United States Department of the Interior

FISH AND WILDLIFE SERVICE
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IN REPLY REFER TO:
1-1-01-I-0311

November 21, 2000

Memorandum

To: Regional Director, Mid-Pacific Region, Bureau of Reclamation

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

Subject: Biological Opinion on Implementation of the CVPIA and Continued Operation and Maintenance of the CVP (Reference 1-1-98-F-0124)

With this memorandum, we are transmitting the Fish and Wildlife Service's *Biological Opinion on Implementation of the CVPIA and Continued Operation and Maintenance of the CVP*. If you have any questions, please contact Cay Goude, Assistant Field Supervisor for the Endangered Species Program, at (916) 414-6648.

Wayne S. White

Attachment

Biological Opinion on Implementation of the CVPIA and Continued Operation and Maintenance of the CVP

November 2000

U.S. Fish and Wildlife Service
Sacramento Fish and Wildlife Office
Endangered Species Division

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Project Description

Introduction

Purpose of Consultation

The purpose of this consultation, and subsequent tiered consultations that follow, is to achieve Endangered Species Act (ESA) compliance for the continued operation and maintenance of the Central Valley Project (CVP) and implementation of the Central Valley Project Improvement Act (CVPIA). The Bureau of Reclamation (Reclamation) and the U.S. Fish and Wildlife Service (Service) have completed a Final Programmatic Environmental Impact Statement (PEIS) addressing the implementation of the CVPIA and are preparing a Record of Decision (ROD) to formally document how the CVPIA will be implemented. Due to the interrelated aspects of the CVPIA and the CVP, Reclamation requested initiation of formal consultation for both implementation of the CVPIA and the continued operation and maintenance of the CVP on March 28, 1998. The intent of initiating this consultation was to ensure that all ESA compliance requirements be addressed in a comprehensive manner, and that a process be established to facilitate tiered consultations on implementation of specific actions.

It is assumed for this biological opinion that all actions of the CVPIA described as being implemented in this Project Description will be implemented in their entirety. The proposed action is split into six sections to simplify and clarify the proposed actions, and does not serve to functionally sever implementation actions in the CVPIA from one another. Specifically, long-term contract renewals, which are discussed separately in section 2 (Description of the Proposed Action) of this opinion, are inextricably linked with the other actions described in this opinion, and were analyzed with the assumption that all commitments and *conservation measures* in the Project Description of this opinion are implemented. A specific action or program of Reclamation or the Service may not necessarily be disrupted or otherwise affected depending on the extent to which the overall program outlined in this Project Description continues to be successfully implemented. Therefore, while some components of the overall program may not be advancing at any given time, a proposed action could move forward independently if the delay in implementation of these other components does not adversely affect the baseline of a species or designated *critical habitat*. In addition, *conservation measures* and other components of the Project Description can be modified through adaptive management, as may be required/desired through informal consultation conducted within continuous coordination processes as described in section VI.

Opinion Summary and Conclusion

This biological opinion addresses both operations and maintenance of the CVP and implementation of the CVPIA of 1992. The description of the Proposed Action (starting on page 2-1) was developed collaboratively by Reclamation and the Service and includes, in part, a description of the proposed actions found in the Final PEIS for the CVPIA. The commitments and *conservation measures* (programs) specified in section VI of the Project Description have been developed by Reclamation and the Service to conserve listed species and address impacts resulting from past and continuing actions related to the operation and maintenance of the CVP and implementation of the CVPIA, Section 7(a)(1) activities, and other authorities. The programs implemented pursuant to the CVPIA are intended to provide mitigation of past CVP effects on fish, wildlife, and associated habitats, including listed species and *critical habitat*. Subsequent tiered consultations, addressing future actions or programs carried out by Reclamation (e.g. contract renewal), shall consider what incremental effect, if any, such action or program causes in addition to the effects included in the existing environmental baseline and not impacts that may result from past actions of operation and maintenance of the CVP.

The CVPIA is being jointly implemented by both Reclamation and the Service. Our intent is to show that collaborative and cooperative processes have been, and will continue to be, established by both agencies. The Agency Commitments for New and Continuing Project Actions (section VI) elucidate the strength of commitments from both agencies. These actions, combined with the CVPIA itself and other commitments from Reclamation and the Service, form a positive basis to assure implementation of the CVPIA in a manner most beneficial to listed species provided protection under the ESA.

The Final PEIS is a tiered National Environmental Policy Act (NEPA) document that allows for future site specific NEPA analysis on CVPIA actions. This biological opinion will similarly be tiered. To better assist Reclamation and the Service in planning and project implementation, the Service's SFWO Endangered Species Division provided guidance on implementation of the ESA which is an integral part of this opinion. Guidance on whether further coordination is needed for ESA compliance for each section or specific action is provided in Appendix K.

Reclamation and the Service have several new and ongoing programs designed to further the purposes of ESA. These programs, and new accountability procedures (primarily presented in section VI), are incorporated into the Proposed Action.

Many of the CVP operations and maintenance actions have been the subject of previous consultations. Some activities have not been previously addressed and will be covered under future biological opinions. In addition, it may be desirable to cover some operations and maintenance activities under contract renewal biological opinions.

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 pages 1-11 and 1-12. 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 process for 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.

Conclusion - Commitments to uphold the ESA by both agencies, combined with implementation of these programs and meeting the assumptions of the effects analysis (pages 4-1 through 4-3) have contributed to a conclusion of no jeopardy in this biological opinion. This no-jeopardy conclusion at the 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 recover listed species, and (4) site specific consultation all diminish the likelihood of future jeopardy opinions tiered under this programmatic biological opinion.

Relationship of this Consultation to Subsequent Tiered Consultations

This consultation is intended to address, in a comprehensive manner, the numerous and widely varied actions related to implementation of the CVPIA and the continued operation and maintenance of the CVP that may be undertaken by the Service and/or Reclamation. While a number of these actions are clearly interrelated and interdependent, others are not and could be

considered as stand alone actions. Nevertheless, the Service and Reclamation have agreed that activities listed in the Project Description would be evaluated as a suite of actions all related in one form or another to the CVP and/or the CVPIA. Therefore, this biological opinion addresses the effects upon listed species resulting from implementation of this suite of actions as a whole, and provides a strategy, or process, to determine how ESA compliance will be accomplished for individual activities that cumulatively make up the program.

A number of assumptions related to implementation of a variety of activities, especially those directly or indirectly addressing the needs of listed species, were considered in the development of this programmatic level biological opinion. Because the effects of the actions are evaluated in aggregate, these programmatic assumptions are critical to the overall determination of how implementing this suite of actions may or may not jeopardize listed species. If the actions that this programmatic level opinion is based on are not implemented or new information becomes available, consultation would be reinitiated at the programmatic level. That consultation will determine how the lack of implementing any action(s), or new information, affects the evaluation of effects on listed species and the conclusions made in this biological opinion. However, neither the pendency nor the completion of such reinitiated consultation shall disrupt or otherwise affect in any manner whatsoever, the specific actions or programs carried out by Reclamation, unless it is first determined, based on the scientific and commercial data then available, that the specific action or program may cause the condition or circumstances necessitating the implementation of *reasonable and prudent measures*.

Site specific or tiered consultations following this programmatic consultation will rely on programmatic assumptions made during this consultation process, while development and implementation of site specific actions will rely on the direction provided by both consultation processes. If the conclusions of project specific or tiered consultations identify that tiered action(s) would not implement program actions assumed to occur at the programmatic level, or new information becomes available, the site specific or tiered consultations may or may not be reinitiated, depending on their relationship to the assumption(s) or new information.

The goals or agency commitments of tiered consultation processes that follow this programmatic biological opinion are to:

1) facilitate 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 through implementation of the CVP Conservation Program, the CVPIA, and similar activities.

Overview of the CVPIA

The 102nd Congress passed multipurpose water legislation which was signed into law October 30, 1992. Previously referred to as H.R. 429, Public Law 102-575 contains 40 separate titles providing water resource projects throughout the West. Title 34 of this law, the CVPIA, mandates changes in management of the CVP, particularly for the protection, restoration, and enhancement of fish, wildlife, and associated habitats. To help further guide these changes, the CVPIA, in section 3402(f), identifies that one of its purposes is to "achieve a reasonable balance among completing demands for CVP water, including the requirements of fish and wildlife, agricultural, municipal and industrial and power contractors." Major areas of change associated with implementation of the CVPIA include:

Fish, Wildlife and Associated Habitats

- establishment and implementation of a program to at least double the natural production of Central Valley anadromous fish
- dedication of up to 800,000 acre-feet of water to fish and wildlife annually
- installation of a temperature control device at Shasta Dam
- implementation of fish passage measures at Red Bluff Diversion Dam
- provision of a firm water supply for Central Valley wildlife refuges
- establishment of a program to address other identified adverse environmental impacts of the CVP not specifically identified in section 3406

CVP Contract Renewal

- application of tiered water pricing to new and renewed contracts
- preclusion of new contracts, with specified exceptions, for CVP water supply for purposes other than fish and wildlife, before fish and wildlife restoration activities specified in sections 3406(b), (c), and (d), and other activities as specified in CVPIA sections 3404(a)(2) and (3) are met
- preclusion of the renewal of existing long-term contracts until completion of a PEIS and other appropriate environmental review
- renewal, upon request, of any existing long-term repayment or water service contracts for delivery of water from the CVP for a period of 25 years and the possible subsequent renewal of such contracts for successive periods of up to 25 years

Water Transfers

- provision of water transfer guidance, including sale of water to users outside the CVP service area

Restoration Fund Collection

- collection of a restoration fund financed by water and power users for habitat restoration and enhancement, and water and land acquisitions

Studies, Evaluations and Modeling

- development of a plan to increase CVP yield for the purpose of minimizing adverse effects resulting from the dedication of water to fish and wildlife under the CVPIA
- establishment of a comprehensive assessment program to monitor fish and wildlife resources to determine the results and effectiveness of implementing the CVPIA and assist in adaptive management.

Additional information on the various provisions of the CVPIA is presented in following sections of this Project Description.

Description of CVP Facilities/Operations

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 water service area. A complete description of the CVP can be found in the Final PEIS for 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 through 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 delivery 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 delivers 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 the 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. The 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 consistent with 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 ROD for the CALFED Bay-Delta Program, and SWRCB decisions.

Ongoing Project Actions and Associated Commitments

Activities related to the CVP include a number of actions that are currently covered[1] by existing biological opinions. Reclamation and the Service will continue to comply with existing biological opinions and will continue to implement and integrate earlier applicable responsibilities and commitments into the baseline condition for this opinion. Both agencies will coordinate to establish procedures to ensure compliance with the ESA.

Endangered Species Act consultations for continuing project actions will be tiered from this and other biological opinions (as may be required). Tables K-1 through K-3, in Appendix K, provides guidance and describes which future actions tiered from this opinion require no further consultation (Table K-1), which may require formal consultation (Table K-2), and which may require further coordination to determine if formal consultation is needed (Table K-3).

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* and/or *reasonable and prudent measures* as necessary. 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 within 90 days of the date of this opinion, 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 continuing actions (section VI) 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; implementation of CALFED; and pursuing common goals with other agencies, including

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

[2] This coordination team is separate and distinct from the Conservation Program Technical team described on page 2-64, although some team members may be on both teams.

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 which includes protocols that will specifically address the integration of continuing project actions meeting the needs of listed species consistent with the requirements of the ESA and its implementing regulations.

The Service will continue to provide Reclamation with the most current *take* avoidance measures, *conservation measures*, and/or reasonable and prudent measures as necessary, through the tiered section 7 consultation process. Reclamation and the Service will coordinate with water districts and county planning offices, the California Department of Pesticide Regulation, and DWR to ensure consistency with Sections 2, 4, and 7 of the ESA for agency actions that *may affect* listed species. Reclamation and/or the Service will distribute the *take* avoidance measures and *conservation measures* in Appendices F and G to all water districts and county planning offices, the California Department of Pesticide Regulations, and DWR by March 15, 2001, and will continue to provide updates to these parties.

The Service and Reclamation will work together to convey information to the water districts, and individual water users (as appropriate), on listed species needs. Reclamation will establish an outreach and education program, in collaboration with the Service, to help water users integrate implementation of the CVPIA and requirements of the contract renewal process as it relates to the ESA.

The Service and Reclamation will collaborate on expediting the generation of baseline conditions for this opinion. Reclamation will work with the Service to provide maps produced as a result of the Land Use Monitoring and Reporting Program (as described in Comprehensive Mapping section of VI.F. of this opinion), as soon as technically possible, to CVP water districts and county planning departments including updates of any new data from the Service.

Description of Terms

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 Table 1.

Table 1 - Acronyms Used In This Opinion

CVP..... Central Valley Project
CVPIA..... Central Valley Project Improvement Act
CVPOCAP.... CVP Long-term Operations Criteria and Plan
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
Reclamation.....U.S. Bureau of Reclamation
Service.....U.S. Fish and Wildlife Service
SFWO.....Fish & Wildlife Service's Sacramento Fish and Wildlife Office
SWRCB..... State Water Resources Control Board

Additionally, the terms "Project Description" and "Proposed Action" are used interchangeably to describe the actions under consultation in this biological opinion. The term "Proposed Alternative" refers to the actions and programs being proposed by Interior for implementation of the CVPIA. The Project Description/Proposed Action includes both the Proposed Alternative for implementing CVPIA and the continued operation and maintenance of the CVP.

Study Area

The area addressed in this biological opinion (Appendix A) is a subset of the Study Area described in the Final PEIS for the 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 Final 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. A

total of 119 listed, proposed, and candidate species occur or potentially occur in the addressed area (Appendix B).

Del Norte, Siskiyou, Modoc, Lassen, Marin, Sonoma, Lake, Mendocino, Monterey, San Luis Obispo, Santa Barbara, Ventura, Riverside, Orange, Los Angeles, and San Diego Counties are excluded from the area addressed by this opinion.

Consultation History

The consultation history on CVP related actions is long and varied. Records of these consultations are on file at the SFWO. To assist in understanding the scope of this opinion, we have provided the following time line of some recent biological opinions issued by the Service (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.
March 05, 1997—Army Corps Public Notice Number 190109804 for the Delta Wetlands Project (1-1-97-F-76) several species.

January 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.
May 18, 1999—Contra Costa Water District Multipurpose Pipeline (1-1-93-F-93) 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.
February 29, 2000—Interim Biological Opinion (1-1-00-F-0056) several species
March 24, 2000—California Toxics Rule (1-1-98-F-21) several species
August 28, 2000—CALFED Bay-Delta Program (1-1-F-00-183) several species.

Description of the Proposed Action

The six elements of the Proposed Action are listed in Table 2. The separation of the actions will not functionally sever implementation of actions in the CVPIA from one another. It is assumed for this biological opinion that all actions of the CVPIA described as being implemented in this Project Description will be implemented in their entirety.

Table 2 - Description of the Proposed Action Components

I. Implementation of the CVPIA
II. Long-Term Renewal of CVP Water Service Contracts (CVPIA §3404(c))
III. Activities Associated with CVP Water and/or Facilities
IV. CVP Conveyance and Storage
V. Operations and Maintenance
VI. Reclamation and Fish and Wildlife Service Commitments for New and Continuing Project Actions

I. Implementation of the CVPIA

The following language is the proposed alternative currently under consideration for implementing the CVPIA, based upon information developed during the NEPA process for implementing the CVPIA. This language may be modified as the ROD is being finalized but is not expected to change in any substantive manner. Reclamation and the Service will implement the CVPIA in a manner similar to the Preferred Alternative identified in Chapter 2 of the Final PEIS, with some modifications, that result in the following proposed alternative. The Preferred Alternative included actions that were divided between Core and Multiple Option programs in order to help develop a range of actions or programs to meet the purposes of the CVPIA and implement its provisions, consistent with the analyses in the CVPIA PEIS.

The following is a list of actions and program level guidance included in the proposed alternative.

A. CVPIA Sections Included in Interior's Current Proposed Alternative

CVP Contract Renewal

3404(c) 3405(b) & (e)	Proceed with the process of long term renewal of CVP water service contracts, including terms for water measurement and conservation, that will result in their renewal for a 25 year period.

Water Transfers

3405(a) Allow transfer of CVP water subject to conditions detailed in section 3405(a). This proposed alternative does not implement any specific transfers, but establishes that CVP water generally will be transferrable. Costs on water transfers will be imposed equal to the cost of service for municipal CVP water, and the higher cost of service or full cost for agricultural CVP water. Costs of transferred CVP water and all other water supplies will include the cost to the seller to make the water available, including the amount of lost income. A $25/acre-foot charge per CVPIA user will be added to transfer agricultural CVP water to non-CVP municipal users. The Restoration Fund charge will be increased from $6 to $12 (1992 dollars) for the transfer of agricultural CVP water to CVP municipal water users.

CVP Water Pricing

3405(d) Implement water pricing, at a minimum, based on the "80/10/10 Tiered Water Pricing up to Full Cost Approach" and the use of the Ability-to-Pay policies.

Anadromous Fish Restoration Program

3406(b)(1) Develop and complete the Anadromous Fish Restoration Program (AFRP) with a goal of developing 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 from 1967 through 1991. Proceed with implementation of non-flow improvements for anadromous fish restoration as identified in the Revised Draft Restoration Plan for the Anadromous Fish Restoration Program, dated May 30, 1997, including the use of adaptive management. Information from all monitoring efforts, including the Comprehensive Assessment and Monitoring Program (CAMP) [3406(b)(16)], will be used to assist in the adaptive management of the AFRP. In addition, Interior will use partnerships with other Federal, State, and private entities to meet the overall goals.

CVP Reoperation

3406(b)(1)(B) Reoperate the CVP, as needed, to achieve the goals of the Anadromous Fish Restoration Program (AFRP) [section 3406(b)(1)] without affecting fulfillment of CVP contractual obligations.

Habitat Restoration Program

3406(b)(1) "Other" Carry out a Habitat Restoration Program developed pursuant to guidance on implementing the section 3406(b)(1) "other" Program in the Final PEIS (Chapter II, Page II-22).

CVP Dedicated Water

3406(b)(2) Dedicate and manage CVP yield for fish and wildlife in accordance with Interior's *Decision on Implementation of Section 3406(b)(2) of the Central Valley Project Improvement Act*, released on October 5, 1999 [henceforth referred to as (b)(2) water].

Supplemental Water Acquisition

3406(b)(3)	Target average annual fish and wildlife water acquisitions for use on the San Joaquin and Sacramento rivers tributaries at approximately 200,000 acre-feet/year.

Structural Modifications

3406(b)(4-6), 3406(b)(11,17), & 3406(b)(20)	Proceed with modifications to facilities, including: Tracy and Contra Costa Pumping Plants fish protection, Shasta Temperature Control Device, Coleman National Fish Hatchery, Keswick Dam Fish Trap, Anderson-Cottonwood Irrigation District Diversion, and Glenn-Colusa Irrigation District Diversion fish screen facility.

Clear Creek Restoration

3406(b)(12)	Proceed with habitat improvements and structural actions on Clear Creek, including the improvement of fish passage and access at McCormick-Saeltzer Dam.

Gravel Replenishment

3406(b)(13)	Implement non-flow stream restoration actions focused on anadromous fish spawning gravel replacement in the Stanislaus, American, and Sacramento rivers

Assessment and Monitoring

3406(b)(16)	Implement the Comprehensive Assessment and Monitoring Program to monitor fish and wildlife resources to assess the effectiveness of actions implemented to restore fish, wildlife, and associated habitats pursuant to section 3406.

Anadromous Fish Screen Program

3406(b)(21)	Provide measures to avoid fish loss at diversions, including construction or modification of screens, bypasses, fish ladders, and diversions.

Seasonal Agricultural Field Flooding

3406(b)(22)	Conduct seasonal agricultural field flooding of up to 80,000 acres per year consistent with the CVPIA.

Refuge Water Supply

3406(d)(1, 4, 5)	Assure firm, reliable water supplies of suitable quality are provided to authorized Central Valley National Wildlife Refuges, Wildlife Management Areas, and the Grassland Resource Conservation District to maintain and improve wetland habitat to meet historic refuge annual supplies available prior to the CVPIA (Level 2[3]). These supplies will be subject to shortages based on "hydrologic circumstances" defined as critically dry years under the Shasta Inflow Index criteria. When imposed, these reductions shall not exceed 25 percent of Level 2 supplies.

[3] "Level 2" refuge water supplies are the average historic water supply levels, based upon deliveries between 1978 and 1984, identified in the 1989 Refuge Water Supply Study and two-thirds of the water needs identified in the San Joaquin Basin Action Plan.

3406(d)(2, 4, 5)	Increase refuge water supplies by the incremental level required for full habitat management (Level 4[4]) through voluntary measures which do not require involuntary reallocation of project yield. These incremental supplies will be subject to shortage allocations based on the priority or priorities which applied to the water prior to its transfer for refuge purposes.

Restoration Fund

3405(f) & 3407	Collect donations and revenues provided under the provisions of the CVPIA into the Restoration Fund as provided by the CVPIA.

Land Retirement Program

3408(h)	Purchase and retire lands from willing sellers using funding provided by the CVPIA. Conduct a Demonstration Study on 15,000 acres in the San Joaquin Valley and use the findings to guide the appropriate continued retirement and management of lands. Retired lands, dependent on the Study results, could remain vacant, contain minimal farming, and/or be revegetated with native vegetation and host reintroduction of special-status species.

Prior to implementation, each program and action will be evaluated to determine if additional NEPA analysis is necessary. Depending on that evaluation, either additional NEPA documentation will be prepared, or a finding made that no significant changes in actions, circumstances, or information has occurred since the Final PEIS.

B. CVPIA Sections Not Included in Interior's Current Proposed Alternative

Implementation of all of the sections of the CVPIA are not included in the proposed alternative. Additional, separate or tiered NEPA analysis may be required to implement many of the CVPIA provisions not included in the proposed alternative. Upon completion of these studies and the gathering of additional information, including the availability of funds, an evaluation will be made as to the level of NEPA compliance and authority necessary for their implementation. The following list explains why certain sections were not included in this proposed alternative.

CVPIA Sections Considered Within Implementing Actions of Other sections of the Act

3406(b)(8)	Anadromous Fish Flow Pulses: It is assumed Interior will make the best use of flow pulses to increase the survival of migratory anadromous fish moving into and through the Sacramento-San Joaquin Delta and Central Valley rivers and streams as provided by existing operations or under sections 3406(b)(2) and (3).

[4] "Level 4" refuge water is the amount of water necessary to fully develop the refuges identified in the 1989 Refuge Water Supply Study, and the remaining one-third of the water needs as described in the San Joaquin Basin Action Plan.

3406(b)(9) Elimination of Flow Fluctuations: It is assumed actions to limit flow fluctuations will be provided by existing operations or under sections 3406(b)(2) and (3).

CVPIA Actions Required by Other Regulations

3405(c) and 3406(b)(7) Water Quality, Flow Standards and Diversion Limits: It is assumed all water quality and flow standards, and objective and diversion limits set forth in all laws and judicial decisions that apply to the CVP are met. Additional NEPA analysis may be necessary if this is not the case.

CVPIA Related Studies Where the Outcome Is Speculative at this Time

3406(b)(19) CVP Carryover Storage Evaluations: The impact of modifying Shasta and Trinity River reservoirs will be evaluated. If reoperation differs significantly from that examined in Final PEIS alternatives, specifically differences in water supplies and stream flows as compared to the range evaluated in the Final PEIS, additional NEPA analysis may be required prior to implementation.

3406(e) Supporting Investigations: This action addresses a number of studies to be initiated to address various methods for improving anadromous fish survival. Depending on their findings, additional NEPA analyses may be required prior to implementation of any action.

3406(g) Ecosystem and Water System Operations Models: As models are developed to evaluate ecologic and hydrologic effects of existing and alternative operations of public and private water facilities and systems in the Central Valley and Trinity River watersheds, additional NEPA analysis may be required prior to implementation of any associated actions.

3406(c)(1 and 2) San Joaquin and Stanislaus Rivers Studies: These are studies. Depending on their findings and recommendations, actions may be taken or modified to improve streamflow, channel, riparian habitat, and water quality. These actions may require future additional NEPA analyses .

3406(d)(6) Investigate Means to Improve Water Supplies to Privately-owned Wetlands: This independent investigation will lead to a Report to Congress. Depending on its findings and recommendations, evaluations under NEPA may be required prior to implementation of any recommended actions in the report.

Insufficient Information Exists to Complete Adequate Analysis Allowing for Implementation

3404(a) New Contracts: As appropriate, further NEPA analysis will consider CVP-wide water supply impacts and examine the impacts of providing this water on lands not currently served by CVP water or in the CVP service area.

3406(b)(10)	Red Bluff Diversion Dam: When evaluations are complete, a decision will be made separate from this proposed alternative regarding the best operation of the Red Bluff Diversion Dam. Operation of the Red Bluff Diversion Dam is assumed, as in the No Action Alternative, to be gates open from mid-September through mid-May, as required by the winter-run chinook salmon biological opinion, and gates closed mid-May through mid-September. Diversions were at No-Action Alternative levels.
Section 3406 (b)(14) & (15)	Delta Barriers: Appropriate operation of fish barriers in Georgiana Slough and Old River are being evaluated in separate processes and are not defined in this proposed alternative. However, the general benefits of their implementation is assumed. Specific actions and operations may require additional NEPA evaluations.
3406(b)(18)	Restoration of Striped Bass Fishery: Specific actions taken to restore the striped bass fishery, including improvements to streambeds and channels and the development of a flow improvement program, would require additional NEPA documentation to evaluate possible impacts on surface water and groundwater supplies, water quality, fish and wildlife, vegetation, soils, and cultural resources. It may also be necessary to examine potential impacts on the interaction between the CVP and SWP operations.
3406(d)(5)	Construction of Conveyance Facilities for Refuges: This action involves construction of conveyance facilities for levels 2 and 4 water supplies. Separate NEPA documentation will be prepared to evaluate impacts on fisheries, vegetation, wildlife, water supply, land use and the local economy.
3408(b)	Use of Electrical Energy for Fish and Wildlife Purposes (such as energy for pumping on refuges): Future NEPA analyses would evaluate impacts to available energy for sale to preference power customers, as appropriate, and the need to acquire additional energy for CVP operations and preference power customers.
3408(c-d)	Contracts for Additional Storage and Delivery of Water and Use of Project Facilities for Water Banking: These provisions address the shortage and delivery of CVP water and non-project water for beneficial purposes, including fish and wildlife and use of CVP facilities for water banking. Future NEPA analyses would evaluate impacts on such things as water supplies to CVP and SWP water users; and changes to CVP power generation, reservoir recreation, fisheries, water quality, and economics.
3408(i)	Water Conservation: Water conservation projects or measures provided for under section 3408(i) may require additional NEPA evaluations once these actions are known.
3408(j)	Project Yield Increase: This provision requires the development of a plan to increase the yield of the CVP by the amount dedicated to fish and wildlife purposes under the Act. The plan is to address various options stipulated in the Act. NEPA analyses would be conducted prior to implementation of plan actions.

3412	Extension of the Tehama-Colusa Canal: This provision addresses the extension of the Tehama-Colusa Canal and the change in the service area to be served by the canal. Future NEPA analysis would address the site specific impacts of construction of the canal extension and impacts of water use.

No Action Alternative and Cumulative Actions With Separate NEPA Underway or Completed

3406(b)(6)	Shasta Temperature Control Device: The benefits of operating the Shasta Temperature Control Device were included in CVP operation modeling in the No Action and other Alternatives in the Final PEIS, including implementation of sections 3406(b)(2) and (3). Section 3406(b)(6) is included here because it is assumed it would be completed without the CVPIA using alternative fund sources. Actual NEPA analysis and associated decision(s) for this structure were provided separately from the proposed alternative.
3406(b)(23)	Instream Fish Flow Releases in Trinity River: Changes to instream fish flow releases in the Trinity River will be analyzed in a separate and concurrent EIR/EIS. Decisions relative to Trinity River flows will be made in a ROD based on that EIR/EIS.

C. CVPIA Actions Potentially Affecting Listed Species

The following is a discussion of the programs and actions being considered for implementation under the CVPIA which may have an effect on proposed, listed, and candidate species. Ongoing Section 7 consultation, formal or informal, has been done on several of these programs. Guidance on whether further coordination is needed for ESA compliance for each section or specific action is provided in Appendix K. Because this opinion considers the overall interrelated and interdependent effects of the CVP and CVPIA, these actions or parts of actions are included in this opinion. In addition, events occurring subsequent to earlier consultations will require these programs to be revisited, including changes in implementation schedules and new information about action needs and the methods to meet those needs.

Limitation on Contracting and Contract Reform

New Contracts (§3404(a)) *[Lead Agency: Reclamation]*

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 in section 3406(b) are met; (2) the San Joaquin and Stanislaus Rivers comprehensive planning and investigation requirements are met (§3406(c)), and (3) Central Valley refuge and wildlife habitat areas water supply and agreement requirements are met (§3406(d)) Additionally, other activities as specified in CVPIA sections 3404(a)(2) and (3) will be concluded or met.

With very limited exceptions, as discussed immediately below, 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 Resources 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)) *[Lead Agency: Reclamation]*

The Secretary is authorized to negotiate and execute contracts pursuant to section 305 of Public Law 102-250 or section 206 of Public Law 101-514, and one year contracts for delivery of surplus flood flows, or two year contracts for delivery of class II water in the Friant Unit. Also, notwithstanding the prohibition in the Energy and Water Development Appropriations Act of 1990, and pursuant to section 203 of the Flood Control Act of 1962, Interior may enter into a long term contract in accordance with Reclamation law with the Tuolumne Regional Water District, for delivery of water from 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)) *[Lead Agency: Reclamation]*

This section is expanded into a separate section on Long-term Renewal of CVP Water Service Contracts.

Water Transfers, Improved Water Management, and Conservation

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

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 individually evaluated and

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 (§3405(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 satisfy fish and wildlife obligations under the CVPIA because of limitations in conveyance or pumping capacity (§3405(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, alternative measures and 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 (§3405(a)(1)(L)).

Many of the standards that are followed to evaluate 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]*

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. Section 3405(b) of the CVPIA requires the contracting district to inform the Secretary of the Interior and the State of California annually as to the monthly volume of surface water delivered within its boundaries. Consistent with water management plan requirements, all districts must provide documentation on the status of measurement of surface water deliveries in their water management plan.

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

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 (i.e., appropriate Total Maximum Daily Loads [TMDL's] applied to impaired waters of the State). This subsection will not affect or alter any legal obligation of Reclamation to provide drainage services.

Reclamation and the Service are continuing to analyze agricultural drainwater problems and alternatives for solution.

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

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 shall implement a system of 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 shall 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 shall 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 shall 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 the Secretary has determined to provide significant and quantifiable habitat values for waterfowl in fields where the water is used and the crops are produced. Such waiver shall apply only if such habitat values can be assured consistent with the goals and objectives of this title through binding agreements executed with or approved by the Secretary.

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

The CVPIA requires that a Water Conservation Office 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, California Department of Water Resources, California academic institutions, and CVP water users.

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 shall 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 shall 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 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.

Fish and Wildlife Restoration Activities

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

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 (AFRP). 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.

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.

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 use other actions not specifically contained in CVPIA.

Doubling the natural production of anadromous fish cannot be accomplished without substantial emphasis on habitat restoration and re-operation of non-CVP facilities. This is especially true for some listed species, such as spring-run chinook salmon (threatened), 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 legally imposed upon the CVP under state and federal law. This includes, but is 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). To the greatest degree practicable, the programs and plans required by this title will be developed and implemented in a way that avoids inconsistent or duplicative obligations from being imposed upon CVP water and power contractors.

Those actions and evaluations under Section 3406(b)(1) that have been implemented or initiated to date, on an interim basis, 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.

CVP Reoperation (3406(b)(1)(B)) *[Lead Agencies: Reclamation and Service]*

The CVPIA provided that, as needed to achieve the goals under section 3406(b)(1), Interior is authorized and directed to modify CVP operations 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 sections 3406(b)(2) and (3), and from sources which do not conflict with fulfilment of Interior's remaining contractual obligations to provide CVP water for other authorized purposes. Instream flow needs for all CVP controlled streams and rivers shall be determined by Interior based on the recommendations of the Service after consultation with the California Department of Fish and Game, and in alignment with the *Decision on Implementation of Section 3406(b)(2) of the Central Valley Project Improvement Act*, released on October 5, 1999.

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

The CVPIA directs Interior to make all reasonable effort, consistent with the requirements of section 3406, to address other identified adverse environmental impacts of the CVP not specifically enumerated in section 3406. To that end, Interior developed the (b)(1) "other" program to address those impacts to other fish, wildlife and habitats.

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 request that adequate funding be allocated to the (b)(1) "other" program to protect and enhance ecosystems of listed species and support recovery of listed species.

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 Final PEIS for (environmental analysis under NEPA which 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. 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.

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

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.

Reclamation and USFWS propose to dedicate and manage 800,000 acre-feet per year of CVP yield consistent with the *Decision on Implementation of Section 3406(b)(2) of the Central Valley Project Improvement Act*, released on October 5, 1999. Modeling results presented in the Final PEIS display the impacts of using 800,000 acre-feet of project yield in combination of quantitative and qualitative analyses. Actions considered in the quantitative modeling for (b)(2) Water Management include reservoir releases to improve instream flows for anadromous fish on CVP controlled rivers; improve releases to meet State Water Resources Control Board (SWRCB) Order 95-06; export limitations to meet SWRCB Order 95-06; and instream releases and export limitations similar to those measures set forth in the November 1997 Administrative Paper (DOI 1997).

The (b)(2) Water Management presented in the Final PEIS included three components: (1) Bay-Delta Component; (2) instream component; and (3) Delta component (in addition to the Bay-Delta Plan component). The Bay-Delta Plan component includes the reduction in CVP water deliveries that occurred due to the implementation of the Bay-Delta Plan Accord, as described in the Accord. The instream component refers to use of (b)(2) water on the CVP controlled streams to further supplement the draft AFRP target flows. The primary goal of the (b)(2) Water Management instream component was to provide water for AFRP salmon and steelhead target flows in the Sacramento, American, Stanislaus, and Lower San Joaquin rivers and in Clear Creek. The Delta component refers to the use of (b)(2) water in the Delta to meet draft AFRP target flows and operational considerations in excess of those identified in the Bay-Delta Plan. Anticipated biological benefits for listed Central Valley anadromous fish include improved water temperature conditions downstream of reservoirs, improved upstream and downstream migration conditions, and direct restoration of instream, riparian, wetland, and estuarine habitat.

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

[Lead Agencies: Reclamation and Service]

The Supplemental Water Acquisition Program is to develop and implement a program, in coordination and conformance with the plan required under section 3406(b)(1), 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 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 the 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.

The target for average annual fish and wildlife water acquisitions in the proposed alternative is approximately 200,000 acre-feet/year in San Joaquin and Sacramento rivers tributaries which will assist meeting increased flow needs like those identified in associated AFRP processes and within the ROD for the Final San Joaquin River Agreement. In comparison to analyses performed in the Final PEIS, over 200,000 acres of land could be fallowed associated with these water acquisitions. Additionally, if a portion of these lands were, as identified in the Final PEIS, acquired under conservation easements, habitat quantity and quality for some terrestrial species in areas of the Central Valley could be protected and/or improved.

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

A program will be developed and implemented to mitigate for fishery impacts associated with operations of the Tracy Pumping Plant. The program shall 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 being evaluated: whether to continue to repair and maintain the existing Tracy Fish Collection Facilities or to replace it with a new facility.

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 and, unless changes in this action are proposed, requires no further consultation at this time.

A program will be implemented to mitigate for fishery impacts resulting from operations of the Contra Costa Canal Pumping Plant No.1. This program shall 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.

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

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. Reclamation will use temperature and flow data for three 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. It is assumed all water quality and flow standards, and objectives and diversion limits set forth in all laws and judicial decisions that apply to the CVP are met.

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 the CVPIA, 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.

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.

Pulse flows, managed by Reclamation and the Service, are a part of water management processes provided by dedicated CVP Yield (§3406(b)(2)) and supplemental water acquisition (3406(b)(3)). 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]*

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) and supplemental water acquisition under section 3406(b)(3).

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

A program will be developed and implemented to minimize fish passage problems for adult and juvenile anadromous fish at the Red Bluff Diversion Dam in a manner that provides for the following objectives to: (1) improve upstream and downstream passage of anadromous fish; (2) deliver water at the time and in quantities required by users, including the Sacramento National Wildlife refuge; (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 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 section 3406(b)(1), the AFRP, 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 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]

The Coleman National Fish Hatchery will be rehabilitated and expanded by implementing the Service's Coleman National Fish Hatchery Development Plan, the Keswick Dam Fish Trap will be modified to provide for its efficient operation at all project flow release levels, and the basin below the Keswick Dam spillway will be modified 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 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 and funding responsibilities of the Coleman National Fish Hatchery to Reclamation while the Service retains 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, located at Keswick Dam, 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 efficient operation at all project flow releases, and modification of the basin below Keswick Dam spillway to prevent trapping of fish and the production of a more efficient sweep mechanism.

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

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. 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, the addition of spawning gravel, 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. Saeltzer Dam has been identified as an impediment to fish migration for years tracing back to the 1950's when DFG installed a fish ladder to address this concern. Since then, the affect of Saeltzer Dam on salmonids has been regularly documented. The proposed project is now to remove Saeltzer Dam, and change the water diversion to another CVP facility. Removing the dam would benefit threatened and endangered anadromous salmonids by providing unimpeded access to the coldest 10 miles of stream habitat and improving sediment transport through the lower reaches of Clear Creek. This action will

compliment other restoration projects in the watershed that benefit anadromous salmonids and other species.

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

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 shall 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.

Interim 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.

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

> 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. The Delta Cross Channel will be addressed when OCAP undergoes supplemental formal consultation with the Service and NMFS.

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.

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.

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 the future. The possible future installation of a permanent fish barrier at the Head of Old River would require separate consultation.

The CVPIA directs that a barrier be constructed at the head of Old River in the Sacramento-San Joaquin Delta 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 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 presented in a draft jeopardy opinion prepared by the Service, the Interim South Delta Program was incorporated into CALFED. Pursuant to this change, the program was renamed the South Delta Improvement program, 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 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 was considered to be 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.

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

A comprehensive assessment and monitoring program was established to monitor fish and wildlife resources in the Central Valley to assess the biological results and effectiveness of restoration efforts. The program involves 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]*

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 developing and implementing management measures to restore the striped bass fishery of the Bay-Delta estuary. This is to be done in coordination with efforts to restore of native fisheries. Because restoration activities for striped bass were preferred to artificial propagation and stocking, the Service and NMFS have given priority to the restoration of habitat under other sections of CVPIA, as 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, including a pen rearing program supported by the State, and a game warden program that 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 the outlines the sharing agreement for costs by both the Federal and State governments. 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. When 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 for Shasta and Trinity Reservoirs will be reevaluated by Reclamation and the Service to maintain minimum carryover to protect and restore anadromous fish of the Sacramento and Trinity rivers in accordance with the mandates and requirements of the CVPIA,

and are subject to the Secretary's responsibility to fulfill all project purposes, including agricultural water delivery.

A number of actions currently underway will influence this study, including implementing Interior's *Decision on Implementation of Section 3406(b)(2) of the Central Valley Project Improvement Act*, released on October 5, 1999, and implementation of the Decision for the Trinity River Mainstem Fishery Restoration Program which will affect CVP operations by meeting other purposes and needs. The relationship of these actions to carryover needs will be evaluated. Any anadromous fish biological benefits accrued as a result of this provision, could be included as part of 3406(b)(2), Dedicated CVP Yield.

The NMFS biological opinion on winter-run chinook salmon evaluated the operational criteria needed to maintain minimum carryover storage at Shasta Reservoir to protect anadromous fish in the Sacramento River. The biological opinion specified that minimum carryover water storage in Lake Shasta for the protection of 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 Interior's Decision on Implementation of Section 3406(b)(2) of the Central Valley Project Improvement Act, released on October 5, 1999.

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 separate formal consultation. No further consultation is expected, unless there are additional actions that were not included in the biological opinion or additional information becomes available.

Interior is required to participate with State and other federal agencies in the implementation of the ongoing program to fully mitigate for the fishery impacts associated with operations of the Glenn-Colusa Irrigation District's Hamilton City Pumping Plant. Such participation shall include replacement of the defective fish screens and fish recovery facilities associated with the Hamilton City Pumping Plant. This authorization shall not be deemed to supersede or alter existing authorizations for the participation of other federal agencies in the mitigation program.

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

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, but not be limited to, 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.

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 saltwater/freshwater 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.

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]*

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 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. This provision will terminate by the year 2002.

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

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 was 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).

<u>San Joaquin and Stanislaus Rivers</u>

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

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 . Releases identified by the plan as necessary to sustain anadromous fish populations could not be implemented without authorization by a specific act of Congress. During the time the Secretary is developing such a plan and pending approval of the plan by Congress, the Secretary

is prohibited from making releases to implement the CVPIA and restore flows between Gravelly Ford and Mendota Pool, absent 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, and 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 placed into the Restoration Fund with other funds to implement fish and wildlife restoration actions under the CVPIA (§3407).

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

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

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 the 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), if that process moves forward.

Central Valley Refuges and Wildlife Habitat Areas

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

Quantities and delivery schedules for refuge water supplies must meet Level 2 of the "Dependable Water Supply Needs" table for those habitat areas 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. Hydrologic circumstances are to be "critically dry water years" in which inflows into Shasta Reservoir is forecast to be less than 3,200,000 acre-feet, or if prior year(s) inflow(s) were less than 4 million acre-feet and together with current forecast has a deficiency of 800,000 acre-feet. The reductions will not exceed in percentage terms the

reductions imposed on agricultural service contractors. Annual Level 2 water supplies total 151,250 acre-feet in the Sacramento Valley and 245,000 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 supply provided upon enactment of the CVPIA. The remaining conveyance improvements are scheduled for completion pending execution of conveyance agreements. The districts will be doing most of the construction improvements to their respective systems, with design and construction assistance from Reclamation.

Annual full Level 4 water supplies total 179,000 acre-feet for the Sacramento Valley and 376,515 acre-feet for the San Joaquin Valley. The incremental Level 4 supply is to be acquired from voluntary providers in not less than 10 percent increments per year and delivered to the refuge boundary.

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

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]*

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 Resources 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) elimination of barriers

to upstream and downstream migration(§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 stream enhancement (§3406(e)(6))

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

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

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

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.

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

Section 3407(a) established the CVP Restoration Fund, deriving revenues through collections of the $25 M&I surcharge, pre-renewal charges, incremental revenues achieved through application of tiered water rates, and 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 the 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. CVPIA projects are primarily 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.

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

Section 3408(h) authorizes Interior to purchase land and associated water rights, from willing sellers, to improve water conservation and agricultural wastewater quality, assist implementation of water conservation plans approved under section 210 of the Restoration and Reform Act of 1982, and agricultural wastewater management activities contained in the final report of the San Joaquin Valley Drainage Program (September, 1990). This section also authorized the acquisition of lands, from willing sellers, that are no longer suitable for sustained production because of permanent damage resulting from severe drainage or agricultural wastewater

management problems, groundwater withdrawals, or other causes. This program is to target such purchases to areas deemed most beneficial to the overall purchase program, including purposes of CVPIA like the mitigation, restoration, and enhancement of fish, wildlife, and associated habitats.

The purpose of the Land Retirement Program is to acquire land, water, and associated property interests, from willing sellers, in order to reduce the quantity of agricultural drainage, enhance fish and wildlife resources, and make water available for other CVPIA purposes. Acquisition of land to enhance wildlife habitat 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 being implemented by an interagency, interdisciplinary team with members from Reclamation, Bureau of Land Management, and the Service. The retirement of land is accomplished under Interim Guidelines for the Land Retirement Program 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 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]*

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 shall 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 the CVPIA. The plan authorized by this subsection shall include, but shall 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 described under section 3406(b)(3).

II. Long-Term Renewal of CVP Water Service Contracts (§3404(c))

Water Service Contracts

Reclamation is currently negotiating the terms and conditions of the long term contract renewals. The contracts intended to result from the negotiations will define the proposed action for the tiered contract renewal, NEPA analysis, and Section 7 consultations.

Water service contracts set forth the terms and conditions under which a water supply is provided to a contractor. Municipal and industrial (M&I) and agricultural water contracts provide for the recovery to the U.S. treasury 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 conveyance facilities. In addition, M&I water service contracts include an 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 the CVPIA. In the future, the Service anticipates 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. However, conversions from agricultural purpose of use to M&I purpose of use are subject to the interim agricultural shortage provisions found in the June 9, 1997 CVPIA Administrative Proposal on Urban Water Supply Reliability.

Renewal of Existing Long-Term Contracts

Once the long-term contract renewal negotiations are completed, the renewals will be subject to a separate, tiered analysis that is consistent with the NEPA tiering in the PEIS. No contracts will be renewed until the appropriate environmental review has been completed. Reclamation will consult either formally or informally with the Service before executing a contract. The site specific, tiered analysis will address direct and indirect effects of contract renewal. While not totally inclusive, the following are examples of possible consultation processes associated with these site specific contract renewal actions.

- For some districts, contract consultation could be conducted *informally*. For example, water districts at full build out, that have well-established district boundaries, that *may*

affect listed species, and are in compliance with other applicable biological opinions (including transfer opinions), could fall into this category.

- For some districts, contract consultation would be conducted formally. For example, those contracts or actions with direct or indirect effects that are *likely to adversely affect* listed species, cause *adverse change* in listed species habitat, or *result in take*. Contract actions resulting in formal consultation could include, but are not limited to, contracts that facilitate the conversion of native habitat to agriculture or urban development.

- Some districts with direct and indirect effects to listed species will be encouraged by Reclamation and the Service to engage in *habitat conservation planning*, under Section 10, to address local land use issues more comprehensively. Reclamation and the Service will cooperate to provide information to water users on listed species and potential habitat. Some solutions to service area effects issues can be found in the Friant Water Contract Renewal, Los Vaqueros , Interim Water Contract Renewal, Solano Project Contract Renewal, and Sacramento County Fazio Water Contract Biological Opinions.

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 procedures and 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 Service's SFWO Endangered Species Division will provide recommendations to Reclamation on the appropriate level of ESA consultation and *conservation measures* needed.

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. 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. All existing, new, and renewed contracts will be administered in conformance with the requirements and goals of the CVPIA and related ESA consultations. For example, Reclamation has indicated that contracts will contain language similar to the following:

> "The Water District shall utilize the Delivered Water in accordance with all applicable requirements of any Biological Opinion 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."

Reclamation, while still meeting its own responsibilities under the ESA, believes it is the responsibility of each CVP contractor to develop their own solutions to endangered species conservation. To enable the CVP contractors to provide for their own endangered species planning and compliance, 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.

Terms and Conditions of Water Service Contracts under Negotiation

Standard water service contracts include articles addressing the following contract terms and conditions. These articles will be addressed as part of the consultation on execution, renewal, or amendment of the contracts .

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

Long term contracts will be for 25 year periods 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 were for a term of up to three years, and subsequent renewal contract have been for terms of up to two years.

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

The Contracting Officer shall make CVP water available for delivery to the Contractor up to a specified maximum quantity in each year, consistent State water rights, permits and licenses, Federal law, and the Temporary Reductions and Water Shortage and Apportionment provisions (discussed below), and with limitations imposed by existing biological opinions (e.g., OCAP and Los Vaqueros). Project water may be utilized for agricultural and/or M&I purposes consistent with the exact contract terminology and is subject to beneficial use.

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

Project water furnished to the contractors by the United States is to be made available to the contractors at a mutually agreed 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 if there is a determination that such delivery results in a finding of *may affect* by Reclamation (see section VI. I. 7 and 8) . In most cases, renewal of the contracts will not result in a change in point of diversion.

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

The CVPIA requires that new, renewed, or amended CVP water service contracts entered into after the date of enactment of the CVPIA shall provide that the contractor ensure 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. The action, as defined in the

alternative currently under consideration for implementing the CVPIA, includes long term renewal of CVP water service contracts with terms for water measurement. 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]*

If there is a reduction in the total water supply available to contractors because of errors in project physical operations, 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, except for such actions taken by the Contracting Officer which are arbitrary, capricious, or not made in good faith. In years of water shortages, the United States will allocate the available project water supply among the contractors, consistent with their contractual obligations. M&I water furnished under the proposed contracts shall also be allocated in accordance with the then existing Project M&I Water Shortage Policy.

Water Conservation *[Lead Agency: Reclamation]*

CVPIA and other Reclamation laws require contractors to 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*]

The interim renewal contracts and contracts subject to early renewal provide for a maximum delivery in any given year of 6 million acre-feet, including over 1.4 million acre-feet of Friant Division Class II supply, much of which is generally available in wet years only. The PEIS assumed that contracts would be renewed for the same quantity of water as the existing contracts, provided the needs analysis demonstrated a continuing need (see contract quantities and recent use in Appendix D). However, until OCAP has been reanalyzed, deliveries will be consistent with the Service's 1995 biological opinions on OCAP and Los Vaqueros. For example, certain contract amounts have never been delivered and these effects would be analyzed in future Section 7 consultations.

The following is a list of the existing contracted amount of water for project water:

Project Water

Division	Contracted Water [acre-feet (thousands)]
American River	443
Delta	599
East Side	155
Friant	2,201
Sacramento River	726
San Felipe	196
Shasta	14
Trinity River	41
West San Joaquin	1,400
Miscellaneous	276
Total	6,054

Acreage Under Contract *[Lead Agency: Reclamation]*

Reclamation estimates that a total of 2,435,000 acres are currently eligible to receive CVP irrigation deliveries. A total of approximately 4,551,000 acres are included within the gross acreage of the districts and other entities that contract for CVP water. Any increase in irrigable acres will require a subsequent Reclamation action. These figures do not include contracts for water rights contractors. Delivery areas for municipalities, counties, state and federal agencies, are included within the gross acreage (no specific acreage figure was specified for these contracts).

The acres eligible to receive irrigation water, and gross acres within CVP Service Areas are as follows:

Division	Eligible for Irrigation Water (acres)	Gross Service Area (acres)
American River	28,982	576,245
Delta	175,693	361,173
East Side	132,946	187,519
Friant	854,230	1,102,433
Sacramento River	527,726	659,092
San Felipe	46,651	883,280
Shasta	49	5,570
Trinity River	13,854	59,932
West San Joaquin	665,761	716,399
TOTAL	2,445,892	4,551,643

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

The amount of water available for delivery in any given year to CVP water service contractors is dependent upon hydrologic, environmental, and reservoir storage conditions. Agricultural deliveries may be reduced by up to 100 percent, if necessary; M&I deliveries will be reduced in accordance with the M&I shortage policy. Generally, the interim M&I water shortage policy attempts to set M&I delivery targets which would result in reductions of M&I deliveries by no more than 25 percent of the maximum contract quantity or recent historic use, whichever is less. Reclamation allocates shortages among water service contractors within the same service area, as individual contracts and CVP operational capabilities permit. Water availability and delivery amounts for the Friant and Eastside Divisions will be calculated independently of the other CVP divisions.

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.

Surplus Flood Flow Water Supplies *[Lead Agency: Reclamation]*

Provisions may be included in some renewal contracts that provide for priority of some contractors relative to eligibility to receive Surplus Flood Flow water as authorized in section 3404(b) in the CVPIA. Reclamation must disperse floodwater to reduce flood damages downstream or reservoirs, or to vacate reservoirs in advance of the flood central season; such waters cannot be stored in Reclamation facilities. Consistent with the 1 year contracting limitations imposed by section 3404(b) of the CVPIA on surplus flood flows, the right to access such water must by necessity be accomplished pursuant to separate 1 year contracts. Such water would physically be available only at those times which the Contracting Officer declares such water to be available at various locations within the CVP system. The quantity and duration of such Surplus Flood Flow waters are not predictable. Such flows are available for delivery only during the time it meets the criteria and delivery, by necessity, follows short notice. The use, dispersion, and quantity of such waters to be diverted by the contractor would be restricted consistent with the appropriate environmental documentation, including Section 7 consultation, which would precede the execution of such contracts. It is expected that in many cases such Surplus Flood Flow water will be diverted from a canal or the river and spread across lands for pre-irrigation and groundwater recharge.

Further discussion and explanation of Surplus Flood Flow Water Supplies water is provided in the following section entitled 'Activities Associated with CVP Water and/or Facilities' (section III) of this Project Description.

The amount of surplus flood flow water supplies water can vary, depending on rainfall in a given year. Surplus flood flow water supplies water can be delivered to lands which do not have a water allocation.

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

Provisions may be included in some renewal contracts that provide for the delivery and/or conveyance of non-Project Water through CVP facilities. Such provisions will be applicable only to specific proposals which are detailed and fully addressed in the accompanying site specific NEPA and Section 7 documentation. Proposals providing for the delivery and/or conveyance of non-Project Water through CVP facilities which are not covered in those documents must be addressed through subsequent documentation and analysis. Warren Act contract amounts vary and apply only to non-CVP water. Warren Act and Water Wheeling are discussed further in the following section entitled 'Activities Associated with CVP Water and/or Facilities' (section III) of this Project Description.

Water Transfers and Contract Assignments

Provisions may be included in renewal contracts that provide for water transfer and contract assignments consistent with provisions of law and upon approval of the Contracting Officer.

Most current CVP water service contracts contain provisions allowing the contractor to sell Project water, subject to Reclamation's written consent. Generally, most transfers have occurred within the same division of the Project during the same water year. However, the CVPIA, section 3405, expressly allows all project water, subject to a water service or repayment contract, (or any water rights settlement contract, or exchange contract), to be transferred to any California water user for beneficial use, provided a number of conditions are met. All transfers authorized by the CVPIA are subject to review and approval under various conditions and must be consistent with environmental laws.

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 effects on delta smelt of transfers involving Project water delivered through the Delta Mendota Canal or San Luis Canal, wheeled through the CVP or SWP, and totaling up to 250,000 acre-feet annually were addressed in the 1995 OCAP Biological Opinion.

The whole or partial assignment of a CVP water service contract to another user is a permanent transaction and removes the assigned 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 assigned water supply to the assignee. The assigned CVP water service contract remains subject to renewal by Reclamation. The ability to permanently assign a CVP water service contract to another user is defined under the terms of individual water service contracts. Under the long term contracts being negotiated, a proposed or partial assignment will be subject to the written approval of the Contracting Officer.

Water Transfers and Assignments are discussed further in the following section entitled "Activities Associated with CVP Water and/or Facilities" (section III) of this Project Description.

Other Contract Provisions

As other provisions of the renewal contracts are negotiated, such provisions will be provided to the Service for review, once the final draft has been generated, to determine what, if any, *affect* such provisions may have on listed species.

Site Specific Biological Assessments

Given the provisions of renewal contracts discussed above, Reclamation is proceeding to prepare site specific biological assessments to determine to what degree renewal of any contract will have an effect on threatened or endangered species. The Service's SFWO Endangered Species Division will provide recommendations to Reclamation on the appropriate level of ESA consultation and *conservation measures* needed for long term contract renewals, based on the biological and/or environmental assessments that have been prepared, or any other information that Reclamation provides.

III. Activities Associated with CVP Water and/or Facilities

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

Renewal of existing long term and interim CVP contracts is addressed in the preceding section. At various times, Reclamation receives a request to amend an existing contract for numerous and varied reasons. As these new actions arise, they will be addressed consistent with applicable laws and regulations.

Consistent with the information put forth in "Exception on Limit on New Contracts" herein, and with very limited exceptions, the Secretary is restricted under the CVPIA from entering into any new short term, temporary or long term contracts or agreements for water supply from the CVP pending the completion of various actions. The exceptions include authority to execute long term contracts with the Tuolmme Utility District, the El Dorado Irrigation District, the United States Department of Veteran Affairs for the San Joaquin Valley National Cemetery, the County of Sacramento, and San Juan Suburban Water District. At this time, long term contracts have been negotiated and executed with the Department of Veterans Affairs for the cemetery, the County of Sacramento and San Juan Suburban Water District. The proposed long-term renewal action will cover the proposed contracts with Tuolumne Utility District and El Dorado County Water Agency, and the early renewal of the County of Sacramento and San Juan Suburban Water District as required under those new contracts consistent with specific renewal triggers. The renewal of the San Joaquin Valley National Cemetery will be covered pursuant to separate action upon expiration of that contract in the year 2003.

Reclamation will make certain that applicable measures to ensure ESA compliance for the renewal of CVP water service contracts are provided within the text of new and/or amended long term water contracts and related actions. 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]*

The Exchange Contract and San Joaquin Water Rights Settlement Contracts are authorized under section 14 of the Reclamation Project Act of 1939. The Exchange Contract for 840,000 acre-feet (650,000 acre-feet in a critical dry year) provides replacement water from the CVP without charge to the Exchange Contractors in exchange for agreement by the Exchange Contractors not to divert water from the San Joaquin Water pursuant to their prior rights. The Exchange Contract is a permanent settlement agreement. The operation of the CVP is subject to granted delivery of

substitute CVP Water to the Exchange Contractors. If the substitute supply from the Delta is insufficient in quality and quantity, water must be released from Friant Dam.

In addition to the Exchange Contractor, the United States has negotiated and executed various water right settlement contracts with districts and individuals which provide for the permanent settlement of prior claimed rights of entities located near the Mendota Pool to use the waters of the San Joaquin River. The San Joaquin River water right settlement contractors claim the construction and operation of the CVP has interfered with their prior rights and have agreed to a permanent adjustment of the water right quantity; many of the San Joaquin water rights settlement contractors are also contractually entitled to receive a project water supply for payment. The project water supply is subject to renewal. All San Joaquin River water right contractors having a right to paid project water are subject to binding agreement relative to early renewal and are included in the proposed long term renewal contract action.

Sacramento River Diverters *[Lead Agency: Reclamation]*

In the early 1960's the United States entered into various contracts with approximately 140 Sacramento River diverters to provide for agreement on the quantity of water which could be diverted by the Sacramento River diverters without charge in response to the asserted rights of the diverters and to provide for payment to the United States for an agreed maximum amount of Project Water to supplement the quantity made available without charge. Almost all Sacramento River contracts provide a supplemental supply of Project water. These contracts are subject to renewal in 2004 and will be preceded by the completion of environmental documentation and consultation, as may be appropriate, consistent with NEPA and ESA, respectively.

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

The Warren Act of 1911, as supplemented by the Drought Relief Act of 1991 and section 3408(c) of the CVPIA, authorizes Reclamation to negotiate and execute contracts to use excess capacity in CVP reservoirs for non-Project Water for domestic, municipal, industrial, fish and wildlife, irrigation, and any other beneficial uses , provided such use does not frustrate project purposes or applicable Federal requirements. Such activities are generally covered by “Warren Act contracts” which are intended to formalize the terms and conditions, particularly the priority, of the non-federal party’s right to access CVP facilities for the purposes of impounding, storing or conveying the non-federal party’s water rights, and to secure appropriate payment to the United States for the use of such facilities. The water to be stored, or conveyed is held by the contractor, pursuant to the contractor’s or a third party’s water right. The execution of such contracts is preceded by the completion of all appropriate environmental documentation and Section 7 consultation, consistent with NEPA and ESA, respectively. Reclamation will continue to assure that no Warren Act type services will be provided if these services would have a significant adverse impact on the ability of Reclamation or the Service 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. The use of federal facilities is usually the most efficient means to deliver the contractor's water and frequently supplements the federal water supply. Such contracts for the CVP includes water quality requirements to prevent degradation of federal water. The rate charged to store or convey non-project water includes water marketing, conveyance, storage, and pumping fees, as appropriate for the service being provided.

Surplus Flood Flow Water Supplies [Lead Agency: Reclamation]

Consistent with the restrictions included in section 3404(b) of the CVPIA, the Secretary is authorized to execute 1 year contracts to provide for the delivery of surplus flood flows at those times which the Contracting Officer declares such water to be available at various locations within the CVP system. The quantity and duration of such Surplus Flood Flow water are not predictable; such flows are available only during the time it meets the flood flow criteria and delivery by necessity follows short-notice. Such 1 year contracts with existing CVP water service contractors (and possibly other agencies) are frequently executed in advance of the availability of Surplus Flood Flows in order for the parties to take advantage of the short notice and the relatively narrow window(s) of availability of such flows. In many cases, said Surplus Flood Flow waters are diverted from a canal or the river and spread across lands for pre-irrigation and groundwater recharge.

Transfers *[Lead Agency: Reclamation]*

Transfers will be consistent with section §3405(a)(1) of the CVPIA in that, among other considerations: (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, so as 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]*

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.

Reclamation will provide information related to proposed new water assignments of Project water to the Service's SFWO Endangered Species Division prior to execution of the assignment. The process for dealing with the determination of effects and provision for Service review is in section VI. I. 7 and 8 of this opinion.

Inclusions and Exclusions *[Lead Agency: Reclamation]*

Generally requests by the contractor for inclusions and exclusions are in fact requests for Reclamation to accommodate through the applicable water service or repayment contract, organizational changes of district boundaries that have been approved or are proposed by local government entities. In order to approve such requests, Reclamation must, among other matters, ensure that the contractor's repayment ability would not be comprised and that the proposed delivery of water (or access to being served through a federally funded distribution system in the case of a CVP repayment contract) is fully consistent with the project authorization (i.e., location and proposed use of water); federal land classification requirements as applicable to agricultural water deliveries; and applicable state water rights permits. Any inclusion approved by Reclamation is conditioned upon the understanding that the maximum project quantity will not be increased as a result of the inclusion. The approval of any such request would be preceded by environmental documentation and any required ESA consultation.

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 considered to be land in agricultural production with few or no habitat values.

The contractor generally pursues an exclusion if the district wishes for any reason to terminate delivery of water or to formally provide for the removal of various lands if the district has not or does not intend to provide water service. However, the termination of water delivery to land proposed to be excluded can occur without Reclamation's approval. Requests for exclusions from the water district boundaries usually result from the land having been sold for urban or industrial development, or alternative supplies of non-CVP water are being utilized. CVP water originally allocated to that land is no longer provided and 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. 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.

Change in Place of Use *[Lead Agency: Reclamation]*

The place of use is the area in which Federal water can be used for a specific purpose. Future changes in place of use will be coordinated with the Service to ensure compliance with the ESA.

Title Transfers *[Lead Agency: Reclamation]*

As a result of water district, Congressional, and Washington level interest, Reclamation is examining project facilities to identify those for which title could be transferred to local entities. In general these are small, isolated, or single purpose facilities absent any significant controversy or environmental issues. Before facilities are transferred, qualified biologists and botanists will conduct surveys 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 under consideration for transfer 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 that appropriate controls are placed on the land to meet recovery objectives.

Self-Funding Agreements for Water Districts to Manage/Maintain Facilities
[Lead Agency: Reclamation]

Reclamation occasionally enters into agreements with individual water districts or other authorities organized to operate and maintain segments of the CVP distribution facilities. These agreements are usually requested by water users because they believe they can more effectively maintain facilities that they are using. Generally, operation and maintenance of the facilities remains exactly the same after the agreement, as before, and the only change is who is actually performing the maintenance and a change in financial agreements between the water users and Reclamation. Currently there are three major agreements with canal authorities: Friant Water Users Authority, San Luis and Delta-Mendota Water Users Authority, and Tehama-Colusa Canal Authority. Reclamation will consider entering such agreements from requesting water districts or canal authorities. Such agreements do not change water allocations nor basic water diversion schedules but rather focus on maintenance of existing facilities. Prior to approving any such agreements, Reclamation reviews them to ensure that future maintenance will be in compliance with all applicable environmental requirements. On a case by case basis these contracts/ agreements will reflect any needed environmental requirements or measures to ensure that adverse effects to listed species do not result from these actions. Where appropriate, Section 7

review of these self-funding agreements will be provided during the long-term contract renewal consultations.

Drainwater Management *[Lead Agency: Reclamation]*

Reclamation will continue to work on addressing problems associated with drainage impaired 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. In order 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 demonstrated to potentially 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 partially completed San Luis Drain. Selenium in this drainwater was determined to be the cause of waterbird deaths and deformities in areas that had received contaminated subsurface drainwater . 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 also 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 management actions. Reclamation is continuing to participate with water districts and other federal and state agencies, and will provide adequate funding to further investigate, demonstrate and evaluate safety to fish and wildlife resources, and implement when proven, appropriate 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 specific proposals for disposal of drainwater or management of drainage impaired lands.

Recreation and Resource Management Plans *[Lead Agency: Reclamation]*

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, with the California State Parks System, 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. Auburn is presently managed under an interim management plan outlining how resources should be managed while the project is pending resolution . 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 by Reclamation.

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 operation and maintenance of 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.

Conjunctive Use *[Lead Agency: Reclamation]*

One of the critical purposes of the CVP was to arrest the overdraft of groundwater across the Central Valley. As specific opportunities arise, Reclamation will participate with and encourage conjunctive use projects that facilitate the most effective use of available water supplies. 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. Additionally, 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.

IV. CVP Conveyance and Storage

Description of CVP Facilities

Central Valley Project facilities and have been described earlier in both the Introduction and in section III. A complete description of CVP facilities and their associated operations can be found in the Programmatic Final PEIS for the CVPIA. Reclamation, as part of its Project Description for this consultation, is committed to operate the CVP consistent with all current operations

criteria, applicable biological opinions, especially those addressing the CVP Operations Criteria and Plan (CVP-OCAP), Los Vaqueros, and the ROD for the CALFED Bay-Delta Program . Any proposed changes in existing operations that are out of the framework of the existing CVP-OCAP, or other applicable restrictions, would be addressed in new or reinitiated Section 7 consultations. Due to a number of factors, including new information, CALFED actions, and newly listed species, Reclamation has committed to reinitiate consultation on CVP-OCAP so that CVP operations can be re-evaluated in the context of current conditions. In any event, Reclamation will continue to operate the CVP in conformance with existing or new biological opinions addressing listed species.

Reclamation will provide information to the Service on annual deliveries of CVP water each year, prior to or concurrent with informing the water districts of their allocation amounts. If Reclamation determines the delivery of CVP water *may affect* federally listed species and/or their designated *critical habitats*, Reclamation will (re)initiate consultation under Section 7 of the ESA. Additionally, if the Service believes these deliveries *may affect* federally listed species and/or their designated *critical habitat*, the Service will request Reclamation to consult under Section 7 of the ESA.

Specific Aspects of Reservoir and Other Facility Operations

Operating Criteria *[Lead Agency: Reclamation]*

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 U.S. 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-1641, 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[5]; 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. The operation of the CVP including associated deliveries to CVP contractors will be in compliance with the existing OCAP Biological Opinion or any subsequent revisions, and with the Los Vaqueros Biological Opinion.

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

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

[5]See page 2-14 for a description of 3406(b)(2)–Management of Dedicated CVP Yield.

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 16 pumps, and each pump has an adjustable pumping rate. Combined operation of 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, threatened or endangered species, or lessen the chance of a species being listed in the future.

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. If changes in the Coordinated Operations Agreement are made that *may affect* listed species, Reclamation will initiate informal consultation with the Service and NMFS.

V. Operations and Maintenance

CVP Facilities

Central Valley Project Facilities are described earlier in this document (pages 1-6). A complete description of the CVP can be found in the Final PEIS for the CVPIA.

CVP Facilities Operations and Maintenance

Many of the CVP operations and maintenance actions have been the subject of previous consultations. Some activities have not been previously reviewed and will be covered under future biological opinions. In addition, it may be desirable to cover some operations and maintenance activities under long term contract renewal biological opinions.

Information needed for future consultations on Operations and Maintenance may include 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 that 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 *take* avoidance measures will be implemented.

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

It is understood these provide only general information needs and the Service and Reclamation will work together on site specific needs for operation and maintenance actions

Maintenance of CVP facilities is needed to protect the integrity of the canals and distribution systems so that structures may operate efficiently and safely. Examples of some routine maintenance activities required are: cleaning of under drains, 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 if it occurs in the course of operation and maintenance of Reclamation facilities. Erosion control includes blading of rills and gullies, non-operational roadwork, 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. "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 dewatered 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 waterweeds 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. For example, methods of control may include the use of carbon monoxide applied by hose from vehicle exhaust, and application of poisoned grain.

VI. Reclamation and Fish and Wildlife Service Commitments for New and Continuing Project Actions

Reclamation and the Service have committed to numerous actions and processes in this Project Description that are considered a part of the Environmental Baseline condition used to complete this biological opinion. While several of these commitments are a sole result of this opinion process, like those associated with implementation of the CVPIA, many are from ongoing actions or processes including ongoing *conservation measures* and commitments related to past and new consultations (as listed on pages 1-11 and 1-12). These activities provide needed context for consultations involving proposed Reclamation and Service actions and, thus, are listed here.

It is assumed that the commitments described in this Project Description will be fully implemented, including those summarized in this section as follows:

- A. Commitments Associated with Implementation of the CVPIA (page 2-50),
- B. Commitments Associated with Long-term Renewal of CVP Water Service Contracts (page 2-54),
- C. Commitments for Activities with CVP Water and/or Facilities (page 2-56).
- D. Commitments Associated with CVP Conveyance and Storage (page 2-58).
- E. Commitments Associated with Operations and Management Planning (page 2-59),
- F. Commitments Associated with Conservation Programs (page 2-60),
- G. Commitments Associated Drainage (page 2-65), and
- H. Commitments Associated with General Consultation Processes (page 2-66).

Additionally, Reclamation and the Service have completed and included a "Strategy Statement to Ensure Compliance with the Endangered Species Act" on page 2-69 (section I.).

It is also assumed that Reclamation and the Service will obtain funding sufficient to implement the following commitments, as necessary, to implement this biological opinion.

If these commitments are not implemented at this programmatic level, or new information becomes available, consultation would be reinitiated at the programmatic-level to ascertain how the lack of implementation of any actions, or new information, affects the evaluation of effects upon listed species associated with the overall implementation of the suite of actions being considered and the subsequent conclusions made in this biological opinion.

The actions identified in this section VI have been developed by Reclamation and the Service to conserve listed species and address impacts resulting from past and continuing actions related to the operation and maintenance of the CVP and implementation of the CVPIA. The programs implemented pursuant to the CVPIA are intended to provide mitigation of past CVP effects on fish, wildlife, and associated habitats, including listed species and *critical habitat*.

It is critical that these commitments be considered in any future consultations regarding Reclamation and Service actions because they are an essential part of the Environmental Baseline condition. Proper evaluation of the incremental effects of Reclamation and Service actions cannot be undertaken without a proper accounting of these measures and provisions. Subsequent tiered consultations addressing future actions or programs carried out by Reclamation (e.g., contract renewal) shall consider what incremental effect, if any, such action or program causes in addition to the effects included in the existing environmental baseline and not impacts that may result from past actions of operation and maintenance of the CVP.

A. Commitments Associated with Implementation of the CVPIA

The CVPIA includes numerous provisions, which are specifically designed to address past effects of the CVP by restoring species and habitat.

Anadromous Fisheries Restoration Activities. (§3406(b)(1)) *[Lead Agency: Service]*

Reclamation and the Service will continue to implement the Anadromous Fisheries Restoration Program consistent with the plan developed for that program and as defined in the proposed alternative described in section I. Implementation of the CVPIA.

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 does 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.

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

Reclamation and the Service commit to develop and implement the Habitat Restoration Program, as defined in the proposed alternative described in section I. Implementation of the CVPIA. Reclamation and the Service commit to request adequate funds be allocated to the (b)(1) "other" Program to protect and enhance ecosystems of listed species and to support recovery of listed species.

Habitat conservation projects that address this "other" mitigation component will be identified during the CVPIA implementation process. Specifically, this program will be designed during, but not limited to, the following activities: (1) ESA, Section 7 consultation for CVP contract renewals; (2) short- and long-term conservation programs being developed as a result of prior consultations (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, Reclamation staff, and 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.

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

Reclamation and the Service have been and will continue to implement the management of water dedicated under section 3406(b)(2) of the CVPIA as defined in the proposed alternative described in section I. Implementation of the CVPIA, and consistent with Interior's *Decision on Implementation of Section 3406(b)(2) of the Central Valley Project Improvement Act*, released on October 5, 1999.

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, and will remain consistent

with the *Decision on Implementation of Section 3406(b)(2) of the Central Valley Project Improvement Act*, released on October 5, 1999. 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]*

Reclamation and the Service will continue to implement the Supplemental Water Acquisition Program consistent with guidance provided under CVPIA and as defined in the proposed alternative in section I. Implementation of the CVPIA.

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.

Other 3406(b) Programs.

Reclamation and the Service will continue to implement the CVPIA consistent with plans developed for associated programs and as defined in the proposed alternative described in section I. Implementation of the CVPIA.

In addition to the principal programs outlined above, CVPIA provides a number of other specific measures to improve the condition of species or habitat. In each case, Reclamation, the Service, and other Interior Agencies are implementing or developing programs to implement these

provisions. A listing of programs that are being implemented to specifically benefit fish and wildlife is provided below. Descriptions of these programs are provided in section I, Implementation of the CVPIA, of this Project Description.

- *Tracy Pumping Plant Mitigation (§3406(b)(4))*
- *Contra Costa Canal Pumping Plant Mitigation(§3406(b)(5))*
- *Shasta Dam Temperature Control Device (§3406(b)(6))*
- *Meet Flow Standards for Anadromous Fish (§3406(b)(7))*
- *Pulse Flows for Anadromous Fish (§3406(b)(8))*
- *Eliminate Flow Fluctuation Losses (§3406(b)(9))*
- *Modify Red Bluff Diversion Dam (§3406(b)(10))*
- *Coleman NFH Restoration and Keswick Fish Trap Modification (§3406(b)(11))*
- *Clear Creek Fishery Restoration* (§3406(b)(12))
- *Gravel Replenishment and Riparian Restoration (§3406(b)(13))*
- *Delta Cross Channel and Georgiana Slough (§3406(b)(14))*
- *Construct Delta Fish Barrier (§3406(b)(15))*
- *Comprehensive Assessment and Monitoring Program (§3406(b)(16))*
- *Anderson-Cottonwood Irrigation District Fish Passage (§3406(b)(17))*
- *Restore Striped Bass Fishery (3406(b)(18))*
- *Shasta and Trinity Reservoir Carryover Storage Studies (§3406(b)(19))*
- *Glenn-Colusa Irrigation District Pumping Plant (§3406(b)(20))*
- *Anadromous Fish Screen Program (§3406(b)(21))*
- *Agricultural Waterfowl Incentives Program (§3406(b)(22))*
- *Trinity River Fishery Flow Evaluation Program* (§3406(b)(23))

B. Commitments Associated with Long-term Renewal of CVP Water Service Contracts

1. 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, as appropriate, is complete. 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.

2. 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 procedures and 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 Service's SFWO Endangered Species Division will provide recommendations to Reclamation on the appropriate level of ESA consultation and *conservation measures* needed.

3. 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 and/or inside the American River watershed, including execution of diversion agreements associated with American River Water Forum.

4. 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 using CVP water, 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 designated *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 in subsequent contract renewal consultation and will be completed within 60 days of execution of long-term contracts .

5. 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.

6. Reclamation will, subsequent to a determination of *may affect* to listed species and/or adverse modification to designated *critical habitat* in consultation with the Service's SFWO Endangered Species Division, consult on all Federal actions that result in changes in purpose of use for CVP water contracts, including changes from Agriculture to Agriculture/Municipal and Industrial purposes.

7. The Service and Reclamation will work together to convey information to the water districts, and individual water users (as appropriate), on listed species needs. Reclamation will establish an outreach and education program, in collaboration with the Service, to help water users integrate implementation of the CVPIA and requirements of the contract renewal process as it relates to the ESA.

8. 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.

9. Reclamation and/or the Service will develop provisions for compensation for the loss of endangered species habitat resulting from the direct or indirect effects of a Reclamation action not covered under prior biological opinions that occur within the CVP service areas from the date of this 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.

10. Reclamation and CVP contractors will comply with all applicable opinions related to the CVP (listed on pages 1-11 to 1-12). 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 any required consultation is reinitiated and completed. (Appendix L, letter to the Service and NMFS from Reclamation, dated October 29, 1999.)

11. Contractors are required to conform with any applicable provisions of 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 related biological opinions) will also stipulate Reclamation will not undertake any discretionary action allowing the delivery of CVP water to native 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.

12. Reclamation, relative to all new and renewed contracts will informally consult with the Service's SFWO Endangered Species Division to determine the need for formal consultation prior to contract execution.
13. Reclamation will make certain that applicable measures to ensure ESA compliance for the renewal of CVP water service contracts are provided within the text of new and/or amended long-term water contracts and related actions.

14. Reclamation will provide information related to proposed new water assignments of Project water to the Service's SFWO Endangered Species Division prior to execution of the assignment.

C. Commitments for Activities Associated with CVP Water and/or Facilities

San Joaquin River Exchange Contractors. *[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.

Sacramento River Diverters. [*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.

Surplus Flood Flows Water Contract [*Lead Agency: Reclamation*]

Approval of each Surplus Flood Flows 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 continue to assure that no Surplus Flood Flows 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 Surplus Flood Flows 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 Surplus Flood Flows 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 Surplus Flood Flow deliveries, that construction or modification project will receive separate environmental review.

Inclusions and Exclusions [*Lead Agency: Reclamation*]

Reclamation will provide the Service with documentation of its procedures for processing exclusions and conducting site investigations.

Reclamation will coordinate with the Service via the process described on page 2-40 on (a) any requested inclusions or exclusions from contract service areas, and (b) any water contracts or water deliveries involving Reclamation facilities within the Final PEIS study area for service areas that are not addressed in any existing biological opinion. This coordination will address all endangered species that may be affected by these actions.

Other CVP Water-related Commitments [*Lead Agency: Reclamation*]

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

Reclamation will continue to assure that no Warren Act type services will be provided if these services would have a significant adverse impact on the ability of Reclamation or the Service to meet fish and wildlife obligations under the CVPIA.

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 and will undergo consultation as may be required when such transfers are proposed. 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.

Conjunctive Use Project Coordination [*Lead Agency: Reclamation*]

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. Future conjunctive use projects involving Reclamation will be coordinated with the Service's SFWO Endangered Species Division to address effects to listed species.

D. Commitments Associated with CVP Conveyance and Storage

1. Reclamation has committed to reinitiate consultation on CVP-OCAP so that CVP operations can be re-evaluated in the context of current conditions.

2. Reclamation and the Service will coordinate, for ecosystem-level planning purposes relative to water deliveries to CVP contractors. 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. However, it is understood biological opinions for OCAP (1-1-94-F-70) and Los Vaqueros (1-1-95-F-117 and 1-1-95-F-134) are in place, and at no time can the total amount of these CVP deliveries exceed the total consolidated amount considered in these opinions. Further, individual tier water contract renewal processes will further address issues related to specific contract quantities as a part of their consultations under Section 7 the ESA.

3. If Reclamation determines effects, including interrelated or interdependent effects, resulting from these CVP deliveries *may affect* federally listed species and/or their designated *critical habitat*, Reclamation will request consultation under Section 7 of the ESA. If, after review of annual delivery information provided by Reclamation (#2 above), the Service believes effects related to these CVP deliveries *may affect* federally listed species and/or their designated *critical habitat*s, the Service will request Reclamation to consult under Section 7 of the ESA.

4. 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 such transfers on terrestrial species, have not yet been addressed will undergo formal consultation. 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.

E. Commitments Associated with Operations and Maintenance Planning

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

2. A plan to prevent *take* associated with operations and maintenance (O&M) of Reclamation facilities, and to help reduce *take* associated with pest control activities by farmers receiving Federal water will be developed and implemented. Reclamation will implement O&M plans for *take* avoidance as described in Appendix F of this biological opinion 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. The Service will consult with EPA to ensure that label restrictions for pesticides address needs of listed species and are used accordingly.

3. Reclamation Area Offices are developing, or have developed, O&M Plans for use by managers and those in the field doing O&M 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 guidance will be updated as new information on the species becomes available and as new species are listed.

4. Reclamation will identify and seek to eliminate invasive species of plants and animals on Reclamation lands that have the potential to severely *adversely affect* native 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 invasive species and Integrated Pest management will be included in the O&M Plans.

5. The O&M Plans and associated Manuals will also contain guidance to reduce impacts from earth moving, minor construction, erosion control, pest control, weed abatement, etc. on wetlands and sensitive, threatened, and endangered species.

Examples of additional information these O&M Plans and Manuals could contain is as follows:

- descriptions of various mitigation and *conservation measures* that would 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.

- commitments to monitor construction sites to assess mitigation success according to defined success criteria and the provision of yearly reports to the Service, California Department of Fish and Game (DFG), and the Corps.
- establishment of and agreement to, 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 would be necessary. If the success criteria are not met, Reclamation would consult with the Service to determine any further monitoring needs.

6. 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.

F. Commitments Associated with Conservation Programs

Reclamation and the Service have, and will continue to implement a number of *conservation measures* designed to improve the conditions of threatened and endangered species or designated *critical habitat*. These *conservation measures* have been or will be undertaken pursuant to Reclamation and the Service's discretionary authorities, including, but not limited to, the authority provided by Section 7(a)(1) of ESA. The Service and Reclamation will work together to ensure that existing wildlife conservation programs are funded adequately and support the purpose of the ESA.

Wetland Development Program. *[Lead Agency: Reclamation]*

Reclamation commits to continued implementation of the Wetland Development Program as funding and authorizations allow, and will continue to seek funding for this program annually.

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's 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 are varied. Numerous brood ponds have been established on 12 properties in the Sacramento Valley for waterfowl production, in

partnership with DFG , the California Waterfowl Association, and others. 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-governmental 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.

CVP Conservation Program *[Lead Agency: Reclamation]*

Reclamation commits to continued implementation of the CVP Conservation Program as funding and authorizations allow. Reclamation and the Service will seek increased annual base funding of the CVP Conservation Program.

Reclamation and the Service developed the CVP Conservation Program as one of the means to make operation of the CVP compatible with objectives of the ESA. During the consultation on Friant Division water contract renewals, Reclamation and the Service agreed to work together to enhance the condition of listed and sensitive species. The Friant Biological Opinion included conservation recommendations that specified that Reclamation and the Service 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 actions were undertaken 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 implemented by both agencies and DFG with Reclamation funding. 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 were likely to occur due to any significant degree from 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 occur in a manner compatible with the continued existence and recovery of listed or proposed species, or 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; and
- 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 or where existing information is not available, the CVP Conservation Program may develop new information.

Comprehensive Mapping *[Lead Agency: Reclamation]*

Reclamation and the Service commit to developing a Comprehensive Mapping Program, consistent with existing biological opinions including the Friant and Interim CVP contract renewals, to identify remaining natural habitats within CVP service areas and identify any changes within those habitats that have occurred between 1993 and 1999. Reclamation will seek funding for this program.

Within 18 months of this biological opinion, the three phases described below will be completed. Once the habitat is located and quantified, CVP Contractors and State and local agencies with jurisdiction over land use planning decisions will be notified of the comprehensive three phase mapping strategy. Mapping will be used to quantify listed species habitat within the service area of the water districts.

> Phase I - A 1993 landcover database or basemap will be developed using the best available existing landcover data and satellite imagery. Classification of land or habitat types represented in the CDF&G/Ducks Unlimited database will be used for wetland types, and WHR (Wildlife Habitat Relationships) classification types will be used for upland types. Classification types will be correlated with the National Biological Diversity Database for determining species habitats. As part of Phase I, a demonstration area will be chosen to develop and test methods, procedures, and products.

Phase II - will determine areas of habitat change by comparing 1993 image data to year 2000 image data. Based on available GIS datasets and spectral change analysis, a preliminary change map will be created to guide sampling and remapping efforts in phase III.

Phase III - will create an updated landcover database representative of landcover and habitat conditions for year 2000. This process may include:

- Field sampling to determine the cause of change and identification of habitat types in change areas.
- Acquisition of large scale, orthorectified digital aerial photography for verification and remapping purposes.
- Additional mapping efforts in areas where existing datasets from 1993 are not adequate to meet the needs of this project.
- GIS analysis for habitat change monitoring

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

Reclamation commits to the development and implementation of a Land Use Monitoring and Reporting Program, as funding and authorizations allow. Reclamation will seek base funding for this program.

The Service and Reclamation will collaborate on expediting the generation of baseline conditions for this opinion. Reclamation will work with the Service to provide maps produced as a result of the Land Use Monitoring and Reporting Program as soon as technically possible, to CVP water districts and county planning departments including updates of any new data from the Service.

The Comprehensive Mapping Program will be implemented immediately to test and track, for the purpose of validating over the life of the project, the assumptions made in this biological opinion that the baselines of the species in Appendix B are stable or increasing.

Monitoring will be used to assess the condition and impacts of Reclamation actions on listed species. Reclamation and the Service are actively developing a monitoring strategy based on the comprehensive mapping program. The land cover database for year 2000, described in Phase III, will be revisited every 5 years for monitoring purposes.

One use of this program is that 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.

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 ultimate goal of Interior to assure that listed species are being recovered. For any species affected by the CVP that are 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*. Any native habitat converted to agricultural or municipal/industrial use 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.

Contingency Plans for Land Conversions. *[Lead Agency: Reclamation]*

Reclamation and the Service commit to working together to develop contingency plans for land conversions, and Reclamation will seek funding to implement these plans as appropriate.

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 regarding any given Reclamation action. 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 means and funding to be used in acquiring, restoring, or otherwise protecting lands to compensate for the loss of listed species habitat. Reclamation recognizes that historic conversion of land in many cases cannot be directly linked to specific Reclamation actions. The purpose of these contingency plans is to address such conversions to the extent Reclamation can do so in a manner consistent with its statutory authorities. The plan will address compensation from the perspective of both long term and temporary 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.

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

Interagency coordination for ecosystem protection is expected to benefit listed species. 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.

G. Commitments Associated with Drainage

1.(a) Discharges into surface water bodies and waterways resulting from implementation of the CVPIA and continued operations of the CVP, under the control of Reclamation and/or the interrelated and interdependent effects of Reclamations actions, including deliveries to CVP water contractors, will comply with standards set in the Description of the Proposed Action for the biological opinion on the Environmental Protection Agency's Promulgation of Numeric Criteria for Priority Toxic Pollutants for the State of California; California Toxics Rule (CTR) (Service File No. 1-1-98-F-21), in accordance with applicable implementation plans.

1.(b) The Service will work with EPA to ensure implementation of protective criteria for listed species.

2[8]. All components of the San Joaquin Valley Drainage Program's Final Report that pertain to the CVP's contract service area will be implemented in a manner that does not preclude recovery of listed and proposed species. Specifically, selenium discharges into the San Joaquin River will not *preclude recovery* of listed and proposed species or adversely modify designated *critical habitat* 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 listed species such as the Sacramento splittail, delta smelt, and giant garter snake, as identified below.

3[6]. Reclamation, in consultation with the Service and consistent with the Interim Contract Renewal biological opinion (1-1-F-00-0056), will implement a study to identify the sources of selenium contamination in the Grasslands, San Joaquin River, and south Delta estuary. The study will identify and quantify all known sources of selenium that contribute to contamination of water supplies to the Federal, State, and private wetlands of the Grasslands area, the San Joaquin River, and southern Sacramento-San Joaquin Delta. The study will include an analysis identifying and quantifying loads from known sources such as the Delta-Mendota canal pumping project, the Mendota pool group groundwater pumping project, and discharges into the San Luis

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[6] Reclamation and the Service are working jointly to implement this effort. Together, Reclamation and the Service are seeking appropriate funding and are refocusing and intensifying existing efforts, helping to identify any additional data needs not being addressed through existing drainage and drainage monitoring programs, and are helping to secure funding for additional needs that cannot be accomplished within the existing programs.

Drain from Panoche Creek flood flows. Further, the study should provide information regarding ongoing efforts to reduce selenium in the Grasslands Area, other studies being conducted related to this venture, and any applicable reports from other investigations that have been completed (e.g, California Central Valley Regional Water Quality Control Board investigations).

4[8]. Reclamation, consistent with the Interim Contract Renewal biological opinion (1-1-F-00-0056), will implement a Service approved monitoring program to assess the effects of selenium loading within the San Joaquin River on aquatic listed species or their surrogates (including but not necessarily limited to, Sacramento splittail, Delta smelt, and giant garter snake) using the lower San Joaquin River and southern Sacramento-San Joaquin Delta. Such a program should determine tissue concentration for these species (or appropriate surrogates) collected from these areas. Initial data from this program will be made available to the Service to be used in the effects analyses of long term contract renewal on aquatic listed species and used to minimize *take*.

5. Additionally, other drainage options not considered under or consistent with the San Joaquin Valley Drainage Program will comply with the ESA.

H. Commitments Associated with General Consultation Processes

1. Reclamation and the Service commit to continued identification and resolution of issues associated with project actions in a timely manner.

2. As part of this CVP comprehensive Section 7 process, Reclamation and the Service commit to developing and implementing an agreement which includes protocols that will specifically address the integration of continuing project actions with actions meeting the needs of listed species, consistent with the requirements of the ESA.

3. Reclamation will implement the planning and communication measures, including the letter to water users associated with contract renewals and new and amended contracts, described in the Project Description of this opinion.

4. Reclamation and the Service will continue to comply with the Coordinated Operating Agreement, the Bay-Delta Plan Accord, applicable biological opinions, and other agreements and with limitations on export and transfers in the biological opinions on OCAP.

5. Reclamation and CVP contractors will comply with all opinions related to the CVP (listed on pages 1-11 and 1-12).

6. 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.

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

8. Regarding future tiered actions, Reclamation and/or the Service will provide to the Service's SFWO Endangered Species Division the best scientific and commercial data available when initiating Section 7 consultations (fulfilling the information requirements specified in 50 CFR 402.14(c)) in order to facilitate and expedite the Service consultation process.

9. Prior to implementation of any new actions undertaken pursuant to the CVP or CVPIA (i.e., signing a FONSI or ROD), Reclamation and/or the Service, in coordination with the Service's SFWO Endangered Species Division, will assess the potential impact upon listed species that may be affected by these actions or any potential modification of designated *critical habitat*.

10. Reclamation and the Service will establish a process to facilitate the completion of consultations and to develop a more streamlined and efficient process to ensure compliance with both the regulatory aspects of the ESA and implementation of conservation and recovery activities. 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. To facilitate implementation and operation of this team the Service will designate a point of contact that will act as a nexus for all Reclamation ESA related coordination activities. This person will ensure the efficient dissemination of ESA related materials and will provide input to Reclamation on status of ongoing consultations. Reclamation will designate a point of contact in each of its CVP Area Offices that can act to facilitate information transfer on ESA related activities. The purpose of this action is to facilitate information transfer, to ensure that the Service is aware of ongoing Reclamation actions, and that the Service has a method of expeditiously providing any comments and concerns.

11. 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 within 90 days of the date of this opinion, 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[7].

12. 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; implementation of CALFED; and pursuing common goals with other agencies, including local jurisdictions, water districts, Resources Conservation Districts, and Local Agency Formation Commissions.

13. The Service will continue to provide Reclamation with the most current *take* avoidance measures and *conservation measures,* in addition to any necessary *reasonable and prudent measures*. Reclamation and 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 and/or the Service will distribute the *take* avoidance measures and *conservation measures* in Appendices F and G to all water districts and county planning offices, the California Department of Pesticide Regulation, and DWR by March 1, 2001, and will continue to provide updates to these parties.

14. 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 process for actions that require further formal or informal consultation tiered from this opinion.

15. 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.

16. In addition to commitments and conservation measures in this opinion, and within other consultations, Reclamation will develop, as appropriate, guidelines and policies that address: (1) conversion of listed species habitat prior to any required Section 7 consultation on Reclamation actions or assistance with implementation of an HCP, (2) indirect effects of groundwater

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[7] This coordination team is separate and distinct from the Conservation Program Technical team described on page 2-64, although some team members may be on both teams.

recharge on listed species habitats inside and outside of water districts resulting from Reclamation actions, and (3) applications of CVP water outside of the place of use or for purposes other than the State approved purpose of use.

I. Service and Reclamation Strategy Statement to Ensure Compliance With the Endangered Species Act

The purpose of this section is to describe the specific commitments and strategy the Service and Reclamation agree to undertake in order to ensure all aspects of the CVP and the CVPIA, for which either agency has discretionary authority, are in compliance with the ESA. These are listed as follows:

1. Reclamation is committed to fully complying with the Endangered Species Act (ESA) with regard to the operation and maintenance of the CVP;

2. The Service and Reclamation are committed to fully complying with the ESA while implementing the CVPIA;

3. Consistent with their respective authorities and obligations concerning the effective and efficient operation of the CVP and implementation of CVPIA, the Service and Reclamation will utilize their authorities in furtherance of the purposes of the ESA by carrying out programs for the conservation of endangered and threatened species as provided in Section 7(a)(1) of ESA;

4. The Service and Reclamation will insure that their actions are not likely to cause jeopardy to the continued existence of any endangered or threatened species or result in the destruction or adverse modification of habitat designated as *critical* to such species as provided in Section 7(a)(2) of ESA;

5. The Service and Reclamation will identify and distinguish between actions taken to comply with ESA that are discretionary programs developed and implemented under authority of Section 7(a)(1), and actions determined to be necessary or appropriate to minimize impacts of CVP and CVPIA actions or developed as a reasonable and prudent alternative to a proposed CVP or CVPIA action in order to avoid causing jeopardy or destruction or adverse modification of designated *critical habitat* under authority of Section 7(a)(2);

6. Discretionary programs under authority of Section 7(a)(1) have been, or will be, developed by the Service and Reclamation in consultation with the Service and implemented to conserve listed species and address impacts resulting from past and continuing actions related to the operation and maintenance of the CVP and implementation of the CVPIA. The programs implemented pursuant to the CVPIA are intended to provide mitigation for past CVP effects on all fish, wildlife, and associated habitats, including listed species and designated *critical habitat*;

7. CVP or CVPIA actions or parts of actions, which *may affect* listed species or for which there is not enough information available to estimate *take* or make a *not likely to adversely affect*

determination, will receive future tiered analysis and consultation. Reclamation or the Service will provide to the Service's SFWO Endangered Species Division, dependent on lead agency status, clear descriptions of proposed CVP or CVPIA actions, specific areas that may be affected directly or indirectly by these actions, the manner in which the actions *may affect* any listed species or designated *critical habitat*, and other relevant reports and information. Reclamation and the Service will also identify any and all interrelated and interdependent actions and measures related to the proposed CVP or CVPIA action. In those situations where the lead agency, or the Service's SFWO Endangered Species Division, determines that an action *may affect* listed species or may adversely modify designated *critical habitat*, Reclamation and/or the Service will initiate informal or formal consultation as appropriate.

8. Reclamation and the Service will work together to develop means to more effectively facilitate ESA compliance through the coordination of activities and commitments discussed in this Project Description. This coordination will include establishment of a process within 3 months of this biological opinion that will provide necessary information to the Service's SFWO Endangered Species Division in situations where a determination of *no affect* has been made, sufficiently in advance, to enable the Service's review. .

9. Based upon the best available scientific and commercial data, Reclamation and the Service, in coordination with the Service's SFWO Endangered Species Division, will prepare any biological assessment(s) necessary to determine whether the proposed CVP or CVPIA action is likely to *adversely affect* endangered or threatened species or designated *critical habitat* and whether formal consultation or conferencing is required;

10. For the renewal of long-term water service contracts, in order to expeditiously complete consultation with the Service, Reclamation will provide to the Service the best scientific and commercial data available during the consultation for an adequate review of the effects these actions may have upon listed species (50 CFR 402.14(d)) and will fulfill the information requirements specified in 50 CFR 402.14(c) at the time of initiation of consultation. To assure a timely and affordable process, Reclamation will endeavor to reduce the number and extent of ESA consultations by consolidating similar renewal contract actions based on activity and geographical area;

11. Reclamation and the Service will collaboratively develop the priority and schedule for initiating and completing any ESA consultations determined by Reclamation and/or the Service to be necessary to address a CVP or CVPIA action that *may affect* a protected species and/or their habitat(s). Future CVP or CVPIA actions will be evaluated to assure necessary compliance with ESA as they arise;

12. Reclamation will work with the Service's SFWO Endangered Species Division to conduct a comprehensive review of the current status of all requirements specified in all previously issued biological opinions addressing contract renewal (e.g., Friant and Interim Contract Renewals). Such comprehensive review will also be conducted for any existing biological opinions which address CVP operations, maintenance and construction, to avoid inconsistent and duplicative

reasonable and prudent alternatives, measures and implementing terms and conditions and monitor effectiveness, identify new or continuing conservation needs. The intent of such a review is to establish a tracking system for all ESA compliance activities related to the CVP; and

13. Reclamation will establish a tracking program to assure conditions necessary for compliance with ESA are met within areas affected by the delivery of CVP water. Where Reclamation and/or the Service believe there are *adverse affects* on listed species, a conservation strategy will be required to be in place for the district or area to receive the contract water . The types of strategies that could be accepted are: *Habitat Conservation Planning*, as described in Section 10(a) of the ESA; requirements resulting from a Section 7 consultation, 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.

Environmental Baseline

The Environmental Baseline for this opinion, as provided by the ESA, consists of a combination of past and present impacts of human actions, and future Federal projects that have already undergone Section 7 consultation under the ESA.

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 already been converted 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 Kuchler (1977) and California GAP (1998). Kuchler's (1977) map of California's potential natural vegetation (i.e., the potential climax vegetation which would occur if all alterations and disturbances to the respective environments, except reservoirs, were removed) was digitized into Geographic Information System format. California GAP (1998) 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 Kuchler (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, Kuchler (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) (Kuchler 1977)	1990 Habitat Estimation (acres) (California GAP 1998)	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%
Coastal 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 (California GAP 1998).

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
Coastal 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%)

Table 3.C.: Distribution of potential natural vegetation categories by region in the Conservation Program Focus Area (Kuchler 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
Coastal 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

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 1996) 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 and proposed species associated with Delta aquatic habitats include delta smelt and Sacramento splittail.

Habitat Trends

Potential natural vegetation in the Delta included approximately 520,000 acres of tule marsh, covering 72% of the area of the Delta (Kuchler 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 (California GAP 1998). Tule marshes had been reduced to 8,904 acres, a decline of 98% from the estimate of Kuchler (1977). All wetland and open water habitat combined covered only 71,387 acres, covering less than 10% of the Delta (California GAP 1998). 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 the Tracy Pumping Plant (CVP), the Banks Pumping Plant (DWR), and numerous smaller water diversions. These 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, water can flow backwards in the channel and young fish following the current can be sucked into the pumps and killed. Several aquatic exotic species have been introduced to the Delta system (e.g. 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 4-17)

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 National Marine Fisheries Service's biological opinions on winter-run chinook for the operations of the CVP and SWP; the delta smelt biological opinion on the Environmental Protection Agency's (EPA) Water Quality Standards for the San Francisco/Sacramento-San Joaquin Rivers and Delta (National Marine Fisheries Service 1993, 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 the 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 the 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

Vernal pools are scattered throughout the grassland habitats mapped by Kuchler (1977) and California GAP (1998) 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% (4.15 million acres) of the Central Valley, and the Service has estimated that 60-85% of historical vernal pool habitat had been eliminated as of 1973 (59 **FR** 48136). Holland (1998a, 1998b) mapped the distribution of vernal pool complexes in the Central Valley, and estimated that vernal pool complexes of varying density and habitat quality covered 964,358 acres as of July 1997.

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, American peregrine falcon, 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 and American peregrine falcon occur widely throughout the study area. After severe declines due largely to pesticides such as DDT, their 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. Both species use riparian and wetland habitats for resting and foraging. Peregrines are limited by lack of cliffs for nesting on the valley floor of the Central Valley. 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 (Kuchler 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 Moore *et al.* 1990) to 4,000,000 acres (Service 1978, cited in Moore *et al.* 1990) in the Central Valley, and 1,093,000 acres in the San Joaquin and Tulare Basins (Moore *et al.* 1990, adapted from Hall 1886 and Kuchler 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 (California GAP 1998), representing a reduction of 96% from the potential natural vegetation described by Kuchler (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 declined. Valley elderberry longhorn beetles occur in riparian habitats of the Sacramento Valley and San Joaquin Valleys and have also 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 (Kuchler 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, cited in Moore *et al.* 1990) and 902,000 acres in the San Joaquin and Tulare Basins (Moore *et al.* 1990, adapted from Hall 1886 and Kuchler 1977).

In 1990, riparian habitat within the Conservation Program Focus Area covered an estimated 134,840 acres (California GAP 1998), representing a reduction of 89% from the potential natural vegetation described in Kuchler (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. Brackish lagoons sheltered from direct wave action are scattered along the coast.

Listed, proposed, and candidate species associated with these habitats are: American peregrine falcon, 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 **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 their 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 lagoons are not classified separately by Kuchler (1977) and California GAP (1998), 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 (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 (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 the Suisun Bay and Marsh, is the largest estuarine ecosystem in California. The 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). Kuchler (1977) estimated that potential natural vegetation of the San Francisco Bay complex included 96,583 acres of coastal salt marsh; this figure omits the brackish marshes in the Suisun Bay area, which are categorized as tule marsh in Kuchler'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 (California GAP 1998). 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 an 17 percent of historical marsh. Existing tidal marshes are fragments of the original marshes, and only a few deep marshes remain. Some have been backfilled, eliminating the high marsh zones and adjacent upland habitat. Others are narrow strips bordering dikes. Diked brackish marshes in Suisun Bay are managed primarily for waterfowl, and are unsuitable for clapper rails and salt marsh harvest mice.

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 Recovery Plan for Upland Species of the San Joaquin Valley, California (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. Peregrine falcons and reintroduced California Condors (in the southern San Joaquin Valley) are wide-ranging species that 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 (California GAP 1998).

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 Recovery Plan for Upland Species of the San Joaquin Valley, California (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. Peregrine falcons and reintroduced California condors (in the southern San Joaquin Valley) are wide-ranging species that may occur in alkali desert scrub habitat.

Habitat Trends

Estimates of regional declines in alkali scrub habitat range from 67 to 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 (California GAP 1998).

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 Kuchler (1977), comprising a "cismontane woodland" category.

Listed, proposed, and candidate species associated with oak woodland include: American peregrine falcon, California condor, California red-legged frog, and California tiger salamander. Peregrine falcons and reintroduced California Condors (in the southern San Joaquin Valley) are wide-ranging species that 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 (derived from Kuchler 1977) 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 (California GAP 1998), representing a 27% decline from potential natural vegetation (Kuchler 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 (*P. ponderosa*), Jeffrey pine (*P. jeffreyi*), Douglas-fir (*Pseudotsuga menziesii*), red fir (*A. 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 *(Pinus radiata*) and knobcone pine (*P. attenuata*).

Listed species associated with coniferous and evergreen hardwood forests are American peregrine falcon, California condor, bald eagle, marbled murrelet and northern spotted owl. The California condor, bald eagle, and American peregrine falcon 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 (Kuchler 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 (California GAP 1998), representing a 2% decline from potential natural vegetation (Kuchler 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, and from late to early successional stages. 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). 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

Chaparral has always been and remains one of the most abundant habitat types in California's Coast Ranges. Potential natural vegetation within the Conservation Program Focus Area

included an estimated 1,474,527 acres of chaparral habitat, including 810,130 acres in the Sacramento Basin, 197,392 acres in the San Joaquin Basin, 379,178 acres in the Tulare Basin, 45,682 acres in the San Francisco Bay area, and 42,145 acres in the San Benito/Santa Cruz area (Kuchler 1977). In 1990, chaparral habitat within the Conservation Program Focus Area was estimated at 1,353,140 acres (California GAP 1998), representing an 8% decline from potential natural vegetation.

Changes in fire frequency have caused changes in the structure and species composition of large areas of chaparral. Where fire has become more frequent, later successional species and slow-maturing species have declined. Where fire is less frequent, understory species decline. Also, fragmentation by roads, agriculture, and other developments have reduced the continuity of habitat form some species. Fragmentation and changes in fire frequency have contributed to the decline of several species. Deterioration of remaining habitat has resulted in many areas from fire suppression, which leads to excess accumulations of woody material and unusually large and intense conflagrations when fires eventually occur (Hanes 1977). 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 prairie and scrub habitats dominated by perennial grasses or shrubs develop behind dunes or along terraces and headlands where salt spray, wind, and coastal fog incursions are common. Coastal scrub is characterized by California 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 and 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, Presidio clarkia, Presidio manzanita, 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 (Bowman 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 Kuchler (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 (California GAP 1998), representing a decline of 58% from the potential natural vegetation estimated by Kuchler (1977). Coastal prairie is not classified separately by Kuchler (1977) and California GAP (1998), so broad-scale trends in this habitat cannot be quantified from these data; however, extensive urbanization along the coast suggests a declining trend.

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 the California Department of Fish and Game; and Henry Cowell Redwoods State Park.

Role of Contaminants in the Decline of Species and Habitats

Drainage Water and Selenium Contamination

Naturally occurring deposits of marine sediments in the Coast Range, containing high levels of arsenic, boron, chromium, molybdenum, and selenium--which are toxic or potentially toxic trace elements–contribute to the soil composition on the west-side and southern end of the San Joaquin Valley. 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 been 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 drainage systems 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, Aug 1989). The historic and continuing discharge of subsurface drain water into surface waters of the San Joaquin Basin has resulted 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. 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 the 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 (California Department of Water Resources 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 in order 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 174 million pounds in 1996 alone (California Environmental Protection Agency)--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).

Existing CVPIA and Related Activities

Interior has been implementing the CVPIA on an interim basis since 1992. These actions have occurred as separable or interim actions, including the appropriate associated planning and environmental documentation. Table 3.D. provides a list of completed or ongoing CVPIA and related activities considered as part of the baseline conditions during completion of this biological opinion.

TABLE 3.D.

Activity Focus	Status
CVP Contracting	*CVPIA Section 3404* - Reclamation negotiated and executed 54 interim renewal contracts, interim renewal contracts with the "Friant 14", 44 of 45 binding agreements for early renewal of long-term contracts, and collected specified charges. It's estimated that activities for most interim renewal and long-term contractors will be completed by November 2000.
Water Transfers	*CVPIA Section 3405(a)* - Interior developed and streamlined transfer approval processes within the CVP. As an example, during the period from 1993 to 1998, water transfers were completed for a total of 1.5 million acre-feet of water for agricultural and municipal uses and 200,000 acre-feet to meet Level 4 refuge water supply needs. To date, no transfers have been approved outside the CVP service area.
Water Conservation	*CVPIA Sections 3405(e) and 3405(b)* - Reclamation established the Water Conservation Program and released "Criteria for Evaluating Water Conservation Plans" (Criteria) in April 1993. 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 Criteria were released in September 1996. In 1999 Reclamation again revised the Criteria. Reclamation currently has deemed more than 70 water management plans as adequate under CVPIA. Plans must be revised every five years. Reclamation also established a water conservation Advisory Center in Folsom. A majority of CVP interim renewal contractors have already exhausted their statutory time period and as such are not entitled to an additional period of time during which to install acceptable measuring devices or implement alternative methods. *Related Efforts* - On July 29, 1993, the Commissioner of Reclamation signed the Memorandum of Understanding Regarding Urban Water Conservation in California. The Best Management Practice (BMP) annual reporting requirements 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. The BMP annual reporting requirement for agricultural water districts matches closely with the Agricultural Water Management Council.

Activity Focus	Status
Anadromous Fish Restoration Program	*CVPIA Section 3406(b)(1)* - The Service established the Anadromous Fish Restoration Program and developed a Restoration Plan to guide implementation of its efforts to at least double the natural production of anadromous fish. From 1993 to 1999, nearly 4,300 acres of riparian habitat were acquired and enhanced to help restore anadromous fish, and numerous partnerships were formed with local watershed groups. These riparian habitat restoration efforts occurred along 30 miles of Central Valley streams. The Service initiated efforts to eliminate predator habitat in San Joaquin River tributaries and provided for the placement of fish ladders and screens at two diversion structures on Butte Creek.
Habitat Restoration Program	*CVPIA Section 3406(b)(1)"other"* - Interior established the Habitat Restoration Program and the San Joaquin River Riparian Restoration Program under section 3406(b)(1) of the CVPIA. To date, the Habitat Restoration Program has helped acquire over 78,000 acres of native habitats to assist efforts to restore the Central Valley ecosystem, including the recovery of listed species. Additionally, numerous studies, surveys, and modeling efforts were completed.
Dedicated CVP Yield	*CVPIA Section 3406(b)(2)* - Interior implemented interim management of the 800,000 acre-feet of water dedicated under the CVPIA and the *Decision on Implementation of Section 3406(b)(2) of the Central Valley Project Improvement Act*, released on October 5, 1999.
Supplemental Water Acquisition Program (Anadromous Fish Focus)	*CVPIA Section 3406(b)(3)* - During the period from 1993 to 1999, Interior acquired nearly 563,000 acre-feet of water in the Central Valley to benefit anadromous fish species.
Supplemental Water Acquisition Program (Refuge Focus)	*CVPIA Sections 3406(b)(3) & (d)(2)* - During the Period from 1993 to 1999, Interior acquired nearly 260,000 acre-feet of interim and long-term water for delivery to refuges to benefit wetland dependent species.
Tracy Pumping Plant Mitigation	*CVPIA Section 3406(b)(4) and CALFED* - From 1993 to 1999, Reclamation improved predator removal processes, increased biological oversight of the pumping operations, developed a better research program, provided new lab and aquiculture facilities, and improved and modified other existing facilities.
Contra Costa Canal Pumping Plant Mitigation	*CVPIA Section 3406(b)(5)* - Reclamation established a cooperative program for the construction of a fish screen at the Rock Slough intake of the Contra Costa Canal, including completion of specifications, drawings, and environmental evaluations.
Shasta Temperature Control Device	*CVPIA Section 3406(b)(6)* - The Shasta Temperature Control Device was completed on 2/28/97. Since completion, it has been operated to help reduce in-river temperatures without requiring the stopping of power generation operations.
Estimate Flow Fluctuation Losses	*CVPIA Section 3406(b)(9)* - Interior coordinated the management of CVP facilities, developed standards to minimize fishery impacts from flow fluctuation, and initiated studies on the American and Stanislaus Rivers.
Red Bluff Diversion Dam	*CVPIA Section 3406(b)(10)* - To date, Reclamation, working with the Service, has completed interim actions and modification of the Red Bluff Diversion Dam to meet the needs of both fish and water users.

Activity Focus	Status
Coleman National Fish Hatchery Restoration and Keswick Fish Trap Modification	*CVPIA Section 3406(b)(11)* - Since 1993, Interior determined the water treatment improvement needs for Coleman NFH, installed ozonation equipment, established the Livinstone Stone Fish Hatchery to move winter-run chinook salmon hatchery operations to the mainstem of the Sacramento River, and designed fish trap improvements at Keswick Dam, including the construction of a trench in the basin below the spillway 1995. This trench now allows the escapement of fish that would otherwise be subject to excess mortality.
Clear Creek Fishery Restoration	*CVPIA Section 3406(b)(12)* - Since 1993, Interior has increased instream flows, initiated channel restoration work, added spawning gravel, completed erosion control measures designed to decrease fine sediment input into the creek, and continued evaluations of the removal of McCormick-Saeltzer Dam. Fall-run chinook salmon numbers have increased 400 percent since the program began.
Gravel Replenishment and Riparian Habitat Protection	*CVPIA Section 3406(b)(13)* - The Service, working with the State of California and Reclamation, developed long-term plans for the Sacramento, Stanislaus, and American Rivers, including placement of over 104,000 tons of gravel into these rivers since 1993.
Delta Barriers - Georgiana Slough and Old River Barrier	*CVPIA Sections 3406(b)(14) and (15), and Related Efforts* - 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. Old River Barrier -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. Delta Water Management Program - 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	*CVPIA Section 3406(b)(16)* - Interior established, with the participation of the State of California, a program to evaluate the success of restoration efforts being implemented under the CVPIA.
Anderson-Cottonwood I.D. Fish Passage	*CVPIA Section 3406(b)(17)* - Reclamation modified the dam structure and operations at the ACID diversion to improve fish passage and, working with the Service, designed new fish ladders and screens. *Related Effort* - CALFED has begun efforts to implement the planning provided by CVPIA processes above. Ladder and screen construction are underway.

Activity Focus	Status
Shasta and Trinity Reservoir Carryover Storage Studies	*CVPIA Section 3406(b)(19)* - Since 1997, actions under section 3406(b)(19) included the evaluation of operational criteria to meet 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. This study is related to studies funded under section 3406(b)(9).
Glenn-Colusa I.D. Pumping Plant	*CVPIA Section 3406(b)(20) and Related Efforts* - Construction of the GCID fish screen and channel improvements has initiated and construction of the water control structure and access bridge has been completed.
Anadromous Fish Screen Program	*CVPIA Section 3406(b)(21)* - Interior established the Anadromous Fish Screen Program, including the acceptance of 19 proposals, initiation of construction on 16 and completion of 12, and providing screening of nearly 3,200 cfs of Central Valley diverted water.
Agricultural Waterfowl Incentives Program	*CVPIA Section 3406(b)(22)* - Funding was first allocated to section 3406(b)(22) in Fiscal Year 1995. Public announcements were mailed out in November 1996 and May 1997. Over 90 farmers submitted proposals for the program during the winter of 1997-98 and 41 landowners were found eligible. Through Cooperative Agreements the program created 22,314 acres of wetland habitat for wintering migratory waterfowl during 1997-89, 38,960 acres during 1998-99, and 53,450 acres during 1999-2000. Avian use in these areas has been estimated at over 45,000 ducks, geese, swans, and shorebirds.
Trinity River Fishery Flow Evaluation Program	*CVPIA Section 3406(b)(23)* - Section 3406(b)(23) provides for completion of the Service study associated with 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. (It should be made clear Interior is not making a decision about Trinity River restoration in this proposed action.) *Related Efforts* - 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 was prepared, analyzing 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 describes the impacts of alternatives that propose increasing the flows beyond the current 340,000 acre-feet level, as well as other alternatives. The Decision for that document is expected shortly.

Activity Focus	Status
San Joaquin River Comprehensive Plan	*CVPIA Section 3406(c)(1)* - Interior initiated the San Joaquin River Comprehensive Study to evaluate the feasibility of restoring the San Joaquin River to a level that would allow for the reestablishment of anadromous fish from Friant Dam to the Bay-Delta Estuary. 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 Funded Under CVPIA Section 3406(b)(1)"other"* - Currently, the Friant Water Users Authority, the Natural Resources Defense Council, and the Pacific Coast Federation of Fisherman's Associations worked together and developed 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.
Stanislaus River Basin Water Needs	*CVPIA Section 3406(c)(2) and Related Efforts* - 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 withdrew as a partner in the study after model studies indicated that no additional dependable water supply was available from the Stanislaus River. Reclamation was unable to identify another non-Federal cost sharing partner to continue the study. The results of the data collection and analysis were published in a transition report titled, "American River/Folsom South Conjunctive Use Optimization Study" dated May 1996. Additional study of the Stanislaus River Basin water needs was initiated in 1998 to assess the water temperature parameters and refine the analysis of the groundwater resources. Two water temperature profilers were purchased for installation in New Melones Reservoir and will collect data to quantify the cold water resource in the reservoir and help manage river temperatures for chinook salmon. Work was initiated to extend the groundwater model (San Joaquin County Integrated Surface Water Model) to include the area between the Stanislaus River and the Tuolumne River. Additional evaluations include a study of the effects of flood-plain development and the relationship between reservoir management and the ecological functioning of the river.
Refuge Water Supply and Conveyance	*CVPIA Section 3406(d)(1-5)* - Since 1993, Interior acquired additional water supplies [listed under section 3406(b)(3) refuge water supplies above], executed 6 interim "wheeling" agreements, began constructing water conveyance facilities, and completed 3.

Activity Focus	Status
Central Valley Wetlands Water Supply Investigations	*CVPIA Section 3406(d)(6)* - An investigation was initiated in 1993 to identify alternative means of improving the reliability and quality of water supplies for privately owned wetlands in the Central Valley. During 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. Interior developed a GIS database to identify potential water supplies for supplemental wetlands. 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.
Investigation on Maintaining Temperatures for Anadromous Fish	*CVPIA Section 3406(e)(1)* - The Service provided for the completion of field investigations on the general effects of riparian vegetation, irrigation, return flows and sewage effluent discharge on instream water temperatures.
Investigations on Tributary Enhancement	*CVPIA Section 3406(e)(3, 6)* -The Service completed a report in 1998 on investigations to eliminate fish barriers and improve habitat on all Central Valley streams, tributary to CVP regulated streams. Additionally, studies were completed monitoring the abundance of anadromous fish in tributaries of the Sacramento River.
Report of Fishery Impacts	*CVPIA Section 3406(f)* - A report was prepared describing the major impacts of CVP reservoir facilities and operations on anadromous fishes. As a result of the 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 of the report was prepared with major input on fish resources from the DFG, and economic values from the NMFS. The results included discussion of CVP impacts associated with blocking access to spawning and rearing areas, altering streamflow regimes, blocking replenishment of spawning gravel, and entraining young fish toward export pumps. The report 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.
Ecological and Hydrological Models	*CVPIA Section 3406(g)* - Interior has been developing models and data to evaluate the effects of various CVP operations (in cooperation with DWR, USGS, others) and systems in the Sacramento, San Joaquin, and Trinity River Watersheds. Work continues 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 Interior 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.

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

Activity Focus	Status
Cost-share Agreement with State of California	*CVPIA Section 3406(h)* - The agreement for Federal and State sharing of costs associated with implementing the CVPIA was signed on 6-27-94.
Restoration Fund	*CVPIA Section 3407* - 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. On September 30, 1993, and September 30, 1997, the Friant surcharge rates increased to $5 and $7 per acre-foot, respectively. In Fiscal Year 2000 the rate for all sold CVP irrigation water was $7.10 per acre-foot and $14.20 per acre-foot for all sold CVP municipal and industrial water; these rates are continuing and are adjusted annually in compliance with the CVPIA. To date, Reclamation has collected over $200 million (1993-99) to help implement the CVPIA.
Rules and regulations	*CVPIA Section 3408(a)* - To date, Reclamation has developed interim guidelines and criteria for 10 sections of the Act. The Administrative Proposal process is ongoing and final rules are expected to follow the CVPIA PEIS Record of Decision.
Land Retirement Program	*CVPIA Section 3408(h)* - Interior established the Land Retirement Program to decrease the drainage problems in San Joaquin Valley, and enhance wildlife habitat and the recovery of endangered species. To date, the program has acquired 2,814 acres from willing sellers and has established a Demonstration Study to evaluate the most appropriate methods to continue implementation of the program.
Project Yield Increase (Water Augmentation Program)	*CVPIA Section 3408(j)* - In 1994, Interior established the process to complete a plan minimizing any adverse effects resulting from the water dedicated to fish and wildlife under the CVPIA and assisting the State in meeting its future water needs. 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 Plan was transmitted to Interior in October 1995. A Supplemental Water Acquisition Strategy paper was completed in February 1996 and another is due to be completed in July 2000. 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, among other alternatives, the development of new reservoirs to increase the yield of the CVP.
Programmatic Environmental Impact Statement	*CVPIA Section 3409* - The draft PEIS for CVPIA was released in November of 1997, a supplement correcting model assumptions was released in June of 1999, and the final was completed and released in October of 1999.

Other CVP Programs and Actions

CVP Conservation Program

The CVP Conservation Program program , in combination with the (b)(1) "other" program identified in Table 3.D. above, is 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 CDFG 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.

Water Deliveries Beyond CVP Service Contract Supplies

Reclamation has obligations to deliver water to users in the Central Valley as part of existing agreements associated with the completion and operation of the CVP. These water users are associated with the exchange and settlement contracts within the San Joaquin and Sacramento basins (explained in section 2, Project Description). Water quantities are as follows:

Water Rights Water	
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
TOTAL	3,102,446 acre-feet

Transfers

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.

Surplus Flood Flow Water Supplies

The amount of Surplus Flood Flow Water Supplies can vary, depending on rainfall in a given year, and can be delivered to lands which do not have a water allocation.

Inclusion and Exclusions

Reclamation receives notification regarding inclusions and exclusions of lands for delivery of CVP contract supplies as they occur. These actions are individually evaluated and, as appropriate, including section 7 consultation under the ESA. Currently, exclusion requests are frequently tardy, sometimes being submitted years after housing developments are already complete. Reclamation is working to make these requests occur in a more timely fashion.

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. Due to the programmatic nature of this consultation, effects have been analyzed on a general level. Specific effects, including interrelated and interdependent effects, of individual actions will be addressed in tiered consultations.

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. The following are assumed in this effects evaluation:

1. Interior will ensure full implementation of commitments and conservation actions described in the Project Description of this opinion, including:

- actions and programs as identified in the Proposed Alternative currently under consideration for implementing the CVPIA, (section 2, I. A. CVPIA Sections Included in Interior's Current Proposed Alternative), including but not limited to: long term contract renewal, management of the CVP in a manner consistent with Interior's *Decision on Implementation of Section 3406(b)(2) of the Central Valley Project Improvement Act*, released on October 5, 1999; implementation of the (b)(1)"other" program; implementation of the Anadromous Fish Restoration Program; and provision of a firm water supplies to Central Valley wildlife refuges and wetland areas.

- activities, programs, and processes included in commitments for this biological opinion, section 2, VI. Reclamation and Service Commitments for New and Continuing Actions.

2. Reclamation and the Service will comply with all biological opinions related to the CVP (listed on pages 1-11 and 1-12), including but not limited to;

- flow standards that form the environmental baseline of the 1995 OCAP and Los Vaqueros biological opinions are met

- commitments, conservation measures and terms and conditions from the Interim Water Contract Renewal biological opinion (1-1-00-F-5.6)

- 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)
- commitments and conservation measures found in the biological opinion for the CALFED Bay-Delta Program (1-1-F-00-183)

3. 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.

4. Other CVP-related, non-CVPIA actions benefitting fish, wildlife, and associated habitats will continue, including:

- implementation of the Central Valley Project Conservation Program
- implementation of the Wetland Development Program
- implementation of the Comprehensive Mapping Program
- implementation of the Land Use Monitoring and Reporting Program
- continued Interagency Coordination for Ecosystem Protection

5. Water will continue to be delivered to CVP service contractors in quantities that approximate amounts provided in Appendix D (1988 through 1997). Reclamation and the Service will coordinate, for ecosystem-level planning purposes relative to water deliveries to CVP contractors. 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. However, it is understood biological opinions for OCAP (1-1-94-F-70) and Los Vaqueros (1-1-95-F-117 and 1-1-95-F-134) are in place, and at no time can the total amount of these CVP deliveries exceed the total consolidated amount considered in these opinions. Further, individual tier water contract renewal processes will further address issues related to specific contract quantities as a part of their consultations under Section 7 the ESA. If Reclamation determines effects, including interrelated and interdependent effects, resulting from these CVP deliveries *may affect* federally listed species and/or their designated *critical habitat*, Reclamation will request consultation under Section 7 of the ESA. If, after review of annual delivery information provided by Reclamation (#2 above), the Service believes effects related to these CVP deliveries *may affect* federally listed species and/or their *critical habitat*, Reclamation shall initiate formal consultation under Section 7 of the ESA.

6. It is assumed delivery of full contract quantities will continue to be impacted by ongoing hydrology; actions and statutes including, but not limited to existing biological opinions (i.e., 1995 OCAP), existing implementation of the CVPIA, and conformance and adherence to additional existing State and Federal regulations and guidelines; and socio-economic factors. The delivery of CVP water supplies will be further evaluated during NEPA evaluations and

ESA consultation processes associated with site-specific long-term contract renewals. The affect on listed and proposed species will be evaluated at that time.

7. The analysis for this opinion is based on the assumption that CVP water contract amounts will remain consistent with those provided and analyzed in the Final PEIS for CVPIA. The analysis further assumed that actual CVP water deliveries to contractors, because of hydrology, compliance with existing regulations and statutes (i.e., 1995 OCAP and Los Vaqueros biological opinions), and existing socio-economic factors, will remain consistent in magnitude with CVP operations from the period 1988 to 1997, as provided in Appendix D of this opinion.

8. Consistent with the CVPIA Administrative Proposal on Urban Water Supply Reliability (dated June 9, 1997), it is assumed that any permanent transfer or assignment of CVP water that occurs after September 30, 1994, that coverts water used for agricultural purposes to M&I purposes, should retain the agricultural shortage.

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 Environmental Baseline section of this opinion. The following estimates are provided to help Reclamation determine possible affects of specific operations and maintenance activities of the CVP.

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 on pages 4-1 through 4-3.

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 on pages 4-1 through 4-3.

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 on pages 4-1 through 4-3.

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:

a. 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.

b. 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 on pages 4-1 through 4-3.

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 assumption 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, and the assumptions on pages 4-1 through 4-3 are implemented.

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 provision of water dedicated under section 3406(b)(2) and water acquired under section 3406(b)(3). These flows would have a positive impact on Delta fishes, anadromous salmonids, and other listed species. 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.

Operations and Maintenance Activities

Implementation of measures described in the Operations and Maintenance section of this decision (section V) are necessary to maintain or increase the likelihood of survival and recovery for listed species. These measures would reduce take of endangered species and reduce the impact of maintenance of levees, mowing, and other activities. The Operations and Maintenance section 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.

Instream Flows and Water Impoundments and Diversions

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 *conservation measures* and commitments, as such measures and their implementation are described, in the Project Description in section 2 of this opinion.

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:

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

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

e. 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.

f. Provide annual assessments to the Service confirming whether or not the Assumptions on pages 4-1 through 4-3 are valid.

g. 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.

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

i. 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.

j. Subsequent fulfillment of the Comprehensive Plan requirements under section 3406(c)(1) of the CVPIA, release more water, as needed, from Friant Dam to improve downstream water quality and to the extent necessary to restore high-value habitat for listed species.

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

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

m. 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.

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

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

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

q. 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).

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

s. 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.

t. 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.