garter snakes in the Yolo Wildlife Area and adjacent rice lands during these surveys are ongoing. Engstrom (2007) reports that the Yolo Basin sub-population is genetically very similar to those of the Natomas and Middle American Basins, but that genetic diversity within the Yolo Basin is lacking, which is typical of recently colonized populations. Populations identified as being recently colonized may have been present for more than 200-years (Eric Hansen pers comm. July 2008) However, there appears to be very little gene flow between the Yolo, Natomas, and Middle American Basins, and ongoing migration into the Yolo Basin is not significant.

During the past three years surveys conducted (Eric Hansen, February 2008 letter to David Kelly of the Service) in the canals and wetlands along and within the western edge of the Yolo Bypass south of Conaway Ranch (Figures 4 and 5) have documented the presence of giant garter snake. The results of these surveys have not yet been entered into the CNDDB. The surveys were conducted in the Yolo Wildlife Area (south of Interstate 80); in the rice lands immediately west of the Yolo Bypass (south of Interstate 80); in the Willow Slough Bypass south of the Davis Wastewater Treatment Plant; the wetlands and perimeter ditches at the Davis Wetlands complex southeast of the Davis Wastewater Treatment Plant; and the ditches and ponds on a private parcel (Smith Farms) adjacent to the Pope Ranch Mitigation Bank, west of the Sacramento River Deep Water Ship Channel (E. Hansen February 2008, letter to David Kelly of the Service).

Fifty-one individual giant garter snakes – 32 females and 19 males – were captured comprising 59 total capture events; six snakes were captured more than once. The majority of individuals (n=36) were captured within the Davis Wetlands complex (29 in the wetlands and seven in the perimeter ditches); these are the first observations of giant garter snakes recorded at this location. The remainder of individuals were captured within the Yolo Wildlife Area (n=5) and within the adjacent rice lands (n=10). No giant garter snakes were captured or observed within the Willow Slough Bypass or at Smith Farms.

Hansen (2008) noted that like in previous years, captures at the Yolo Wildlife Area and adjacent rice lands were concentrated downstream from the Willow Slough Bypass and south of Interstate 80 (I-80) along and in proximity to the drains at the east and west toes of the Yolo Bypass west levee. The number of individuals captured in this area decreased significantly from both 2005 (n=41) and 2006 (n=31). Of the 15 individuals captured there in 2007, six were recaptures originally marked in previous years (three each from 2005 and 2006). As was the case in 2006, a higher proportion of snakes was captured in the rice lands on the west side of the levee (n=10) than along the toe drain and associated laterals and wetlands within the Yolo Bypass (n=5).

Of the five snakes captured on the east side of the levee, four were recaptures from previous years (one from 2005, three from 2006). Three of these snakes (two recaptures, one new) were trapped in the toe drain along the east edge of the levee, and the other two (both recaptures) were

trapped in the densely vegetated permanent wetland immediately east of the toe drain. The traps in the wetland were removed twelve days after being set due to diminished water levels which made trapping infeasible. The decrease in capture success on the east side of the levee may be explained in part by the high water levels that occurred in the Yolo Bypass during the winter of 2005/2006, and the possibility that the remaining snakes were not detected because they were spending more time in the bypass wetlands where trapping efforts were hampered by shallow conditions (E. Hansen February 2008, letter to David Kelly).

On the west side of the levee, several changes in habitat conditions were observed compared with the two previous years; these changes may have further contributed to the decreases in capture success in this area. The rice field immediately west of the levee and south of the El Macero Channel was fallow in 2007, which coincided with significant reductions of water levels in the El Macero Channel and the toe drain along the west side of the levee where giant garter snake captures were most numerous in 2006. The water level in the El Macero Channel was too low for trapping in 2007; eight individuals were captured there in 2006. Hansen (2008) reported that while water within the toe drain was also low, the flow rate was notably higher than in previous years, likely reducing trapping effectiveness and overall habitat suitability. Only two individuals were captured in the toe drain in 2007 (one new, one recapture from 2005), compared to eight in 2005 and eleven in 2006. The remaining snakes captured in the rice lands on the west side of the levee were trapped in the ditches along the north and south edges of the rice field immediately west of the fallow field. Four individuals were captured in each of these ditches, one being a recapture from 2005. In contrast to observations in both 2005 and 2006, no giant garter snakes were detected moving from one side of the levee to the other during the 2007 field season (Eric Hansen February 2008, letter to David Kelly).

A habitat conservation bank has been established south of I-80 inside Yolo Bypass in part for the purpose of selling giant garter snake credits to developers or others who need to compensate for environmental impacts to the species from their projects. Pope Ranch, a 391-acre ranch in Yolo County, has sold all of their giant garter snake credits, ensuring that the habitat on the site is managed for the benefit of the species and protected in perpetuity.

Additional habitat has been created in Yolo Bypass south of south of the I-80 causeway in the form of the 15,830 acre Yolo Bypass Wildlife Area. This area includes the areas sampled by Eric Hansen which is described above.

The Yolo Basin is largely rural, but has not escaped the recent effects of rapid California development. Urban and commercial development in Davis and Woodland 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 in the Yolo Basin. Also, development promotes road widening and bridge replacements, such as those authorized under section 7, which result in direct alteration of snake habitat. Other projects affecting the environment in and around the action area include the levee reconstruction following the flood events of 1997 and 1998 and the reconstruction and the raising of the levees along the east side of the Bypass that

surround West Sacramento. Mitigation required for the loss of giant garter snake habitat during this construction was responsible for the creation of the Pope Ranch Mitigation Bank.

The Yolo Basin sub-population is within the rice production zone where giant garter snakes are known to occupy the maze of interconnected agricultural water delivery and drainage facilities (Service 1993). 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 2003). 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 2003).

American Basin Sub-population. The action area includes the American Basin sub-population which occurs in portions of Yuba, Placer, Sutter, and Sacramento Counties. Two Habitat Conservation Plans (HCPs) developed in this basin collectively permit the loss of 17,500 acres and requires the restoration of 8,750 acres of habitat for the snake (Service 2003). Although a report of giant garter snake surveys conducted between 2000 and 2003 states that it is still too early to determine whether the HCP mitigation efforts have resulted in increasing the numbers of giant garter snake, positive trends have been observed in some areas (City of Sacramento 2004, TNBC 2006b). Mitigation properties reported to support the giant garter snake continue to do so and four acquisition sites on which no giant garter snake were found during baseline surveys reported giant garter snake sightings in 2003 (City of Sacramento 2004). On the other hand, Paquin *et al.* (2006) suggested that the El Centro population (Fisherman's Lake) within the Natomas Basin suffered catastrophic population declines due to habitat loss since the beginning of her study in 1998; however, no population estimates subsequent to 1998 are currently available. Within the Natomas Basin, good quality giant garter snake habitat is found scattered mostly in the northern region, generally north of Elverta Road (Wylie *et al.* 2002a), although suitable snake habitat is found throughout most of the basin.

Factors Affecting the Snake within the Action Area

As noted in the Giant Garter Snake 5-Year Review: Summary and Evaluation (Service 2006), the overall status of the giant garter snake has not improved since its listing. The Colusa Basin sub-population supports a better documented, relatively larger, and more stable giant garter snake sub-population (Wylie *et al.* 2004a; 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.

The Colusa Basin is largely rural, but has not escaped the recent effects of rapid California development. 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 in the Colusa Basin. Also, development promotes road widening and

bridge replacements, such as those authorized under section 7, which result in direct alteration of snake habitat.

Ongoing agricultural and flood control activities may decrease and degrade the remaining habitat throughout the snake's range affecting the environmental baseline for the snake. Such activities are largely not subject to section 7 consultation. The Colusa Basin sub-population is within the rice production zone where giant garter snakes are known to occupy the maze of interconnected agricultural water delivery and drainage facilities (Service 1993). 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 2003). 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 2003).

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 2003). 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 accumulative effects of these activities.

In addition to projects already discussed, 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 the Colusa Basin 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.

Radiotelemetry studies conducted by USGS-WERC (formerly USGS Biological Resources Division) have examined giant garter 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 19-20 percent of observations, marsh habitat 20-23 percent of observations, and in canal and waterway habitat 50-56 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 vegetation was emergent in the rice fields, giant garter snakes used rice fields 39-60 percent of the time and canals 40-61 percent of the time (Wylie and Casazza 2000). Thus both rice fields and canals are important habitats for the snake.

Researchers with the USGS estimated the home range size of giant garter snakes at four study sites. Home range estimates were derived from telemetry data using the adaptive kernel method

(Wylie1998b; Wylie *et al.* 2000). Home range estimates averaged a minimum of 1.8 hectares (4.5 acres) to a maximum of 376.6 hectares (930.7 acres) (N=73). In 2000, the home range estimate at the Colusa National Wildlife Refuge, was reduced by more than 800 hectares (2,000 acres) (N=9) from previous year's estimates. This reduction is believed to be attributed to the maintenance of water in ditches and adjacent habitat, including a recently restored wetland area (Wylie *et al.* 2000). 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 giant garter snake movements. There the home range (N=8) was estimated to be 4 to 82 hectares (10 to 203 acres) for an area 234.7 hectares (580 acres) in size.

USGS-WERC has also estimated home range sizes for giant garter snakes and determined median home ranges that are generally less than 100 acres in size, demonstrating that giant garter 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 giant garter snakes at the Gilsizer Slough study site varied from approximately 5 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 giant garter snakes at the Colusa National Wildlife Refuge. Home range sizes at Colusa NWR have been 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 2792 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 the 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 forage on frogs, tadpoles and fish. Most of the radio-marked snakes were captured along the waters edge of the wetlands (Wylie *et al.* 2005). USGS-WERC also concluded that reduced movements indicated that giant garter snakes were less exposed to mortality factors such as predators and vehicles (Service 1999, Wylie and Casazza 2000, Wylie et al 2002).

In the final rule listing giant garter 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 giant garter snake. The Service concluded that these factors in combination with other threats put the Butte, Colusa, and Sutter Basin populations of giant garter 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) (Draft Recovery Plan) 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 giant garter snakes, and to develop programs to promote maintenance of cropping patterns that benefit the snake. As reported in the Five Year Review (Service 2006), the abundance and distribution of giant garter snakes has not changed significantly since the time of listing. 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.

The 2005 Monitoring Report for the Colusa NWR (Wylie *et al* 2005) concluded that "The management of the Colusa Refuge for giant garter 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."

The Five Year Review concluded that by far the most serious threats to giant garter snake continue to be loss and fragmentation of habitat from urban and agricultural development and loss of habitat associated with changes in rice production. 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 2006).

The period immediately preceding the listing of the giant garter snake included California's most recent multi-year statewide drought – 1987-1992 (California Department of Water Resources 2008 at cdec.water.ca.gov). This, coupled with low rice production (USDA-NASS Quick Stats – Rice at www.nass.usda.gov), likely contributed to the declines in giant garter snake populations that led to the listing of the snake as a threatened species. For a wetland-dependent species like the giant garter snake, drought or drought-like conditions are a serious threat to the long-term survival and recovery of the species.

The Recovery Plan concluded that maintenance of rice cultivation is important to the continued existence of the species. In addition, the recovery plan proposes recovery tasks to protect rice lands, to develop methods to assure water deliveries to support giant garter snakes, and to develop programs to promote maintenance of historic cropping patterns that benefit the snake. The proposed water transfer is inconsistent with these goals because it actually removes rice from production and creates financial disincentives to grow rice. It also affects the amount and availability of water in the Sacramento Valley to support rice agriculture and giant garter snake habitat.

Many areas supporting giant garter snakes have been documented to have abundant predators (R. Hansen 1980, Hansen and Brode 1993, Wylie *et al.* 1997). G. Hansen (1986) observed that nearly all giant garter 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).

Habitat degradation or alteration that benefits non-native species may increase the vulnerability of giant garter snakes to predation. Introduced game fish such as largemouth bass (*Micropterus salmoides*) and catfish (*Ictalurus* species) prey upon Giant garter snake and have been responsible for eliminating many species of native fishes and aquatic vertebrates in the western United States (Minkley 1973, Moyle 1976). Brood areas free of predatory fish may be important in that these areas allow juvenile giant garter snakes to grow large enough to avoid predation by game fish (G. Hansen pers. comm. 1998). Introduced predatory fish may also compete with giant garter snakes for smaller forage fish (G. Hansen 1986, California Department of Fish and Game 1992).

EFFECTS OF THE PROPOSED ACTION ON GIANT GARTER SNAKE

The proposed action will result in fallowing a maximum of 55,571 acres of rice land if the full amount of 183,385 acre feet of surface water is transferred as a result of crop idling under the authority of the DWB. 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 (particularly for young [< 2 years old] snakes), 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.

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 well beyond the one-year transfer program. Fallowing of land appears to reduce or eliminate giant garter snake capture success in adjacent canals (Wylie *et al.* 2004). However, we have no data that indicate the extent that snakes successfully relocate and assimilate into adjacent or nearby habitat when rice lands are fallowed, the extent to which the configuration of the landscape mosaic of rice fields and fallowed rice affects the success of individuals to assimilate, the extent to which snake population trends respond not only to fallowing but to subsequent increases in rice cultivation, or the degree to which fluctuation in rice acreage over time mirrors variability in the snake population over time.

The proposed fallowing or planting alternate crops on up to 55,571 acres under the DWB water transfer program is in addition to normal fallowing to accommodate farm activities being done in the rice lands not participating in the DWB. The fallowing that occurs because of this water transfer project is not the normal fallowing that farmers would do for a year. Therefore, the fallowing under the water transfer program is well above and beyond that done under normal crop rotation programs or water conservation programs in this drought year. Fallowing as a

result of the proposed action would be, at a maximum, 11 percent (55,571/489,258) of the 10 year average of the rice grown in the Sacramento Valley.

The proposed fallowing or crop conversion of up to 55,571 acres of rice fields to alternate crops in the action area will reduce the availability of stable wetland areas which are important to giant garter snake populations. The importance of stable wetlands was reported in the 2005 Monitoring Report for the Colusa NWR that concluded that, "The management of the Colusa Refuge for giant garter 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).

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). Although it is unknown where the snakes relocated to or if they were able to find suitable breeding and feeding aquatic habitat elsewhere, these results suggest that at the least snake distribution depends on where the rice fields are. 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. Giant garter 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 to find suitable aquatic habitat may reduce the fecundity of female snakes who would otherwise be expending effort on breeding, feeding, and other essential life functions. In addition, giant garter 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 fallowing or conversion to alternate crops of up to 55,571 acres of rice fields in the action area may reduce foraging success 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 dependant on rice land habitats. Migrating 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.).

Adverse effects from the proposed fallowing or conversion to alternate crops of up to 55,571 acres of rice fields in 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. Giant garter 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 2 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 giant garter snakes. Juveniles and neonates also rely on developing sufficient body mass prior to overwintering in order to survive long periods without foraging.

The proposed fallowing or conversion to alternate crops of up to 55,571 acres of rice fields in the action area may result in an increased risk of predation on individual giant garter 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 do not provide much 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 giant garter snakes.

Although it is likely that most or all canals and waterways will remain wetted with a minimum of two feet of water during the summer months, these features only make up a portion of giant garter snake's aquatic habitat. Given that giant garter snakes rely on rice lands or wetlands for foraging and predator avoidance, the significant reduction in the amount of rice within the northern portions of the DWB action area, it can be expected that giant garter snakes in the vicinity of fallowed rice fields may be adversely affected as a result of the reduction in habitat and summer water available, increased competition for resources in the remaining habitat, and increased predation as snakes attempt to relocate to suitable areas. This reduction in habitat in turn may decrease prey populations and reduce foraging success. Effects of decreased foraging success include reduced survival, reproduction, and recruitment. The reduced habitat available and more widely dispersed prey and habitat resources will cause snakes to either be displaced or move over a much wider area to meet their habitat needs (as evidenced by the Colusa NWR monitoring that indicates giant garter snakes must travel over wider areas when habitat conditions are less favorable), resulting in increased mortality from predation and increased competition with other giant garter snakes for limited resources.

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.

We have no information on State, tribal or local government actions reasonably certain to occur in the action area. However, we do anticipate that the frequency and magnitude of rice land fallowing resulting from forbearance agreements and transfer programs are likely to increase in the future, as the price that farmers get for idling rice is so high compared to the prices they receive for planting their crop. However, we do believe that because transfers of this magnitude are likely to occur with some certainty and regularity in future water years, and that water contractors have not provided a guarantee that future fallowing programs will be limited to less

that 20 percent of the total acreage planted in rice, chronic adverse effects to giant garter snake and their habitats may result in long-term degradation to snake populations in the lower Sacramento Valley.

Repeated episodes of dewatering 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 of rice fields will not only temporarily remove suitable habitat, but may adversely affect reproduction, recruitment, and survival of giant garter snakes.

CONCLUSION

After reviewing the current status of the species considered in this opinion, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that implementation of the proposed project as described, will likely result in the loss of an unknown number of giant garter snakes as a result of increased mortality from increased competition for resources, reduced reproductive rates, and increased mortality from predation when crossing dewatered areas in search of suitable forage areas. Reclamation and DWR are not providing compensation for the temporary loss of up to 11 percent of the giant garter snake summer habitat that will result from the idling of up to 55,571 acres of rice lands.

The reasonable certainty of adverse effects to the giant garter snake results from: fallowing or planting non-wetland crops on up to 55,571 acres of rice lands as a result of the program will adversely affect the short-term ability of individual giant garter snakes to forage, reproduce, and find shelter. We are not able to accurately predict the number of individual giant garter snakes that will be lost because there are no population data available for the action area.

As described above, the proposed action will reduce suitable giant garter snake foraging habitat by approximately 11 percent from the 10 year average of all rice croplands in the action area. As a result, we anticipate that some individuals may have to relocate from an area that may have been their foraging area in prior years. Although individual snakes that must relocate are likely to be subject to greater risk of predation as they move to find new suitable foraging areas, we anticipate that some individuals will be able to successfully relocate in suitable habitat elsewhere within the DWB action area. Young snakes (2 years and less) that need to relocate may be particularly vulnerable to the increase predation risk, either in the fallow fields or in the adjoining canals. The 320 acre limitation on the parcel size will assure that the distance travelled to a wetted area is within the normal disbursal range that giant garter snake will travel to find suitable habitat (Hansen and Brode 1993). Use of the BMP's and the Conservation Measures contained in the project description will also help minimize this risk by leaving vegetative cover along conveyance canals for snakes to hide in. In addition, a large reduction in available habitat and foraging opportunities compared to recent years may adversely affect foraging success and

breeding condition if some individuals are unable to relocate. Again, we anticipate young snakes to be at greater risk.

We do not know and have no information with which to estimate the size or age-class structure of the resident snake population in the action area. Whatever it is, it is a product of annual fluctuation in acreage planted to rice prior to 2009, in combination with other physical and environmental factors. We anticipate that the 2009 fallowing is likely to affect predation risk, foraging success, and breeding condition in individuals to a similar degree and magnitude that it has in previous years. While the 2009 rice acreage is expected to be within the 10-year average, the transfer program could result in the lowest acreage planted in rice since 1995 if the maximum number of acres is fallowed, although other years have been close (1998 [449,800 acres], and 2001 [450,000 acres]). If there is a population that has persisted in the DWB action area during this time, we would not anticipate the effects of the 2009 transfer program to impair the ability of that population to continue to persist. We anticipate that some individuals are likely to be displaced and will need to relocate elsewhere. Of these, we expect that some will successfully relocate, and that some may be lost to predation or other forms of mortality caused by loss of foraging opportunities, either through competition with other individuals or loss of body condition and failure to thrive, particularly young snakes.

After reviewing the current status of giant garter snake, the effects of the proposed action and the cumulative effects, we have determined that implementation of the proposed action will not jeopardize the continued existence of giant garter snake in the action area.

INCIDENTAL TAKE STATEMENT

Section 9(a)(1) of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened fish and wildlife species 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 the Service 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 Service to include significant habitat modification or degradation that results in death or injury to listed species by impairing 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, DWB water sellers, or DWB 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 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, and/or (2) fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse.

Amount or Extent of Incidental Take

The Service anticipates incidental take of giant garter snakes will occur. Giant garter snakes are secretive and notoriously sensitive to human activities. Individual snakes are difficult to detect unless they are observed, undisturbed, at a distance. Most close-range observations represent chance encounters that are difficult to predict. The Service anticipates that an unknown number of snakes that utilize the up to 55,571 acres that are to be fallowed or planted to crops other than rice will be taken as a result of this proposed action. 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 assimilate into other suitable habitat on or adjacent to a field fallowed as a result of participating in the DWB.

The proposed fallowing or crop shifting on up to 55,571 acres of rice fields for the DWB will result in the loss of an undetermined number of individual snakes through increased mortality or reduced or forgone reproduction by snakes in affected areas. Fallowing rice fields or planting crops that do not provide suitable habitat will not only temporarily remove suitable giant garter snake habitat, but may also have adverse effects on reproduction, recruitment, and survival of the snake that would continue to affect giant garter snake populations well beyond the one year project time frame.

Based on our analysis presented in the **Environmental Baseline** and **Effects of the Action** sections, which describes how the majority of the action area, both under current and proposed land management, is considered to be optimal giant garter snake habitat, we anticipate that large numbers of snakes are likely to be exposed to adverse effects from the proposed rice field fallowing. However, because no estimate of the current giant garter snake population exists and there is no way to accurately determine what number of individuals or percentage of the population may currently exist in or travel onto fallowed lands, the Service is providing an anticipated level of take based on certain assumptions concerning project configuration and giant garter snake ecology.

As described in the **Status of the Species** section and in the Draft Recovery Plan for the Giant Garter Snake (FWS 1999) the breeding season for the giant garter snake begins soon after emergence from overwintering sites and extends from March into May, and resumes briefly during September (G. Hansen pers. comm. 1998). Males immediately begin searching for mates after emerging (G. Hansen pers. comm. 1991). Females brood young internally, and typically give birth to live young from late July through early September (Hansen and Hansen 1990). Young immediately scatter into dense cover and absorb their yolk sacs, after which they begin feeding on their own (FWS 1993).

Based on the analysis in the **Effects of the Action** section, we believe that all age classes of giant garter snake will be exposed to increased predation as a result of emerging from overwintering and having to cross fallowed fields in search of suitable areas to find food and cover. This exposure may be most problematic for the one-year age class since they will need to find a suitable food source to build mass and strength to avoid predators.

Effect of the Take

The Service has determined that the level of potential take from authorization of the one year transfer of CVP and SWP water from the action area north of the Delta to water buyers south of the Delta is not likely to result in jeopardy to the giant garter snake. Although the magnitude of the proposed fallowing is within the 10-year historic average for rice acreage for the valley and the resident animals have undergone similar reductions in rice habitat in the past; it is unlikely that the fallowed acreage has been confined to such a constricted area. Fallowing rice fields or planting crops that do not provide suitable habitat will not only temporarily remove suitable giant garter snake habitat, but will also have adverse effects on reproduction, recruitment, and survival of the snake that will continue to affect giant garter snake populations well beyond the one year project time frame.

Reasonable and Prudent Measures

Because the proposed fallowing of up to 55,571 acres of rice fields in the action area will result in the loss of an undetermined number of individual giant garter snakes through increased mortality or reduced or forgone reproduction by snakes in affected areas: This fallowing of rice fields will not only temporarily remove suitable habitat, but we also anticipate may have adverse effects on reproduction, recruitment, and survival of the snake that will continue to affect giant garter snake populations well beyond the one year project time frame.

The Service believes the following reasonable and prudent measure is necessary and appropriate to minimize the impact of take caused by the proposed action.

Reasonable and Prudent Measure 1. Reclamation must work with DWR to document the compliance with the commitment to assure that idle parcels are no more then 320 acres in size, not located across a canal or other waterway, are not immediately adjacent to another fallowed parcel, and are distributed across the landscape in a checkerboard pattern.

Reasonable and Prudent Measure 2. Reclamation will implement the remaining Conservation Measures contained in the Project Description.

Terms and Conditions

To be exempt from the prohibitions of section 9 of the Act, Reclamation must comply with the following terms and conditions which implement the reasonable and prudent measure number one. These terms and conditions are non-discretionary.

The following Terms and Conditions implement Reasonable and Prudent Measure 1:

1. Reclamation will reject parcels that do not conform to these criteria from participating in the DWB.

2. Reclamation will create maps showing the location of parcels enrolled to sell water to the DWB by rice fallowing or crop substitution which demonstrate compliance with the spatial criteria for fallowing rice. Reclamation will provide the maps to the Service within 60 days from receipt of this opinion.

The following Terms and Conditions implement Reasonable and Prudent Measure 2:

1. Reclamation will gather information on the level of participation by DWB entities in the BMP's for giant garter snake.

2. Reclamation will provide this information to the Service at the end of August 2009.

Reporting Requirements

Reclamation shall submit a monthly compliance report prepared by DWR to the Sacramento Fish and Wildlife Office beginning thirty (30) calendar days from signing contracts to participate in the DWB. This report shall detail (i) total acreage affected and location where the fallowing occurred; (ii) confirmation that acreage fallowed conformed to the checkerboard pattern; (iii) confirmation that buffer zones have been complied with; (iv) confirmation that water levels are being maintained in ditches around affected fields; (v) occurrences of incidental take of any giant garter snake, if any; (vi) an explanation of failure to meet such measures, if any; and (vii) other pertinent information.

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 implement recovery actions, to help implement recovery plans, to develop information, or otherwise further the purposes of the Act.

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. We propose the following conservation recommendations:

1. Reclamation should assist the Service in implementing recovery actions identified in the *Draft Recovery Plan for the Giant Garter Snake* (U.S. Fish and Wildlife Service 1999).

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

3. Reclamation should work with the Service to create and restore additional stable perennial wetland habitat for giant garter 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.

REINITIATION - CLOSING STATEMENT

This concludes consultation with Reclamation on the proposed DWB action to transfer up to 370,935 acre-feet of water from CVP and non-CVP entities and to fallow or plant alternate crops on up to 55,571 acres of rice land habitats. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been maintained (or is authorized by law) and if: (1) new information reveals effects of the proposed action may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (2) the agency action is subsequently modified in a manner that causes an effect to listed species or critical habitat that was not considered in this opinion; or (3) a new species or critical habitat is designated that may be affected by the proposed action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending re-initiation.

This amount and extent of take is considered to be exceeded if: a) more than 55,571 acres are fallowed or planted to non-wetland crops; b) participants do not adhere to the Giant Garter Snake Conservation Strategy; and c) participants do not adhere to the Giant Garter Snake Best Management Practices in management of irrigation conveyances and farming operations.

The SFWO would like to thank you and your staff for their assistance in providing information, ground-truthing, helping us better understand Reclamation's water contracting process, and commitment to working with us to conserve listed species. Please contact Mike Welsh or Jan Knight at (916) 414-6700 with questions about this biological opinion.

Figures 1-2 Attached

cc:

CDFG, Rancho Cordova, CA (Attn: Kent Smith)
NMFS, Sacramento, CA (Attn: Bruce Oppenheim)
DWR (Teresa Geimer)
Bureau of Reclamation
Shane Hunt
Tim Rust
Becky Victorine

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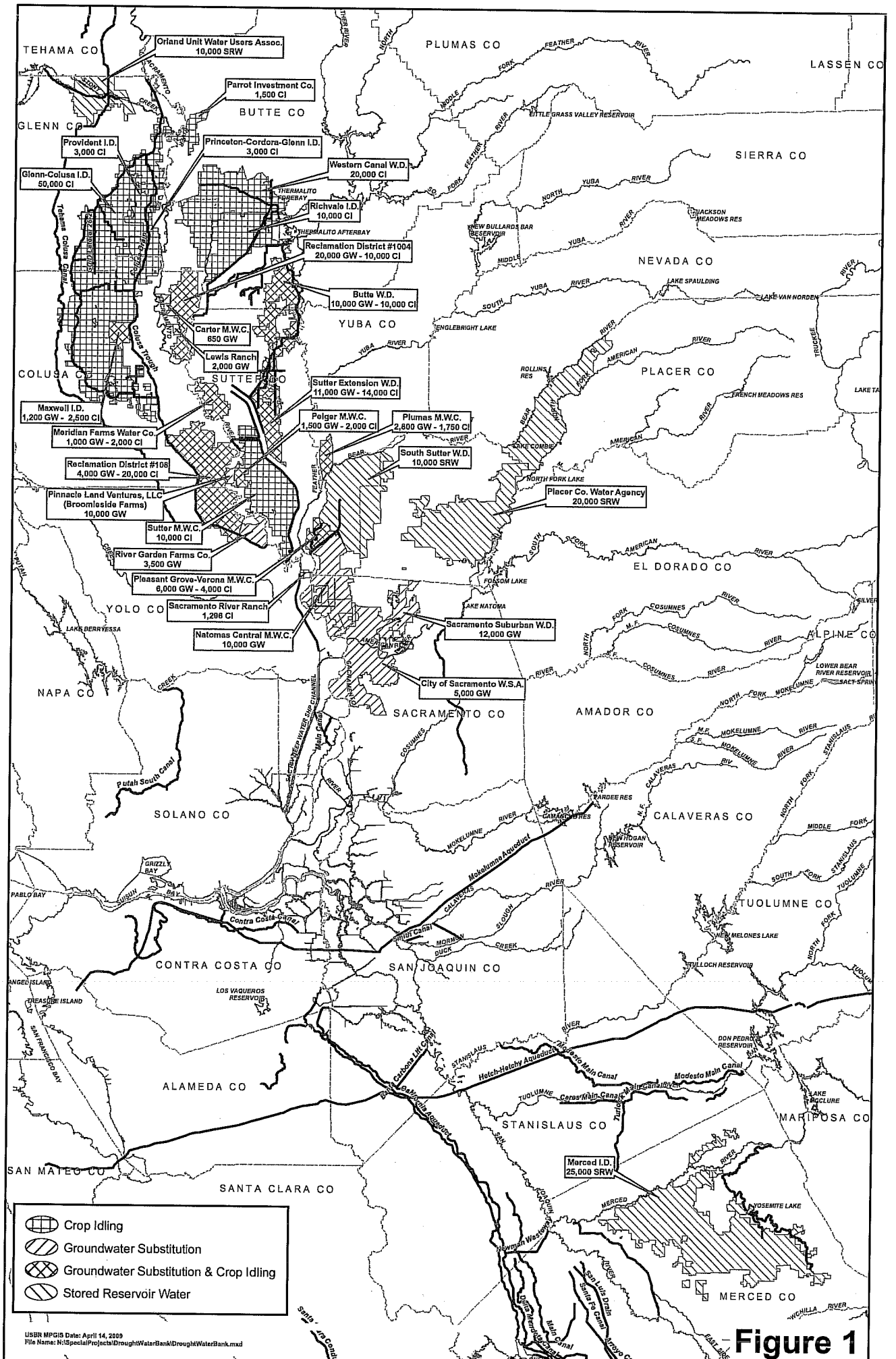
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Provident I.D.
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Princeton-Cordora-Glenn I.D.
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Glenn-Colusa I.D.
50,000 CI
Western Canal W.D.
20,000 CI
Richvale I.D.
10,000 CI
Reclamation District #1004
20,000 GW - 10,000 CI
Butte W.D.
10,000 GW - 10,000 CI
Carter M.W.C.
650 GW
Lewis Ranch
2,000 GW
Sutter Extension W.D.
11,000 GW - 14,000 CI
Maxwell I.D.
1,200 GW - 2,500 CI
Meridian Farms Water Co.
1,000 GW - 2,000 CI
Pelger M.W.C.
1,500 GW - 2,000 CI
Plumas M.W.C.
2,800 GW - 1,750 CI
South Sutter W.D.
10,000 SRW
Reclamation District #108
4,000 GW - 20,000 CI
Pinnacle Land Ventures, LLC
(Broomleside Farms)
10,000 GW
Placer Co. Water Agency
20,000 SRW
Sutter M.W.C.
10,000 CI
River Garden Farms Co.
3,500 GW
Pleasant Grove-Verona M.W.C.
6,000 GW - 4,000 CI
Sacramento River Ranch
1,296 CI
Natomas Central M.W.C.
10,000 GW
Sacramento Suburban W.D.
12,000 GW
City of Sacramento W.S.A.
5,000 GW
Merced I.D.
25,000 SRW
TEHAMA CO
PLUMAS CO
LASSEN CO
BUTTE CO
GLENN CO
SIERRA CO
NEVADA CO
YUBA CO
COLUSA CO
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ALAMEDA CO
STANISLAUS CO
MARIPOSA CO
SAN MATEO CO
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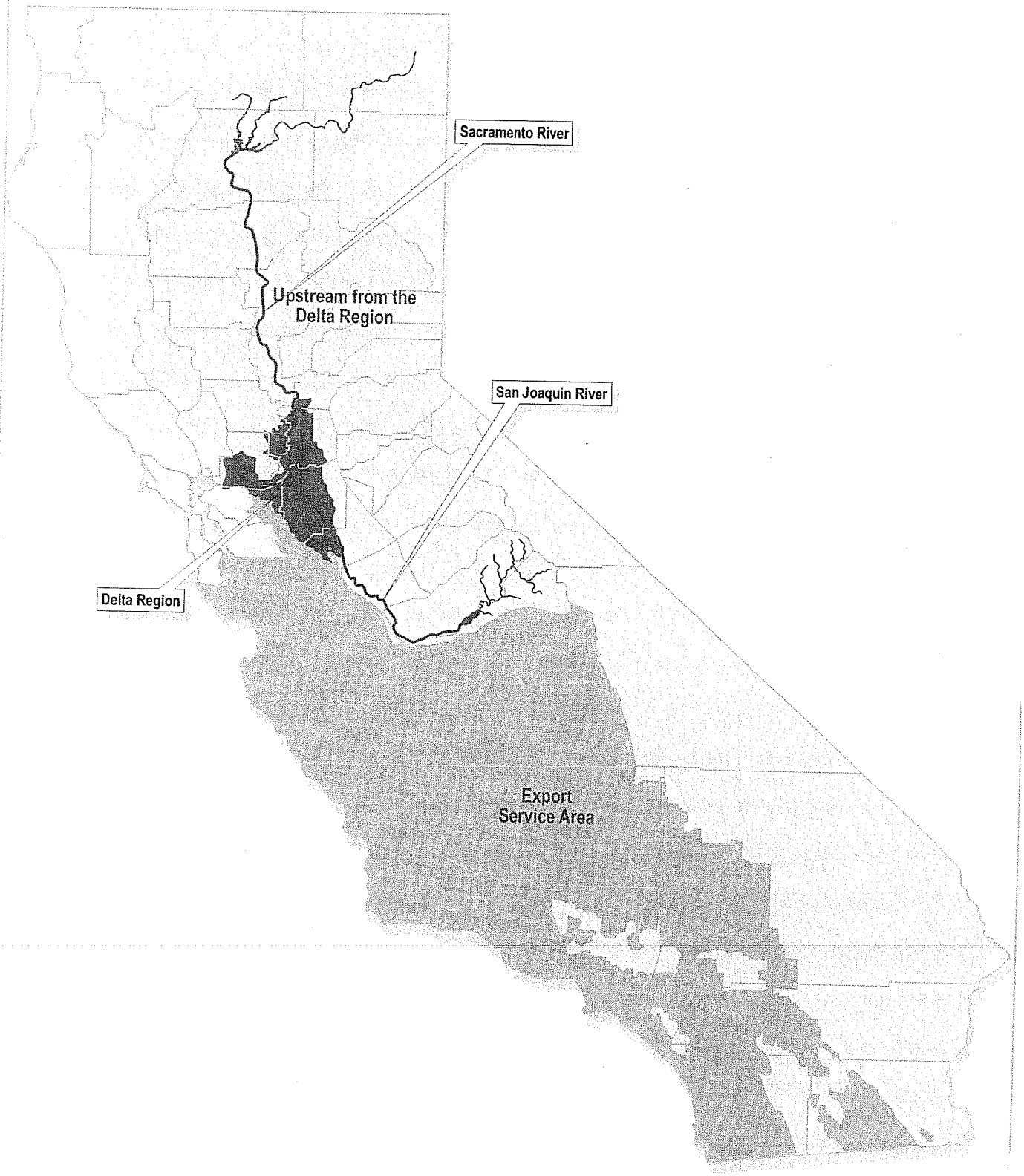
Figure 1



No Scale

Figure 2