

RECLAMATION

Managing Water in the West

Finding of No Significant Impact

2015 Tehama-Colusa Canal Authority Water Transfers

FONSI 15-05-MP

Recommended by:

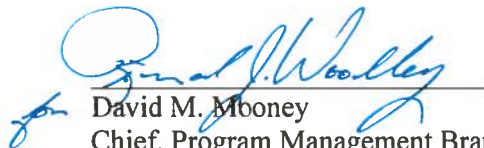


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U.S. Department of the Interior
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Background

The U.S. Department of Interior, Bureau of Reclamation (Reclamation) and the Tehama-Colusa Canal Authority (TCCA) prepared a joint Environmental Assessment/Initial Study (EA/IS) on the proposed action for approving water transfers to areas within the Tehama-Colusa Canal Authority experiencing water shortages in 2015. Reclamation is the Federal lead agency for the EA pursuant to the National Environmental Policy Act of 1969 (NEPA), as amended, and TCCA is the State lead agency for the IS pursuant to the California Environmental Quality Act (CEQA). This FONSI summarizes the analysis from the Reclamation and TCCA EA/IS dated April 2015. The EA/IS is attached and incorporated by reference.

To help facilitate the transfer of water to TCCA users experiencing water shortages, Reclamation is considering whether it can approve and facilitate individual water transfers between willing sellers and buyers. Reclamation has approval authority over water transfers that involve Central Valley Project Water and Base Supply water, or the use of CVP facilities. Reclamation would approve each transfer on an individual basis, but this document refers to them collectively as the 2015 Tehama-Colusa Canal Authority Water Transfers. Water transfers would occur from willing sellers within the Sacramento Valley to buyers that divert water from the Tehama-Colusa Canal. The transfer water would be conveyed, using CVP facilities, to water users experiencing water shortages in 2015 and require supplemental water supplies to meet anticipated demands. Reclamation would review and approve, as appropriate, proposed water transfers in accordance with the Draft Technical Information for Preparing Water Transfer Proposals (Reclamation and DWR, November 2014), state law and/or the Interim Guidelines for Implementation of the Water Transfer Provisions of the Central Valley Project Improvement Act (CVPIA) (Reclamation 1993).

Alternatives Including Proposed Action

No Action Alternative

Under the No Action Alternative, Reclamation would not approve the proposed transfer of Base Supply and/or Project Water from willing Sacramento River Settlement Contract (SRS Contract) sellers to users that farm within the area served by the Tehama-Colusa Canal Authority in 2015. However, other transfers that do not involve the CVP or CVP contractors may occur under the No Action Alternative. Additionally, Base Supply and/or Project Water transfers within basins would continue to occur and would still require Reclamation's approval.

Under the No Action Alternative, agricultural and urban water users will face shortages in the absence of water transfers. These users may take alternative water supply actions in response to shortages, including increased groundwater pumping, cropland idling, reduction of landscape irrigation, or water rationing. Water users may also seek to transfer water from others, which may require additional NEPA or CEQA analysis. In the absence of water transfers, growers may not have enough water to meet demands, and some permanent crops could be lost.

Proposed Action

The Proposed Action includes groundwater substitution transfers and cropland idling/shifting transfers in 2015 that require Reclamation approval. The Proposed Action includes potential transfers of Base Supply and/or Project Water from twenty entities with Sacramento River Settlement Contracts. Administratively, Reclamation would evaluate each proposal individually, as it is received, to determine if it meets state law and CVPIA requirements. Reclamation has followed this process in past years when approving transfers (such as the Drought Water Bank in 2009 and water transfers in 2013 and 2014). Reclamation would reoperate CVP facilities to deliver transferred water to TCCA Member Units; DWR may also reoperate SWP facilities to help facilitate delivery of transfer water.

The Proposed Action would make water available to buyers from willing sellers during 2015. Reclamation would limit the total amount of water approved for transfer under this action to a maximum of 98,000 acre-feet. Tables 2-2 and 2-3 in the EA/IS (Pages 2-5 and 2-6) provide details of potential transfer types that could be made available by the twenty seller water agencies. Existing CVP facilities could be used to convey transfer water to entities that require supplemental water supplies to meet anticipated demands. These transfers also include transfers between “common landowners” that own land in multiple water districts that may want to move water between different parcels to preserve permanent crops. Other transfers not involving the TCCA and its participating members could occur during the same time period. Reclamation and the San Luis and Delta-Mendota Water Authority (SLDMWA) released a Long-Term Water Transfers EIS/EIR to analyze transfers from a very similar list of sellers to the SLDMWA Member Units and buyers in the San Francisco Bay area. These two documents reflect different potential buyers for the same water sources; that is, the sellers have only the amounts of water listed in Table 2-1 in the EA/IS (page 2-2) available for transfer, but the water could be purchased by TCCA members or buyers listed in the Long Term Water Transfers EIS/EIR.

Comments on the EA

Comment letters were received from AquAlliance, California Department of Fish and Wildlife (DFW), Central Valley Regional Water Quality Control Board, and Defenders of Wildlife (DOW). CVRWQCB provided comments on their surface and groundwater quality protection responsibilities and the various laws and regulatory permitting authorities. DFW’s letter requested specific clarifications on some of the Biological Resources analysis and provided some recommendations for further coordination and clarification of the Environmental Commitments. AquAlliance’s letter expressed concern with water transfers in general and particularly groundwater substitution transfers and stated certain opinions regarding the use of water in northern California. DOW’s comment focused on cropland idling impacts and conservation measures associated with the giant garter snake. Reclamation considered every comment in approving these transfers; below is a discussion of the substantive issues raised regarding the analysis and how it was considered in Reclamation’s decision. Reclamation’s decision is the approval or disapproval of the proposed transfer of Base Supply or Project Water and is independent of the lead agency’s decision under CEQA. All issues raised in the comment letters have been specifically addressed in Appendix A of the EA/IS.

Scope of the Action and NEPA Process

AquAlliance suggests that Proposed Action is not a temporary one year action but rather transfers are occurring on a regular basis. Their comment letter also suggests that Reclamation understands this because we have prepared a long-term EIS. The EA/IS provides a thorough and systematic evaluation of a broad range of environmental issues and demonstrates that no potentially significant environmental impact may occur as a result of the Proposed Action, as mitigated. The Proposed Action is not part of the Long-Term Water Transfers EIS/EIR discussed in the comment. The current Proposed Action for temporary transfers during 2015 has independent utility and is not dependent on, nor does it dictate the nature and scope of, the long-term transfers addressed in the EIS/EIR. AquAlliance also suggested that the urgency and shortened review period is inappropriate. No formal public review of an EA is required – only public notice.

DOW claims that the EA/IS fails to consider an adequate range of alternatives. According to the DOI NEPA Regulations regarding the contents of an EA at 43 CFR 46.310 (b), “when the Responsible Official determines that there are no unresolved conflicts about the proposed action with respect to alternative uses of available resources, the environmental assessment need only consider the proposed action and does not need to consider additional alternatives, including the no action alternative. (See section 102(2)(E) of NEPA)”, and (c) “in addition, an environmental assessment may describe a broader range of alternatives to facilitate planning and decision-making.” The EA/IS concluded that implementation of the Proposed Action, as mitigated, would not result in any unavoidable significant impacts and the record contains no substantial evidence that any significant impacts would result from the Proposed Action. In addition, analyzing a different mix of transfers, including a lesser amount of water to be made available, would not facilitate planning or decision-making since any potential impacts associated with a lesser quantity of water would be contained within the amounts analyzed. Therefore, a discussion of alternatives within the EA/IS is unnecessary.

DOW requests that an EIS/EIR be prepared based on their concern that the proposed action would have significant wildlife impacts. The EA satisfies NEPA requirements. NEPA requires federal agencies to prepare a detailed Environmental Impact Statement (EIS) on all major Federal actions significantly affecting the quality of the human environment (42 U.S.C. 4332 (2)(c)). The EA/IS provides a thorough and systematic evaluation of a broad range of environmental issues and demonstrates that no potentially significant impacts would occur over the transfer period as a result of the Proposed Action. The record contains no substantial evidence that any significant environmental impacts may occur as a result of the Proposed Action, as mitigated. Preparation of an EIS/EIR therefore is not warranted or required.

Groundwater Analysis

AquAlliance raised several questions and concerns related to the groundwater resources analysis and emphasizes that the long-term monitoring shows water levels in the Tuscan aquifer system declining. Impacts to the aquifers from groundwater substitution are discussed in detail in Section 3.3, Groundwater Resources. As described in Section 3.3, any effects on the aquifers from groundwater substitution would be less than significant with implementation of Mitigation Measure GW-1. Because the groundwater

modeling indicates that groundwater levels would recover after potential transfer activities, any pumping from groundwater substitution is not expected to have adverse effects on the aquifers, including cumulative effects from climate change. The lead agencies included groundwater monitoring data in Appendix C of the Final EA/IS to provide additional background. The information in Appendix C shows that over time, water levels have decreased in drier periods but have not shown long-term increasing or decreasing trends. In addition to Reclamation's requirements, districts that are required to comply with local groundwater management plans or ordinances have demonstrated their compliance to the satisfaction of the groundwater management entity.

Reclamation also requires each entity proposing to transfer water to comply with a monitoring program to determine: (1) the extent of surface water-groundwater interaction in the areas where the groundwater is pumped for the transfer, (2) the direct effects of transfer pumping on the groundwater basin, and (3) the magnitude and potential significance of any effects on other legal users of water. Reclamation also reviews information and data for each well that is proposed as a source of substitute water to ensure that there would be no significant impacts to fish and wildlife. Wells that are anticipated to have significant impacts to the environment are not approved for use as a source of substitute water for transfers. If, in the unlikely event a well is approved and later is shown to have impacts, transfer entities are required to mitigate impacts to other legal users of water, or the local environment and economy. Impacts that must be mitigated would include any contribution to long-term overdraft conditions, a reduction in water levels in non-participating wells, a change in the hydrologic regime of streams such that the ecological health of the stream is impaired, land subsidence, and degradation of groundwater quality. These requirements ensure any potential impacts are adequately addressed.

Fish and Wildlife

DOW raised several concerns related to the following: analysis of giant garter snake impacts; Environmental Commitments and mitigation for giant garter snake impacts; analysis related to impact to birds, fish, and other species; analysis of migratory bird impacts; Environmental Commitments and mitigation for migratory bird impacts; analysis of groundwater substitution transfers on fish, terrestrial species, & natural communities; and analysis of cumulative impacts. Based on the analysis presented in the EA, as supported by substantial evidence provided therewith, impacts associated with cropland idling and groundwater substitution under the Proposed Action would be less than significant. That conclusion takes into account the environmental commitments related to biological resources. The environmental commitments have been further revised to protect additional habitat for waterfowl and shorebirds. Environmental commitments have also been refined to include requirement of an annual monitoring report to the United States Fish and Wildlife Service (USFWS) and the California Department of Fish and Wildlife (CDFW) that includes maps of idled fields in the previous year, results of current giant garter snake surveys, new scientific research, and recommendations for future protection measures. The monitoring report will be followed by coordination efforts between Reclamation and the wildlife agencies.

DOW questioned why the EA/IS does not include previously approved commitments to ensure protection of giant garter snake (i.e., limiting parcel size for idling and prohibiting the same field from being idled

more than two consecutive seasons). DOW is correct that environmental commitments in the EA/IS are modified from past water transfer documents, including the 2013 Draft Technical Information. However, commitments in the EA/IS are consistent with the 2014 Water Transfer Biological Opinion and with the 2015 Water Transfer Biological Opinion. Refinement of prior year's environmental commitments was based on best available scientific data that provides better information on where giant garter snake populations are likely to be found. Commitments that broadly restrict idling across the service area were refined to focus on cropland idling restrictions in areas where giant garter snake have a high likelihood of occurrence. Giant garter snake priority habitat areas have been identified by Reclamation and maps have been developed (Halstead 2014) for each water district using the best available scientific information on habitat use, known populations, and historic tule marsh zones. The purpose of these maps is to identify areas with the highest probability of giant garter snake occurrence so that water transfer actions can be avoided within these areas. The range of transfer activities in the action alternatives could result in up to 18.0 percent of rice field idling throughout the sellers' service area; however, idling would be focused in areas where giant garter snake occurrence probability is low. Environmental commitments state that lands in the Natomas Basin will not be permitted to participate in cropland idling transfers, in addition to locations of other known priority giant garter snake populations. These habitat restrictions, along with retaining water within conveyance structures that provide habitat movement corridor, avoid potentially significant impacts from cropland idling.

In response to both CDFW and DOW comments, Reclamation has clarified environmental commitments regarding coordination with USFWS and CDFW and priority habitat. Reclamation must provide annual monitoring reports to USFWS and CDFW to report on idling actions and resulting effects on sensitive species and hold annual meetings with the agencies to discuss contents of the report. Reclamation reviews and approves potential transfer activities based on detailed review of the specific proposed transfer. Reclamation will not permit transfers in areas that are known to have priority giant garter snake populations. Reclamation technical experts review all proposed transfers prior to approval of the transfer to ensure that impacts of the proposed transfer are within the scope of analysis in the EA/IS. Reclamation ensures that the identified environmental commitments and mitigation measures are implemented through review of monthly reports, field visits, and necessary coordination with transfer participants.

Consistent with the provisions contained in Water Code Section 1018, Reclamation and DWR recognize that rice fields and irrigation/drainage ditches can provide habitat for terrestrial wildlife and waterfowl species. Potential sellers are encouraged to incorporate measures in their crop idling proposal to protect habitat value in the areas to be idled, and language has been added to the description of cropland idling in Chapter 2 to clarify this issue. CDFW can advise landowners in the use of nonirrigated cover crops or natural vegetation as it applies to the provision of waterfowl, upland game bird and other wildlife habitat to provide habitat benefits while still meeting the conditions necessary to make water available for transfer. Section IV of the EA/IS evaluates effects to birds, fish, and other species. Specifically, Section IV(a) evaluates effects to special status fish in main stem rivers and smaller creeks. These effects were based on groundwater modeling described in Section IX(b). Section IV(a) also evaluates effects to special status wildlife species, including giant garter snake, greater sandhill crane, black tern, and pacific pond turtle. Section IV(d) evaluates effects on movement corridors for fish and wildlife in the project area.

These effects were based on evaluation of existing habitat in the project area and known populations in these areas.

To address commenters' concerns regarding impacts specific to migratory birds, additional information was added to the section to further describe these potential impacts. Impacts would still be less than significant. Section IV(a) Draft EA/IS identify and evaluate potential impacts of cropland idling/shifting on terrestrial wildlife species that use seasonally flooded agriculture for some portion of their lifecycle, including wintering waterfowl and shorebirds. The EA/IS acknowledges the importance of agricultural lands within the project area for migratory birds, particularly those traveling on the Pacific Flyway. Cropland idling transfers would only be on rice fields and would not reduce availability of forage from upland crops, which is a substantial acreage in the Sacramento Valley. Although the project may reduce the availability of cropland, it would not affect post-harvest practices (i.e., flooding, burning, disking, or rolling). Specifically, the project would not include transfers of rice decomposition water and so would not reduce the availability of water for post-harvest flooding. The majority of forage available to migratory birds in the project area is in the form of decomposing waste grains during post-harvest flooding. Farmers in the Sacramento Valley only flood-up a fraction of the cropland planted; typically around 60 percent in normal water years (Miller et al 2010, Central Valley Joint Venture 2006) and as little as 15 percent in critically dry years (Buttner 2014). Cropland idling does not change the amount of water available for post-harvest flooding; this water would be used to flood other fields that had been planted during the growing season. Therefore, the project would not result in a reduction of winter forage for migrating birds, specifically waterfowl and shorebirds, because it would not affect the availability of water for post-harvest flooding. To further ensure there are no significant adverse impacts on migratory birds, including greater sandhill crane, the environmental commitment pertaining to the Butte Sink has been refined to limit water transfer activities near all wildlife refuges and established wildlife areas within the seller's service area that support high concentrations of waterfowl and shorebirds. Discussion of the tricolored blackbird has been added to Chapters 2 and 3. The Environmental Commitments will reduce potential effect to migratory bird species, including the tricolored blackbird.

CDFW and DOW raised questions and provided comments about the use of the one cfs to evaluate biological effects and effects to fish species. Section IV(a) includes detailed analysis of groundwater substitution transfers on fish species, based on groundwater modeling results. Section IV(b,c) also quantify potential changes of transfers, including groundwater substitution transfers, on flows in the Sacramento River. Section IV(b,c) further evaluates effects to terrestrial species and natural communities of groundwater substitution transfers, based on groundwater model results. The use of one cfs threshold to evaluate effects was biological in nature and was applied to every month of groundwater modeling. If a change of greater than 1 cfs occurred in any single month during the entire modeled period (1976-2003), the waterway was examined further for potential biological effects. Flows in smaller waterways with less than 1 cfs are expected to be within the normal range of annual fluctuation; some of these waterways are ephemeral and are subject to a wide range of flow conditions dependent on annual hydrology. Other smaller waterways are part of a managed system (i.e., canals) that also results in variation in flows. These small waterways were not analyzed further as groundwater substitution impacts on surface waterways are expected to be within this annual variation.

The EA/IS states the following “Based on a review of field sampling data and reports, this analysis concluded that there is no evidence of the presence of special-status fish species in the following creeks and any streamflow depletion would have no effects on special status fish species: Walker Creek, French Creek, Willow Creek, South Fork Willow Creek, Funks Creek, Stone Corral Creek, Lurline Creek, Cortina Creek, Sand Creek, Sycamore Slough (Colusa County), Wilkins Slough Canal, Honcut Creek, North Honcut Creek, South Honcut Creek, and Dry Creek (tributary of Bear River)” and then goes on to evaluate effects to creeks where special status species may be present. Existing conditions information has been added in Section 2.5.3 on potentially affect natural communities, including terrestrial species that occupy them.

In response to CDFW’s request for clarification of Mitigation Measure GW-1, Mitigation Measure GW-1 has been revised to include the following:

“Sellers will monitor groundwater depth data to verify that significant adverse effects to deep-rooted vegetation are avoided or allow sellers to modify actions before significant effects occur. If monitoring data indicate that water levels have dropped below root zones (i.e., more than 10 feet where groundwater was 10 to 25 feet below ground surface prior to starting the transfer of surface water made available from groundwater substitution actions), the seller must implement actions set forth in the mitigation plan. If historic data show that groundwater elevations in the area of transfer have typically varied by more than this amount annually during the proposed transfer period, then the transfer may be allowed to proceed. If there is no deep-rooted vegetation (i.e., oak trees and riparian trees that would have tap roots greater than 10 feet deep) within one-half mile of the transfer wells or the vegetation is located along waterways that will continue to have water during the transfer, the transfer may be allowed to proceed. If no existing monitoring points exist in the shallow aquifer, monitoring would be based on visual observations of the health of these areas of deep-rooted vegetation. If significant adverse impacts to deep-rooted vegetation (that is, loss of a substantial percentage of the deep-rooted vegetation as determined by Reclamation based on site-specific circumstances in consultation with a qualified biologist) occur as a result of the transfer despite the monitoring efforts and implementation of the mitigation plan, the seller will prepare a report documenting the result of the restoration activity to plant, maintain, and monitor restoration of vegetation for 5 years to replace the losses.”

Both CDWF and DOW expressed comments on the effects of water transfers on flow changes. Chapter 3, Section IV(b,c) quantifies potential changes of transfers on flows in the Sacramento River. The largest change in flow could be approximately 400 cfs in June (if the Sacramento River Settlement Contractors receive 100 percent of the Contract Total). For comparison, flow in the Sacramento River near Colusa averaged 6,244 cfs in June (USGS 2014) during the dry conditions in 1977. Fish species would not be affected by a maximum 6% decrease in Sacramento River flow during one month. The EA/IS discusses effects of water transfers to biological resources in Shasta Reservoir and the Sacramento River qualitatively. Surface water modeling was not completed for the EA/IS because the maximum quantity of water transfers relative to total reservoir storage and river flows would be minor and the Proposed Action would not result in significant impacts to biological resources.

In response to DOW's comment concerning cumulative impacts, the EA/IS analyzes cumulative impacts of transfers in Chapter 3, Section XVIII(b), including as related to air quality, biological resources, and groundwater resources. That section includes a list of transfers that could occur in addition to the Proposed Action as part of a cumulative condition. To determine this list, the lead agencies reached out to other potential buyers and sellers (including both state and federal as suggested in the comment) to characterize the potential transfers under consideration for 2015. Public comments have not disclosed any additional transfers that are missing from this list. Because of the short-term nature of this project, the lead agencies did not identify other current or future projects that may contribute to the cumulative effects identified in this analysis after the proposed project is complete. Cumulative effects to special status species are evaluated in Chapter 3, Section XVII.

Findings

In accordance with NEPA, the Mid-Pacific Regional Office of Reclamation has found that the approval of proposed water transfers in 2015 is not a major federal action that would significantly affect the quality of the human environment. Consequently, an Environmental Impact Statement is not required. This determination is supported by the following factors:

Water Resources: Under the Proposed Action, Reclamation would deliver most of the transferred water to TCCA Member Units on the same schedule that it would have delivered to the seller if no transfer occurred. This operation would result in a small change in flow between the TCCA diversion and the point where water would have been diverted without the transfer. The largest change in flow could be approximately 400 cfs in June (if the Sacramento River Settlement Contractors receive 100 percent of the Contract Total). For comparison, flow in the Sacramento River near Colusa averaged 6,244 cfs in June (USGS 2014) during the dry conditions in 1977. The transfers would not affect flows downstream of the point where water would have been diverted if a transfer did not occur, therefore flows into the Delta would not be affected. Reclamation may also back up transfer water into storage in Shasta Reservoir to help schedule water deliveries, which could reduce Sacramento River flows for a short period. Keeping water in storage in Shasta Reservoir could help conserve the cold water pool in a year where reservoir levels are low; however, the very small change in flow from the transfers would be a minor benefit. Changes in flows would not violate any existing water quality standards or worsen any water quality and flow standard violation.

Groundwater pumped in lieu of diverting surface water could affect groundwater hydrology. The potential effects could be short term declines in local groundwater levels, interaction with surface water, and land subsidence. Increased groundwater substitution pumping could result in temporary declines of groundwater levels. Groundwater substitution pumping could occur from April through October and the pumped groundwater would be used for crop irrigation within the seller's district. Declining groundwater levels resulting from increased groundwater substitution pumping could cause: (1) increased groundwater pumping costs due to increased pumping depth; (2) decreased yield from groundwater wells due to reduction in the saturated thickness of the aquifer; (3) decrease of the groundwater table to a level below

the vegetative root zone, which could result in environmental effects; and 4) third-party impacts to neighboring wells.

Some of the transferred surface water would be delivered to users within the same groundwater basin, and could offset groundwater pumping in the Proposed Action Alternative to address shortages. The amount of offset is uncertain, so to be conservative, the analysis considers impacts to groundwater without this offset. Under the Proposed Action, additional water supply would benefit water users who receive the transferred water. The Proposed Action would not adversely affect surface water resources.

Groundwater Resources: Groundwater substitution transfers could affect groundwater hydrology. The potential effects would be decline in groundwater levels, interaction with surface water, land subsidence, and water quality impacts. Mitigation Measure GW-1 was revised and included in the EA to provide specific details concerning the required monitoring and mitigation measures that must be implemented to avoid significant adverse impacts.

Mitigation Measure GW-1: Monitoring Program and Mitigation Plan

The *DRAFT Technical Information for Preparing Water Transfer Proposals* (Reclamation and DWR 2014) provides guidance for the development of groundwater substitution water transfer proposals. The technical information informs the development of the monitoring and mitigation program for the range of potential transfer activities evaluated in this EA/IS.

The objective of Mitigation Measure GW-1 is to avoid significant adverse environmental effects and ensure prompt corrective action in the event unanticipated effects occur. The measure accomplishes this by monitoring groundwater and/or surface water levels during transfers to avoid potential effects. The objectives of this process are to: (1) minimize potential effects to other legal users of water; (2) provide a process for review and response to reported effects to non-transferring parties; (3) assure that a local mitigation strategy is in place prior to the groundwater transfer; and (4) mitigate significant adverse environmental effects. Reclamation will verify that sellers adopt and implement these mitigation measures to avoid potentially significant adverse effects of transfer-related groundwater extraction. In addition, each entity participating in a groundwater substitution transfer must confirm that the proposed groundwater pumping will be compatible with state and local regulations and Groundwater Management Plans (GMPs). As Groundwater Sustainability Plans (GSPs) are developed by Groundwater Sustainability Agencies, potential sellers must confirm that the proposed pumping is compatible with applicable GSPs.

The monitoring program is detailed in the EA. The mitigation plan includes:

Potential sellers must complete and implement a mitigation plan to avoid potentially significant groundwater impacts and ensure prompt corrective action in the event unanticipated effects occur. Mitigation actions could include:

- Curtailment of pumping until natural recharge corrects the issue.
- Lowering of pumping bowls in non-transferring wells affected by transfer pumping.

- Reimbursement for significant increases in pumping costs due to the additional groundwater pumping to support the transfer.
- Curtailment of pumping until water levels rise above historic lows if non-reversible subsidence is detected (based on local data to identify elastic versus inelastic subsidence).
- Reimbursement for modifications to infrastructure that may be affected by non-reversible subsidence.
- Other appropriate actions based on local conditions, as determined by Reclamation.

The mitigation plan will describe how to avoid significant effects and address any significant effects that occur despite the monitoring efforts. The objectives of this process are to: (1) minimize potential effects to other legal users of water; (2) provide a process for review and response to reported effects; and (3) assure that a local mitigation strategy is in place prior to the groundwater transfer. Accordingly, to ensure that mitigation plans will be feasible, effective, and tailored to local conditions, the plan must include the following elements:

- A procedure for the seller to receive reports of purported environmental effects or effects to non-transferring parties;
- A procedure for investigating any reported effect;
- Development of mitigation options, in cooperation with the affected parties, for legitimate significant effects; and
- Assurances that adequate financial resources are available to cover reasonably anticipated mitigation needs.

Mitigation to avoid potentially significant subsidence impacts and ensure prompt corrective action in the event that unanticipated effects occur is described by the following stages.

Stage 1: Groundwater Levels

Irreversible subsidence would not occur if groundwater levels stay above historic low levels for the entire transfer season. As groundwater is pumped from an aquifer, the pore water pressure in the aquifer is reduced. This reduction in pore water pressure increases the effective stress on the structure of the aquifer itself. This increase in effective stress can cause the aquifer structure to deform, or compress, resulting in the subsidence of the ground surface elevation. Subsidence can be irreversible if the reduced effective stress is lower than the historically low effective stress. Typically this would be the result of groundwater levels reaching levels lower than the historical low level.

Before a transfer, each seller will examine local groundwater conditions and groundwater level changes based on past pumping events or groundwater substitution transfers. This existing information will be the basis to estimate if groundwater levels are likely to decline below historic low levels as a result of the proposed transfer. If the pre-transfer assessment indicates that groundwater levels will stay above historic low levels, and this finding is confirmed by monitoring during the transfer-related pumping period, then no additional actions for subsidence monitoring or mitigation are necessary. Sellers would need to proceed to stage 2 for land surface elevation monitoring if the pre-transfer estimates indicate that

groundwater levels are anticipated to decline below historic low levels. If monitoring during the transfer-related pumping period (confirmed by two measurements within seven days) indicates that groundwater levels have fallen below historic low levels, sellers must immediately stop pumping from transfer wells in the area that is affected or proceed to stage 2.

Stage 2: Ground Surface Elevations

Stage 2 includes monthly ground surface monitoring during transfer-related pumping if pumping could cause groundwater levels to fall below historic low levels, as described above in the Monitoring Plan. If ground surface elevations decrease between 0.1 and 0.2 foot, the seller will evaluate the accuracy of the information based on the current limitations of technology, professional engineering/surveying judgment, and other local data. If the elevations decline more than 0.2 foot, this change could indicate inelastic subsidence, which would trigger a shift to Stage 3.

Stage 3: Local Investigation

If the threshold of 0.2 foot of ground surface elevation change is exceeded, the seller shall cease groundwater substitution pumping for the transfer until one of the following occurs: (1) groundwater levels recover above historic low groundwater levels; (2) seller completes a more detailed local investigation identifying hydrogeologic conditions that could potentially allow continued transfer-related pumping from a subset of wells (if the seller can provide evidence that this pumping is not expected to cause additional subsidence); or (3) seller completes an investigation of local infrastructure that could be affected by subsidence (such as water delivery infrastructure, water supply facilities, flood protection facilities, highways, etc.) indicating the local threshold of subsidence that could be experienced before these facilities would be adversely affected. Any option should also consider the effect of non-transfer pumping that may be causing subsidence.

Stage 4: Mitigation

If subsidence effects to local infrastructure occur despite monitoring efforts, then the sellers must work with the lead agencies to determine whether the measured subsidence may be caused by transfer-related pumping. Any significant adverse subsidence effects caused by transfer pumping activities must be addressed. A contingency plan must be developed in the event that a need for further corrective action is necessary. This contingency plan must be approved by Reclamation before transfer-related pumping could continue after Stage 3.

Stage 5: Continued Monitoring

The sellers will continue to monitor for subsidence while groundwater levels remain below historic low levels. If the seller has ceased transfer-related pumping but groundwater levels remain below historic lows, subsidence monitoring will need to continue until the spring following the transfer. The results of subsidence monitoring will be factored into monitoring and mitigation plans for future transfers.

The mitigation plans will be required from sellers for review by Reclamation during the transfer approval process. Reclamation will not approve transfers without adequate mitigation and monitoring plans. Therefore, the Proposed Action will not have a significant adverse impact on groundwater resources.

Air Quality: The proposed Project would result in the potential for significant environmental impacts associated with air quality. Mitigation measures have been incorporated into the Proposed Action to reduce impacts to less than significant levels. The mitigation measures (AQ-1) for the Proposed Action listed below have been adopted by Reclamation and TCCA. The Proposed Action will not result in significant impacts to air quality.

- AQ-1 – Selling agency would reduce pumping at diesel wells to reduce emissions to below the thresholds. If an agency is transferring water through cropland idling and groundwater substitution in the same year, the reduction in vehicle emissions can partially offset groundwater substitution pumping at a rate of 4.25 AF of water produced by idling to one acre-foot of groundwater pumped. Agencies may also decide to replace old diesel wells to reduce emission below the thresholds.

If a selling agency, through the actions above, can reduce daily emissions below thresholds while operating wells 24 hours per day, then that agency must provide an analysis to Reclamation. This analysis should identify that all wells proposed for participation in a 2015 Water Transfer may be operated on a 24-hour per day basis without exceeding emission thresholds.

Alternately, if a selling agency with potentially significant emissions, as determined by this EA/IS, intends to operate wells less than 24 hours per day to reduce emissions below the thresholds, then that agency will be required to maintain recordkeeping logs that document the specific engine to be used for groundwater substitution transfers, the power rating (hp), and applicable emission factors. Emission calculations for daily emissions will be completed for comparison to the significance thresholds determined for each selling agency. The recordkeeping logs will be sent to Reclamation monthly for verification that emissions are within the allowable limits.

Reclamation will also work with the water agencies to inform individual growers of incentive funding available through the Natural Resources Conservation Service's Environmental Quality Incentives Program. Funded conservation practices include the replacement of internal combustion engines in irrigation pumps; therefore, the program may be used by growers to further reduce criteria pollutant emissions.

Mitigated emissions are provided in Table 3-4 of the EA/IS. Implementation of these mitigation measures would reduce VOC and NOx emissions to less than significant.

Geology and Soils: Increased cropland idling in the Sacramento Valley to make water available for transfer is not likely to substantially increase wind erosion of sediments. In the buyer area, water is likely to be used on permanent crops (such as orchards and vineyards). The soils underlying these fields have a low risk of wind erosion; therefore, continued cultivation is not likely to substantially increase erosion.

Groundwater substitution transfers could reduce groundwater levels, which could decrease water pressure and result in a loss of structural support for clay and silt beds. The analysis finds that the potential for land subsidence from increased groundwater pumping (under the No Action Alternative and the Proposed Action) would be small.

Biological Resources:

FISHERY RESOURCES

Water transfers would slightly decrease river flows during the transfer period from the TCCA diversion at Red Bluff to downstream of the point of diversion for the sellers under the No Action Alternative. Reclamation is consulting frequently with USFWS and the National Marine Fisheries Service (NMFS) on CVP and SWP operations relative to the BOs and special status fish species. Special status fish species would not be affected by the Proposed Action beyond those impacts considered by the BOs and current consultations with NMFS and USFWS.

SPECIAL STATUS SPECIES

Reclamation consulted under Section 7 of the ESA with the USFWS for this action. USFWS provided its Biological Opinion (BO) to Reclamation on April 30, 2015. Conservation measures included in the Biological Opinion are essentially the same conservation measures listed in the EA/IS. The final conservation measures are included in the April 30, 2015 BO, which is appended to this document in Appendix A. All potential transfers that would occur under the Proposed Action would be subject to the terms, conditions and conservation measures included in the BO.

The following is a discussion of effects of rice idling actions on special status wildlife species that are present in the sellers' area. Environmental Commitments have been incorporated into the Proposed Action to reduce potential impacts to special status wildlife species. The Environmental Commitments are listed in Section 2.4. Additional special status animal and plant species have the potential to occur in the project area, but would not be affected by the Proposed Action. The EA/IS appendices F and G list special status animal and plant species that could be present in the project area and the reason for no effect.

Rice idling could affect special status species that use rice fields for forage, cover, nesting, breeding, or resting. Under the Proposed Action, a maximum of 49,294 acres of rice could be idled in Colusa, Glenn, Sutter and Yolo counties.

Rice idling actions could affect the GGS that use flooded rice fields for foraging and protective cover habitat during the summer months. GGS require water during their active phase, extending from spring until fall. During the winter months, GGS are dormant and occupy burrows in upland areas. While the preferred habitat of GGS is natural wetland areas with slow moving water, GGS use rice fields and their associated water supply and tail water canals as habitat, particularly where natural wetland habitats are not available. Because of the historic loss of natural wetlands, rice fields and their associated canals and drainage ditches have become important habitat for GGS.

Rice idling would affect available habitat for GGS. The GGS displaced from idled rice fields would need to find other areas to live and may face increased predation risk, competition, and reduced food supplies. This may lead to increased mortality, reduced reproductive success, and reduced condition prior to the start of the overwintering period. Rice idling transfers would be subject to the Environmental Commitments in the EA/IS, which include measures to protect GGS. Rice idling transfers would also be subject to the conservation measures described in the BO.

As included in the Environmental Commitments, Reclamation will coordinate with USFWS and GGS experts to identify priority suitable habitat for GGS and discourage idling in those priority areas. Implementation of Environmental Commitments will also protect movement corridors for GGS by maintaining water in irrigation ditches and canals. Some GGS would successfully relocate to find alternate forage, cover, and breeding areas.

Rice idling under the Proposed Action would have a less than significant impact on GGS because the Environmental Commitments would avoid or reduce many of the potential impacts associated with displacement of GGS. Some individual snakes would be exposed to displacement and the associated increased risk of predation, reduced food availability, increased competition, and potentially reduced fecundity. The number of individual snakes affected is expected to be small because Environmental Commitments avoid areas known to be priority habitat for GGS or where GGS populations are known to occur. The Environmental Commitment to maintain water in canals near idled fields would also protect GGS.

RIPARIAN/WETLAND HABITAT and SENSITIVE AREAS

The changes in river flows would likely be a fairly small percent of the overall river flows. The Proposed Action would result in minor effects to any riparian habitat near the rivers. Environmental Commitments limiting the amount of rice acres idled in historic tule marsh habitat and maintaining water in ditches would support flows to existing wetlands. The incremental effect to wetlands under the Proposed Action would be less than significant.

Several adopted Habitat Conservation Plans (HCP) and Natural Community Conservation Plans (NCCP) exist within the project area, including the Natomas Basin HCP, South Sacramento HCP, and the Yuba-Sutter NCCP/HCP. Water transfers under the Proposed Action would have a less than significant impact on the natural communities that are covered in these plans because of the temporary nature of the transfers and the minimal changes in flows and reservoir levels associated with water transfers. The Environmental Commitments under the Proposed Action would minimize impacts to special status species that are covered in the plans. The Environmental Commitments also require sellers to address third-party impacts from groundwater substitution specifically in areas where groundwater subbasins include conservation banks or preserves for GGS. The Proposed Action would not conflict with HCP and NCCP provisions.

Cultural Resources: The Proposed Action would allow for water transfers via groundwater substitution and/ or cropland idling/shifting in the Sacramento Valley and are conveyed to the TCCA through existing facilities. No new construction, ground disturbing activities, or changes in land use would occur. Since

the Proposed Action has no potential to affect historic properties, no cultural resources would be impacted as a result of the Proposed Action.

Indian Trust Assets: The Proposed Action does not include areas where Indian Trust Assets have been identified; therefore, there is no potential to affect Indian Trust Assets.

Indian Sacred Sites: The Proposed Action does not include Federal land; therefore, there is no potential for Indian Sacred Sites to be affected by the Proposed Action.

Environmental Justice: Under the Proposed Action, cropland idling transfers could disproportionately and adversely affect minority and low-income farm workers by reducing agricultural production. A maximum of 55,041 acres of rice could be idled under the Proposed Action. Based on the maximum idling acreage under the Proposed Action, approximately 138 farm workers jobs would be lost in Glenn, Colusa, Sutter, and Yolo counties (1.1 percent of total 2013 farm employment). This magnitude of job losses is within historic annual fluctuations in farm worker employment. Annual changes in farm worker employment from 2002 to 2013 were 2 percent or greater in 6 years (EDD 2014). All farm worker effects would be temporary and only occur during the 2015 crop season. Cropland idling under the Proposed Action would not result in an adverse and disproportionately high effect to farm employment.

Water transfers under the Proposed Action would provide water to agricultural users in the buyers' area. Increased water supply would be used to irrigate permanent crops that face water shortages under the No Action Alternative. This would provide employment for the labor intensive, permanent crops, which would provide farm employment for low income and minority workers. This would be a beneficial effect to environmental justice populations.

Socioeconomics: Based on the estimated direct effects and employment multipliers, the total economic effect to employment of the proposed rice idling actions would be a loss of 138 jobs in Colusa, Glenn, Sutter, and Yolo counties. These job losses would largely occur in the agricultural sector. Some of these direct effects may be offset if farm workers can shift from working fields that are idled to fields where the transfer water is being used.

There would also be secondary regional economic impacts as a result of increased idling. Secondary effects occur because of the linkages among industries and include effects to employment, income, and output of support industries and as a result of reduced household spending. Secondary effects would occur to agricultural support businesses that would have reduced sales because growers would not purchase inputs or rent equipment. Transportation businesses and rice mills would also be affected because there would be less rice harvested.

At the regional level, the direct and secondary economic effects would not be substantial. Relative to the baseline economy, the effects would be minor. Further, the Proposed Action would last for one year and growers could put the land back into agricultural production in the subsequent year if water supplies increase. Therefore, economic effects from cropland idling would be a temporary effect.

Effects may be more adverse in local communities. Rural communities have a much smaller economic base, and any changes to economic levels would be more adverse relative to a large regional economy. Reclamation and participating buyers and sellers will limit cropland idling as a result of the Proposed Action to less than 20 percent of the acreage of a particular crop in a district to reduce the potential for economic effects. Water Code Section 1745.05(b) requires a public hearing under some circumstances in which the amount of water from land idling exceeds 20 percent of the water that would have been applied or stored by the water supplier absent the water transfer in any given hydrologic year. Third parties would be able to attend the hearing and could argue to limit the transfer based on its economic effects.

In the buyer area, water transfers under the Proposed Action would provide water for irrigation that would help maintain crop production. Even with transfers, growers would continue to face water shortages and take actions to address reduce supplies. Transfer water would be used to irrigate permanent crops to keep them alive through the dry year and support long-term production. Permanent crops are typically more labor intensive and have higher value than field crops. Continued irrigation of permanent crops through the 2015 irrigation season would support farm labor and provide revenue to the region through 2015 and in the long-term. Transfer water would help local farm economies in the TCCA area of the Sacramento Valley by providing employment and wages to farm laborers. Transfers would protect growers' investments in permanent crops and farm income. Transfers would provide long-term economic benefits by keeping permanent crops alive through the 2015 dry conditions. If permanent crops do not survive through 2015, there would be substantial long-term adverse economic effects to the buyer area by reducing employment and income in subsequent years. The Proposed Action would benefit the regional economy in the buyer area.

Cumulative Impacts: The cumulative impacts analysis considers other potential water transfers that could occur in the 2015 transfer season, including non-CVP water transfers and other existing water transfer and groundwater programs, including the Lower Yuba River Accord. Given the short-term nature of the Proposed Action, Environmental Commitments and minimization measures, impacts to the previously discussed resource categories associated with the Proposed Action will not contribute to a cumulatively significant adverse impact when added to other past, present, and reasonably foreseeable future actions. The Proposed Action would not adversely affect the human environment and therefore would not contribute to any long-term effects on environmental resources. The Proposed Action will not result in cumulative impacts to any of the resources previously described.

Appendix A

USFWS Biological Opinion



United States Department of the Interior



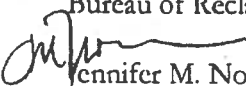
In Reply Refer to:
08ESM1-00-
2015-F-0116

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

APR 30 2015

Memorandum

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

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

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

Introduction

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

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

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

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

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

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

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

In addition, based on a review of the information contained in the December 15, 2008, biological opinion for the Coordinated Operations of the CVP and SWP, it is our determination that the effects of these transfers on delta smelt and its critical habitat were included in that consultation (Service 2008). We do not anticipate additional adverse effects to delta smelt or its critical habitat, or an increase in the incidental take authorized, beyond what was evaluated in our December 15, 2008, biological opinion.

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

Consultation History

- March 4, 2014 – Meeting held between the Service, DWR, U.S. Geological Survey (USGS), and California Department of Fish and Wildlife (CDFW) focused on draft environmental commitments to conserve the snake. Reclamation recommended that the environmental commitments for water transfers in 2014 should reflect new information published since the 2010 biological opinion. USGS concurred that their data supported revision to the environmental commitments and provided refinements to the technical analysis used to depict areas of highly suitable habitat which likely contained snake populations. Reclamation asked for feedback on the draft language and agreed to modify the technical analysis used to depict snake priority habitat areas.
- April 21, 2014 – The Service issued Biological Opinion for the snake to Reclamation for 2014 Water Transfers (Reference No. 08ESM100-2014-F-0359) (Service 2014)
- November 18, 2014 – The Service received Reclamation's request for formal consultation for the Proposed Long-term Water Transfers from 2015 to 2024.
- February 10, 2015 – The Service requested that Reclamation provide additional information regarding proposed conservation measures for the snake.
- March 17, 2015 – The Service received Reclamation's memorandum with additional information regarding snake research and monitoring and proposed conservation measures.
- April 8, 2015 – The Service received Reclamation's memorandum amending the description of the proposed project to include eight additional sellers, increase the proposed transfer amounts of three existing sellers and adding one buyer, TCCA. Reclamation also revised total maximum potential transfer amount which was incorrect in the November 2014 BA.
- April 23, 2015 – The Service and Reclamation met to discuss the preparation of a programmatic biological opinion with annual appendages and incidental take statements for the remainder of the program.

Description of the Action

The proposed project consists of water transfers to CVP contractors over which Reclamation has approval authority, including any transfers that involve CVP water supplies or require the use of CVP facilities, for a 10-year period (2015-2024). These transfers may result from forbearance¹ actions taken by the sellers and may include Base Supply and Project Water from willing sellers located upstream of the Sacramento-San Joaquin Delta (Delta). Water transfers included in the proposed project represent only a portion of the expected overall transfers between 2015 and 2024. The remaining transfers (SWP) are not dependent on Reclamation's approval; this biological opinion considers these transfers in the context of cumulative effects.

The proposed project consists of making up to 565,614 acre-feet (AF) of water available for transfer each water year (2015 through 2024) through cropland idling/shifting, reservoir releases, conservation measures or groundwater substitution and assumes 100 percent supply is allocated (Tables 1 and 2). The CVP contractors identified in Tables 1 and 2 are the most likely participants through the duration of the proposed project. However, all CVP contractors North of the Delta have the opportunity to participate in the proposed project, subject to Reclamation's review and approval of all transfer proposals². Annual transfer maximums authorized under the proposed project will not exceed the maximum transfer volume of 565,614 AF nor will the maximum annual cropland idling acreages, by region, exceed the values included in Table 4.

Procedures for Appending to the Programmatic Biological Opinion

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

¹ For purposes of this BA, the term "forbear" or "forbearance" will refer to both the Base Supply and Project Water made available under the respective Sacramento River Settlement Contract, although, it is understood the Base Supply will be forborne, while the Project Water will be transferred. Base Supply and Project Water Supply are terms of art from the Sacramento River Settlement Contract which is available at

http://www.usbr.gov/mp/cvpia/3404c/lt_contracts/2005_exec_cts_sac_river/index.html. Base Supply shall mean the quantity of Surface Water established in Articles 3 [refers to Exhibit A: Schedule of Monthly Diversions of Water] and 5 [Constraints on the Availability of Water] which may be diverted by the Contractor from its Source of Supply each month during the period April through October of each Year without payment to the United States for such quantities diverted. Project Water shall mean all Surface Water diverted or scheduled to be diverted each month during the period April through October of each Year by the Contractor from its Source of Supply which is in excess of the Base Supply.

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

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

- all available information including monitoring reports from previous transfers that address amount and locations of fallowed lands;
- giant garter snake and habitat monitoring data; and
- environmental conditions from the previous year(s) and those expected in the coming year.

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

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

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

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

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

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

Source: Reclamation 2014c

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

Water Agency	April – June (AF)				July – September (AF)			
	Groundwater Substitution	Cropland Idling/Crop Shifting	Stored Reservoir Release	Conservation	Groundwater Substitution	Cropland Idling/Crop Shifting	Stored Reservoir Release	Conservation
Sacramento River Area of Analysis								
Anderson-Cottonwood Irrigation District	2,613				2,613			
Burroughs Farms	1,000				1,000			
Canal Farms	575	235			425	400		
Conaway Preservation Group	21,550	7,900			13,450	13,450		
Cranmore Farms	5,140	925			2,860	1,575		
Eastside Mutual Water Company	1,067	683			1,163	1,163		
Glenn-Colusa Irrigation District	12,500	24,420			12,500	41,580		
Maxwell Irrigation District	1,330	888			2,270	1,512		
Natomas Central Mutual Water Company	15,000				15,000			
Pelger Mutual Water Company	2,151	939			2,670	1,599		
Pelger Road 1700, LLC	1,700				1,700			
Pleasant Grove-Verona Mutual Water Co.	8,000	3,330			10,000	5,670		
Princeton-Cordura-Glenn Irrigation District	2,000	1,110			3,000	1,890		
Provident Irrigation District	3,000	1,110			3,000	1,890		
Reclamation District 108	7,500	7,400			7,500	12,600		
Reclamation District 1004		4,625			7,175	7,875		
River Garden Farms	4,000	5,550			5,000	9,450		
Sutter Mutual Water Company		6,600				11,340		
Sycamore Mutual Water Company	7,500	3,700			7,500	6,300		
T&P Farms	650	330			550	560		
Te Velde Revocable Family Trust	2,700	2,581			4,394	4,394		
American River Area of Analysis								
City of Sacramento					5,000			
Placer County Water Agency							47,000	
Sacramento County Water Agency					15,000			
Sacramento Suburban Water District	15,000				15,000			
Yuba River Area of Analysis								
Browns Valley Irrigation District							5,000	3,100
Cordua Irrigation District					12,000			
Feather River Area of Analysis								
Butte Water District	2,750	5,750			2,750	5,759		
Garden Highway Mutual Water Company	6,500				7,500			
Gilsizer Slough Ranch	1,500				2,400			
Goose Club Farms and Teichert Aggregates	4,000	3,700			6,000	6,300		
South Sutter Water District							15,000	
Tule Basin Farms	3,800				3,520			
Merced River Area of Analysis								
Merced Irrigation District							30,000	
Delta Region Area of Analysis								
Reclamation District 2068	2,250	2,775			2,250	4,725		
Pope Ranch	1,400				1,400			
Total (AF)¹	134,426	84,551	0	0	176,590	140,032	97,000	3,100
¹ These totals cannot be added together. Agencies could make water available through groundwater substitution, cropland idling, or a combination of the two; however, they would not make the full quantity available through both methods. This table reflects the total upper limit for each agency.								

Source: Reclamation 2014c

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

Table 3 Potential Buyers (2015)

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

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

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

Reservoir Release

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

Cropland Idling

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

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

Table 4 Maximum Annual Rice Cropland Idling Acreages

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

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

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

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

Year	Butte	Colusa	Glenn	Sacramento	Sutter	Yolo	Yuba	Total	Total Annual Change
1992	76,300	94,800	65,800	8,900	73,100	19,000	31,700	369,600	--
1993	79,300	112,000	74,500	10,400	81,000	21,400	31,300	409,900	40,300
1994	88,000	123,000	81,000	11,500	90,000	26,700	34,000	454,200	44,300
1995	83,000	122,000	79,000	10,300	82,000	27,000	32,000	435,300	-18,900
1996	97,000	136,000	87,000	8,800	86,000	21,600	34,000	470,400	35,100
1997	97,000	137,000	89,000	9,400	90,000	24,000	35,000	481,400	11,000
1998	88,000	121,000	83,000	9,100	91,000	20,400	37,300	449,800	-31,600
1999	102,500	135,000	88,000	9,700	104,500	30,000	39,200	508,900	59,100
2000	98,000	145,000	87,500	9,000	108,000	35,500	39,000	522,000	13,100
2001	86,800	126,300	78,300	7,800	87,700	26,000	37,100	450,000	-72,000
2002	100,000	138,500	87,500	8,200	101,700	31,500	36,000	503,400	53,400
2003	87,800	138,000	82,500	8,100	96,900	32,300	35,400	481,000	-22,400
2004	105,800	156,400	90,300	9,600	124,000	41,900	34,300	562,300	81,300
2005	96,800	145,600	87,100	7,900	101,800	29,200	33,300	501,700	-60,600
2006	99,100	145,900	87,500	3,700	106,600	28,900	33,200	504,900	3,200
2007	102,000	155,000	86,500	3,700	106,000	23,800	33,700	510,700	5,800
2008	96,500	152,000	84,700	2,500	97,300	27,300	35,200	497,500	-13,200
2009	106,400	150,400	85,700	3,120	115,300	35,900	38,000	534,820	37,320
2010	93,800	153,000	85,600	4,184	116,000	41,000	38,700	532,284	-2,536
2011	111,000	154,000	88,600	3,200	123,000	41,000	39,000	561,000	28,716
2012	93,000	157,000	86,000	5,899	119,000	40,461	39,400	540,760	-20,240
2013	104,000	164,000	80,000	8,363	117,000	33,200	37,500	544,063	3,303
Avg.	95,095	139,177	83,868	7,426	100,814	29,912	35,650	492,088	--
Source: U.S. Department of Agriculture 2015; Sacramento County Agricultural Commissioner's annual Stock and Livestock Reports 2015; Yolo County Agricultural Commissioner's 2013 Agricultural Crop Report									

Groundwater Substitution

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

Crop Shifting and Conservation

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

Transfer Quantities

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

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

Consolidated Place of Use

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

Risk and Uncertainty

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

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

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

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

Transfer Length

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

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

Conservation Measures

Reclamation refined the environmental commitments for snakes from the 2014 North to South Water Transfers BA based on best available scientific data on where snake populations are likely to be found (Reclamation 2015). Commitments that broadly restrict idling across the service area were refined to focus on cropland idling restrictions in areas where snakes have a high likelihood of occurrence. Giant garter snake priority habitat areas have been identified by USGS and maps have been developed (Attachment A) for each water district using the information on habitat use, known populations, and historic tule marsh zones. The purpose of these maps is to identify areas with the highest probability of snake occurrence so that water transfer actions can be avoided within these areas. Reclamation is implementing a conservation strategy that requires water be maintained in areas most important to snakes and that water not be transferred from habitat priority conservation areas (e.g., Natomas).

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

All Transfer Methods

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

Cropland Idling/Shifting Transfers

- As part of the approval process for long-term water transfers, Reclamation will have access to the sellers' land to verify how the water transfer is being made available and to verify that actions to protect the snake are being implemented. At the end of each water transfer year, Reclamation will prepare a monitoring report that contains the following:
 - Maps of all cropland idling actions that occurred within the range of potential transfer activities affected by this program;
 - Results of current scientific research and monitoring pertinent to water transfer actions; and
 - A discussion of conservation measure effectiveness.
 - The report will be submitted to the Service and CDFW by January 31, prior to the next year of potential transfers.
- Reclamation will establish annual meetings with the Service to discuss the contents and findings of the annual report. These meetings will be scheduled following the distribution of the monitoring report and prior to the next transfer season.
- If, upon review of monitoring reports or other scientific literature, it appears that the proposed project is having unanticipated effects on snakes, Reclamation will initiate contact with the Service to discuss the information available and effectiveness of conservation measures.
- Movement corridors for aquatic species (including pond turtle and snake) include major irrigation and drainage canals. The water seller will keep adequate water in major irrigation and drainage canals¹. Canal water depths should be similar to years when transfers do not occur or, where information on existing water depths is limited, at least two feet of water will be considered sufficient.

¹ The term "adequate water" is used in the environmental commitments along with objectives of what must be accomplished with this water. Reclamation will review each transfer proposal to make sure that the seller meets these objectives, in accordance with the Mitigation Monitoring and Reporting Plan in Appendix D. These other terms describe agricultural water conveyance and drainage facilities, and are also considered during review of each transfer proposal. (D. Cordova, pers. comm. 2015)

- Districts proposing water transfers made available from idled rice fields will ensure that adequate water is available for priority habitat with a high likelihood of snake occurrence (see Attachment A, Giant Garter Snake Priority Habitat maps). The determination of priority habitat will be made through coordination with snake experts, GIS analysis of proximity to historic tule marsh, and GIS analysis of suitable habitat. The priority habitat areas are indicated on the priority habitat maps for participating water agencies and will be maintained by Reclamation. As new information becomes available, these maps will be updated in coordination with the Service and CDFW. In addition to mapped priority habitat, fields abutting or immediately adjacent to federal wildlife refuges and conservation banks will be considered priority habitat.
- Maintaining water in smaller drains and conveyance infrastructure supports key habitat attributes such as emergent vegetation for snake for escape cover and foraging habitat. If crop idling/shifting occurs in priority habitat areas, Reclamation will work with contractors to document that adequate water remains in drains and canals in those priority areas. Documentation may include flow records, photo documentation, or other means of documentation agreed to by Reclamation and the Service.
- Areas with known priority snake populations and priority habitats with a high likelihood of snake occurrence (60 percent or greater probability) will not be permitted to participate in cropland idling/shifting transfers. Water sellers can request a case-by-case evaluation of whether a specific field would be precluded from participating in long-term water transfers. These areas include lands adjacent to naturalized lands (such as banks) and refuges and corridors between these areas, including but not limited to:
 - Fields abutting or immediately adjacent to Little Butte Creek between Llano Seco and Upper Butte Basin Wildlife Area (WA), Butte Creek between Upper Butte Basin and Gray Lodge WAs, Colusa Basin drainage canal between Delevan and Colusa National Wildlife Refuges (NWR), Gilsizer Slough, Colusa Drainage Canal, the land side of the Toe Drain along the Sutter Bypass, Willow Slough and Willow Slough Bypass in Yolo County, Hunters and Logan Creeks between Sacramento and Delevan NWRs; and
 - Lands in the Natomas Basin.
- Sellers will perform snake best management practices, including educating maintenance personnel to recognize and avoid contact with snakes, dredging only one side of a conveyance channel per year, and implementing other measures to enhance habitat for snakes. Implementation of best management practices will be verified by the sellers or Reclamation and included in the annual monitoring report.
- In order to limit reduction in the amount of over-winter forage for migratory birds, including greater sandhill crane, cropland idling transfers will be minimized near known wintering areas that support high concentrations of waterfowl and shorebirds, such as wildlife refuges and established wildlife areas, which will also benefit the snake. Cropland idling transfers will not be permitted from fields within one-mile radius surrounding the Butte Sink WA, Sutter NWR, Sacramento NWR, Gray Lodge WA, Delevan NWR, Colusa NWR, Upper Butte Basin WA, and Yolo Bypass WA.

- Reclamation will provide digital maps to the Service in June of each year showing the parcels of riceland that are proposed for the purpose of transferring water for that year. These maps will be prepared to comport to Reclamation's GIS standards.

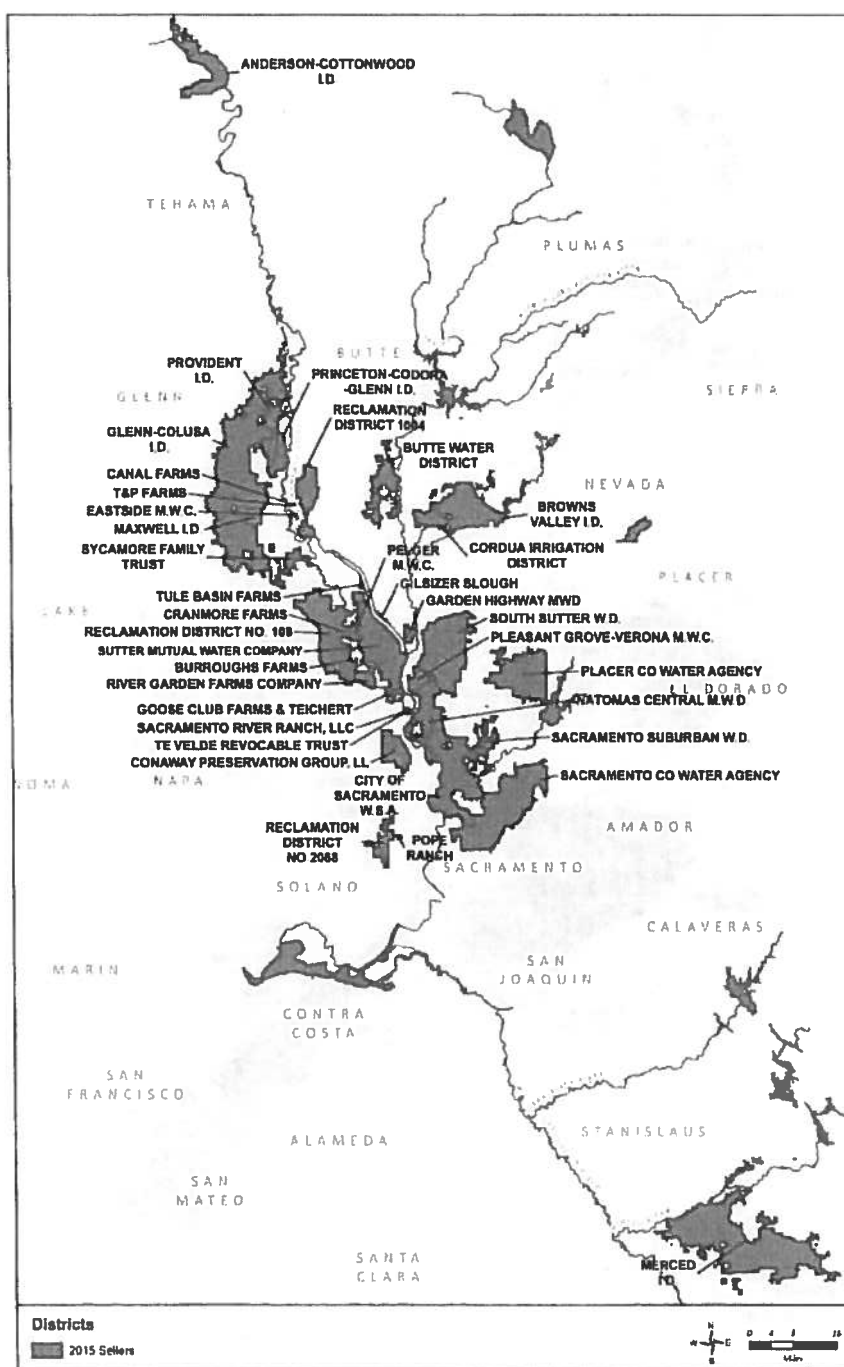
Action Area

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

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

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







Analytical Framework for the Jeopardy Analysis

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

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

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

Status of the Species

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

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

Snake Research Associated with CVP/SWP Conservation Programs

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

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

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

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

USGS WERC has also estimated home range sizes for snakes and determined median home ranges that are generally less than 100 acres in size, demonstrating that snakes typically use relatively small areas, even though they are capable of moving longer distances (up to five miles in a few days). Home range sizes for snakes at the Gilsizer Slough study site varied from approximately five acres to 212 acres with a median of 39.5 acres. In the Natomas Basin, home range sizes varied from 32 acres to 214 acres with a median of 86 acres. USGS WERC has also studied snakes at the Colusa NWR

where home range sizes were found to be highly variable. Home range sizes estimated for year 2000 ranged from 2.5 to 81.5 acres with a median of 42 acres and for 2001 from 7.4 to 427.5 acres with a median of 59.3 acres. These home ranges are about half the size of those estimated for the study period 1996-97 (home ranges varied from 3.2 acres to 2,792 acres with a median of 103.8 acres). USGS-WERC concluded that home range sizes decreased as more summer water became available to the snake on the refuge in the later study period.

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

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

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

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

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

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

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

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

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

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

Table 6 CVPCP and HRP Funded Giant Garter Snake Grants

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

Source: D. Cordova pers. comm. 2015

Environmental Baseline

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

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

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

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

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

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

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

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

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

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

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

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

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

In studies of marked snakes in the Natomas Basin, snakes moved about 0.25 to 0.5 miles (0.4 to 0.8 kilometers) per day (Hansen and Brode 1993). Total activity, however, varies widely between individuals. Individual snakes have been documented to move up to 5 miles (8 kilometers) over a few days in response to dewatering of habitat (Wylie *et al.* 1997) and more than 8 miles (12.9 kilometers) of linear aquatic habitat over the course of a few months. Estimated home ranges in the Natomas Basin and Colusa NWR of snakes have averaged about 0.1 mile (25 hectares) in both the Natomas Basin and the Colusa NWR (Wylie 1998a; Wylie *et al.* 2002a; Wylie *et al.* 2002b). Home range estimates for giant garter snakes near the restored wetlands at Colusa NWR were generally smaller than previously found at the refuge when the lands were managed for waterfowl and in other off-refuge study areas (Wylie *et al.* 2000a). Wylie hypothesized that maintaining water in restored wetlands and nearby habitat provided sufficient conditions to meet the biological requirements of the giant garter snakes; individuals were less likely to move further distances as in previous years when conditions were drier and water was not maintained specifically to benefit giant garter snakes (Wylie *et al.* 2000a).

Factors Affecting the Snake within the Action Area

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

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

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

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

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

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

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

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

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

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

Past Water Transfer Programs

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

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

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

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

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

Effects of the Action

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

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

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

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

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

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

skewing the age structure of the population to older snakes. Juveniles and neonates also rely on developing sufficient body mass prior to overwintering in order to survive long periods without foraging.

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

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

The proposed conservation strategy ensures that most or all canals and waterways, which make up a portion of snake aquatic habitat, will remain wetted during the summer months, thereby providing refuge to snakes. The conservation measures, as proposed by Reclamation, will minimize the effects of the proposed project by providing assurances that in specific high priority snake habitat areas, as described in section 2.6.3 of the biological assessment, transfers “...will not be permitted...” In other areas where high quality snake habitat exists and snakes are known to occur, as described in Appendix A of the Biological assessment, sellers will be required to maintain habitat features (ditches, drains, conveyance structures, etc.) in an aquatic condition that can be used by snakes, thus providing habitat across the action area.

These measures were developed using the best available science on snake biology, habitat use and suitability, and known occurrences (Halstead et al 2013, Halstead B.J. 2010). The measures focus conservation in the most important areas for snakes, considering high quality habitat and known use by snakes. These conservation measures will be implemented in areas with a high likelihood of snake occurrence (60% or greater probability) and will encompass 80% of all known snake detections (Reclamation 2014). Maintaining water in drains and conveyance structures in these areas will also maintain emergent cover for snake foraging and escape habitat over the action area. Other measures, implemented during water conveyance structure maintenance, will also be important minimization measures and include cleaning only one side of the conveyance channel per year and when mowing allowing sufficient remaining vegetation to avoid direct mortality to snakes.

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

Cumulative Effects

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

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

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

Conclusion

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

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

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

implement adaptive management measures to assure effective implementation of the conservation measures.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harass is defined by FWS regulations at 50 CFR 17.3 as an intentional or negligent act or omission which creates the likelihood of injury to a listed species by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering. Harm is defined by the same regulations as an act which actually kills or injures wildlife. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with this Incidental Take Statement. This incidental take statement does not authorize any incidental take of listed species resulting from related actions that are not part of or controllable by Reclamation, long-term water transfer water sellers, or long-term water transfer water purchasers, and that are not included in the project description of this biological opinion.

The measures described below are non-discretionary, and must be implemented by Reclamation so that they become binding conditions of any agreement, contract, grant or permit issued to the applicant, as appropriate, in order for the exemption in section 7(o)(2) to apply. Reclamation has a continuing duty to regulate the activity covered by this incidental take statement. If Reclamation (1) fails to assume and implement the terms and conditions or (2) fails to require the applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to any agreement, contract, permit, or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, Reclamation must report the progress of the action and its impact on the snake to the Service as specified in the incidental take statement [50 CFR §402.14(i)(3)].

Amount or Extent of Take for 2015

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

Based on our analysis presented in the *Environmental Baseline* and *Effects of the Proposed Action* sections, which describe how the majority of the action area, both under current and proposed land management, is considered to be snake habitat, we anticipate that snakes are likely to be exposed to adverse effects from the proposed rice field fallowing and crop shifting. The incidental take is

expected to be in the form of harm as displaced snakes may be taken by predators or may die or suffer reproductive failure if they cannot successfully relocate and utilize suitable habitat on or adjacent to a field fallowed as a result of implementation of this water transfer program in 2015 in and around the 60,693 acres of rice fields that are idled or have alternative crops.

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

Effect of the Take

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

Reasonable and Prudent Measures

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

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

Terms and Conditions

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

1. For lands where cropland idling or crop shifting will occur, Reclamation shall condition the contracts between them and potential water sellers to include the conservation measures contained in the project description and the terms and conditions including access by Reclamation and Service personnel to said lands to validate their implementation.
2. No later than December 31, 2015, Reclamation shall submit to the Service a supplement to the conservation measures which will establish performance measures and metrics to evaluate their effectiveness. This supplement shall identify the data needed to produce estimates of change or trends in snake reproduction, numbers, and distribution in the action area.
3. Reclamation shall submit a monthly compliance report to the Service's Sacramento Fish and Wildlife Office beginning thirty (30) calendar days from issuance of this biological opinion. This report shall detail (i) acreage and location of seller's parcels affected by crop idling/crop substitution and maps of where the cropland idling or cropland shifting occurred; (ii) confirmation that, where appropriate, buffer zones have been complied with; (iii) confirmation that, where appropriate, water

levels are being maintained in ditches around affected fields; (iv) occurrences of incidental take of any snakes including an updated occurrence map based on the most recent data available; (v) an explanation of failure to meet such measures, if any; and (vi) other pertinent information. GIS shape files of the parcels that were fallowed will be in projected coordinate system NAD 1983 Zone 10 N.

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

Reporting Requirements

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

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The Service recommends the following actions:

1. Reclamation should assist the Service in implementing recovery actions identified in the *Draft Recovery Plan for the Giant Garter Snake* (Service 1999) or any final recovery plan for the giant garter snake issued during the transfer action.
2. Reclamation should work with the Service, DWR, and water contractors to investigate the long-term response of snake individuals and local populations to annual fluctuations in habitat from fallowing rice fields.
3. Reclamation should support the research goals of the Giant Garter Snake Monitoring and Research Strategy for the Sacramento Valley proposed in the project description of this biological opinion.
4. Reclamation should work with the Service to create and restore additional stable perennial wetland habitat for snakes in the Sacramento Valley so that they are less vulnerable to

market-driven fluctuations in rice production. The CVPLA (b)(1) other and CVPCP conservation grant programs would be appropriate for such work.

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

REINITIATION - CLOSING STATEMENT

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

- (a) If the amount or extent of taking specified in the incidental take statement is exceeded;
- (b) If new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered;
- (c) If the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the biological opinion; or
- (d) If a new species is listed or critical habitat designated that may be affected by the identified action.

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

cc:

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

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