# United States Department of the Interior

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**U.S. Fish and Wildlife Service**
**Sacramento Fish and Wildlife Office**
**2800 Cottage Way**
**Sacramento CA 95825-1898**

**U.S. Bureau of Reclamation**
**Mid-Pacific Region**
**2800 Cottage Way**
**Sacramento CA 95825-1898**

Dear CVP Stakeholders and Interested Parties:

Enclosed is a copy of the Draft Biological Opinion prepared by the U.S. Fish and Wildlife Service (Service), in cooperation with the Bureau of Reclamation (Reclamation), on the operation and maintenance of the Central Valley Project (CVP) and implementation of the Central Valley Project Improvement Act (CVPIA). Also included are any appendices that you have requested.

Written comments on the Draft Biological Opinion should be provided to Reclamation by March 3, 2000. Please provide your comments to:

Mr, Frank Michny
Regional Environmental Officer
Bureau of Reclamation, MP-150
2800 Cottage Way
Sacramento CA 95825

Comments received will be compiled by Reclamation and utilized, where appropriate, by the Service in preparing the final Biological Opinion. No individual responses to comments will be provided or included in the final Biological Opinion.

For questions concerning distribution or requesting a copy of the document or appendices, please contact Bob Eckart at (916) 978-5051 or TDD (916) 978-5608.

Sincerely,

Karen J. Miller

for Cay C. Goude
Acting Field Supervisor
U.S. Fish and Wildlife Service

Frank Michny

Frank Michny
Regional Environmental Officer
U.S. Bureau of Reclamation

Enclosure

# Introduction

This biological opinion addresses both operations and maintenance of the Central Valley Project (CVP) and implementation of the Central Valley Project Improvement Act of 1992 (CVPIA). The **Project Description** (starting on page 2-1) was developed collaboratively by the Bureau of Reclamation (Reclamation) and the Fish and Wildlife Service (Service) and includes, in part, the description of proposed actions found in the Programmatic Environmental Impact Statement for the CVPIA (PEIS).

The CVPIA is being jointly implemented by both Reclamation and the Service. Our intent is to show the collaborative and cooperative processes that have been, and will continue to be, established by both agencies. The **Agency Commitments for New and Continuing Project Actions** (page 2-2) and **Conservation Measures** (page 2-33) elucidate the strength of commitments from both agencies. These actions, combined with the specific guidance and measures that address **Water Service Contracts** (page 2-8), form a positive basis for dovetailing CVPIA and the Endangered Species Act of 1973, as amended (ESA).

The PEIS is a tiered National Environmental Policy Act (NEPA) document that allows for future site-specific NEPA analysis on CVPIA actions. This biological opinion is similarly tiered. To better assist Reclamation and the Service in planning and project implementation, we have provided guidance on implementation of the ESA as an integral part of this opinion. Each section, or specific action, is accompanied by guidance on compliance with ESA.

Reclamation and the Service have several new and ongoing programs designed to further the purposes of ESA. These programs, and new accountability procedures, are incorporated into the **Project Description**. Commitments to uphold the ESA by both agencies, combined with implementation of these programs and meeting the assumptions of the effects analysis (page 4-1) contributed to the Service's decision-making process leading to a **Conclusion** of no jeopardy (page 4-31). The no-jeopardy conclusion at this programmatic scale is not intended to, and does not, preclude the Service from making a future jeopardy determination based on the effects analysis for a site-specific action. However, the (1) collection of data and monitoring, (2) communication, cooperation, and outreach, (3) conservation, restoration, compensation, and commitments to work together to recovery listed species, and (4) site specific consultation all diminish the likelihood of future jeopardy opinions tiered under this programmatic biological opinion.

To streamline consultations on one tier of this opinion, we have provided Reclamation with a programmatic incidental take statement for those aspects of CVP operations and maintenance that have not been addressed in previous opinions. Future operations and maintenance actions that are consistent with this opinion may be appended to this opinion in the future.

The Service and Reclamation have consulted on several large-scale projects and plans that impact species protected under the ESA. The results of these consultations have been biological opinions that stand on their own merits, that establish thresholds to ensure survival and recovery of listed species, and that establish a baseline for the effects considered by the consultations. Of particular note are: the Service's October 15, 1991, biological opinion on the Friant Water Contract Renewals (Friant, Service file #1-1-91-F-22); the Service's December 27, 1994, biological opinion on Interim Water Contract Renewal (Interim, Service file #1-1-94-F-69); the Service's March 6, 1995, biological opinion on Reclamations's Long-term Operations Criteria and Plan (OCAP, Service file #1-1-94-F-70); and the Service's opinions on the Los Vaqueros Project—in particular the September 9, 1993, opinion (Los Vaqueros, Service file #1-1-93-F-35). An annotated list of major consultations is provided on page 1-4. This biological opinion is based on the understanding that the thresholds identified in those earlier opinions are a part of the baseline for this consultation. Actions that are not consistent with the project description in this document have not been analyzed for their impacts on the survival and recovery of proposed and listed species.

To implement long-range planning and to assure efficient and effective implementation of CVPIA and ESA, Reclamation and the Service will continue coordination with the National Marine Fisheries Service (NMFS), California Department of Fish and Game (DFG), and California Department of Water Resources (DWR) on: (1) conservation actions needed to minimize the impact of the CVP on listed species and (2) developing a comprehensive evaluation of actions that require further formal or informal consultation tiered from this opinion.

Although this document is intended to dovetail with the NEPA process, it should be noted that Categorical Exclusions from NEPA are not exempted from ESA. The ESA guidance in this opinion is intended to be followed based on effects to listed species. Any ancillary or exclusionary language from laws other than ESA should not be used to bear upon any effects determinations that are made relative to listed species.

Numerous acronyms are used for actions and projects within the CVP and CVPIA. In this document use of acronyms has been limited to those entities, acts, and descriptors that are referred to frequently. A list of these acronyms is provided on the following page in Table 1.A.

**Table 1.A.** Acronyms used in this opinion

CVP..... Central Valley Project
CVPIA..... Central Valley Project Improvement Act
DFG..... California Department of Fish and Game
DWR..... California Department of Water Resources
ESA..... Endangered Species Act
HCP..... Habitat Conservation Plan
M&I..... Municipal and Industrial
NEPA..... National Environmental Policy Act
NMFS..... National Marine Fisheries Service
O&M..... Operation and Maintenance
PEIS..... Programmatic Environmental Impact Statement for the CVPIA
SWRCB..... State Water Resources Control Board

**Study Area**

The area addressed in this biological opinion (Appendix A) is a subset of the Study Area described in the Programmatic Environmental Impact Statement (PEIS) for the Central Valley Project Improvement Act (CVPIA). It represents an area where direct and indirect service-area effects are expected to occur, and covers ten, specific, geographic areas used in the CVPIA PEIS: East and West Sacramento Valley; East and West San Joaquin Valley; East and West Tulare Basin; Delta; San Francisco Bay Area; San Benito/Santa Cruz/Santa Clara; and Trinity. The area corresponds to the Conservation Program Focus Area (Appendix A) combined with the Trinity geographic area (including northern Trinity and Humboldt Counties). The eastern boundary of the Study Area and Conservation Program Focus Area is limited to the areas within the watersheds that could be affected by provisions of the CVPIA—defined as extending from the valley floor to the western boundaries of national forests in the Sierra Nevada Mountains. The Study Area includes Shasta, Tehama, Glenn, Butte, Yuba, Colusa, Sutter, Yolo, Sacramento, San Joaquin, Stanislaus, Merced, Kings, Napa, Solano, Contra Costa, Alameda, Santa Clara, Santa Cruz, San Mateo, San Francisco, and San Benito Counties in their entirety. Portions of Trinity, Humboldt, Nevada, Placer, El Dorado, Amador, Calaveras, Tuolumne, Mariposa, Madera, Fresno, Tulare, and Kern Counties are also included in the Study Area. Del Norte, Siskiyou, Modoc, Lassen, Marin, Sonoma, Lake, Mendocino, Monterey, San Luis Obispo, Santa Barbara, Ventura, and Los Angeles Counties are excluded from the area addressed by this opinion. A total of 119 listed, proposed, and candidate species occur or potentially occur in the addressed area (Appendix B) .

**Consultation History**

The consultation history on CVP-related actions is long and varied. Records of these consultations are on file at the Sacramento Fish and Wildlife Office. To assist in understanding the scope of this opinion, we have provided the following time line of some recent Service-issued biological opinions (with the Service file number in parentheses) noting the species addressed in each:

*October 15, 1991*—Friant Water Contract Renewals (1-1-91-F-22), San Joaquin kit fox, blunt-nosed leopard lizard, Fresno kangaroo rat, and other species (amended May 14, 1992, appended to 1-1-95-F-39 on February 27, 1998)

*February 12, 1993*—Long-Term Operations Criteria and Plan for CVP Reservoirs (1-1-93-F-10), bald eagle, salt marsh harvest mouse, California clapper rail.

*May 23, 1993*—Operations Criteria and Plan (1-1-92-F-18), bald eagle, salt marsh harvest mouse, California clapper rail.

*May 26, 1993*—1993 Operations Criteria and Plan-Delta smelt (1-1-93-F-32) delta smelt.

*September 2, 1993*—Los Vaqueros vernal pool shrimp conference opinion (1-1-93-C-68), vernal pool fairy shrimp, longhorn fairy shrimp, California linderiella.

*September 3, 1993*—Los Vaqueros Terrestrial (1-1-92-F-48), San Joaquin kit fox, bald eagle.

*September 9, 1993*—Los Vaqueros Project (1-1-93-F-35), delta smelt.

*February 4, 1994*—1994 Operations Criteria and Plan (1-1-94-F-2), delta smelt.

*December 27, 1994*—Interim Water Contract Renewal (1-1-94-F-69), 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 opinion to include critical needs planning (1-1-95-F-39).

*March 6, 1995*—Long-term Operations Criteria and Plan (1-1-94-F-70) delta smelt, delta smelt critical habitat, Sacramento splittail [amended April 26, 1995 (1-1-95-I-804)].

*April 9, 1995*—Striped Bass Management (1-1-95-F-58), delta smelt (amended on May 30, 1996).

*August 7, 1995*—Los Vaqueros Project adoption of September 2, 1993, conference opinion (1-1-95-F-117), vernal pool fairy shrimp and longhorn fairy shrimp.

*June 6, 1996*—Los Vaqueros Project (1-1-95-F-134), formal conference California red-legged frog and Alameda Whipsnake (amended November 1, 1995).

*August 14, 1996*—Interim Operation of Kern Water Bank (1-1-95-F-63), San Joaquin kit fox and many others. [Action converted to a Habitat Conservation Plan (1-1-97-F-108)].

*November 8, 1996*—Los Vaqueros Project amendment and adoption of June 6, 1996, conference opinion for California red-legged frog and issuance of conference opinion for Alameda whipsnake (1-1-96-F-151).

*April 26, 1996*—Temporary Barriers (1-1-96-F-53), delta smelt and delta smelt critical habitat.

*Janurary 20, 1998*—Interim Water Contract Renewal Opinion amendment (1-1-98-I-383), San Joaquin kit fox, large-flowered fiddleneck, giant garter snake, vernal pool fairy shrimp, other species.

*March 19, 1998*—Refuge Water Supply Program (1-1-98-F-61) giant garter snake.

*May 4, 1998*—Draft Jeopardy on Interim South Delta Project (1-1-97-F-184), delta smelt and delta smelt critical habitat.

*December 7, 1998*—Conveyance of Refuge Water Supply East and West Sacramento Valley (1-1-99-F-15) giant garter snake.

*March 11, 1999*—Water Service Contracts with Sacramento County Water Agency, San Juan Water District, and City of Folsom (1-1-97-F-161), several species.

*March 19, 1999*—Solano Project Contract Renewal (1-1-99-F-54), several species.
*June 28, 1999*—Refuge Water Conveyance Mendota Wildlife Management Area, Kern and Pixley National Wildlife Refuges (1-1-99-F-36) several species.
*July 26, 1999*—Amendment to 1-1-99-F-15 Refuge Water Conveyance, West and East Sacramento Valley (1-1-99-128) giant garter snake and valley elderberry longhorn beetle.
*September 21, 1999*—CVPIA Land Retirement Program Demonstration Project, Fresno, Kings and Tulare Counties (1-1-99-F-125) several species.

# Project Description

## Description of Central Valley Project Facilities

The CVP is the largest surface water storage and delivery system in California, with a geographic scope covering 35 of the state's 58 counties. The project includes: 20 reservoirs, with a combined storage capacity of approximately 11 million acre-feet; eight powerplants and two pump-generating plants, with a combined generation capacity of approximately 2 million kilowatts; two pumping plants; and approximately 500 miles of major canals and aqueducts. The CVP supplies water to more than 250 long-term water contractors in the Central Valley, the Santa Clara Valley, and the eastern San Francisco Bay Area. Appendix C shows the locations of CVP facilities and reservoirs, rivers that are controlled or affected by the operation of CVP facilities, and the CVP service area. A complete description of the CVP can be found in the Programmatic Environmental Impact Statement (PEIS) for the Central Valley Project Improvement Act (CVPIA).

The CVP facilities include reservoirs on the Trinity, Sacramento, American, Stanislaus, and San Joaquin rivers. Water from the Trinity River is stored and re-regulated in Trinity Lake, Lewistown Lake, and Whiskeytown Reservoir, and diverted through a system of tunnels and powerplants into the Sacramento River for use by the CVP in the Central Valley. Water also is stored and re-regulated in Shasta Lake and Folsom Lake for use by the CVP. Waters from all of these reservoirs--and other reservoirs owned and/or operated by the California Department of Water Resources (DWR) and local water rights holders--flow into the Sacramento River. Some of the CVP contractors divert water directly from, or immediately below, the dam outlet works. Other CVP contractors, Sacramento River water rights contractors, and water rights holders divert water directly from the Sacramento and American rivers.

Water is conveyed in the Sacramento River to the Delta. Major CVP facilities in the Delta include the Delta Cross Channel, the Contra Costa Pumping Plant, and the Tracy Pumping Plant. The Delta Cross Channel permits diversion of water from the Sacramento River to the Mokelumne River, facilitating transfer to pumps in the southern Delta. The Contra Costa Pumping Plant, in the western Delta, pumps water from Rock Slough into the Contra Costa Canal, for delivery to the northwestern San Francisco Bay area. The Tracy Pumping Plant, at the southern end of the Delta, lifts water into the Delta Mendota Canal for export to CVP contractors and exchange contractors on the San Joaquin River and water rights contractors on the Mendota Pool. The CVP water also is conveyed to the San Luis Reservoir for deliveries to CVP contractors that divert from the San Luis Canal. Water from San Luis Reservoir also is conveyed through the Pacheco Tunnel to CVP contractors in Santa Clara and San Benito counties.

The CVP also serves water from the Friant Dam on the San Joaquin River to CVP contractors located near the Madera and Friant-Kern canals. Water from New Melones Reservoir is used by water rights holders in the Stanislaus River watershed and CVP contractors located in the northern San Joaquin Valley.

Water provided by SWP is stored and re-regulated in Lake Oroville. SWP contractors and water rights settlement contractors divert water from the Feather River and Sacramento River. SWP water flows in the Sacramento River to the Delta. In the western Delta, the Suisun Marsh Salinity Control Structure controls tidal flow through Montezuma Slough, restricting upstream flow of salty water during flood tides while allowing downstream flow of fresh water from the Sacramento River during ebb tides. The Barker Slough Pumping Plant, in the northern Delta, pumps water to the North Bay Aqueduct for delivery to users in the Napa Valley region. The Banks Pumping Plant in the southern Delta lifts water into the California Aqueduct. SWP water in the California Aqueduct can be conveyed to the South Bay Aqueduct, or can be conveyed to San Luis Reservoir for deliveries to SWP contractors that divert from the California Aqueduct. These contractors are located in the southern San Joaquin Valley, Central Coastal area, and Southern California. SWP also delivers CVP water to the Cross-Valley Canal, when capacity is available in the conveyance systems, for CVP water service contractors.

Because both the CVP and SWP convey water in the Sacramento River and the Delta, operations of the facilities are coordinated based on the Coordinated Operating Agreement, the Bay-Delta Plan Accord, applicable biological opinions, and other agreements. Reclamation and the Service will continue to comply with these agreements and with limitations on export and transfers in the biological opinions on OCAP.

There are two primary conditions to be met before the CVP and SWP are allowed to export water from the Delta: (1) the upstream water demands (environmental, contractual, and navigational) are met; and (2) the Delta is in a balanced or excess condition with respect to flow and water quality under water rights orders from the State Water Resources Control Board (SWRCB). In addition, Reclamation is managing flows to comply with OCAP, the Bay-Delta Accord, and SWRCB decisions.

**Agency Commitments for New and Continuing Project Actions**

Central Valley Project activities include a number of actions that are currently covered[1] by existing ESA consultations. Reclamation and the Service will continue to comply with existing consultations and integrate earlier responsibilities and commitments with those described in this opinion. Both agencies will coordinate to establish procedures to ensure consistency with sections 2, 4, and 7 of the ESA.

[1] "Covered" is defined here as satisfying all ESA requirements, with no further section 7 consultation required.

Endangered Species Act assessments for continuing project actions will be tiered from this and other biological opinions. In order to consistently address future consultation needs for the programs described here, the Service will provide the technical support to expedite tiered consultations and implementation of conservation measures. Reclamation and the Service will develop and implement a collaborative and integrated process to coordinate CVP actions and other State and Federal actions under State and Federal laws, to aid in recovery of listed species. Reclamation and the Service will establish a coordination team by March 1, 2000, to design and implement this process and to ensure that the programs described in this biological opinion are consistent with this biological opinion and the ESA. The coordination team will meet at least quarterly. Coordination team guidance may result in future, tiered programmatic consultation or collaboration in local-area planning[2].

Reclamation and the Service have identified a number of new and ongoing actions for which effective implementation will require resolution of associated issues. Resolution may include planning processes, development of standards, criteria, policies, or other methods not yet determined to resolve issues. Reclamation and the Service commit to continued identification and resolution of issues associated with project actions in a timely manner.

Reclamation and the Service are committed to continued progress on issues such as, but not limited to: incentive programs, joint efforts with DWR on common issues and striving toward common policy; collaborating with the California Department of Pesticide Regulation to share information pertinent to the protection, enhancement, or recovery of threatened and endangered species; and pursuing common goals with other agencies, including local jurisdictions, water districts, Resources Conservation Districts, and Local Agency Formation Commissions.

Reclamation and the Service will be undertaking specific projects, or groups of specific projects, as part of the ongoing operations of the CVP and implementation of the CVPIA. In a programmatic sense these actions are considered in this and previous consultations. However, additional evaluation of the potential to affect threatened and endangered species will be necessary to assure that continuing project actions do not adversely affect or jeopardize the species addressed in this opinion. As part of this CVP comprehensive section 7 process, Reclamation and the Service commit to developing and implementing an agreement that will specifically address the integration of continuing project actions meeting the needs of listed species and requirements of the ESA.

The Service will continue to provide Reclamation with the most current take avoidance measures and conservation measures. Reclamation, in cooperation with the Service, will coordinate with all water districts and county planning offices, the California Department of Pesticide Regulations, and DWR to ensure consistency with sections 2, 4, and 7 of the ESA. Reclamation will distribute the take avoidance measures and compensation measures in Appendices F and G to all water districts and county planning

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[2] This coordination team is separate and distinct from the negotiations support team described on page 2-9, although some team members may be on both teams.

offices, the California Department of Pesticide Regulations, and DWR by March 1, 2000, and will continue to provide updates to these parties.

The Service and Reclamation will work together to convey information to the water districts on listed species needs. Reclamation will establish an outreach and education program, in collaboration with the Service, to educate water users on the CVPIA and the contract-renewal process as it relates to the ESA. Reclamation will implement the planning and communication measures, including the letter to water users, described in the Renewal of Existing Long-Term Contracts section (page 2-9) of this opinion.

The Service and Reclamation will collaborate on expediting the generation of a baseline for this opinion. Reclamation will provide maps produced as a result of the Land Use Monitoring and Reporting Program (page 2-35) to water districts and county planning departments prior to long-term contract renewals and within one month of receipt of any new or updated maps from the Service.

The goals of this tiered consultation process and the agency commitments are to: (1) facilitate the continued operation of the CVP, including implementation of the CVPIA; (2) provide for implementation of continued project actions, in a timely and cost-effective manner, while avoiding adverse effects on threatened and endangered species; (3) allow for site-specific analysis where it is needed; and (4) otherwise meet the needs, including critical needs, of special status species affected by the CVP.

**Maintenance Activities Performed by Reclamation Staff** [Lead Agency: Reclamation]

> This biological opinion provides incidental take coverage for maintenance at a programmatic level. For the incidental take from specific activities to be included under this opinion, Reclamation will provide an assessment of the action to the Service with a request for the action to be appended to this document. The take avoidance measures in Appendix F will be implemented by Reclamation staff. When take is unavoidable, in order to remain consistent with the habitat and recovery needs of listed species, Reclamation will implement the most current conservation measures and habitat creation/preservation ratios in Appendix G--or any future revisions of these measures, as appropriate. Reclamation will meet annually with the Service to track the incidental take that has occurred from maintenance activities and assess the effectiveness of this programmatic strategy.

Incidental take that is programmatically expected to occur as a result of the activities and actions described in this section is described in the Incidental Take Statement on page 5-1. For maintenance activities and actions to be included in the in the section 9 exemption provided in the Incidental Take Statement, Reclamation will request that site-specific actions be included in, and appended to, this biological opinion. The Service will review the request and determine whether it is suitable for appending to this opinion and provide a written response to Reclamation.

The assessment of the action to be provided to the Service for inclusion into this opinion and will contain the following:

1. A concise description of the proposed project that includes any figures that would help to illustrate project elements. The description should include the location, extent, and type of project activities, the proposed starting and completion dates, and the type of construction equipment to be used.

2. A map providing the precise location of the project site clearly delineated on either an original or high-quality copy of a U. S. Geological Survey (USGS) topographic map (exact scale, 7.5 minute, 1" = 2,000 ft.), and including the quad name, county name, and project name on the map margin.

3. A second, hand-sketched map (scale 1" = 100' or 1" = 200') delineating the major vegetation communities present on the site.

4. A Service "Species List," which lists all potential federally endangered, threatened, candidate, and species of concern the Service considers likely to occur in the project area. The Service will provide this list within 30 days of the receipt of a written or verbal request providing the name of the USGS 7.5 minute quadrangle(s) on which the project site occurs. Requests should be directed to the Service's Section 7 Database Technician at (916) 414-6670.

5. For each listed or proposed species, an assessment of:

    a. Whether the species is likely to occur in the area affected by the project, describing the site's habitat quality, whether it is within the species' current range boundaries, and any records of the species in or near the affected area.

    b. How the project will affect listed species and their habitat, including direct, indirect, and cumulative effects (defined under 50 CFR §402.02 as those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation).

    c. The expected amount of take for those species that are likely to be adversely affected (quantified in number of individuals or acres of appropriate habitat affected).

    d. A description of how Appendix F–Take Avoidance Measures–will be implemented.

e. When take is unavoidable, a description of how Appendix G–the conservation measures and habitat creation/preservation ratios–will be implemented.

f. A description of the timing of the action, including implementation of Appendices F and G and the terms and conditions of this opinion.

Maintenance of CVP facilities is needed to protect the integrity of the canals and distribution systems so that structures may operate efficiently and safely. Some routine maintenance activities required are: cleaning of underdrains, replacement of utilities; backfilling of gullies and holes caused by erosion; use of herbicides to prevent excess growth of weeds, and the use of rodenticides to prevent damage from burrowing animals.

Earth moving activity includes any type of activity that disturbs or moves earth. It can include blading, removing fill from spoil piles and placing it in another site, and destroying and refilling rodent burrows. In this context, the earth moving is of a routine nature in the course of operation and maintenance of Reclamation facilities. Erosion control includes blading of rills and gullies, non-operational road work, and improvement of erosion or drainage channels. Again, this is intended to be routine in nature and an activity that is associated with operation and maintenance of Reclamation facilities.

Weed control activities include the use of herbicides, mowing, grading or other methods of reducing terrestrial and aquatic weeds along CVP canals, maintenance roads, and embankments. Weed control activities have been conducted extensively on United States lands administered by Reclamation within the CVP beginning with the first water deliveries. Maintenance procedures for Reclamation facilities are moving toward the use of fewer pesticides and herbicides and the adoption of Integrated Pest Management strategies. Integrated Pest Management stresses the minimal use of chemical controls, alternating use of different pesticides to prevent development of resistance, and increased use of management techniques designed to avoid long-term pest problems. Reclamation will use mowing as the preferred method of weed control on roads and road shoulders. Burning with weed burners (to control Russian thistle blowing in from non-Reclamation lands) and flailing are commonly used. Where herbicides are necessary, selective herbicides will be used which eliminate broad-leaved weeds and allow grasses to spread. Herbicides will be used at the lowest rate necessary to achieve the desired results. In some locations, grazing is allowed or encouraged on outside canal banks to control terrestrial weeds. Tests have been conducted to select and plant the best types of grazing plants which would control erosion and crowd out undesirable weeds. In canals that are de-watered much of the year, terrestrial weeds may grow within the banks; these weeds are actively eliminated because they may reduce canal capacity and because the presence of weeds on the inside bank above the water level allows seeds to drop into the water and results in delivery of weed seeds to the farmer at the end of the delivery system.

Problems caused by aquatic weed growth include decrease of canal capacity, particularly in concrete lined sections. (Records in the Reclamation's South-Central California Area Office showed an up to 29 percent decrease in capacity of the Madera Canal due to unrestricted algae growth. A loss of 10

percent capacity in the Friant-Kern Canal would amount to 900 acre-feet per day.) Water utilized by the weeds is unavailable for other uses, including irrigation of crops. Aquatic weeds slow the flow of water and make calculations of water deliveries inaccurate, and interfere with flows from turnouts and measuring devices into distribution systems. Fragments of water weeds also clog sprinkler heads. Additionally, portions of some of the canal distribution systems consist of underground concrete pipe with propeller meters to measure water deliveries to farms. Algae can wrap around the propellers, causing errors in the measurement of water delivered.

When aquatic weed growth is heavy, copper sulfate is applied by the slug method every two weeks at a rate of two pounds for each cubic foot per second (cfs) of flow. The slug method involves dumping copper sulfate crystals into the flowing water to create a cloud of copper sulfate in solution sufficient to kill aquatic weeds. The slug containing the copper passes any given point along the canal (such as a water delivery turnout) within one to two minutes. The cloud drifts down the canal and eventually becomes diluted to the point that water tests show only a trace. Each application is completed in one day and within a few hours is diluted to insignificant levels. At points where the solution is too weak to kill aquatic weeds, but can be detected by water tests (water is tested on the site and shows when the slug passes), another slug is dumped into the canal. Since the time when the slug method was first used, experimentation has shown that satisfactory control can be achieved using one pound of fine copper sulfate crystals for each cubic foot per second of flow and applied at only two locations (Nielsen 1967); or as little as one-half pound is satisfactory if more locations are used as application sites (the rate used depends upon the magnitude of the aquatic weed situation; two pounds per cfs is needed if aquatic weed growth is very heavy, while one-half pound per cfs will maintain low aquatic weed growth once the canal is relatively free of aquatic weeds). Concentrations of copper sulfate in the canal are calculated to range from 0.1 to 0.5 parts per million on the day of treatment, depending upon the plant which is targeted (United States Department of the Interior, Reclamation 1949). Treatment with copper sulfate usually does not occur more than eight times during a water delivery year.

Animal pest control includes the use of insecticides and rodenticides, destroying and filling rodent burrows and other methods of controlling pests. Use of insecticides on Reclamation facilities is limited to spraying for black widow spiders and wasps in recorder houses. Rodent control may be done in locations where burrows could cause structural damage to CVP facilities. Burrowing by rodents in fill areas of the canal can cause canal failure, with potential loss of life and property, in addition to loss of water from the canal. Neighboring landowners do not want rodents colonizing their property from Reclamation facilities. Rodents can cause significant damage to crops, and may harbor diseases. Rodent control was aggressive during the 1940's and 50's on Reclamation lands. Methods of control included the use of carbon monoxide applied by hose from vehicle exhaust, application of poisoned grain, and the use of firearms.

**Water Service Contracts**

The objective of water service contracts is to set forth the terms and conditions under which a water supply is provided. Agricultural and municipal and industrial (M&I) water contracts provide for the recovery of an appropriate share of annual operation and maintenance (O&M) costs and construction (capital) costs connected with water supply, major conveyance, pumping and other facilities needed to provide water. In addition, M&I water service contracts include and interest component on all assigned capital.

The Friant Division employs a two-class system of water service contracts to support conjunctive use of surface water and groundwater. Class I contracts relate to "dependable supply," and are usually assigned to users with limited access to good quality groundwater. Class II contracts are usually held by water users with access to good quality groundwater for use during surface water deficiency, and often involve groundwater recharge and recharge/exchange agreements.

Historically, approximately 90 percent of the CVP water has been delivered to agricultural users. Municipal and Industrial usage of CVP water is increasing due to expansion of urban areas, changes in water contracts allowing conversion from agricultural to M&I uses, and the facilitation of increased water transfers by CVPIA. In the future it is anticipated that a greater percentage of CVP contract allotment will be allocated to M&I uses. During drought periods agricultural deliveries may be reduced by up to 100 percent if necessary; M&I deliveries may be reduced by up to 25 percent. Many of the contracts have changed the purpose of use from Agriculture to Agriculture and M&I. The Service has not been consulted on this change, but in order to assess the effects of these changes, Reclamation will provide the Service with a list of all CVP water contracts with a description of whether the contract is an Agriculture, M&I, or Agriculture/M&I contract and provide the date in which the contract was written or converted to include M&I as a use. Reclamation will consult on all changes in water contracts from Agriculture only to Agriculture/M&I purposes.

An essential component of formal consultation with the Service on water service contracts has been implementation of measures to address service-area effects. The Service's final biological opinions, including: Friant Water Contract Renewals (October 15, 1991), Los Vaqueros terrestrial (September 3, 1993), Interim Water Contract Renewal (December 27, 1994), Solano Project Contract Renewal (March 19, 1999), and Sacramento County Fazio Water Contract (March 11, 1999), all address service-area effects. Reclamation will ensure that no water transfers will be approved to areas outside the existing place of use in any given year that are inconsistent with Section 3405 of the CVPIA--especially section 3405(a)(1)(H) that addresses conflicts between transfers and fish and wildlife

obligations[3]. In addition, Reclamation will consult pursuant to the ESA on all transfers that may affect listed and proposed species.

Renewal of Existing Long-Term Contracts *[Lead Agency: Reclamation]*

> Long-term contract renewals are subject to a separate, tiered analysis that is consistent with the NEPA tiering in the PEIS. Reclamation will consult either formally or informally with the Service before executing a contract. For some districts contract consultation could be conducted informally; for example, water districts that were at full build-out at the inception of CVPIA, that have well-established district boundaries, that are not depleting ground water, that do not contribute to deterioration of water quality that may affect listed or proposed species, that are not contributing to adverse change or alteration of potential listed species habitat, and that are in compliance with other biological opinions (including transfer opinions) could fall into this category. The site-specific, tiered analysis will address indirect effects of contract renewal, as well as the direct and indirect effects of interrelated and interdependent actions.
>
> Reclamation will consult formally with the Service on those contracts or actions with direct or indirect effects that are likely to adversely affect listed species or result in take. Contract actions that will result in formal consultation include, but are not limited to contracts that involve: ongoing and expected conversion of native habitat to agriculture or to urban development; conversions to more intensive agriculture; deliveries of water outside of their service area, either through apportionment or transfer; changes in district boundaries; ground water depletion; of adverse change in listed species habitat, including terrestrial and aquatic species.

Reclamation and the Service will establish an interagency ESA support team[4], with appropriate representation, that will advise the Reclamation negotiation team throughout the contract negotiation process. The ESA support team will be briefed periodically on the progress of the negotiation. If ESA becomes a complex issue during the negotiations, the ESA support team may be included on the negotiation team at the negotiation team's discretion and upon invitation of the negotiating parties. The ESA support team will be available to answer questions and for clarification of ESA issues. The FWS will only be at the negotiations table when invited by all parties. The ESA support team will respect the confidentiality of caucusing.

Water service contracts will allow for implementation of measures to address service-area effects. Some solutions to service-area effects issues can be found in the Friant Water Contract Renewal, Los Vaqueros terrestrial, Interim Water Contract Renewal, Solano Project Contract Renewal, and Sacramento County Fazio Water Contract biological opinions.

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[3] The Service is concerned that this statement could limit sections 3406 (b)(3) and 3406(d)(2) from being fully implemented, because there is no commitment to keep water within the existing place-of-use to meet the guidance and mandates of these subsections.

[4] The ESA support team is not expected to include more than six people. This is not the same as the coordination team described on page 2-3, but some team members may be on both teams.

Reclamation and the Service will develop a strategy to encourage local entities to engage in habitat conservation planning under section 10 to address local land-use issues. Reclamation and the Service will cooperate to provide information to water users on listed species and potential habitat.

During the contract renewal process, a needs-analysis to determine beneficial use of CVP water will be completed, and all contract renewals will be subject to section 7 consultation under the ESA and to review under the NEPA process. A site-specific biological assessment, to determine potential impacts of using CVP water on Federal and State listed and proposed species, will be completed for individual water districts or for groups of districts in close proximity to one another. The ESA support team will provide recommendations to Reclamation on the appropriate level of ESA consultation and conservation measures.

During the NEPA review process, the public and municipalities will have the opportunity to evaluate and provide input with respect to the beneficial use of CVP water. No renewals will be authorized until appropriate environmental review has been completed. Contracts which expired prior to the completion of the PEIS were renewed for an interim period not to exceed three years in length, and for successive interim periods of not more than two years in length. Upon completion of formal section 7 consultation and the environmental impact statement, these contracts will be eligible for long-term renewal as provided above.

All requirements imposed by existing law, including provisions of the CVPIA, will be included within the renewed contracts. All existing, new, and renewed contracts will be administered in conformance with the requirements and goals of the CVPIA. Reclamation will include measures in all amended, renewed, and new contracts to protect and conserve listed threatened and endangered species addressed in this biological opinion or site-specific biological opinions. For contracts that do not contain such protective language, Reclamation will include such language in any contract renewals, amendments, or new contracts. The contracts will be amended to incorporate measures to protect and conserve listed species and will include the provisions specified. The contracts will be examined to determine if the existing terms and conditions are adequate to minimize the impact of incidental take, and whether they are consistent with this and other biological opinions. An example of the protective language is: "The Water District shall utilize the Delivered Water in accordance with all applicable requirements of any Biological Opnion addressing the execution of this contract developed pursuant to Section 7 of the Endangered Species Act of 1973, as amended, and in accordance with such environmental documentation as may be required for specific activities."

To be consistent with the 1991 Friant biological opinion, and its 1992 amendment, Reclamation will provide or ensure the following conservation measures. These measures will be applied to all contracts subject to consultation, including all amended, renewed, and new contracts and related actions.

**1/27/00 Draft Biological Opinion** on Operation of the CVP and Implementation of the CVPIA

1. **Issuance of notices** to all contractors regarding the need to protect all remaining habitat of listed species in the service area.

> Reclamation and the Service will write a joint letter to the water districts, any member agencies, Planning Departments of cities or counties within the districts, and other responsible parties regarding requirements under the ESA. The letter will include: (1) a discussion of Reclamation's need to ensure that CVP water is not used in a manner which could jeopardize the continued existence of any listed species or result in the destruction or adverse modification of critical habitat, and (2) an explanation of the prohibitions described under section 9 of the ESA in regard to take. The letter will discuss the appropriate protection measures as described here and will be completed within 30 days of this biological opinion.

2. **Provisions for compensation** for the loss of endangered species habitat, not covered under prior biological opinions, that occurs within the CVP service areas from the date of this draft opinion until completion of either: (a) contract area-specific section 7 consultation, (b) any other required site specific section 7 consultation on the effects of the conversion in question, or (c) the completion of an HCP that encompasses the area in question.

> Reclamation will amend all new, renewal, or amended contracts to require conformance with any biological opinions addressing contract renewal so as to prohibit the use of CVP water that results in unauthorized take or conversion of wildland habitat determined to have the potential to be occupied by listed species, or violation of any terms of the contracts pertaining to the conservation of listed species. All contracts (or incorporated biological opinions) will also stipulate (that after issuance of the 18-month notices to the contractors specified under #3 below) the delivery of CVP water is prohibited to wildlands supporting habitat for listed species depicted on the maps attached to the 18-month notices unless clearance pursuant to the ESA has been obtained from the Service.
>
> The Service and Reclamation will establish and/or adopt a contingency plan to address conversions of potential habitat that have occurred in the absence of any required Section 7 consultation. Reclamation will also work with the Service to develop/implement measures to help address such adverse land use changes that occur in CVP service areas but were not, or are not, subject to section 7 consultation. The contingency plan(s) will address the dispensation of monies, if any, and/or other means to be used in acquiring, restoring, or otherwise protecting lands to compensate for loss of listed species habitat. The plan will address compensation from the perspective of both long-term and temporal effects and will be developed, or substantially agreed upon, prior to contract renewal. In the event these plans cannot be completed prior to contract renewal, their effective date will nevertheless be the date of contract renewal.

3. **Completion of comprehensive mapping** of all lands in the service area to identify all remaining potential habitat for listed species within 18 months of this biological opinion.

**Mapping will be used to assess impacts to listed species. Reclamation and the Service are actively developing a mapping strategy. The final mapping strategy will be included in the final biological opinion.** Contractors subsequently will be notified of the location of wildlands suitable for listed species.

> To assess impacts to listed species, and to monitor trends, in endangered species **baseline** habitat, within three months of issuance of this biological opinion, Reclamation will provide the Service with copies of, or funding to acquire, digital orthophoto quads **and** the most recent aerial photography of the district taken prior to issuance of this opinion. In areas where digital orthophoto quads have not been generated, Reclamation will provide the Service with non-digital orthophoto quads. In areas where no aerial photography is available, either from State agencies such as DWR or from commercial sources, Reclamation will contract to have aerial photographs taken within18 months and provide the photographs to the Service. For all water districts that were included in the December 27, 1994, Interim Water Contract biological opinion, where aerial surveys were not conducted, Reclamation will acquire commercially available aerial images taken in the year proceeding or following that opinion in addition to the aerial photographs identified in this opinion. Reclamation will provide funding and technical support to the Service to map listed-species baseline habitat, or will contract with a Service-approved party that has sufficient local area expertise to complete the mapping. The maps will consist of a GIS layer of potential habitat for each listed or proposed species in Appendix B. The use of additional data (including satellite imagery, other aerial photographs, soil maps, vegetation maps, etc.) may be necessary to help identify suitable habitat. Reclamation will ensure that mapped listed-species baseline habitats are digitized and will provide the digitized layer to the Service or fund the Service to digitize the maps. Using the digitized data, the Service will provide Reclamation, the water districts, any member agencies, planning departments of cities and counties within the water districts, and other responsible parties copies of maps of potential habitat for listed species.

4. Implementation of a **plan to prevent take** associated with operations and maintenance (O&M) of Reclamation facilities, and pest control activities by farmers receiving Federal water.

> Reclamation will implement O&M plans for take avoidance (page 2-24 and Appendix F) throughout the CVP. Reclamation will continue to work with California Department of Pesticide Regulation to assure that pesticides are not used in or adjacent to the habitat of listed species prior to completion of section 7 consultation or an HCP.

5. **Consultation with the Service** on (a) any requested inclusions or exclusions from contract service areas, and (b) any water contracts or water deliveries involving Reclamation facilities within the PEIS study area for service areas that are not addressed in any existing biological opinion. These consultations will address all endangered species that may be affected by these actions.

In addition to the conservation measures and consultations above, Reclamation will continue to develop guidelines and policy that address: (1) conversion of listed species habitat prior to section 7 consultation or implementation of an HCP, (2) indirect effects of groundwater recharge on listed species habitats inside and outside of water districts, and (3) applications of CVP water outside of the place of use or for purposes other than the State-approved purpose of use.

New and Amended Water Contracts and Related Actions *[Lead Agency: Reclamation]*

> Reclamation will consult informally with the Service on new and amended water contracts, and related actions, that may affect listed species. For those contracts or actions with direct or indirect effects that are likely to adversely affect listed species, or result in take, Reclamation will consult formally with the Service. Reclamation, through informal consultation with the Service, will determine if new and amended water contracts, and related actions will not affect listed species prior to signing of the FONSI or ROD.

Reclamation will ensure that the measures described above for renewal of existing long-term contracts will be applied to new and amended water contracts and related actions. At times, Reclamation receives a request for a new contract or to amend an existing contract to increase the contracted amount. Reclamation is in the process of consulting with the Service regarding various operational and contractual changes within the American River basin. These changes will include new contracts, amended contracts, Warren Act contracts, land use easements, Folsom Dam long-term reoperation for flood control, American River Water Forum actions, Placer County Water Agency pumps, and long-term contract renewals. Reclamation also will continue to consult with the Service on a drainage-basin basis or ecosystem-level strategy for addressing new and amended water contracts outside of the American River watershed, including execution of diversion agreements associated with American River Water Forum.

*San Joaquin River Exchange Contracts* *[Lead Agency: Reclamation]*

> Interior will work with the Exchange Contractors to develop conservation measures, as appropriate, for listed species. Interior will communicate and coordinate with the Exchange Contractors in determining how to address any effects to listed species, as necessary, through section 7 or section 10.

The objective of these contracts is to provide replacement water from the CVP without charge as authorized under Section 14 of the Reclamation Act of 1939, in settlement of the contractors' claims of rights to water from the San Joaquin River as well as supplemental project water for payment. Exchange Contractors are the "entities or individuals who are parties to an Exchange Contract with the United States for an Exchange Water supply pursuant to Section 14 of the Reclamation Project Act of 1939, as amended and supplemented." These contractors have asserted claims that the construction and operation of the CVP has interfered with claimed rights in and to the use of waters in the San Joaquin River by impairing the quantity and they are willing to accept delivery of water from the Mendota Pool as an adjustment of these asserted claims.

Pursuant to purchased rights, Reclamation stores and diverts water from the San Joaquin River for use by contractors unaffiliated with the exchange contract, in return for supplying the affiliated contracting entities (Exchange Contractors) with substitute water from the Sacramento River, Sacramento-San Joaquin Delta, and other sources through the Delta-Mendota Canal of the CVP. Exchange contract entitlements total 840,000 acre-feet in a normal water year, or 650,000 acre-feet in a critical year. The operation of the entire CVP is subject to the delivery of water guaranteed under the Exchange Contracts. If the substitute supply from the Delta is insufficient in quality or quantity, water must be released from Friant Dam.

Reclamation and the Service will establish a tracking program to assure that conditions necessary for compliance with ESA are met. It is the goal of Interior to have conservation strategies in place for the districts or areas to be receiving the water. The types of strategies that could be accepted are: Habitat Conservation Planning as described in section 10(a) of the ESA; programmatic land management actions that include protection of listed and proposed species; or an expansion of the existing CVP Conservation Program[5] that adequately compensates for the direct and indirect effects of increased water delivery to an area. Other actions that include components of the above strategies could also be accepted.

*Sacramento River Water Rights Settlements* *[Lead Agency: Reclamation]*

> Interior will work with the Sacramento River Water Rights Settlement Contractors to develop conservation measures, as appropriate, for listed species. Interior will communicate and coordinate with the Sacramento River Water Rights Settlement Contractors in determining how to address any effects to listed species, as necessary, through section 7 or section 10

Sacramento River Water Rights contractors claim water rights on the Sacramento River and its tributaries. These water rights holders entered into contracts with Reclamation in the 1940s, following the control of the Sacramento River by Shasta Dam. Most of these contracts established the quantity of water the contractors are allowed to divert without charge between April and October, in settlement of the contractors' water rights claims. The contractors are provided a supplemental supply of CVP water allocated by Reclamation. Most of these contracts are due for renewal in 2004.

Reclamation and the Service will establish a tracking program to assure that conditions necessary for compliance with ESA are met. It is the goal of Interior to have conservation strategies be in place for the districts or areas to be receiving the water. The types of strategies that could be accepted are: Habitat Conservation Planning as described in section 10(a) of the ESA; programmatic land management actions that include protection of listed and proposed species; or an expansion of the existing CVP Conservation Program that adequately compensates for the direct and indirect effects of

[5] CVP Conservation Program is described on page 2-34.

increased water delivery to an area. Other actions that include components of the above strategies could also be accepted.

*Warren Act Contracts and Water Wheeling* *[Lead Agency: Reclamation]*

> For Warren Act contracts and water wheeling that may affect listed species, Reclamation will initiate informal consultation with the Service. For those contracts or actions with direct or indirect effects that are likely to adversely affect listed species, or result in take, Reclamation will consult formally with the Service. Reclamation, through informal consultation with the Service, will determine if Warren Act contracts and water wheeling will not affect listed species prior to signing of the FONSI or ROD.

The Warren Act of 1911 authorizes Reclamation to negotiate contracts to use excess capacity in federal reservoirs and canals for irrigation water that does not belong to Reclamation (water wheeling). The objective of Warren Act contracts is to secure an appropriate use-of-facilities charge for the impoundment, storage, and conveyance of nonproject water through federal facilities when excess capacity is available. Warren Act contracts are <u>not</u> to be used for the sale of project water, but only the use of excess capacity in facilities. The water to be impounded, stored, or conveyed must be under a water right held by the contractor.

Warren Act contracts are negotiated at the discretion of Reclamation when capacity is available in federal facilities. In most cases, the use of federal facilities is the most efficient means to deliver the contractor's water and usually supplements the federal water supply. Each contract includes water quality requirements to prevent degradation of federal water. The rate charged to convey non-project water includes water marketing, conveyance, storage, and pumping fees, if necessary.

Reclamation will establish a tracking program to assure that conditions necessary for compliance with ESA are met. These conditions will require that a conservation strategy be in place for the district or area to be receiving the water. The types of strategies that could be accepted are: Habitat Conservation Planning as described in section 10(a) of the ESA; programmatic land management actions that include protection of listed and proposed species; or an expansion of the existing Conservation Program that adequately compensates for the direct and indirect effects of increased water delivery to an area. Other actions that include components of the above strategies could also be accepted.

Reclamation will continue to assure that no water wheeling will be authorized if it has a significant adverse impact on the ability to meet fish and wildlife obligations under the CVPIA. Warren Act contracts are negotiated at the discretion of Reclamation when capacity is available in federal facilities. The exact amount of non-project water to be conveyed through Warren Act contracts varies from year to year and cannot be predicted in advance.

*215 Water Contracts* *[Lead Agency: Reclamation]*

> For delivery of 215 water that may affect listed species, Reclamation will initiate informal consultation with the Service. For those contracts or actions with direct or indirect effects that are likely to adversely affect listed species, or result in take, Reclamation will consult formally with the Service. Reclamation, through informal consultation with the Service, will determine if 215 water contracts will not affect listed species prior to signing of the FONSI or ROD.

Section 215 water supplies, as defined in the Reclamation Reform Act Rules and Regulations 426.13(a)(3), are unusually large water supplies or unmanaged flood flows that can be made available by the Contracting Officer as temporary supplies. Reclamation must disperse flood water to reduce flood damage downstream of reservoir, and 215 water, by definition, cannot be stored in Reclamation facilities. The quantity and duration of this water are not predictable; it will be available only during the time it meets this definition and usually must be delivered on short-notice. It has been customary to execute a series of temporary contracts with existing contractors and other water agencies to market flood water. The flood water has been diverted from the river and spread across lands for pre-irrigation and groundwater recharge. Such diversions have not caused any significant, adverse impacts to the quality of the human environment. The term of each "215 contract" will not exceed one year.

An obligation period is declared to prevent a spill or while evacuating storage to meet flood control criteria. Since these criteria are the same criteria used to announce the availability of Section 215 water, water delivered to the contractors during the obligation period can be considered Section 215 water, provided the contractor executes a Section 215 one-year temporary contract with the United States. The amount of water taken under that Section 215 temporary contract will still be counted against a contractor's Class II water supply or obligation.

Section 215 limits such water supplies to one year; therefore, it cannot be sold under long-term contracts. During an obligation period, the contractor will be required to take and pay for specified quantities of water whether he uses that supply or not. If such water is considered Section 215 water, the contractor will be allowed to apply this water to ineligible lands. Ineligible lands are over the landowner acreage entitlement to receive Reclamation water. The landowner may own acreage over the limit to receive Reclamation water; these lands are usually irrigated by well water. Use of 215 water on ineligible lands lessens groundwater overdraft. This allows for better use of Project water and further encourages the contractor to divert those excess flows which would cause flood damage downstream. This puts the long-term Class II contractors on the same basis as other contractors who can enter into a separate Section 215 contract. At no time are they allowed to put Section 215 water outside the approved place of use, as permitted by the California State Water Resources Control Board.

Approval of each Section 215 water contract will be conditioned with the following understanding: the Water Service Contractors will be notified that some types of activities require formal consultation with the Service. The intent is that irrigation activities not affect the presence of threatened or endangered species and that previously untilled land must not be tilled and put into agricultural production using this water. This water will not be applied to grassland or shrub land which has never been plowed or

irrigated. If the land has been fallow for five consecutive years or more, it must be inspected for endangered species prior to contract approval.

Reclamation will establish a tracking program to assure that conditions necessary for compliance with ESA are met. These conditions will require that a conservation strategy be in place for the district or area to be receiving the water. The types of strategies that could be accepted are: Habitat Conservation Planning as described in section 10(a) of the ESA; programmatic land management actions that include protection of listed and proposed species, implementation of site-specific conservation measures, or an expansion of the existing CVP Conservation Program that adequately compensates for the direct and indirect effects of increased water delivery to an area. Other actions that include components of the above strategies could also be accepted.

Reclamation will continue to assure that no 215 water will be authorized if it has a significant adverse impact on the ability to meet fish and wildlife obligations under the CVPIA. The availability of Section 215 water will be based on consideration of many operational requirements including inflow to reservoirs, downstream capacity, and maintaining flows at Vernalis. At this time, none of the state, federal, or private wildlife refuges located near Los Banos hold any permits to divert water from the river. Supplemental water for these areas will be provided by Reclamation through the Delta-Mendota Canal. The execution of Section 215 contracts for San Joaquin River water will not interfere with Reclamation's obligations to deliver water to these refuges. If new construction or modification of existing Project facilities is needed to receive 215 water, that construction or modification project will receive separate environmental review.

Terms and Conditions of Water Service Contracts

Standard water service contracts include articles addressing the following contract terms and conditions. These issues will require formal or informal consultation as described below, either as part of the consultation on execution, renewal, or amendment of the contract or separately.

*Term of Contract - Right to Use of Water* *[Lead Agency: Reclamation]*

> For any term of contract that may affect listed species, Reclamation will initiate informal consultation with the Service. For those contracts or actions with direct or indirect effects that are likely to adversely affect listed species, or result in take, Reclamation will consult formally with the Service. Reclamation, through informal consultation with the Service, will determine if an action will not affect listed species prior to signing of the FONSI or ROD.

Long-term contracts will be for periods of 25 years with successive long-term renewal contracts for periods not to exceed 25 years. Interim renewal contracts have been and will continue to be executed to provide existing CVP contractors water deliveries during the period from expiration of original long-term contracts until environmental documentation is complete, in accordance with the CVPIA. Initial interim renewal contracts will be for a term of up to three years, and subsequent renewal contracts will

be for terms of up to two years. Future formal section 7 consultation will be required to provide incidental take authorization for each of these actions.

*Water to be Made Available and Delivered to the Contractor* *[Lead Agency: Reclamation]*

> For water made available and delivered to the contractor that may affect listed species, Reclamation will initiate informal consultation with the Service. For those contracts or actions that are likely to adversely affect listed species, or result in take, Reclamation will consult formally with the Service. Reclamation, through informal consultation with the Service, will determine if an action will not affect listed species prior to signing of the FONSI or ROD. If delivery of the water has already been addressed through consultation with the Service, no further consultation will be necessary unless there is reason for reinitiation.

One of the stipulations under this article is that Interim Renewal contractors shall utilize their project water entitlements in accordance with all applicable requirements of any biological opinion developed pursuant to Section 7 of the ESA as well as environmental documentation required for specific activities. Reclamation believes that is the responsibility of each purveyor to develop their own solutions to endangered species conservation. To enable the purveyors to do their own endangered species planning, maps and trend data for native vegetation will be provided to the water districts under CVP contract as it becomes available; the maps and trend data also will be provided to county planning departments to assist them in conservation planning. Reclamation and the Service will establish an outreach program to facilitate information exchange.

*Point of Diversion and Responsibility for Distribution of Water* *[Lead Agency: Reclamation]*

> For point of diversion and distribution issues that may affect listed species, Reclamation will initiate informal consultation with the Service. For those actions with direct or indirect effects that are likely to adversely affect listed species, or result in take, Reclamation will consult formally with the Service. Reclamation, through informal consultation with the Service, will determine if an action will not affect listed species prior to signing of the FONSI or ROD. If delivery of the water has already been addressed through consultation with the Service, no further consultation will be necessary unless there is reason for reinitiation.

Project water furnished to the contractors by the United States is to be made available to the contractors at a mutually agreed to point or points of delivery. All project water delivered to contractors is to be measured and recorded at the established point(s) of delivery. Future section 7 consultation will be required for any points of delivery not addressed in previous biological opinions.

*Measurement of Water Within the District* *[Lead Agency: Reclamation]*

> For measurement of water within the district that may affect listed species, Reclamation will initiate informal consultation with the Service. Reclamation, through informal consultation with the Service, will determine if an action will not affect listed species prior to signing of the FONSI or ROD.

Within five years of the contracts' effective date, contractors will ensure that all surface water delivered for irrigation and M&I purposes within the contractors' boundaries is measured at each agricultural turnout and M&I connection, respectively. Contractors are to use information obtained from water measuring devices or methods to ensure proper management of the water, to bill water users for water delivered by the contractors, and to record water delivered for M&I purposes by customer class as defined in its water conservation plan.

*Water Shortage and Apportionment* *[Lead Agency: Reclamation]*

> For water shortage and apportionments that are consistent with existing criteria and opinions, no further section 7 consultation is necessary. For those actions that may affect listed species, Reclamation will initiate informal consultation with the Service. For those contracts or actions with direct or indirect effects that are likely to adversely affect listed species, or result in take, Reclamation will consult formally with the Service. Reclamation, through informal consultation with the Service, will determine if an action will not affect listed species prior to signing of the FONSI or ROD.

If there is a reduction in the total water supply available to contractors because of current water-year rainfall totals, drought, or other physical causes beyond the control of the United States, no liability will accrue to the United States or any of its officers, agents, or employees for any damages. In years of water shortages, the United States will allocate the available project water supply among the contractors consistent with their contractual obligations. Criteria for apportionment of CVP water during water shortages are included under the 1995 OCAP biological opinion; substantial changes in water allocation criteria would require reinitiation of consultation on OCAP.

*Water Conservation* *[Lead Agency: Reclamation]*

> For water conservation actions that may affect listed species, Reclamation will initiate informal consultation with the Service. For those actions that are likely to adversely affect listed species, or result in take, Reclamation will consult formally with the Service. Reclamation, through informal consultation with the Service, will determine if an action will not affect listed species prior to signing of the FONSI or ROD.

Federal law establishes that contractors must implement effective water conservation programs based on conservation and efficiency criteria. Water conservation plans include definite water conservation objectives, appropriate economically feasible water conservation measures, and time schedules for meeting those objectives. Under certain circumstances contractors are required to implement Best Management Practices identified by the California Urban Water Conservation Council. In addition, contractors are required to implement a tiered block water pricing program to promote conservation and efficient management of project water. Contractors are to submit annual status reports at the end of every calendar year. See the "Implementation of CVPIA" section following for a complete explanation of water conservation.

Quantity of Water Under Contract [Lead Agency: Reclamation]

> For changes in quantity of water under contract that may affect listed species, Reclamation will initiate informal consultation with the Service. For changes with direct or indirect effects that are likely to adversely affect listed species, or result in take, Reclamation will consult formally with the Service. Reclamation, through informal consultation with the Service, will determine if changes in quantity of water under contract will not affect listed species prior to signing of the FONSI or ROD. However, until OCAP has been reanalyzed, deliveries will be consistent with the Service's 1995 Biological Opinion on OCAP. (For example, certain contract amounts have never been delivered and these effects would be analyzed in future section 7 consultations).

Annual contracts exceed 9 million acre-feet, including over a million acre-feet of Friant Division Class II supply, which is generally available in wet years only. The following is a list of the contracted amount of water for project water and water rights water:

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|---|---|
| *Project Water* | 6,018,589 acre-feet |
| American River Division | 407,850 acre-feet |
| Delta Division | 598,598 acre-feet |
| East Side Division | 155,000 acre-feet |
| Friant Division | 2,201,475 acre-feet |
| Sacramento River Division | 726,346 acre-feet |
| San Felipe Division | 196,300 acre-feet |
| Shasta Division | 14,250 acre-feet |
| Trinity River Division | 40,800 acre-feet |
| West San Joaquin Division | 1,401,670 acre-feet |
| Miscellaneous | 276,300 acre-feet |
| *Water Rights Water* | 3,102,446 acre-feet |
| Sacramento River Division | 1,874,169 acre-feet |
| American River Division | 335,000 acre-feet |
| Delta Division | 887,277 acre-feet |
| West San Joaquin Division | 6,000 acre-feet |

Transfer and exchange water amounts vary each year depending upon circumstances. Even though they vary, they are all part of the original contracted allotment for the water districts. The amount of 215 water can vary, depending on rainfall in a given year, and 215 water can be delivered to lands which do not have a water allocation. Warren Act contract amounts vary and apply only to non-CVP water.

The analysis for this opinion is based on the assumption that Reclamation will provide information to the Service on annual deliveries each year, prior to or concurrent with informing the water districts of their

allocation amounts--particularly where the mean annual delivery for 1988 to 1997 will be delivered to the contracts. This notification will occur annually until completion of individual formal consultation on those contracts. If the Service determines that effects may occur due to particular deliveries, Reclamation and the Service will coordinate on appropriate ways to address these effects. The average deliveries to several water districts during this period was over the contracted amount. Appendix D lists all the CVP contracts and water rights users along with their contracted amounts, average deliveries, and delivery amounts considered as a trigger for reinitiation under this opinion. Contractors shall be notified that, when they receive an increase above average deliveries, they need to work closely with the Service to assure that application of additional water does not result in adverse effects or jeopardy to listed and proposed species.

Acreage under Contract [Lead Agency: Reclamation]

> Reclamation and the Service will continue to collaborate on completing the baseline mapping for this opinion (page 2-12). For changes in acreage under contract that may affect listed species, Reclamation will initiate informal consultation with the Service. For those contracts or changes with direct or indirect effects that are likely to adversely affect listed species, or result in take, that have not been covered by existing biological opinions, Reclamation will consult formally with the Service. Reclamation, through informal consultation with the Service, will determine if changes in acreage under contract will not affect listed species prior to signing of the FONSI or ROD.

An estimated total of 8,352,452 acres is under contract for water deliveries to CVP water service contractors. This figure is based on acreage data in the Environmental Impact Report for the Consolidated and Conformed Place of Use (CH2M Hill 1997), adjusted to reflect discontinued and combined contracts using data from Reclamation files. This figure does not include contracts for water rights contractors or for most municipalities, counties, and state and federal agencies, because no acreage figure was specified for these contracts.

| | |
|---|---|
| American River Division | 1,276,678 acres |
| Delta Division | 299,198 acres |
| East Side Division | 110,601 acres |
| Friant Division | 1,108,709 acres |
| Sacramento River Division | 156,128 acres |
| San Felipe Division | 1,809,000 acres |
| Shasta Division | 2,564,694 acres |
| Trinity River Division | 52,651 acres |
| West San Joaquin Division | 868,046 acres |
| Miscellaneous | 106,747 acres |

Criteria for Water Deliveries to CVP Contractors [Lead Agency: Reclamation]

> Existing criteria for water deliveries to CVP contractors are covered in the 1995 OCAP biological opinion. Reclamation will operate under the existing criteria until such time that new criteria are established and consultation has been completed with both the Service and NMFS. For changes in criteria that may affect listed species, Reclamation will initiate informal consultation with both the Service and NMFS. For those changes in criteria with direct or indirect effects that are likely to adversely affect listed species, or result in take, Reclamation will consult formally with the Service and NMFS. Reclamation, through informal consultation with the Service and NMFS, will determine if an action will not affect listed species prior to signing of the FONSI or ROD.

Criteria have been established for different divisions of the CVP to determine when water deliveries will be reduced. The "Shasta Criteria" influence deliveries to water rights and exchange contractors in the North and South systems, including the Sacramento River Water Rights Contractors and the San Joaquin River Exchange Contractors. As defined by the "Shasta Criteria," when inflows to Shasta Lake fall below the defined thresholds or accumulated deficiencies fall below a threshold, the water year is defined as critical, and water deliveries to the above contractors may be reduced. Delivery of water right entitlements in the North System (Trinity, Shasta, Sacramento River, and American River Divisions) and South System (Delta, West San Joaquin, and San Felipe Divisions) may be reduced up to 25% during critical dry years only. These deliveries were reduced when critical dry years were declared in 1977, 1991, and 1992.

Water availability for delivery to CVP water service contractors during periods of insufficient water supply is determined based on a combination of operational objectives, hydrologic conditions, and reservoir storage conditions. During drought periods agricultural deliveries may be reduced by up to 100 percent if necessary; M&I deliveries may be reduced by up to 25 percent. Reclamation allocates shortages among water service contractors within the same service area, as individual contracts and CVP operational capabilities permit. Reclamation estimates the water supply for the coming contract year based on hydrologic conditions, storage in upstream reservoirs, and assumptions based on statistical analysis of historic records. Water availability and delivery amounts for the Friant and Eastside Divisions are calculated independently of the other CVP divisions. Deliveries from New Melones Dam to water users in the Eastside Division were restricted during the drought of the early 1990s, and were coordinated through stakeholder meetings.

Transfers and Assignments

*Transfers* *[Lead Agency: Reclamation]*

> For water transfers that may affect listed species, Reclamation will initiate informal consultation with the Service. For those contracts or actions with direct or indirect effects that are likely to adversely affect listed species, or result in take, Reclamation will consult formally with the Service. The effects on delta smelt of transfers originating north of Mendota Pool, wheeled through the CVP or SWP, and totaling up to 250,000 acre-feet annually were addressed in the 1995 OCAP biological opinion. The effects of additional transfers (*i.e.,* exceeding a cumulative 250,000 acre-feet annually) on delta smelt, as well as the indirect effects of all transfers on terrestrial species, have not yet been addressed will undergo formal consultation. Reclamation, through informal consultation with the Service, will determine if a transfer, assignment, or group of transfers will not affect listed species prior to signing of the FONSI or ROD. Because of the high number of transfers that occur annually, the Service and Reclamation are collaborating on streamlining the consultation process to allow for expedited consultation on water transfers.

The term transfer is used to describe situations in which a Project contractor allows another to use the contractor's Project water supply. In accordance with the existing water service contracts and the Water Policy Statement, any transfer of Project water by the contractor for use outside the contractor's service area must be approved in writing by the Contracting Officer. Transfers are well documented and checked. Reclamation has established a tracking program and will coordinate with the Service to assure that conditions necessary for compliance with ESA are met. The cumulative amount of water transferred is tracked and limited under 3 regional programmatics covering 1-3 year terms. These NEPA documents have not undergone formal consultation, but have been developed collaboratively by the Service and Reclamation and are currently due for renewal. Reclamation will continue to assure that no transfer will be authorized if it has a significant adverse impact on the ability to meet fish and wildlife obligations under the CVPIA, or if it is inconsistent with the 1995 OCAP biological opinion.

All CVP water service contracts contain provisions allowing the contractor to sell, transfer, or exchange Project water, subject to Reclamation's written consent. Most transfers occur within the same division of the Project during the same water year. The CVPIA allows all project water--subject to a water service or repayment contract, a water rights settlement contract, or an exchange contract--to be transferred to any entity in California for beneficial use[6]. However, transfers from a CVP contractor to an entity outside of the service area require more legal and environmental review and separate consultation.

[6] The Service is concerned that this statement could limit sections 3406 (b)(3) and 3406(d)(2) from being fully implemented, because there is no commitment to keep water within the existing place-of-use to meet the guidance and mandates of these subsections.

Transfers will be consistent with Section §3405(a)(1) of the CVPIA (see page 2-39) in that: *(1) no transfer will be authorized unless the transfer is consistent with State law, including but not limited to provisions of the California Environmental Quality Act (§3406(a)(1)(D)); (2) no transfer will be authorized if it has a significant adverse impact on the ability to deliver CVP contract water or fish and wildlife obligations under the CVPIA because of limitations in conveyance or pumping capacity (§3406(a)(1)(H)); and (3) no transfer will be authorized if it results in a significant reduction in quantity or quality of water currently used for fish and wildlife purposes, unless it is determined that such adverse effects would be more than offset by the benefits of the proposed transfer. In the event of such a determination, mitigation activities will be developed and implemented as integral and concurrent elements of any such transfer to provide fish and wildlife benefits substantially equivalent to those lost as a consequence of such transfer (§3406(a)(1)(L)).*

*Permanent Assignment of CVP Waters* *[Lead Agency: Reclamation]*

> For assignments of CVP water that may affect listed species, Reclamation will initiate informal consultation with the Service. For those contracts or actions with direct or indirect effects that are likely to adversely affect listed species, or result in take, Reclamation will consult formally with the Service. Reclamation, through informal consultation with the Service, will determine if an action will not affect listed species prior to signing of the FONSI or ROD.

The assignment of a CVP water service contract to another user is a permanent transaction and removes the CVP water supply from its original user for delivery to the district or municipality receiving the assigned water. An assignment involves a change in ownership of the CVP water service contract. The original owner of the water service contract relinquishes all rights to the supply of the purchaser and new owner of the contract. The assigned CVP water service contract remains subject to renewal by Reclamation. The ability and authorization to permanently assign a CVP water service contract to another user are defined under the terms of individual water service contracts.

Inclusions and Exclusions

*Inclusions* *[Lead Agency: Reclamation]*

> To facilitate the consultation process on inclusions, the Service and Reclamation will develop a programmatic strategy for consultation. Prior to completing the strategy, Reclamation will use the following process for consultation: For inclusions that may affect listed species, Reclamation will initiate informal consultation with the Service. For those inclusions with direct or indirect effects that are likely to adversely affect listed species, or result in take, Reclamation will consult formally with the Service. Reclamation, through informal consultation with the Service, will determine if the inclusions will not affect listed species prior to signing of the FONSI or ROD.

A landowner may request that his land be included in the irrigation district and be allowed to receive Reclamation water. After the landowner petitions the water district to allow inclusion of the property in

the district, the water district provides initial review and may reject some of the requests for a variety of reasons. Any requests that are seriously considered by the District must also be approved by Reclamation. Reclamation has established approval procedures and has sent these procedures to the Districts.

Reclamation requires that a survey for endangered species be conducted by a qualified biologist if a landowner wishes to have land included in the district and receive water and if the land has never been plowed or been in agricultural production. If the land has been in continuous production since October of 1992 (using well water or rainfall if in dryland farming), the current condition at the time of the request to include the land would be land in agricultural production with few or no habitat values, unless there are plans to restore the land for mitigation banking purposes. Prior to making an effects determination and signing a FONSI or ROD, Reclamation will have coordinated with the Service.

*Exclusions* *[Lead Agency: Reclamation]*

> To facilitate the consultation process on exclusions, the Service and Reclamation will develop a programmatic strategy for consultation. Prior to completing the strategy, Reclamation will use the following process for consultation: For exclusions that may affect listed species, Reclamation will initiate informal consultation with the Service. For those exclusions with direct or indirect effects that are likely to adversely affect listed species, or result in take, Reclamation will consult formally with the Service. Reclamation, through informal consultation with the Service, will determine if the exclusions will not affect listed species prior to signing of the FONSI or ROD.

Requests for exclusions from the water district boundaries usually result from the land having been sold for urban or industrial development. As soon as housing is completed, the Reclamation water originally allocated to that land is no longer provided; the water goes back into the District supply to be used elsewhere. The water district is required to submit the resolutions from Local Agency Formation Commissions and the district's Board of Directors approving the detachment to Reclamation. Reclamation reviews exclusions on a case-by-case basis, and Reclamation biologists conduct site investigations when warranted. Exclusion requests are frequently tardy, sometimes being submitted years after housing developments are already complete. Reclamation and the Service are working on guidelines for the Districts on the process which must be followed by the Districts and Reclamation. Reclamation will provide the Service with documentation of its procedures for processing exclusions and conducting site investigations, and will consult with the Service where listed species or their potential habitats are found, or where recovery plans have identified action items necessary for the recovery of listed species.

Change in Place of Use/Consolidated Place of Use [Lead Agency: Reclamation]

> For changes in the place of use that may affect listed species, Reclamation will initiate informal consultation with the Service. For those changes with direct or indirect effects that are likely to adversely affect listed species, or result in take, Reclamation will consult formally with the

> Service. Reclamation, through informal consultation with the Service, will determine if change in place of use will not affect listed species prior to signing of the FONSI or ROD.

The place of use is the area in which Federal water can be used for a specific source of water. Currently, there are five places of use for the CVP (Trinity, Shasta, Folsom, Contra Costa, and Delta-Mendota Canal). For example, the Trinity place of use includes the entire CVP service area, while the Folsom place of use allows Folsom water to be used only in the middle section of the CVP service area. Reclamation has petitioned the SWRCB to consolidate the places of use into one place of use. The consolidation of the place of use would allow any CVP water to be used anywhere in the CVP service area. The single place of use would extend from Shasta and Trinity Dams in northern California to southern Kern County. Several areas that are outside the place of use that currently receives Federal water, and the petition requests inclusion of these areas into the place of use.

Title Transfers [Lead Agency: Reclamation]

> For all title transfers, Reclamation will coordinate with the Service on presence of potential habitat for proposed or listed species and the consult informally on the utility of the property for recovery of listed species. For title transfers that may affect listed species, Reclamation will initiate informal consultation with the Service. For those transfers that are likely to adversely affect listed species, or result in take, Reclamation will consult formally with the Service. Reclamation, through informal consultation with the Service, will determine if an action will not affect listed species prior to signing of the FONSI or ROD.

Before excess lands are sold or exchanged by Reclamation, qualified biologists and botanists will survey each parcel, according to Service protocol, to determine whether it is suitable habitat for threatened and endangered species. Botanical surveys will be conducted at appropriate times of year during normal or high rainfall years. All relevant recovery plans (including the San Joaquin Valley Recovery Plan) will be reviewed to determine whether the land is necessary for recovery of endangered species, even if not occupied by listed species. If the land is identified in a recovery plan, Reclamation will ensure that the land is owned and managed by the United States Department of the Interior (Interior), or an appropriate conservation organization, in perpetuity to meet recovery objectives.

Self-Funding Agreement for Water Authorities to Manage Facilities [Lead Agency: Reclamation]

> For management of facilities that may affect listed species, Reclamation will initiate informal consultation with the Service. For those facilities where management leads to direct or indirect effects that are likely to adversely affect listed species, or result in take, Reclamation will consult formally with the Service, unless that take has been covered in another biological opinion. Reclamation, through informal consultation with the Service, will determine if a facility management action will not affect listed species prior to signing of the FONSI or ROD. Reclamation will assure that section 7 consultation or an approved HCP is in place prior to transferring facilities into non-Federal ownership or management.

Reclamation collects money from water districts to do O&M activities. In some cases, the districts opt to perform the activities rather than pay Reclamation to do them. An example of such an activity is the

grading of a road. There are currently four such agreements. Reclamation is planning on handing over other operations of its facilities to private or State entities in the future, as requested by those agencies. Reclamation has reached findings that the four activities turned over to contractors prior to this consultation would not affect any endangered species. Because of the nature of some of the facilities that outside agencies have proposed to manage involve the diversion and transfer of water, it is anticipated that there will be situations in the future where this kind of delegation may affect listed species.

Conjunctive Use [Lead Agency: Reclamation]

> For interrelated and interdependent actions as a result of conjunctive use that may affect listed species, Reclamation will initiate informal consultation with the Service. For those contracts or actions that are likely to adversely affect listed species, or result in take, Reclamation will consult formally with the Service. Reclamation, through informal consultation with the Service, will determine if an action will not affect listed species prior to signing of the FONSI or ROD.

One of the critical purposes of the CVP was to arrest the overdraft of groundwater across the valley. The Friant Division of the CVP, in particular, was developed specifically to supplement groundwater resources in the eastern portion of the San Joaquin Valley with surface water from the San Joaquin River. The delivery of surface water not only replaces groundwater for irrigation, but is used to recharge the aquifer. Surplus surface water is banked in the aquifer for future use. Portions of some CVP canals were also designed to recharge local aquifers. In those canals, the water supply includes an estimated number of acre-feet of water that seeps from the unlined portion of the canal that crosses the district.

Use of CVP water supplies to recharge aquifers can enhance stream flows and wetlands by minimizing seepage into groundwater systems. Within the affected groundwater basin, CVP water deliveries can also allow increased agricultural or urban development using groundwater (either within or outside designated service areas) by directly recharging the aquifer or indirectly freeing groundwater supplies for other users. Resulting effects on listed species must be addressed through formal consultation with the Service.

Reservoir and Other Facility Operations

Operating Criteria [Lead Agency: Reclamation]

> Reclamation has undergone formal consultation on the operating criteria with both the Service and NMFS. Reclamation will operate under the existing criteria until such time that new criteria are established and consultation has been completed with both the Service and NMFS. For changes in operating criteria that may affect listed species, Reclamation will initiate informal consultation with the Service and NMFS. For those changes in operating criteria with direct or indirect effects that are likely to adversely affect listed species, or result in take, Reclamation will consult formally with the Service and NMFS. Reclamation, through informal

consultation with the Service and NMFS, will determine if an action will not affect listed species prior to signing of the FONSI or ROD.

The principal elements determining reservoir storage are inflow rates and release requirements. Decisions about reservoir operations are based on conditions at the reservoir and at other project reservoirs, as well as on downstream requirements for water quality and instream needs. Other factors that influence the operation of CVP reservoirs include: flood control requirements; environmental regulations and agreements setting required flow levels, ramping flows, water quality, water temperature, cold water reserves, and carryover storage; the Coordinated Operations Agreement with DWR (Reclamation 1985); lake recreation; power production capabilities; and pumping costs.

The Army Corps of Engineers (Corps) is responsible for determining flood control operational requirements at most CVP reservoirs. Reservoirs are operated to keep water levels low in the fall in anticipation of winter rains; water must be released if levels exceed Corps standards. CVP operators have some latitude in controlling the magnitude and duration of these releases, based on criteria for downstream public safety and levee stability.

CVP operations are, and historically have been, affected by the provisions of several regulatory requirements and agreements, including: SWRCB Water Rights Decisions D-1422 and D-1485, identifying minimum water flow and water quality conditions at specified locations; the Coordinated Operations Agreement, specifying the responsibilities shared by the CVP and SWP for meeting the requirements of D-1485; Water Rights Order 90-5; the Service's September 9, 1993, Los Vaqueros Project and March 6, 1995, OCAP biological opinions for the delta smelt; the National Marine Fisheries Service (NMFS) biological opinion on the CVP-OCAP for the winter-run chinook salmon (NMFS 1993); dedication of 800,000 acre-feet of CVP yield for fish and wildlife needs under section 3406(b)(2) of the CVPIA[7]; Environmental Protection Agency water quality standards for the Sacramento and San Joaquin Estuary; and parts of the SWRCB Bay-Delta Water Quality Control Plan.

A more complete description of the operational requirements of the CVP can be found in Chapter III (and elsewhere) in the PEIS for the CVPIA and in the CVP-OCAP (Reclamation 1992). SWP and CVP facilities and operations in the Delta are described in the Service's March 6, 1995, OCAP biological opinion.

*Coordinated Operations Agreement Between CVP and SWP* [Lead Agency: Reclamation]

The Coordinated Operations Agreement is one of the documents that establishes the baseline condition for this opinion. Unless there are changes to the criteria, no further consultation is necessary. Any changes in the Coordinated Operations Agreement that may affect listed species, Reclamation will initiate informal consultation with the Service and NMFS. For those

[7]See page 2-45 for a description of 3406(b)(2)–Management of Dedicated CVP Yield.

> changes with direct or indirect effects that are likely to adversely affect listed species, or result in take, Reclamation will consult formally with the Service and NMFS. Reclamation, through informal consultation with the Service and NMFS, will determine if an action will not affect listed species prior to signing of the FONSI or ROD.

In 1986 the Coordinated Operating Agreement defined the rights and responsibilities of the CVP and SWP in meeting Sacramento Valley and Delta water needs, based on the water quality objectives specified in D-1485. When water must be withdrawn from reservoir storage to meet Sacramento Valley in-basin requirements, 75 percent of the water is provided by the CVP and 25 percent is provided by SWP. When water from non-CVP/SWP sources and unregulated flow into the Delta is available for export in the Delta, the sum of CVP storage gains, SWP storage gains, and the available flow for export in the Delta is apportioned to give 55 percent to the CVP and 45 percent to SWP. If one party cannot use its share of available water, the other party may use the available water. When there is more than sufficient water to meet all Delta beneficial use standards, the Coordinated Operating Agreement allows the CVP and SWP to store and export as much of the additional water as possible within physical and contractual limits.

The State and Federal pumps at Tracy, together with the riparian water rights holders downstream (especially the Delta farmers) are capable of pumping at rates greater than the inflow to the Delta. This is compensated for by increasing the flows through the Central Valley by releasing more water from Reclamation reservoirs, particularly Shasta and Folsom.

A mechanism for measuring the balance of inflow and outflow in the Delta is determination of the location of increased salinity in the Delta, specifically 2.0 parts per thousand, which is referred to as X2. However, there is a lag time between the detection, or modeling, of upstream movement of X2 and the ability to shift X2 downstream. The location of X2 at or downstream of Chipps Island is the keystone of the Service's March 6, 1995, OCAP biological opinion (see that opinion for further discussion and details). It takes about three days for increased releases from Shasta to increase the outflows past Chipps Island. It takes a little more than a full day for increases from Folsom to reach Chipps Island. Currently, the pumps at Tracy are not slowed during the time between the detection of negative flows and the time when compensating releases balance the Delta pumping rate.

The four Federal pumps are each on or off. The State Water Project has about 16 pumps, and each pump has an adjustable pumping rate. The two types of pumps, on\off or adjustable rate, affects how the "ramping down," or decreases in pumping rate can be accomplished during any periods when Delta inflows lag behind the pumping rate in the Delta relative to the rate of release from Reclamation reservoirs. The current Coordinated Operations Agreement may not adequately provide for the configurations of how many pumps are on and the rate of pumping of the State pumps that are in use.

As the coordinated operation of CVP and SWP apply to this Federal action, Reclamation will continue to coordinate methods of conducting O&M activities to avoid impacts to threatened and endangered species. To the extent that both agencies can develop coordinated policies of protecting species while

conducting O&M activities, implementation of those policies should result in cost savings for both agencies and a better effort to protect species. Efforts to coordinate between agencies should also include reviewing potential opportunities to cost-share on projects that may be mutually beneficial to both agencies and which may benefit the environment, habitat, or threatened or endangered species, or lessen the chance of a species being listed in the future.

Drainwater Management [Lead Agency: Reclamation]

> For drainwater management and management of drainwater impaired lands in the federal service area that may affect listed species, Reclamation will initiate informal consultation with the Service. For those actions related to drainwater management or management of drainwater impaired lands with direct or indirect effects that are likely to adversely affect listed species, or result in take, Reclamation will consult formally with the Service. Reclamation, through informal consultation with the Service, will determine if a drainwater management action or management of drainwater impaired lands will not affect listed species prior to signing of the FONSI or ROD.

Drainage impaired lands are those lands on the west side and southern end of the San Joaquin Valley that are underlain by a shallow groundwater table and contain high concentrations of salts and trace elements such as Selenium and Boron. Elevated salts and boron in shallow groundwater are toxic to plants so, to maintain agricultural productivity, many lands with a saline, shallow groundwater table are drained. The drainage systems installed to dispose of subsurface drainwater usually consists of a system of perforated pipes buried six to nine feet underground. The system takes away harmful salts and excess moisture, thus lowering the water table to below the root zone for most crops.

Subsurface drainwater often contains salts, trace elements, and agricultural chemicals that have been shown can cause harm to exposed fish and wildlife resources. In the early-mid 1980's, subsurface drainwater from the San Luis Unit, was conveyed to Kesterson Reservoir through the San Luis Drain. Selenium in this drainwater was determined to be the cause of waterbird deaths and deformities in areas contaminated by subsurface drainwater contamination. Threatened and endangered species in contaminated areas (e.g., where drainwater has been disposed or where shallow groundwater is impacting biological resources at the soil surface) are also at risk of selenium poisoning.

Subsurface drainwater must be disposed in a sound manner that does not impair the quality of water in rivers and streams or harm fish and wildlife resources. Economical and environmentally acceptable disposal methods have yet to be developed and implemented that maintain westside agricultural productivity. The 1990 San Joaquin Valley Drainage Program concluded that drainage problems in the western San Joaquin Valley were manageable at this time through a number of recommended in-valley management actions. Presently, Westlands Water District in cooperation with Reclamation and the California State Water Resources Control Board are considering the development of an EIS/EIR to evaluate the completion of the San Luis Drain to provide a means of disposing of subsurface drainwater out of the valley. Reclamation is continuing to participate with water districts and other federal and state agencies, and will provide adequate funding to further investigate, demonstrate, evaluate safety to fish and wildlife resources, and, when proven appropriate, implement environmentally safe drainage management measures. Future section 7 consultation will be required to address the adverse direct and indirect effects of the agricultural subsurface drainwater problem including disposal of drainwater or management of drainage impaired lands.

Recreation and Resource Management Plans [Lead Agency: Reclamation]

> For Recreation and Resource Management Plans that may affect listed species, Reclamation will initiate informal consultation with the Service. For those plans, and actions within plans, with direct or indirect effects that are likely to adversely affect listed species, or result in take, Reclamation will consult formally with the Service. Reclamation, through informal consultation with the Service, will determine if an action will not affect listed prior to signing of the FONSI or ROD.

CVP reservoirs are managed for recreational and natural resource purposes (boating, camping, fishing, etc.) according to cooperative resource management plans. The Whiskeytown-Shasta-Trinity National Recreation Area is managed in cooperation with the U.S. Forest Service and National Park Service. Folsom is presently managed under a General Development Plan originated in 1978. It has been updated several times over the years and reflects present conditions. Reclamation is planning to begin a new Resource Management Plan for the Folsom/Natoma area in Fiscal Year 1999-2000. Auburn is presently managed under an interim management plan outlining how resources should be managed while the project is pending approval. Reclamation is presently updating a portion of the plan covering the Mammoth Bar area. New Melones is operated under both the old Management plan developed by the Corps in 1978 and a new Draft Resource Management Plan that is in the process of being finalized.

Because there is often a cooperating agency such as the National Park Service involved in the recreational use of Reclamation properties by the public, Recreation and Resource Management Plans usually tier from a memorandum of agreement. These memoranda describe the authorities of Reclamation to manage for purposes other than the water impoundment facilities. Included in these is management of renewable natural resources and conservation of resources of value to the nation. An example of a provision of such a memorandum of agreement that implements this authority is that the Forest Service shall manage its portions of the Whiskeytown-Shasta-Trinity National Recreation Area in accordance with the "Best Management Practices" set forth in the document titled "Water Quality Management for National Forest System Lands in California" (U.S. Department of Interior, Bureau of Reclamation 1986). Several of the management plans and memoranda for Reclamation lands are being written or revised to specify conservation of identified endangered species resources found on particular properties.

Operations and Maintenance Plans and Manuals [Lead Agency: Reclamation]

> For Operations and Maintenance Plans and Manuals that include actions that may affect listed species, Reclamation will initiate informal consultation with the Service. For those plans, or actions within the plans, with direct or indirect effects that are likely to adversely affect listed species, or result in take, Reclamation will consult formally with the Service. Reclamation, through informal consultation with the Service, will determine if an action will not affect listed species prior to signing of the FONSI or ROD.

Reclamation Area Offices are developing, or have developed, O&M Plans for use by managers and those in the field doing work, for avoidance and minimization of impacts to listed species. In addition to

the Plans, O&M manuals are used to provide staff-level guidance on implementation of O&M Plans. These manuals are used to address listed and proposed species found within each office's jurisdiction, and include take avoidance measures for listed species. The South-Central California Area Office O&M Plan and manual are completed. The Central California Area Office and Northern California Area Office are currently developing manuals based on take avoidance measures in Appendix F. Each area office will combine the existing O&M manual with take avoidance information in Appendix F, in order to develop site-specific documents for each area office, increase the number of species covered, and improve coverage for facilities in the Sacramento Valley. Take avoidance measures will be updated as new information on the species becomes available and as new species are listed.

Reclamation will identify and seek to eliminate alien species of plants and animals on Reclamation lands that have the potential to severely adversely affect habitat. In addition, Reclamation, in cooperation with the water districts, will be responsible for the development and implementation of Integrated Pest Management Plans to reduce the use of pesticides on Reclamation lands and to further reduce the possibility of adverse impact to threatened, endangered, and species of concern. Management direction for alien species and Integrated Pest management will be included in the O&M Plans.

Included in the O&M Plans and manuals are descriptions of various mitigation and conservation measures that will be implemented to reduce anticipated project related impacts related to O&M to a less-than-significant level and eliminate effects to sensitive, threatened and endangered species and wetlands.

The manuals contain measures to reduce impacts from earth moving, minor construction, erosion control, pest control, weed abatement, etc. on wetlands and sensitive, threatened, and endangered species. Construction sites will be monitored to assess mitigation success according to defined success criteria. Yearly reports will be submitted to the Service, California Department of Fish and Game (DFG), and the Corps. Reclamation will establish success criteria for all mitigation and conservation measures to be implemented. If the success criteria are being met after three years of monitoring, no additional monitoring will be necessary. If the success criteria are not met, Reclamation will consult with the Service to determine any further monitoring needs.

As take avoidance measures are developed by the Service and DFG, they will be distributed and implemented on Reclamation lands as well as made available to private landowners receiving Reclamation water. This information will also be provided to the Department of Pesticide Regulation, where it may be shared, at their discretion, with certified applicators and licensed users.

## Conservation Measures

The Service and Reclamation will work together to ensure that existing wildlife conservation programs are funded adequately and support the purpose of the ESA. Both agencies will make a case for adequate funding in the budget review process to meet Interior's obligations to implement CVPIA and ESA for conservation of natural resources. Reclamation will seek increased annual base funding of the CVP Conservation Program, and Reclamation and the Service will seek increased funding of b(1) other and other related programs to meet these needs.

Compensation for Impacts to Listed Species [Lead Agency: Reclamation]

> To assure that impacts to listed species are addressed in a manner that is consistent with other agencies and applicants, Reclamation will compensate for all direct impacts to listed species that may result from Reclamation actions and direct and indirect effects of management activities. It is expected that consultation on this compensation will be addressed during consultation on management activities described on page 2-5, but if consultation has not occurred Reclamation will consult informally with the Service prior to implementing the compensation measures.

When take cannot be avoided for the blunt-nosed leopard lizard, giant garter snake, giant kangaroo rat, San Joaquin kit fox, Tipton kangaroo rat, valley elderberry longhorn beetle, vernal pool tadpole shrimp and vernal pool fairy shrimp, Reclamation will compensate for the impact to these species in accordance with the most current conservation measures and habitat creation/preservation ratios (Appendix G, subject to future update and revision by the Service). Prior to impacting these species or their habitats, Reclamation will provide a biological assessment to the Service describing the individual action and its impact on one or more of these listed species. The Service may, at that time, append the action to this biological opinion.

Wetland Development Program [Lead Agency: Reclamation]

> For Wetland Development Program actions that may affect listed species, Reclamation will initiate informal consultation with the Service. For those actions with direct or indirect effects that are likely to adversely affect listed species, or result in take, Reclamation will consult formally with the Service. Reclamation, through informal consultation with the Service, will determine if an action will not affect listed species prior to signing of the FONSI or ROD.

The Regional Wetlands Development Program (Program) is funded to conduct wetland, riparian, and associated upland habitat protection, enhancement, and restoration activities on Reclamation lands, and on lands that affect or are affected by Reclamation operations or activities. In addition, the Program allows Reclamation's participation in planning, monitoring, surveys, and public education programs focused on environmental awareness toward issues that are associated with Reclamation's interests.

Actions taken through this Program generally involve a partnership of Federal, or State agencies, and/or non-profit environmental interest groups whereby, through grants or cooperative agreements, funds are transferred to the partner to provide desired services on a cost-shared basis.
Actions that have been accomplished under this program include the following projects. Numerous brood ponds have been established on 12 properties in the Sacramento Valley for Mallard production, in partnership with DFG and the California Waterfowl Association. These ponds were developed in marginal rice production areas, and will provide giant garter snake habitat. The Program has provided funds to Colusa National Wildlife Refuge to restore giant garter snake and waterfowl habitat, and has provided funds to the American River Conservancy to assist in purchase and management of habitat for the California red-legged frog. Additionally, considerable funds have been provided to many non-government agencies to promote educational and outreach activities (*e.g.*, San Joaquin Audubon Society, American River Natural History Association, California Native Plant Society, Ducks Unlimited, California Waterfowl Association).

CVP Conservation Program [Lead Agency: Reclamation]

> Reclamation consults informally in an ongoing basis on the CVP Conservation Program. For Conservation actions that may affect listed species, Reclamation will initiate informal consultation with the Service. For those actions with direct or indirect effects that are likely to adversely affect listed species, or result in take, Reclamation will consult formally with the Service. Reclamation, through informal consultation with the Service, will determine if an action will not affect listed species prior to signing of the FONSI or ROD.

Reclamation and the Service developed the CVP Conservation Program as one of the means to offset the effects of the CVP on endangered species. During the consultation on Friant Division water contract renewals, Reclamation and the Service agreed to work together to solve endangered species problems. The Friant biological opinion specified that Reclamation and the Service would identify critical needs of the species found in that part of the San Joaquin Valley. With time it became clear that the list of conservation actions to be done changed each year with new information. At the time of the Interim Water Contract Renewal consultation, Reclamation and the Service agreed to reexamine annually the list of actions to be done and identify which ones had the highest priority. This would ensure that important problems were not missed and that money would be used effectively to solve problems. The CVP Conservation Program Framework Document was written to confirm the strategy. All of the species in the area affected by CVP were included because spending decisions would be done most cost-effectively during the prioritization process. Participation by both agencies would ensure that the interests of Reclamation and the Service would be considered in all decision-making.

Under the Framework Document, the CVP Conservation Program is a joint Reclamation/Service Program developed and being implemented by both agencies and DFG. The primary goal of the CVP Conservation Program is to meet the needs, including habitat needs, of threatened and endangered and special-status species in the areas affected by the CVP. The special-status species whose needs will be addressed by the CVP Conservation Program include primarily federally-listed species. In addition, species that are candidates or are proposed species for Federal listing, as well as other species of

concern, will benefit from the Program if they have high-priority biological needs. The Conservation Program would be applicable to actions that would benefit even a single, specific species, if a declining trend is likely to occur due to any significant degree to the effects of ongoing actions of CVP, including those species that only began declining since 1992.

The Conservation Program, along with other initiatives [e.g., (b)(1) "other" Program, Land Retirement Program, Refuge Water Supply, and the Wetland Development Program], are intended to ensure that the existing operation of the CVP and implementation of the CVPIA would not jeopardize listed or proposed species or adversely affect designated or proposed critical habitat.

The implementation process for the CVP Conservation Program is guided by the following principles:

- Implementing actions will respond directly to biological needs;
- Highest priority needs will generally be addressed first;
- Priorities and needs, and thus the implementation plan, will change over time.

The CVP Conservation Program will identify actions for implementation mainly by synthesizing existing information about needs and specific actions rather than by duplicating other efforts. A prime example of existing information is an approved recovery plan. Recovery plans contain implementation schedules of actions needed to conserve the species and background material to aid preparation of scopes of work. However, for species that do not yet have a recovery plan, where there are some scientific data gaps where existing information is not available, the CVP Conservation Program will develop new information.

Land Use Monitoring and Reporting Program [*Lead Agency: Reclamation*]

> Land use monitoring and reporting is expected to benefit listed species, and Reclamation and the Service will continue to collaborate and consult informally on this program.

**Monitoring will be used to assess impacts to listed species. Reclamation and the Service are actively developing a monitoring strategy. The final proposal will be included in the final biological opinion.** Reclamation will acquire aerial photographs (at a scale of 1:24,000) of lands within the CVP service-area at least once every 10 years–in addition to the comprehensive survey and baseline mapping described on page 2-12 For those areas subject to a high rate of development, aerial photographs will be taken every five years or less (e.g., Folsom District). Photos will be analyzed for the purpose of determining effects to listed species in the form of habitat lost and habitat gained and for identifying successes in conservation and recovery efforts. Habitat losses include agricultural development of lands that have not been previously cultivated as well as conversions to urban or industrial use. Habitat gains would include creation of wetlands or other habitat enhancement measures, increase in lands set aside for habitat, including mitigation banks, and lands retired through the Land Retirement Program (discussed on page 2-65).

Reclamation will digitize all potential listed species habitat detected from the aerial photographs and orthophoto quads or provide adequate funding to the Service to complete the digitization. The data collected will be digitized to overlay 7 ½ minute U.S. Geographical Survey quadrangle maps and incorporated into Reclamation and Service GIS databases. Subsequently, Reclamation will similarly update, or fund the Service to update, the habitat mapping and digitizing as described above and on pages 2-12 Reclamation and the Service will provide updated maps and digitized data to the water districts and local planning departments.

The changes and trend in potential listed species habitat will be reviewed by the Conservation Program Technical Team and will be used to determine the effectiveness of the Conservation Program and other local planning efforts in protecting and recovering listed species. This will help focus conservation efforts on acquisition needs with the highest priority. In addition, the team will identify other priority needs that are not habitat related. As needs for information gathering or additional interagency coordination needs are identified, the Service and Reclamation will put programs in place or bolster existing programs to meet those needs.

The Service and Reclamation will work together to ensure that existing programs are funded adequately. Both agencies will make a case for adequate funding in the budget review process to meet Interior's obligations to implement CVPIA and ESA for conservation of natural resources affected prior to 1992, from 1992 to present, and in the future. Reclamation will increase annual base funding of b(1) other, the Conservation Program, and other related programs to meet these needs.

Other agencies will be encouraged to cost-share, and the flights can be coordinated to time them to the benefit of as many agencies as possible. Any habitat converted within the water service area without prior biological surveys, as required by Reclamation prior to the delivery of Reclamation water, will be evaluated to determine what mitigation measures will be required.

Reclamation and the Service will use the best scientific and commercial information available, in conjunction with data from aerial photograph analysis to monitor trends in the environmental baseline for listed species. It is the intention of Interior to assure that listed species are being recovered. For any species that is continuing to decline, the Service and Reclamation will immediately assess critical needs for the species and determine whether it is appropriate to expand the Conservation Program or implement other conservation measures.

Interagency Coordination for Ecosystem Protection [*Lead Agencies: Reclamation and Service*]

> Interagency coordination for ecosystem protection is expected to benefit listed species, and Reclamation and the Service will continue to collaborate and consult informally on this action.

Reclamation and the Service will establish a coordination team to ensure that the programs described in this biological opinion further the purposes of the ESA and are consistent with this biological opinion. The coordination team will meet at least quarterly. This team will develop and implement an integrated

planning process to coordinate CVP actions and other State and Federal actions under State and Federal laws to further the purposes of the ESA. Recovery of listed species, biological diversity, and ecosystem functions will be considered in Reclamation's planning processes. The team will evaluate adverse effects of CVP actions on listed species, species of concern, and their associated habitats, and identify conservation measures to protect species populations and habitats and help avoid the necessity of listing additional species under the ESA.

## Implementation of the CVPIA

The following are actions being implemented under CVPIA which are expected to have an effect on proposed, listed, and candidate species. Actions, or part of actions, for which there is not enough information available to estimate take or make a no-jeopardy determination are identified for future analysis and consultation. Ongoing section 7 consultation, formal and informal, has been done on several of the following programs. However, the analysis of the overall interrelated and interdependent effects of the CVP in this opinion necessitates their inclusion. In addition to this, events occurring since some of the earlier consultations (including changes in implementation schedules and new information about action needs and methods to meet those needs) require that these programs be revisited.

Limitation on Contracting and Contract Reform

*New Contracts (§3404(a))*

> For new contracts that may affect listed species, even those exempted from the limitations on new contracts, Reclamation will initiate informal consultation with the Service. For those contracts where execution of the contract will lead to direct or indirect effects that are likely to adversely affect listed species, or result in take, Reclamation will consult formally with the Service. Reclamation, through informal consultation with the Service, will determine if a new contract will not affect listed species prior to signing of the FONSI or ROD.

New contracts will be administered in conformance with the requirements and goals of CVPIA. Except as described in *(§3404(b))*, below, Reclamation will not enter into any new short-term, temporary, or long-term contracts or agreements for water supply from the CVP for any purpose other than fish and wildlife before: (1) fish and wildlife restoration activities *(§3406(b))* have been completed, (2) San Joaquin and Stanislaus Rivers comprehensive planning and investigations *(§3406(c))* have been completed, and Central Valley refuges and wildlife habitat areas water supplies and agreements *(§3406(d))* have been acquired and are completed.

Reclamation is also restricted from entering into any new short-term, temporary, or long-term contracts or agreements for water supply from the CVP for any purpose other than fish and wildlife before: (1) the SWRCB concludes the review ordered by the California Court of Appeals in U.S. v. SWRCB, 182 Cal.App. 3rd 82 (1986) and determines the means of implementing its decision, including the obligations of the CVP, if any, (2) the Administrator of the Environmental Protection Agency has approved such decision pursuant to existing authorities and (3) at least one hundred and twenty days have passed after the Secretary has provided a report to the Committee on Energy and Natural Resources of the Senate and the Committee on Interior and Insular Affairs and the Committee of Merchant Marine and Fisheries of the House of Representatives explaining the obligations, if any, of the CVP system, including its component facilities and contracts, with regard to achieving its responsibilities for the San Francisco

Bay/Sacramento-San Joaquin Delta Estuary as finally established and approved by relevant State and Federal authorities, and the impact of such obligations on CVP operations, supplies, and commitments.

*Exceptions to Limit on New Contracts (§3404(b))*

> For new contracts that may affect listed species, Reclamation will initiate informal consultation with the Service. For those contracts where execution of the contract will lead to direct or indirect effects that are likely to adversely affect listed species, or result in take, Reclamation will consult formally with the Service. Reclamation, through informal consultation with the Service, will determine if a new contract will not affect listed species prior to signing of the FONSI or ROD.

Contracts executed pursuant to section 305 of Public Law 102-250 of section 206 of Public Law 101-514 or to one-year contracts for delivery of class II in the Friant Unit. Also, pursuant to section 203 of the Flood Control Act of 1962, Reclamation may enter into a long-term contract in accordance with the Reclamation with the Tuolumne Regional water District for delivery of water form the New Melones Project to the county's distribution system and a contract with the Secretary of Veteran Affairs to provide for the delivery in perpetuity of water from the CVP in quantities sufficient, but not to exceed 850 acre-feet, to meet the needs of the San Joaquin Valley National Cemetery.

*Renewal of Existing Long-Term Contracts (§3404(c))*

> The consultation process for contract renewal is described starting on page 2-9 of this opinion.

The foundation for renewing long-term contracts to be in compliance with ESA was established in the Friant and Interim biological opinions and is described on page 2-9 of this opinion. Long-term repayment or water service contracts will be renewed for the delivery of water from the CVP for a period of 25 years. These contracts may be renewed for successive periods of up to 25 years each. Contract renewals will follow the finalization of the PEIS and are subject to the charges mandated in §3406(c) and §3407(b) of the CVPIA.

Existing contracts will be administered in conformance with the requirements and goals of CVPIA. The CVPIA is deemed applicable law as that term is used in Article 14(c) of the contracts renewed since January 1, 1998, and the contracts will incorporate all requirements from existing law, including ESA and CVPIA.

Once the PEIS is finalized, to encourage early renewal of contracts and to facilitate timely implementation of CVPIA, Reclamation will impose on existing contractors and additional mitigation and restoration payment of one and one-half times the annual mitigation and restoration payment under CVPIA, ending on the effective date of the renewal contract and payable prior to the renewal of the contract.

Water Transfers, Improved Water Management, and Conservation

*Water Transfers (§3405(a))* *[Lead Agency: Reclamation]*

> Because of the high number of transfers that occur annually, the Service and Reclamation are collaborating on streamlining the consultation process to allow for expedited consultation on water transfers. For water transfers that may affect listed species, Reclamation will initiate informal consultation with the Service. For those transfers with direct or indirect effects that are likely to adversely affect listed species, or result in take, Reclamation will consult formally with the Service. Reclamation, through informal consultation with the Service, will determine if an action will not affect listed species prior to signing of the FONSI or ROD.

All individuals or districts who receive CVP water under water service or repayment contracts, water rights settlement contracts, or exchange contracts may transfer all or a portion of the water subject to such contracts to any other California water user or water agency, State or Federal agency, Indian Tribe, or private nonprofit organization for project purposes or any purpose recognized as beneficial under applicable State law. The terms of such transfers are set by mutual agreement between the transferee and the transferor, and are approved by Reclamation (representing the Secretary of the Interior) as provided under the transfer provisions of Section 3405(a).

The conditions of transfers are defined in Section 3405(a)(1). Included in the list are the following conditions:

1. No transfer will be authorized unless the transfer is consistent with State law, including but not limited to provisions of the California Environmental Quality Act (§3406(a)(1)(D)).

2. No transfer will be authorized if it has a significant adverse impact on the ability to deliver CVP contract water or fish and wildlife obligations under the CVPIA because of limitations in conveyance or pumping capacity (§3406(a)(1)(H)).

3. No transfer will be authorized if it results in a significant reduction in quantity or quality of water currently used for fish and wildlife purposes, unless it is determined that such adverse effects would be more than offset by the benefits of the proposed transfer. In the event of such a determination, mitigation activities will be developed and implemented as integral and concurrent elements of any such transfer to provide fish and wildlife benefits substantially equivalent to those lost as a consequence of such transfer (§3406(a)(1)(L)).

Many of the standards that are followed in evaluation of the effects of a transfer on the quality and quantity of water for fish and wildlife purposes are found in existing biological opinions of the Service and the National Marine Fisheries Service, such as the Service's 1995 OCAP opinion.

*Metering of Water Use (§3405(b))* *[Lead Agency: Reclamation]*

> For metering of water use that may affect listed species, Reclamation will initiate informal consultation with the Service. Reclamation, through informal consultation with the Service, will determine if an action will not affect listed species prior to signing of the FONSI or ROD.

CVPIA provides that measuring devices will be installed to gauge all water deliveries. In section 3405(b) it provides some requirements for the manner of implementation. All CVP water service or repayment contracts for agricultural, municipal, or industrial purposes that are entered into, renewed, or amended under any provision of Federal Reclamation law, shall provide that the contracting district or agency shall ensure that all surface water delivery systems within its boundaries are equipped with water measuring devices or effective water measuring methods within five years of the date of contract execution, amendment, or renewal, and that any new surface water delivery systems installed within its boundaries on or after the date of contract renewal are so equipped. If alternative measurement methods are proposed, Reclamation will consult with the Service to identify and address endangered species concerns. The contracting district or agency shall inform the Secretaries of Interior and Commerce and the State of California annually as to the monthly volume of surface water delivered within its boundaries. Districts provide documentation on the status of measurement of surface water deliveries in their water management plan. If meters of measurement devices are needed, they must provide an implementation plan and schedule to meet the requirement which is tracked through the annual update process. Water metering at the point of delivery is being implemented for CVP water contracts as contracts are being renewed. Water metering will continue to be implemented with measurement devices at the point of diversion from CVP supplies and estimates for individual users, or with measurement devices at point of use.

*State and Federal Water Quality Standards (§3405(c))* *[Lead Agency: Reclamation]*

> For State and Federal water quality standards as they apply to Reclamation, that may affect listed species, Reclamation will initiate informal consultation with the Service and NMFS for implementation of applicable portions of these standards. For those standards with direct or indirect effects that are likely to adversely affect listed species, or result in take, Reclamation will consult formally with the Service and NMFS. Reclamation, through informal consultation with the Service and NMFS, will determine if an action will not affect listed species prior to signing of the FONSI or ROD.

All CVP water service or repayment contracts for agricultural, municipal, or industrial purposes that are entered into, renewed, or amended under any provision of Federal Reclamation law, shall provide that the contracting district or agency shall be responsible for compliance with all State and Federal water quality standards applicable to surface and subsurface agricultural drainage discharges generated within its boundaries. This subsection will not affect or alter any legal obligation of Reclamation to provide drainage services.

Reclamation has participated in several processes to analyze agricultural drainwater problems and alternatives for solution. Deliveries to water users that do not meet water quality standards have not been reduced.

*Water Pricing Reform (§3405(d))* *[Lead Agency: Reclamation]*

> For water pricing reform that may affect listed species, Reclamation will initiate informal consultation with the Service. For those actions with direct or indirect effects that are likely to adversely affect listed species, or result in take, Reclamation will consult formally with the Service. Reclamation, through informal consultation with the Service, will determine if an action will not affect listed species prior to signing of the FONSI or ROD.

All CVP water service or repayment contracts for a term longer than three years for agricultural, municipal, or industrial purposes that are entered into, renewed, or amended under any provision of Federal Reclamation law will be subject to tiered water pricing. Such a system shall specify rates for each district, agency or entity based on an inverted block rate structure with the following provisions:

1. The first rate tier will apply to a quantity of water up to 80 percent of the contract total and will not be less than the applicable contract rate;

2. The second rate tier will apply to that quantity of water over 80 percent and under 90 percent of the contract total and will be at a level halfway between the rates established under paragraphs (1) and (3);

3. The third rate tier will apply to that quantity of water over 90 percent of the contract total and will not be less than the full cost rate; and

4. The Secretary will charge contractors only for water actually delivered.

Application of this subsection will be waived as it relates to any project water delivered to produce a crop which is determined to provide significant and quantifiable habitat values for waterfowl in fields where the water is used and the crops are produced.

*Water Conservation Standards (§3405(e))* *[Lead Agency: Reclamation]*

> For water conservation standards that may affect listed species, Reclamation will initiate informal consultation with the Service. Reclamation, through informal consultation with the Service, will determine if an action will not affect listed species prior to signing of the FONSI or ROD.

The CVPIA requires that an office will be established and administered to develop criteria for evaluating the adequacy of all water conservation plans developed by project contractors, including those plans required by section 210 of the Reclamation Reform Act of 1982. Water conservation best management

practices will be evaluated in consultation with the Secretary of Agriculture, DWR, California academic institutions, and CVP water users. This office will also evaluate within 18 months following enactment of this title all existing conservation plans submitted by project contractors to determine whether they meet the conservation and efficiency criteria established pursuant to this subsection (§3405(e)(2)).

The CVPIA states that water conservation criteria will be established and shall be reviewed periodically thereafter, but no less than every three years (§3405(e)(1)). The review process will promote the highest level of water use efficiency reasonably achievable by project contractors using best available cost-effective technology and best management practices. The criteria will include, but not be limited to agricultural water suppliers' efficient water management practices developed pursuant to California State law or reasonable alternatives. In developing the water conservation best management practice criteria, Interior will take into account and grant substantial deference to the recommendations for actions specific to water conservation and drainage source reduction proposed in the Final Report of the San Joaquin Valley Drainage Program, entitled A Management Plan for Agricultural Subsurface Drainage and Related Problems on the Westside San Joaquin Valley (September 1990) (§3405(e)(3)). Implementation of water conservation practices will include water conservation for municipal and on-farm uses assumed in the DWR Bulletin 160-93. Implementation will also include conservation plans completed under the 1982 Reclamation Reform Act with implementation of all cost-effective Best Management Practices that are economical and appropriate, including measurement devices, pricing structures, demand management, public information, and financial incentives.

Reclamation released the "Criteria for Evaluating Water Conservation Plans" in April 1993. By law, the Criteria must be reviewed and updated at least every three years. Reclamation released a draft of the revised Criteria in 1996 and received public comment through a series of public workshops, the CVPIA Public Forum's Water Conservation Workgroup, and submitted written comments. The final revised Criteria were released in September 1996. Reclamation currently has deemed more than 70 water management plans as adequate under CVPIA. Plans must be revised every five years. The first plan revisions will be due in 1999.

On May 31, 1996, Interior circulated the draft Administrative Proposal on Water Conservation to interested parties and received comments. The final Administrative Proposal was issued on March 20, 1997. Since the release of the final Administrative Proposal, Interior staff at the Regional level have been developing regional criteria for the Sacramento Valley

On July 29, 1993, the Commissioner of Reclamation signed the Memorandum of Understanding Regarding Urban Water Conservation in California. The criteria for municipal and industrial water districts is the same as that developed by the California Urban Water Conservation Council, which recently approved a revised set of criteria and guidelines. Reclamation will consider these in the upcoming 1999 Criteria revision process beginning in 1998.

The Water Conservation and Advisory Center was opened in early 1993. The Center was located in Reclamation's Mid-Pacific Regional Office and open to the public. With increased building security, the office was closed and a virtual water conservation center on the Internet was created at www.watershare.gov. *Conservation Connections* is a quarterly newsletter which highlights water conservation projects being implemented by Reclamation, water districts, and others in the Mid-Pacific Region. In addition to articles and announcements, the newsletter regularly features "hot tips" and calendar sections. The newsletter mailing list contains approximately 850 addresses. Reclamation has also developed a water conservation data base which provides each water district with specific information to enable them to prepare their annual water conservation plan update which demonstrates how districts are implementing their plans. The data base provides districts and Reclamation with examples of successful water conservation programs as well as new capabilities to prepare reports, studies, and research, and to share them with other federal, state, and local agencies.

Fish and Wildlife Restoration Activities

*Anadromous Fish Restoration Program (§3406(b)(1))* *[Lead Agency: Service]*

> The Service continues to conduct intra-Service consultation on the For Anadromous Fish Restoration Program. For Anadromous Fish Restoration Program actions that may affect listed species, the Service will initiate informal consultation using internal guidance on intra-Service consultation. The Service, through ongoing intra-Service consultation, will determine if an action will not affect listed species prior to signing of the FONSI or ROD.

The CVPIA requires that a program be developed which makes all reasonable efforts to ensure that, by the year 2002, natural production of anadromous fish in Central Valley rivers and streams will be sustainable, on a long-term basis, at levels not less than twice the average levels attained during the period of 1967-1991, also known as the Anadromous Fish Restoration Program. This goal shall not apply to the San Joaquin River between Friant Dam and Mendota Pool, for which a separate program is authorized under subsection 3406(c) of the CVPIA. The programs and activities authorized by this section shall, when fully implemented, be deemed to meet the mitigation, protection, restoration, and enhancement purposes established by subsection 3406(a) of the CVPIA. In the course of developing and implementing the AFRP, all reasonable efforts shall be made consistent with the requirements of Section 3406.

The AFRP will give first priority to measures which protect and restore natural channel and riparian habitat values through habitat restoration actions, modifications to CVP operations, and implementation of the supporting measures mandated by the CVPIA. The AFRP will be reviewed and updated every five years and will describe how the Secretary intends to operate the CVP to meet the fish, wildlife, and habitat restoration goals and requirements set forth in the CVPIA and other project purposes.

As needed to achieve the goals of the AFRP, CVP operations will be modified to provide flows of suitable quality, quantity, and timing to protect all life stages of anadromous fish, except that such flows

shall be provided from the quantity of water dedicated to fish, wildlife, and habitat restoration purposes under 3406(b)(2); from the water supplies acquired pursuant to 3406(b)(3); and from other sources which do not conflict with fulfillment of the Secretary's remaining contractual obligations to provide CVP water for other authorized purposes. Instream flow needs for all CVP controlled streams and rivers will be determined by the Secretary based on recommendations of the Service after consultation with the DFG. A portion of this determination has been reached.

The AFRP is the cornerstone for actions aimed at restoring natural production of anadromous fish on both CVP and non-CVP controlled rivers and streams, and will: (1) include determinations of quantity, quality, and timing of flows necessary to protect anadromous fish; (2) provide an initial framework for the management of CVP water dedicated to anadromous fish; (3) recommend structural habitat restoration measures; and (4) help guide the acquisition and management of supplemental water necessary to fulfill the biological goals of the CVPIA. It will emphasize improved passage and habitats within the Bay-Delta estuary, includes all fishery-related measures in Section 3406(b), and uses other actions not specifically contained in CVPIA.
Doubling the natural production of anadromous fish cannot be accomplished without substantial emphasis on habitat restoration and operation of non-CVP facilities. This is especially true for some listed and proposed species, such as spring-run chinook salmon (proposed), fall-run chinook salmon (proposed) and steelhead (threatened). Without considerable emphasis on habitat restoration measures and improvements to non-CVP streams, these species will continue to decline, perhaps to the point of extinction. During development and implementation of the AFRP, Interior will cooperate with the State of California to ensure that, to the greatest degree practicable, the specific quantities of yield dedicated to and managed for fish and wildlife purposes under the CVPIA are credited against any additional obligations of the CVP which may be imposed by the State of California, including but not limited to increased flow and reduced export obligations which may be imposed by the California State Water Resources Control Board in implementing San Francisco Bay/Sacramento-San Joaquin Delta Estuary standards pursuant to the review ordered by the California Court of Appeals in U.S. v. State Water Resources Control Board, 182 Cal.App.3rd 82 (1986), and that, to the greatest degree practicable, the programs and plans required by this title are developed and implemented in a way that avoids inconsistent or duplicative obligations from being imposed upon CVP water and power contractors.

The actions and evaluations implemented or initiated to date include: protecting and restoring riparian habitat along the Sacramento and Tuolumne rivers and Mill, Deer, and Butte creeks; improving fish passage on the Yuba River and Butte Creek; enhancing water quality on Middle and Big Chico creeks; improving monitoring of aquatic habitat conditions on Antelope, Mill, Deer, Big Chico, and Butte creeks; increasing law enforcement to enhance protection of anadromous fish and their habitat throughout the tributaries of the Sacramento and Feather rivers; continuing development of comprehensive watershed management plans for the Tuolumne River and Battle, Deer and Butte creeks; evaluating intermittent streams as rearing habitat for chinook salmon; improving monitoring of anadromous fish production on the Sacramento, American, and Stanislaus rivers, Butte Creek, and the Delta; and conducting instream flow studies on the Sacramento, American, and Merced rivers.

*Habitat Restoration Program (§3406(b)(1) "other") [Lead Agencies: Reclamation and Service]*

> Reclamation consults informally in an ongoing basis on the Habitat Restoration Program activities that may affect listed species, the consultation is concluded informally. The Service will continue to conduct intra-Service consultation on this program. For those restoration actions with direct or indirect effects that are likely to adversely affect listed species, or result in take, a biological opinion will be completed. Reclamation, through informal consultation with the Service, and the Service, through intra-Service consultation, will determine if an action will not affect listed species prior to signing of the FONSI or ROD.

Habitat conservation projects that address this "other" mitigation component will be identified during other efforts, including but not limited to: (1) ESA, Section 7 consultation for interim CVP contract renewals; (2) short- and long-term conservation programs being developed as a result of the Friant contract renewal consultation and CVP long-term contract renewals (CVP Conservation Program); (3) the CVPIA-PEIS (environmental analysis under NEPA identified several important areas of wildlife conservation needs of both endangered species and other wildlife and ecosystem resources); and (4) implementation of other CVPIA activities. Representative projects include identification, protection, and restoration of habitat suitable for conservation of native species in areas impacted by the CVP.

The (b)(1) "other" program has been based on the ranking of habitats and species of concern, the assessment of factors limiting native fish, wildlife, and associated habitats, and geographic areas where those habitats, species, and factors converge to the greatest degree. This will not be to the exclusion of other concerns or opportunities, but has been Interior's emphasis. Species and habitat prioritizations are being reevaluated throughout implementation of the CVPIA, through regular prioritization meetings between Service and Reclamation staff, close coordination with DFG, and yearly critical needs analysis. The critical needs analysis will be a collaborative effort between Reclamation and the Service and will include close coordination with DFG.

Habitats or ecosystems known or believed to have experienced the greatest percentage decline in quantity and quality since construction of the CVP, and whose impacts can be attributed, at least partially, to CVP construction and operation, will be a focus for the (b)(1) "other" Program. Populations of native species impacted by the CVP, not specifically addressed in other portions of section 3406 of the CVPIA, will be addressed in the (b)(1) "other" Program. Reclamation and the Service commit to requesting that adequate funding be allocated to the (b)(1) "other" program to protect and enhance ecosystems of listed species and to support recovery of listed species.

*Management of Dedicated CVP Yield (§3406(b)(2)) [Lead Agencies: Reclamation and Service]*

> This action has undergone formal section 7 consultation in the 1995 OCAP biological opinion. Currently there is no further section 7 consultation expected for management of dedicated yield; however, the Service, Reclamation, and NMFS will continue to coordinate closely. If consultation needs are identified in the future, as identified through coordination, consultation will proceed as necessary.

An annual amount of 800,000 acre-feet of CVP yield will be dedicated and managed by Reclamation and the Service for the primary purpose of implementing the fish, wildlife, and habitat restoration purposes and measures authorized by the CVPIA; to assist the State of California in its efforts to protect the waters of the San Francisco Bay/Sacramento-San Joaquin Delta Estuary; and to help meet such obligations as may be legally imposed upon the CVP under state or federal law following enactment of the CVPIA, including but not limited to additional obligations under the federal Endangered Species Act. Anticipated biological benefits for anadromous fish and other species include better instream temperatures for incubation and juvenile rearing, suitable migration conditions, and direct restoration of instream, riparian, wetland, and estuarine habitat.

The water will be in addition to the quantities needed to implement Level 2 refuge water supply described in section 3406(d)(1) and in addition to all water allocated to the Trinity River pursuant to section 3406(b)(23) for the purposes of fishery restoration, propagation, and maintenance, and will be supplemented by all water that comes under the Secretary's control pursuant to subsections 3406(b)(3), 3408(h)-(I), and through other measures consistent with subparagraph 3406(b)(1)(B). The water will be managed pursuant to conditions specified by the Service after consultation with Reclamation and DWR and in cooperation with DFG.

Operation of the CVP is coordinated between Reclamation and the Service for management of the 800,000 acre-feet of CVP yield made available under the CVPIA. Deliveries of the water may be reduced up to 25 percent whenever reductions due to hydrological circumstances are imposed upon agricultural deliveries of CVP water. Reductions will not exceed in percentage terms the reductions imposed on agricultural service contractors. Delivery of this water will not require the project to be operated in a way that jeopardizes human health or safety. If the 800,000 acre-feet of water dedicated for fish and wildlife enhancement, or any portion thereof, is not needed for the purposes of this section, such water will be made available for other project purposes.

*Supplemental Water Acquisition Program (§3406(b)(3))*

*[Lead Agencies: Reclamation and Service]*

> For supplemental water acquisition that may affect listed species, Reclamation will initiate informal consultation with the Service. Reclamation, through informal consultation with the Service, and the Service, through intra-Service consultation, will determine if an acquisition action will not affect listed species prior to signing of the FONSI or ROD.

The Supplemental Water Acquisition Program is to develop and implement a program (in coordination and in conformance with the plan required under the AFRP that is described in section 3406(b)(1)) for the acquisition of a water supply to supplement the 800,000 acre-feet of water that is dedicated in section 3406(b)(2) for fish and wildlife purposes, and to fulfill the obligations for Level 4 refuge water supply established in section 3406(d)(2).

The water acquired through the Supplemental Water Acquisition Program will: increase restoration benefits for anadromous fish species provided by dedicated water; assist in reaching Level 4 refuge water supply; provide benefits to wetlands, adjacent terrestrial habitats, and estuarine areas; and furnish additional benefit to wildlife and resident and estuarine fish species. The program will identify how Interior intends to utilize the following options to acquire supplemental water: improvements in or modifications of the operations of the project; water banking; conservation; transfers; conjunctive use; and temporary and permanent land fallowing, including purchase, lease, and option of water, water rights, and associated agricultural land. Implementation of this program as described in Alternative 4 of the CVPIA-PEIS will result in acquisition of 200,000 acre-feet each on Stanislaus, Tuolumne, and Merced rivers, 30,000 acre-feet on Calaveras River, 70,000 acre-feet on Mokelumne River, 100,000 acre-feet on Yuba River, and an undetermined amount of water on upper Sacramento tributaries.

Water supply needs for full wetland habitat management for certain Central Valley National Wildlife Refuges, State of California Wildlife Management Areas, and the Grassland Resource Conservation District were described in two reports published in 1989. Section 3406 (d) (1) of the CVPIA referred to both reports in directing the Secretary of the Interior to provide firm water supplies of suitable quality to maintain and improve wetlands habitat areas of the refuges cited in the 1989 reports.

Approximately 160,000 acres of land would be fallowed under the Supplemental Water Acquisition Program, with associated water rights used to supplement water dedicated to fish and wildlife purposes. Acquired water cannot be exported. Approximately 22,600 acres of agricultural land in the Sacramento River Region, 1,600 acres in the Delta Region, and 10,600 acres in the Tulare Lake Region would be fallowed. It is assumed that this land would be in small, isolated parcels located throughout the region. Approximately 125,600 acres of agricultural land would be fallowed in the San Joaquin River Region. It was assumed that approximately 15 percent (18,800 acres) would be adjacent to wildlife refuges or other managed natural area, or that individual parcels would be large enough to provide potentially high-quality habitat. Conservation easements could be acquired on up to 15 percent of fallowed land in the San Joaquin Valley.

*Tracy Pumping Plant Mitigation (§3406(b)(4))* *[Lead Agency: Reclamation]*

> For Tracy Pumping Plant mitigation actions that may affect listed species, Reclamation will initiate informal consultation with the Service. For those actions with direct or indirect effects that are likely to adversely affect listed species, or result in take, Reclamation will consult formally with the Service. Reclamation, through informal consultation with the Service, will determine if a mitigation action will not affect listed species prior to signing of the FONSI or ROD.

A program will be developed and implemented to mitigate for fishery impacts associated with operations of the Tracy Pumping Plant, which delivers approximately 8,000 acre-feet per day of water to users in the San Joaquin Valley. The program will include, but is not limited to, improvement or replacement of the fish screens and fish recovery facilities and practices associated with the Tracy Pumping Plant.

Interim mitigation efforts to improve the Tracy Fish Collection Facility are continuing, while a long-term solution to Delta export problems is being developed. The current Tracy Fish Collection Facilities Evaluation and Improvement Program was initiated in 1992 following execution of an agreement between Reclamation and DFG. The agreement committed Reclamation and DFG to make physical improvements and operational changes, assess fishery conditions, and monitor salvage operations to reduce and offset direct fish losses. Two strategies are currently being evaluated: whether to continue to repair and maintain the existing Tracy Fish Collection Facilities or to replace it with a new facility. Costs will be reimbursed in accordance with the following formula: 37.5 percent will be reimbursed as main project features, 37.5 percent will be considered a nonreimbursable Federal expenditure, and 25 percent will be paid by the State of California. The reimbursable share of funding for this and other facility repairs, improvements, and construction will be allocated among project water and power users in accordance with existing project cost allocation procedures.

*Contra Costa Canal Pumping Plant Mitigation(§3406(b)(5))* *[Lead Agency: Reclamation]*

> This action has undergone formal section 7 consultation in the 1993 Los Vaqueros biological opinion on delta smelt. For changes in this action from that which has been addressed during prior consultation, Reclamation will initiate informal consultation with the Service. For those mitigation actions with direct or indirect effects that are likely to adversely affect listed species, or result in take, Reclamation will consult formally with the Service. Reclamation, through informal consultation with the Service, will determine if an action will not affect listed species prior to signing of the FONSI or ROD.

A program will be developed and implemented to mitigate for fishery impacts resulting from operations of the Contra Costa Canal Pumping Plant No.1. This program will provide for construction and operation of fish screening and recovery facilities, and for modified practices and operations.

Alternative designs for fish screens and barriers are being evaluated for their cost and effects on local hydraulics of existing facilities, water quality, operational activities, debris problems and fishery resources. Anticipated biological benefits depend on selected screen and recovery facility configuration; however, any screen should provide an incremental increase to survival rates of juvenile anadromous species and Delta smelt within the Delta. The facility is not anticipated to provide significant benefits for eggs and larvae of fish species because of the difficulty in screening these life stages. Costs associated with this program will be reimbursed in accordance with the following formula: 37.5 percent will be reimbursed as main project features, 37.5 percent will be considered a nonreimbursable Federal expenditure, and 25 percent will be paid by the State of California.

*Shasta Dam Temperature Control Device (§3406(b)(6))* *[Lead Agency: Reclamation]*

> For changes in this action from that which has been addressed during prior consultation, Reclamation will initiate informal consultation with the Service. For those actions with direct or indirect effects that are likely to adversely affect listed species, or result in take, Reclamation will consult formally with the Service. Reclamation, through informal consultation with the Service, will determine if an action will not affect listed species, prior to signing of the FONSI or ROD.

A structural temperature control device was installed and is being operated at Shasta Dam. Reclamation will develop and implement modifications in CVP operations as needed to control water temperatures in the upper Sacramento River, to protect anadromous fish in the upper Sacramento River. Shasta Reservoir, a feature of the CVP located on the Sacramento River just northwest of Redding, stores up to 4.5 million acre-feet of water providing flood control and water for urban, agricultural, power, and environmental benefits. The purpose of the Shasta Temperature Control Device is to allow the selective withdrawal of water from Shasta Reservoir to reduce downstream temperatures in the Sacramento River. It includes a 250-feet wide by 300-feet high gated shutter structure that encloses all five powerplant penstock intakes. A 125-feet wide by 170-feet high low level intake structure gives access to the deeper, colder water near the center of the dam and diverts it to the shutter structure. The 8,000-ton 300-foot tall steel-frame structure is connected to the upstream face of the dam. A series of gates allows the withdrawal of water at various lake levels helping with the control of water temperatures downstream. Costs associated with planning and construction of the structural temperature control device will be reimbursed in accordance with the following formula: 37.5 percent will be reimbursed as main project features, 37.5 percent will be considered a nonreimbursable Federal expenditure, and 25 percent will be paid by the State of California. Reclamation will use temperature and flow data for 3-dimensional hydrodynamic modeling to improve gate operation guidelines and improve outflow temperatures.

*Meet Flow Standards for Anadromous Fish (§3406(b)(7))*
*[Lead Agencies: Reclamation and Service]*

> This action was considered as part of the baseline for the 1995 OCAP opinion and requires no further consultation at this time. For any changes in flow standards that may affect listed species, Reclamation will initiate informal consultation with the Service and NMFS. For those flow standards with direct or indirect effects that are likely to adversely affect listed species, or result in take, Reclamation will consult formally with the Service and NMFS. Reclamation, through informal consultation with the Service and NMFS, and the Service, through intra-Service consultation and informal consultation with NMFS, will determine if an action will not affect listed species prior to signing of the FONSI or ROD.

To meet flow standards for anadromous fish, the Department of Interior will comply with flow standards and objectives and diversion limits set forth in all laws and judicial decisions that apply to CVP facilities, including, but not limited to, provisions of this title, the 1995 OCAP biological opinion, and all obligations of the United States under the "Agreement Between the United States and the Department of

Water Resources of the State of California for Coordinated Operation of the CVP and the State Water Project" dated May 20, 1985, as well as Pub. L. 99-546. The no-jeopardy conclusion in this opinion is based on the understanding that these standards will be met.

*Pulse Flows for Anadromous Fish (§3406(b)(8))* *[Lead Agencies: Reclamation and Service]*

> This action was considered as part of the 1995 OCAP opinion and requires no further consultation at this time. For changes in pulse flows that may affect listed species, Reclamation will initiate informal consultation with the Service and NMFS. For those pulse flows with direct or indirect effects that are likely to adversely affect listed species, or result in take, Reclamation will consult formally with the Service and NMFS. Reclamation, through informal consultation with the Service and NMFS, and the Service, through intra-Service consultation and informal consultation with NMFS, will determine if an action will not affect listed species prior to signing of the FONSI or ROD.

Pulse flows managed by Reclamation and the Service contribute to the management of dedicated CVP Yield (§3406(b)(2)). Springtime pulse flows in the Stanislaus River and in the lower San Joaquin River have undergone formal section 7 consultation in the 1995 OCAP biological opinion. These short pulses of increased water flows are intended to increase the survival of migrating anadromous fish moving into and through the Sacramento-San Joaquin Delta and Central Valley rivers and streams.

*Eliminate Flow Fluctuation Losses (§3406(b)(9))* *[Lead Agencies: Reclamation and Service]*

> For actions to eliminate flow fluctuation losses that may affect listed species, Reclamation will initiate informal consultation with the Service and NMFS and the Service will conduct intra-Service consultation. Reclamation, through informal consultation with the Service and NMFS, and the Service, through intra-Service consultation and informal consultation with NMFS, will determine if an action will not affect listed species prior to signing of the FONSI or ROD.

A program will be developed and implemented to eliminate, to the extent possible, losses of anadromous fish due to flow fluctuations caused by operation of any CVP storage or re-regulating facility. The program will be patterned where appropriate after the agreement between DWR and DFG with respect to operation of the SWP Oroville Dam complex. This measure is expected to yield significant biological benefits for anadromous fish species and will be integrated with, and considered part of, the management of the dedicated 800,000 acre-feet of CVP yield under §3406(b)(2).

*Modify Red Bluff Diversion Dam (§3406(b)(10))* *[Lead Agency: Reclamation]*

> For Red Bluff Diversion Dam modifications that may affect listed species, Reclamation will initiate informal consultation with the Service and NMFS. For those modifications with direct or indirect effects that are likely to adversely affect listed species, or result in take, Reclamation will consult formally with either the Service of NMFS, as appropriate. Reclamation, through informal consultation with the Service and NMFS, will determine if an action will not affect listed species prior to signing of the FONSI or ROD.

The Red Bluff Diversion Dam is generally recognized as the downstream terminus of the area that provides the best salmon spawning habitat on the main stem of the Sacramento River. Important rearing habitats and confluences of tributary stream utilized by anadromous fish are also located upstream of the dam. Successful implementation of 3406(b)(1), the Anadromous Fish Restoration Program, will require migrations into and out of these important habitats. Measures to minimize fish passage problems for adult and juvenile anadromous fish at the Red Bluff Diversion Dam will be developed and implemented to provide for the use of associated CVP conveyance facilities for delivery of water to the Sacramento Valley National Wildlife Refuge complex in accordance with the requirements for refuge water supply discussed in section 3406 (d). A comprehensive solution to anadromous fish passage problems at Red Bluff Diversion Dam will result in improved access to upstream areas, primarily spawning areas for salmon and steelhead, and in better survival rates for downstream migrating juveniles. In addition, sturgeon, which historically spawned above the dam, but can not ascend fishways, are able to pass the dam during the gates-out period. Striped bass and American shad would also benefit incrementally from increased access to suitable habitat in the upper river. The long-term solution will also result in more dependable water deliveries for all associated users, including the Sacramento Valley National Wildlife Refuge. This will benefit associated wildlife species within the refuge complex. In particular, the Refuge is working to understand the management needs that will make the managed wetland habitats on the Refuge more compatible with use by the giant garter snake.

The objectives of the Red Bluff Diversion Dam Fish Passage Program are to: (1) improve upstream and downstream passage of anadromous fish; (2) deliver water at the time and in quantities required by users (farmers and wildlife refuges) served by the Tehama-Colusa and Corning Canals; (3) implement where possible, improvements to existing operations and facilities to benefit passage and water delivery capabilities; (4) maintain Lake Red Bluff and other authorized uses of the CVP while meeting other objectives; and (5) select and implement a solution to fish passage while incorporating changes in the environmental, institutional, and regulatory environment.

The period when dam gates are removed to provide unrestricted fish passage is eight months out of the year. Actions to improve water deliveries include: re-diversion of CVP water from Black Butte Reservoir on Stony Creek to the Tehama-Colusa Canal; use of the Research Pumping Plant during key spring and fall periods, and modifications to facilities and operations during the gates-out period to maximize the use of available water supplies. The Research Pumping Plant was constructed to research the potential for use of innovative “fish friendly” pumps as a potential solution to the passage problems at the dam. It has also been utilized to help meet water delivery demands during the gates-out period. Studies at the Research Pumping Plant have monitored populations of juvenile salmonids and downstream predators since 1994 and have evaluated entrainment and survival of juvenile salmonids since 1995. Waterways, screens, and fish ladders at the dam have been reconfigured to improve survival of fish.

*Coleman National Fish Hatchery Restoration and Keswick Fish Trap Modification (§3406(b)(11))* *[Lead Agency: Reclamation]*

> For Coleman National Fish Hatchery restoration and Keswick Fish Trap modification that may affect listed species, Reclamation will initiate informal consultation with the Service and NMFS. Reclamation, through informal consultation with the Service and NMFS, will determine if an action will not affect listed species, prior to signing of the FONSI or ROD.

Coleman National Fish Hatchery is a 50-year-old hatchery requiring considerable rehabilitation and expansion. The Coleman National Fish Hatchery will be rehabilitated and expanded by implementing the Service's Coleman National Fish Hatchery Development Plan, modifying the Keswick Dam Fish Trap to provide for its efficient operation at all project flow release levels, and modifying the basin below the Keswick Dam spillway to prevent the trapping of fish.

Work to restore the full effectiveness of the Coleman National Fish Hatchery for conservation of salmon and steelhead includes rehabilitation of the rearing facilities and installation of a state-of-the-art ozone treatment facility. On March 19, 1993, Reclamation entered into an agreement with the Service to transfer administrative responsibility and funding responsibility of the Coleman National Fish Hatchery to Reclamation while the Service will retain full operational custody and program responsibility. The hatchery became an integral mitigation feature of the CVP beginning in fiscal year 1994.

The Keswick Fish Trap is located at Keswick Dam and is used by the Service to collect broodstock for Coleman National Fish Hatchery. The program requires modification of the Keswick Dam Fish Trap to provide for efficient operation at all project flow release levels, to prevent trapping of fish and produce a more efficient sweep mechanism. The Keswick Trench in the basin below the spillway was completed in 1995. This involved cutting a new channel from the stilling basin back to the river to allow escapement of fish that would otherwise be subject to excess mortality. Planning for other improvements is still in progress.

*Clear Creek Fishery Restoration (§3406(b)(12))* *[Lead Agency: Reclamation]*

> For Clear Creek fisher restoration that may affect listed species, Reclamation will initiate informal consultation with the Service. Reclamation, through informal consultation with the Service, will determine if an action will not affect listed species, prior to signing of the FONSI or ROD.

A comprehensive program will be developed and implemented to provide flows to allow sufficient spawning, incubation, rearing, and out-migration for salmon and steelhead from Whiskeytown Dam as determined by instream flow studies conducted by DFG after Clear Creek has been restored and a new fish ladder has been constructed at the McCormick-Saeltzer Dam. Clear Creek provides about two percent of current upper Sacramento River salmon escapement, and the stream's rehabilitation would improve the overall capacity of the Central Valley system. Restoration activities focus on increased flows, upland erosion control, spawning gravel addition, and channel morphology restoration. In addition, efforts continue to provide fish passage at McCormick-Saeltzer Dam, which blocks migration

to approximately 10 miles of upstream habitat. Emphasis is currently being placed on removal of McCormick-Saeltzer Dam, and construction of a new diversion upstream. The new upstream diversion will provide up to 55 cfs to the Townsend Flat Water Ditch Company and will not require an instream structure that may negatively affect upstream fish migration. Costs associated with channel restoration, passage improvements, and fish ladder construction required by this program will be allocated 50 percent to the United States as a nonreimbursable expenditure and 50 percent to the State of California. Costs associated with providing the flows required by this paragraph will be allocated among project purposes.

Interior is working with DFG, DWR, National Park Service, Bureau of Land Management, county and local agencies and organizations, and private citizens in planning Clear Creek restoration. Restoration objectives established by the multi-agency Clear Creek restoration team include: (1) improving fish passage at McCormick-Saeltzer Dam; (2) restoring anadromous fish habitats above and below McCormick-Saeltzer Dam; (3) providing flows of adequate quantity and quality to meet requirements of all life stages of salmon and steelhead; and (4) reducing watershed erosion and sedimentation. Increased minimum flows from Whiskeytown Dam to lower Clear Creek are intended to increase available habitat while maintaining optimum water temperatures for all life stages. Erosion control measures include a watershed erosion inventory, erosion control projects, and a watershed fuel inventory. These activities will decrease the amount of fine sediments in the stream channel and reduce future transport into the stream. Sections of lower Clear Creek have been badly degraded due to past gravel and gold mining operations that have led to loss of spawning gravel and riparian habitat, and creation of a wide, willow channel. Spawning gravel was added to the creek below Whiskeytown Dam and below McCormick-Saeltzer Dam. Plans to place additional gravel, and potential for annual pulse flows, are being developed.

*Gravel Replenishment and Riparian Restoration (§3406(b)(13))* *[Lead Agency: Service]*

> For gravel replenishment and riparian restoration that may affect listed species, the Service will conduct intra-Service consultation. For those replenishment or restoration actions with direct or indirect effects that are likely to adversely affect listed species, or result in take, intra-Service consultation will result in a biological opinion. The Service will complete intra-Service consultation in writing prior to signing of any FONSI or ROD on gravel replenishment and riparian restoration.

A continuing program will be developed and implemented for the purpose of restoring and replenishing, as needed, spawning gravel lost due to construction and operation of CVP dams, bank protection projects, and other actions that have reduced the availability of spawning gravel and rearing habitat in the Upper Sacramento River from Keswick Dam to Red Bluff Diversion Dam, and in the American and Stanislaus Rivers downstream from the Nimbus and Goodwin Dams, respectively. The program will include preventive measures, such as re-establishment of meander belts and limitations on future bank protection activities, to avoid further losses of instream and riparian habitat. Conservation measures will include all applicable "Best Management Practices" found in the "Stream Corridor Restoration Handbook" (Interagency Stream Corridor Restoration Team, in press). Direct replacement of spawning

gravel would benefit salmon and steelhead by ensuring that spawning is possible below project dams. Development of meander belts and bank protection limitations would ensure availability of a natural source of gravel and allow development of alluvial river channels and riparian vegetation. A natural channel and riparian pattern would provide important fish rearing habitat and increase adjacent terrestrial habitats for numerous wildlife species, including several that are threatened or endangered.

Spawning gravel restoration projects have been implemented on the Stanislaus River and below Keswick Dam on the Sacramento River. A multi-year pilot gravel management project is being conducted by DFG on the American River. Costs associated with implementation of this program will be reimbursed in accordance with the following formula: 37.5 percent will be reimbursed as main project features, 37.5 percent will be considered a nonreimbursable Federal expenditure, and 25 percent will be paid by the State of California.

*Delta Cross Channel and Georgiana Slough (§3406(b)(14))* *[Lead Agency: Reclamation]*

> Currently management of the Delta Cross Channel gates and flows in Georgiana Slough are addressed under the existing 1995 OCAP biological opinion, as such no further consultation is necessary. If OCAP undergoes supplemental formal consultation, Delta Cross Channel and Georgiana Slough will be addressed at that time through consultation with the Service and NMFS.

Existing management of Delta Cross Channel gates and springtime restrictions on flows at Georgina Slough have been addressed in the 1995 OCAP opinion. Measures involving modification of system-wide operations, such as pumping schedules and Sacramento River flows, could substantially reduce striped bass mortality throughout the Delta, while reducing diversions of fish into the Cross Channel and Georgiana Slough. Modified operations of the Delta Cross Channel gates, and new or improved structures, are intended to benefit other anadromous fishes. Many species of fish experience increased mortality when drawn into the central Delta by Federal and State pumping. A program will be developed and implemented which provides for modified operations and new or improved control structures at the Delta Cross Channel and Georgiana Slough during times when significant numbers of striped bass eggs larvae, and juveniles, as well as winter-run and spring-run salmon smolts, approach the Sacramento River intake to the Delta Cross Channel or Georgiana Slough.

In 1993 and 1994, an acoustic barrier was installed and tested in Georgiana Slough. The barrier was intended to keep downstream migrating juvenile salmon in the mainstem Sacramento River, and out of Georgiana Slough and the Lower Mokelumne River, thereby out of the Central Delta and away from the influence of the pumps. The effectiveness of the barrier appears to be limited.

*Construct Delta Fish Barrier (§3406(b)(15))* [Lead Agency: Reclamation]

> Temporary fish barriers have undergone formal section 7 consultation, but will require additional consultation in 2000. For any project modifications of the temporary barriers that may affect listed species, Reclamation will initiate informal consultation with the Service and NMFS. For construction of any permanent barriers, Reclamation will consult formally with the Service and NMFS. Reclamation, through informal consultation with the Service and NMFS, will determine if any action related to the fish barriers will not affect listed species prior to signing of the FONSI or ROD.

A barrier at the head of Old River in the Sacramento-San Joaquin Delta is planned to be constructed (in cooperation with the State of California and in consultation with local interests). The barrier is to be operated on a seasonal basis, and is intended to increase the survival of young out-migrating salmon that are diverted from the San Joaquin River to CVP and SWP pumping plants. It is expected to be operated in a manner that does not significantly impair the ability of local entities to divert water or further degrade the environmental baseline for the delta smelt and Sacramento splittail.

The barrier at the head of Old River currently is one of the four temporary barriers that are constructed seasonally in the Delta. The current seasonal construction of these barriers, including the head of Old River, is addressed until 2000 in the Temporary Barriers biological opinion, which is a no-jeopardy opinion for the delta smelt. However, there is a draft jeopardy biological opinion for the Interim South Delta Program; a program which includes significant project changes over the Temporary Barriers project.

The Interim South Delta Program proposes to expand the intake to the existing Clifton Court Forebay to divert additional water from the Delta through State Water Project facilities; dredge Old River to facilitate this additional diversion; install a permanent but operable barrier in Old River at its head for juvenile salmon protection; install permanent operable tidal barriers in Old River at Tracy, Middle River, and Grantline Canal; and improve water surface elevation and water quality for local agricultural diversions. Following a reasonable and prudent alternative in the draft jeopardy opinion, the Interim South Delta Program was incorporated into CALFED. Pursuant to this change, the program was renamed the South Delta Improvement, and the project is being modified to address ecosystem restoration while addressing other program elements including water supply reliability, water quality, etc.

Construction of a barrier of consistent design at the head of Old River is assumed to be included as part of the Vernalis Adaptive Management Program and San Joaquin River Agreement. There has been informal consultation on the Vernalis Adaptive Management Program, under which the head of Old River barrier is currently covered under the Temporary Barriers opinion. After the Temporary Barriers opinion expires in 2000, Reclamation must reinitiate consultation for the long-term construction and operation of a barrier at the head of Old River.

The proposed Delta Water Management Program (also known as the South Delta Barrier Program) preceded CVPIA. A draft agreement between Reclamation, the South Delta Water Agency and DWR, which calls for the construction of three circulation and water level barriers and one fishery barrier, was

reached in 1990. The State then began a temporary-barrier test program to collect design data for a permanent barrier. (See the Service's April 26, 1996, biological opinion on the temporary barriers and May 4, 1998, biological opinion on the Interim South Delta Project.)

*Comprehensive Assessment and Monitoring Program (§3406(b)(16))* *[Lead Agency: Service]*

> The Service will conduct ongoing intra-Service consultation on the Comprehensive Assessment and Monitoring Program, and Reclamation will continue ongoing informal consultation with the Service.

A comprehensive assessment and monitoring program will be established to monitor fish and wildlife resources in the Central Valley to assess the biological results and effectiveness of restoration efforts. The program will involve Interior, independent entities, and the State of California, and will be closely tied to the AFRP. The assessment and monitoring program will measure the potential success and continued improvement of restoration efforts associated with implementing biological restoration actions found in the CVPIA, allowing for more appropriate adaptive management.

*Anderson-Cottonwood Irrigation District Fish Passage (§3406(b)(17))* *[Lead Agency: Service]*

> For the Anderson-Cottonwood Irrigation District fish passage, the Service will conduct intra-Service consultation prior to signing a FONSI or ROD. For changes in pulse flows that may affect listed species, the Service will initiate informal consultation with NMFS. If construction of the fish passage is likely to adversely affect listed species, or result in take, the Service will consult formally with the NMFS. The Service, through informal consultation with the NMFS, will determine if an action will not affect listed species prior to signing of the FONSI or ROD.

A program will be developed and implemented to resolve fishery passage problems at the Anderson-Cottonwood Irrigation District Diversion Dam as well as upstream stranding problems related to Anderson-Cottonwood Irrigation District Diversion Dam operations. Completion of this mitigation program will improve access to three miles of spawning and rearing habitat for chinook salmon, predominantly winter-run, upstream of the Anderson-Cottonwood Irrigation District Diversion Dam facility.

*Restore Striped Bass Fishery (3406(b)(18))* *[Lead Agency: Service]*

> The effects of future striped bass management on native fisheries are addressed by a Habitat Conservation Plan developed by the Service, NMFS, and DFG. This action has a take permit under section 10(a)(1)(B) of the Act and no further consultation is required at this time.

Under this authority, the Secretary is authorized to assist DFG in restoring the striped bass fishery of the Bay-Delta estuary to levels similar to those prevailing when this fishery was at its height. This is to be done in coordination with restoration of native fisheries. To date, the Service has not approved any of the proposals of DFG for use of CVPIA Restoration Funds to increase the striped bass fishery under the authority of this section. The Service and NMFS have given priority to restoration of habitat under other

sections of CVPIA, because restoration was preferred to stocking of striped bass. This strategy has been followed to avoid a disproportionate increase in striped bass over native fishes.

Restoration of the striped bass fishery of the Bay-Delta estuary has several components. The State of California has supported a pen-rearing program. A game warden program has been supported by a mixture of Federal and State funding sources. In October 1995 the State of California requested assistance through CVPIA with the effort to restore the fishery. Following recovery of native fishes, additional management measures will be developed and implemented on a cost share basis following completion of a satisfactory task order by the State. Such measures will be developed in coordination with planning of efforts to protect and restore native fisheries.

*Shasta and Trinity Reservoir Carryover Storage Studies (§3406(b)(19))*
*[Lead Agencies: Reclamation and Service]*

Shasta and Trinity Reservoir carryover is addressed under the existing 1995 OCAP biological opinion, as such no further consultation is necessary. If OCAP undergoes supplemental formal consultation, Shasta and Trinity Reservoir carryover will be readdressed at that time through consultation with the Service and NMFS.

Existing operational criteria have been addressed in the OCAP biological opinion. These criteria will be reevaluated by Reclamation and the Service to maintain minimum carryover storage for Sacramento and Trinity river reservoirs. These criteria are intended to protect and restore anadromous fish of the Sacramento and Trinity rivers and are subject to the responsibility to fulfill all project purposes, including agricultural water delivery.

A number of actions currently underway will influence this study, including the development of criteria for dedication and management of CVP yield under 3406(b)(2), and operation of the Trinity River under the Trinity River Restoration Program which will affect project operations by meeting other purposes. The relationship of these actions to carryover needs will be evaluated. Any anadromous fish biological benefits accrued as a result of this provision, would be included as part of 3406(b)(2), Dedicated CVP Yield.

In Fiscal Year 1997, actions involved the evaluation of operational criteria for temperature needs and water supplies as project operations change due to other dependencies. Temperature model studies combined with the monitoring of actual operations were used to evaluate Shasta Temperature Control Device operations and determine the most efficient use of cold water resources in various year types.

The NMFS biological opinion on winter-run chinook salmon evaluated the operational criteria needed to maintain minimum carryover storage at the Shasta Reservoir to protect anadromous fish in the Sacramento River. The biological opinion specified that the minimum carryover water storage in Lake Shasta for protection of the winter-run chinook salmon should be 1.9 million acre-feet. Minimal planning for carryover storage is being done pending completion of the Anadromous Fish Restoration Plan

(§3406(b)(1)) and the management plan for the 800,000 acre-feet of CVP dedicated yield (§3406(b)(2)).

*Glenn-Colusa Irrigation District Pumping Plant (§3406(b)(20))  [Lead Agency: Reclamation]*

> The Glenn-Colusa Irrigation District's Hamilton City Pumping Plant modifications have undergone formal consultation. No further consultation is expected, unless there are additional actions that were not included in the biological opinion.

Glenn-Colusa Irrigation District's Hamilton City Pumping Plant has resulted in the loss of millions of juvenile salmon annually. Interior is participating with the State of California and other federal agencies in implementation of an on-going program to mitigate fully for fishery impacts associated with operations of the pumping plant.

The current program includes modification of the existing fish screen and extending the screen by about 574 feet, modification of the lower oxbow channel to improve fish passage, construction of a left bank guide berm and three, closed fish-bypasses discharging to the lower oxbow channel, replacement of the temporary check structure with an adjustable laminar overflow weir and removable bridge, replacement of the dredge docking facility that will be removed by excavation of the pumping plant forebay, and installation of a river bed gradient feature in the main stem of the river. The Service's December 3, 1997, biological opinion--on effects of these actions on the valley elderberry longhorn beetle, giant garter snake, and Sacramento splittail-- includes a detailed description of the screening project.

*Anadromous Fish Screen Program (§3406(b)(21))  [Lead Agencies: Reclamation and Service]*

> Reclamation and the Service are collaborating on preparation of a programmatic biological opinion for this program.

There are approximately 2,109 agricultural diversions in the Delta, 450 in the Sacramento River system, 152 within the San Joaquin River system, and 370 in the Suisun Marsh basin. Unscreened diversions from small tributaries, such as Butte Creek, to the salt-water interface near Suisun Bay, affect anadromous fish throughout their juvenile stages. Appropriate screening of diversions is anticipated to reduce a substantial cumulative source of mortality for anadromous and resident fish species. Interior will assist the State of California in efforts to develop and implement measures to avoid losses of juvenile anadromous fish resulting from unscreened or inadequately screened diversions on the Sacramento and San Joaquin rivers, their tributaries, the Sacramento-San Joaquin Delta, and Suisun Marsh. Projects will include actions such as construction of screens on unscreened diversions, rehabilitation of existing screens, replacement of existing non-functioning screens, and relocation of diversions to less fishery-sensitive areas. The Anadromous Fish Screen Program is voluntary, making it difficult to predict the number of program related screening projects in the future. It is currently estimated that over 50 diverters may be interested in screening their diversions.

*Agricultural Waterfowl Incentives Program (§3406(b)(22))* *[Lead Agency: Service]*

The Service will conduct intra-Service consultation on the Agricultural Waterfowl Incentives Program prior to signing a FONSI or ROD.

Farmers will be encouraged to participate in a program that would seasonally flood fields to create and maintain waterfowl habitat and enhance CVP yield. This program would use payments up to $25/acre (1992 dollars) to flood up to 80,000 acres of fields in the Central Valley (not to exceed $2,000,000 annually). The land to be flooded would be primarily rice fields that are designed to be flooded. The program would primarily benefit wintering waterfowl and other wetland-dependent migratory birds by expanding wetland habitat in the Central Valley. Funding was first allocated to the program in Fiscal Year 1995. Public announcements were mailed out in November 1996 and May 1997. Over 90 farmers submitted proposals for the program. From this initial group of landowners, 41 were found eligible and have agreed through Cooperative Agreements to create 22,314 acres of habitat for wintering migratory waterfowl and enhance CVP water supplies. This provision will terminate by the year 2002.

*Trinity River Fishery Flow Evaluation Program (§3406(b)(23))*
*[Lead Agencies: Reclamation and Service]*

For Trinity River Fishery Flow Evaluation Program actions that may affect listed species, Reclamation and the Service will initiate informal and/or internal consultation with the Service and NMFS. For those actions with direct or indirect effects that are likely to adversely affect listed species, or result in take, Reclamation will consult formally with the Service and NMFS. Reclamation, through informal consultation with the Service and NMFS, will determine if an action will not affect listed species, prior to signing of the FONSI or ROD.

Under this section the Trinity River Division was to provide an instream release of water to the Trinity River of not less than 340,000 acre-feet per year for the purposes of fishery restoration, propagation, and maintenance for water years 1992 through 1996. Interior met this instream release target from 1994 to 1996. Interior is to complete the Trinity River Flow Evaluation Study in a manner which insures the development of recommendations, based on the best available scientific data, regarding permanent instream fishery flow requirements and Trinity River Division operating criteria and procedures for the restoration and maintenance of the Trinity River fishery. Trinity River operations criteria are summarized in the CVP-OCAP (Reclamation 1992).

This work is closely related to the Trinity River Restoration Program, established by Congress in 1984 to restore fish and wildlife resources in the Trinity River Basin to pre-project levels. To date, major projects funded through the Trinity River Restoration Program include construction of Buckhorn Mountain Dam, a 1,090 acre-foot sediment control facility on Grass Valley Creek; modernization of the Trinity River Hatchery; habitat improvement projects along the Trinity River and its tributaries; and acquisition of over 17,000 acres of highly erodible land in the Grass Valley Creek watershed (now managed by the Bureau of Land Management).

A long term Flow Evaluation Program was initiated by the Service in 1985. Annual reports have been published on the effects of increased river flows and other habitat restoration efforts on fishery habitat and the anadromous fish resources within the Trinity River. A final report, including recommendations for flows in future years, was release to the public June 1999.

An Environmental Impact Statement/Environmental Impact Report is also being prepared, which analyzes a range of alternatives to restore and maintain the natural production of anadromous fish populations of the Trinity River main stem downstream of Lewiston Dam and will describe the impacts of alternatives that propose increasing the flows beyond the current 340,000 acre-feet level, as well as other alternatives.

San Joaquin and Stanislaus Rivers

*San Joaquin River Comprehensive Plan (§3406(c)(1)) [Lead Agencies: Reclamation and Service]*

> For San Joaquin River Comprehensive Plan actions that may affect listed species, Reclamation and the Service will initiate informal and/or internal consultation with the Service and NMFS. For those actions with direct or indirect effects that are likely to adversely affect listed species, or result in take, Reclamation and the Service will consult formally with the Service and NMFS. Reclamation, through informal consultation with the Service and NMFS, and the Service, through intra-Service consultation and informal consultation with NMFS, will determine if an action will not affect listed species prior to signing of the FONSI or ROD.

A reasonable, prudent, and feasible comprehensive plan was to be developed to address fish, wildlife, and habitat concerns on the San Joaquin River, including but not limited to streamflow, channel, riparian habitat, and water quality improvements that would be needed to reestablish and sustain naturally reproducing anadromous fisheries from Friant Dam to the San Francisco Bay/Sacramento-San Joaquin Delta Estuary. Releases identified by the plan as necessary to sustain anadromous fish populations could not be implemented without authorization by a specific act of Congress. Until such time as sufficient fisheries flows are provided, entities who receive water from the Friant Division of the CVP are to be assessed a $4.00 per acre-foot surcharge for all Project water delivered on or before September 30, 1997; a $5.00 per acre-foot surcharge for all Project water delivered after September 30, 1997, but on or before September 30, 1999; and a $7.00 per acre-foot surcharge for all Project water delivered thereafter. These surcharges are to be conveyed into the Restoration Fund.

San Joaquin River field studies which analyzed river flows and losses, travel times, water quality, and the interface between groundwater and surface water were initiated. The technical team outlined study parameters for anadromous fish reestablishment; drafted an anadromous fish historical conditions report; compiled a listing of existing conditions documents for baseline definition; initiated a listing of potential alternative water supplies; and defined six major areas of emphasis for ecosystem improvement. However, because of the uncertainty of funding, documents drafted were not reviewed by the agencies, and meetings or workshops scheduled to discuss the concepts were canceled. Since Fiscal Year 1996 Interior has not received appropriations to fund this program.

Currently, Interior is working with Friant Water Users Authority, the Natural Resources Defense Council, and the Pacific Coast Federation of Fisherman's Associations to develop the *San Joaquin River Riparian Habitat Restoration Project*. The purpose of the project is to restore the riparian corridor along the San Joaquin River. It will be stakeholder driven, involve a variety of agencies and private interests, and will be implemented in three separate phases. Phase I will determine the scope of work. Phase II provides for project development and regulatory compliance activities. Phase III is implementation of the final plan. Reclamation will seek to complete and will have submitted it to Congress. Prior to plan completion, Restoration Funds will be used to acquire water flows to support riparian habitat along the Upper San Joaquin River below Friant Dam to the confluence with the Merced River.

*American River/Folsom South Conjunctive Use Optimization Study (Stanislaus-Calaveras*) *(§3406(c)(2))* *[Lead Agency: Reclamation]*

> For conjunctive use optimization that may affect listed species, Reclamation will initiate informal consultation with the Service and NMFS. For those actions with direct or indirect effects that are likely to adversely affect listed species, or result in take, Reclamation will consult formally with the Service and NMFS. Reclamation, through informal consultation with the Service, will determine if an action will not affect listed species, prior to signing of the FONSI or ROD.

The purpose of this study is to formulate a plan for the long-term use of the water supply for the Folsom South area, primarily between Calaveras and Stanislaus rivers. This study was revised to specifically include fish and wildlife resources as a basin need. The alternatives to be investigated in the study will be incorporated into the comprehensive plan for the San Joaquin River referenced in Section 3406 (c)(1).

In the course of preparing the Stanislaus River Basin and Calaveras River Water Use Program Environmental Impact Statement, existing and anticipated future basin needs in the Stanislaus River Basin will be evaluated and determined. In the course of such evaluation, alternative storage, release, and delivery regimes will be investigated. These include but are not limited to conjunctive use operations, conservation strategies, exchange arrangements, and the use of base and channel maintenance flows, to best satisfy both basin and out-of-basin needs

From 1993 to 1995 Reclamation and DWR developed surface water and groundwater models to analyze alternatives. In 1994 the Service completed a terrestrial Habitat Evaluation Procedure along the riparian corridor of the Stanislaus River downstream from Goodwin Dam to the confluence with the San Joaquin River. In March 1995, DWR decided not to participate as a partner in this study. Subsequently, Reclamation reviewed the status of the study, decided to discontinue it, and prepared a transition report which documented study activity and proposed a new study for the Stanislaus River.

Central Valley Refuges and Wildlife Habitat Areas

*Refuge Water Supply and Conveyance (§3406(d)(1-5))* *[Lead Agency: Reclamation]*

Three biological opinions have been completed for refuge water supply and conveyance, one of which is a programmatic biological opinion for the Sacramento Valley. It is anticipated that an additional programmatic biological opinion will be completed prior to 2000 deliveries for the San Joaquin Valley. For refuge water supply and conveyance actions that may affect listed species, Reclamation will initiate informal consultation with the Service. For those actions with direct or indirect effects that are likely to adversely affect listed species, or result in take, that have not been addressed in prior biological opinions, Reclamation will consult formally with the Service. The Service will conduct separate intra-Service consultations to address all on-Refuge affects that have not been addressed through prior intra-Service consultation. Reclamation, through informal consultation with the Service, will determine if an action will not affect listed species, prior to signing of the FONSI or ROD.

Quantities and delivery schedules for refuge water supplies must meet Level 2 of the Dependable Water Supply Needs described in the *Refuge Water Supply Investigations Report* (Reclamation 1989) and two-thirds of that needed for full habitat development as described in the *San Joaquin Basin Action Plan/Kesterson Mitigation Action Plan Report*. Sources of supply will be diversified to minimize possible adverse effects upon CVP contractors. Deliveries of Level 2 water supply may be temporarily reduced up to 25 percent of such total whenever reductions due to hydrologic circumstances are imposed upon agricultural deliveries of CVP water. The reductions will not exceed in percentage terms the reductions imposed on agricultural service contractors. Annual Level 2 water supplies total 169,800 acre-feet in the Sacramento Valley and 211,750 acre-feet in the San Joaquin Valley.

By 2002, refuge water deliveries will meet Level 4 of the Dependable Water Supply Needs described in the *Refuge Water Supply Investigations Report* (Reclamation 1989) and the amount needed for full habitat development as described in the *San Joaquin Basin Action Plan/Kesterson Mitigation Action Plan Report*, which covers a contiguous complex of State, Federal, and private wetlands in the San Joaquin River basin. Water conveyance facilities, conveyance capacity, and wells will be constructed or acquired as necessary to deliver refuge water supplies (§3406(d)(5)).
Planning and implementation of water supply conveyance facilities for the various refuges in this area are proceeding as an integrated unit. Certain lands within this area had no surface water delivery system and thus were not able to receive the Level II (2/3) supply provided upon enactment of the CVPIA. The remaining conveyance improvements are scheduled for completion in late 1999, or early 2000. The districts will be doing most of the construction improvements to their respective systems, with some design and construction assistance from Reclamation.

Annual Level 4 water supplies total 199,550 acre-feet for the Sacramento Valley and 326,650 acre-feet for the San Joaquin Valley. The Level 4 supply is to be acquired from voluntary providers in not less than 10 percent increments per year.

*Central Valley Wetlands Water Supply Investigations (§3406(d)(6))*
*[Lead Agencies: Reclamation and Service]*

This investigation has been completed and no further consultation is anticipated.

An investigation was initiated in Fiscal Year 1993 to identify alternative means of improving the reliability and quality of water supplies for privately owned wetlands in the Central Valley. During Fiscal Year 1994, the research team reviewed water supplies and water quality for private wetlands to assess reliability and need. In addition, a review was made by the research team of the most feasible means of meeting associated water supply requirements. Based on the review made by the research team, water supply and delivery requirements needed for full development of 120,000 acres of restored wetlands habitat were determined.

The Central Valley Habitat Joint Venture, in coordination with Reclamation, DFG, DWR, and other interests, is currently preparing a report which discusses the possibilities for private wetland water supplies. The report is to be submitted to Congress and will provide, in a single document, the most comprehensive information available relative to private wetland water supplies and the potential location, water needs and supply for lands which could be restored to wetlands in the Central Valley. The report will serve as a valuable resource tool for those who are interested in further investigating wetland water needs and supplies on a site-specific basis.

Supporting Investigations and Models

*Supporting Investigations (§3406(e))* *[Lead Agency: Service]*

Ongoing intra-Service consultation will occur for all supporting investigations

Investigations will be conducted by the Service and recommendations provided to the Committee on Energy and Natural Resources of the Senate and the Committees on Interior and Insular Affairs and Merchant Marine and Fisheries of the House. Investigations will involve the feasibility, costs, and desirability of developing and implementing each of the following, including, but not limited to, the impact on the project, its users, and the State of California: (1) maintaining temperatures for anadromous fish (§3406(e)(1)), (2) additional hatchery production needs (§3406(e)(2)), (3) tributary enhancement (§3406(e)(3)), (4) a temperature control device at Trinity Dam (§3406(e)(4)), (5) monitoring success of management actions at Delta Cross Channel and Georgiana Slough (§3406(e)(5)), and (6) tributary enhancement (§3406(e)(6))

Various actions have been taken to implement this section, including temperature monitoring on the Sacramento River, a study of water temperatures and riparian forest interaction, feasibility studies of eliminating barriers, a feasibility plan to maintain Trinity River temperatures, and monitoring fish abundance in tributaries of the Sacramento River.

*Report of Project Fishery Impacts (§3406(f))* *[Lead Agency: Service]*

The Service is conducting ongoing informal consultation with NMFS on this reporting.

In consultation with the Secretary of Commerce, the State of California, appropriate Indian tribes and other appropriate entities, the Service will initiate investigation on all effects of the CVP on anadromous fish populations and the fisheries, communities, tribes, businesses and other interests and entities that have now or in the past had significant economic, social or cultural association with those fishery resources.

As a result of review of numerous reports and file documents, public meetings, and meetings with appropriate entities such as sport and commercial anglers, business owners, and Indian tribe representatives, a draft report has been prepared with major input on fish resources from the DFG, and on economic values from the NMFS.

The report describes the major impacts on anadromous fishes of CVP reservoir facilities and operations. These include such impacts as blocking access to spawning and rearing areas, altering streamflow regimes, blocking replenishment of spawning gravel, and entraining young fish toward export pumps. It also chronicles the downward trend of fish resources during the period of analysis (1935-1993), including trends in commercial salmon landings, sport fishing, and the Native American fishery in the Trinity/Klamath River system. The report concludes that although the CVP has undoubtedly contributed to a decline in the resources and in resource-related activities, it is not possible to quantify specific cause and effect relationships because of parallel impacts resulting from many other factors such as other water projects, adverse weather and environmental conditions.

*Ecosystem and Water System Operations Models (§3406(g))* *[Lead Agency: Service]*

The Service will continue to conduct intra-Service consultation on these models.

Readily usable and broadly available models and supporting data will be developed to evaluate the ecological and hydrological effects of existing and alternative operations of public and private water facilities and systems in the Sacramento, San Joaquin, and Trinity River watersheds. The primary purpose of this effort will be to support Interior's efforts in fulfilling the requirements of the CVPIA through improved scientific understanding. Studies recommended in the CVPIA include a variety of resource monitoring and feasibility studies and models.

Work is continuing on updating model and system input data, developing and expanding model documentation, developing more useable user interfaces for models and design and development of daily operations models and biological models. Activities Reclamation is involved in include: participation in

the Bay-Delta Modeling Forum and other modeling groups; translation of data to be used by PROSIM[8]; development of hydrologic models; population modeling of salmon; development of operations models; development of new models; improvement of existing data; and model testing.

Restoration Fund (*§3407)* [*Lead Agencies: Reclamation and Service*]

> For Restoration Fund actions that may affect listed species, Reclamation or the Service will initiate informal consultation with the Service. When the Service initiates consultation, it will follow the intra-Service consultation process. Reclamation, through informal consultation with the Service and NMFS, and the Service, through intra-Service consultation and informal consultation with NMFS, will determine if implementation of an action through the Restoration Fund will not affect listed species prior to signing of the FONSI or ROD.

Section 3407(a) established the CVP Restoration Fund, deriving revenues through collections of pre-renewal charges, tiered water rates, transferred water rates, Friant surcharges, and mitigation and restoration payments by water and power beneficiaries. At least 67 percent of the Restoration Fund is to be used for habitat restoration, improvement and acquisition provisions of the CVPIA; the remainder is to be used for sections 3406(b)(4)-(6), (10)-(18), and (20)-(22) of the CVPIA. Additional funds donated for specific purposes are to be expended for those purposes only. Most CVPIA projects are funded from the Restoration Fund; however, a number of the projects have been co-funded or entirely funded from Reclamation's Water and Related Resources Appropriation.

Beginning on October 31, 1992, all entities receiving Project water from the CVP's Friant Unit were assessed a $4 Friant surcharge for each acre-foot of delivered Project water. In Fiscal Year 1994 the rate for irrigation water was $6.20 per acre-foot and $12.40 per acre-foot for municipal and industrial water; these rates are continuing in compliance with the CVPIA.

Land Retirement (§3408(h)) *[Lead Agency: Reclamation and Service]*

> Formal consultation has been concluded on a five-year, 15,000-acre demonstration project for the Land Retirement Program. For land retirement actions that may affect listed species, Reclamation and the Service, in cooperation with the Bureau of Land Management, will collectively initiate informal consultation with the Service. For those actions with direct or indirect effects that are likely to adversely affect listed species, or result in take, Reclamation and the Service will collectively consult formally with the Service. Reclamation and the Service, through informal and intra-Service consultation with the Service, will determine if an action will not affect listed species, prior to signing of the FONSI or ROD. If a land retirement action has already been addressed through consultation with the Service, no further consultation will be necessary unless there is reason for reinitiation.

The purpose of the Land Retirement Program is to acquire land, water, and associated property interests, from willing sellers, in order to reduce agricultural drainage, enhance fish and wildlife resources, and make water available for other CVPIA purposes. Acquisition of land to enhance wildlife habitat

[8] Projects Simulation Model (PROSIM) is modeling software developed by Reclamation.

and contribute to the recovery of endangered species is consistent with this purpose. Retired lands can, if appropriate, be added to existing Federal and State refuge systems, or be placed under agreement with local entities or landowners for habitat management purposes.

The Land Retirement Program is bing implemented by and interagency, interdisciplinary team with members form Reclamation, Bureau of Land Management, and the Service. The retirement of land is accomplished under Interim Guidelines and existing Federal regulations. Lands acquired under this program will be managed in most cases by the Bureau of Land Management or the Service, as part of the National Wildlife Refuge System. Acquired lands will be adaptively managed predominately, but not exclusively, for endangered upland species recovery. Total acreage for the land retirement program is dependent upon the amount brought forward by willing sellers and the available program budget.

Project Yield Increase (§3408*(j)*) *[Lead Agency: Reclamation]*

> For project yield increases that may affect listed species, Reclamation will initiate informal consultation with the Service. For those increases with direct or indirect effects that are likely to adversely affect listed species, or result in take, Reclamation will consult formally with the Service. Reclamation, through informal consultation with the Service, will determine if a project yield increase will not affect listed species prior to signing of the FONSI or ROD.

To minimize adverse effects, if any, upon existing CVP water contractors resulting from the water dedicated to fish and wildlife under the CVPIA, and to assist the State of California in meeting its future water needs, Interior will develop and submit to Congress, a least-cost plan to increase, within 15 years after the date of enactment of the CVPIA, the yield of the CVP by the amount dedicated to fish and wildlife purposes under this title. The plan authorized by this subsection will include, but not be limited to, a description of how Interior intends to use the following options: improvements in, modification of, or additions to the facilities and operations of the project; conservation; transfers; conjunctive use; purchase of water; purchase and idling of agricultural land; and direct purchase of water rights.

The plan will include recommendations on appropriate cost-sharing arrangements and will be developed in a manner consistent with all applicable State and Federal law. These options are also potential sources for acquiring supplemental water for fish and wildlife purposes by the Water Acquisition Program under section 3406(b)(3).

The options and findings were presented in the "Least-Cost Yield Increase Plan" (Plan). Additionally, technical appendices to the Plan provide supporting documentation. In July 1995, a newsletter was released, a draft Plan report was distributed for public review, and a public workshop was held. In August 1995 agencies, organizations and the public provided comments on the Plan. The final Plan report was prepared in response to comments and after administrative review. The Plan was transmitted to the Secretary of the Interior for approval. The final report of the Least-Cost CVP Yield Increase Plan was transmitted to Interior in October 1995. A Supplemental Water Acquisition Strategy paper was completed in February 1996. The Least-Cost CVP Yield Increase Plan was approved by the

Secretary of the Interior and submitted to Congress in July 1996. This plan proposes development of new reservoirs to increase the yield of the CVP.

# Environmental Baseline

Most of the Central Valley's threatened and endangered species depend on native habitats that are declining in area and quality. Because these sensitive habitats may host several threatened and endangered species, their loss or degradation can often adversely affect multiple species. Factors contributing to the environmental baseline are therefore grouped by habitat type in the analysis below. However, effects from environmental contaminants are typically less specific to particular habitats and are discussed separately. Population status for individual species is described in the species accounts found in Appendix E.

When the CVP began operations, approximately 30% of all natural habitats in the Central Valley had been converted already to urban and agricultural lands. This included loss of more than 80% of the riparian vegetation along the Sacramento River. By the time Shasta Reservoir (the first large CVP facility) began operation in 1944, many of California's natural habitats had been altered dramatically.

**Habitat Analyses**

Acreage trends in the analyses below are based primarily on Küchler (1977) and GAP (1996). Küchler's (1977) map of California's potential natural vegetation (*i.e.*, the potential climax vegetation which exists or has been estimated to exist and would occur if all alterations and disturbances to the respective environments, except reservoirs, were removed) was digitized into Geographic Information System format. GAP (1996) included digital information about extent and distribution of habitats from 1990 LANDSAT Thematic Mapper satellite imagery. The minimum mapping unit in GAP data is 100 hectares for upland habitats and 40 hectares for wetland habitats. Because comparisons of acreage figures between the two studies are complicated by slight differences in habitat classification, percentage changes are approximate. In particular, the areas delineated as potential wetlands by Küchler (1977) historically included habitats such as the large lakes of the Tulare Basin, which may be more comparable to the "open water" category of GAP data. Conversely, Küchler (1977) included artificial reservoirs in his map that did not exist prior to European settlement. Definitions of barren/alpine habitat also differ between the two studies. However, the two studies differ in estimation of total acreage by less than 0.1%. The estimated trends in habitat are identified in Table 3.A. The current (1990) acreage of native habitats and percent of land use is identified in Table 3.B.

**Table 3.A.** Habitat Trend Analysis for Conservation Program Focus Area.

| Habitat Type | Potential Habitat Estimation (acres) (Küchler 1977) | 1990 Habitat Estimation (acres) (GAP 1996) | Percentage Difference |
|---|---|---|---|
| Coniferous and Mixed Forest | 5,660,803 | 5,525,528 | -2% |
| Cismontane Woodlands | 9,384,947 | 6,919,647 | -27% |
| Riparian | 1,192,605 | 134,840 | -89% |
| Alkali Desert Scrub | 1,385,948 | 444,188 | -68% |
| Coastal Scrub | 383,308 | 159,210 | -58% |
| Sagebrush | 88,558 | 67,203 | -24% |
| Chaparral | 1,474,527 | 1,353,140 | -8% |
| Grassland | 8,931,211 | 4,551,710 | -49% |
| Wet Meadow | Category Not Used | 13,295 | NA |
| Tule Marsh | 1,968,749 | 86,704 | -96% |
| Salt Marsh | 96,583 | 73,455 | -24% |
| Water | 70,482 | 299,409 | +324% |
| Alpine or Barren | 1,277 | 102,293 | +7,910% |
| Agricultural | 0 | 9,555,666 | NA |
| Urban | 0 | 1,379,243 | NA |
| Total | 30,637,721 | 30,665,716 | +0.09% |

**Table 3.B.**: Distribution of habitat types by region in the Conservation Program Focus Area, as of 1990 (GAP 1996).

| Habitat Acreage | Sacramento Basin | San Joaquin Basin | Tulare Basin | Delta | San Francisco Bay Area | San Benito/ Santa Cruz |
|---|---|---|---|---|---|---|
| Total Area | 12,086,435 | 8,355,936 | 6,319,359 | 744,735 | 1,985,249 | 1,173,972 |
| Coniferous & Mixed Forest | 3,679,930 | 798,003 | 626,437 | 0 | 220,009 | 201,334 |
| Cismontane Woodland | 3,602,914 | 1,764,580 | 1,049,081 | 0 | 284,290 | 218,782 |
| Riparian | 67,128 | 25,498 | 36,777 | 2,587 | 696 | 2,154 |
| Alkali Scrub | 0 | 60,549 | 383,639 | 0 | 0 | 0 |
| Coastal Scrub | 5,864 | 35,925 | 24,103 | 0 | 78,860 | 14,458 |
| Sagebrush | 1,720 | 0 | 65,483 | 0 | 0 | 0 |
| Chaparral | 422,607 | 381,595 | 165,483 | 0 | 166,333 | 217,122 |
| Grassland | 1,027,935 | 1,579,938 | 1,098,498 | 22,209 | 485,308 | 337,822 |
| Wet Meadow | 11,472 | 644 | 1,179 | 0 | 0 | 0 |
| Tule Marsh | 57,208 | 16,357 | 4,099 | 8,904 | 136 | 0 |
| Salt Marsh | [†]54,088 | 0 | 0 | 9,443 | 5,760 | 0 |
| Water | 142,831 | 67,596 | 21,114 | 53,040 | 14,828 | 0 |
| Alpine or Barren | 67,657 | 11,500 | 13,479 | 1,478 | 2,594 | 5,585 |
| All Natural Communities | 9,141,354 (75.6%) | 4,746,319 (56.8%) | 3,489,372 (55.2%) | 97,661 (13.1%) | 1,258,814 (63.4%) | 997,257 (85.0%) |
| Agriculture | 2,591,986 (21.4%) | 3,378,816 (40.4%) | 2,734,909 (43.3%) | 597,624 (80.2%) | 102,843 (5.2%) | 149,488 (12.7%) |
| Urban | 353,095 (2.9%) | 230,801 (2.8%) | 95,078 (1.5%) | 49,450 (6.6%) | 623,592 (31.4%) | 27,227 (2.3%) |

[†]Includes Suisun Marsh and San Pablo Bay

**Table 3.C.**: Distribution of potential natural vegetation categories by region in the Conservation Program Focus Area (Küchler 1977).

| Habitat Acreage | Sacramento Basin | San Joaquin Basin | Tulare Basin | Delta | San Francisco Bay Area | San Benito/ Santa Cruz |
|---|---|---|---|---|---|---|
| Total Area | 12,061,234 | 8,358,500 | 6,333,602 | 722,696 | 1,987,737 | 1,173,952 |
| Coniferous & Mixed Forest | 4,077,008 | 777,063 | 574,887 | 0 | 71,903 | 159,942 |
| Cismontane Woodland | 3,462,430 | 2,335,602 | 1,491,951 | 50 | 1,285,115 | 809,799 |
| Riparian | 837,103 | 288,551 | 48,123 | 18,828 | 0 | 0 |
| Alkali Scrub | 0 | 208,852 | 1,177,096 | 0 | 0 | 0 |
| Coastal Scrub | 58,602 | 0 | 0 | 0 | 280,162 | 44,544 |
| Sagebrush | 88,558 | 0 | 0 | 0 | 0 | 0 |
| Chaparral | 810,130 | 197,392 | 379,178 | 0 | 45,682 | 42,145 |
| Grassland | 2,155,424 | 4,105,962 | 2,143,355 | 180,539 | 228,409 | 117,522 |
| Tule Marsh | 506,245 | 429,115 | 505,306 | 523,279 | 4,804 | 0 |
| Salt Marsh | [†]24,921 | 0 | 0 | 0 | 71,662 | 0 |
| Water | 40,813 | 15,963 | 13,706 | 0 | 0 | 0 |
| Alpine or Barren | 1,277 | 0 | 0 | 0 | 0 | 0 |

[†] Includes Suisun Marsh and San Pablo Bay

## General Habitats

Delta Aquatic

*Habitat Description and Associated Species*

The Delta is the uppermost part of the Sacramento-San Joaquin Estuary and is largely a tidally influenced freshwater system. During high flows of fresh water from the Sacramento and San Joaquin Rivers, the mixing zone between fresh and salt water is pushed downstream toward the Golden Gate. The position of the freshwater edge of the mixing zone (also known as X2), where the salt content (salinity) of the water is 2 parts per thousand, is determined by river flows and tides. Plankton (microscopic organisms floating in the water column) are most abundant in the mixing zone, so the vicinity of X2 is high-quality habitat for adult and larval fish that feed on plankton. Shallow aquatic habitats have been identified in the Delta Native Fishes Recovery Plan (Service 1996a) as essential to the long-term survival and recovery of delta smelt and other resident fish. When the mixing zone is below the Delta in Suisun Bay, a large area of suitable shallow water habitat is in the mixing zone and water temperatures are favorable for growth of plankton.

Listed species associated with Delta aquatic habitats include delta smelt and Sacramento splittail. Delta smelt and Sacramento splittail seek shallow, tidally-influenced, freshwater (< 2 ppt salinity) backwater sloughs and edge waters for spawning. To assure egg hatching and larval viability, spawning areas also must provide suitable water quality (*i.e.*, low concentrations of contaminants) and substrates for egg attachment (*e.g.*, submerged tree roots, branches, emergent vegetation).

*Habitat Trends*

Potential natural vegetation in the Delta included approximately 520,000 acres of tule marsh, covering 72% of the area of the Delta (Küchler 1977). Since the 1850's, there has been a cumulative loss of 94 percent of the Estuary's tidal marshes (Nichols *et al*. 1986, Monroe and Kelly 1992). In 1990, the Delta contained 597,624 acres of agricultural land and 49,450 acres of urban land, covering nearly 87% of the area of the Delta (GAP 1996). Tule marshes had been reduced to 8,904 acres, a decline of 98% from the estimate of Küchler (1977). All wetland and open water habitat combined covered only 71,387 acres, covering less than 10% of the Delta (GAP 1996). Most channels in the Delta have been dredged and shallow wetland habitats have been separated from the river by an extensive levee system.

Water flow and salinity in the Delta is strongly influenced by operations of the CVP and SWP including the Tracy Pumping Plant (CVP), the Banks Pumping Plant (DWR), and numerous smaller water diversions. The storage of runoff in reservoirs as well as diversions of fresh water move the mixing zone upstream, reducing habitat quality for Delta fishes. When river flows are low, and pumps are pulling in large amounts of water, the net flow of water is in the upstream direction in the channel, and young fish following the current can be sucked into the pumps and killed. In addition to direct mortality, upstream

movement of water can delay migration and increase fishes exposure to predation, poor water quality, and other factors.

Several aquatic exotic species have been introduced to the Delta system (see Nichols *et al.* 1986). These exotics have outcompeted many native species, replacing natural populations. For further information on alien species, see the Cumulative Effects Section of the Chapter on Effects of the Proposed Action (page 4-14)

Operations in the Delta are determined by: the Bay-Delta Accord, as implemented by the State Water Resources Control Board under order number WR 95-6; the Service's OCAP opinion on delta smelt; the NMFS's biological opinions on winter-run chinook for the operations of the CVP and SWP (National Marine Fisheries Service 1993, 1995); the delta smelt biological opinion on the Environmental Protection Agency's (EPA) Water Quality Standard s for the San Francisco/Sacramento-San Joaquin Rivers and Delta (Service 1994d, 1994b, 1995); and implementation of the Anadromous Fish Restoration Program of the CVPIA. The water quality standards and operational constraints set forth in these documents include locating X2 at Chipps Island, export rate limits, and other operational standards.

Vernal Pool

*Habitat Description and Associated Species*

Vernal pools are seasonal wetlands that are unique to the Mediterranean climate region of California and northwestern Baja California and are most abundant in the Central Valley. Many of the endangered plants and invertebrates that inhabit vernal pools have sporadic and disjunct distributions (*i.e.*, they occur in relatively few pools at a given location and some of these locations are widely separated from each other).

Vernal pools are distinguished by their hydrology and their relationship to adjacent habitat. First, the Mediterranean climate of the region results in most rain falling during the winter. On locally flat land the water tends to pool after each rainfall in small depressions on the land surface. Over time the soils where the wetting and drying continue year after year develop a layer below the surface that becomes resistant to water. In some soils a hardpan of mostly lime develops. In others there is a layer where clay particles have built up. The pools gather water that falls as rain over a small area of relatively flat land and then hold it at the surface until it evaporates during the summer, providing a unique habitat type. Most of these vernal pools are found on sites where the soil has been in place for thousands of years. Over thousands of years a group of species has developed adaptations to the annual wetting and drying cycle and the mineral content of the water in the pools. Other species near pools (particularly co-adapted pollinators) interact with the plants and animals found in the pools themselves. The area comprising the pools, the areas of catchment where the water gathers as rain falls, and the associated species found in the habitat near the pools form a unit that is referred to as a "vernal pool complex".

Conservation of vernal pool species depends on maintaining the ecosystem functions of the entire complex.

Listed, proposed, and candidate species associated with vernal pools are: Butte County meadowfoam, California tiger salamander, Calistoga allocarya, Colusa grass, Conservancy fairy shrimp, Contra Costa goldfields, delta green ground beetle, few-flowered navarretia, fleshy owl's-clover, Greene's tuctoria, hairy Orcutt grass, Hoover's spurge, Loch Lomond coyote thistle, longhorn fairy shrimp, Sacramento Orcutt grass, San Joaquin Valley Orcutt grass, slender Orcutt grass, Solano grass, vernal pool fairy shrimp, and vernal pool tadpole shrimp. Most of these species are patchily distributed within the Sacramento and/or San Joaquin Valleys in vernal pool complexes. Calistoga allocarya, few-flowered navarretia, and Loch Lomond coyote thistle are restricted to Napa County.

*Habitat Trends*

Holland (1998) mapped the distribution of vernal pool complexes in the Central Valley. Vernal pools are scattered throughout the grassland habitats mapped by Küchler (1977) and GAP (1996) but occur at too fine a resolution to have been adequately mapped as a distinct habitat type by those studies. Holland (1978) estimated that vernal pools occurred historically at varying densities over an estimated 31 percent (4.15 million acres) of the Central Valley, and the Service estimates that 60-85% of historical vernal pool habitat had been eliminated as of 1973 (59 **FR** 48136).

Freshwater Wetland

*Habitat Description and Associated Species*

Freshwater wetlands are characterized by a specialized community of aquatic dependent plant species such as the common tule (*Scirpus acutus*), cattail (*Typha latifolia*), sedges (*Carex* spp.), spike-rush (*Eleocharis* spp.) and rushes (*Juncus* spp.). Wetlands are usually defined by the types of plants, types of soils, and inundation duration. Wetland types in this category include deep and shallow freshwater marshes, wet meadows, seasonal wetlands, saturated freshwater flat, and vegetated shallows.

Listed, proposed, and candidate species associated with freshwater wetlands are: Aleutian Canada goose, bald eagle, Buena Vista Lake shrew, California red-legged frog, California tiger salamander, giant garter snake, marsh sandwort, San Francisco garter snake, and Santa Cruz long-toed salamander.

The bald eagle occurs widely throughout the study area. After severe declines due largely to pesticides such as DDT, its numbers have been increasing following new pesticide regulations. Ecosystem degradation in the Central Valley may limit the extent of their recovery in the Central Valley. Eagles use riparian and wetland habitats for resting and foraging. Recovery of bald eagles may be limited by availability of nest trees in riparian and woodland habitat and by declining wetland habitat. California red-legged frogs have been virtually extirpated from the floor of the Central Valley, despite their historic presence in the Central Valley in numbers large enough for commercial harvest. They currently remain

only in foothills of the Coast Range and isolated drainages in the Sierra Nevada. The giant garter snake occurs in scattered populations from Butte County south to the northern San Joaquin Valley. The Aleutian Canada goose winters in restricted areas of the Sacramento and San Joaquin Valleys. The Buena Vista Lake shrew is restricted to remnant wetland areas near the Kern Lake Preserve and Kern National Wildlife Refuge. The Santa Cruz long-toed salamander is found only in southern Santa Cruz County. The San Francisco garter snake has been reduced to 5 populations that are unprotected, unstable, or declining. Marsh sandwort populations in San Francisco and Santa Cruz Counties have been extirpated by urban development.

*Habitat Trends*

Potential natural vegetation within the Conservation Program Focus Area included an estimated 1,968,749 acres of tule marshes (Küchler 1977). These wetlands occurred primarily in the Sacramento Basin (506,245 acres), San Joaquin Basin (429,115 acres), Tulare Basin (505,306 acres), and the Delta (523,279 acres). Independent estimates of historic wetland acreages range from 1,500,000 acres (Warner and Hendrix 1985, cited in San Joaquin Valley Drainage Program 1990) to 4,000,000 acres in the Central Valley (Service 1978), and 1,093,000 acres in the San Joaquin and Tulare Basins (San Joaquin Valley Drainage Program 1990, adapted from Hall 1886 and Küchler 1977).

Freshwater emergent wetlands occupied about 554,000 acres of the Central Valley in the 1940s (Frayer *et al*. 1989, Central Valley Habitat Joint Venture 1990). By 1990, only 86,704 acres remained (GAP 1996), representing a reduction of 96% from the potential natural vegetation described by Küchler (1977). Regional reductions in freshwater emergent wetlands were estimated at 88.7% in the Sacramento Basin, 96.2% in the San Joaquin Basin, 99.2% in the Tulare Basin, 98.3% in the Delta, and 97.2% in the San Francisco Bay area.

The hydrology of many of the remaining wetlands has been altered from seasonal to permanent inundation. This change has altered plant communities and facilitated the invasion of introduced aquatic predators such as bullfrogs, bass, and sunfish. These species compete with or prey upon several listed species, including California red-legged frogs and giant garter snakes.

Riverine, Riparian, and Floodplain

*Habitat Description and Associated Species*

Riparian forests of the Central Valley are dominated by cottonwood (*Populus fremontii*) and willow (*Salix* spp.) near the rivers, with sycamore (*Platanus racemosa*), boxelder (*Acer negundo*), and valley oak (*Quercus lobata*) dominating the less frequently flooded higher terraces. Floodplain habitats above the riparian zone typically do not support wetland vegetation, but are hydrologically linked to rivers and riparian forests by periodic flooding and can be considered with them as an ecological unit. Streams historically flooded during the winter rainy season sometimes dry up partially or completely during summer droughts. Several fish species migrate from ocean or estuary habitats to spawn in sloughs, tributary streams, or inundated floodplain throughout the Central Valley.

Sacramento splittail, which migrate upstream to spawn in flooded riparian and floodplain vegetation, have also declined. Valley elderberry longhorn beetles occur in riparian habitats of the Sacramento Valley and San Joaquin Valleys and have declined with loss of habitat. Least Bell's vireos have not nested anywhere in the Central Valley for several decades, and southwestern willow flycatchers are restricted to the South Fork of the Kern River near Lake Isabella. The riparian woodrat and riparian brush rabbit are now largely or completely restricted to Caswell State Park on the Stanislaus River, which is the largest remaining tract of riparian forest in the northern San Joaquin Valley. The California red-legged frog has now been extirpated from 75% of its historic range, mostly in the Central Valley.

*Habitat Trends*

Potential natural vegetation within the Conservation Program Focus Area includes an estimated 1,192,605 acres of riparian habitat, including 837,103 acres in the Sacramento Basin, 288,551 acres in the San Joaquin Basin, 48,123 acres in the Tulare Basin, and 18,828 acres in the Delta (Küchler 1977). Historic acreages of riparian forest have been independently estimated at 1,600,000-2,000,000 acres in the Central Valley (Warner and Hendrix 1985) and 902,000 acres in the San Joaquin and Tulare Basins (San Joaquin Valley Drainage Program 1990, adapted from Hall 1886 and Küchler 1977).

In 1990, riparian habitat within the Conservation Program Focus Area covered an estimated 134,840 acres (GAP 1996), representing a reduction of 89% from the potential natural vegetation described in Küchler (1977). Regional reductions in riparian habitat were 92% in the Sacramento Basin, 91% in the San Joaquin Basin, 24% in the Tulare Basin, and 86% in the Delta. An estimated 2% of the historical riparian habitat remains on the Sacramento River (McGill 1979, McCarten and Patterson 1987). As a result, riparian-dependent species include several of the most critically endangered species in the Central Valley.

Coastal Beach, Lagoon, Inland Dune

*Habitat Description and Associated Species*

Coastal beach habitats within the Conservation Program Focus Area extend along approximately 200 miles of coastline from the Golden Gate to southern Santa Cruz County. Where coastal headlands are absent, dune habitats often occur behind the beaches. Coastal prairie and scrub habitats dominated by perennial grasses or shrubs develop behind the dunes or along terraces and headlands where salt spray, wind, and coastal fog incursions are common. Brackish lagoons sheltered from direct wave action are scattered along the coast.

Listed, proposed, and candidate species associated with these habitats are: bald eagle, beach layia, black legless lizard, California brown pelican, California least tern, Monterey spineflower, Myrtle's silverspot butterfly (extirpated), robust spineflower, San Francisco lessingia, Santa Cruz tarweed, tidewater goby, and western snowy plover. The coastal habitats used by each species are summarized in Table 3.D.

The **Antioch Dunes** are Pleistocene, wind-deposited sands adjacent to the San Joaquin River east of the City of Antioch in Contra Costa County. Exploitation of the dunes dates back to 1885, with the establishment of a pottery works. Subsequent activities that eliminated and degraded habitat included sand mining, agricultural conversion of sandy soils adjacent to the dunes, industrialization, urban expansion, power line right-of-way and fire break maintenance, and off-road vehicle recreation. Large numbers of black locust and other weedy, non-native plants have invaded the disturbed dunes, displacing endemic species from much of their habitat. Special-status species associated with Antioch Dunes are Contra Costa wallflower, Antioch Dunes evening primrose, and Lange's metalmark butterfly.

*Habitat Trends*

Coastal habitats such as dunes and coastal prairie are not classified separately by Küchler (1977) and GAP (1996), so trends in these habitats on a large scale cannot be quantified from these data Extensive urbanization along the coast suggests declining trends in all native coastal habitats.

For the Antioch Dunes, a 1908 U.S. Geological Survey map shows approximately 190 acres of dune deposits along approximately 2 miles of river front, averaging about 0.17 mile in width (U.S. Fish and Wildlife Service 1984, Howard and Arnold 1980). Today approximately 70 acres of the original habitat remain, but most is severely degraded and lacks natural dune topography. Since 1980 the Service has owned and managed 60 acres of habitat and buffer as a satellite to the San Francisco Bay National Wildlife Refuge Complex and has negotiated agreements with adjacent landowners (including the Pacific Gas and Electric Company) to protect an additional 20 acres (U.S. Fish and Wildlife Service 1984, Howard and Arnold 1980). The Service has removed the locust trees within the refuge boundary and is actively restoring the dunes.

Salt Marsh

*Habitat Description and Associated Species*

The San Francisco Bay complex, including San Pablo Bay and Suisun Bay and Marsh, is the largest estuarine ecosystem in California. Tidal marshes consist of a low marsh dominated by cordgrass (*Spartina foliosa*) or tules (*Scirpus* spp.), a middle marsh of pickleweed (*Salicornia virginica*), alkali bulrush (*Scirpus robustus*), or cattails (*Typha* spp.), and a high marsh of peripheral halophytes (plants which grow in salty soils) with infrequent tidal coverage. Listed and proposed species associated with salt marsh habitats include: California clapper rail, California seablite (extirpated), salt marsh harvest mouse, soft bird's-beak, and Suisun thistle.

*Habitat Trends*

Originally the San Francisco Bay complex included an estimated 181,446 acres of tidal marsh, including 46,405 acres in San Francisco Bay, 63,678 acres in San Pablo Bay, and 71,363 acres in Suisun Bay and Marsh (Service 1984). Küchler (1977) estimated that potential natural vegetation of the San Francisco Bay complex included 96,583 acres of salt marsh; this figure omits the brackish marshes in the Suisun Bay area, which are categorized as tule marsh in Küchler's map.

In 1990, salt marsh and brackish marsh were estimated to cover 69,291 acres, including 54,088 acres in the Sacramento Basin (Suisun Bay and Marsh), 9443 acres in the Delta, and 4760 acres in the San Francisco Bay area (GAP 1996). This estimate probably includes large areas of diked marsh, particularly in Suisun Bay where non-tidal diked marshes are managed primarily for waterfowl. Dedrick (1993) estimated that about 30,100 acres of tidal marsh currently remain, representing 17 percent of historical marsh. Some salt marshes have been backfilled, eliminating the high marsh zones and adjacent upland habitat, others are narrow strips bordering dikes. Existing tidal marshes are fragments of the original marshes, and only a few large marshes remain.

Interior Grassland

*Habitat Description and Associated Species*

Grasslands in the Central Valley were originally dominated by native perennial grasses such as needlegrass (*Nassella pulchra*) and alkali sacaton (*Sporobolus airoides*). Currently most grasslands in the area are dominated by introduced annual grasses of Mediterranean origin and a mixture of native and introduced forbs. Please refer to the San Joaquin Valley Native Species Recovery Plan (Service 1998) for a complete description of this habitat.

Blunt-nosed leopard lizards, San Joaquin kit foxes, giant kangaroo rats, Tipton kangaroo rats, and Fresno kangaroo rats occur in arid grasslands in the San Joaquin and Tulare Basins. Bakersfield cactus, California jewelflower, Hartweg's golden sunburst, Hoover's wooly-star, and San Joaquin

wooly-threads occur in isolated populations within grassland habitat in the San Joaquin and Tulare Basins. The San Joaquin adobe sunburst is restricted to grasslands on adobe clay soils in the San Joaquin Valley. The Kern primrose sphinx moth occurs locally in agricultural fields and grasslands in the Walker Basin in Kern County. The large-flowered fiddleneck occurs in grasslands on a few sites in Alameda, San Joaquin, and Contra Costa Counties. The Alameda whipsnake is found in grasslands adjacent to chaparral and scrub in Alameda and Contra Costa Counties. Napa bluegrass occurs in grasslands in Napa County, in association with hot springs. Showy Indian clover originally occurred in grasslands from Mendocino to Santa Clara Counties, but is now extirpated from all but one site in Marin County. Reintroduced California Condors (in the southern San Joaquin Valley) range widely and may forage in grassland habitat.

*Habitat Trends*

Less than 1% of remaining grassland areas in the Central Valley contain enough native grass species to be labeled either valley sacaton or valley needlegrass grasslands (GAP 1996).

Alkali Desert Scrub

*Habitat Description and Associated Species*

Alkali desert scrub is dominated by low succulent chenopod shrubs including *Allenrolfea, Atriplex* (saltbush) and *Sueda* species. This habitat occurs most commonly on fine-textured, alkaline, or saline soils in areas of impeded drainage. Please refer to the San Joaquin Valley Native Species Recovery Plan (Service 1998) for a complete description of this habitat.

Blunt-nosed leopard lizards, San Joaquin kit foxes, giant kangaroo rats, Tipton kangaroo rats, and Fresno kangaroo rats occur in alkali desert scrub and other habitats in the San Joaquin and Tulare Basins. Bakersfield cactus, Hoover's wooly-star, Kern mallow, palmate-bracted bird's beak, and San Joaquin wooly-threads occur in isolated populations within alkali desert scrub habitat in the San Joaquin and Tulare Basins. Reintroduced California condors (in the southern San Joaquin Valley) range widely and may occur in alkali desert scrub habitat.

*Habitat Trends*

Regional declines in alkali scrub habitat range between 67 and 90 percent. Much of the remaining alkali scrub that is suitable habitat for wildlife exists in small, fragmented, and widely distributed patches in the San Joaquin and Tulare Basins.

Oak Woodland

*Habitat Description and Associated Species*

Several different types of oak woodland occur in the Central Valley and central coast regions of California. Oak woodlands in the Conservation Program Focus Area include stands dominated by: valley oak (*Quercus lobata*), mostly along rivers and streams on the valley floor and lower foothills; blue oak (*Q. douglasii*) and gray or digger pine (*Pinus sabiniana*), at low to middle elevations in foothills of the Sierra Nevada and Coast Ranges); coast live oak woodland (*Q. agrifolia*) in valleys and hills of the Coast Ranges; canyon live oak (*Q. chrysolepis*) and interior live oak (*Q. wislizenii*), near some CVP reservoirs; and Oregon white oak (*Q. garryana*) in and near service areas between Redding and Red Bluff. Transitional communities of mixed oaks, other hardwoods, pine, and chaparral occur among many of these woodland types (Forest and Rangelands Assessment Program 1988, Griffin 1977). These oak woodlands correspond to the valley oak savanna, Oregon oak forest, mixed hardwood forest, and blue oak-digger pine forest mapped by Küchler (1977), and can be considered to comprise a "cismontane woodland" category.

Listed, proposed, and candidate species associated with oak woodland include: California condor, California red-legged frog, and California tiger salamander. Reintroduced California Condors (in the southern San Joaquin Valley) range widely and may occur in oak woodland habitat. California red-legged frogs occur in oak woodland in foothills of the Coast Range and isolated drainages in the Sierra Nevada. California tiger salamanders occur in oak woodland at the fringes of the Central Valley and in the Coast Ranges. The frogs and salamanders live in burrows in these woodlands during dry parts of the year. Suitable habitat for these burrows is essential to their survival.

*Habitat Trends*

Potential natural vegetation within the Conservation Program Focus Area included an estimated 9,384,947 acres of cismontane woodland habitat (3,462,430 acres in the Sacramento Basin, 2,335,602 acres in the San Joaquin Basin, 1,491,951 acres in the Tulare Basin, 50 acres in the Delta, 1,285,115 acres in the San Francisco Bay area, and 809,799 acres in the San Benito/Santa Cruz area).

In the 1940s, woodland dominated by oaks and other hardwoods covered approximately 2,970,000 acres in the Sacramento Basin, 1,720,000 acres in the San Joaquin Basin, and 950,000 acres in the Tulare Basin (Weislander 1945). In 1990, cismontane woodland habitat within the Conservation Program Focus Area was estimated at 6,919,647 acres (GAP 1996), representing a 27% decline from potential natural vegetation (Küchler 1977). Regional declines in cismontane woodland habitat were 24% in the San Joaquin Basin, 30% in the Tulare Basin, 100% in the Delta, 78% in the San Francisco Bay area, and 73% in the San Benito/Santa Cruz area. Cismontane woodland increased by 4% in the Sacramento Basin.

Evergreen Hardwood and Coniferous Forests

*Habitat Description and Associated Species*

Coniferous and evergreen hardwood forests generally occur at higher elevations in the Sierra Nevada and Coast Ranges, on the margins of the Central Valley. This category comprises several forest types. Moist coastal forests in San Mateo and Santa Cruz Counties are dominated by redwood *(Sequoia sempervirens*) and Douglas-fir (*Pseudotsuga menziesii*). Montane forests in the Coast Ranges and Sierra Nevada are dominated by a variety of conifers including ponderosa pine (*Pinus ponderosa*), Jeffrey pine (*P. jeffreyi*), Douglas-fir (*Pseudotsuga menziesii*), red fir (*Abies magnifica*), and white fir (*A. concolor*). In the Coast Ranges stands may be dominated by evergreen hardwoods such as madrone (*Arbutus menziesii*), tanoak (*Lithocarpus densiflorus*), and bay laurel (*Umbellularia californica*). Dry regions support woodlands and savannas dominated by pinyon pine (*P. monophylla*) and juniper (*Juniperus californica*). On drier sites, stands may be dominated by cypress (*Cupressus* spp.) and fire-dependent species such as Monterey pine *(P. radiata*) and knobcone pine (*P. attenuata*).

Listed species associated with coniferous and evergreen hardwood forests are California condor, bald eagle, marbled murrelet and northern spotted owl. The California condor and bald eagle may occur over wide areas and are not specifically limited to coniferous forest. The northern spotted owl and marbled murrelet require large tracts of old-growth coniferous forest as nesting habitat and are threatened by conversion to short-rotation forestry practices. Northern spotted owls occur in forests along the western and northern edges of the Sacramento Valley, and marbled murrelets can occur in Santa Cruz and San Mateo Counties.

*Habitat Trends*

Potential natural vegetation within the Conservation Program Focus Area included an estimated 5,660,803 acres of coniferous and mixed forest habitat, including 4,077,008 acres in the Sacramento Basin, 777,063 acres in the San Joaquin Basin, 574,887 acres in the Tulare Basin, 71,903 acres in the San Francisco Bay area, and 159,942 acres in the San Benito/Santa Cruz area (Küchler 1977).

In the 1940s, coniferous forest covered approximately 3,507,000 acres in the Sacramento Basin, 877,000 acres in the San Joaquin Basin, and 414,000 acres in the Tulare Basin (Weislander 1945). In 1990, coniferous and mixed forest habitat within the Conservation Program Focus Area was estimated at 5,525,713 acres (GAP 1996), representing a 2% decline from potential natural vegetation (Küchler 1977). Regional increases in coniferous forest habitat were 3% in the San Joaquin Basin, 9% in the Tulare Basin, 206% in the San Francisco Bay area, and 26% in the San Benito/Santa Cruz area. Coniferous forest declined by 10% in the Sacramento Basin.

Hidden within these totals is a shift from commercially valuable redwood and Douglas fir to juniper and other less merchantable conifers. This shift has contributed to declines of species that need habitat with large trees.

Chaparral

*Habitat Description and Associated Species*

Chaparral habitats in the **Coast Ranges** are characterized by dense thickets of chamise (*Adenostoma fasciculatum*), manzanita (*Arctostaphylos* spp.), ceanothus (*Ceanothus* spp.), scrub oak (*Quercus berberidifolia*), and other shrubs. Chaparral occurs mostly on steep slopes and ridgetops that have thin soils and are hot and dry during the summer. Moister variants of chaparral habitat occur in gullies and on cooler, north-facing slopes (Hanes 1977). Presidio clarkia, Presidio manzanita. The Alameda whipsnake and pallid manzanita are found in chaparral habitats in Contra Costa and Alameda Counties.

Patches of serpentine, volcanic, and granitic soils occur sporadically along the western flanks of the **Sierra Nevada**. Special-status species associated with this habitat are: Chinese Camp brodiaea, Keck's checker-mallow, Mariposa pussypaws (granitic soils), Red Hills vervain, and Springville clarkia (granitic soils).

**El Dorado County gabbro soils** support the following listed chaparral species: Stebbins' morning-glory, Pine Hill ceanothus, Pine Hill flannelbush, El Dorado bedstraw, and Layne's butterweed. The five El Dorado County plant species occur primarily in the Pine Hill intrusive complex, a unique and localized geologic formation composed of gabbroic rocks. The Pine Hill intrusion occupies approximately 25,700 acres, and serpentine soils occupy an additional 10,000-15,000 acres in western El Dorado County. These species have a scattered distribution within chaparral and oak woodland habitats, which occupy 73% of the Pine Hill intrusion. Additional populations of a few of these species occur on soils derived from serpentine or metamorphic rocks at locations outside the Pine Hill intrusion. Both gabbro and serpentine soils strongly influence plant distributions because of nutrient imbalances and other characteristics that favor the growth of plants specifically adapted to these conditions (59 **FR** 18774; Kruckeberg 1984).

Outcrops of the **Ione Formation** are primarily restricted to an area of about 35 square miles in Amador County. These outcrops form barren, gravelly, kaolinic soils that are inhospitable for most plants. Kaolin clays are relatively poor at holding several important plant nutrients. The Ione buckwheat and Ione manzanita grow in openings within chaparral vegetation on lateritic soils crusts (cement-like crusts of yellow iron oxide) developed under a subtropical or tropical climate during the Eocene. Ione soils exhibit soil properties typical of those produced under tropical climates such as high acidity, high aluminum content, and low fertility (Singer 1978). These soils and the sedimentary deposits with which they are associated also contain large amounts of commercially valuable minerals including quartz sands, kaolinitic clays, lignite (low-grade coal), and possible gold-bearing gravels

(Chapman and Bishop 1975). Ione buckwheat and Ione manzanita can tolerate the acidic, nutrient-poor Ione soils and are essentially restricted to this soil type.

*Habitat Trends*

Fire suppression and reduced fire frequency have caused changes in the structure and species composition of large areas of chaparral. Longer intervals between fires has led to an increase in later successional species and slow-maturing species, greater standing biomass and dry fuels, and larger, more intense fires. Where fire is less frequent, many chaparral species decline. Also, roads, agriculture, and urban development have fragmented the habitat of some species. Changes in fire frequency and fragmentation and have contributed to the decline of several species.

Urban development increases local fire suppression efforts as well as directly removing chaparral habitat. Urban development in the foothills of the western Sierra Nevada, through expansion of residential neighborhoods and road construction and maintenance, has destroyed or degraded numerous populations of listed plants. Residential and commercial development around the communities of Cameron Park and Shingle Springs have caused the greatest losses in gabbro soils habitat. There are 15 active surface mines on private land near Ione, where the habitat of listed plants continues to be degraded. Mining for quartz sand, clay, lignite, laterite, and gravel have destroyed a large proportion of the original habitat.

Coastal Scrub and Coastal Grassland

*Habitat Description and Associated Species*

Coastal scrub is characterized by sagebrush (*Artemisia californica*) and coyote brush (*Baccharis pilularis consanguinea*), and the coastal grasslands are generally dense grasses in low lying areas or sparse grasses mixed with forbs on hilltops and ridges (balds). Coastal sagebrush occurs mostly on steep slopes and thin soils, and coyote brush is found in deeper soils with minimal slopes. The coastal grasslands are characterized by a mix of native and European grasses. Coastal scrub is typically found adjacent to and interspersed with coastal grasslands.

Callippe silverspot butterfly, Mission blue butterfly, and San Bruno elfin butterfly are largely restricted to coastal scrub and coastal grassland on mountains in San Mateo County, including San Bruno Mountain, Montara Mountain, Milagra Ridge, Sweeney Ridge and Skyline College. Isolated colonies also remain locally in San Francisco, Solano, Alameda, Contra Costa and Marin Counties.

The San Francisco garter snake is found in open canopy coastal scrub and grasslands adjacent to permanent water in San Mateo County. The habitat of this species continues to be lost to urbanization and agriculture, although agricultural ponds built after the drought in the 1970s may have provided for a

temporary increase in foraging habitat. The five remnant populations of San Francisco garter snake are unstable, unprotected, or seriously declining.

The Alameda whipsnake is found in coastal sage scrub and chaparral adjacent to grasslands in Contra Costa and Alameda counties. The habitat of this species has been subject to over 150 years of urbanization and over 100 years of fire suppression. The populations of this species are extremely disjunct and genetic exchange between the 5 remaining populations is extremely low or unlikely.

The following **serpentine** endemics, are found on serpentine outcrops in these habitats: Bay checkerspot butterfly, Clara Hunt's milkvetch, coyote ceanothus, fountain thistle, Hickmann's cinquefoil, Marin dwarf-flax, Metcalf Canyon jewelflower, Red Mountain campion, San Benito evening primrose, San Mateo thornmint, San Mateo wooly sunflower, Santa Clara Valley dudleya, showy Indian clover, Tiburon paintbrush, and white-rayed pentachaeta.

**Zayante soils** are endemic to Santa Cruz County and occur predominantly near the communities of Ben Lomond, Felton, Mount Hermon, Olympia, and Scotts Valley, as well as the Bonny Doon area. Zayante soils are deep, coarse-textured, poorly developed, and well drained (USDA Soil Conservation Service 1980). A unique habitat within the Zayante sand hills ecosystem is sand parkland characterized by sparsely vegetated, sandstone-dominated ridges and saddles that support a wide array of annual and perennial herbs and grasses. Scattered ponderosa pine trees are often present. Species occurring in this habitat are Ben Lomond spineflower, Ben Lomond wallflower, Mount Hermon June beetle, robust spineflower, Santa Cruz cypress (sandstone or granitic soils), Santa Cruz long-toed salamander (wetlands), and Zayante band-winged grasshopper.

*Habitat Trends*

Much of the coastal scrub and grassland in the San Francisco Bay Area is urbanized. The majority of the remaining natural habitat is largely restricted to ridges and mountains that are difficult to build on. Coastal scrub and its associated grasslands in San Mateo County have largely been destroyed or degraded by urbanization. The remaining isolated fragments are expected to be developed in the near future. In addition to urbanization, habitat modifications through changes in hydrology and fire frequency, as well as invasion of exotic species, are still affecting most habitats. The map developed by Küchler (1977) estimates that potential natural vegetation within the Conservation Program Focus Area included 383,308 acres of coastal scrub habitat. In 1990, coastal scrub habitat within the Conservation Program Focus Area had been reduced to 159,210 acres (GAP 1996), representing a decline of 58% from the potential natural vegetation estimated by Küchler (1977).

Although serpentine habitats are naturally fragmented and separated by areas of different geology and soils, serpentine habitats in the San Francisco Bay area have been severely reduced and fragmented by urban development and related activities in recent decades (Kruckeberg 1984; 57 **FR** 59053).

More than 40 percent of the Zayante sand hills and over 60 percent of the sand parkland habitat is estimated to have been lost or degraded (62 **FR** 3616). Portions of the Zayante sand hills ecosystem are protected under public ownership in only three locations: the Quail Hollow Ranch, owned by the County of Santa Cruz; Bonny Doon Ecological Preserve, managed by DFG; and Henry Cowell Redwoods State Park.

## Role of Contaminants in the Decline of Species and Habitats

Drainage Water and Selenium Contamination

Soils on the west-side and southern end of the San Joaquin Valley are derived from marine sediments in the Coast Range and contain naturally high levels of arsenic, boron, chromium, molybdenum, and selenium, which are toxic or potentially-toxic trace elements. Evaporation has caused high concentration of these elements in near-surface soils and groundwater in those areas, and application of irrigation water increases these concentrations. Subsurface clay, underlying these contaminated soils, impedes vertical and lateral movement of irrigation water percolating below the root zone (Moore *et al.* 1990), causing a drainage problem.

To move contaminated water out of these saturated soils, deep ditches have be dug or subsurface drainage systems installed. The drainage systems take away harmful salts and excess moisture, thus lowering the water table to below the root zone for most crops. The effluent from these drains often contains salts, trace elements, and agricultural chemicals. Subsurface agricultural drainage water collected in such systems is pumped away or allowed to drain into surface ditches and canals, eventually discharged into ponds for evaporative disposal, or creeks or sloughs tributary to major streams and rivers. On average, approximately 0.7-0.8 acre-feet of subsurface drainage water is generated annually per acre of irrigated agricultural land on the west side and southern end of the San Joaquin Valley (San Joaquin Valley Drainage Program 1989). The historic and continuing discharge of subsurface drain water into surface waters of the San Joaquin Basin has resulted in degradation of surface- and groundwater quality through salinization and contamination by elevated concentrations of toxic or potentially toxic trace elements and agricultural chemicals.

In the drainage-impaired areas, evaporation ponds and agroforestry plantations are used for disposal of contaminated drain water. In 1990, 28 evaporation ponds (about 7,400 total acres) were utilized to dispose of drain water in Merced, Kings, Kern, and Tulare Counties. These ponds received approximately 30,000-40,000 acre-feet per year from a total of about 55,000 acres of irrigated lands (San Joaquin Valley Drainage Program 1990). Since 1990, the total acreage of evaporation ponds/basins has declined from about 7,000 acres to about 5,000 acres. The ponds are regulated by the Regional Board by means of Waste Discharge Requirements (*e.g.*, Order No. 93-136) that require creation of clean wetlands to mitigate unavoidable toxic impacts to breeding waterbirds.

Agroforestry disposal of drain water involves irrigation of various combinations of salt tolerant crops, shrubs, and trees with subsurface drainage wastewater. More than 40 agroforestry drainage water disposal sites were established between 1985 and 1990 (Moore et al. 1990). Given current trends in rising ground water elevations and the general lack of acceptable disposal options other than agroforestry sites, it is expected that the expansion of agroforestry sites will exponentially accelerate within a 5-10 year planning horizon. Although it has been established that agroforestry plantations (like evaporation basins) are wildlife magnets in the extensively cultivated landscape of the San Joaquin Valley (Moore et al. 1990), the potential for contaminant hazards remains poorly documented. A small set of waterbird eggs collected by the Service from just two agroforestry sites in 1996 yielded the highest rates of selenium-induced embryonic malformation ever reported in the scientific literature (Skorupa 1998) and established that the method of furrow irrigation being used was attracting breeding waterbirds.

The extent and severity of the drainage problem in the western and southern San Joaquin Valley continues to worsen. Between 1991 and 1997 the acreage of land in the southern San Joaquin Valley with shallow groundwater rising to within 5 feet of the soil surface–having a drainage problem--has increased from 159,000 acres to 359,000 acres (DWR 1997); therefore, in the past 6 years, an additional 200,000 acres of agricultural lands have been added to the inventory of parcels requiring a disposal option for drainage water to stay in production. Land retirement (retirement from irrigation) is being planned in this area (on a willing seller basis) to remove the lands with the greatest drainage problem from production.

Pesticides

Insecticides, herbicides, and rodenticides have been used for decades throughout the Central Valley, including the CVP service area. Farmers have used insecticides to eliminate crop damage caused by harmful insects and herbicides to reduce crop competition with weeds and other undesirable plants. Rodenticides have been used primarily to reduce or eliminate populations of ground squirrels and other burrowing rodents that can damage flood control levees and water delivery systems.

Beginning in the 1950's synthetic organochlorine (DDT, dieldrin, aldrin, endrin, toxaphene, lindane, chlordane, heptachlor, and Mirex) and organophosphate (*e.g.*, carbaryl and carbofuran) pesticides were extensively and increasingly used. Several organochlorine compounds persist in the soil for many years. In the Central Valley, the California brown pelican, American peregrine falcon, osprey, bald eagle, and California condor were seriously affected by DDT. Use of DDT was banned in the United States in 1972, and all of these species have increased their populations since that time. However, some birds may still be contaminated as a result of illegal or foreign application of DDT.

The quantity of pesticides used in the State--over 120 million pounds in 1980 alone (California Department of Food and Agriculture 1981)--is, in part, a result of the types of crops grown. For example, traditional cotton production uses more pesticides than production of any other crop (Service, undated). Acreage devoted to cotton production in the Tulare Basin increased by 330% between

1940 and 1980. During 1978, about 1.7 million acres in the Central Valley were devoted to cotton production, more acreage than for any other crop (~27% of the irrigated acreage in the Central Valley). The vast majority of the Central Valley's cotton production occurs within the San Joaquin Valley (Reclamation 1984). Of the almost 70 million pounds of pesticides applied in the Central Valley during 1980, a substantial proportion was used to produce cotton in the San Joaquin Valley (California Department of Food and Agriculture 1981).

**CVP Environmental Programs**

The CVP Conservation Program and the (b)(1)"other" program are currently carrying out a number of conservation actions for endangered species that form part of the baseline for this consultation. During 1996, 1997, and 1998, these programs have sponsored or obligated funds for a wide variety of projects including: purchase of Valensin Ranch (a large parcel of riparian, grassland, and vernal pool habitats along the Cosumnes River in southern Sacramento County); surveys for Keck's checker mallow; restoring habitat for the large-flowered fiddleneck; purchase of lands for Pine Hill Ecological Reserve in El Dorado County; purchase of property supporting California red-legged frogs on Weber Creek in El Dorado County; censussing, monitoring, and developing a restoration plan for riparian brush rabbits and riparian woodrats in Caswell State Park; acquisition of vernal pool and alkali sink habitat for the Allensworth Ecological Reserve in Tulare County; habitat protection and environmental education for Bakersfield cactus in Kern County; hydrological studies, conservation easements, and land purchase for the palmate-bracted bird's-beak at Springtown Alkali Sink; and surveying DFG property in Kern County for rare plant species. Additional planned projects include: protecting habitat for the Fresno kangaroo rat at Kerman and Alkali Sink Ecological Reserves in Fresno County; protection of riparian and vernal pool habitat at Howard Ranch in Sacramento County; planning riparian habitat restoration on the San Joaquin River; and acquisition of San Joaquin kit fox habitat owned by Wells Fargo in Stanislaus and Merced Counties.

# Effects of the Proposed Action

The section below discusses direct and indirect effects on listed, proposed, and candidate species or their critical habitat that result from the proposed action. Cumulative effects (effects of future State, local, or private actions on endangered and threatened species or critical habitat) are discussed separately at the end of this section. Effects are analyzed on an ecosystem level, including all species that could be impacted by the actions. Anadromous salmonids are under the legislative authority of the NMFS but are discussed here because of the interrelated nature of the effects; however, separate consultation with NMFS is required to fully address effects on these species.

**Assumptions**

The assumptions used in this effects analysis are as follows:

1. The conservation actions described in the Project description will be fully implemented, including **Agency Commitments for New and Continuing Project Actions** (page 2-3), specific guidance for **Water Service Contracts** (page 2-10), and **Conservation Measures** (page 2-31).

2. Reclamation and the Service will request adequate funding for the CVP Conservation Program as necessary to implement this biological opinion.

3. Discharges into surface water bodies by CVP water contractors comply with the standards set in the biological opinion on the California Toxics Rule.

4. All components of the San Joaquin Valley Drainage Program's Final Report that pertain to the CVP's contract service area are implemented in a manner that does not preclude recovery of listed and proposed species–specifically, Selenium discharges into the San Joaquin River do not preclude recovery of listed and proposed species that are using impacted waterways, e.g. the San Joaquin River and its tributaries and the Sacramento San Joaquin Delta. Interior will conduct monitoring to determine whether existing discharges are impacting recovery of Sacramento splittail, delta smelt, and giant garter snake. Monitoring and evaluation of results will be used to determine effects prior to long-term contract renewal.

5. Long-term contracts will be renewed, and Reclamation will complete tiered site-specific consultations with the Service. No CVP water will be delivered or applied outside current contract service areas until either formal or informal consultation is complete. In some cases, deliveries in excess of the average historical delivery amounts to water districts may result in a change in land-use practices in the districts and indicate the need for informal consultation between Reclamation and the Service.

Once formal site-specific consultation has occurred that is in compliance with this opinion, it is assumed that changes in land-use practices, and impacts to listed and proposed species, in the districts have been addressed.

6. Interior will work with Sacramento River Water Rights Settlements contractors and San Joaquin River Exchange contractors to develop conservation measures for listed species, as appropriate, and will communicated and coordinate with the Sacramento River Water Rights Settlement contractors and San Joaquin River Exchange contractors in determining how to address any effects to listed species, as necessary, through section 7 or section 10.

7. For Warren Act, water wheeling, 215 water contracts, and water transfers, Reclamation and the Service will establish a tracking program that assures compliance with the ESA.

8. Conservation strategies will be in place for the districts or areas receiving CVP water. The types of strategies that could be accepted are: Habitat Conservation Planning as described in section 10(a) of the ESA; programmatic land management actions that include protection of listed and proposed species; requirements resulting from site-specific section 7 consultation; or an expansion of the existing CVP Conservation Program that adequately compensates for the direct and indirect effects of increased water delivery to an area.

9. Reclamation will informally consult with the Service, and the Service will conduct intra-Service consultation, to determine whether any future CVP actions (including water transfers and permanent assignment of CVP waters) will affect listed species prior to signing a FONSI or ROD.

10. Interior will work closely with the water users, providing them maps of listed species habitats within their service-areas and guiding them through the consultation process to address site-specific effects. Reclamation may encourage CVP contractors to complete HCPs encompassing the affected areas.

11. Reclamation will consult on all changes in purpose of use for CVP water contracts, including changes from Agriculture to Agriculture/Municipal and Industrial purposes.

12. Reclamation and CVP contractors will comply with all opinions related to the CVP (listed on pages 1-4 to 1-5). Flow standards that form the environmental baseline of the 1995 OCAP biological opinion will be met, and Reclamation will take no discretionary actions (e.g. new contracts, contract amendments, facility construction) that would incrementally increase diversions and alter hydrologic and environmental conditions in the Delta until consultation on OCAP is reinitiated and completed. (Appendix K, letter to the Service and NMFS from Reclamation, dated October 29, 1999.)

13. Any site-specific effects to listed species will be consulted upon following site-specific analysis and prior to the effect, and the Service and Reclamation are adequately funded and staffed to complete tiered site-specific consultations from this opinion and track implementation of conservation actions.

14. Implementation of, and conformance with, recovery plans will be an integral part of all site-specific consultations.

15. The baselines of the species in Appendix B are stable or increasing, and monitoring (for the life of the project) will be implemented immediately to test and track this assumption.

16. The CVP will be managed in a manner consistent with the CVPIA Section 3406(b)(2) decision of October 1999.

17. Reclamation and CVP contractors will comply with all opinions related to the CVP (listed on pages 1-4 and 1-5).

18. Reclamation will coordinate closely with the Service during development and implementation of all O&M Plans and Resource Management Plans.

19. This biological opinion is based on information in the Service's file # 1-1-98-0124. New information may become available that indicates one or more of the above assumptions have not been met. If this occurs, Reclamation and the Service will reinitiate this consultation.

## Direct and Indirect Effects

Direct effects include those actions that are the direct result of the proposed action. Direct effects include interrelated actions (actions that are part of the larger proposed action and depend on the larger action for their justification) and interdependent actions (actions having no independent utility apart from the proposed action). Indirect effects are caused by or result from the proposed action, are later in time, and are reasonably certain to occur. The proposed action includes the continuing operation and maintenance of the CVP and implementation of the CVPIA and other resource conservation measures. It is assumed in this analysis that water will continue to be supplied up to the average delivery amounts (from years 1988 through 1997). Specific information on individual species can be found in the species accounts in Appendix E. Specific information on habitat types and trends can be found in the Baseline section of this opinion.

Site-Specific Effects from Operations and Maintenance

*Blunt-nosed Leopard Lizard* - An estimated 150 miles of CVP canals are within the range of the blunt-nosed leopard lizard. When blunt-nosed leopard lizards are above ground, during the summer active period, it is expected that they are likely to avoid direct mortality from maintenance activities such as mowing, but those activities may affect blunt-nosed leopard lizard foraging and reproduction.

*Giant Garter Snake* - An estimated 450 miles of CVP canals are within the range of the giant garter

snake. Many species of garter snake retreat into rodent burrows when disturbed and then leave the burrow when the disturbance increases. This behavior makes garter snakes very susceptible to being killed during mowing; however, it is expected that giant garter snakes are more likely to retreat into canals during disturbance-causing activities. Dredging can bury giant garter snake habitat, and potentially the snakes, when dredge spoils are placed on canal tops or banks. Dredging of CVP canals is an infrequent activity, therefore it is expected that no more than one linear mile of aquatic garter snake habitat will be buried annually.

*Giant Kangaroo Rat and Tipton Kangaroo Rat* - The giant kangaroo rat and Tipton kangaroo rat may inhabit as much as100 miles of CVP canals each. Kangaroo rats are very sensitive to sound and maintenance activities during the breeding season is likely to disrupt reproduction and affect foraging.

*San Joaquin Kit Fox* - An estimated 250 miles of CVP canals are within the range of the 250 miles of CVP canals and suitable denning and foraging habitat is likely to occur withing 200 feet on the upland side of the waterline. Mowing and other maintenance activities are likely to cause harassment of kit foxes. Because of careful implementation of avoidance measures, it is not expected that there will be any harm or harassment of San Joaquin kit foxes associated with natal dens.

*Valley Elderberry Longhorn Beetle* - Based on existing management projections, it is expected that as many of 200 elderberry plants, each with at least one stem measuring 1.0 inch or greater in diameter at ground level, or 2,000 elderberry stems measuring 1.0 inch or greater in diameter at ground level may be disturbed annually due to routine maintenance annually.

*Vernal Pool Crustaceans* - The standard avoidance measures for vernal pool crustaceans make the likelihood of impacting larger, more noticeable, pools unlikely. However, small pools make be inadvertently impacted by heavy equipment in some instances. It is estimated that no more than 0.5 acre of vernal pools in any one county during a twelve-month period are likely to be impacted.

Scope and Distribution of Effects

The direct and indirect effects of the CVP can occur throughout the Central Valley, Santa Clara Valley and part of San Benito County, Sierra and coastal foothills, and Delta by actions such as water impoundments and diversions, agricultural conversion and related operations, urban development, and continued operations and maintenance of the CVP. Listed species and critical habitat occur throughout the study area on (1) native habitats, (2) agricultural lands, and (3) marginal habitats surrounding reservoirs, conveyance facilities, pumping plants, urban centers, and agricultural lands. Activities associated with the CVP can thus directly or indirectly affect listed species or their critical habitat. For example, upstream water diversions affect the aquatic and riparian species downstream of the diversion. In addition, upland habitats supporting listed species are being converted to agricultural or urban land uses facilitated by availability and use of CVP water supplies.

Timing of Effects

CVP water is diverted year-round, although the majority is delivered during the spring and summer growing seasons. Water impoundments prevent heavy winter and spring run-offs, and diversions reduce water available during other parts of the year. Many species of fish require adequate flows during sensitive periods of their life cycle. Flood flows and spring runoff enhance the ecosystem when they: (1) scour out blocked channels to allow upward migration, (2) supply cool, fresh water needed for spawning, (3) inundate essential spawning habitat to allow for spawning, and (4) assist out-migration of juveniles.

Activities associated with agricultural operations often occur during sensitive periods of terrestrial species' life cycles. Ground disturbance and pesticide application often occur during reproductive effort and juvenile growth. Breeding, feeding, and foraging of listed species can be disrupted by agricultural operations during mating, denning, nesting, whelping, or other reproductive behavior.

Loss of adequate flows to sustain listed and proposed aquatic species can reasonably be expected to reduce the likelihood of survival and recovery of those species. However, this should not be the case given the assumptions that (1) the CVP will be managed in a manner consistent with the CVPIA Section 3406(b)(2) decision of October 1999; (2) flow standards that form the environmental baseline of the 1995 OCAP biological opinion are met; (3) Reclamation does not implement additional discretionary actions (e.g., new contracts, contract amendments, facility construction) that would incrementally increase diversions and alter hydrologic and environmental conditions in the Delta until consultation on OCAP is reinitiated and completed
–Appendix K, letter to the Service and NMFS from Reclamation, dated October 29, 1999; and (4) Reclamation and CVP contractors are in compliance with all opinions related to the CVP (listed on pages 1-4 and 1-5).

Agricultural operations during the breeding seasons of terrestrial species can reasonably be expected to reduce the likelihood of survival and recovery of listed and proposed species. However, this should not be the case given the assumptions that (1) any site-specific effects to listed species will be consulted upon following site-specific analysis and prior to the effect, (2) implementation of recovery plans will be an integral part of site-specific consultation, (3) ongoing monitoring and mapping of listed and proposed species baselines is occurring, and (4) baselines for listed species are shown to be increasing, or at least stable, by the monitoring.

Nature of the Effects

The pumping, delivery, and application of CVP water can adversely affect various aspects of the biology of listed species, including reproduction, growth, survival, migration, predator avoidance, and foraging. Conversion of habitats has eliminated or greatly reduced habitat use by listed species. Activities such as water impoundments and diversions, agricultural land conversions and related operations, municipal and industrial development, and operations and maintenance will continue to

directly and indirectly affect listed species and their habitat. A detailed description of the nature of the effects of the pumping, delivery, and application of CVP water follows. See Table 4.A. (following page) for habitats adversely affected by CVP activities. A more complete explanation of habitat trends can be found in the Baseline section of this opinion.

**Table 4.A**. Activities associated or facilitated by the CVP and the habitats that may be directly or indirectly adversely affected. Actual effects would be determined on a site-specific basis. An "X" denotes those activities that have the greatest impact on the habitat type, although the other activities may have an impact as well.

| Habitat Type | Water Impoundments & Diversions | Agricultural Conversion & Related Operations | Municipal & Industrial Development | Operations & Maintenance |
|---|---|---|---|---|
| Delta Aquatic Habitats | X | X | X | X |
| Vernal Pool Habitats | | X | X | X |
| Freshwater Wetland Habitats | X | X | X | X |
| Riparian Habitats | X | X | X | X |
| Coastal Beach/Lagoon/Dune Habitats | X | X | X | |
| Salt Marsh Habitats | X | | X | |
| Interior Grassland Habitats | | X | X | X |
| Alkali Scrub Habitats | | X | X | X |
| Oak Woodland Habitats | | X | X | |
| Evergreen Hardwood and Coniferous Habitats | | | X | |
| Chaparral Habitats | | | X | |
| Coastal Scrub and Coastal Grassland | | | X | |

*Water Impoundments and Diversions*

Water impoundments and diversions include: construction of dams, levees, pumping plants, and conveyance facilities; diversion of water out of the natural water course; and conveyance of the water to a different location. These activities have caused the loss and degradation of listed species habitat such as Delta aquatic habitat, wetlands, riparian corridors, coastal beaches and lagoons, and salt marshes. Diversions reduce the water available to water-dependent listed species such as Delta fishes,

anadromous salmonids, and riparian-dependent species.

The direct and indirect effects of water impoundments and diversions include the following:

1. Effects of impoundment, pumping and conveyance on fish include: direct mortality from pumping activities; mortality when listed fish and their predators are drawn into small areas (such as the Clifton Court Forebay), leaving them vulnerable to predation; entrainment of fish into water diversion facilities where they are killed by the pumps; reverse flows of waters in the Delta and San Joaquin River which confuse fish and disrupt migration; diversion of fish into canals from which they cannot return to suitable breeding and foraging habitat; prevention of upstream migration by dams; dewatering of portions of the San Joaquin River upstream of its confluence with the Merced that has eliminated native salmonids from the upper San Joaquin watershed; alteration of the magnitude, timing, and duration of flows; prevention of heavy spring run-off; constriction of low salinity habitat to deep-water river channels of the interior Delta; destruction of spawning, rearing, and refugial habitat; scouring of spawning areas by high flow releases from dams; changes in the hydrologic patterns in Delta waterways; movement of the mixing zone (X2) upstream from Suisun Bay to the interior of the Delta, where foraging and breeding habitat is poor in quality and limited in area; delays in correcting Delta flow problems, caused by time lags of one to three days between water releases from CVP reservoirs and arrival of water in the Delta; water temperature fluctuations; and loss and degradation of shallow water habitat and salt marsh habitats.

2. Flow regulation affects vegetation structure by preventing regeneration of riparian corridors, changing salt marsh vegetation by altering salinity, and degrading coastal lagoons. The vegetation in marshes around Suisun Bay has been increasingly converted from brackish to saltmarsh species due to the diversion of freshwater from the Delta and further exacerbated by droughts.

3. Construction of dams, pumping and conveyance facilities, and levees, as well as preparation of these sites for construction, have footprint effects that cause: direct loss of riparian bottomlands, grasslands, vernal pools, and other upland habitat; flooding of riparian valleys and the degradation of downstream riparian corridors; changes in hydrology and aquifers; and altered dispersal patterns of terrestrial species due to impassible barriers.

Construction of new facilities, raising dam levels, and modifications of operating parameters of existing facilities would increase the amount of water available, thereby facilitating the continued conversion of native habitat as described below. Site specific information is needed for a full determination of impacts of new facilities or modifications of existing facilities, so these actions are not covered in this opinion.

Decline of habitats and species numbers is expected to continue if water diversions and impoundments increase. Degradation of listed species habitats and lack of recovery of certain listed species is expected to continue as long as significant amounts of water continue to be impounded and diverted.

Water impoundments and diversions have ultimately led to the listing of many species and can reasonably be expected to reduce the likelihood of survival and recovery of listed and proposed species. However, this should not be the case given the assumptions that: the CVP will be managed in a manner consistent with the CVPIA Section 3406(b)(2) decision of October 1999; flow standards that form the environmental baseline of the 1995 OCAP biological opinion are met; Reclamation does not implement additional discretionary actions (e.g., new contracts, contract amendments, facility construction) that would incrementally increase diversions and alter hydrologic and environmental conditions in the Delta until consultation on OCAP is reinitiated and completed–Appendix K, letter to the Service and NMFS from Reclamation, dated October 29, 1999; Reclamation and CVP contractors are in compliance with all opinions related to the CVP (listed on pages 1-4 and 1-5); conservation actions described in the Project Description of this opinion are fully implemented, including Agency Commitments for New and Continuing Project Actions (page 2-3), specific guidance for Water Service Contracts (page 2-10) and Conservation Measures (2-31); discharges into surface water bodies by CVP water contractors resulting from CVP water impoundments and diversions will comply with the standards set in the biological opinion on the California Toxics Rule (number 1-1-98-F-21); Reclamation will consult on all changes in purpose of use for CVP water contracts from Agriculture to Agriculture/Municipal and Industrial; monitoring is implemented which shows that the baselines of the species in Appendix B are stable or increasing; and the Bureau and the Service will coordinate when the quantity of water to be delivered to the districts exceeds the average historical delivery amounts and in the view of the Service may affect listed or proposed species.

*Agricultural Conversions and Related Operations:*

Agricultural conversions and related operations either directly or indirectly facilitated by the CVP include: conversion of native habitats to agricultural fields; conversion of land use to more water intensive purposes; disposal of agricultural drainwater; application of pesticides; and other mowing and harvesting operations. Agricultural conversion and related operations have contributed to the loss and degradation of listed species habitat such as Delta aquatic habitat, vernal pools, wetlands, riparian habitats, coastal habitats, grasslands, alkali scrub, oak woodlands, rare serpentine soil habitats, and Antioch dunes habitat. Most of the other types of habitats considered in this opinion have also been affected to some degree by agricultural operations.

The direct and indirect effects of agricultural conversions and related operations facilitated by the CVP include the following:

1 Direct loss of upland, riparian and wetland habitats occurs when native habitats are converted to irrigated agriculture either with associated CVP allocations or in anticipation of a CVP allocations (e.g., via water transfers, water freed-up by water

conservation actions or land retirement). Conversion of native habitats such as vernal pools and uplands occurs by means of plowing and deep-ripping and reduces or eliminates the habitat's suitability for listed species.

2. Potential direct loss of upland, riparian and wetland habitats can occur with use new CVP supplies from raising dams of existing project facilities or from building new project facilities.

3. Conversion of native habitats to irrigated agriculture indirectly facilitated with CVP water allocations via the following means:

   a. Use of groundwater augmented by CVP water via 1) recharge from the application of CVP water to agricultural land; 2) recharge from adjacent project facilities; or 3) recharge from CVP water applied to water banks.

   b. Use of tail water produced from application of CVP water to agricultural land.

   c. Use of recycled water on agricultural land produced from application of CVP water to municipal and industrial development.

4. Degradation and fragmentation of remaining habitat, potentially without regard for the need of dispersal corridors, greatly reducing its value for listed species.

5. Effects to aquatic habitats from agricultural run-off include siltation of stream habitat and reduced water quality.

6. Effects from agricultural drainwater contamination, an unwanted byproduct of irrigating poorly drained soils on the westside of the San Joaquin Valley include: reduced water quality (*e.g.*, high concentration of total dissolved solids); degradation of surface- and groundwater quality through salinization and contamination by elevated concentrations of toxic or potentially toxic trace elements (*e.g.*, arsenic, boron, chromium, molybdenum, and/or selenium); direct loss of habitat from construction of on-farm disposal options such as evaporation ponds and agroforestry plantations; and adverse biological effects in native species associated with drainage-contaminated habitats. The effects of selenium poisoning on avian species include: gross embryo deformities, winter stress syndrome, depressed resistance to disease due to depressed immune system function, reduced juvenile growth and survival rates, mass wasting, loss of feathers (alopecia), embryo death, altered hepatic enzyme function, and mortality. The potential effects of selenium on mammal species include: gross embryo deformities, reduced longevity, winter stress syndrome, depressed resistance to disease due to depressed immune system function, reduced juvenile growth and survival rates, food aversion and mass wasting, loss of hair and nails, reduced reproductive success, skin lesions,

respiratory failure, lameness, paralysis, and mortality. Little information is available for the effects of selenium on reptiles and amphibians. Due to the close phylogenetic relationship between birds and reptiles, reptiles are likely to be similarly effected by selenium as birds are. Effects of selenium on fish include: gross embryo deformities. growth inhibition, depressed immune response, mass wasting, changes in blood parameters and tissue structure, edema, reduced activity and feeding, reduced survival, and mortality. The synergistic effects of selenium and mercury include embryo deformities, embryo death, reduced juvenile survival, behavioral abnormalities, depressed immune response, mass wasting, and mortality.

7. Insecticides, herbicides, and rodenticides applied to agricultural lands can adversely affect listed species by: direct mortality; secondary poisoning of predators and scavengers; degradation of habitat quality following herbicide application; loss of prey base after pesticide application; reduced water quality; impacting native habitat through pesticide and herbicide drift; and loss of pollinators.

8. Effects to terrestrial species include: loss of upland refugia near aquatic habitats; altered migration and dispersal patterns of animals due to large tracks of agricultural land; reduced likelihood of seed dispersal across agricultural fields; reduced survival in degraded habitats within and around agricultural operations; and reduced survival due to necessary operations such as mowing and harvesting.

Land conversion from native habitat to farmland is facilitated in part (directly or indirectly) by the supply of CVP water, and continues to occur. The California Department of Forestry and Fire Protection (1988) predicted net loss of 775,000 acres of native habitat in the Central Valley from 1980-2010. Between 1990 and 1996, a gross total of approximately 72,700 acres of native habitat were converted to farmland in 30 counties (total area 23.1 million acres) in the Conservation Program Focus area (California Department of Conservation 1994, 1996, 1998). This figure includes 1,206 acres of urban land, 42,520 acres of grazing land, 93 acres of water, and 28,854 acres of other land (predominantly native habitat). Net trends in agricultural acreage were negative over this period due largely to land idling in the southern San Joaquin Valley. To identify trends over a longer period, we analyzed DWR land use data collected from 1972 to 1998 for 21 counties in the Central Valley and Central Coast. Analysis of these data, although complicated by non-synchronous surveys and inconsistencies in survey area, indicates that net conversion of native habitat to agricultural and urban uses has averaged about 24,000 acres annually. Gross losses of native habitat have been considerably larger, because the net loss includes substantial increases in the "native" category from long-term idling or retirement of farmland. These recently created native lands may not constitute high-quality habitat for listed species. Expansion of agriculture into marginal or upslope lands continues to affect native habitat. The Service has identified at least 9,820 acres of endangered species habitat on 16 sites in Fresno, Kern, Madera, Merced, and Tulare Counties that have been lost to unpermitted conversions between 1997 and 1999. Changes to more intensive farming practices (from dryland farming to irrigated agriculture or from discing to deep-ripping) also increase the severity of agricultural impacts on endangered species.

Continued conversion of native habitats is one of the greatest threats to the survival of listed species in the Central Valley. The number of listed species in California continues to rise, in large part due to the loss and degradation of habitat from agricultural conversion. Conversions will continue to occur as irrigated/cultivated agriculture in the Central Valley continues to expand.

The effects of CVP water deliveries on groundwater recharge can be estimated as follows. The CVP delivered 3.4 million-acre-feet of irrigation water to farms in 1978 (Reclamation 1981). Thus, the CVP supplies about 31 percent of the surface water diversion irrigation water of 11 million-acre-feet. Using the same proportion of 31 percent to calculate the share of CVP to the aquifer recharge by surface diversion irrigation water of 4.6 million-acre-feet indicates that about 12 percent (1.4 million-acre-feet) of the groundwater recharge in the Central Valley is supplied by CVP each year, and the overall recharge over several years amounts to 2.3 million-acre-feet or about 20 percent of the 11.5 million-acre-feet of groundwater pumping for irrigation. Taken together, CVP supplies about 5.7 million-acre-feet or 25 percent of the 22.5 million-acre-feet of agricultural irrigation water used each year. Groundwater pumping is used in many areas of the Central Valley to substitute for or supplement surface diversion irrigation water during dry years (Williamson *et al.* 1989). As a result, the CVP contributes significantly to effects on most of the irrigated farmlands and urban uses of water in the Central Valley. Thus the entire service areas of the water districts and their associated groundwater basins, not merely those parcels that purchase water directly from Reclamation, should be included for all considerations regarding the adverse effects associated with land use changes.

Decline of habitats and additional listing of species is expected to continue if conversion of native habitat for agricultural purposes continues. Degradation of listed species habitats and lack of recovery of certain listed species is expected to continue as a result of continued agricultural operations and indirect effects of those operations.

Agricultural conversions, which are an indirect effect of water impoundments and diversions, have ultimately led to the listing of many species and can reasonably be expected to reduce the likelihood of survival and recovery of these species. However, this should not be the case given the assumptions that: any site-specific effects to listed species will be consulted upon following site-specific analysis and prior to the effect; implementation of recovery plans will be an integral part of site-specific consultation; Interior will work closely with the water users, providing them maps of listed species habitats within their service areas and guiding them through the consultation process to address site-specific effects; conservation strategies will be in place for districts or areas receiving CVP water; the CVP will be managed in a manner consistent with the CVPIA Section 3406(b)(2) decision of October 1999; flow standards that form the environmental baseline of the 1995 OCAP biological opinion are met; Reclamation will not implement additional discretionary actions (e.g., new contracts, contract amendments, facility construction) that would incrementally increase diversions and alter hydrologic and environmental conditions in the Delta until consultation on OCAP is reinitiated and completed–Appendix K, letter to the Service and NMFS from Reclamation, dated October 29, 1999; Reclamation and CVP contractors comply with all opinions related to the CVP (listed on pages 1-4 and 1-5); Interior will ensure full implementation of the conservation actions described in the Project

Description of this opinion, including Agency Commitments for New and Continuing Project Actions (page 2-3), specific guidance for Water Service Contracts (page 2-10) and Conservation Measures (2-31); discharges into surface water bodies by CVP resulting from CVP water impoundments and diversions will comply with the standards set in the biological opinion on the California Toxics Rule (number 1-1-98-F-21); Reclamation will consult on all changes in purpose of use for CVP water contracts from Agriculture to Agriculture/Municipal and Industrial; monitoring is implemented which shows that the baselines of the species in Appendix B are stable or increasing;and the Bureau and the Service will coordinate when the quantity of water to be delivered to the districts exceeds the average historical delivery amounts and in the view of the Service may affect listed or proposed species.

*Municipal and Industrial Development*

Municipal and industrial development facilitated by the CVP includes the following: conversion of native habitat to municipal and industrial uses; conversion of agricultural land for municipal and industrial uses; construction of infrastructure and supportive networks; pesticide and herbicide application; and recreational uses. Municipal and industrial development has contributed to the loss and degradation of all of the habitats described in the Baseline section of this opinion.

The direct and indirect effects of municipal and industrial conversions facilitated by the CVP include the following:

1. Direct loss of upland, riparian and wetland habitats when native habitats are converted to municipal and industrial land use either with associated CVP allocations or in anticipation of a CVP allocations (e.g., via water transfers, water freed-up by water conservation actions or land retirement). Conversion of native habitats to municipal and industrial development eliminates the habitat's usefulness for listed species.

2. Potential direct loss of upland, riparian and wetland habitats can occur with use new CVP supplies from raising dams of existing project facilities or from building new project facilities.

3. Conversion of native habitats to municipal and industrial development indirectly facilitated with CVP water allocations via the following means:

    a. Use of groundwater augmented by CVP water via (1) recharge from the application of CVP water to agricultural land; (2) recharge from adjacent project facilities; or (3) recharge from CVP water applied to water banks.

    b. Use of recycled water produced from application of CVP water to municipal and industrial development.

4. Degradation and fragmentation of remaining habitat, potentially without regard for the need of dispersal corridors, greatly reducing its value for listed species, including extreme degradation of rare habitats found only in a certain region (*e.g.*, serpentine and gabbro soils).

5. Recreational disturbance effects including: off-road vehicle use which disturbs and degrades habitats such as dunes; recreational use of beaches that degrades habitat; trampling by hikers, dogs, and horses; disturbance of normal behavioral patterns; and other human recreational disturbances that degrade upland habitat and disrupt the natural cycles of native species.

6. Development of infrastructure and supportive activities including: road construction and maintenance which eliminates, fragments, and disturbs habitat; energy development that eliminates upland habitat; freshwater discharges from waste water facilities that alter salt marsh habitats; fire suppression for protection of human habitations, resulting in degradation of fire-dependent habitats such as chaparral; clearing of uplands for fire breaks; power line installation and maintenance; and waste disposal sites that eliminate habitat such as serpentine soils.

7. Effects from urban development including: increased erosion; increased roadkill incidence; increased pesticide use; increased predation by pets and introduced animals such as red foxes; and reduced water and air quality.

It has been estimated that between 12,000 and 50,000 acres of land are converted from agricultural use to urban use per year in the Central Valley of California, a number that is expected to increase in the future (Sokolow, 1997). Conversion of agricultural land to urban use between 1995 and 2040 has been predicted to exceed 1,000,000 acres (Thompson et al. 1995). Between1990 and 1996, a total of approximately 101,700 acres were converted to urban land use in 30 counties in the Conservation Program Focus area (California Department of Conservation 1994, 1996, 1998). This figure includes 49,705 acres of farmland, 20,476 acres of grazing land, 113 acres of water, and 31,366 acres of other land (predominantly native habitat). The CVPIA PEIS projects that municipal and industrial land use in the Central Valley will increase 50 percent in the next 30 years (USBR 1997). Urban lands are unsuitable habitat for many species that are able to persist in agricultural landscapes, and are virtually impossible to restore as wildlife habitat than are agricultural lands. Because one acre of irrigated agricultural land requires more water than that same acre in urban use, conversion of agricultural land to municipal and industrial use frees up some water that can be used to convert additional native habitat. Reducing water deliveries during drought is also more difficult on urban lands than on agricultural lands, so agricultural to urban conversions reduce the flexibility of the CVP to respond to water shortages.

Several rare habitat communities (such as those on gabbro soils and serpentine soils) are currently under increasing pressure to be developed for municipal and industrial uses. Decline of habitats and species numbers is expected to continue as urban expansion persists and the population of California

continues to rise. Degradation of listed species habitats and lack of recovery of certain listed species is expected to continue as a result of indirect impacts from urban centers.

Municipal and industrial development, which is an indirect effect of water impoundments and diversions, can reasonably be expected to reduce the likelihood of survival and recovery of these species, because once the development has occurred, the opportunity of utilizing the land to contribute to survival and recovery is foreclosed. However, reduction in the likelihood of survival and recovery of these species should not be the case based on the assumptions that: any site-specific effects to listed species will be consulted upon following site-specific analysis and prior to the effect; implementation of and conformance with recovery plans will be an integral part of site-specific consultation; Interior will work closely with the water users, providing them maps of listed species habitats within their service-areas and guiding them through the consultation process to address site-specific effects; conservation strategies will be in place for districts or areas receiving CVP water; the CVP will be managed in a manner consistent with the CVPIA Section 3406(b)(2) decision of October 1999; flow standards that form the environmental baseline of the 1995 OCAP biological opinion are met; Reclamation will not implement additional discretionary actions (e.g., new contracts, contract amendments, facility construction) that would incrementally increase diversions and alter hydrologic and environmental conditions in the Delta until consultation on OCAP is reinitiated and completed–Appendix K, letter to the Service and NMFS from Reclamation, dated October 29, 1999; Reclamation and CVP contractors comply with all opinions related to the CVP (listed on pages 1-4 and 1-5); Interior will ensure full implementation of the conservation actions described in the Project Description of this opinion, including Agency Commitments for New and Continuing Project Actions (page 2-3), specific guidance for Water Service Contracts (page 2-10) and Conservation Measures (2-31); discharges into surface water bodies by CVP contractors resulting from CVP water impoundments and diversions will comply with the standards set in the biological opinion on the California Toxics Rule (number 1-1-98-F-21); Reclamation will consult on all changes in purpose of use for CVP water contracts from Agriculture to Agriculture/Municipal and Industrial; monitoring is implemented which shows that the baselines of the species in Appendix B are stable or increasing;and the Bureau and the Service will coordinate when the quantity of water to be delivered to the districts exceeds the average historical delivery amounts and in the view of the Service may affect listed or proposed species.

*Operations and Maintenance*

Operations and maintenance activities include mowing, levee maintenance, dredging, pest control, erosion control, and flood control. Operations and maintenance activities can contribute to loss and degradation of most of the habitats listed in the Baseline section, but have the most impact on Delta aquatic habitats, vernal pools, wetlands, riparian habitats, grasslands, and alkali scrub.

The direct and indirect effects of operations and maintenance of the CVP include the following:

1. Canal maintenance or dredging disturbs wetland habitat, increases siltation, and disturbs behavior of aquatic listed species.

2. Direct mortality from vehicle traffic, mowing, and burning on levees and near canals.

3. Flood control (including flow restrictions, levee maintenance and installation of riprap) can interfere with the natural regeneration processes of forests and alter other upland and wetland habitats by removing vegetation or changing patterns of disturbance and sediment deposition.

4. Continued disturbance of habitats around facilities through maintenance activities prevents reestablishment of native habitat and disturbs hibernating or denning species.

5. Insecticides, herbicides, and rodenticides applied around facilities can adversely affect listed species by: direct mortality; secondary poisoning of predators and scavengers; degradation of habitats following herbicide application; loss of prey base after pesticide application; reduced water quality; pesticide and herbicide drift; and loss of pollinators.

Degradation of listed species habitats and mortality and disturbance of listed species is expected to continue as a result of continued operations and maintenance activities associated with CVP facilities.

Operations and maintenance can reasonably be expected to reduce the likelihood of survival and recovery of these species. However, this should not be the case given the assumptions that: O&M plans are developed and implemented by all Reclamation area offices as described in this opinion and are consistent with section 7(a)(1) of the ESA; Interior will ensure full implementation of other conservation actions described in the Project Description of this opinion, including Agency Commitments for New and Continuing Project Actions (page 2-3), specific guidance for Water Service Contracts (page 2-10) and Conservation Measures (2-31); any site-specific effects to listed species will be addressed through site-specific analysis and implementation of avoidance measures in compliance with this opinion; implementation of and conformance with recovery plans will be an integral part of management actions; Reclamation will consult on development and implementation of Resource Management Plans; Reclamation and CVP contractors comply with all opinions related to the CVP (listed on pages 1-4 and 1-5); discharges into surface water bodies resulting from CVP water impoundments and diversions will comply with the standards set in the biological opinion on the California Toxics Rule (Service File # 1-1-98-F-21); monitoring is implemented which shows that the baselines of the species in Appendix B are stable or increasing.

Duration

The effects of the CVP can be divided into three types, based on duration of effect.

1. Short-term events whose effects are relaxed almost immediately. Routine maintenance activities tend to be short-term events.

2. Sustained, long-term events whose effects are not relaxed. Water flows vary from year to year depending on available flows and contract deliveries. The continued impoundment, pumping, and diversion of water has long-term effects on species dependent on historical water flows.

3. Permanent events that set a new threshold for some feature of a species' environment. The construction of dams and the corresponding loss of a riparian corridor and the surrounding land due to flooding is an example of a permanent event. Conversion of land for intensive agricultural uses or urban centers also permanently removes that habitat for use by listed species dependent on that habitat.

The CVP was initiated to provide a steady water supply to water users. As such, the effects of the CVP tend to be sustained events or permanent changes.

Disturbance Frequency, Intensity, and Severity

Water is diverted every year to fulfill various water rights and water contracts. Most agricultural fields are irrigated every year, although the intensity of irrigation may vary from year to year depending on available water. Some fields are fallowed each year. In the event of a prolonged low-flow period, the effect of continued diversions on listed species would be greater. Pesticides are applied every year, often more than once a year, on most fields.

Conversions of habitat facilitated by CVP water have drastically reduced the range of many listed species. Listed species may or may not be able to recover from repeated disturbance, depending on the sensitivity of the species, the severity of the disturbance, and the other stressors in its environment. Listed species tend to be more sensitive to disturbance and habitat loss, simply due to their restricted range. Each species will react differently to the disturbance. Refer to the individual species accounts in Appendix 6 for explanation of the reasons for decline and sensitivity to disturbance.

Even relatively small land conversions facilitated by the CVP in rare habitats such as gabbro soils, serpentine soils, dunes, and vernal pools can significantly reduce the range of already rare species. This can be especially true of listed plant species that are dependent on specific soil types for survival, as well as the animal species that utilize those plants.

The disturbances and habitat loss caused by the CVP leave species more vulnerable to other stressors in their environment, such as floods, drought, fires, disease, pollution, and predators. Species with severely restricted ranges become vulnerable to inbreeding, hybridization with other subspecies, and genetic drift. Severe or moderate disturbances can decrease the recovery rate of a species or reduce the chances of recovery. Direct and indirect effects of the CVP have caused many native species in the Central Valley to be listed, and continued activities may continue to negatively impact listed species. Many direct, indirect, interrelated, and interdependent effects of the CVP have occurred and are expected to continue to occur.

Conservation Measures

Reclamation and the Service have committed to implementation of conservation measures associated with various biological opinions and passage of the CVPIA. Activities include implementation of: biological opinions and their associated programs, actions associated with CVPIA, measures to reduce or eliminate adverse effects to plant and animal species associated with operation and maintenance of CVP facilities, actions under the wetlands program, and the Central Valley Project Conservation Program. Full implementation of these programs and consultation to minimize any secondary adverse effects is crucial to maintaining or increasing the likelihood of survival and recovery of listed species in the affected area. More detail on these programs is provided in the Project Description section of this document.

*CVPIA Programs*

One of the purposes of the CVPIA is to protect, restore, and enhance fish and wildlife populations and their habitats. Most of the provisions of the CVPIA deal with methods to improve the habitat and survival of native fish. Through programs such as the Anadromous Fish Restoration Program, the impacts of the CVP on listed fish species is expected to be reduced. Full implementation of the CVPIA would result in increased flows in the Sacramento and San Joaquin Rivers and their tributaries, and increased Delta outflow through acquisition of (b)(2) and (b)(3) water. These flows would have a positive impact on Delta fishes, anadromous salmonids, and other listed species. Increased Trinity River flows would improve habitat for listed species in the Trinity River system. Fish screens, fish passages, reduced flow fluctuations, and other modifications to operations would result in increased survival, increased reproductive output, improved habitat quality, and decrease the possibility of entrainment of Delta fishes and anadromous salmonids. Modifications of dams, pumping plants, and fish hatcheries would also improve habitat quality for Delta fishes and anadromous salmonids.

Full implementation of the CVPIA will improve water supplies for anadromous fish and improve refuge water supplies. Land fallowing would decrease the use of pesticides in the local area, potentially affecting water quality. Land fallowing, flooding of fields, and full level 4 refuge water supplies are expected to benefit both terrestrial and aquatic listed species.

Increased flows and riparian restoration programs would increase riparian areas used by listed species. Riparian restoration efforts would increase riparian areas along Clear, Cow, Cottonwood, Mill, Deer, and Big Chico Creeks, and the Sacramento, Yuba, lower American, Mokelumne, Stanislaus, Tuolumne, Merced, and San Joaquin Rivers. Increased flows would increase riparian areas on other rivers as well. The (b)(1)"other" program would benefit listed species through habitat acquisition, management, restoration, and studies. Improvements in fisheries resources would improve conditions for piscivorous wildlife.

The CVPIA land retirement program may benefit species eventually, depending on the quality of land that is retired and restoration efforts. Retirement of severely degraded land is unlikely to benefit listed species. Water that is released back to the district from retired land will allow further land conversion. Long term effects which could include eventual habitat rehabilitation may take 10-20 years. Further documentation is needed to determine the effect of land retirement on listed species.

*Take Avoidance Plans*

Implementation of the take avoidance measures described in the Operations and Maintenance Manual is necessary to maintain or increase the likelihood of survival and recovery for listed species. The take avoidance measures would reduce take of endangered species and reduce the impact of maintenance of levees, mowing, and other activities. The Operations and Maintenance Manual contains measures to reduce impacts from earth moving, minor construction, erosion control, pest control, weed abatement, etc. on wetlands and sensitive, threatened, and endangered species.

*Conservation Program and Other Resource Conservation Programs*

Effects of the Conservation Program activities will, with time, provide a benefit by supporting recovery actions, through support of specific research activities to provide for better adaptive management of species and habitat, and to set aside lands and restore and enhance lands to provide habitat for species that have historically occurred within the CVP service area. Implementation of other resource conservation programs and restoration of wetlands should further improve existing conditions.

Implementation of the Conservation Program and other resource conservation programs will reduce the impacts of the many CVP activities on listed species. The Conservation Program and (b)(1) "other" program will create a means of preserving listed species habitat that is left. From 1993-1998, (b)(1) "other" and other CVPIA programs, in conjunction with state and private cooperators, contributed funds toward acquisition of 79,111 acres of upland habitat and 1,578 acres of riparian habitat, and these beneficial effects are expected to continue. Maintaining the likelihood of survival and recovery for listed species assumes full and timely implementation of high priority actions and Priority 1 recovery tasks for listed species, with corresponding increases in funding for (b)(1)"other and the Conservation Program. Take minimization measures, such as take avoidance plans, will reduce the likelihood of take from operations and maintenance of the CVP. With implementation of the ESA compliance strategy, the effects of many future actions on listed species would be reduced. Overall, the take avoidance measures, resource conservation measures, and full implementation of the CVPIA would minimize many of the impacts of the CVP.

As part of implementation of the Friant and Interim biological opinions, Reclamation in conjunction with the water districts has also accomplished a number of other conservation actions including: support of the Endangered Species Recovery Program; public outreach on endangered species issues; aerial photo analysis in the San Joaquin Valley; habitat enhancement projects (Kings River, Madera Equalizing Reservoir, etc.); a feasibility study for vernal pool creation; determination of land ownership

in areas of biological interest; and ground surveys for endangered species on private property and canal rights-of-way. These actions are likely to aid the recovery of listed species.

**Cumulative Effects**

Cumulative effects are those effects of future State, local, or private actions on endangered and threatened species or critical habitat that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action (*e.g.*, non-CVP Reclamation projects such as the Solano Project, Corps projects, and Forest Service or Bureau of Land Management actions) are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Numerous activities continue to eliminate habitat for listed and proposed threatened and endangered species in the Central Valley. Habitat loss and degradation affecting both animals and plants continues as a result of urbanization, oil and gas development, road and utility right-of-way management, flood control projects, overgrazing by livestock, and continuing agricultural expansion. Listed and proposed animal species are also affected by poisoning, shooting, increased predation associated with human development, and reduction of food sources. All of these nonfederal activities are expected to continue to adversely affect listed and proposed species in the Central Valley.

Cumulative effects on many species are severe enough to substantially reduce the likelihood of long-term survival and recovery of these species. Ongoing operation of the CVP contributes to the threat to these species. However, Reclamation's proposed ESA compliance strategy is designed to minimize further losses within the CVP service areas and to offset impacts from ongoing CVP operations. Thus Reclamation's proposed action and ongoing CVP operations would not contribute to, but instead would serve to lessen, the adverse impacts of nonfederal activities that otherwise could jeopardize the survival of listed threatened and endangered and proposed species within the Central Valley. Part of Reclamation's commitment is to adopt an adaptive strategy in the implementation of recovery and enhancement actions. As more information becomes available, components of actions can be modified to provide the most benefit. This strategy should hasten the recovery of species within the Central Valley over time.

In this section, a general description of the adverse impacts to habitats described in the Baseline section of this opinion are characterized. The habitat sections that follow describe in more detail how activities and events are impacting listed species.

Cumulative Effects to Habitats

*Delta Aquatic Habitats*

Delta fishes continue to be adversely affected by entrainment, upstream or reverse flows of waters in the Delta and San Joaquin River, destruction of spawning and refugial areas, change in the hydrologic

patterns in Delta waterways, and constriction of low salinity habitat to deep-water river channels of the interior Delta (Moyle *et al*. 1992). Reduced or reversed flows due to pumping can confuse migrating fishes and lengthen out-migration periods. Pumping activities can concentrate Delta fishes and their predators in small areas where predation risk is increased. Fish can be killed by impingement on screening facilities at high flow rates, entrainment through pumping plants, and diversion into unsuitable habitat. Reduction in food supply due to water diversions can also cause increased mortality. Water diversions contributing to these cumulative effects include intakes serving non-federal pumping plants, municipal and industrial uses, water for power plants, and numerous small, private agricultural lands and duck clubs in the Delta, upstream of the Delta, and in Suisun Bay. Suitable water quality must be provided by addressing point sources of contaminants so that maturation is not impaired by pollutant concentrations. Levee maintenance disturbs spawning and rearing habitat, and re-suspends contaminants into these waters.

Cumulative effects on the delta smelt and Sacramento splittail include any continuing or future non-Federal diversions of water that may entrain adult or larval fish or that may decrease outflows incrementally, thus shifting the position of these fish species preferred habitat upstream. Water diversions through intakes serving numerous small, private agricultural lands and duck clubs in the Delta, upstream of the Delta, and in Suisun Bay contribute to these cumulative effects. These diversions also include municipal and industrial uses, as well as providing water for power plants. Delta smelt adults seek shallow, tidally influenced, fresh water (*i.e.*, less than 2 ppt salinity) backwater sloughs and edgewaters for spawning. To assure egg hatching and larval viability, spawning areas also must provide suitable water quality (*i.e*., low concentrations of contaminants) and substrates for egg attachment (*e.g*., submerged tree roots, branches, emergent vegetation). Suitable water quality must be provided by addressing point sources of contaminants so that maturation is not impaired by pollutant concentrations. Levee maintenance disturbs spawning and rearing habitat, and resuspends contaminants into these waters.

The introduction of exotic species may occur when the levees are breached or when separate creeks or river systems are reconnected during various projects. Several exotic species may adversely affect the delta smelt and splittail, including the Asian clam and three non-native species of euryhaline copepods. The Asian clam could potentially play an important role in affecting the phytoplankton dynamics. The exotic copepods may displace native species and at least one species of copepod (*Sinocalanus doerri*) is difficult for larval fishes to catch because of its fast swimming and effective escape response. Reduced feeding efficiency and ingestion rates weaken and slow the growth of young and make them more vulnerable to starvation and predation.

Other cumulative effects include: wave action in the water channel caused by boats that can degrade riparian and wetland habitat and erode banks; the dumping of domestic and industrial garbage, presenting hazards to the fish because they could become trapped in the debris, injure themselves, or ingest the debris; reduction of habitat, and introduction of pesticides and herbicides, from golf courses; oil and gas development and production remove habitat and may introduce pollutants into the Napa River; agricultural uses on levees reduce riparian and wetland habitats; residential or agricultural land

use can fragment and reduce wildlife habitat and corridors; unscreened agricultural diversions throughout the delta divert all life stages of the fish (Service 1996); and grazing activities may degrade or reduce suitable habitat.

Additional cumulative effects result from the impacts of point and non-point source chemical contaminant discharges. These contaminants include selenium and numerous pesticides and herbicides associated with discharges related to agricultural and urban activities. Implicated as potential sources of mortality for delta smelt and Sacramento splittail, these contaminants may adversely affect delta smelt and Sacramento splittail reproductive success and survival rates. Spawning habitat may also be affected if submersed aquatic plants used as substrates for adhesive egg attachment are lost due to toxic substances.

*Vernal Pools*

Activities that contribute to vernal pool habitat losses include plowing and deep-ripping for agriculture, energy development, urban development, flood control projects, highway and utility projects, and overgrazing (California Department of Fish and Game 1992; 58 **FR** 41700; 59 **FR** 48136). Limited distributional patterns increase the susceptibility of individual populations and entire species to severe declines from both natural and human-induced disturbances. Much of the remaining vernal pool habitat continues to be degraded by fragmentation, changes in hydrologic patterns, off-road vehicle use, increased competition from non-native species, periodic drought, and miscellaneous human disturbances. In many areas, the cumulative effects of habitat loss, fragmentation, and degradation reduce the potential for remaining habitats to indefinitely sustain viable populations of rare species. Some vernal pool complexes are protected from disturbance, but the majority remains under pressure for development, and threatened by activities such as agricultural and urban development, mosquito abatement, gravel mining, flood control and water conveyance projects, pipeline projects, reservoir construction, off-road vehicle use, intensive livestock grazing, refuse disposal, and other activities (59 **FR** 48136). Listed plant species endemic to vernal pool habitats are adapted to hydroperiods with winter inundation and summer drying, and are outcompeted by marsh plants when hydrology is altered so standing water is permanently present.

*Freshwater Wetland Habitats*

These wetlands continue to be drained for agricultural and urban use. Some wetlands may also be inundated by reservoirs and converted to open water habitat. Conversion of natural habitats to agricultural and urban uses results in loss of marshes, sloughs, ponds, and small streams. Many of the remaining wetlands may be converted from seasonal to permanent water inundation. Habitat value of some man-made wetlands (rice fields, canals, reservoirs) is adversely affected by maintenance activities and pesticide use.

*Riparian Habitats*

Factors contributing to the loss of riparian forest include: (1) continued conversion of nonirrigated land to irrigated agriculture, (2) levee construction and maintenance, (3) bank erosion, (4) browsing by livestock, (5) use of riprap for bank protection, (6) groundwater extraction, (7) flow regulation, and (8) the continuing development of land along the riparian corridor. Dams flood riparian vegetation in their impoundments and degrade it downstream by altering flows and geomorphic processes. Flood control interferes with natural processes that affect forest regeneration. Controlled water release from dams reduces mid-successional habitat (dominated by brush and young to mid-aged trees). Unusually heavy or extended flooding of remnant riparian habitats can be detrimental to some terrestrial endangered species (*e.g.*, riparian brush rabbits could drown or be isolated in small upland refugia where they would be more vulnerable to predation; giant garter snakes dormant in burrows could drown or be forced to seek new hibernacula).

*Coastal Beach, Lagoon, and Inland Dune Habitats*

Continued recreational use of beaches causes disturbance to nesting snowy plovers and least terns from pets, beachcombers, and off-road vehicles. Dune habitats on coastal beaches continue to be altered by the introduction of invasive dune-stabilizing vegetation (especially the beach grass *Ammophila arenaria* and the ice-plant *Carpobrotus edulis*). Dune-stabilizing vegetation competes for space with native dune plants (see Table 3.D) and stabilizes open sand faces needed by native dune plants.

Lagoon habitats are altered by upstream water diversions, dredging, and associated changes in salinity, pollution, and siltation. During drought periods, the lack of rainfall, combined with human induced water reductions (*i.e.*, diversions of water from streams, excessive groundwater withdrawals), degrades lagoon ecosystems and creates extremely stressful conditions for most aquatic species. The introduced yellowfin goby (*Acanthogobius flavimanus*) may also compete with the tidewater goby in lagoon habitats.

Ongoing threats to listed species at the Antioch Dunes include competition from weedy species, disturbance from fuel break maintenance and people walking to the riverfront, and ecological changes resulting from severe reduction, fragmentation, and degradation of the dune ecosystem (U.S. Fish and Wildlife Service 1984).

*Salt Marsh Habitats*

Pollution, over-exploitation of commercial fisheries, water diversions, and introduction of numerous non-native species continue to affect the ecology of San Francisco Bay tidal marshes. A number of factors influencing the remaining tidal marshes limit their habitat value. Much of the East Bay shoreline from San Leandro to Calaveras Point is rapidly eroding. Many marshes around South San Francisco Bay are undergoing vegetational changes because of land subsidence caused by groundwater pumping. In addition, an estimated 600 acres of former salt marsh along Coyote Creek, Alviso Slough, and Guadalupe Slough is currently dominated by fresh- and brackish-water vegetation due to continuing freshwater discharge from South Bay wastewater facilities and is thus of lower quality for California

clapper rails and salt marsh harvest mice. In San Pablo and Suisun Bays the average salinities are increased by upstream diversions by the CVP and DWR water projects. Intertidal and riparian marsh habitats used by species such as the California clapper rail, salt marsh harvest mouse, and Suisun thistle may be degraded or destroyed by a variety of development and maintenance activities conducted by private organizations or state or local governments.

*Interior Grassland Habitats*

Grassland losses have continued to result from urban expansion and conversion to irrigated croplands. Degradation of grassland quality also continues, especially on heavily grazed rangelands. Conversely, grasslands are also being created by conversion of other native habitats for grazing.

*Alkali Scrub Habitats*

Alkali scrub habitat continues to decline because of agricultural conversion, flood control, and groundwater pumping.

*Oak Woodland Habitats*

Continued habitat loss and decline results from clearing for livestock forage improvement, residential and commercial development, fuelwood harvesting, agricultural conversion, and other activities. In many areas, remaining oak woodlands are declining due to lack of regeneration and survival of young trees. The reasons for the lack of stand regeneration in oaks are not well understood; however, competition with introduced grasses; fire suppression; and consumption of acorns and seedlings by livestock, rodents, and other wildlife have all been implicated (Mayer *et al*. 1986, Griffin 1977). Urban and agricultural development, rangeland improvement, fuel harvesting, and other activities continue to eliminate oak woodland habitats.

*Coniferous and Mixed Forest Habitats*

Continuing timber harvest creates large areas of early-successional clearcuts and even-aged young stands, reduces the structural complexity of forests, diminishes the availability of snags and deadwood habitat, increases the fragmentation of habitat with logging roads and clearcuts, and causes soil erosion into streams. Local areas of forest are severely affected by mining and the growth of urban areas.

*Chaparral Habitats*

Chaparral habitat continues to be converted to urban areas and agricultural land. In many areas deterioration of remaining habitat results from fire suppression, which leads to excess accumulations of woody material and unusually large and intense conflagrations when fires eventually occur (Hanes 1977).

The species associated with gabbro soils are declining as a result of: habitat loss, fragmentation, and alteration of natural ecosystem processes caused by residential and commercial development; grading, road construction and maintenance; fire suppression; herbicide use; unauthorized dumping; mining; and other activities (59 **FR** 18774).

Fifteen active surface mines on private land near Ione continue to remove Ione soils habitat; approved reclamation plans show that in excess of 3,500 acres of surface removal will occur. Plants on Ione soils are also threatened by disease, clearing of vegetation for irrigated/cultivated agriculture and fire protection, habitat fragmentation, residential and commercial development, changes in fire frequency, and ongoing erosion.

Sierra serpentine habitats are being reduced and degraded by urbanization. Species on serpentine soils are also adversely affected by firebreak construction, agricultural land conversion, livestock grazing, trash dumping, off-road vehicle use, recreational gold mining, and trampling by hikers.

*Coastal Scrub and Coastal Grassland Habitats*

Four major factors contribute to changes in the distribution and composition of coastal prairies: the introduction of highly competitive, non-native species; an increase in grazing pressures; the elimination of annual fires; and cultivation (Heady *et al*. 1988). In addition, urban growth is increasingly causing fragmentation and restriction of coastal prairie and coastal scrub habitat. Threats to species on these habitats include loss of habitat to urbanization, roadkill fatalities, illegal collection, off-road vehicle use, unsuitable levels of livestock grazing, trampling of food plants by horses and hikers, use of insecticides, rock and sand quarrying, and invasive exotic vegetation.

Ongoing threats to listed and proposed species on serpentine habitats in the Bay Area include urban growth (including residential developments, golf courses, road and highway construction, and waste disposal), recreational use of open space (resulting in erosion and facilitating growth of weedy species), invasion by non-native plants, and ecological changes resulting from severe habitat reduction and fragmentation (57 **FR** 59053).

Threats to endemic species of Zayante sandhill habitats include destruction of habitat from residential development, recreational activities, equestrian use, agriculture, invasion by non-native vegetation, changes in fire cycles, and sand mining.

<u>Instream Flows and Water Impoundments and Diversions</u>

Hydrodynamic conditions in the Delta are tied to continuing and future hydraulic modifications in the Delta made for various beneficial purposes, such as levee construction for land reclamation and flood control; channel dredging, enlargement, and deepening for navigation and levee maintenance; operation of diversion pumps, siphons, and drainage pumps; and construction of non-Federal export pumping plants and associated facilities for water management. Increased demands may further reduce reservoir

storage and will adversely affect riverine conditions. Reduced availability will result from: (1) operations that reduce the frequency of spill from upstream reservoirs; (2) build out by senior water right holders; and (3) changes in the criteria that define surplus flows. Continued upstream impoundment and diversion of snowmelt will reduce the potential for high spring outflows. Because surplus flows combined with required flows in the Water Quality Control Plan are critical for transporting fish larvae to rearing habitat and maintaining that rearing habitat in a suitable location in Suisun Bay, new diversions of surplus water will reduce the likelihood that fisheries declines will be reversed. Variation in climate between years can also exacerbate the cumulative effects of water diversions. Annual rainfall has varied greatly over the last 10 years. Drought conditions increase demand for water while reducing the total amount of water available for fish and wildlife, agricultural, municipal and industrial uses, and can thus result in additional shortfalls in instream flow and upstream movement of the 2 parts-per-thousand (ppt) isohaline (X2). Extremely high precipitation events can also adversely affect endangered species. Delta fishes can suffer increased mortality if they are carried out of their preferred estuarine habitats toward San Francisco Bay by high outflows.

Contaminants and Water Quality

Agricultural and industrial activity can introduce contaminants into water used by threatened and endangered species. These contaminants may include selenium, arsenic, cadmium, chromium, copper, mercury, lead, nickel, silver, tributyltin, zinc, hydrocarbons, and organochlorines. Contaminants may enter surface waters through point source spills and discharges, urban and agricultural runoff, deposition of atmospheric aerosols, and dredging that releases contaminants trapped in sediments.

The major source of water contamination in the Central Valley is agricultural drainwater, which has high salinity, high selenium concentrations (particularly in water draining selenium-rich soils in the San Joaquin Valley), and pesticides. Dumping of highly saline drainwater into rivers can have similar adverse effects on aquatic organisms.

Evaporation ponds which concentrate selenium-rich drainwater can attract wetland animals which may then die or suffer developmental abnormalities from selenium toxicity. Broadcast spray of malathion and other pesticides in agricultural areas can drift into non-target areas, kill plant pollinators, reduce insect prey species, and contaminate runoff. Pesticides cause death of the small invertebrates and zooplankton that support the food chain, and can be toxic to higher-level predators by bioaccumulating to increased concentrations. Eggs and larvae of aquatic organisms are particularly vulnerable to mortality or developmental abnormalities from pesticides. Levee maintenance and dredging resuspends contaminants trapped in sediments. Selenium, pesticides, and herbicides may adversely affect delta smelt and Sacramento splittail reproductive success and survival rates.

Spillage of wastewater from mining activity (particularly the Iron Mountain Mine) could potentially introduce large pulses of water laden with contaminants such as copper, zinc, and cadmium into Central Valley river systems and the Delta. Central Valley waters could also be contaminated by incidental leakage of gasoline and oil from vehicles and storage tanks, illegal dumping of waste oil, or accidental

spills of chemicals or fuel oil from tank trucks or rail cars. Release of contaminated ballast in San Francisco Bay further reduces water quality.

Exotic Species

Exotic species continue to spread and be introduced into aquatic habitats of the Delta and Central Valley rivers. Releases of ballast water from ships or deliberate stocking of fish introduce exotic species into water bodies. Exotic euryhaline clams reduce the abundance of phytoplankton. (Euryhaline species are able to live in water with widely varying salinity.) Exotic diatoms growing in chains are more difficult for zooplankton to graze upon. Introduced copepods are more difficult to catch than native copepod species and may thus reduce food availability for native fishes. Introduced silversides and gobies may prey on eggs and larvae of native fishes. Larval striped bass and other exotic fish may compete for food and space with native fishes. Delta smelt may hybridize with the introduced Japanese pond smelt. Introduction of large predatory fish such as northern pike has the potential to greatly increase mortality of native fishes.

Introduced bullfrogs pose a great threat to a variety of aquatic species, including snakes, fish, and other frog species. Adult bullfrogs are accomplished predators which can populate an area quickly and outcompete, as well as prey upon, the natives.

Introduced plants have also caused problems for native species. Exotic plants compete with native plants for light, space, and nutrients. The lack of natural population controls for exotics (*i.e.*, predators, disease, etc.) can allow these species to completely outcompete native species and form a monoculture of an introduced species. Species such as the Brazilian elodea (*Egeria densa*) and yellow star thistle (*Centaurea solstitialis*) have taken over aquatic and terrestrial habitats (respectively) in California.

Native Habitat Conversion and Associated Activities

Terrestrial and wetland habitats used by threatened and endangered species continue to be modified or converted by private entities or state or local governments. The increase in urbanization and agricultural conversion increases fragmentation and degradation of remaining habitat.

Land conversions that occur include: oil and gas development; mining or quarrying for sand, gravel, or minerals; liquid waste treatment plants; wind farms; pipeline installation; transmission line installation; creation of reservoirs or evaporation ponds; construction of roads or other transportation infrastructure; urban or industrial developments; or agricultural conversion. Land conversions can result in take of a wide variety of threatened or endangered animal species, including but not limited to giant garter snake, California red-legged frog, San Joaquin kit fox, blunt-nosed leopard lizard, valley elderberry longhorn beetle, and vernal pool crustaceans. Numerous threatened and endangered plants of vernal pool, wetland, grassland, serpentine, and alkali scrub habitats are also affected by ongoing habitat conversion. Areas of endemism where habitat conversion would have disproportionately large effect on listed species include: remnant vernal pool complexes and riparian habitats in the Sacramento and

San Joaquin Valleys; alkali scrub/grassland habitats of the San Joaquin Valley and Carrizo Plain; the San Bruno Mountain and Milagra Ridge area of San Mateo County; the gabbro and serpentine soils of the Pine Hill intrusion in El Dorado County; the Antioch Dunes in Contra Costa County; the Zayante sand hills of the Santa Cruz Mountains; and the serpentine soils of the San Francisco Bay and Santa Clara Valley areas. Many of these areas are currently under great pressure to be developed for municipal and industrial uses.

Conversion of land for agricultural purposes continues to be the most critical threat to listed species. Although the increment of habitat loss attributable to urban development appears to be increasing, these activities remain less significant, for most species, than conversion of native habitats for irrigated/cultivated agriculture. Agricultural conversion is generally not subject to any environmental review and is not directly monitored or regulated. Conversion of privately owned habitat without use of federally supplied water or filling of wetlands typically does not result in section 7 consultation with the Service, nor is it usual for there to be an application for a section 10 incidental take permit. Illegal fill of wetlands without Corps permits has occurred in the past and is likely to continue. In addition, CVP water is used for groundwater recharge by some districts in the San Joaquin Valley. Such recharge may allow nearby landowners to pump groundwater for uses that may affect listed and proposed species.

The California Department of Forestry (1988) has predicted wildland habitat losses totaling 110,000 acres in the Sacramento Valley region and 465,000 acres in the San Joaquin Valley region between 1980 and 2010 as a result of agricultural conversion and urbanization. Much of the projected loss is likely to occur in the remaining blocks of habitat for listed and proposed species.

During habitat conversion threatened and endangered species could be killed or injured by operation of heavy equipment (crushing, burial by earthmoving equipment, discing, grading, mowing) or flooding of habitat. Individuals could be harassed during construction by noise, ground vibrations and compaction of burrows, construction lighting, and disruption of foraging and breeding behavior. Individuals not killed directly by operation of equipment would probably find themselves in suboptimal habitat with a decreased carrying capacity due to lower availability of foraging and breeding habitat and greater vulnerability to predation. If individuals were displaced from converted lands into nearby native habitat, population densities would rise and intraspecific competition and predation pressure would be likely to increase. Animals that loose their fear of humans can become more vulnerable to shooting, poisoning, and roadkill. Habitat conversion also reduces the availability of suitable habitat for future recovery of species and isolates populations by increasing habitat fragmentation.

Some listed terrestrial species (*e.g.*, bald eagle, San Joaquin kit fox, kangaroo rats, giant garter snake) are vulnerable to accidental or intentional unauthorized take by electrocution on electric fences or power lines, trapping, shooting, clubbing, or poisoning. Incidental disturbance from human activity may also cause disruption of normal foraging and reproductive activities. Listed plants may be threatened by vandalism or horticultural collecting. Listed butterflies can be threatened by unauthorized collecting by

lepidopterists. These forms of unauthorized take are likely to occur more frequently as the human population in the Central Valley increases and native habitat is fragmented and converted.

Vehicular traffic is an ongoing hazard that can cause roadkill mortality for a wide variety of terrestrial listed species (*e.g.*, giant garter snake, blunt-nosed leopard lizard, San Joaquin kit fox, California red-legged frog). Traffic will be increased by construction of new roads and agricultural, industrial, and urban development. As barriers to dispersal, roads also reduce the probability that unoccupied habitat will be colonized by listed species. Roadside maintenance can affect listed plants by grading, mowing, erosion control, and spraying of herbicides.

Off-road vehicles can kill or injure listed plants and animals, as well as causing erosion, harassing animals with noise and ground vibrations, and crushing burrows used for shelter. Heavy pedestrian foot traffic can also compact soil and trample plants and small or dormant animals.

Rodent control measures can: reduce the availability of prey for listed predators (*e.g.*, San Joaquin kit fox); injure or kill listed predators through secondary poisoning if poisoned rodents are eaten; injure or kill other listed species (*e.g.*, Fresno, Tipton, and giant kangaroo rats, San Joaquin woodrat) that may eat rodenticide-treated baits; and reduce the availability of ground squirrel burrows as shelter and hibernation refugia for listed species (*e.g.*, giant garter snake, San Francisco garter snake, kangaroo rats). Use of burrow fumigants on levees and other potential upland refugia can injure or kill listed species sheltering in ground squirrel burrows.

Urban and agricultural development results in increased abundance of domestic and feral cats and dogs, as well as wild predators (such as raccoons, red foxes, and skunks) that are attracted to trash dumping and suburban developments. This high abundance of predators can result in increased predation rates for small terrestrial vertebrates, including listed species (*e.g.*, blunt-nosed leopard lizard, giant garter snake, California red-legged frog). Listed predatory species such as the San Joaquin kit fox may similarly suffer increased competition for space and food. Other indirect effects from urbanization include increased disturbance levels, ground slumping, garbage dumping, altered fire regimes, vandalism to protected habitats, increased foot traffic through protected areas, and unauthorized activities that adversely affect the survival of rare species.

Listed plant species can be buried or killed by dumping of trash, fill dirt, or garden debris. Dredging and clearing of vegetation from irrigation canals reduces foraging habitat and escape cover for giant garter snakes. Listed species in wetland habitats (including vernal pool crustaceans and eggs and tadpoles of California red-legged frogs) may be injured or killed by mosquito abatement measures including pesticide application and predation by introduced mosquitofish.

Hydrological changes caused by development can include changes in the water table or increased runoff from upslope agricultural irrigation, residential development, or golf courses. Erosion and slumping of soils may result from changes in hydrology. These effects may change the suitability of habitat for listed plant species.

Transformation of watercourses and wetlands from seasonal to permanent hydroperiods by irrigation and damming alters the plant and animal communities, allowing colonization by bass, sunfish, bullfrogs and emergent marsh vegetation such as cattails and tule reeds. Tadpoles of California red-legged frogs typically metamorphose by late summer and are able to survive if wetlands dry in early autumn. Bullfrogs, which are larger and have a longer tadpole period, will competitively exclude California red-legged frogs in permanent water bodies. Bullfrogs, bass, and sunfish will also prey on California red-legged frog eggs and tadpoles.

Oil exploration poses a threat to many species as well. Construction of pads and roads associated with oil development, as well as the process of finding oil deposits can disturb large areas of habitat. Noise, vibration, traffic, and other human disturbances can also adversely affect species in the area.

Grazing and Land Management

Livestock grazing on State and private lands can cause erosion and degradation of riparian vegetation that provides habitat for listed species such as the valley elderberry longhorn beetle, southwestern willow flycatcher, riparian brush rabbit, and San Joaquin woodrat. Livestock wallows may degrade seasonal wetlands that harbor listed species. Trampling can also collapse rodent burrows used as shelter by some listed species. Listed plant species can be adversely affected by overgrazing and trampling, which can reduce survival and reproductive output of plants. However, in some cases moderate levels of grazing may be beneficial to listed plants by preventing establishment of competing species. Management for high deer and elk populations can also result in increased grazing and browsing pressure on listed plant species.

Most native plant species have adapted to a certain level of grazing pressure. Grazing management practices are often incompatible with the continued survival of certain species. For many species, the grazing management that would best suit the species is simply unknown. This may lead to inappropriate habitat management practices.

Logging on State and private lands can kill or harm listed species that require mature forest habitat (*e.g.*, marbled murrelet, northern spotted owl). These species could be directly killed or injured by destruction of active nests, or indirectly harmed by increasing predation risk or reducing the availability of nest sites, suitable foraging habitat, or prey.

Fire management activities can change the fuel load and the frequency and severity of fires. The fire regime can affect listed plants by changing germination success, seed bank composition, adult mortality, and intensity of interspecific competition.

Management regimes that pose a threat to species include: lack of protection on private lands, lack of funding for protection, lack of funding for correct management, management practices for one species that eliminates another, or inappropriate habitat management due to lack of information on the biology

of the species. Private land management practices can also be incompatible with the continued viability of species.

Population Size and Life History

Certain aspects of the biology of species put them more at risk of extinction from habitat degradation and fragmentation. Small populations are more at risk to random catastrophic events than large populations. Events such as drought, flooding, predators or pests, fires, and disease can pose a serious threat to a species that is limited to only several small populations. Small populations are also at risk of genetic drift, hybridization with closely related species or subspecies, and inbreeding. The lack of genetic variability leaves species at further risk to random events. Many native species are dependent on rare habitat types, leaving them at risk from development in these areas. Species with low density, low reproductive rate, large home ranges, or dependency on social facilitation are further at risk to multiple stressors.

**Conclusion**

After reviewing the current status of the species in Appendix B, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, the Service has determined that the level of programmatically anticipated take is not likely to result in jeopardy to the species listed in Appendix B, or destruction or adverse modification of critical habitat. In the absence of the conservation measures and other commitments in the **Project Description**, the effects analysis above would support a conclusion of jeopardy for many of the listed species in the affected area; however, this no-jeopardy determination is based upon implementation of and compliance with all of the **Assumptions** used in this analysis (page 4-1).

# Incidental Take Statement

**Statement of Regulation**

Section 9 of the ESA and Federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harass is defined by the Service as an intentional or negligent act or omission which creates the likelihood of injury to a listed species by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering. Harm is defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by impairing behavioral patterns including breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with this Incidental Take Statement.

Sections 7(b)(4) and 7(o)(2) of ESA do not apply to the incidental take of listed plant species. However, protection of listed plants is provided to the extent that ESA requires a Federal permit for removal or reduction to possession of endangered plants from areas under Federal jurisdiction, or for any act that would remove, cut, dig up, or damage or destroy any such species on any other area in knowing violation of any regulation of any State law, including the California Endangered Species Act, or in the course of any violation of a State criminal trespass law.

The measures described below are non-discretionary, and must be implemented by Reclamation in order for the exemption in section 7(o)(2) to apply. Reclamation has a continuing duty to regulate the activity covered by this incidental take statement. If Reclamation (1) fails to require staff or contractors to adhere to the terms and conditions of this incidental take statement through enforceable terms that are added to water contracts, construction contracts, or Reclamation policy and/or (2) fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse.

The amount of incidental take addressed below is for those actions that are within Federal discretion for the purposes of section 7 of the ESA. As discussed in the Effects of the Proposed Action, the anticipated take from the proposed action transcends Federal discretion due to the indirect effects of the proposed action. As discussed in the Project Description, separate section 7 consultation will

occur on projects wherein an area-specific analysis is needed. Those actions which are covered by this incidental take statement, and those which will require future incidental take authorization, are discussed in more detail below.

**Included and Excluded Activities**

*Activities Covered by This Incidental Take Statement* - Incidental take of listed species may result from normal operation and maintenance of CVP facilities, as described below in the **Amount or Extent of Take** section. These activities may include: routine maintenance activities of canals, ditches, and levees; mowing; grading and repair of roads; construction of firebreaks; spraying, drift, or runoff of herbicide or insecticide on the facilities; and use of equipment near vernal pools that does not result in fill of wetlands, penetration of hardpan, or permanent changes in hydrology. These activities may also include ordinary operations and maintenance activities similar in scope, impact, and duration to those above but not specifically listed. The actual delivery of Federal water by Reclamation to the water districts is also covered under this incidental take statement.

*Activities Not Covered by This Incidental Take Statement* - Incidental take of listed species that are addressed in other biological opinions, including but not limited to OCAP, Los Vaqueros, Friant and Interim, is not covered by this incidental take statement. Incidental take of listed species caused by the following activities is not covered by this incidental take statement:

- Construction of new water delivery or treatment facilities
- New water contracts
- Private actions related to the use of CVP water, including construction of private development projects facilitated by CVP water
- Indirect effects of delivery of the water in contract service areas
- Indirect effects of delivery of the water outside contract service areas
- Indirect effects of delivery of the water outside of the place-of-use
- Maintenance activities on privately owned water delivery systems
- Projects that would require Corps permits for fill of wetlands under Section 404 of the Clean Water Act
- Selenium contamination of Refuge Water Supplies
- Adverse effects of selenium on the delta smelt and giant garter snake
- Actions of individual entities in utilizing CVP water for either agricultural or municipal and industrial purposes
- Local HCP's within the CVPIA study area

**Amount or Extent of Take**

The incidental take anticipated in this opinion is only in the form of harming, killing, or harassment of giant garter snake, Sacramento splittail, valley elderberry longhorn beetle, and vernal pool crustaceans, and in the form of harassment for blunt-nosed leopard lizard, giant kangaroo rat, Tipton kangaroo rat, and San Joaquin kit fox. No other forms of take are anticipated. Implementation of the Avoidance Measures in Appendix F is expected to substantially reduce, but not eliminate, the potential for incidental take of listed species resulting from operation of the CVP and implementation of the CVPIA. The actions and processes for which this incidental take statement applies include the direct effects of the continued operation and maintenance of CVP facilities for these species only.

*Blunt-nosed Leopard Lizard* - The Service anticipates that take of blunt-nosed leopard lizards will be difficult to quantify for the following reasons: (1) the small body size makes the finding of dead or injured specimens unlikely; (2) losses may be masked by seasonal fluctuations in numbers or other causes; (3) the secretive or diurnal nature of the species; and (4) the species occurs in burrows. For these reasons, the Service is estimating the level of take for blunt-nosed leopard lizards (in the form of harassment only) in terms of the total linear feet of habitat along canals within the affected area that may be influenced, at unpredictable locations and infrequent intervals, by operations and maintenance actions. Therefore, the Service has determined that the continued operations and maintenance of the CVP could result in the harassment of blunt-nosed leopard lizards inhabiting as much as, but no more than, 150 miles of CVP canals (each) that may result from activities such as mowing along the canals. In accordance with the project description, each mile of canal will be mowed no more than once each year.

*Giant Garter Snake* - The Service expects that incidental take of giant garter snakes will be difficult to quantify for the following reasons: (1) the snakes are secretive and notoriously sensitive to human activities, (2) individual snakes are difficult to detect unless they are observed, undisturbed, at a distance, and (3) the difficulty of detecting and tracking all operations and maintenance activities that may result in harm of listed species. For these reasons, the Service is estimating the level of take in terms of the total linear feet of aquatic habitat within the affected area that may be influenced, at unpredictable locations and infrequent intervals, by operations and maintenance actions. Therefore, the Service has determined that the maintenance mowing of CVP canals and facilities could result in the killing, harm, or harassment, annually, of giant garter snakes inhabiting approximately 450 miles of CVP canals. In addition, giant garter snakes could be harmed or killed as a result of dredging in as much as, but no more than, one linear mile of aquatic garter snake habitat (such as dredging in a canal or ditch) annually.

*Giant Kangaroo Rat and Tipton Kangaroo Rat* - The Service anticipates that take of giant kangaroo rats and Tipton kangaroo rats will be difficult to quantify for the following reasons: (1) the small body size makes the finding of dead or injured specimens unlikely; (2) losses may be masked by seasonal fluctuations in numbers or other causes; (3) the secretive or diurnal nature of the species; and (4) the

species occurs in burrows. For these reasons, the Service is estimating the level of take for the kangaroo rats (in the form of harassment only) in terms of the total linear feet of habitat along canals within the affected area that may be influenced, at unpredictable locations and infrequent intervals, by operations and maintenance actions. Therefore, the Service has determined that the continued operations and maintenance of the CVP could result in the harassment of all giant kangaroo rats and Tipton kangaroo rats inhabiting as much as, but no more than, 100 miles of CVP canals (each) that may result from activities such as mowing along the canals. Each mile of canal may be mowed no more than once each year.

*Sacramento splittail* - The Service anticipates that take Sacramento splittail will be difficult to quantify for the following reasons: (1) finding dead or impaired specimens is unlikely; (2) losses may be masked by seasonal fluctuations in numbers or other causes; (3) the aquatic nature of the species; (4) the effects of Selenium poisoning on Sacramento splittail has not been quantified; and (5) dead or impaired specimens may not show external signs of poisoning. For these reasons, the Service is estimating the level of take for Sacramento splittail for the entire area of the water bodies directly affected by Reclamation pumping Selenium-laden water into the conveyance system. Therefore, the Service has determined that the continued operations and maintenance of the CVP could result in the killing, harm, or harassment of all Sacramento splittail that enter the Delta Mendota Canal and Mud Slough.

*San Joaquin Kit Fox* - The Service anticipates that take of San Joaquin kit fox will be difficult to quantify for the following reasons: (1) finding dead or impaired specimens is unlikely; (2) losses may be masked by seasonal fluctuations in numbers or other causes; (3) the secretive nature of the species; and (4) species occurs in dens. For these reasons, the Service is estimating the level of take for San Joaquin kit fox (in the form of harassment only) in terms of the total linear feet of habitat along canals within the affected area that may be influenced, at unpredictable locations and infrequent intervals, by operations and maintenance actions. Therefore, the Service has determined that the continued operations and maintenance of the CVP could result in the harassment of all San Joaquin kit foxes inhabiting as much as, but no more than, 250 miles of CVP canals (and 200 feet on the upland side of the waterline) that may result from activities such as mowing along the canals. This incidental take statement does not extend to harassment of active San Joaquin kit fox natal dens.

*Valley Elderberry Longhorn Beetle* - The Service anticipates that incidental take of valley elderberry longhorn beetle will be difficult to quantify for the following reasons: (1) the small body size makes the finding of dead or injured specimens unlikely, (2) the secretive nature of the species, and (3) the difficulty of detecting and tracking all operations and maintenance activities that may result in harassment of listed species. Due to the difficulty in quantifying the number of valley elderberry longhorn beetles, the Service is estimating incidental take due to the proposed project on the basis of loss of elderberry bushes. The Service has determined that continued operations and maintenance of the CVP could result in the loss of all beetles inhabiting as many as, but no more than, 200 elderberry plants, each with

at least one stem measuring 1.0 inch or greater in diameter at ground level, or 2,000 elderberry stems measuring 1.0 inch or greater in diameter at ground level along levees and canals due to routine maintenance annually. This incidental take quantification does not extend to any activity that results in loss or destruction of riparian habitat along a natural watercourse.

*Vernal Pool Crustaceans* - The Service expects that incidental take of the vernal pool crustaceans (vernal pool fairy shrimp, vernal pool tadpole shrimp, and conservancy fairy shrimp) will be difficult to quantify for the following reasons: (1) the aquatic nature of the organisms and their relatively small body size make the finding of dead or injured specimens unlikely, (2) the variable sizes of resident populations over time, and (3) the difficulty of detecting and tracking all operations and maintenance activities that may result in harassment of listed species. Due to the difficulty in quantifying the number of vernal pool crustaceans that will be taken as a result of the proposed action, the Service is quantifying take incidental due to the proposed project as the number of acres of habitat that will become unsuitable for the species as a result of the action. Therefore, the Service has determined that the continued operations and maintenance of the CVP could result in the loss of all vernal pool crustaceans inhabiting as much as, but no more than 10 acres of vernal pools during a twelve-month period and no more than 0.5 acre of vernal pools in any one county during a twelve-month period. This incidental take estimation does not extend to any activity that results in fill of water of the United States under the jurisdiction of the United States Army Corps of Engineers, beyond the 10 acres identified above.

Upon implementation of the following reasonable and prudent measures, Reclamation will become exempt from the prohibitions described under section 9 of the ESA for direct effects of routine operations and maintenance activities of the CVP, for the species, forms of take, and areas described in this section. Individual users of the Federal water will not be exempt from section 9 of the ESA under this incidental take statement, but are expected to receive incidental take permits via the section10(a)1(B) permit process or by separate section 7 consultation. No other forms of take are expected to occur. Therefore, this exemption does not extend to other forms of take other than that described for the blunt-nosed leopard lizard, giant kangaroo rat, giant garter snake, San Joaquin kit fox, vernal pool crustaceans, Tipton kangaroo rat, or valley elderberry longhorn beetle**.**

**Effect of the Take**

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

**Reasonable and Prudent Measures**

The following reasonable and prudent measures are necessary and appropriate to minimize the direct impact of the take of terrestrial species and the direct and indirect effects of maintenance on all listed species.

I. Protect listed species on lands held or managed by Reclamation.

II. Quantify and monitor Selenium contributions to the Madera Canal, Mud Slough, San Joaquin River, and the Sacramento and San Joaquin River Delta in collaboration with the Service.

**Terms and Conditions**

In order to be exempt from the prohibitions of section 9 of ESA, Reclamation must comply with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are nondiscretionary.

I. Reclamation shall protect listed species on lands held or managed by Reclamation by implementing the following:

A. Prior to selling or transferring the deed of Reclamation lands, Reclamation shall implement the following:

1. The land shall be surveyed for proposed, threatened, and endangered species according to FWS protocols (see guidelines for botanical surveys in Appendix 8). Even if not occupied by proposed, threatened, or endangered species, an assessment shall be prepared to determine the suitability of the land for use in recovery of listed, proposed, and special status species. Recovery plans shall be utilized during the writing of the assessment. Reclamation shall consult informally with the Service during this process.

2. Reclamation shall not sell or transfer properties that are identified in recovery plans as needed to achieve recovery, or the corridors necessary to connect these lands, except to agencies satisfactory to the Service and after consultation with the Service.

B. Reclamation must implement take avoidance measures in Appendix F on all lands held or managed by Reclamation within the CVPIA-PEIS study area and must implement the compensation measures in Appendix G for the blunt-nosed leopard lizard, giant

garter snake, giant kangaroo rat, San Joaquin kit fox, Tipton kangaroo rat, vernal pool crustaceans, and valley elderberry longhorn beetle.

1. Reclamation must ensure that the avoidance measures found in Appendix F are followed by Reclamation staff.

2. Reclamation must ensure the completion of operations and maintenance manuals for the CVP, the distribution of the manuals to the necessary parties, and the implementation of the measures in the manuals.

3. Reclamation must ensure the implementation of Service-approved O&M plans, and all of the protective measures for listed species that are identified in the plans, including distribution and implementation of O&M manuals and implementation of Integrated Pest Management plans by the following dates:

    a. April 31, 2000 for area administered by the South-Central California Area Office,
    b. September 30, 2000, for the area administered by the Central California Area Office,
    c. March 31, 2001, for the area administered by the Northern California Area Office

4. Reclamation must follow and comply with the compensation measures in Appendix G for routine operations and maintenance of CVP facilities where: impacts of these activities to the blunt-nosed leopard lizard, giant garter snake, giant kangaroo rat, San Joaquin kit fox, Tipton kangaroo rat, vernal pool crustaceans, and valley elderberry longhorn beetle are unavoidable, and the action is in conformance with this biological opinion.

5. Reclamation shall notify the Service when incidental take of listed species as provided for in this opinion has or may occur; Reclamation shall only proceed with take provided for in this opinion after receiving and agreement from the Service to append the action to this opinion; and Reclamation shall provide the Service with yearly summaries of actual incidental take of listed species as provided for in this opinion.

C. When Reclamation is using the standard habitat creation and preservation measures (Appendix G), and has an area that they wish to set aside in perpetuity for the protection of listed species, the following conditions shall be met:

1. A Service-approved conservation easement shall be placed on the conservation area for the protection of listed species and their habitat in perpetuity from further development. The easement shall include, but not be limited to, provisions and responsibilities of Reclamation for the protection of conservation area including any future transfers of the easement or fee interest that may be anticipated. The easement shall specify the purposes for which it is established. The Service shall receive a true copy of the recorded conservation easement within 30 days of its recordation. The easement shall be held by a third party approved by the Service. The easement shall include a list of prohibited activities that are inconsistent with the maintenance of the preserve for the listed species. To address the possibility of the third-party easement holder vacating the easement, the easement shall contain a reversion clause that reverts the title to Reclamation until another third party is found to hold the easement.

2. Reclamation shall establish an adequate endowment fund for monitoring and perpetual management and maintenance of the conservation area. The principal in the endowment must generate sufficient revenue to cover the costs of alien species removal, maintenance of fencing, monitoring of the habitat and species, and remediation of indirect effects in perpetuity. The endowment amount must be prior-approved by the Service, to address sufficiency, and the endowment shall be made to a Service-approved entity. Specific actions covered under the endowment shall be addressed in the Management Plan (further described below). A third party selected by Reclamation and approved by the Service shall work with Reclamation to determine what amount of money is necessary for an endowment fund to adequately finance the monitoring and perpetual management and maintenance of the preserve and mitigation area.

3. A Management Plan for the conservation area shall be completed. A draft of the Management Plan shall be submitted to the Service for review and approval. The Management Plan shall include, but not be limited to, explanations of how the conservation area will be managed in perpetuity for the benefit of special status species.

4. Appropriate Contaminants assessment, and remediation if necessary, shall be conducted on all set-aside lands.

D. Reclamation must protect denning San Joaquin kit foxes.

1. Reclamation shall not mow canal levees more frequently than once each year.

2. Prior to mowing in kit fox habitat--including canal levees--from north of San Louis Reservoir to Los Vaqueros Reservoir, Reclamation must survey for kit fox dens and report den location and den activity to the Service. For all dens detected, the avoidance measures in Appendix F must be followed.

E. Reclamation shall not fumigate rodent burrows in potential giant garter snake, kangaroo rat, blunt-nosed leopard lizard, or San Joaquin kit fox habitat.

II. Reclamation shall quantify and monitor selenium contributions to the Delta Mendota Canal, Mud Slough, San Joaquin River, and the Sacramento and San Joaquin River Delta and associated effects on listed species in collaboration with the Service by implementing the following:

1. Reclamation shall help identify the source of selenium contamination in the Delta Mendota Canal, Mud Slough, San Joaquin River, and the Sacramento and San Joaquin River Delta.

2. If selenium concentration in refuge water supplies exceeds the 2ug/l monthly mean standard and this contamination is a result either directly or indirectly from Reclamation actions, Reclamation shall identify and implement corrective actions and initiate separate formal consultation with the Service.

3. Reclamation shall provide quarterly reports to the Service on locations of monitoring and monitoring results. These reports can be in conjunction with the monitoring and reporting required under the January 20, 1998, Interim Water Contract Renewal Opinion amendment (Service file #1-1-98-I-383).

4. Reclamation will commit to funding a monitoring program to assess the effects of selenium loading from the San Joaquin River on Sacramento splittail, delta smelt, and giant garter snake using the lower San Joaquin River and Sacramento-San Joaquin Delta. Such a program should determine tissue concentration for these species (or appropriate surrogates) collected from these areas. Data will be made available by August 2000 to be included in the analyses of effects of long-term water contract renewals.

The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take on a species that might result from the proposed action. If, during

the course of the action, the level of incidental take described above is exceeded, such incidental take would represent new information requiring review of the reasonable and prudent measures provided. The Federal agency must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures.

**Reporting Requirements**

Reclamation shall notify the Service immediately if dead or injured endangered species are found during implementation of actions or on Reclamation land and must submit a report including date(s), location(s), habitat description, and any corrective measures taken to protect the individual(s) found. If endangered animals are captured, the report shall also include photographs of the individuals, condition of the individual, length of time held, release location, and any other pertinent information.

For all endangered species encountered during construction and construction-related activities, Reclamation shall submit locality information to the California Department of Fish & Game (CDFG), using completed California Native Species Field Forms or their equivalent, within 90 calendar days of the species being observed. Each form shall have an accompanying scale map of the site (such as a photocopy of a portion of the appropriate 7.5 minute U.S. Geological Survey map) and shall provide at least the following information: township, range, and quarter section; name of the 7.5- minute or 15-minute quadrangle; dates (day, month, year) of field work; number of individuals and life stage (where appropriate) encountered; and a description of the habitat by community-vegetation type.

For those projects requiring a Service-approved biologist or where mitigation is required, a post-construction compliance report prepared by the Service-approved monitoring biologist shall be forwarded to the Chief, Endangered Species Division, at the Sacramento Fish and Wildlife Office within 60 calendar days of the completion of each project and shall include the file number of this consultation on the cover sheet (1-1-F-98-1). This report shall detail (1) dates that construction occurred; (2) pertinent information concerning the applicant's success in meeting project mitigation measures; (3) an explanation of failure to meet such measures, if any; (4) known project effects on federally listed species, if any; (5) occurrences of incidental take of federally listed species, if any, (including handling and relocation); and (6) other pertinent information.

# Conservation Recommendations

Section 7(a)(1) of ESA directs Federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities that can be implemented to further the purposes of the ESA, such as preservation of endangered species habitat, implementation of recovery actions, or development of information and data bases. The recommendations here relate only to the proposed action and do not necessarily represent complete fulfillment of Reclamations 7(a)(1) responsibilities. The Service recommends that Reclamation:

1. Implement all programs within CVPIA to be consistent with §7(a)(1) of the ESA.

2. Operate the CVP in a manner that is consistent with §7(a)(1) of the ESA.

3. When coordinating with the Service regarding project impacts and effects determinations, include coordination with the Service's Endangered Species Division to assure consistency with §2 and §4 of the ESA.

4. Provide annual assessments to the Service confirming whether or not the **Assumptions** on pages 4-1 and 4-2 are valid.

5. In preparing NEPA documents relative to transferring or delivering water out of the CVP, or contributing selenium to the CVP, fully consider §7(d) of the ESA.

6. Fully implement §3406 of CVPIA prior to delivering or transferring water out of CVP service areas or out of the CVP place-of-use.

7. Conduct studies for the Central Valley Project with particular reference toward releasing more water to restore riparian habitat and contribute to the recovery of the riparian brush rabbit, riparian woodrat, least Bell's vireo, southwestern willow flycatcher, and yellow-billed cuckoo. The Service will assist in the study design.

8. Release more water from Friant Dam to improve downstream water quality to the extent necessary to restore high-value habitat for listed species.

9. Follow the strategy set forth by the Service's Habitat Conservation Division on implementation of 3406(b)(3) and 3408(j).

10. Provide more education to Reclamation staff at all levels on upholding the ESA and 7(a)(1) responsibilities.

11. Conduct workshops for Service and Reclamation staff on implementing this biological opinion and on the importance of the concepts of communication, coordination and cooperation that establish the premise of this biological opinion.

12. Provide outreach to the public and to schools on protecting listed species, establishing safe harbors, forming partnerships that foster conservation, and habitat conservation planning.

13. Fund studies of groundwater percolation and contaminant levels through the Service or the United States Geological Survey.

14. Follow ecosystem protection components for the Central Valley and Bay Delta of the Service's Ecoregion Program.

15. Adopt the Plan of Action prepared by the Service's Habitat Conservation Division and utilize the Request for Consultation Services for implementation of 3406(c)(1).

16. Have Reclamation Environmental Affairs staff review Water Management Plans prior to submitting to the Service.

17. Evaluate species of concern and their associated habitats, as listed in Appendix 5, to assess possible adverse effects of CVP actions and identify conservation measures that could protect species populations and help avoid the necessity of listing those species under the ESA.

18. Establish a tracking program for compliance with this opinion and report to the Service any actions which are not consistent with this opinion.

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

# Reinitiation/Closing Statement

This concludes formal consultation on the actions outlined in the request. 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.