SAN LUIS UNIT

FINAL ENVIRONMENTAL ASSESSMENT

INTERIM CONTRACT RENEWAL

Appendix E
San Luis Unit Interim Contract Renewal Biological Opinion

November 2007

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United States Department of the Interior
FISH AND WILDLIFE SERVICE
Sacramento Fish and Wildlife Office
2800 Cottage Way, Room W-2605
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In reply refer to: 81420-2008-F-0538

DEC 18 2007

Memorandum

To: Chief, Resources Management Division, Bureau of Reclamation, South-Central California Area Office, Fresno, California

From: Field Supervisor, Sacramento Fish and Wildlife Office, Sacramento, California

Subject: Consultation on the Interim Renewal of Water Service Contracts with Westlands Water District, California Department of Fish & Game, and the Cities of Avenal, Coalinga, and Huron

This document transmits the Fish and Wildlife Service's (Service) biological opinion (BO) based on our review of the proposal to execute five Interim Renewal Contracts for periods of 26 months, beginning on January 1, 2008, and January 1, 2009, in accordance with section 7 of the Endangered Species Act (ESA) (16 U.S.C. 1531 *et seq.*). We received your July 17, 2007 request for formal consultation on July 18, 2007.

This memorandum is in response to your July 17, 2007, memorandum (Memo) requesting initiation of formal consultation pursuant to section 7(a) of the Endangered Species Act of 1973, for the execution of 26-month Interim Renewal Water Service Contracts (IRC's) on behalf of the Bureau of Reclamation (Reclamation) and five Central Valley Project (CVP) co-applicants: the California Department of Fish and Game (CDFG) Mendota Wildlife Management Area (WMA), the cities of Avenal, Coalinga and Huron, and Westlands Water District (WWD). The current WWD contract expires at the end of this year (2007). The other San Luis Unit (SLU) contracts expire at the end of 2008. Westlands interim contract would begin on January 1, 2008and expire on February 28, 2010, and the remaining four interim contracts would begin on January 1, 2009 and expire on February 28, 2011.

Introduction

Reclamation has requested initiation of formal consultation under the ESA based on the information provided for the SLU long term contract renewal (LTCR) consultation (the 2004 Biological Assessment and Draft Environmental Impact Statement, two responses to the Service's insufficiency memoranda, additional information generated by the Endangered Species Recovery Program, and in the May 2007 Draft Environmental Assessment, San Luis Unit Water Service Interim Renewal Contracts— 2008- 2011). The proposed action is the execution of Interim water service contracts for CDFG, City of Avenal, City of Coalinga, City of Huron, and Westlands WD in amounts up to a maximum of 1,166,510 acre-feet (af) that provides for

delivery of "a maximum quantity of water subject to hydrological and regulatory constraints for up to the full contract amounts", as described in Reclamation's September 2005 LTCR Memo and attachments.

Relationship of the Proposed Action to Other Reclamation Actions

The proposed action does not include the execution of water service contracts for Panoche Water District (Panoche WD) and San Luis Water District (San Luis WD). Although the Service will approach the consultation for the proposed actions of executing interim renewal contracts for those districts similarly, Reclamation has decided not to consult on those contracts at this time, deferring formal consultation until some time in 2008. Reclamation's decision to defer consultation on the Panoche WD and San Luis WD interim contracts was based at least in part on the fact that the existing contracts for those districts do not expire until December 31, 2008, and Reclamation intends to reinitiate consultation on the Grasslands Bypass Project (GBP).

Reclamation is still in the process of defining the project description that will be included in the reinitiated consultation. The GBP participants intend to acquire lands to use for expansion of the reuse areas, which were analyzed in the existing GBP BO. New information developed has identified 151 acres of the proposed acquisition as alkali scrub, alkali meadow, and marsh. This new information will be analyzed during the GBP reconsultation. The consultation on the Panoche WD and San Luis WD interim contracts will be complete in 2008, after the GBP reinitiated consultation, a project to manage subsurface drainage water originating, in part, within those two districts.

The Service is aware that a new agreement to continue the Grassland Bypass Project is being negotiated among the parties. These negotiations are not expected to be completed until late 2008. Once that negotiation is complete, and a new use agreement has been developed to the point where a project description can be adequately described, Reclamation and the Service will reinitiate consultation on the GBP, this time based on the new agreement. That subsequent consultation is expected to occur after consultation on the Panoche WD and San Luis WD interim contracts.

The interim renewal contracts will apply the same interim shortage provisions that are currently applied to existing contracts, in accordance with the June 9, 1997 Central Valley Project Improvement Act (CVPIA) Administrative Proposal on Urban Water Supply Reliability (p. 2-29, CVPIA Programmatic biological opinion, Service file no. 1-1-98-F-0124). These interim renewals will not change contract terms or conditions governing the allocation of project water during a drought emergency, so would not provide additional water reliability. As a result, we do not anticipate the 2008 interim renewal contracts to affect water allocations identified by existing CVP operations criteria. We expect Reclamation to analyze the effects of permanently converting CVP contracts to a mixed Ag/M&I purpose of use within the long term contract renewal consultations, and to also analyze possible service-area effects of Reclamation's M&I Shortage Policy under the long-term contract renewal consultations (see **Environmental Baseline**).

Background

This consultation addressed the potential effects of the proposed federal action to the following species: Buena Vista Lake shrew (*Sorex ornatus relictus*), Fresno kangaroo rat (*Dipodomys nitratoides exilis*), giant kangaroo rat (*Dipodomys ingens*), riparian woodrat (*Neotoma fuscipes riparia*), California condor (*Gymnogyps californianus*), California red-legged frog (*Rana aurora draytonii*), California tiger salamander (*Ambystoma californiense*), vernal pool fairy shrimp (*Branchinecta lynchi*), vernal pool tadpole shrimp (*Lepidurus packardi*), palmate-bracted bird's-beak (*Cordylanthus palmatus*), valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*), California clapper rail (*Rallus longirostrus obsoletus*), Tipton kangaroo rat (*Dipodomys nitratoides nitratoides*), blunt-nosed leopard lizard (*Gambelia silus*), California least tern (*Sterna antillarum browni*), California jewelflower (*Caulanthus californicus*), San Joaquin woolly-threads (*Monolopia congdonii*), giant garter snake (*Thamnophis gigas*), and San Joaquin kit fox (*Vulpes macrotis mutica*). Bald eagle (*Haliaeetus leucocephalus*) is not being considered because it was delisted on July 9, 2007 (50 CFR 17 37346 – 37372). The effects of water diversion on Delta smelt (*Hypomesus transpacificus*) and Delta smelt Critical Habitat are being analyzed in the consultation being conducted on the Operating Criteria and Plan currently underway. See Contemporaneous Consultation below.

Reclamation and Service conducted discussions and site visits on the potential effects of the proposed action and have determined that delivery of CVP water under the proposed interim contract renewal is not likely to adversely affect Tipton kangaroo rat (*Dipodomys nitratoides nitratoides*), blunt-nosed leopard lizard (*Gambelia silus*), California least tern (*Sterna antillarum browni*), California jewelflower (*Caulanthus californicus*), San Joaquin woolly-threads (*Monolopia congdonii*). Giant garter snake (*Thamnophis gigas*) and San Joaquin kit fox (*Vulpes macrotis mutica*) are the primary species if concern for this consultation.

Our approach to water contract consultations is that the environmental baseline represents environmental conditions/species' status prior to the renewal of the contract; impacts of future water deliveries are not part of the environmental baseline. The direct; interrelated and interdependent actions; indirect effects; and cumulative effects of the action are determined based on the effects of water deliveries over the Interim contract period, including continuation of any ongoing actions. In short, we view them as effects from a proposed Federal action that have not undergone section 7 consultation.

Direct effects

We therefore intend to address the effects of future implementation of Interim contracts, including the effects of interrelated and interdependent actions, as effects of the Federal action, not as part of the environmental baseline. The jeopardy analysis will compare the environmental baseline that exists at the time of the Federal action to the adverse effects of the Federal action projected into the future, starting at the time the Federal action is taken, including the effects of interrelated and interdependent actions.

Indirect Effects

Indirect effects are effects caused by or result from the proposed action, will occur later in time, and are reasonably certain to occur. Indirect effects may also occur outside of the area directly

affected by the action. Indirect effects to listed species or suitable habitat has likely occurred as a result of the delivery of CVP water to the individual water districts or municipalities during the life of the existing water delivery contract. Many of these activities took place prior to implementation of the ESA in 1973 and prior to the listing of the species listed below and were not subject to the provisions of the ESA. Land use decisions subsequent to that time have continued to result in adverse effects to the species and suitable habitat and have not been authorized incidental take under section 9 or 10 of the ESA. A search of CEQA Net (www.ceqanet.ca.gov) on December 17, 2007 revealed a number of proposed development projects which will receive CVP contract water. The City of Avenal is considering development proposals totaling approximately 184 acres; the City of Coalinga is considering development proposals totaling approximately 1,441 acres, the City of Huron is considering development proposals totaling approximately 298 acres. These developments may result in indirect effects to listed species or habitat suitable for their use which would likely result in the take of protected species. Any such take which occurs during the interim contract period will not be exempt under this biological opinion from the provisions of Section 9 of the ESA. To avoid this take being in violation of the ESA, consultation on the proposals should be accomplished by the applicants.

In order to proceed with long term contract renewals for SLU urban contractors, Reclamation should facilitate and coordinate meetings between the applicants and the Service to develop conservation measures that prevent adverse effects to listed species from developments in the vicinity of listed species and their habitats in the action area. Such measures could include a commitment to complete an HCP within a prescribed period of time, and short-term conservation measures to be implemented prior to the completion of an HCP (e.g., a requirement that project proponents provide evidence of compliance with the Act prior to approval of any action or project within the action area).

Determinations of "No Effect"

We have reviewed the information provided in your September 14, 2004 memorandum, the accompanying Biological Assessments for long-term contract renewals provided for the WD's in the SLU dated July 15, 2003, supplemental information provided by your office and by Reclamation's Mid-Pacific Region, including Federal and State GIS data, the Environmental Impact Statement (and Supplement) for long-term contract renewals provided for the San Luis Unit (dated November 2004), the Environmental Assessment for the SLU IRC's, information gathered during site visits, and other information available to us, and agree with Reclamations determination that the proposed renewal of interim CVP water service contracts will have no effect on, the following species:

- No Effect:
  - Buena Vista Lake shrew (*Sorex ornatus relictus*; Federal status: endangered)
  - Fresno Kangaroo rat (*Dipodomys nitratoides exilis*; Federal status: endangered)
  - Giant Kangaroo rat (*Dipodomys ingens*; Federal status: endangered)
  - Riparian woodrat (*Neotoma fuscipes riparia*; Federal status: endangered)

- Bald eagle (*Haliaeetus leucocephalus*; Federal status: delisted, formerly threatened)
- California condor (*Gymnogyps californianus*; Federal status: endangered)
- California red-legged frog (*Rana aurora draytonii*; Federal status: threatened)
- California tiger salamander (*Ambystoma californiense*; Federal status: threatened)
- Vernal pool fairy shrimp (*Branchinecta lynchi*; Federal status: threatened)
- Vernal pool tadpole shrimp (*Lepidurus packardi*; Federal status: endangered)
- Palmate bracted bird's beak (*Cordylanthus palmatus*)
- Valley elderberry longhorn beetle (*Desmocerus californicus dimorphus;* Federal status: threatened)
- Delta smelt and Delta smelt Critical Habitat (*Hypomesus transpacificus*; Federal status: threatened)
- California clapper rail (*Rallus longirostrus obsoletus*; Federal status: Endangered)

We have reached this determination because either the current range for the species does not extend into the SLU or there are no known occurrences of the species inside the action area that would be affected by the continued delivery of CVP water during the interim contract period

Biological Opinion

This biological opinion is based on information provided in your request dated July 17, 2007, for formal consultation, information contained in the draft Environmental Assessment dated May 2007, information contained in the biological assessment for long-term water service contract renewal dated September 14,2004, information provided by Reclamations South Central California Area Office (SCCAO) for the San Luis Drainage Features Reevaluation, for the long term contract renewal for the San Luis Unit contractors, and the 2000, 2002, and 2004 biological opinions on interim CVP contract renewals, and other information in our files. These documents are described in the Consultation History section below. A complete administrative record of this consultation is on file in the Service's Sacramento Fish and Wildlife Office.

After review of information available to us and discussions with SCCAO and Reclamations Mid-Pacific Regional Office staff; we concur with Reclamations determination that renewal of the CVP interim water service contract for the Cities of Avenal, Coalinga, and Huron, WWD, and CDFG is not likely to adversely affect the following species. The proposed project does not affect any critical habitat because no critical habitat has been designated for these species within the action area.

- Not Likely to Adversely Affect:
  - Tipton kangaroo rat (*Dipodomys nitratoides nitratoides*; Federal status: endangered)
  - San Joaquin kit fox (*Vulpes macrotis mutica*; Federal status: endangered)
  - Blunt-nosed leopard lizard (*Gambelia silus*; Federal status: endangered)

- California least tern (*Sterna antillarum browni*; Federal status: endangered)
- Giant garter snake (*Thamnophis gigas*; Federal status: threatened)
- California jewelflower (*Caulanthus californicus*; Federal status: endangered)
- San Joaquin woolly-threads (*Monolopia congdonii*; Federal status: endangered)

We have reached this determination based on the reasons contained in the following table:

Table 2. Summary of Species Not Likely to be Adversely Affected

Species	*Reason for Concurrence*
San Joaquin kit fox	The currently known species range encompasses all of SLU, on-going urban development and changes in crop type continue to eliminate suitable habitat; additional land conversions unlikely over the period of the IRC's; effects of farming attributable to the proposed federal action are not subject to a severable analysis of effects from actions by other entities; urban areas in the Cities of Avenal and Huron are not projected to experience significant growth over the period of the IRC's. Known habitat in Coalinga is either situated in areas that are within the FEMA flood zone and off limit to development, or interspersed within the petroleum fields.
Tipton kangaroo rat	Historically known to occur in action area although no sightings have been reported since 1992 from Merced, Madera, or Fresno Counties. Two populations reported in Kings County (one at Lemoore NAS). On-going urban development and changes in crop type continue to eliminate suitable habitat; additional land conversions unlikely over the period of the IRC's; effects of farming attributable to the proposed federal action are not subject to a severable analysis of effects from actions by other entities; urban areas in the Cities of Avenal and Huron are not projected to experience significant growth over the period of the IRC's. Known habitat in Coalinga is either situated in areas that are within the FEMA flood zone and off limit to development, or interspersed within the petroleum fields.
California least tern	Although present in the action area (at evaporation ponds) the delivery of CVP water will not result in changes to existing ponds in the region
Blunt-nosed leopard lizard	Currently known to occur in Action Area from the Anticline Ridge and Kettleman Hills in the Coalinga and Avenal WD's and in the western areas of the Westlands WD; on-going urban development and changes in crop type continue to eliminate suitable habitat; additional land conversions unlikely over the period of the IRC's; effects of farming attributable to the proposed federal action are not subject to a severable analysis of effects from actions by other entities; however, urban areas in the Cities of Avenal and Huron are not projected to experience significant growth during the duration of the IRC's. Known habitat in Coalinga is either situated in areas that are within the FEMA flood zone and off limit to development, or interspersed within the petroleum fields.
Giant garter snake	In the WWD, there is no collection of subsurface or surface drainage, and there is no discharge of any subsurface drainage outside district boundaries. Although present in the drainage canals in the northern portion of the action area, the continued delivery of CVP water will not result in a change from the base condition
California jewelflower	Populations are known to occur within the CVP place of use and sphere of influence for the City of Avenal and the City of Coalinga and were present historically within the City of Huron; on-going urban development and changes in crop type continue to eliminate suitable habitat; however, urban areas in the Cities of Avenal, and Huron are not projected to experience significant growth during the duration of the IRC's. Known habitat in Coalinga is either situated in areas that are within the FEMA flood zone and off limit to development, or interspersed within the petroleum fields.

San Joaquin woolly-threads	Substantial populations are known to occur within the CVP place of use and sphere of influence for the City of Avenal and the City of Coalinga; on-going urban development and changes in crop type continue to eliminate suitable habitat; however, urban areas in the Cities of Avenal and Huron are not projected to experience significant growth during the duration of the IRC's. Known habitat in Coalinga is either situated in areas that are within the FEMA flood zone and off limit to development, or interspersed within the petroleum fields.

Consultation History

In November 2000, the Service issued a BO on the Implementation of the Central Valley Project Improvement Act and Continued Operation and Maintenance of the Central Valley Project (CVPIA BO) (Service 2000). The CVPIA BO addressed both the overall operation and maintenance of the CVP and implementation of the Central Valley Project Improvement Act (CVPIA). Because the CVPIA BO is a programmatic document, subsequent site-specific evaluations are being prepared to analyze the effects of implementing specific actions of the CVPIA on listed species, and the Interim water service contract renewals are an action requiring site-specific evaluation.

Reclamation and the Service also continue to consult on several other large-scale projects within the San Joaquin Valley and the Delta that may affect listed species. The results of these other consultations are or will be BO's that stand on their own merits and that establish thresholds to ensure the survival and recovery of listed species. These BO's are listed below. Where applicable, the Service file numbers are in parentheses and species addressed in each are provided for additional information.

September 14, 2004. Reclamation submittal of Biological Assessment and request for formal consultation for the long-term contract renewal (LTCR) of SCCAO Water contracts for SLU unit.

November 3, 2004. Reclamations R requests formal reinitiation of consultation on OCAP to address critical habitat issues and effects on delta smelt.

November 24, 2004. Service issued an insufficiency memorandum outlining lack of information and requesting additional information from SCCAO on SLU LTCR consultation.

February 15, 2005. Biological Opinion (1-1-05-F-0055), delta smelt and critical habitat.

May 19 and September 27, 2005. Reclamation provided additional information (and requested that consultation be initiated in their September 27 memorandum) for SLU LTCR consultation.

July 6, 2006. Reclamation requested that the Service reinitiate consultation on delta smelt

May 2007. Draft Environmental Assessment, San Luis Unit Water Service Interim Renewal Contracts— 2008- 2011

July 17, 2007. Reclamation requested initiation of formal consultation pursuant to section 7(a) of the Endangered Species Act of 1973, for the execution of 26-month Interim Water Service Contracts

August 20, 2007. Service responded to request for formal consultation with an insufficiency memo (1-1-07-I-1405), identifying additional information needs

October 25, 2007. Reclamation responded to information request (via email) with the requested additional information

Project Description

The proposed action is to execute contract up to the maximum quantity of water available for the combined five interim water service contracts of 1,166,510 acre-feet per year (afy). However, under the terms of the five IRC's the "maximum quantity of water (is) subject to hydrological and regulatory constraints", as described in Reclamation's September 27, 2005 Memorandum and attachments (which responded to a request for additional information for the section 7 consultation on renewal of the long-term SLU contracts (LTCR); this consultation has been suspended pending completion of the section 7 consultation for the Operations Criteria and Plan). The water delivered under the five IRC's will be used for agricultural and municipal and industrial (Ag and M&I) within the designated CVP place of use identified in the Attachment A maps for the individual contracts. See Table 1 below.

Table 1. CVP Interim Water Service Contract Amounts and Service Areas for Contractors in the San Luis Unit

Contractor	Water Service Contract Amount (acre-feet)	Area (acres)	Primary Contract Use	Contract Period (months)
CDFG (Mendota WMA)	10	>1	M&I	01/01/2009-02/28/2011 (26)
City of Avenal	3,500	13,120	M&I	01/01/2009-02/28/2011 (26)
City of Coalinga	10,000	38,585	M&I	01/01/2009-02/28/2011 (26)
City of Huron	3,000	830	M&I	01/01/2009-02/28/2011 (26)
Westlands Water District	1,150,000	596,749	Agriculture	01/01/2008-02/28/2010 (26)
TOTAL Contract Amount	*1,166,510*			

The purpose of the proposed action is to execute five San Luis Unit interim renewal contracts for up to two years and two months (26 months) each, beginning in January 1, 2008 for WWD and January 1, 2009 for the other six interim renewal contractors as required by, and to further implement CVPIA Section 3404(c). Execution of these five interim renewal contracts will provide the contractual relationship for the continued delivery of CVP water to these contractors pending execution of their long-term renewal contracts.

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

On November 20, 1969, the City of Avenal signed a long-term contract (Contract 14-06-200-4619A) with Reclamation for up to 3,500 af of CVP water annually. This contract will remain in effect through December 31, 2008. The City of Avenal's water supply source is CVP water from the San Luis Canal. All of Avenal's CVP water supply is used for M&I purposes. Under a formal agreement, Avenal supplies Avenal State Prison with 1,411 af of water annually. The City of Avenal also provides water service to the urbanized portions of Avenal and a limited number of

connections in the northern portion of the community. Avenal does not pump any groundwater. The poor quality of the groundwater and its high concentrations of sulfate, nitrates, and sodium preclude its use for domestic purposes. The City of Avenal's water needs analysis completed by Reclamation in July 2000 estimated that there would be an unmet demand of 391 af for 2025 with an estimated population of 12,000; however the City of Avenal's web page(www.city-data.com/city/Avenal-California.html) lists a current population of 16,737 with a projected population of .

The City of Coalinga's sole water supply source is CVP water obtained at a single turnout from the Coalinga Canal, which is fed by the San Luis Canal. Because WWD operates the US owned pipeline, the City of Coalinga pays an operation and maintenance charge to WWD for transporting CVP water to obtain its CVP supply. The City of Coalinga supplies potable water to almost all of the residences within its service area. The current long-term contract required Coalinga to abandon its former source of water supply (i.e., pumping water from groundwater wells) and to depend on its CVP supply as its M&I water supply. The City of Coalinga's water needs analysis completed by Reclamation in July 2000 estimated that there would be no unmet demand for 2025 however the City of Coalinga's web page (www.coalinga.com) lists a current population of 12,200 and the Draft General Plan Update 2005-2025 projects a population of 22,185.

The City of Huron's only water supply is CVP water received from a lateral connection to the San Luis Canal. Water is transported to Huron via Lateral 27, which is operated by WWD. Huron pays WWD O&M costs for transportation of their CVP supply. Huron does not pump groundwater. Groundwater in the area is very deep, of poor quality and almost non-potable. The City of Huron's water needs analysis completed by Reclamation in July 2000 estimated that there would be no unmet demand for 2025; however the City of Huron's web page (www.fresnocog.org/city) lists a current population of 7,493. and the water needs assessment projects a population of 12,810.

The CDFG currently receives 10 af of M&I water for domestic use at the headquarters of the Mendota Waterfowl Management Area. On January 1, 1976, the CDFG signed a long-term contract (Contract 14-06-200-8033A-LTR1) with Reclamation to supply 10 af of supply for domestic use at the Mendota Waterfowl Management Area headquarters, near the City of Mendota. The CVP supply is the CDFG's only long-term water supply used at this facility.

WWD's permanent distribution system consists of 1,034 miles of closed, buried pipeline that conveys CVP water from the San Luis and Coalinga Canals and 7.4 miles of unlined canal that conveys CVP water from the Mendota Pool. The area served by the system encompasses approximately 88 percent of the irrigable land in the district, including all land lying east of the San Luis Canal. The district also operates and maintains the 12-mile-long, concrete-lined Coalinga Canal, the Pleasant Valley Pumping Plant, and the laterals that supply CVP water to Coalinga and Huron. WWD provides water via gravity water service and pumping from the San Luis Canal depending on location.

On June 5, 1963, WWD entered into a long-term contract (Contract 14-06-200-495-A) with Reclamation for 1,008,000 af of CVP supply from the San Luis Canal, Coalinga Canal, and Mendota Pool. In a stipulated agreement dated September 14, 1981, the contractual entitlement

to CVP water was increased to 1.15 million af. The long-term contract will expire on December 31, 2007. The first deliveries of CVP water from the San Luis Canal to WWD began in 1968.

In 1999, Reclamation stated that the estimated average long-term supply for WWD was 70 percent of its water supply contract, or about 805,000 af per year. Prior to 1990, its average CVP water supply, including interim CVP water when it was available, was approximately 1,250,000 af per year, and associated groundwater pumping in the district averaged approximately 150,000 af per year. The needs analysis completed by Reclamation in July 2000 estimated that the unmet demand in WWD for 2025 would be approximately 74,287 af per year. (

As noted above, in addition to the CVP supply, groundwater is available to some of the lands within WWD. The safe yield of the aquifer underlying WWD is approximately 200,000 af of EA-07-56 - 31 – Draft Environmental Assessment water. WWD supplies groundwater to some district farmers and owns some groundwater wells, with the remaining wells privately owned by water users in WWD. Other water supply sources available to the district for purchase include floodwater diverted from the Mendota Pool in periods of high runoff.

Execution of interim contracts is needed to continue delivery of CVP water to interim contractors until the long-term contracts can be executed. The period of renewal for each interim contract would normally be for up to two years, as permitted under subsection 3404(c)(1) of the CVPIA. The current contract provisions are those that are included in the existing water service contracts, with only minor, administrative changes to the contract provisions. Existing contract provisions such as payment, water quality, water measurement, water conservation, water shortage, discretionary provisions of the Reclamation Reform Act, Endangered Species Act compliance, and standard articles have not changed. Interim Central Valley Project (CVP) water contract renewals are consistent with the tiered implementation of the CVPIA, as described in the biological opinion on Implementation of the CVPIA (CVPIA opinion, Service File No., 1-1-98-F-0124).

In addition, Article 3(b) of the existing Interim renewal contracts includes mutual and dependent covenants mutually agreed upon by the parties, related to Water to be Made Available and Delivered to the Contractor as follows, "The Contractor shall utilize the Project Water made available to it pursuant to this interim renewal contract in accordance with all applicable requirements of any Biological Opinion addressing the execution of this interim renewal contract developed pursuant to section 7 of the ESA of 1973 as amended, and in accordance with environmental documentation as may be required for specific activities, including conversion of Irrigation Water to M&I Water." Part of the Service and Reclamation strategy to ensure compliance with the ESA includes a commitment for Reclamation to "provide necessary information to the Service's SFWO Endangered Species Division in situations where a determination of *no affect* [*sic*] has been made, sufficiently in advance, to enable the Service's review. Reclamation actions subject to this requirement include conversion of Irrigation Water to M&I water (CVPIA programmatic biological opinion, p. 2-70, Service File no. 1-1-98-F-0124).

Water will be delivered to the interim water service contractors in quantities up to the contract totals. These 2008 interim renewal contract quantities remain the same as in the existing water service contracts.

No changes to district boundaries are part of the proposed action. Reclamation will consult with or notify the Service (as appropriate) on future inclusions and exclusions to any interim renewal contract service-area boundaries to determine if any inclusions or annexations affect listed species.

No water transfers are part of the proposed action. Appropriate environmental compliance and section 7 consultations will be completed for any other requests from interim contractors for Reclamation approval of CVP water transfers.

Warren Act contracts for conveyance of non-federal water using federal facilities are not part of the proposed action. The Mendota Pool Pumpers Exchange Agreement and other non-Central Valley Project Waters that are pumped into the Mendota Pool are also not part of the proposed action.

Potential impacts arising from future assignments of water are also not included in the proposed action. They are separate independent actions and require their own NEPA and ESA compliance.

Changes to the existing Operations and Criteria and Plan (OCAP) were addressed in our February 15, 2005 biological opinion (Service File No. 1-1-05-F-0055) and are discussed below in the **Environmental Baseline**. Consultation on OCAP was reinitiated on July 6, 2006 as a result of the listing of the distinct population segment of the North American green sturgeon by National Marine Fisheries Service. See Contemporaneous Consultations discussion below.

Action Area

The action area (see 50 CFR §402.02) for this opinion falls mainly within portions of Fresno and Kings Counties (Figure 1 shows the location for the five water districts). The action area is located in the western San Joaquin Valley, and primarily consists of lands within the boundary of the CVP's SLU. The action area also includes the Sacramento – San Joaquin Delta (Delta) as the source for the water delivered to meet these CVP contracts and the canals and waterways that return the agricultural runoff from the water districts back to the San Joaquin River or to the San Luis Drain; the San Joaquin River down to Vernalis for terrestrial species, and to the estuary for aquatic species. The effects on protected species from pumping water from the Delta are being evaluated in a separate opinion being prepared for the Operating Criteria and Plan (OCAP) and the effects to species in the canals and waterways leading to the San Joaquin River have been analyzed in the opinion prepared for the San Luis Drainage Features Reevaluation and will not be discussed further in this opinion.

Specifically, the action area includes the CVP Service Areas of the five SLU contractors. The service area for the City of Avenal encompasses an area of approximately 13,120 acres or 20.5 sq mi (sq mi) of which 2.5 sq mi is urbanized and the sphere of influence contains an additional 2.25 sq mi Figure 2 is the Attachment A map from the contract; the City of Coalinga covers 5,248 acres or 4.1 sq mi and its sphere of influence encompasses and additional 8.2 sq mi Figure 3 is the Attachment A map from the contract; the City of Huron covers 994 acres or 1.6 sq mi Figure 4 is the Attachment A map from the contract; and Westlands WD covers 605,422 acres and totally surrounds the City of Huron Figure 5 is the Attachment A map from the contract;.

The CDFG service area is the headquarters for the Mendota Waterfowl Management Area in the community of Mendota.

Contemporaneous Consultations

The SFWO is working with Reclamation's SCCAO to accumulate the information necessary to evaluate the effects of renewing the long-term water contracts for the City of Tracy in the Delta-Mendota Canal Unit and the San Felipe Division which includes the San Benito County Water District and the Santa Clara Valley Water District. The SFWO is also working with SCCAO to conclude the consultation on the long-term water contracts for the eight SLU contractors. The long-term consultation will include the following contracts, which have been, or are currently being evaluated for permanent assignment to Westlands WD: Widren WD – 2,990 acre feet per year; Centinella WD – 2,500 acre feet per year; Oro Loma – 6,000 acre feet per year; and Broadview – 27,000 acre feet per year. The effects to listed species of permanently assigning this additional 38,490 acre feet per year to Westlands WD are being evaluated as part of the LTCR consultation; however the effects of the contracts for delivering CVP water to the five DMC WD's were evaluated as part of the consultation for the DMC Unit.

Central Valley Project Operations Criteria and Plan (OCAP)

The OCAP describes the coordinated operation of the CVP and State Water Project (SWP) by Reclamation and the California Department of Water Resources. On July 30, 2004, the Service issued biological opinion 1-1-04-F-0140, which addressed the effects of operating the CVP/SWP and delivering CVP water for renewing water contracts and other actions on the threatened delta smelt (*Hypomesus transpacificus*). On February 15, 2005, the Service issued biological opinion 1-1-05-F-0055 in response to Reclamation's November 3, 2004 request for reinitiation of formal consultation on the OCAP to address potential critical habitat issues and effects of the OCAP on delta smelt.

On April 7, 2006, NOAA Fisheries Service listed the southern distinct population segment of North American green sturgeon as threatened under the Endangered Species Act. The operators of the CVP and SWP facilities may be required to alter the releases from the dams or to change the pumping regime from the Delta to avoid affecting this species or habitat suitable for its use. Because this newly listed species had not been consulted on under Section 7 of the Act; Reclamation requested that NOAA Fisheries consultation on OCAP be reinitiated. Because of the potential for revising the OCAP, Reclamation requested that the Service also reinitiate consultation on delta smelt. This formal request was received by the Service on July 6, 2006.

Subsequent to receiving this request for reinitiation consultation, Reclamation and the Natural Resources Defense Counsel (NRDC) et al reached a settlement on the long-standing lawsuit over the reestablishment of flows in the San Joaquin River from Friant Dam to the confluence with the Merced River. See the Friant Division (below) for additional details.

As a result of the changes to the operating regime that will result from the listing of the green sturgeon and the parties reaching a settlement in the NRDC vs Friant Water Users lawsuit, the OCAP consultation is re-analyzing the effects of numerous new actions on the delta smelt and its

designated critical habitat, including storage of CVP and SWP water in reservoirs, water releases from reservoirs, river operations, operation of the Federal/State diversion facilities, and the CVP/SWP export-pumping operations in and through the Delta. The OCAP consultation will address the operation of the CVP/SWP in the Sacramento Valley, and included all commitments of the SWP and CVP, such as meeting requirements of the CVPIA PBO (USFWS 2000), the obligations contained in the Central Valley Water Quality Control Board water right permits, obligations of CVP water service contracts, Sacramento River Settlement contracts, San Joaquin exchange contracts, the Friant Settlement, and other requirements. Therefore, the OCAP BO will address all the aquatic effects of operating the CVP/SWP.

In contrast, the Service's consultations on the long-term water-service contract renewals addressing the diversion of water at prescribed diversion points and times for the use of that water on a specified land area (the contractors' service area). All renewal contracts, while identifying a full contract amount, recognize that the delivery of full contract amount is subject to availability of water and other obligations of the CVP (such as CVPIA and biological ESA consultation requirements). In other words, the contracts address a demand (among other demands) for CVP water and the OCAP consultation addresses how the CVP projects are operated to meet those demands. There clearly is a linkage between contract renewals and the operation of the CVP. These linkages must, and are being addressed in separate but parallel individual consultations such that all of the possible effects on listed species and designated critical habitat are being identified and consulted on.

Friant Division

The Friant Division consists of three units having a total of forty-one water districts; the Cross Valley Unit consists of eight water districts; and the Hidden and Buchannan Divisions. The consultation for the Friant and Cross Valley Division Contractors (FWS 1-1-01-F-0825) was completed on January 19, 2001. The CVP water delivery contracts for the Cross Valley Unit have never been executed and the Friant Division was the subject of on-going litigation that has challenged the validity of the biological opinions issued for these water delivery contracts.

Reclamation and the Natural Resources Defense Counsel (NRDC) et al have reached a settlement on the long-standing lawsuit over the reestablishment of flows in the San Joaquin River from Friant Dam to the confluence with the Merced River.

This settlement, formally announced on September 13, 2006, is based on two goals and objectives:

1. A restored San Joaquin River with continuous flows to the Sacramento-San Joaquin River Delta and naturally reproducing populations of Chinook salmon.

2. A water management program to minimize water supply impacts to San Joaquin River water users.

The parties will work together on a series of projects to improve the river channel in order to restore and maintain healthy salmon populations. Flow restoration is to be coordinated with these

channel improvements, with spring and fall run Chinook salmon populations reintroduced in approximately six years. At the same time, the Settlement limits water supply impacts to Friant Division long-term water contractors by providing for new water management measures that are to be undertaken by Reclamation. These measures include: a recirculation plan that would allow Friant Division contractors to capture water from downstream areas after it has served its 'Restoration Purpose' and the water could be delivered to the contractor using either the SWP or CVP delivery system; and the creation of a 'Recovered Water Account' which would allow participating contractors to purchase water during certain wet conditions when water is available that is not needed to meet contractual obligations or Restoration Flows

Restoring continuous flows to the approximately 60 miles of dry river will take place in a phased manner. Planning, design work, and environmental reviews will begin immediately, and interim flows for experimental purposes will start in 2009. The flows will be increased gradually over the next several years, with salmon being re-introduced by December 31, 2012. The settlement continues in effect until 2026, with the U.S. District Court retaining jurisdiction to resolve disputes and enforce the settlement. After 2026, the court, in conjunction with the California State Water Resources Control Board, would consider any requests by the parties for changes to the restoration program.

The agreement also requires that long-term Friant Division water service contracts be amended to conform to the contracts to the terms of the settlement.

These projects or consultations are not considered part of the Environmental Baseline because final biological opinions have not yet been issued for them.

Environmental Baseline and Status of the Species in the Action Area

The environmental baseline is an analysis of the effects of past and ongoing human and natural factors leading to the current status of the species, their habitats (including critical habitat), and ecosystems within the action area. The baseline includes State, tribal, local, and private actions already affecting the species or that will occur at the same time as this consultation.

The baseline condition for interim contract renewal assumes that there will be no drainage service provided under the authority of the San Luis Drainage Features Reevaluation Project during the period of the IRC's and that there will be no reduction in the level of contaminated surface and subsurface runoff from the drainage impaired lands in the northern portion of WWD. Reclamations preferred strategy for disposing of drainage water within the Unit is referred to as the "In-Valley/Water Needs Land Retirement Alternative" (Reclamation 2007). This plan includes drainage reduction measures, drainage water reuse facilities, treatment systems, evaporation ponds, and the retirement of 194,000 acres of land from irrigated crop production (of which, 44,106 acres have already been retired).

In 2004, when the LTCR BA was prepared, approximately 14 percent of the San Luis Unit's land area remains undeveloped. Approximately 71 percent of undeveloped lands are in the hills surrounding the Pleasant Valley near the City of Coalinga and the Kettleman Hills near the City of Avenal. The remaining 29 percent is in the northern portion of the San Luis Unit near Santa

Nella and various small parcels throughout the San Luis Unit (CDWR 2004).

Approximately 75 to 81 percent of the San Luis Unit is currently used as irrigated farmland, 2.5 percent is used for oil production, and 1.5 percent is used for urban areas, farmsteads, and transportation and conveyance facilities (CDWR 2004). Approximately one half of the San Luis Unit's irrigated farmland is used for the production of cotton (35 percent) and tomatoes (16 percent). Approximately 11 percent is used for orchards and vineyards, half of which is used for the production of almonds. The remaining farmland is used for a variety of crops, such as alfalfa, asparagus, wheat, melons, corn, grain, and various pasture crops (CDWR 2004).

There is a trend toward an increase in the number of acres in Westlands Water District planted in permanent crops (orchards and vineyards) (Phillips 2006b; Westlands Water District 2004-2005), particularly on the western, non-drainage-impaired portion of the district (Phillips 2006b). The number of acres planted in permanent crops in Westlands Water District has doubled from 1993 to the 2004-2005 water year (Westlands Water District 2004-2005). In the last three years, the number of acres planted in permanent crops rose by over 15%, with an almost 8% decrease in the number of acres planted with field crops (Westlands Water District 2004-2005).

The following discussions are excerpted from *Habitat Suitability and Potential Corridors for San Joaquin Kit Fox in the San Luis Unit, Fresno, Kings, and Merced Counties, California*, prepared by the Endangered Species Recovery Program May 2007 (Cypher, et al 2007 In-progress draft); and *Environmental Baseline of the San Luis Unit, Fresno, Kings, and Merced Counties, California*, prepared by Endangered Species Recovery Program January 2006 (Phillips, 2006). Both reports were prepared for Reclamation to help answer questions about remaining kit fox habitat in and around the San Luis Unit (internal citations and references are specific to the source documents, not to this biological opinion).

> <u>*Cropland and pasture*</u>
> *Approximately 82% of the study area contains non-permanent field, truck, grain and pasture crops. Nearly half of the total area consists of cotton and tomato fields (Table 3). Approximately 9% of crop fields are classified as Fallow indicating there was no existing crop but the land appeared to have had a crop in the previous year. Approximately 1% of crop fields where idle, indicating that there did not appear to be a crop the previous year, but had been within the past three years. Some lands classified as Grassland/Ruderal in Table 3 are lands that had previously been cropped, but appeared to have been out of production for greater than three years. Based on a cursory review of aerial photographs (USDA 2004) and field observations, we estimate that there is presently a greater amount of land that would have been classified as either Idle or Grassland/Ruderal including some of the lands classified as Fallow in 2000. Additional aerial photo interpretation and field surveys are required to quantify the current extent of farmland out of production or retired. Some rice (1,945 ac) is produced along the northern edge of the study area near the Delta-Mendota Canal (Figure 5).*
>
> <u>*Orchards and vineyards*</u>

Approximately 10% of the study area contains permanent crops of orchards or vineyards, 60% of which are in almonds. Remaining permanent crops are in vineyards, pistachios, and other deciduous orchard crops such as pomegranates. Stability of water supplies and high demand for almonds have resulted in a trend of increased almond plantings in the area, particularly in Fresno County (CASFMRA 2004). Of the 43,300 acres classified as almonds, 25% where classified as being "Young" or recently planted. We estimate that acreage of permanent crops in the Fresno County portion of the study area has increased nearly eightfold between 1977 and 2000 and nearly 228% between 1994 and 2000. General field observations and land value reports (CASFMRA 2004) suggest that this is a continuing trend and with new orchards displacing cotton and tomato crops.

Urban/Industrial land uses

Urban or industrial land uses make up approximately 1.6% of the study area. Of this area approximately 42% are vacant areas such as highway rights of way (Interstate 5), and airport runway facilities at Naval Air Station Lemoore. Approximately 36% are residential and commercial areas of small, rural communities such as Huron, Three Rocks, Cantua Creek, Westhaven, Five Points, and Westside. The largest urban areas are Huron with a population of 6,997 and Lemoore Station with a population of 5,749 (US Census 2004). Together they account for approximately 59% of the population within the study area (CDF 2002). Industrial areas are primarily agriculture related storage and distribution facilities and make up approximately 22% of lands classified as Urban/Industrial (DWR 2005).

Table 2 – Summary of Land Uses in San Luis Unit Study Area 2000

Land Use Class	*Land Use Sub-Class*	*Acres*	*% of Class*	*Total %*
Cropland and Pasture	*Cotton*	*250,981*	*41.22*	*34.25*
	Tomatoes	*112,311*	*18.44*	*15.33*
	Fallow fields	*52,125*	*8.56*	*7.11*
	Grain	*43,608*	*7.16*	*5.95*
	Melons	*36,434*	*5.98*	*4.97*
	Alfalfa	*35,957*	*5.90*	*4.91*
	Onions and Garlic	*30,811*	*5.06*	*4.20*
	Sugar beets	*11,271*	*1.85*	*1.54*
	Other truck crops	*7,772*	*1.28*	*1.06*
	Corn	*6,877*	*1.13*	*0.94*
	Other field crops	*6,172*	*1.01*	*0.84*
	Idle farmland	*5,757*	*0.95*	*0.79*
	Beans	*5,634*	*0.93*	*0.77*
	Rice	*1,945*	*0.32*	*0.27*
	Other pasture crops	*1,294*	*0.21*	*0.18*
	Total	***608,945***		***83.10***
Change in Land Use 2000 to 2006		***530,584***		***69 - 77***
Orchards and vineyards	*Almonds*	*43,295*	*60.44*	*5.91*
	Vineyards	*11,685*	*16.31*	*1.59*
	Pistachios	*9,426*	*13.16*	*1.29*
	Other deciduous orchards	*6,135*	*8.56*	*0.84*

	Oranges	*694*	*0.97*	*0.09*
	Olives	*321*	*0.45*	*0.04*
	Other citrus orchards	*82*	*0.11*	*0.01*
	Total	***71,639***		***9.78***
Change in Land Use 2000 to 2006		***150,000***		***16 - 24***
Semi-agricultural	*Open water*	*5,120*	*72.02*	*0.70*
	Farmsteads	*1,172*	*16.48*	*0.16*
	Confined feeding lots	*817*	*11.50*	*0.11*
	Total	***7,109***		***0.97***
Urban/Industrial	*Urban*	*9,071*	*77.58*	*1.24*
	Industrial	*2,622*	*22.42*	*0.36*
	Total	***11,693***		***1.60***
Non-developed	*Grassland/Ruderal*	*32,695*	*97.85*	*4.46*
	Riparian	*719*		*0.10*
	Total	***33,414***		***4.56***

Non-developed land

Non-developed lands of the study area are primarily areas formerly in farmland that have been out of production for more than three years. Nearly half (48%) of lands classified as non-developed in 2000 where classified as agricultural farmland in 1986 (including 2% classified as idle, DWR 2005). Other non-developed lands include rights of way areas along canals, primarily the California Aqueduct. These make up around 15% of non-develop lands. Natural lands along the foothills on the western edge of the study area make up around 20% lands and consist of non-native grasses with some cattle grazing (field observation). Linear edges and beds of the larger creeks (Little Panoche, Panoche, Cantua, and Los Gatos) make up about 5% of non-develop lands and contain a mix of non-native grasses, scrub, and riparian vegetation such as cottonwood trees. The remaining non-developed lands are in miscellaneous small parcels and linear features with ruderal vegetation or non-native grasses.

Retired farmland

Retired farmland in the study area consists of lands retired through the Central Valley Improvement Act (CVPIA) land retirement program, lands retired as the result of litigation over drainage service, and additional lands purchased for retirement by Westlands Water District.

We estimate the location and amount of retired farmland in each class based on a map of Westlands Water District map of Peck Lands to be Acquired and District Acquired Lands to 1/5/05 (Westlands 2005a), GIS data produced by ESRP for the CVPIA Land Retirement Program, and GIS data provided by the Reclamation, SCCAO showing the location of lands retired though the Britz settlement. We used a GIS layer of Fresno County parcel locations to identify parcels associated with each program and combine them to a common base map.

Based on available sources, we estimate the area of land acquired for retirement is approximately 77,130 acres including 38,022 acres purchased for retirement by Westlands Water District (49%), 33,864 acres identified by Westlands as

"Peck Acquired Lands" (44%), 3,100 acres retired identified as part of the "Britz Settlement" (4%), and 2,144 acres retired through the CVPIA Land Retirement Program (3%).

CVPIA Land Retirement

Lands retired though the CVPIA Land Retirement Program (LRP) consists of the Tranquillity Land Retirement Demonstration Project (LRDP, Figure 8). The LRDP was implemented to "provide site-specific scientific data to guide the implementation of the LRP and develop tools to predict potential benefits and impacts of retiring land from irrigated agriculture" (Uptain et al. 2005). An initial area of 1700 acres purchased in 1998 and used as a five-year research project (1999-2003) to examine the effects of land retirement on water quality and biota and conduct habitat restoration research. Additional parcels where added to the project though 2001 including a 440-acre parcel adjacent to the Mendota Wildlife Area. Monitoring for the five-year study ended in 2003 but additional restoration research trials continue at the site. The site is also contains a native plant seed production facility that was established in 2001 to provide a source for native San Joaquin Valley seed for restoration uses (ESRP 2005). Sheep grazing also takes place on areas of the site not used for research.

Westlands Retired Farmland

Westlands Water District owns large areas of land identified as purchased for retirement (WWD 2005a, Figure 11, Figure 9, Figure 10). Of the approximately 75,000 acres of land identified as being retired, about half (36,963 acres) appear to be retired as the result of litigation and considered "permanently" retired (contain non-irrigation pact). The remaining half would be retired voluntarily without such restrictions on future land uses. We are currently gathering additional information to identify the current land uses of these lands and clarify the purposes and restrictions.

Public Lands and Conservation Easements

Public lands within study area include the Tranquillity Land Retirement (see CVPIA land retirement section); Naval Air Station, Lemoore; Arroyo Pasajero Westside Detention Basin; Pilibos Wildlife Area; California Fish and Game land near the Dos Amigos Pumping Plant and rights of way along canals such as the California Aqueduct (San Luis Canal) Land use at Naval Air Station Lemoore consists primarily of irrigated farmland and urban uses (runways and other facilities). There are also some small areas of natural lands at the air station. Arroyo Pasajero Westside Detention Basin is an area owned by the U.S. Bureau of Reclamation and managed by the California Dept. of Water Resources (DWR) to control flooding from Los Gatos Creek (Julie Vance, DWR Personal Communications). The area is primarily former farmland and currently in non-native grassland or ruderal vegetation. Lands near the California Aqueduct also contain various scrub species and some riparian vegetation (Woody Moise, DWR, Personal Communications and unpublished GIS data). Pilibos Wildlife Area (Figure 12) is 148 parcels along the California Aqueduct. It is managed as

a dove hunting area and planted in safflower (field observation, CDFG dove hunting web site). It also contains a small area of trees (field observation). Dos Amigos Wildlife Area is approximately 114 acres and is also managed for dove hunting (CDFG dove hunting web site).

Major rights of way in the study area are along the California Aqueduct (San Luis Canal) that runs through north to south though the western half of the study area (Figure 12). The San Luis Canal is a joint-use facility owned by the U.S. Bureau of Reclamation and managed by the California Department of Water Resources. Additional rights of way are on the Coalinga Canal (managed by Westlands Water District) and the Delta-Mendota Canal (U.S. Bureau of Reclamation Operated).

Public lands and easements adjacent to or near the study along the Panoche, Ciervo and Kettleman Hills and the Pleasant Valley area include Bureau of Land Management (BLM) lands, Pleasant Valley Ecological Reserve, Panoche Hills Ecological Reserve, and Little Panoche Reservoir Wildlife Area (Figure 11, Table 2). East of the study area, along the area of Fresno Slough are the Mendota Wildlife Area (Figure 14), Alkali Sink Ecological Reserve (Figure 15) and lands in the Natural Resource Conservation Service (NRCS) Wetland Reserve Program (WRP, Figure 16, Figure 17) (Figure 11, Table 2). There are also U.S. Fish and Wildlife Service wetland easements north of the study area in the area of the Grasslands Wildlife Management Area (FWS unpublished GIS data).

The baseline also includes the consultations completed for the renewal of other long-term water contracts, and consultations related to the operation and maintenance activities of the CVP. Other unrelated Federal actions affecting the species or their critical habitat that have completed consultation are also included as part of the baseline.

Exchange Contractors areas have not been provided a solution to their "drainage problems" and will continue to contribute selenium contaminated drain water to Grassland Bypass channels, both in the irrigation waters and in storm surges during extreme rainfall episodes. The affects of continuing to contribute this contaminated drain water to the channels has not been evaluated; nor has the effects of increased concentrations of selenium resulting from the reduced quantities of water being released to the areas adjacent and down-gradient of the WD's resulting from the capture and re-use of irrigation waters by the Exchange Contractors on their crops.

The natural community and land use maps and associated statistics in the LTCR Environmental Impact Statement were provided by the California State University, Stanislaus-Endangered Species Recovery Program (CSUS ESRP), using data derived from multiple data and map sources. The primary data source used was the CDWR Division of Planning and Local Assistance Land Use data (CDWR 2004). Data from the California Department of Conservation Farmland Mapping and Monitoring Program and the USGS Land Use and Land Cover data were used as secondary sources for developed land use classes. Data from the California Gap Analysis Program (University of California, Santa Barbara (UCSB) 1996), the Service's National

Wetlands Inventory, and the photo interpretation of summer 2000 Landsat 7 imagery were used as secondary sources for undeveloped land use and natural communities classifications. Additional data on retired farmland was derived from maps provided by Westlands Water District and the Department of Interior Land Retirement Team.

Status of the Species

San Joaquin Kit Fox

Listing.

The San Joaquin kit fox was listed as an endangered species on March 11, 1967 (Service 1967) and was listed by the State of California as a threatened species on June 27, 1971. This canine is the umbrella species for the Recovery Plan for Upland Species of the San Joaquin Valley, California (Service 1998).

Description.

The kit fox is the smallest canid species in North America and the San Joaquin kit fox is the largest subspecies in skeletal measurements, body size, and weight. Adult males average 80.5 centimeters (31.7 inches) in total length, and adult females average 76.9 centimeters (30.3 inches in total length (Grinnell et al 1937). Kit foxes have long slender legs and are approximately 30 centimeters (12 inches) high at the shoulder. The average weight of adult males is 2.3 kilograms (5 pounds), and the average of adult females is 2.1 kilograms (4.6 pounds) (Morrell 1972).

General physical characteristics of kit foxes include a small, slim body, relatively large ears set close together, narrow nose, and a long, bushy tail tapering slightly toward the tip. The tail is typically carried low and straight.

Color and texture of the fur coat of kit foxes varies geographically and seasonally. The most commonly described colorations are buff, tan, grizzled, or yellowish-gray dorsal coats (McGrew 1979). Two distinctive coats develop each year: a tan summer coat and a silver-gray winter coat (Morrell 1972). The ear pinna (external ear flap) is dark on the back side, with a thick border of white hairs on the forward-inner edge and inner base. The tail is distinctly black-tipped.

Historical and Current Range.

In the San Joaquin Valley before 1930, the range of the San Joaquin kit fox extended from southern Kern County north to Tracy, San Joaquin County, on the west side, and near La Grange, Stanislaus County, on the east side (Grinnell et al 1937; Service 1998). Historically, this species occurred in several San Joaquin Valley native plant communities. In the southernmost portion of the range, these communities included Valley Sink Scrub, Valley Saltbush Scrub, Upper Sonoran Subshrub Scrub, and Annual Grassland.

Kit foxes currently inhabit some areas of suitable habitat on the San Joaquin Valley floor and in the surrounding foothills of the coastal ranges, Sierra Nevada, and Tehachapi Mountains, from southern Kern County north to Contra Costa, Alameda, and San Joaquin Counties on the west, and near La Grange, Stanislaus County on the east side of the Valley, and some of the larger scattered islands of natural land on the Valley floor in Kern, Tulare, Kings, Fresno, Madera, and Merced Counties.

The largest extant populations of kit foxes are in western Kern County on and around the Elk Hills and Buena Vista Valley, Kern County, and in the Carrizo Plain Natural Area, San Luis Obispo County. Though monitoring has not been continuous in the central and northern portions of the range, populations were recorded in the late 1980s at San Luis Reservoir, Merced County (Briden et al 1987); North Grasslands and Kesterson National Wildlife Refuge (NWR) area on the Valley floor, Merced County (Paveglio and Clifton 1988); and in the Los Vaqueros watershed, Contra Costa County in the early 1990s (Service 1998). Smaller populations are also known from other parts of the San Joaquin Valley floor, including Madera County and eastern Stanislaus County (Williams 1990). An additional population of kit foxes has been identified in close proximity to the action area (Service 1998). This "Panoche Core Population" is generally located on lands west of I-5 in the Panoche Valley and suitable lands to the north and south, such as the Silver Creek Ranch and lands from Little Panoche Creek up to Route 152. This population is just west of WWD. Kit foxes occur at varying densities in the areas between the core populations (e.g., Kettleman Hills), providing linkages between core populations, and also probably with smaller, more isolated populations in adjacent valleys and in the Kreynhagen Hills and Anticline Ridge around Coalinga and Avenal. Maintain and enhance connecting corridors for movement of kit foxes between the Kettleman Hills and the Valley's edge through the farmed gap between the Kettleman and Guijarral Hills, and between the Guijarral Hills and Anticline Ridge; and around the western edge of the Pleasant Valley and Coalinga.

Essential Habitat Components.

Kit foxes prefer loose-textured soils (Grinnell et al 1937, Hall 1946, Egoscue 1962, Morrell 1972), but are found on virtually every soil type. Dens appear to be scarce in areas with shallow soils because of the proximity to bedrock (O'Farrell and Gilbertson 1979, O'Farrell et al 1980), high water tables (McCue et al 1981), or impenetrable hardpan layers (Morrell 1972). However, kit foxes will occupy soils with a high clay content, such as in the Altamont Pass area in Alameda County, where they modify burrows dug by other animals (Orloff et al 1986). Sites that may not provide suitable denning habitat may be suitable for feeding or providing cover.

Conservation Needs of San Joaquin Kit Fox in the Action Area

Kit fox core population and corridors. A potential core population of kit foxes has been identified just north of the WWD action area (Service 1998). This "Panoche Core Population" is generally located on lands west of I-5 in the Panoche Valley and suitable lands to the north and south, such as the Silver Creek Ranch and lands from Little Panoche Creek up to Route 152. Kit foxes occur at varying densities in the areas between the core populations (e.g., Kettleman Hills), providing linkages between core populations, and also probably with smaller, more isolated populations in adjacent valleys and in the Kreynhagen Hills and Anticline Ridge around Coalinga and Avenal. Maintain and enhance connecting corridors for movement of kit foxes between the Kettleman Hills and the Valley's edge through the farmed gap between the Kettleman and Guijarral Hills, and between the Guijarral Hills and Anticline Ridge; and around the western edge of the Pleasant Valley and Coalinga. Because of the amount of available optimal habitat (e.g., saltbush scrub, arid grasslands), the Panoche population is probably not as extensive as the Western Kern County and Carrizo Plain Core Populations. Thus, it is critical that connectivity be maintained between the Panoche Core Population and the 2 core populations further south. This necessitates that a viable corridor be maintained on remaining natural lands

between I-5 and the foothills of the Coast Ranges. The need to conserve this corridor in the action area is identified prominently in Tasks 5.3.4, 5.3.5, 5.3.6, and 5.3.7 in the *Recovery Plan for Upland Species of the San Joaquin Valley, California* (Service 1998).

Habitat Connectivity. Very little suitable habitat for kit foxes remains in the action area; within the unit boundaries, there are only 5,559 acres (<1%) of suitable habitat and 20,543 acres (2.7%) of sub-optimal habitat. Much of the suitable habitat for kit foxes in the action area is located in the narrow band between the western boundary of WWD and Interstate 5; and in the oil fields and undeveloped areas around Avenal and Coalinga. The vast majority of the WWD lies east of Interstate 5, and in this area there currently is very little suitable habitat. What suitable habitat there is occurs as very scattered habitat fragments which are all too small in size to support even a single kit fox family group. Recently, in the Lokern area of western Kern County, home range was measured at 5.91 square kilometers (2.3 square miles) (Nelson 2005). The area of habitat required to support one family group varies according to carrying capacity elements such as prey abundance, shelter, and denning terrain. An average required area has been estimated at 1,200 acres for one mated pair or family group (Cypher 2006). In moderately suitable habitat, considerably more acreage may be needed to support a family group.

Currently, kit foxes in the action area primarily occur on natural lands with gentle relief west of Interstate 5. In particular, kit fox populations appear to persist in the Ciervo-Panoche area (particularly Panoche Valley) and the Coalinga-Pleasant Valley area (Service 1998).

Under current habitat conditions, corridors into the action area and on to suitable habitat east of the unit are relatively low in quality based on modeling results. The corridors that would provide the least risk for kit foxes would primarily originate in the Ciervo-Panoche region and traverse the Northerly Impaired and Westlands Impaired North sections of the SLU.

Conversion of croplands to permanent crops such as orchards has improved permeability somewhat for kit foxes, but also increase the likelihood that these lands will stay in agricultural production. Maintenance of movement corridor needs to be addressed in any regional kit fox conservation strategy. The importance of conserving this corridor also was reflected in modeling results, which suggest that foxes from the Pleasant Valley-Coalinga area likely would access the northern portions of the action area by first traveling 20-25 miles north along the western edge of the unit and then entering the unit. Thus, this western edge corridor should significantly enhance the probability and rate of colonization of retired lands by foxes by facilitating access from two existing kit fox population centers. This corridor also is essential for maintaining connectivity between the two source populations.

Giant Garter Snake

Listing.

The Service published a proposal to list the giant garter snake as an endangered species on December 27, 1991 (56 FR 67046). The Service reevaluated the status of the snake before adopting the final rule. The snake was listed as a threatened species on October 20, 1993 (58 FR 54053).

Description.

The giant garter snake is one of the largest garter snake species reaching a total length of approximately 64 inches. Females tend to be slightly longer and proportionately heavier than males. The weight of adult female snakes is typically 1.1-1.5 pounds. Dorsal background coloration varies from brown to olive with a cream, yellow, or orange dorsal stripe and two light-colored lateral stripes. Some individuals have a checkered pattern of black spots between the dorsal and lateral stripes. Background coloration and prominence of the checkered pattern and three yellow stripes are geographically and individually variable; individuals in the northern Sacramento Valley tend to be darker with more pronounced mid-dorsal and lateral stripes (Hansen 1980; Rossman et *al.* 1996). Ventral coloration is variable from cream to orange to olive-brown to pale blue with or without ventral markings (Hansen 1980).

Historical and Current Range.

Giant garter snakes formerly occurred throughout the wetlands that were extensive and widely distributed in the Sacramento and San Joaquin Valley floors of California (Fitch 1940; Hansen and Brode 1980; Rossman and Stewart 1987). The historical range of the snake is thought to have extended from the vicinity of Chico, Butte County, southward to Buena Vista Lake, near Bakersfield, in Kern County (Fitch 1940; Fox 1948; Hansen and Brode 1980; Rossman and Stewart 1987). Early collecting localities of the giant garter snake coincide with the distribution of large flood basins, particularly riparian marsh or slough habitats and associated tributary streams (Hansen and Brode 1980).

Loss of habitat due to agricultural activities and flood control have extirpated the snake from the southern one third of its range in former wetlands associated with the historic Buena Vista, Tulare, and Kern lake beds (Hansen 1980, Hansen and Brode 1980). By 1971, so much wetland habitat had been reclaimed, that the California Department of Fish and Game classified the giant garter snake as a rare animal and conducted a series of field surveys. The results of these surveys indicated that snake populations were distributed in marsh wetlands, tributary streams, and portions of the rice production zones of the Sacramento Valley in Butte, Glenn, Colusa, Sutter, Yolo and Sacramento Counties, in the Delta region along the eastern fringes of the Sacramento-San Joaquin River Delta in Solano, Contra Costa, Sacramento, and San Joaquin Counties, and in the San Joaquin Valley in San Joaquin, Stanislaus, Merced, Mendota, and Fresno Counties (Hansen 1988, Hansen and Brode 1980).

Upon federal listing in 1993, the Service identified 13 separate populations of giant garter snakes, with each population representing a cluster of discrete locality records (Service 1993). The 13 populations largely coincide with historical flood basins and tributary streams throughout the Central Valley: (1) Butte Basin, (2) Colusa Basin, (3) Sutter Basin, (4) American Basin, (5) Yolo Basin/Willow Slough, (6) Yolo Basin/Liberty Fanns, (7) Sacramento Basin, (8) Badger Creek/Willow Creek, (9) Caldoni Marsh/White Slough, (10) East Stockton--Diverting Canal & Duck Creek, (11) North and South Grasslands, (12) Mendota, and (13) Burrel/Lanare. Although these groups were defined as populations in the final rule, the breeding patterns and genetic relationships between the groups are unknown. Therefore, these groups are more accurately characterized as sub-populations.

Surveys over the last 25 years suggest that sub-populations of giant garter snakes in the northern parts of its range (i.e., Butte, Colusa, and Sutter Counties) are relatively large and stable (Wylie

et al 1997, Wylie et al 2003 & 2004). Habitat corridors connecting sub-populations, however, are either not present or not protected, and urban encroachment is an increased threat. Sub-populations in Yolo, Sacramento, Solano, and San Joaquin Counties areas are small, fragmented, and threatened by urbanization (Hansen 2004). Those sub-populations in the San Joaquin Valley, however, are most vulnerable, having suffered near-devastating declines and possible extirpations over the last two decades (including populations in Stanislaus, Merced, Madera and Fresno Counties) (Dickert 2002 & 2003, Hansen 1988, Williams and Wunderlich 2003). The southern sub-populations are extremely small, distributed discontinuously in isolated patches, and therefore are highly vulnerable to extinction by random environmental, demographic, and genetic processes (Goodman 1987).

Essential Habitat Components.

Endemic to wetlands in the Sacramento and San Joaquin valleys, the giant garter snake inhabits marshes, sloughs, ponds, small lakes, low gradient streams, and other waterways and agricultural wetlands, such as irrigation and drainage canals, rice fields and the adjacent uplands. Essential habitat components consist of: (1) wetlands with adequate water during the snake's active season (early-spring through mid-fall) to provide food and cover; (2) emergent, herbaceous wetland vegetation, such as cattails and bulrushes, for escape cover and foraging habitat during the active season; (3) upland habitat with grassy banks and openings in waterside vegetation for basking; and (4) higher elevation uplands for over-wintering habitat with escape cover and underground refugia (Hansen 1988). Snakes are typically absent from large rivers and other bodies of water that support introduced populations of large, predatory fish, and from wetlands with sand, gravel, or rock substrates (Hansen 1988; Hansen and Brode 1980; Rossman and Stewart 1987). Riparian woodlands do not provide suitable habitat because of excessive shade, lack of basking sites, and absence of prey populations (Hansen 1988).

Foraging Ecology.

Giant snakes are the most aquatic garter snake species and are active foragers, feeding primarily on aquatic prey such as fish and amphibians (Fitch 1941). Historically, giant garter snake prey likely consisted of Sacramento blackfish (*Orthodon microlepidots*), thick-tailed chub (*Gila crassicauda*), and red-legged frog (*Rana aurora*) (Rossman et al, 1996). Because these prey species are no longer available (due to drastic declines or extirpation), the predominant food items are now introduced species such as carp (*Cyprinus carpio*), mosquito-fish (*Gambusia affinis*), larval and sub-adult bullfrogs (*Rana catesbiana*), and Pacific chorus frogs (*Pseudacris regilla*) (Fitch 1941; Hansen and Brode 1993; Rossman et al. 1996).

Reproductive Ecology.

The giant garter snake breeding season extends through March and April, and females give birth to live young from late July through early September (Hansen and Hansen 1990). Brood size is variable, ranging from 10 to 46 individual young, with a mean of 23 individuals (Hansen and Hansen 1990). At birth, young average about 8.1 inches snout-to-vent length and 3 to 5 grams. Although growth rates are variable, young typically more than double in size by one year of age, and sexual maturity averages three years in males and five years for females (Service 1993).

Movements and Habitat Use.

The giant garter snake is highly aquatic but also occupies a terrestrial niche (Wylie et al 2004). Aquatic habitat includes remnant native marshes and sloughs, restored wetlands, low gradient streams, and agricultural wetlands including rice fields and irrigation and drainage canals. Terrestrial habitat includes adjacent uplands which provide areas for basking, retreats, and over-wintering. Basking takes place in tules, cattails, saltbush, and shrubs over-hanging the water, patches of floating vegetation including waterweed, on rice checks, and on grassy banks. 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 2003). It also uses burrows as refuge from extreme heat during its active period (Wylie et al 1997; Wylie et al 2004). While individuals usually remain in close proximity to wetland habitats, the Biological Resources Division of the U.S. Geological Survey has documented snakes using burrows as much as 165 feet (50 meters) away from the marsh edge to escape extreme heat, and as far as 820 feet (250 meters) from the edge of marsh habitat for over-wintering habitat (Wylie et al 1997). Snakes typically select burrows with sunny exposures along south and west facing slopes (Service 1993).

In studies of marked snakes in the Natomas Basin, snakes moved about 0.25 to 0.5 mile (0.4 to 0.8 kilometer) per day (Hansen and Brode 1993). Home range (area of daily activity) averages about 0.1 square mile (25 hectares) in both the Natomas Basin and the Colusa NWR (Wylie 1998; Wylie et al 2002). Total activity, however, varies widely between individuals. Individual snakes have been documented to move up to 5 miles (8 kilometers) over a few days in response to dewatering of habitat (Wylie et al 1997) and to use up to eight miles (12.9 kilometers) of linear aquatic habitat over the course of a few months, with a home range as large as 14.5 square miles (3744 hectares) (Wylie and Martin 2004). In agricultural areas, snakes were documented using rice fields in 19-20 percent of the observations, marsh habitat in 20-23 percent of observations, and canal and agricultural waterway habitats in 50-56 percent of the observations (Wylie 1998). In the Natomas Basin, used habitat consisted almost entirely of irrigation ditches and established rice fields (Wylie 1998; Wylie et al 2004). In the Colusa NWR, snakes were regularly found on or near edges of wetlands and ditches with vegetative cover (Wylie et al 2003). Telemetry studies also indicate that active snakes use uplands extensively; more than 31 percent of observations were in uplands (Wylie 1998). Snakes observed in uplands during the active season were consistently near vegetative cover, particularly where cover exceeded 50 percent in the area within 1.6 feet (0.5 meter) of the snake (Wylie 1998). Snakes will move into restored habitat. At the Colusa NWR, after two years, restoration area population estimates increased from 30 snakes per kilometer to 59-95 snakes per kilometer (Wylie et al 2004). At the Colusa Basin Drainage Canal, snakes were given three upland restoration treatments: 1) soil planted with native grasses over rock riprap, 2) soil planted with native grasses without rock riprap, and 3) rock riprap only. Snakes were most commonly found at the soil over rock riprap treatment (Wylie and Martin 2004).

Predators.

Giant garter snakes are eaten by a variety of predators, including raccoons (*Procyon lotor*), striped skunks (*Mephitis mephitis*), opossums (*Didelphis virginianus*), bull frogs (*Rana catesbiana*), hawks (*Buteo* spp.), egrets (*Casmerodius albus, Egretta thula*), and great blue herons (*Ardea herodias*) (Dickert 2003; Wylie et al 2003). Many areas supporting snakes have abundant predators; however, predation does not seem to be a limiting factor in areas that

provide abundant cover, high concentrations of prey items, and connectivity to a permanent water source (Hansen and Brode 1993; Wylie et al 1996).

Reasons for Decline and Threats to Survival.

The current distribution and abundance of the giant garter snake is much reduced from former times. Less than 10 percent, or approximately 319,000 acres (129,000 hectares), of the historic 4.5 million acres (approximately 1.8 million hectares) of Central Valley wetlands remain (U.S. Department of Interior 1994), of which very little provides habitat suitable for the giant garter snake. Loss of habitat due to agricultural activities and flood control have extirpated the snake from the southern one-third of its range in former wetlands associated with the historic Buena Vista, Tulare, and Kern lakebeds (Hansen 1980; Hansen and Brode 1980). These lakebeds once supported vast expanses of ideal snake habitat, consisting of cattail and bulrush dominated marshes. Cattail and bulrush floodplain habitat also historically typified much of the Sacramento Valley (Hinds 1952). Prior to reclamation activities beginning in the mid- to late-1800s, about 60 percent of the Sacramento Valley was subject to seasonal overflow flooding providing expansive areas of snake habitat (Hinds 1952). Valley flood wetlands are now subject to cumulative effects of upstream watershed modifications, water storage and diversion projects, as well as urban and agricultural development. Loss and fragmentation of habitat continues to be the most serious threat to giant garter snake populations, primarily from changes in rice production. Activities that are associated with habitat loss are of concern as they exacerbate the losses from development and habitat fragmentation.

The CVP is the largest water management system in California. CVP, the SWP, and the historic water development activities that preceded them have not only resulted in the loss of approximately 90 percent of natural wetlands, they have created an ecosystem altered to such an extent that remaining wetlands, like agriculture, depend on managed water (U.S. Department of Interior 1994). The historic disturbance events associated with seasonal inundation that occur naturally in dynamic riverine, riparian, and wetland ecosystems have been largely eliminated. In addition to the highly managed water regimes, implementation of CVP has resulted in conversion of native habitats to agriculture, and has facilitated urban development throughout the Central Valley. In 1992, Congress enacted the CVPIA, the concerns of which include pricing and management of Central Valley water and attempting to mitigate for project impacts on fish, wildlife, and associated habitat.

Residential and commercial growth within the Central Valley is consuming an estimated 15,000 acres of Central Valley farmland each year (American Farmland Trust 1999). In the future, this transformation is expected to accelerate. Rice fields have become important habitat for giant garter snake, particularly associated canals and their banks for both spring and summer active behavior and winter hibernation (Hansen 2004). While within the rice fields, snakes forage in the shallow water for prey, utilizing rice plants and vegetated berms dividing rice checks for shelter and basking sites (Hansen and Brode 1993). The loss of rice land resulting from residential and commercial growth compounds the impact of direct habitat loss resulting from development itself.

Ongoing maintenance of aquatic habitats for flood control and agricultural purposes eliminates or prevents the establishment of habitat characteristics required by snakes (Hansen 1988). Such

practices can fragment and isolate available habitat, prevent dispersal of snakes among habitat units, and adversely affect the availability of the snake's food items (Hansen 1988; Brode and Hansen 1992). For example, tilling, grading, harvesting and mowing may kill or injure giant garter snake (Wylie et al 1997). Biocides applied to control aquatic vegetation reduce cover for the snake and may harm prey species (Wylie et al 1996). Rodent control threatens the snake's upland aestivation habitat (Wylie et al 1996; Wylie et al 2004). Restriction of suitable habitat to water canals bordered by roadways and levee tops renders snakes vulnerable to vehicular mortality (Wylie et al 1997). Materials used in construction projects (e.g., erosion control netting) can entangle and kill snakes (Stuart et al 2001). Livestock grazing along the edges of water sources degrades water quality and can contribute to the elimination and reduction of available quality snake habitat (Hansen 1988). Fluctuation in rice and agricultural production affects stability and availability of habitat (Wylie and Casazza 2001; Wylie et al 2003 & 2004).

Other land use practices also currently threaten the survival of the snake. Nonnative predators, including introduced predatory game fish, bullfrogs, and domestic cats, can threaten snake populations (Dickert 2003; Wylie et al 1996; Wylie et al 2003). Nonnative competitors, such as the introduced water snake (*Nerodia fasciata*) in the American River and associated tributaries near Folsom, may also threaten the giant garter snake (Stitt et al 2005). Recreational activities, such as fishing, may disturb snakes and disrupt basking and foraging activities. While large areas of seemingly suitable snake habitat exist in the form of duck clubs and waterfowl management areas, water management of these areas typically does not provide the summer water needed by the species.

The disappearance of giant garter snake from much of the west side of the San Joaquin Valley was approximately contemporaneous with the expansion of subsurface drainage systems in this area, providing circumstantial evidence that the resulting contamination of ditches and sloughs with drainwater constituents (principally selenium) may have contributed to the demise of giant garter snake populations. Dietary uptake is the principal route of toxic exposure to selenium in wildlife, including giant garter snake (Beckon et al 2003). Many open ditches in the northern San Joaquin Valley carry subsurface drainwater with elevated concentrations of selenium. Green sunfish (*Lepomis cyanellus*) in this drainwater have been found to have concentrations of selenium ranging from 12 to 23 µp/g (Saiki 1998), within the range of concentrations associated with adverse affects on predatory aquatic reptiles (Hopkins et al 2002). This toxic level of exposure may have adverse effects on giant garter snakes caused by predation on contaminated fish.

The Central Valley contains a number of endangered ecosystems due to its fertile soils, amiable climates, easy terrains, and other factors that historically have encouraged human settlement and exploitation (Noss et al 2003). Environmental impacts associated with urbanization include loss of biodiversity and habitat, alteration of natural fire regimes, fragmentation of habitat from road construction, and degradation due to pollutants. Rapidly expanding cities within the snake's range include Chico, Yuba City, the Sacramento area, Galt, Stockton, Gustine, and Los Banos.

Recovery Status.

The revised draft recovery plan for the giant garter snake subdivides its range into three proposed recovery units: (1) Northern Sacramento Valley Recovery Unit; (2) Southern Sacramento Valley

Recovery Unit; and (3) San Joaquin Valley Recovery Unit. The Northern Sacramento Valley Unit at the northern end of the species' range contains subpopulations in the Butte Basin, Colusa Basin, and Sutter Basin. Protected snake habitat is located on State refuges and refuges of the Sacramento NWR Complex in the Colusa and Sutter Basins. Suitable snake habitat is also found in low gradient streams and along waterways associated with rice farming. This northernmost recovery unit is known lo support relatively large, stable sub-populations of giant garter snakes (Wylie et al 1996; Wylie et al 2002; Wylie et al 2004).

Habitat corridors connecting subpopulations, however, are either not present or not protected. The Southern Sacramento Valley Unit includes sub-populations in the American Basin, Yolo Basin, and Delta Basin. The status of Southern Sacramento Valley subpopulations is uncertain; each is small, highly fragmented, isolated, and threatened by urbanization (Hansen 2004; Wylie et al 2004). The American Basin sub-population, although threatened by urban development, receives protection from the Metro Air Park and Natomas Basin Habitat Conservation Plans, which share a regional strategy to maintain a viable snake sub-population in the basin.

The San Joaquin Valley Unit includes sub-populations in the San Joaquin Basin and Tulare Basin. The San Joaquin Valley Unit formerly supported large snake populations, but numbers have severely declined, and recent survey efforts indicate numbers are extremely low compared to Sacramento Valley sub-populations (Dickert 2002 & 2003; Wylie 1998). Giant garter snakes currently occur in the northern and central San Joaquin Basin within the Grassland Wetlands, Mendota Area, and Burrel/Lanare Area. Agricultural and flood control activities are presumed to have extirpated the snake from the Tulare Basin (Hansen 1995); however, comprehensive surveys for this area are lacking and where habitat remains, the giant garter snake may be present.

The revised draft recovery criteria require multiple, stable sub-populations within each of the three recovery units, with sub-populations well-connected by corridors of suitable habitat. This requires that corridors of suitable habitat between existing snake sub-populations be maintained or created to enhance sub-population interchange to offset threats to the species. Overall, the future availability of habitat in the form of canals, ditches, and flooded fields are subject to market-driven crop choices, agricultural practices, and urban development, and are therefore uncertain and unpredictable.

California Least Tern

Listing

The California least tern, which is one of three subspecies of least tern in the United States, was listed as endangered in 1970 (35 FR 16047). No critical habitat has been designated for this species; a recovery plan was prepared in 1980 (Service 1980a) and revised in 1985 (Service 1985). The California least tern is a fully protected species under California law.

Description.

California least terns are the smallest members of the subfamily Steminae (family Laridae), measuring about nine inches long with a twenty inch wingspan. Sexes look alike, being characterized by a black cap, gray wings with black wingtips, orange legs, and a black-tipped yellow bill. Immature birds have darker plumage, and a dark bill, and their white heads with dark

eye stripe are quite distinctive. The California least tern cannot be reliably differentiated from other races of tern on the basis of plumage characteristics alone (Burleigh and Lowery 1942).

Historical and Current Range.

The California least tern breeds along the Pacific Coast from San Francisco Bay to San Jose del Cabo, Baja California, Mexico. As reported in the 1985 Recovery Plan (Service 1985), the California least tern nest in large nesting colonies which are discontinuous along the California coast and generally are spread out along beaches at the mouths of larger estuaries. At that time, there was no discussion of terns occurring away from the breeding colonies along the coast. Approximately 32 active nesting locations exist from San Francisco Bay south to the Mexican border. There are eight active nesting locations in Santa Barbara and Ventura counties. Although this subspecies is considered a colonial nester, some observations of single pairs nesting have been made at some of these locations. The Santa Margarita River mouth in San Diego County now hosts the largest number of birds among all locations. However, in the California Least Tern Breeding Survey, 1998 Season, Keane (CDFG 1999) reported that there were 28 locations that reported successfully producing fledglings, and all but 2 were located along the coast. The two non-coastal nesting sites are located at a PGE power plant at Pittsburgh in the western Sacramento-San Joaquin Delta and at Kettleman City in the San Joaquin Valley at the southern boundary of Westlands Water District and Lemoore Naval Air Station (LNAS) is within the district boundaries of Westlands WD. There was one nest reported from the terminal cells of evaporation basins at the Kettleman City location that produced one fledgling from two eggs in 1998 (CDFG 1999).

A few least terns have been observed foraging at the sewage ponds at LNAS in 1997 and 1998 but no nesting has been documented there. The birds at both LNAS and Kettleman City arrive on site in June or July and are either "second wave" nesters which are first time breeders (2-year old birds) or birds that have nested at a coastal site (either successfully or unsuccessfully) as a "first wave" breeder (CDFG 1999). There is no definitive information that links the Central Valley east terns to any of the coastal colonies, so they may be refugees from a coastal colony or a pair of young birds that got lost on their way to the breeding grounds. There have also been reports of single pairs nesting at evaporation ponds in the Tulare Lake Basin.

Reproductive Ecology and Demography

The California least tern breeding season typically begins in April. Most commonly, two eggs are laid in the first part of May and hatching occurs in early June. Fledgling of chicks usually occurs by late June. A second wave of nesting often occurs from early June to late July which is usually instigated by the failure of the first nest. Parents and fledglings remain close to the breeding site before beginning their migration southward, usually no later than mid-September. Their wintering localities are not well known, although some banded birds have been observed in Colima, Mexico. California least terns appear to have strong nesting site fidelity and most return to their natal breeding beach year after year. Mass relocations have been documented when a breeding site has been destroyed or heavy predation has occurred.

For nesting, California least terns require areas that have relatively flat, open, sandy beaches, in proximity to foraging habitat, and have relative seclusion from disturbance and predation. California least terns have been known to nest on artificial surfaces, such as airfields, landfills,

and vacant parking lots. During the nesting season, coastal California least terns feed on small fish captured either in ponds, bays and estuaries, or immediately offshore. Prey items include northern anchovy (*Engraulis mordax*), topsmelt (*Atherinops afinis*), California grunion (*Leuresthes tenuis*), and killifish (*Fundulus pawipinnis*). Typically, in these two Central Valley locations, the species forages on inland silversides (*Menidia beryllina*) or gambusia, which was introduced into one of the evaporation ponds near Kettleman City; the gambusia could only persist in the cells with the deepest, least saline water. Both the male and female select a suitable site to begin scraping their nest if it is located on sand. If no sand is available in their nesting location, the birds will select a natural depression in the ground, such as a boot or tire depression in dried mud. After the eggs are laid, the nest is sometimes lined with shell fragments and small pebbles. Eggs are incubated primarily by the female for 20 to 25 days,

Least terns hover over standing or flowing water and dive to capture fish. They also may catch aquatic macroinvertebrates. The diet of the California least tern is known to consist mostly of small fish (Tomkins 1959; Atwood and Kelly 1984) and this appears to be true of least terns in the Tulare Basin. In some locations, other least terns are known to forage heavily on invertebrates, including shrimp and ants in South Carolina (Thompson et al 1997) and flying insects (nesting birds in Texas) (McDaniel and McDaniel 1963).

Reasons for Decline and Threats to Survival

The decline of the California least tern has been attributed primarily to destruction of breeding and foraging habitat, and human disturbances at nesting locations. Their decline was a gradual process as European settlers began establishing along the California coast. The Pacific Coast Highway, constructed in the early 1900s, is thought to have contributed substantially to the decline of California least terns as the highway paved over many nesting locations, and promoted development and recreation along the coast. At the time of listing, a census revealed only 600 pairs of breeding California least tern in the entire state, but recovery efforts instituted after the time of listing have helped raise numbers of breeding birds. Statewide surveys conducted in 1995 counted 2,598 pairs (Caffrey 1995). Dramatic fluctuations in the number of breeding pairs after listing have been attributed to severe El Niño Southern Oscillations, which affect the birds' food supply.

Recovery Status

The California Least Tern Recovery Plan's primary objective is to restore and maintain the breeding populations to secure levels. To achieve that objective, the breeding population must increase to at least 1,200 breeding pairs distributed among secure colonies in at least 20 secure coastal management areas throughout their breeding range, Concurrent efforts should also be undertaken in the Mexican portion of the breeding population. A requirement for maintaining the population levels would be 1) sufficient habitat to support at least one viable tern colony (defined as consisting of at least 20 breeding pairs with a 5-year mean reproductive rate of at least 1.0 young fledged per year per breeding pair) at each of the 20 coastal management areas (including San Francisco Bay, Mission Bay, and San Diego Bay, which should have 4, 6, and 6 secure colonies respectively), that are managed to conserve least terns; and 2) land ownership and management objectives are such that future habitat management for California least tern at these locations can be assured. The chief limiting factor influencing the number of least tern breeding pairs is the availability of undisturbed suitable habitat on the breeding grounds.

Blunt-nosed Leopard Lizard

The blunt-nosed leopard lizard (*Gambelia silus)* was listed as Endangered by the Service in 1967 (32 FR 4001). Recovery of the blunt-nosed leopard lizard is discussed in the Recovery Plan for Upland Species of the San Joaquin Valley (Service 1998).

Life History and Habitat Requirements

The blunt-nosed leopard lizard was originally described and named from a specimen collected from Fresno County in 1890. This lizard is a relatively large lizard of the family Iguanidae (Stebbins 1985). Adult males are typically 3.4 to 4.7 inches from snout to vent and weigh between 3 1.8 and 37.4 grams. The adult females are similar in length (range 3.4 to 4.4 inches), but weigh only 20.6 to 29.3 grams (Tollestrup 1982, Uptain et al. 1985 in Service 1998). The blunt-nosed leopard lizard inhabits Nonnative Grassland, Valley Sink Scrub, Valley Needlegrass Grassland, and Alkali Playa communities on the floor of the San Joaquin Valley (Holland 1986). It also is found in low foothills, canyon floors, plains, washes, arroyos, and open areas with scattered low bushes on alkali flats, particularly those Saltbush Scrub communities within the foothills of the southern San Joaquin Valley and the adjacent Carrizo Plain. The above habitat classifications by Holland (1986) are subsumed within the more general Alkali Desert Scrub and Annual Grassland habitat types described by Mayer and Laudenslayer (1988).

Blunt-nose leopard lizards are typically absent where habitat conditions include steep slopes, dense vegetation, or areas subject to seasonal flooding (Montanucci 1965). Preferred substrates range from sandy or gravelly soils to hardpan. It prefers flat terrain and tends to avoid dense or tall herbaceous cover that restricts vision for foraging and escape from predators (Warrick et al 1998).

These lizards frequently seek refuge in small mammal burrows (Stebbins 2003), using small rodent burrows for shelter from predators and temperature extremes. Burrows are usually abandoned ground squirrel tunnels or kangaroo rat burrows (abandoned or occupied). In areas of low mammal burrow density, lizards will construct shallow, simple tunnels in earth berms or under rocks. Burrows are important structures that enable blunt-nosed lizards to moderate temperature extremes and avoid a wide-range of predators. Species preying upon blunt-nosed lizards include: snakes, shrikes, hawks, owls, eagles, squirrels, skunks, badgers, coyotes, and foxes (Montanucci 1965, Tollestrup 1979).

The diet of the blunt-nosed lizard consists primarily of insects and other lizards (Service 1998). Insects consumed include grasshoppers and crickets in the Order Orthoptera and moths of the Lepidoptera. Other lizards consumed by blunt-nosed lizards include: side-blotched lizards (*Uta stansburiana*), coast horned lizards (*Phrynosoma coronatum*), California whiptails (*Cnemidophorus tigris*), and the spiny lizards (Sceloporus spp.) (Service 1998). Interspecific competition is hypothesized to occur between blunt-nosed lizards and California whiptails because they consume similar food items (Montanucci 1965, Service 1998).

Above ground activity of blunt-nosed lizards is primarily dependent on temperature with optimal activity occurring when air temperatures are between 74 and 104 degrees Fahrenheit (°F) and ground temperatures are between 72 and 97 °F. Smaller lizards and young have a wider activity

range than adults and as a result they emerge from hibernation earlier than adults, remain active later in the year, and begin their activity earlier during the day (Montanucci 1965). These temperature-related patterns result in adult lizards being active above ground from March or April through June or July. By the end of June or July, the majority of sightings are of sub-adult and hatchling lizards (Service 1998).

Breeding begins within a month of emergence from dormancy and typically lasts from the end of April through the beginning of June, but occasionally may last through the end of June. Adults are paired and frequently occupy the same burrow during the breeding period and for up to several months afterwards (Montanucci 1965, Service 1998). Two to six eggs are laid in June or July in a chamber excavated for a nest or in an existing burrow system. Adverse conditions can delay or halt reproduction, while variable environmental conditions may result in more than one clutch of eggs being produced per year (Service 1998).

Historical and Current Distribution

This species is endemic to the San Joaquin Valley (Montanucci 1970, Tollestrup 1979 *in* Service 1998) and is thought to have once occurred from the Tehachapi Mountains in Kern County northward to Stanislaus County (Service 1998). Although the boundaries of its original distribution are uncertain, blunt-nosed leopard lizards probably occurred in the San Joaquin Valley from Stanislaus County in the north to the Tehachapi Mountains of Kern County in the south, and from the Coast Range Mountains, Carrizo Plain, and Cuyama Valley in the west to the foothills of the Sierra Nevada in the east. In general, blunt-nosed leopard lizards are not found in areas with steep slopes, dense vegetation or in areas subject to seasonal flooding.

The current range is thought to include scattered populations throughout the undeveloped land of the San Joaquin Valley and in the foothills of the Coast Range below 2,600 feet (Montanucci 1970, Service 1998). Lizards occur on scattered parcels of undeveloped land on the valley floor, most commonly annual grassland and valley sink scrub. The lizards also inhabit alkali playa and valley saltbush scrub. This species occurs in the San Joaquin Valley from Stanislaus County through Kern County, and along the eastern edges of San Luis Obispo and San Benito Counties. In the southern San Joaquin Valley, extant populations are known to occur in the Kern and Pixley National Wildlife Refuges, Liberty Farms, Allensworth, Antelope, the Casrizo and Elkhorn Plains, Buttonwillow, Elk Hills and Tupman Essential Habitat Areas, north of Bakersfield around Poso Creek, and western Kern County around the towns of Maricopa, McKittrick, and Taft.

Reasons for Decline and Threats to Survival

Populations of the blunt-nosed leopard lizard declined to levels warranting listing because of the conversion and degradation of suitable habitat (Service 1998). Agricultural, urban, petroleum, mineral, and other development activities altered an estimated 94 percent of the wildlands on the Valley floor by 1985. The conversion of land for agricultural purposes along the Friant Kern Canal has led to a loss of patches of suitable habitat large enough likely to be inhabited by blunt-nosed leopard lizard. Ground disturbance, including that associated with agricultural practices, may kill or harm individuals. Due to its obligate use of burrows, the blunt-nosed leopard lizard can be adversely impacted by rodent control programs (through loss of burrows over time). Also, there is some concern that the application of broad-spectrum insecticides on natural lands that

harbor blunt-nosed leopard lizards-to combat agricultural pest species-may be an additional threat to their survival. It also is threatened by overgrazing and rodent control. Those lands where the species still exists are often heavily grazed or treated with pesticides, both of which have been shown to have detrimental effects on the lizard (Germano and Williams 1992).

The recovery plans for the blunt-nosed leopard lizard identified habitat units that are considered essential for the continued persistence of viable populations within the San Joaquin Valley but, having no legal status equivalent to critical habitat; the conversion of suitable habitat within these units has continued (Service 1980b). Consequently, habitat disturbance, conversion, and fragmentation continue to be the greatest threats to blunt-nosed leopard lizard populations. Other direct and indirect effects result from automobile and off-highway vehicle traffic, livestock grazing, and pesticides (Service 1998). The recovery strategy for this species includes identifying and protecting existing habitat, determining the best habitat management practices, and conducting public information and education programs (Service 1998).

Tipton Kangaroo Rat

The Tipton kangaroo rat (*Dipodomys nitratoides nitratoides*) was listed as endangered on July 8, 1988 (53 FR 25608). The Tipton kangaroo rat is included in the *Recovery Plan for Upland Species of the San Joaquin Valley* (Service 1998).

Life History and Habitat Requirements.

The Tipton kangaroo rat is one of three subspecies of the San Joaquin kangaroo rat (*Dipodomys nitratoides* sp.). It is distinguished by being larger than the Fresno kangaroo rat (*Dipodomys nitratoides exilis*) and smaller than the short-nosed kangaroo rat (*D. n. brevinasus*), although these size differences are largely indiscernible in the field. Recent genetic studies, using mitochondrial deoxyribonucleic acid (DNA) markers, divide San Joaquin kangaroo rats into two separate evolutionarily significant units: the Fresno kangaroo rat and a complex including both the Tipton and short-nosed kangaroo rat (Kelly 1990). Kangaroo rats are adapted for survival in an arid environment. They shelter in burrows, which are usually found in relatively light, sandy soils in raised areas.

Historical and Current Distribution.

The known historical range of the Tipton kangaroo rat encompassed an area of grassland and alkali scrub communities on the valley floor in the eastern and southern San Joaquin Valley in Kings, Tulare, and Kern Counties (Service 1998).

Reasons for Decline and Threats to Survival.

Loss and degradation of habitat due to agricultural conversion is the principal reason for the decline of the Tipton kangaroo rat and the principal threat to its survival.

Species Occurrence and Habitat Status in the Action Area.

The San Luis Unit is in the western San Joaquin Valley, adjacent to or to the west of the Tipton kangaroo rat's geographic range. The San Luis Unit is generally within the known historical range of the short-nosed kangaroo rat, a federal species of concern (Service 1998), but also includes the area of Naval Air Station Lemoore, where San Joaquin kangaroo rats considered to be Tipton kangaroo rats or at least part of the Tipton/short-nose genetic clade have been

documented (Service 1998; Kelly 1990).

San Joaquin Woolly-Threads

Listing.

The San Joaquin woolly-threads (*Monolopia congdonii*) was listed as endangered on July 19, 1990 (55 FR 29361). Recovery of San Joaquin woolly-threads is discussed in the Recovery Plan for Upland Species of the San Joaquin Valley (Service 1998).

Life History and Habitat Requirements.

The San Joaquin woolly-threads, a dicot in the family Asteraceae, is an annual herb endemic to the southern San Joaquin Valley and surrounding hills. It has tiny yellow flower heads clustered at the tips of erect to trailing stems covered with tangled hairs. It is readily distinguished from Eatonella, its closest relative, by differences in growth habit, flower and seed morphology, and geographic range.

The San Joaquin woolly-threads grow in annual grasslands or saltbush scrub on alluvial fans, often with sandy soil. It occurs on neutral to subalkaline soils deposited in geologic times by flowing water. On the San Joaquin Valley floor, it typically is found on sandy or sandy loam soils, whereas in the Carrizo Plain, it occurs on silty soils. San Joaquin woolly-threads occupy microhabitats in nonnative grassland, valley saltbush scrub, interior Coast Range saltbush scrub, and upper Sonoran subshrub communities with less than 10 percent shrub cover but in either sparse or dense herbaceous cover. It has been reported from elevations ranging from 200 to 850 feet on the San Joaquin Valley floor and from 2,000 to 2,600 feet in San Luis Obispo and Santa Barbara Counties.

The seeds of San Joaquin woolly-threads may germinate as early as November, but usually germinate in December and January. Flowering generally occurs between late February and early April and may continue into May. Seed production depends on plant size and number of flower heads. In contrast to the more persistent skeletons of Hoover's woolly-star, all trace of San Joaquin woolly-threads plants disappears rapidly after seeds are shed in April or May. Seed dispersal agents are unknown, but may include wind, water, and animals. Seed-dormancy mechanisms are thought to allow the formation of a substantial seed bank in the soil.

Historical and Current Distribution.

San Joaquin woolly-threads are endemic to the southern San Joaquin Valley and surrounding hills. Its original range extended from southern Fresno and Tulare Counties (excluding the Tulare lakebed) to the City of Bakersfield and the Cuyama Valley. San Joaquin woolly-threads currently exist as four metapopulations and several small, isolated populations. The largest metapopulation occurs on the Carrizo Plain, where occupied habitat has been observed to vary from a high of 2,800 acres in a favorable year, to much less in years of lower rainfall. Much smaller metapopulations occur in Kern County near Lost Hills, in the Kettleman Hills of Fresno and Kings Counties, and in the Jacalitos Hills of Fresno County. Isolated occurrences are known from the Panoche Hills in Fresno and San Benito Counties, near the City of Bakersfield, and the Cuyama Valley.

Reasons for Decline and Threats to Survival.

Throughout its range, most of its habitat has been eliminated by conversion to agriculture. Threats to remaining unprotected populations include heavy grazing (especially by sheep), oil field development, and possibly air pollution. Population and plant size can vary, depending on site and weather conditions. In years of below-average precipitation, few seeds of this species germinate, and those that do typically produce tiny plants.

Species Occurrence and Habitat Status in the Action Area.
Substantial populations of wooly-threads are present within the action area (Westlands Water District, City of Avenal, City of Coalinga), in the Kettleman Hills of Kings County, and in the Jacalitos and Panoche Hills of Fresno County.

California jewelflower
Listing.
The California jewelflower (*Caulanthus californicus*) was listed as an endangered species on July 19, 1990 (55 FR 29361).

Species Description and Life History.
This is an annual herb belonging to the mustard family (Brassicaceae), and has flattened, sword-shaped fruits. Known populations of California jewelflower occur in non-native grassland, upper Sonoran subshrub scrub, and cismontane juniper woodland and scrub communities. Historical records suggest that it also occurred in the valley saltbush scrub community in the past.

Populations of California jewelflower have been reported from subalkaline, sandy loam soils at elevations of approximately 240 to 2,950 feet. Seeds of California jewelflower begin to germinate in the fall, and seedlings may continue to emerge for several months. The seedlings develop into rosettes of leaves during the winter months, after which stems elongate and flower buds appear in February or March. Flowering and seed set may continue as late as May in years of favorable rainfall and temperatures. It is thought that California jewelflower forms a persistent seed bank, but seeds appear to germinate only when exposed to conditions simulating prolonged weathering. Seed dispersal agents are unknown, but may include gravity, seed-eating animals such as giant kangaroo rats, wind, and water. Pollinator-exclusion experiments indicated that insects are necessary for seed set in California jewelflower. Honeybees (*Apis mellifera)* have been observed visiting the flowers, but native insects also would be expected to serve as pollinators. Closely related species of the genus *Thelypodium* were visited by several species of bees *(Bombus* sp., *Apis* sp., and *Xylocopa* sp.) and butterflies (*Pieris* sp.)

Historic and Current Distribution.
The historical distribution of California jewelflower is known from 40 herbarium specimens, which were collected in 7 counties between 1880 and 1973. Approximately half of the collection sites were on the floor of the San Joaquin Valley in Fresno, Kern, and Tulare Counties. Several other collections came from two smaller valleys southwest of the San Joaquin Valley: the Carrizo Plain (San Luis Obispo County) and the Cuyama Valley (Santa Barbara and Ventura Counties). Three occurrences (i.e., collection sites separated by 0.4 kilometer [0.25 mile] or more) were in the Sierra Nevada foothills at the eastern margin of the San Joaquin Valley in Kern County. The remainder of the historical sites are in foothills west of the San Joaquin Valley, in Fresno, Kern, and Kings Counties. By 1986, all the occurrences on the San Joaquin and Cuyama Valley floors had been eliminated, and the only natural population known to be

extant (i.e., still in existence) was in Santa Barbara Canyon, which is adjacent to the Cuyama Valley in Santa Barbara County. A small, introduced colony also existed at the Paine Preserve in Kern County at that time.

Since then, several more introductions have been attempted (see Conservation Efforts in the Recovery Plan for Upland Species of the San Joaquin Valley), and a number of colonies were rediscovered in two other areas where the species had been collected historically. The naturally-occurring populations known to exist today are distributed in three centers of concentration: (1) Santa Barbara Canyon, (2) the Carrizo Plain, and (3) the Kreyenhagen Hills in Fresno County. The Santa Barbara Canyon metapopulation occurs on the terraces just west of the Cuyama River and includes approximately 30 acres of occupied habitat.

The Carrizo Plain metapopulation is confined to the western side of the Carrizo Plain and encompasses approximately 10 acres of occupied habitat. The Kreyenhagen Hills metapopulation includes 4 small colonies within a small area of rolling hills.

Reasons for Decline and Threats to Survival
The primary reason for decline of California jewelflower was habitat conversion to agriculture and urban development. Potential threats to one or more of the remaining populations of California jewelflower include development on private land in the Santa Barbara Canyon area, competition from non-native plants, direct and indirect effects from pesticide and herbicide use for insect control and cropland management, and potential cattle grazing of populations on private lands. The small population size of the California jewelflower also makes it vulnerable to natural catastrophic events such as drought or fire.

Species Occurrence and Habitat Status in the Action Area.
Substantial populations of wooly-threads are present within the action area (Westlands Water District, City of Avenal, City of Coalinga), in the Kettleman Hills of Kings County, and in the Jacalitos and Panoche Hills of Fresno County.

Effects Overview

The following represents a general overview of the types of effects that we anticipate will arise from the proposed 26 month interim contract renewals and which are applicable to the species and critical habitat in Table 2. We anticipate that effects will be similar in scope and significance as those analyzed in our recent evaluations of the previous contract renewals (Service file nos. 1-1-00-F-0056 and 1-1-02-F-0070), and in the programmatic biological opinion on implementation of the Central Valley Project Improvement Act (Service file no. 1-1-98-F-0124).

Reclamation provided information generated by the Central Valley Habitat Monitoring Program for interim renewal contractors in Attachment 6 of the Supplemental Information on Long-Term Renewal Contracts. This information summarizes land use changes in water districts between the years 1993 and 2000. Information from these reports is used in the following analysis.

Conservation measures
Essential to the findings below are Reclamation's past and continuing conservation efforts to

recover listed species through the Central Valley Improvement Act (b)(1)(other) and Central Valley Project Conservation Program. These programs have provided funding for habitat acquisition and management, surveys, and research that have contributed to the recovery of numerous listed species that have been adversely affected by the Central Valley Project.

The measures described in the project description or commitments are intended to reduce, ameliorate, or reverse effects of water diversions and deliveries on listed and proposed species within the action area. Some, but not all, measures have been fully implemented. The conservation measures help offset the effects of habitat conversion and fragmentation by identifying, protecting, and restoring habitat that has been identified as important for recovery, and providing funding for other high priority recovery actions. Actions funded by these programs contribute to stabilizing or improving the overall status of listed species that have been affected by past operation of the Central Valley Project. Were it not for the continuing commitment of Reclamation and the applicants to implement the conservation measures and terms and conditions of past biological opinions on interim contract renewals, there would be little to counterbalance ongoing adverse effects of land use changes related to Federal water deliveries that eliminate or degrade habitat of listed species. Reclamation will continue to work with our office to implement the conservation measures over the two-year period of the interim contract renewals.

Existing agricultural uses

Reclamation has stated that the proposed contracts would provide unchanged amounts of water to the contractors. We anticipate that continued application of Federal water to existing uses over the 26 month periods of the interim contracts, without alteration of use, will result in effects to listed species similar to those ongoing effects described in the Environmental Baseline and in the Species Accounts. However, some conversion between different agricultural uses receiving unchanged deliveries of contract water could result in impacts, or benefits, to listed species. For example, some row crops have low habitat value for kit fox, while orchards can have somewhat higher values. Conversion of orchards to row crops may adversely affect kit foxes without triggering Reclamation or District review. Information provided by Reclamation indicates that uses on lands already converted to agriculture as of this date within the districts will remain on average the same over the 26 month periods analyzed in this biological opinion and that there will be no significant adverse changes in the status of listed species that occur within agricultural water districts as a result of the proposed interim renewal of the five water service contracts.

Habitat conversion and fragmentation

A substantial threat to listed species populations remaining in interim contract areas is continued conversion of useful habitats to non-habitat or less useful habitats. Habitat conversions may in many cases occur as a result of, or be related to, federal water deliveries, since water supplies are limited and water is needed for agricultural and municipal and industrial developments in the semi-arid southern Central Valley. Attachment 6 of the information accompanying Reclamation's request for consultation on the renewal of the long-term water service contracts provided information on the status and findings of the Central Valley Habitat Monitoring Program. Based on this preliminary information on trends between 1993 and 2000, it appears conversion of native habitat within contract service areas may be small in the majority of interim contract service areas. Two areas of special concern are the Santa Nella area and development

along the I-5 corridor in Fresno and Kings County, which are addressed below because that part of the service area includes rapidly developing urban areas. Based on the low amount of within water district habitat conversion over the seven-year period of 1993 to 2000, we anticipate no significant change in that trend during the two-year period of the proposed interim contract renewals, *i.e.*, ongoing effects to listed species described below will continue, but because of the brief nature of the Federal action, we can make a finding that these trends will not appreciably reduce the likelihood of both the survival and recovery of listed species.

As noted above, most habitat conversions are outside the control of Reclamation or the contractors. Conversions inside the contract service areas that use groundwater and are not directly supplied with Federal water could continue unabated.

Habitat conversions also can fragment remaining habitat and break habitat connectivity needed to allow a species to disperse throughout its range. Dispersal promotes gene flow and among different portions of a species range, and is important to maintain stable populations within available habitat through the species' range as populations fluctuate over time. Loss of connecting habitat that reduces gene flow and population interchange may reduce the likelihood of survival and recovery of listed species by isolating populations within small habitat patches that are at increased risk of extirpation from stochastic events, inbreeding depression, or other factors. The Service considers habitat conversions that fragment and reduce the connectivity between remaining pieces of habitat as likely to have such effects on kit fox, jewel flower, and wooly-thread. Habitat fragmentation that results from land use changes remains a major threat for the listed species addressed herein within the action and throughout their ranges. As noted elsewhere in this discussion, the brief nature of the federal action is a significant factor in the findings of this biological opinion.

Habitat conversion and fragmentation affect listed species by modifying or destroying habitat to an extent that results in death of wildlife or impairment of essential behaviors in many ways, including (a) through starvation, by destroying prey base and other food sources; (b) displacing animals and forcing movement to adjacent areas of non-habitat, increasing exposure to predators or other sources of mortality, such as roadways, dogs, and cats, or forcing animals into adjacent habitat in which they must compete with resident individuals; (c) eliminating breeding and rearing habitat (burrows, trees, and the like); (d) truncating hydrologic connections within seasonal wetland complexes that changes hydroperiods to regimes unsuitable for listed species that reproduce in seasonal wetlands, or by making hydroperiods suitable for predators of listed species such as bullfrogs; (e) increasing exposure to oil, pesticides, and other toxic substances associated with urban environments; (f) increasing exposure to stressors such as noise, light, human presence, off-road vehicles associated with urban environments. The significance of these effects on survival and recovery of kit fox, jewel flower, and wooly-thread, both within the action area and throughout their respective ranges, underscores the importance of continued implementation and expansion of conservation programs throughout areas that receive Central Valley Project water.

Pesticide use

An interrelated effect of Federal water deliveries to contractors is the use of pesticides, including insecticides, acaricides, herbicides, fungicides, and other chemicals, on crops grown benefiting

from Federal water. Effects of pesticide use on listed species are addressed in the 2002 biological opinion on interim contract renewal (Service file # 1-1-02-F-0070). We anticipate effects of the proposed contract renewal to be similar in frequency, intensity, duration, and significance, to those analyzed in the 2002 biological opinion.

Rodenticides and insecticides pose a threat to kit foxes through primary and secondary poisoning and through reduction of prey base. Kit foxes may be killed if they ingest rodenticide in a bait application, or if they eat a rodent that has consumed the bait. Even sub-lethal doses of rodenticides may lead to the death of these animals by impairing their ability to escape predators or find food. Appetite suppression is a common side effect of ingesting pesticides, and kit foxes may starve from both a reluctance to eat and from a lack of available prey. Rodenticides and insecticides, by reducing the abundances of staple prey species, indirectly affect the survival of kit foxes

Kit foxes eat baits that coyotes ignore, leading to direct poisoning (Bunker 1940, Swick 1973[b]), eat impaired rodents, leading to secondary poisoning (Berry et al 1987, Spiegel and Disney 1996, Standley et al 1992) and suffer from lack of reproductive success and population suppression when their prey base is reduced or removed (Orloff et al 1986, Spiegel and Tom 1996, White and Ralls 1993, White et al 1996, White and Garrott 1997).

Grinnell et al (1937) documented the "intensive trapping" and "poison campaigns" that led to the rarity of the San Joaquin kit fox in the early part of the last century. This suppression of the species was the result of the occasional popularity of its pelt (Grinnell et al 1937) and the perception the species was a pest (Waithman 1974). Primary and secondary poisoning, as a threat to the San Joaquin kit fox, has been confirmed numerous times since listing (Bell et al 1994, Berry et al 1992, CDFG 1999, Hosea 1999, Hosea *in litt.* 2000, Huffman and Murphy 1992, E. Littrell 1988, Orloff et al 1986, Schitoskey 1975, Standley and McCue 1992, Service 1993 & 1998). There is a rising threat to the species in the form of highly-toxic, second-generation anticoagulants such as brodifacoum, which is persistent in tissue, bioaccumulates, and impairs reproduction (Altero 1996, Altero and Moller 2000, Chen and Deng 1986, Eason et al 1996, Eason et al 1999, Eason et al. 2001, Eason et al 2002, Hedgal and Colvin 1988, Howald et al 1999, Mount and Feldman 1983, Munday and Thompson 2003).

In 1993, in consultation with the Environmental Protection Agency (EPA), the Service concluded that ongoing use of the rodenticides aluminum and magnesium phosphide, chlorophacinone, diphacinone, pival, and potassium and sodium nitrate in San Joaquin kit fox habitat, would jeopardize the continued existence of the species. The analysis, conducted by the Service, was on expected mortality from direct and indirect exposure to the toxic agents and did not include an analysis on the effect of loss of prey. Reasonable and prudent alternatives to avoid jeopardy included restricting the use of aluminum and magnesium phosphide and potassium and sodium nitrate within the geographic range of the kit fox to qualified individuals, and prohibiting the use of chlorophacinone, diphacinone, pival, and sodium cyanide within the geographic range of the kit fox, with certain exceptions (*e.g.*, agricultural areas that are greater than 1 mile from any kit fox habitat). The reasonable and prudent alternatives from the 1993 opinion never went into effect. In 1996, the Sacramento Fish and Wildlife Office approved two EPA pesticide bulletins for application of grain baits, pelletized rodenticides, and burrow fumigants in San

Joaquin kit fox habitat (Service 1995). Since that time the majority of the kit fox populations that were dependent on the California ground squirrel have declined, and only one of these populations (out of 18 that have been documented since listing) has any known breeding today.

Every year, approximately 10 million pounds of anticoagulant are sold in California (O'Neill 2004), of which approximately 75 percent (by weight) is diphacinone (Timm *et al.* 2004). Even if compounds registered with the EPA are applied with strict observance of EPA-approved label restrictions, the use of pesticides and rodenticides still poses a significant threat to the kit fox (Service 1993). Documented exposure and mortality to kit foxes from chlorophacinone (Berry et al 1992, Standley et al 1992), diphacinone (Littrell 1988), and brodifacoum poisoning (Hosea *in litt.* 1999) indicate that this threat is ongoing. Although the California Department of Pesticide Regulation has proposed use restrictions for (the highly-toxic, second-generation anticoagulants) brodifacoum, difethailone, and bromadiolone (CDPR 2005), these restrictions have not been promulgated and are open to comments from registrants.

Animals that carry sub-lethal loads of anticoagulants have a propensity to bleed, leading to the potential of bleed-out from minor wounds (Jackson and Kaukeinen 1972), and causing cerebral hemorrhages in some cases (Eason et al 2001). Vaginal bleeding is a clinical sign of anticoagulant poisoning (EPA 2004, Erickson *in litt. 2004*, Padgett et al 1998), and female kit foxes with sub-lethal loads of anticoagulants may suffer from hemorrhages in their reproductive tracks during estrus. It is unknown if this hemorrhaging could lead to permanent impairment of the reproductive tract; however, reproductive implications could be grave during birthing. The persistence of brodifacoum in the liver for periods exceeding 6 and 8 months, in many taxa (Eason et al 2001, Munday and Thompson 2003, Stone et al 1999), has serious implications for San Joaquin kit fox dispersal and reproduction. A second sub-lethal dose of brodifacoum, even much later in time, can lead to fatal hemorrhaging (Stone et al 1999). In addition, canine pup (neonate) mortality has been documented at levels of brodifacoum loading that are significantly lower than the toxic dose for an adult dog (Munday and Thompson 2003).

Stone et al (1999) documented wildlife deaths, of both birds and mammals, from warfarin, brodifacoum, bromadiolone, and diphacinone. Brodifacoum contributed to significantly more wildlife deaths than the other rodenticides. The label restriction for brodifacoum indicates that it should be used "in and around" structures; however, the distance from the structure and the type of structure is not specified. This has led to the relatively loose interpretation that it can be used in some orchards. Brodifacoum is used in apple orchards (Hegdal and Colvin 1988) and "recommended" in almond orchards (Heintz 2000). It is registered with EPA in 36 pesticide products (CDPR 1999) and is available over-the-counter and on the Internet. Brodifacoum is under reevaluation with CDPR, because of exposure of wildlife (birds and mammals) in areas adjacent to urban development. Poisoning of non-target wildlife may be widespread.

Intentional and accidental poisoning should not be overlooked as a threat to the San Joaquin kit fox. Sodium fluoroacetate (1080), a rodenticide and predacide, was not determined to jeopardize the San Joaquin kit fox, because its use is restricted to livestock protection collars (Service 1993, EPA 1995). Sodium fluoroacetate was historically used in California to kill rodents (EPA 1995) and jackrabbits (Schitoskey 1975) and had a tallow-bait formulation designed to kill foxes. Although no longer as a rodenticide in the U. S. (Robinson et al 2002), the Service has

documented and prosecuted use of the highly toxic1080 from black market sources (Speart 1992).

It has been hypothesized that kit foxes that grow up in an urban environment, and survive to adulthood, are unlikely to get hit by cars (Bell *in litt.* 2006). It is well established that brodifacoum causes hemorrhaging in the brain (Eason 2001), so the mental impairment and sluggish behavior that are known side-effects of anticoagulants could be increasing susceptibility to road mortality in urban areas and near orchards.

White and Ralls (1993) found that prey scarcity was the primary factor contributing to decreased reproductive success during a short drought period on the Carrizo Plain. The California ground squirrel, which is the staple prey of kit foxes in the northern portion of their range, was thought to have been eliminated from Contra Costa County in 1975, after extensive rodent eradication programs. Field observations indicated that the long-term use of ground squirrel poisons in this county severely reduced kit fox abundance through secondary poisoning and the suppression of populations of its staple prey (Orloff et al 1986). Starvation and lack of reproductive success occurs in San Joaquin kit fox populations when their prey base is reduced or removed (Morell 1972, Orloff et al 1986, Spiegel and Tom 1996, White and Ralls 1993, White et al 1996, White and Garrott 1997), and this can lead to population suppression or collapse.

Insects are a significant prey source for the San Joaquin kit fox (Hawbecker 1943, Scrivner et al 1987, Vanderbilt-White 1993), especially during periods of low prey availability. During the summer months in the northern range, particularly July and August, insects provide the primary prey for San Joaquin kit foxes (Archon 2004). Insects are an important part of the diet of juvenile San Joaquin kit foxes. Cypher and Brown (2006) found that "pups primarily consumed ground squirrels and insects" at the Bena Landfill site in Kern County. Kit foxes have demonstrated the ability to switch to insect prey, when there habitat is destroyed or impaired (Arjo et al 2003), although such prey may not prove stable over time in areas where the insects are responding to changes in vegetation, weather, and climate. Insecticides that target the supplemental prey base of grasshoppers and crickets (Scrivner et al 1987), and detritivorous insects (Vanderbilt-White 1993), may suppress San Joaquin kit fox populations, reduce juvenile survivorship, or inhibit successful dispersal.

Two primary paths of secondary poisoning are likely to occur in kit foxes. Kit foxes are scavengers and are likely to be exposed to anticoagulants as a result of foraging on tainted carcasses. Anticoagulants often impair prey behavior, resulting from both cerebral hemorrhaging and deranged (addictive) foraging. These side effects of anticoagulant exposure provide for easy meals. Although this is a serious concern for all anticoagulants, the second-generation anticoagulants are much more toxic and are very widely used. Brodifiacoum has such high secondary exposure that it has been used to control small-predator populations in New Zealand, by poisoning the prey (Alterio and Moller 2000). Kit foxes are known to use canals as foraging and denning habitat. Canals are often the only travel routes of habitat connecting disjunct populations; however, canal maintenance and adjacent agricultural applications increase the rodenticide threat along these dispersal paths.

Increasing reproductive success and carrying capacity are theorized and testable measures that

can prevent species extinction (McCarthy et al 2003). Rodenticides and insecticides can reasonably be expected to both impair reproductive success and reduce carrying capacity of kit foxes. Although other mortality factors should be considered and addressed, removing rodenticide and insecticide use from kit fox breeding, feeding, and dispersal habitat would contribute significantly to stabilizing impaired kit fox populations and increasing reproductive success and carrying capacity.

Direct Effects and Effects of Interrelated and Interdependent Actions

Direct effects are defined as those effects of the project that are immediate in nature and include interrelated and interdependent actions. An interrelated action is an activity which is part of the proposed action and depends on the proposed action for its justification. An interdependent action has no independent use apart from the action being consulted on – this means that an interdependent action would have no independent utility apart from the proposed action.

The Service anticipates that there will be no direct effects to listed species associated with the proposed execution of the 5 interim contracts for 26 month periods between January 1, 2008, through February 28, 2010, for Westlands Water District and January 1, 2009, through February 28, 2011, for the remaining four contractors. Operation and maintenance of CVP water conveyance facilities, which can be considered interdependent actions, have received non-jeopardy biological opinions (see **Environmental Baseline**).

The proposed federal action will continue deliveries of water to these five contractors with no construction of new facilities, installation of new structures, or modification of existing facilities required or planned. Delivery of federal water to these five contractors, and from the contractors to the individual water users, will maintain the patterns of land use described above in the **Environmental Baseline**. Execution of the IRC's is the action that allows for the delivery of the federal CVP water, and thus any effects anticipated would be indirect, rather than direct.

Indirect Effects

Indirect effects are effects caused by or result from the proposed action, will occur later in time, and are reasonably certain to occur. Indirect effects may also occur outside of the area directly affected by the action. Indirect effects also include the effects of changing cropping patterns, or of converting seasonal crops to permanent crops such as orchards and vineyards. Existing municipal and industrial activities in each of the communities that utilize the contract water have resulted in effects to habitat used by kit fox, blunt-nosed leopard lizard, Tipton kangaroo rat, jewel flower, and wooly-thread.

Reclamation (USBR 2004a) identified approximately 34,860 acres of urban or industrial land uses including transportation corridors, industrial areas, farmsteads and urban/residential areas in the San Luis Unit. The largest block of this total (25,290 acres) is the industrial – transportation category, which includes the I-5 corridor and other roadways and the oilfields around Avenal and Coalinga; and the remaining lands are the urban area of Avenal, Coalinga, Huron, and the individual farmsteads.

Continued delivery of water under these contracts is vital to sustain the agricultural, residential, commercial, and industrial activities that occur within contract service areas. These activities would not be sustainable at the same scale, extent, intensity, and duration absent federal water supplies. On the other hand, the land use activities that are sustained by or that will utilize contract water are not controlled by Reclamation, nor are they directly controlled by the Water Districts. Water Districts are retailers of CVP water, whereas land use is controlled by end-users such as individual farmers in the case of agricultural use, or by local or state government in the case of residential, commercial, and industrial activities. Indirect effects may also occur outside of the area directly affected by the action. Indirect effects to listed species or suitable habitat has likely occurred as a result of the delivery of CVP water to the individual water districts or municipalities during the life of the existing water delivery contract. Many of these activities took place prior to implementation of the ESA in 1973 and prior to the listing of the species listed below and were not subject to the provisions of the ESA. Land use decisions subsequent to that time have continued to result in adverse effects to the species and suitable habitat and have not been authorized incidental take under section 9 or 10 of the ESA. A search of CEQA Net (www.ceqanet.ca.gov) on December 17, 2007 revealed a number of proposed development projects which will receive CVP contract water. The City of Avenal is considering development proposals totaling approximately 184 acres; the City of Coalinga is considering development proposals totaling approximately 1,441 acres, the City of Huron is considering development proposals totaling approximately 298 acres. These developments may result in indirect effects to listed species or habitat suitable for their use which would likely result in the take of protected species. Any such take which occurs during the interim contract period will not be exempt under this biological opinion from the provisions of Section 9 of the ESA. To avoid this take being in violation of the ESA, consultation on the proposals should be accomplished by the applicants.

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 unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act. The discussion of cumulative effects in the 2000 and 2002 biological opinions on interim contracts is incorporated by reference.

Most of the indirect effects of the proposed action are also cumulative effects, because they are carried out by State, local, or private entities, not the action agency or the applicants. We anticipate the cumulative effects to listed species to be very similar to those described above for indirect effects and effects of interdependent actions. We do not anticipate significant cumulative effects in the primarily agricultural water districts over the next two years because so little habitat remains. While we expect that continued habitat loss and fragmentation throughout the action area will continue to adversely affect the listed species addressed in this opinion, recent trends of habitat conversion within the primarily agricultural water districts do not indicate that these effects will rise to a level of significance that would preclude the survival or recovery of these species during the next two years. To the extent that these actions have effects that result in incidental take of listed species, the sponsors, applicants, or proponents of such actions must obtain exemption for such take through either section 7 or section 10 of the Endangered Species

Act.

In the water districts where CVP water will comprise a portion of the municipal water supply for rapidly expanding urban areas such as the I-5 corridor in Merced, Fresno, and King Counties the likelihood of significant cumulative effects during the next two years is greater than in the primarily agricultural or rural areas of the water districts.

Cumulative Effects on Critical Habitat
The proposed project would not have any cumulative effect on critical habitat because no critical habitat has been designated for these species within the action area.

Summary of Effects

The most significant effects of irrigated agriculture on listed species occurred long ago as a result of the original loss and fragmentation of habitat from conversion of natural lands to agricultural and urban uses. However, as noted in the Environmental Baseline, some agricultural lands provide prey and potential den sites and are likely to continue to provide that function to small numbers of kit fox under renewed water service contracts. Giant garter snakes recorded in wetlands outside of, but within 5 miles of Westlands WD, may also be associated with water conveyance facilities within the contract service areas.

The proximity of kit fox, blunt-nosed leopard lizard, Tipton kangaroo rats, and giant garter snakes to actively farmed areas, and their use of some farm lands and facilities for movement corridors, hunting or denning, exposes them to adverse effects of farm chemicals. Pesticides and rodenticides can adversely affect kit foxes and giant garter snakes through direct or secondary poisoning, and kangaroo rats through direct poisoning. Kit foxes may be killed if they ingest rodenticide in a bait application, or if they eat a rodent that has consumed the bait. Even sublethal doses of rodenticides may lead to the death of these animals by impairing their ability to escape predators or find food. Pesticides and rodenticides may also indirectly affect the survival of kit foxes and giant garter snakes by reducing the abundances of their staple prey species. Kit foxes occupying habitats adjacent to agricultural lands are also likely to come into contact with insecticides applied to crops owing to runoff or aerial drift. Kit foxes, Tipton kangaroo rats, and giant garter snakes could be affected through direct contact with sprays and treated soils, or through consumption of contaminated prey or other food items.

California least terns are likely to be found within the action area. Potential effects to this species result from existing evaporation ponds, or from the reuse areas established as part of the solutions being implemented for selenium drainage, as described in the Biological Opinion for the San Luis Drainage Feature Reevaluation Project (Service file #: 1-1-06-F-0027), and which would occur with or without the proposed federal action.

California jewelflower and San Joaquin woolly-threads are known to occur within the action area. The current locations are primarily within the boundaries of the Cities' service areas. As there is a low probability that the cities will expand into the areas known to harbor these plants during the period of the IRC's, the effects to the species are discountable.

The biological assessment and supporting information in the water needs assessments provided for the long-term contract renewal consultation indicate that water use in Westlands WD is likely to remain predominantly agricultural for the foreseeable future and that even absent a CVP water supply, agricultural land use likely would continue, although many other factors (e.g., fuel costs, commodity prices) will influence whether or not land will be farmed and what will be grown on it. Thus the potential effects attributable to agricultural land use supported by CVP water supply occur seamlessly with the effects of activities having an existence independent of CVP water. These effects have the potential to occur regardless of the continued availability of CVP water; only varying in magnitude. We conclude that the majority of the secondary effects of farming activities are caused by farming activities that have independent utility from the provision of the federal water supply during the interim contract period, and that the increment of these effects potentially attributable to the federal water supply is not readily subject to quantification. We therefore conclude that the effects of interrelated and interdependent actions may affect the San Joaquin kit fox, blunt-nosed leopard lizard, California least tern, California jewelflower, San Joaquin woolly-threads, Tipton kangaroo rat, and giant garter snake.

Conclusion

After reviewing the current status of the San Joaquin kit fox and giant garter snake, the environmental baseline for the action area, the effects of the proposed action and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the species, and is not likely to destroy or adversely modify designated critical habitat. The Service has concluded that the interim renewal of CVP water service contracts may affect, but is not likely to adversely affect, the San Joaquin kit fox, blunt-nosed leopard lizard, California least tern, California jewelflower, San Joaquin woolly-threads, Tipton kangaroo rat, and giant garter snake for the following reasons: (a) We do not anticipate additional agricultural land conversion in Westlands WD because the water districts are fully developed;. (b) Effects of farming activities attributable to the increment of agricultural activity that has no independent utility apart from the provision of federal water is not subject to a severable analysis of effect from agricultural activities in the contract service areas supported by non-CVP water, and are therefore discountable; and (c) the urban areas in Avenal, Coalinga, and Huron are not projected to experience significant growth during the 26 month periods covered by the interim contract.

No critical habitat has been designated for these species; therefore no critical habitat will be modified or affected.

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 to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by Service 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. Harass is defined by Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but

are not limited to, 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 the terms and conditions of this Incidental Take Statement.

The Service does not anticipate the proposed action will take any species, and therefore no incidental take statement is needed.

Conservation Recommendations

Section 7(a)(1) of the ESA 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. The term "conservation recommendations" has been defined as suggestions from the Service regarding discretionary measures to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding the development of information. The recommendations provided here relate only to the proposed action and do not necessarily represent complete fulfillment of the agency's 7(a)(1) responsibilities for these species. In order for the Service to be kept informed of actions that either minimize or avoid adverse effects or that benefit listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

The Service recommends that Reclamation:

1. Continue to take affirmative actions to offset the impacts of past and present CVP implementation and its consequences on listed species. In particular, assist the Service and other organizations in permanently conserving lands important as habitat or movement corridors for listed species, and expand existing conservation and restoration programs for listed species and species trending towards listing.

2. Proactively encourage and fund retirement of seleniferous agricultural lands, including but not limited to those within or adjacent to the Grassland Drainage Area. This support could take the form of land purchases, incentives for withdrawing such lands from irrigation, disincentives for applying Federal water, reclassifying seleniferous lands, et cetera, and should be pursued by Reclamation whether independently or in cooperation with other appropriate Federal, State, and local agencies.

3. Reallocate Central Valley Project water from retired lands to meet listed species water supply needs.

4. Continue to assist the Service in the implementation of recovery actions in the Final, Recovery Plan for Upland Species in the San Joaquin Valley (USFWS, September 1998), Draft Recovery Plan for the least Bell's vireo (USFWS, 1998), Recovery Plan for the Sacramento/San Joaquin Delta Native Fishes (USFWS,1995), and Recovery Plan for valley elderberry longhorn beetle (USFWS, 1984).

5. Assist the Service and other relevant parties in implementation of recommended actions to reduce the extent and severity of drainwater contamination identified in the San Joaquin Valley Drainage Program's Final Report: A Management Plan for Agricultural Subsurface Drainage and Related Problems on the Westside San Joaquin Valley.

6. To assist the Service with determining an environmental baseline for the San Joaquin kit fox in the action area for the long term contract renewals of SLU agricultural contractors, Reclamation should request from the applicants and provide to the Service information on rodenticide use within the district (e.g., form of rodenticides used, amount, timing and application methods).

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 informal consultation on the 5 interim water service contracts listed above. No further action is needed unless: (1) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered; (2) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered; or (3) a new species is listed or critical habitat designated that may be affected by the action, and (4) discretionary Federal agency involvement or control over the action is maintained (or is authorized by law). Reclamation should continue to monitor these actions and review this determination as needed based on the reinitiation criteria.

As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been maintained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

If you have questions regarding the proposed Interim Renewal of Water Service Contracts consultation, please contact Michael Welsh or Dan Russell at (916) 414-6643 or 414-6620.

Figures 1 – 5 Attached

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Literature Cited

American Farmland Trust. 1999. California's Central Valley Urban Sprawl 2040 Zone of Conflict. Farmland Information Library.

Alterio, N. 1996. Secondary poisoning of stoats (*Mustela erminea*), feral ferrets (*Mustela furo*), and feral cats (*Felis catus*) by the anticoagulant poison, brodifacoum. New Zealand Journal of Zoology 23:331-338.

Alterio, N., and H. Moller. 2000. Secondary poisoning of stoats (*Mustela erminea*) in a South Island podocarp forest, New Zealand: implications for conservation. Wildlife Research 27:501-508.

Archon, M. 1992. Ecology of the San Joaquin kit fox in western Merced County, California. M.A. thesis, California State University, Fresno. 62 pages.

Arjo, W. M., T. J. Bennett, and A. J. Kozlowski. 2003. Characteristic of current and historical kit fox (*Vulpes macrotis*) dens in the Great Basin Desert. Canadian Journal of Zoology 81:96-102.

Atwood, J.L. and P.R. Kelly. 1984. Fish dropped on breeding colonies as indicators of Least Tern food habits. Wilson Bulletin 96:34-47.

Beckon, W.N., M.C.S. Eacock, A. Gordus, and J.D. Henderson. 2003. Biological effects of the Grassland Bypass Project. Chapter 7 Grassland Bypass Project Annual Report 2001-2002. San Francisco Estuary Institute, San Francisco.

Bell, H. M., J. A. Alvarez, L. L. Eberhardt, and K. Ralls. 1994. Distribution and abundance of San Joaquin kit fox. California Department of Fish and Game, Sacramento, Nongame Bird and Mammal Section. Unpublished Report.

Berry, W. H., J. H. Scrivner, T. P. O'Farrell, C. E. Harris, T. T. Kato, and P. M. McCue. 1987. Sources and rates of mortality of the San Joaquin kit fox, Naval Petroleum Reserve #1, Kern County, California, 1980-1986. U. S. Department of Energy Topical Report, EG&G/EM Santa Barbara Operations Report No. EGG 10282-2154. 34 pages.

Berry, W. H. and W. G. Standley. 1992. Population trends of San Joaquin kit fox (*Vulpes velox macrotis*) at Camp Roberts Army National Guard Training Site, California. Prepared for U. S. Departments of the Army and Air Force, National Guard Bureau, by EG&G/EM Santa Barbara Operations, Report No. EGG 10617-2155 UC-702. 16pp

Berry, W. H., W. G. Standley, T. P. O'Farrell, and T. T. Kato. 1992. Effects of military-authorized activities on the San Joaquin kit fox (*Vulpes velox macrotis*) at Camp Roberts Army National Guard Training Site, California. U. S. Department of Energy Topical Report No. EGG 10617-2159, EG&G/EM Santa Barbara Operations, National Technical Information Service, Springfield, Virginia.

Briden, L.E., M. Archron, and D.L. Chesemore. 1987. Ecology of the San Joaquin kit fox in western Merced County. California State University, Fresno, 16 pp.

Brode, J.M. and G.E. Hansen. 1992. Status and future management of the giant garter snake (*Thamnophis gigas*) within the southern American Basin, Sacramento and Sutter

Counties, California. California Department of Fish and Game, Inland Fisheries Division (January 1992).

Bunker, C. D. 1940. The kit fox. Science 91(2376):35-36.

Burleigh, T.D. and G.H. Lowery, Jr. 1942. An inland race of *Sterna albifrons*. Occasional Papers of the Mus. Of Zoology, Louisiana State Univ. 10:173-177.

Caffrey, C. 1995. California least tern breeding survey, 1994 season. CDFG Catalog of Southern California Wetland Publications.

California Department of Fish & Game (CDFG). 1999. Exposure of Non-target Wildlife to Anticoagulant Rodenticides in California. Robert C. Hosea. California Department of Fish and Game Pesticide Investigations Unit. Rancho Cordova, California

California Department of Pesticide Regulation (CDPR). 1995. DRAFT California State plan for protection of endangered species from pesticide exposure. CDPR September 13, 1995. 10 pages.

_____ 1999. News Release: DPR releases 1998 pesticide use data.

California Department of Water Resources (CDWR), Division of Planning and Local Assistance. 2004. Land use data. Geographic information systems data.

Chen, T. W., and J. F. Deng. 1986. A brodifacoum intoxication case of mouthful amount. Veterinary and Human Toxicology 28:488.

Cypher, B. L. 2006. DRAFT Kit Fox conservation strategy in the San Luis Drainage Study Unit: Ecological considerations relevant to the development of a conservation strategy for kit foxes. California State University--Stanislaus, Endangered Species Recovery Program, Fresno, CA. 8pp.

Cypher, B. L., and A. D. Brown. 2006. Demography and ecology of endangered San Joaquin kit foxes at the Bena Landfill, Kern County, California. California State University—Stanislaus, Endangered Species Recovery Program. April 2006. 17 pages.

Dickert, C. 2002. San Joaquin Valley giant garter snake project 2001. California Department of Fish and Game. 14 pp.

Dickert, C 2003. Progress report for the San Joaquin Valley giant garter snake conservation project - 2003. California Department of Fish and Game. 37 pp.

Eason, C.T., G.R. Wright, L. Meike, and P. Elder. 1996. The persistence and secondary poisoning risks of sodium monofluoracetate (1080), brodifacoum, and cholecalciferol in possums. Proc. Vertebr. Pest Conf. 17:54-58

Eason, C.T., L. Milne, M. Potts, G. Morriss, G.R.G. Wright, and O.R.W. Sutherland. 1999. Secondary and tertiary poisoning risks associated with brodifacoum. New Zealand Journal of Ecology 23:219-224.

Eason, C., E. Murphy,G. Wright, C. O'Connor, and A. Buckle. (2001) Risk Assessment of broad-scale toxicant application for rodent eradication on island versus mainland use. In H-J. Pelz, D.P. Cowan, and C.J. Feare (eds), Advances in Vertebrate Pest ManagementII, Filander Verlag, Furth. Pp 45 - 48

Eason, C.T., E. C. Murphy, G.R.G. Wright, and E. B. Spurr. 2002. Assessment of risks of brodifacoum to non-target birds and mammals in New Zealand. Ecotoxicology 11:35-48

Egoscue, H.J. 1962. Ecology and Life History of the Kit Fox in Tooele County, Utah. Ecology 43:48 1-497

Erickson, W. and D Urban. 2004. Potential risks of nine rodenticides to birds and non-target mammals: A comparative approach. July 2004. 225 pages. Office of Pesticide Programs, Environmental Fate and Effects Division.

Fitch, H.S. 1940. A bio-geographical study of the ordinoides artenkreis of giant garter snake (genus *Thamnophis*). Univ. Calif. Pub. Zool. 44: 1-1 50.

Fitch, H.S. 1941. Geographic variation in garter snakes of the genus *Thamnophis sirtalis* in the Pacific coast region of North America. American Midland Naturalist 26:570-592.

Fox, W. 1948. The relationships of the garter snakes of the garter snake *Thamnophis ordinoides*. Copeia 1948: 113-120.

Germano, D. J., and D. F. Williams. 1992. *Gambelia sila* (Blunt-nosed leopard lizard) Reproduction. Herpetological Review 23:117-118.

Goodman, D. 1987. The demography of chance extinction. Pages 11-19 *In*: M. E. Soulé (ed.). Conservation Biology: the science of scarcity and diversity. Sinauer Associates, Inc, Sunderland, Massachusetts.

Grinnell, J., J.S. Dixon, and J.W. Linsdale. 1937. Fur-bearing mammals of California. 2 Volumes. University of California Press, Berkeley.

Hall, E.R. 1946. Mammals of Nevada. University of California Press, Berkeley, California.

Hansen, E.C. 2004. Year 2003 investigations of the giant garter snake *(Thamnophis gigas)* in the Middle American Basin: Sutter County, California. Prepared for Sacramento Area Flood Control Agency, Sacramento, California.

Hansen, G.E. 1988. Review of the status of the giant garter snake *(Thamnophis couchi gigas)* and its supporting habitat during 1986-1987. Final report for California Department of Fish and Game Contract C-2060, Sacramento, California. Unpublished Report, 31 pp.

Hansen, G.E. 1995. Status of the giant garter snake (*Thamnophis gigas*) in the San Joaquin Valley-1995. Final Report for California Department of Fish and Game Standard Agreement No. FG4052IF. Section 6 Project EF94-XX, Objectives 3 and 5, November 1996, Sacramento, California.

Hansen, G.E. and J.M. Brode. 1980. Status of the giant garter snake *Thamnophis couchi gigas* (Fitch). California Department of Fish and Game, Inland Fisheries Endangered Species Program Special Publication 80-5, Sacramento, California. 14 pp.

Hansen, G.E. and J.M. Brode. 1993. Results of relocating canal habitat of the giant garter snake (*Thamnophis gigas*) during widening of SR 99/70 in Sacramento and Sutter Counties, California, Final report for Caltrans Interagency Agreement 03E325 (FG7550) (FY 87188-9 1-92). Rancho Cordova, California. 36 pp.

Hansen, R.W. 1980. Western aquatic garter snakes in central California: an ecological and evolutionary perspective. Master of Arts thesis, California State University, Fresno, California, 78 pp.

Hansen, R.W. and G.E. Hansen. 1990. *Thamnophis gigas* (giant garter snake) reproduction. Herpetological Review 2 1 (4):93-94.

Hawbecker, A. C. 1943. Food of the San Joaquin kit fox. Journal of Mammalogy 24:499.

Hedgal, P. L., and B. A. Colvin. 1988. Potential hazard to eastern screech-owls and other raptors of brodifacoum bait used for vole control in orchards. Environmental Toxicology and Chemistry 7:245-260.

Hinds, N. E. A. 1952. Evolution of the California landscape. California Division of Mines Bulletin No. 158, Sacramento, California. 240 pp.

Holland, R.F. 1986. Preliminary Descriptions of the Terrestrial Natural Communities of California. Natural Heritage Division, California Department of Fish and Game, Sacramento, CA. 156 pp.

Hopkins, W.A., J.H. Roe, J.W. Snodgrass, B.P. Staub, B.P. Jackson, and J.D. Congdon. 2002. Effects of chronic dietary exposure to trace elements on banded water snakes (*Nerodia fasciata*). Environmental Toxicology and Chemistry **2** 1 :906-9 13.

Hosea, R.C. 2000. Exposure of non-target wildlife to anticoagulant rodenticides in California. Proc. Vertebr. Pest Conf. 19:236 – 244.

Hosea 1999. Letter from Robert C. Hosea, California Department of Fish and Game, Rancho Cordova, California, to Christine Van Horn Job, Endangered Species Recovery Program, Fresno, California, including necropsy information on two dead kit foxes. October 14, 1999.

Howald, G. R., P. Mineau, J. E. Elliott, and K. M. Cheng. 1999. Brodifacoum poisoning of avian scavengers during rat control on a seabird colony. Ecotoxicology 8:431-447.

Huffman, L. and T. D. Murphy. 1992. The effects of rodenticide and off-road vehicle use on San Joaquin kit fox activity in Bakersfield, California. Page 378 in: Endangered and Sensitive Species of the San Joaquin Valley, California. (Eds: D. F., Williams, S. Byrne, and T. A. Rado) California Energy Commission, Sacramento, CA. (ABSTRACT ONLY)

Kelly, P. 1990. Population Ecology and Social Organization of Dusky-footed Woodrats, *Neotoma fuscipes*. Ph.D. Dissertation, University of California, Berkeley.

Mayer, K.E. and W.F. Laudenslayer, Jr. (Editors). 1988. A Guide to Wildlife Habitats of California. California Department of Forestry and Fire Protection, Sacramento. 166 pp.

McCue, P.M., T. Kato, M.L. Sauls, and T,P. O'Farrell. 1981. Inventory of San Joaquin Kit Fox on land proposed as Phase 11, Kesterson Reservoir, Merced County, California. Report Number EGG 11 83-2426, EG&G, Energy Measurements, Goleta, CA, 16 pp.

McDaniel, B., and S. McDaniel. 1963. Feeding of Least Terns over land. Auk 80:544.

McGrew, J.C. 1979. San Joaquin Kit Fox *Vulpes macrotis*. Mammalian Species 123: 1-6.

Montanucci R.R. 1965. Observations on the San Joaquin leopard lizards, *Crotaphytus wislizenii silus* (Stejneger). Herpetologica. 21:270-83.

Montanucci, R. R. 1970. Analysis of hybridization between *Crotaphytus wislizenii* and *Crotaphytus silus* (Sauria, Iguanidae) in California. Copeia 1970: 104-123.

Morrell, S.H. 1972. Life history of the San Joaquin kit fox. California Department of Fish and Game 58: 162- 174.

Mount, M.E. and B.F. Feldman. 1983. Mechanism of diphacinone rodenticide toxicosis in the dog and its therapeutic implications. Amer. J. Veterinary Res. 44:2009-2017.

Munday, J. S., and L. J. Thompson. 2003. Brodifacoum toxicosis in two neonatal puppies. Veterinary Pathology 40:216-219.

Nelson, J. L. 2005. Effects of varying habitats on competition between endangered San Joaquin kit foxes (*Vulpes macrotis mutica*) and coyotes (*Canis latrans*). M.S. thesis, Montana State University, Bozeman, Montana. 80 pages.

Noss, R.F., E.T. LaRoe III, and J.M. Scott. 2003. Endangered ecosystems of the United States: a preliminary assessment of loss and degradation -- April 2003. http://biology.usgs.gov/pubs/ecosys.htm

O'Farrell, T.P. and L. Gilbertson. 1979. Ecological life history of the desert kit fox in the Mojave Desert of southern California. Final Report. Bureau of Land Management, Riverside, California.

O'Farrell, T.P., T. Kato, P. McCue, and M.L, Sauls. 1980. Inventory of San Joaquin kit fox on Bureau of Land Management lands in southern and southwestern San Joaquin Valley. Final Report. EG&G, U. S. Department of Energy, Goleta, California. EGG 1 183-2400.

O'Neill, S. 2004. Toxic prey: Poison targeting the rodent population is turning up in their predators. Los Angeles Times. April 13, 2004.

Orloff, S. G., F. Hall and L. Spiegel. 1986. Distribution and habitat requirements of the San Joaquin kit fox in the northern extreme of their range. Transcripts from the Western Section of the Wildlife Society 22:60-70.

Padgett, S. L., J. E. Stokes, R. L. Tucker, and L. G. Wheaton 1998. Hematometra secondary to anticoagulant rodenticide toxicity. Journal of the American Animal Hospital Association 34(5): 437-439.

Paveglio, F.L., and S.D. Clifton. 1988. Selenium accumulation and ecology of the San Joaquin kit fox in the Kesterson National Wildlife Refuge area. Report prepared for the U.S. Bureau of Reclamation, U.S. Fish and Wildlife Service, San Luis National Wildlife Refuge, San Luis, California.

Phillips, S.E. 2006. In Progress Draft Environmental Baseline of the San Luis Unit Fresno, Kings and Merced Counties, California. California State University-Stanislaus, Endangered Species Recovery Program, Fresno, California.

Rossman, D.A. and G.R. Stewart. 1987. Taxonomic reevaluation of *Thamnophis couchii* (Serpentes: Colubridae). Occasional Papers of the Museum of Zoology, Louisiana State University 63: 1-25.

Rossman, D.A., N.B. Ford, and R.A. Seigel. 1996. The garter snakes: evolution and ecology. University of Oklahoma Press, Norman, OK. 331 pp.

Saiki, M.K. 1998. An ecological assessment of the Grassland Bypass Project on fishes inhabiting the Grassland Water District, California. Final Report. U.S. Fish and Wildlife Service, Sacramento, California.

Schitoskey, F. Jr. 1975. Primary and secondary hazards of three rodenticides to kit fox. Journal of Wildlife Management 39(2):416-418.

Scrivner, J. H., T. P. O'Farrell, and T. T. Kato. 1987. Diet of the San Joaquin kit fox, *Vulpes macrotis mutica*, on Naval Petroleum Reserve #1, Kern County, California, 1980-1984. Report Number. EGG 10282-2168, EG&G Energy Measurements, Goleta, California, 26 pages.

Scrivner, J. H., T. P. O'Farrell, and T. T. Kato. 1987. Dispersal of San Joaquin kit foxes, *Vulpes macrotis mutica*, on Naval Petroleum Reserve #1, Kern County, California. Report Number. EGG 10282-2190, EG&G Energy Measurements, Goleta, California, 32 pages.

Spiegel, L. K. and M. Disney. 1996. Mortality sources and survival rates of San Joaquin kit foxes in oil-developed and undeveloped lands of southwestern Kern County, California. Pages 71-92 *in* L.K. Spiegel (editor). Studies of the San Joaquin kit fox in undeveloped and oil-developed areas. California Energy Commission, Sacramento, California.

Spiegel, L. K. and J. Tom. 1996. Reproduction of San Joaquin kit fox undeveloped and oil-developed habitats of Kern County, California. Pages 53-69 *in* L.K. Spiegel (editor). Studies of the San Joaquin kit fox in undeveloped and oil-developed areas. California Energy Commission, Sacramento, California.

Standley, W. G. and P. M. McCue. 1992. Blood characteristics of San Joaquin kit fox (*Vulpes velox macrotis*) at Camp Roberts Army National Guard Training Site, California. U. S. Department of Energy Topical Report, EG&G/EM Santa Barbara Operations Report No. EGG 10617-2160.

Standley, W. G., W. H. Berry, T. P. O'Farrell, and T. T. Kato. 1992. Mortality of San Joaquin kit fox (*Vulpes velox macrotis*) at Camp Roberts Army National Guard Training Site, California. U. S. Department of Energy Topical Report No. EGG 10617-2157, EG&G/EM Santa Barbara Operations, National Technical Information Service, Springfield, Virginia.

Stebbins, R.C. 1985. Western Reptiles and Amphibians. Houghton Mifflin Company, Boston. 336pp.

Stebbins, R. C. 2003. A field guide to western reptiles and amphibians. Third edition. Houghton Mifflin Company, Boston.

Stitt, E. W., P.S. Balfour, T. Luckau, and T.E. Edwards. 2005. The southern water snake (*Nerodia fasciata*) in Folsom, California: history, population attributes, and relation to other introduced water snakes in North America. Final Report to U.S. Fish and Wildlife Service, Sacramento, California.

Stone W. B., J. C. Okoniewski, and J. R. Stedelin. 1999. Poisoning of wildlife with anticoagulant rodenticides in New York. Journal of Wildlife Diseases 35:187-193.

Stuart, J.N., M.L. Watson, T.L. Brown, and C. Eustice. 2001. Plastic netting: an entanglement hazard to snakes and other wildlife. Herpetological Review 32(3): 162-1 64.

Swick, C. D. 1973. San Joaquin kit foxes—an impact report of secondary hazards of aerial application of 1080 grain baits for ground squirrel control in San Luis Obispo county. California Department of Fish and Game, Special Wildlife Investigations, Job II-11, Final Report, 14 pages.

Thomkins, I.R. 1959. Life history notes on the Least Tern. Wilson Bulletin 71:313-322.

Thompson, B.C., J.A. Jackson, J. Burger, L,A. Hill, E.M. Kirsch, and J.L. Atwood. 1997. Least Tern (*Sterna antillarum*). The Birds of North America 290: 1-32.

Tollestrup, K. 1979. The ecology, social structure, and foraging behavior of two closely related species of leopard lizards, *Gambelia silus* and *Gambelia wislizenii*. Ph.D. dissertation, University of California, Berkeley.

University of California, Santa Barbara. 1996. Biogeography Lab. California Gap Analysis Land Cover Map. Geographic information system data.

U.S. Bureau of Reclamation (Reclamation). 2004a. Draft Central Valley Project West San Joaquin Division, San Luis Unit, Long-Term Water Service Contract Renewal Environmental Impact Statement

_____ 2004b. Central Valley Project West San Joaquin Division, San Luis Unit, Biological Assessment Long-Term Water Service Contract Renewal. 126 Pages.

_____ 2007a. Draft Environmental Assessment, San Luis Unit Interim Water Service Contracts— 2008 – 2011. 107 pages with Appendices

_____ 2007b. San Luis Drainage Feature Reevaluation Record of Decision. March 2007.

U.S. Department of the Interior (USDI). 1994. The Impact of Federal Programs on Wetlands, Vol. 11, A Report to Congress by the Secretary of the Interior, Washington, D.C., March, 1994. http://www.doi.gov/opec/wetlands2/

U. S. Environmental Protection Agency (EPA). 1995. Protecting endangered species: interim protective measures for San Joaquin kit fox. Pesticides and Toxic Substances (H-7506-C). November 20, 1995. 13 pages.

_____. 2004. Potential risks of nine rodenticides to birds and non-target mammals: A comparative approach. July 2004. 225 pages. Prepared by William Erickson and Douglas Urban, Office of Pesticide Programs, Environmental Fate and Effects Division.

U.S. Fish & Wildlife Service (Service). 1967. Native fish and wildlife. Endangered species. Federal Register 32:4001. [Includes blunt-nosed leopard lizard and San Joaquin kit fox].

_____ 1980a. Recovery plan for the California least tern, *Sterna antillarum browni*. U.S. Fish and Wildlife Service, Portland, OR.

_____. 1980b. Listing the valley elderberry longhorn beetle as a threatened species with critical habitat. Federal Register 45:52803-52807.

_____. 1985. Revised recovery plan for the California least tern, *Sterna antillarum browni*. U.S. Fish and Wildlife Service, Portland, OR

_____. 1993. Endangered and Threatened Wildlife and Plants: Determination of threatened status for the giant garter snake. Federal Register 58:54053-54066.

_____ 1993. Effects of 16 vertebrate control agents on threatened and endangered species. U. S. Fish and Wildlife Service, Endangered Species Program, Arlington, Virginia. March 1993. 177 pages. (Also on file at the Vero Beach Field Office; Vero Beach, Florida.)

_____ 1998. Recovery Plan for Upland Species of the San Joaquin Valley, California. Region 1, Portland, Oregon. 319 pp.

_____ 1999. Draft Recovery Plan for the Giant Garter Snake (*Thamnopsis gigas*). U.S. Fish and Wildlife Service, Portland, Oregon. 192+ pp.

_____. 2000. Biological Opinion on Implementation of the CVPIA and Continued Operations and Maintenance of the CVP. November 2000. Service File No.: 1-1-01-I-0311.

Vanderbilt White, C. A., K. Ralls, and P. J. White. 1993. Diet of the San Joaquin kit fox during periods of low and high prey availability.

Waithman, J. D. 1974(b). San Joaquin kit fox distribution in the counties of Santa Barbara, Kings, Tulare, and Kern. June 28, 1774. U. S. Fish and Wildlife Service special report. 18 pages.

Warrick, G. D., T. T. Kato, and B. R. Rose. 1998. Microhabitat use and home range characteristics of blunt-nosed leopard lizards. Journal of Herpetology 32:183-191.

Westlands Water District Annual Report. 2004-2005. 16 pp. http://www.westlandswater.org/long/200601/annual_report_2004_2005.pdf

White, P. J. and R. A. Garrott. 1997. Factors regulating kit fox populations. Canadian Journal of Zoology 75:1982-1988.

White, P. J. and K. Ralls. 1993. Reproduction and spacing patterns of kit foxes relative to changing prey availability. Journal of Wildlife Management 57:861-867.

White, P. J., C. A. Vanderbilt-White, and K. Ralls. 1996. Functional and numerical responses of kit foxes to a short-term decline in mammalian prey. Journal of Mammalogy 77(2):370-376.

Williams, D.F. 1990. Assessment of potential habitat for the blunt-nosed leopard lizard and San Joaquin kit fox in western Madera County, California. U.S. Fish and Wildlife Service, Endangered Species Office, Sacramento, CA, 31 pp.

Williams, T. and V. Wunderlich. 2003. Progress report: 2003 San Joaquin Valley garter snake conservation project. San Luis National Wildlife Refuge Complex, Los Banos, California.

Wylie, G.D. 1998. Results of the 1998 survey for giant garter snakes in and around the Grasslands Area of the San Joaquin Valley. Dixon Field Station, Biological Resources Division, U.S. Geological Survey, Dixon, California.

Wylie, G.D. and M.L. Casazza. 2001. Investigations of giant garter snakes in the Natomas Basin: 2001 field season. Dixon Field Station, Biological Resources Division, U.S. Geological Survey, Dixon, California. 9 pp.

Wylie, G.D., and L.L. Martin. 2004. Results of 2004 monitoring for giant garter snake (*Thamnophis gigas*) for the bank protection project on the left bank of the Colusa Basin

Drainage Canal in Reclamation District 108, Sacramento River Bank Protection Project, Phase 11.Prepared for: Environmental Planning Section, U.S. Army Corps of Engineers, Sacramento District, November 2004.

Wylie, G.D., T. Graham, M.L. Casazza, M.M. Paquin, and J. Daugherty. 1996. National Biological Service giant garter snake study progress report for the 1995 field season. Preliminary report. Dixon Field Station, Biological Resources Division, U.S. Geological Survey, Dixon, California.

Wylie, G.D., M.L. Casazza, and J.K. Daugherty. 1997. 1996 Progress report for the giant garter snake study. Preliminary report. Dixon Field Station, Biological Resources Division, U.S. Geological Survey, Dixon, California.

Wylie, G.D., M.L. Casazza, and N.M. Carpenter. 2002. Monitoring giant garter snakes at Colusa National Wildlife Refuge: 2001 progress report. Dixon Field Station, Biological Resources Survey, U.S. Geological Survey, Dixon, California. 10 pp.

Wylie, G.D., M.L, Casazza, L.L. Martin, and M. Carpenter. 2003. Monitoring giant garter snakes at Colusa National Wildlife Refuge: 2002 progress report. Dixon Field Station, Biological Resources Survey, U.S. Geological Survey, Dixon, California. 16 pp.

Wylie, G.D., M.L. Casazza, L.L. Martin, and M. Carpenter. 2004. Monitoring giant garter snakes at Colusa National Wildlife Refuge: 2003 progress report. Dixon Field Station, Biological Resources Survey, U.S. Geological Survey, Dixon, California. 17 pp.

October 15, 1991- Friant Water Contract Renewals (1-1-91-F-0022), San Joaquin kit fox, blunt-nosed leopard lizard, Fresno kangaroo rat, and other species (amended May 14, 1992, appended to 1-1-95-F-0039 on February 27, 1998).

February 12, 1993- Long Term Operations Criteria and Plan (OCAP) for CVP Reservoirs (1-1-93-F-0010), bald eagle, salt marsh harvest mouse, California clapper rail.

May 23, 1993-OCAP (1-1-93-F-0032), delta smelt.

February 4, 1994-1 994 OCAP (1-1-94-F-0002), delta smelt.

December 27, 1994 - Interim Water Contract Renewal (1-1-94-0069), San Joaquin kit fox, large-flowered fiddleneck, giant garter snake, vernal pool fairy shrimp, other species.

February 23, 1995 - Amendment of December 27, 1994 Interim Water Contract Renewal BO to include critical needs planning (1-95-F-0039).

February 27, 1995 - Interim renewal of 67 water contracts of the CVP.

March 6, 1995- OCAP BO (1-1-94-F-70), delta smelt, delta smelt critical habitat, Sacramento splittail (amended April 26, 1995 (1-1-95-1-0804)).

April 26, 1996-Temporary Barriers (1-1-96-F-0053), delta smelt and delta smelt critical habitat.

January 20, 1998-Interim Water Contract Renewal BO amendment (1-1-98-I-0383), San Joaquin kit fox, large-flowered fiddleneck, giant garter snake, vernal pool fairy shrimp, other species.

February 27, 1998 - Re-initiation of Formal Endangered Species Consultation on the Supplemental Interim Renewal of CVP Water Contracts to include 14 Friant Water Contracts (1-1-98-I-0595), San Joaquin kit fox, blunt-nosed leopard lizard, Fresno kangaroo rat, and other species.

March 19, 1998 - Refuge Water Supply Program (1-1-98-F-0061), giant garter snake.

June 28, 1999 - Refuge Water Conveyance Mendota Wildlife Management Area, Kern and Pixley National Wildlife Refuges (1-1-99-F-0036), several species.

February 29, 2000 - Interim BO (1-1-F-0056), several species.

February 28, 2001- Memo 1-1-01-1-0121 1 extends the BO dated February 29, 2000. Some of the interim contracts are covered under Friant/Cross Valley BO dated January 20, 2001.

November 21, 2000 – Implementation of the CVPIA and Continued Operation and Maintenance of the CVP, Programmatic Consultation (1-1-98-F-0124).

September 27, 2001-Grasslands Bypass Project (GBP) BO (1-1-01-1-3305).

December 14, 2001- Interim Contract Renewal Consultation 2002-2004, CVP, Supplemental Information.

April 11, 2003 - Informal Section 7 Consultation on Multiple Categories of Temporary Water Service Actions for CVP Water Service Contractors Occurring Under the Authority of Reclamation, for Water Years 2002-2005; Two-Year Concurrence for

Water Years 2003-2004 (1-1-03-1-1689).

February 27, 2004 - Interim Renewal Contract BO 2004-2006 (1-1-04-F-0360), several species.

July 30, 2004, BO on the Operations Criteria and Plan (1-1-04-F-0140), delta smelt (*Hypomesus transpacificus*).

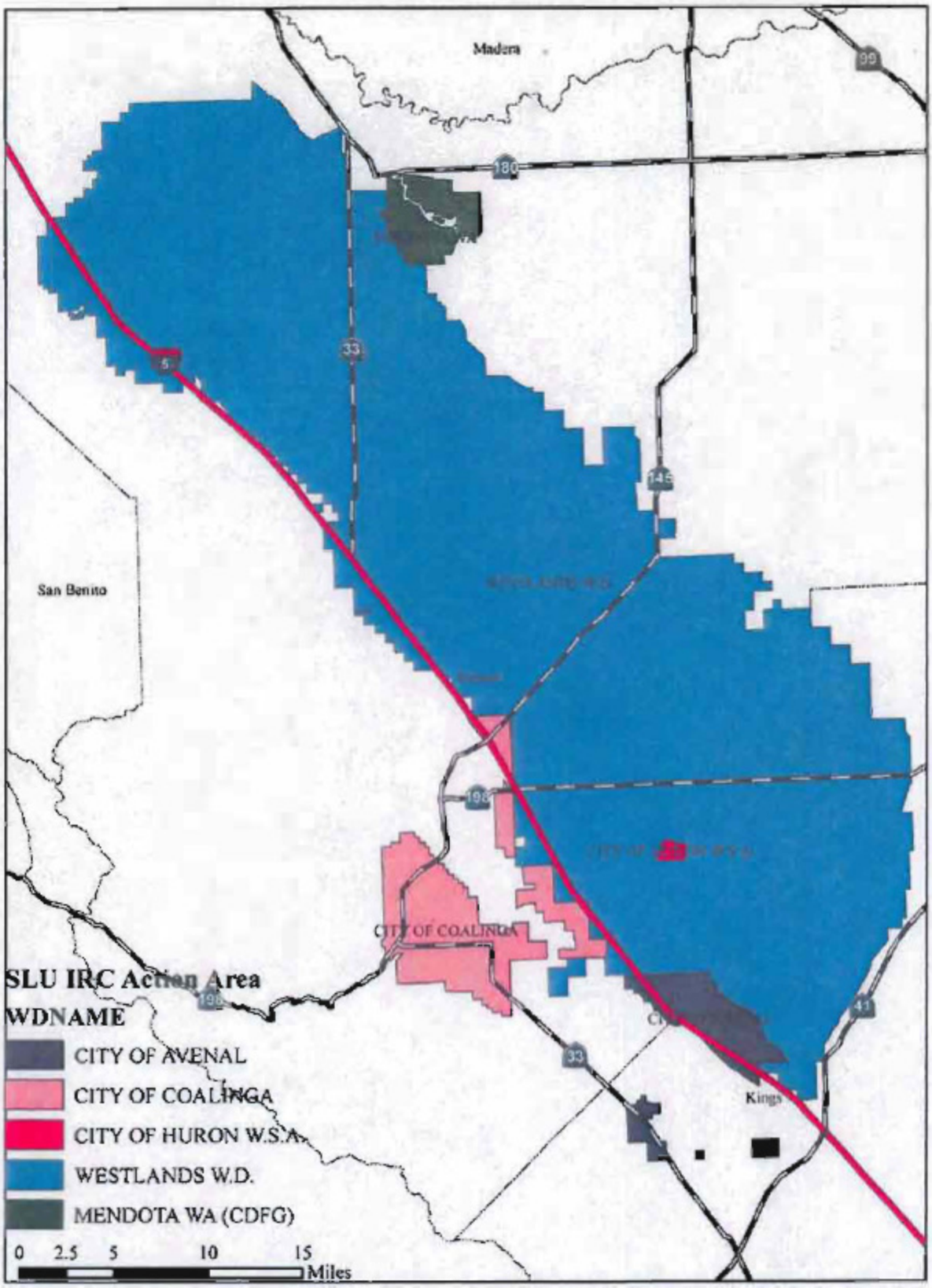

FIGURE 1. AREA OVERVIEW

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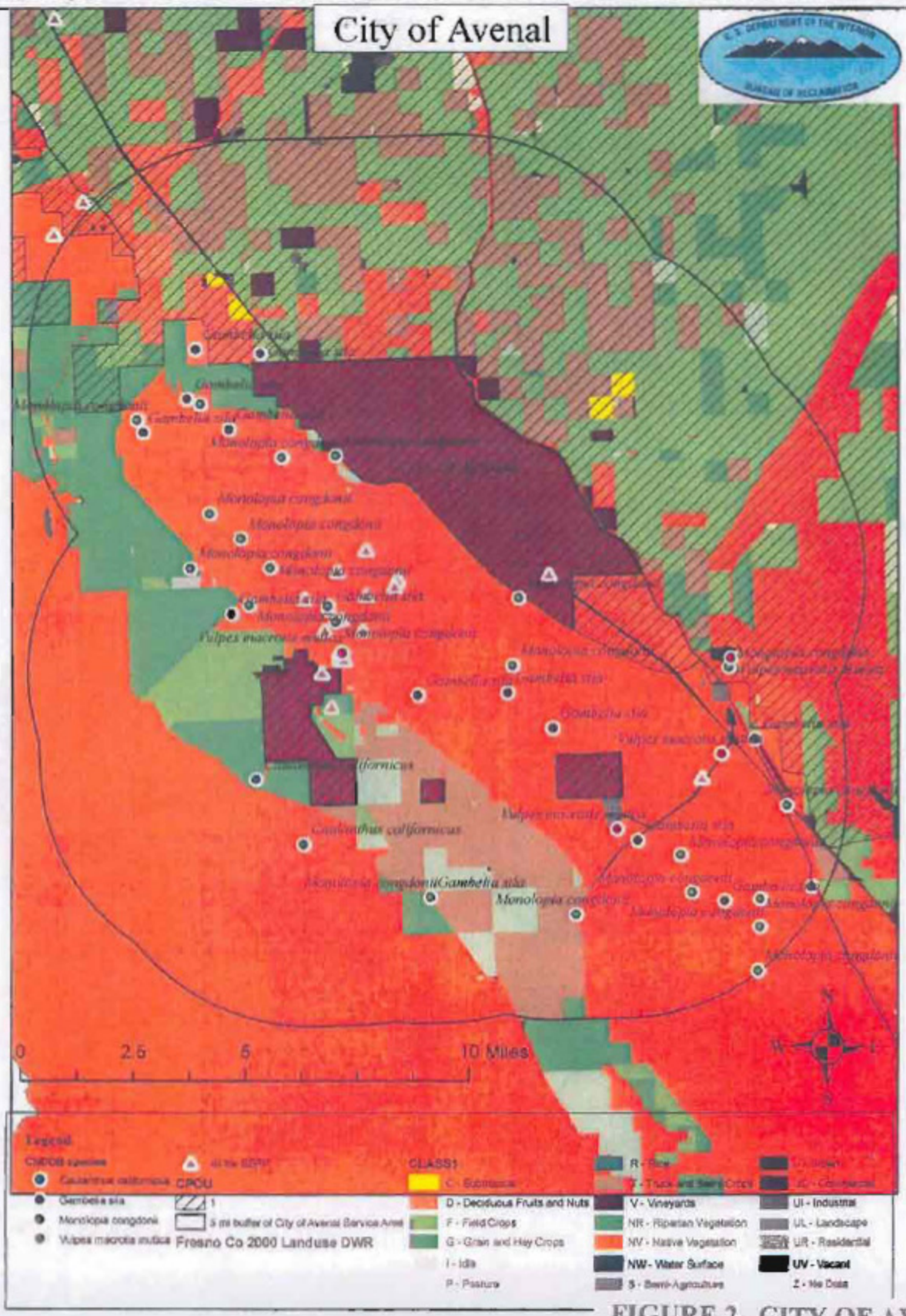

FIGURE 2. CITY OF AVENAL

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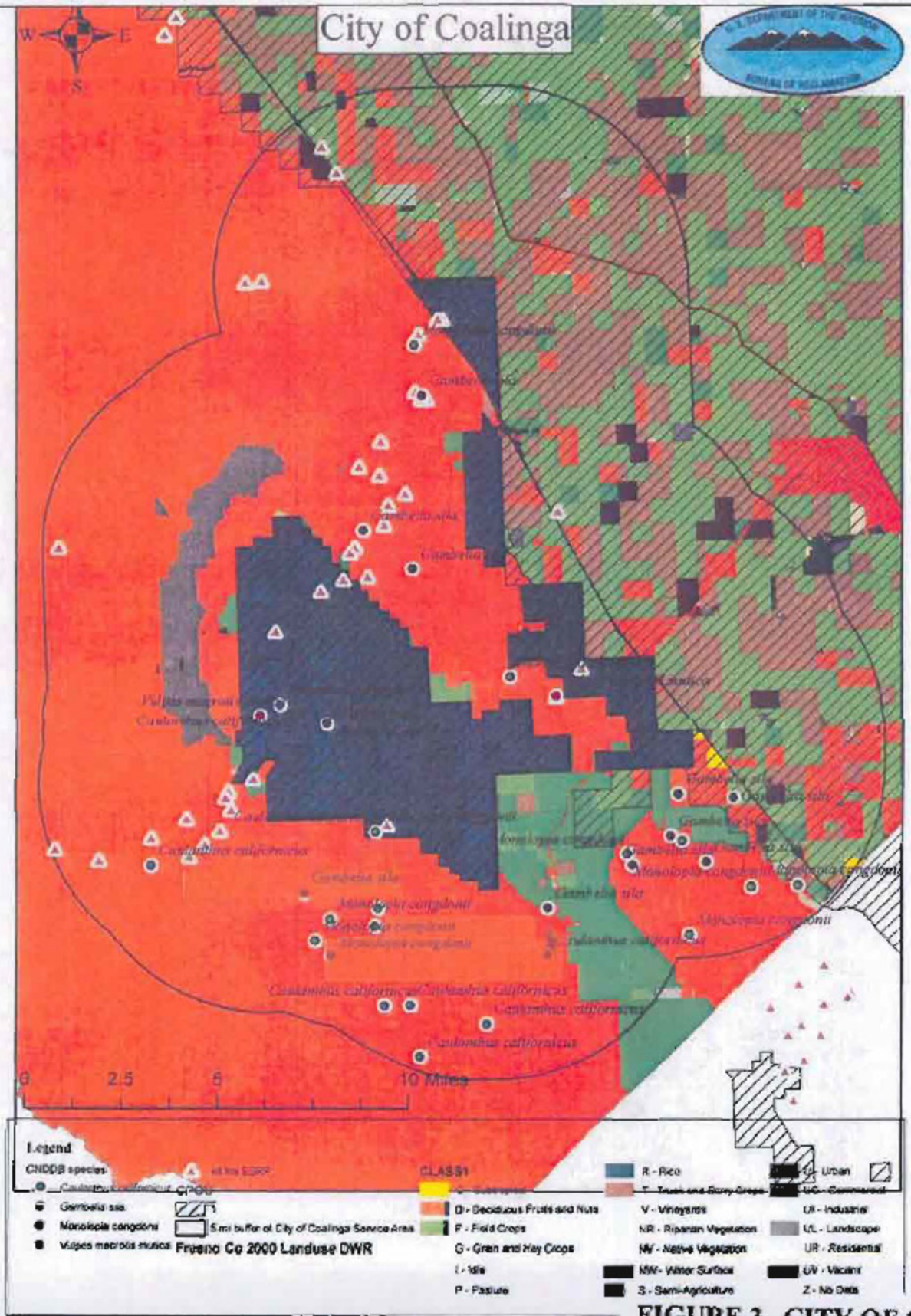

FIGURE 3. CITY OF COLINGA

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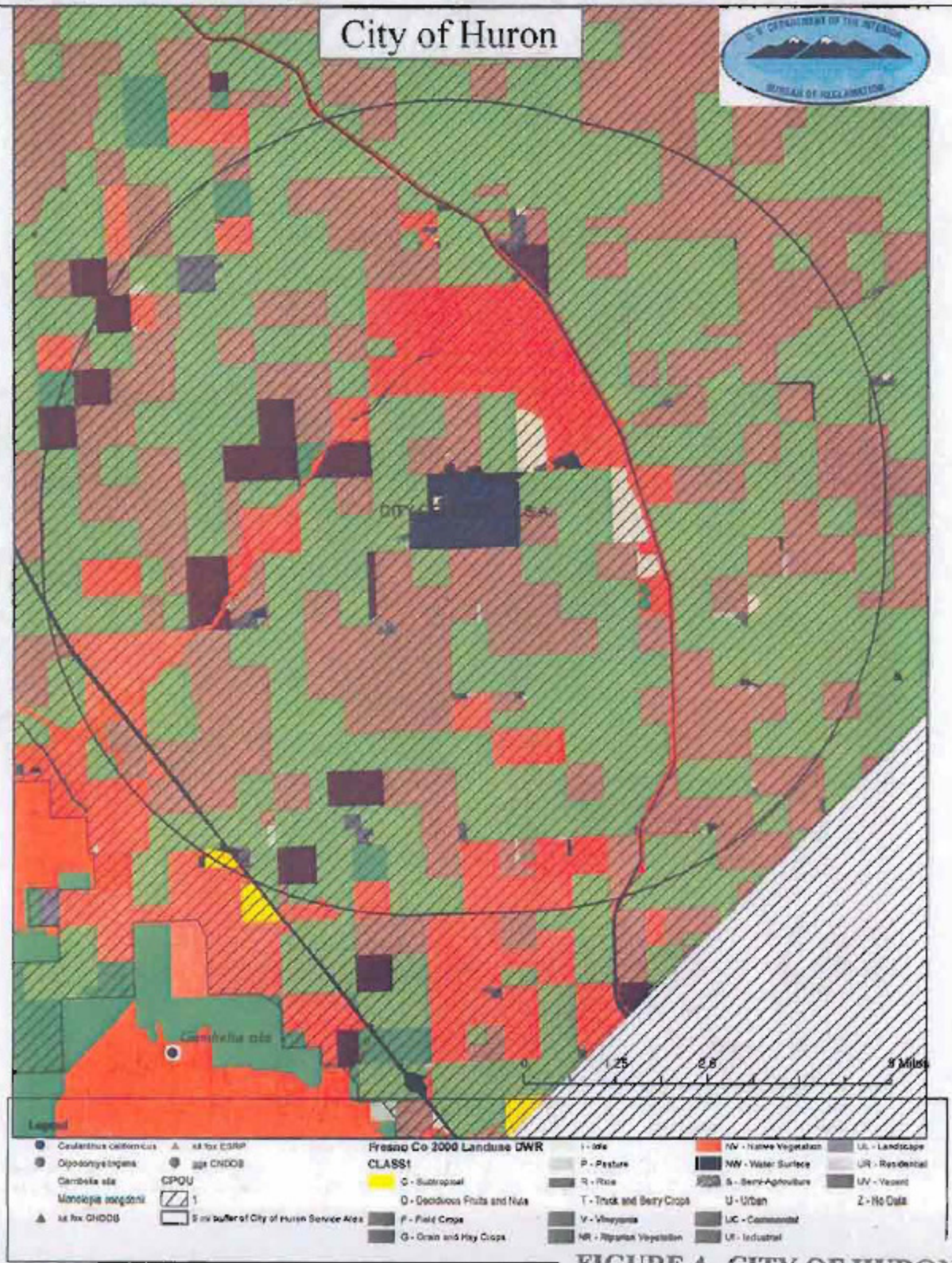

FIGURE 4. CITY OF HURON

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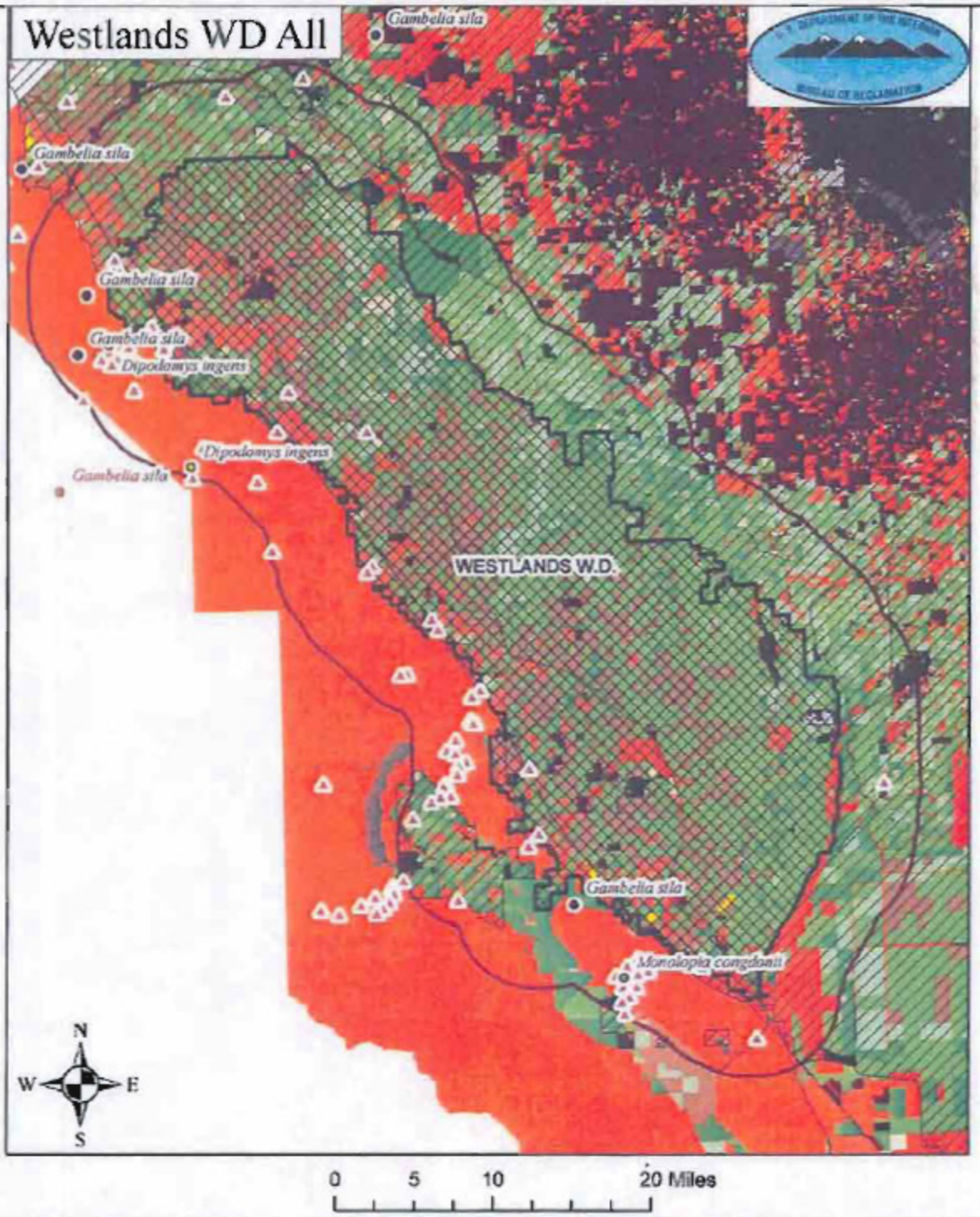

Legend

- Caulanthus californicus
- Dipodomys ingens
- Gambelia sila
- Monolopia congdonii
- kit fox CNDDB
- kit fox ESRP
- gga CNDDB
- CPOU
- 1
- 5 mi buffer of Westlands WD Service Area

King Co 2003 Landuse DWR

CLASS1

- C - Subtropical
- D - Deciduous Fruits and Nuts
- F - Field Crops
- G - Grain and Hay Crops
- I - Ide
- P - Pasture
- T - Truck and Berry Crops
- V - Vineyards
- WR - Riparian Vegetation
- WV - Native Vegetation
- W - Water Surface
- S - Semi-Agriculture
- U - Urban
- UC - Commercial
- UI - Industrial
- UL - Landscape
- UR - Residential
- UV - Vacant
- Z - No Data

FIGURE 5. WESTLANDS WATER DISTRICT