SECTION 6

Cumulative Effects

6.1 Introduction

This section describes the anticipated cumulative effects associated with past land and water development, the proposed project and alternatives, and other ongoing and reasonably foreseeable future projects that may affect environmental resources of the project area and vicinity. Because land and water development in the Central Valley has been ongoing throughout the past 100 years, much information regarding historic environmental conditions is qualitative. In addition, because there have been many projects in the Central Valley that have been implemented by federal, state, local, and private entities, it is not possible to assign responsibility for historic impacts on the physical and biological resources of the region to any single entity or group of entities. Therefore, this analysis does not speculate about the identity of projects that have had historic adverse impacts on the environment of the Central Valley.

6.2 Cumulative Effects of Past Land and Water Development

The U.S. Fish and Wildlife Service (FWS) recently noted that about 85 percent of wetlands and about 30 percent of all habitats in the Central Valley had been altered by land and water development immediately prior to the operation of the CVP (FWS, 1995). These habitat losses resulted from land use changes and the introduction of human populations to the Central Valley from Spanish colonization to the late 1930s. During this period, and especially during the late 1800s and early 1900s, substantial development of the Central Valley occurred because of the introduction of agriculture, grazing, the development of rural and urban communities.

The CVP contributed to these habitat losses by providing water that supported agricultural, municipal, and industrial land uses in the Central Valley. The FWS believes that about 25 percent of the total 7.8 million acres of altered habitat in the Central Valley is attributable to the CVP (FWS, 1995). Therefore, the operation of the CVP has contributed to the degradation of about 2 million acres of native habitat in the Central Valley while providing water supplies for beneficial uses such as agricultural, municipal, and industrial land uses.

Figure 6-1 illustrates the historic increase of improved agricultural acreage in the Central Valley. As shown, agriculture has increased from about 1.3 million acres in the 1860s to about 19.5 million acres in the 1960s. This acreage has subsequently declined because of land being removed from commercial agricultural production and encroachment of urban land uses in the valley. It is estimated that from 50,000 to 100,000 acres of agricultural land are urbanized on an annual basis (Jelinek, 1979).

In the early 1950s, CVP water was delivered to about 1.25 million acres. Lands served by the CVP continued to expand to over 2 million acres by 1990; however, in many areas new lands were not brought into production from CVP water use, but exchanged water sources with local surface water or groundwater.
Figure 6-1

6.3 Other Projects and Reasonably Foreseeable Actions Contributing to Cumulative Effects

Other actions being implemented or proposed to be implemented by Reclamation or other federal, state, local, or private entities would contribute in an incremental manner to the cumulative impact on physical and biological resources of the region. Many of these actions have no direct relation to the changes to the water rights permits being addressed in this document. These actions, however, may be indirectly related to those changes because they have the potential to alter or modify CVP operation, which, in turn, could affect the CVP's compliance with existing terms and conditions assigned by the water rights permits.

6.3.1 Projects that May Contribute to Cumulative Impacts

Of the many actions being considered by Reclamation and other entities, only a few have proceeded beyond the initial study phase and have gone on to design, pre-construction, or construction phases. Table 6-1 lists the projects or actions currently being considered by Reclamation or other federal entities that would contribute in an incremental manner to the cumulative impact on physical and biological resources of the region. The projects that have not proceeded beyond the initial study phase have not been included in Table 6-1 because it would be speculative to assume that they would be implemented at this time.

Table 6-1
Actions that May Contribute to Cumulative Impacts

Action	Consequences
SWRCB Water Rights and CALFED Bay-Delta Planning Programs	Changes in Delta inflow and associated instream releases Restoration of habitat in streams and actions to improve water quality Development of new storage and/or Delta conveyance facilities
Changes Water Transfer Actions	More extensive non-CVPIA water transfers than assumed in Base Transfer Scenario for alternatives with CVPIA transfers
Changes in Federal Farm Programs	If lands fallowed or retired due to CVPIA actions continue to accumulate support payments, net revenue to farmer may increase and the revenue to the Federal Treasury may not increase
Fishery Programs	Changes in use of hatcheries could occur based upon future studies Changes in harvest limitations could occur in the future
Yield Increase Plan	Development of facilities and programs to increase CVP water supplies to reduce impact of shortages from CVPIA actions
Additional Wetlands	Improve reliability of water supplies to private wetlands and develop new wetlands. A portion of the new wetlands considered in the Draft PEIS alternatives

6.3.1.1 Other Ongoing Reclamation Actions that May Contribute to Cumulative Impacts

- **CALFED Bay-Delta Program** - The CALFED Bay-Delta Program (CALFED Program) started in June 1995 as a collaborative effort to address a declining ecosystem, uncertain water supplies, imperiled water quality, and unstable levees in the San Francisco Bay-San Joaquin River Delta. The federal and state agencies that are participating in this effort are:

  -- California Resources Agency (including the California Department of Fish and Game and the California Department of Water Resources

  -- California Environmental Protection Agency (including the State Water Resources Control Board)

  -- U.S. Environmental Protection Agency

  -- U.S. Department of the Interior (including the U.S. Fish and Wildlife Service and the U.S. Bureau of Reclamation)

  -- U.S. Department of Commerce (including the National Marine Fisheries Service)

  The purpose of the CALFED Program is to develop a long-term solution to problems affecting the Delta. The CALFED Program is evaluating alternatives, including several water storage options that include groundwater banking, offstream surface water storage, and conjunctive use. The CALFED Program could also develop more reliable water supplies, and thereby reduce the impacts of Central Valley Project Improvement Act (CVPIA) actions on CVP water contractors through the construction of new storage and conveyance facilities.

- **Central Valley Project Improvement Act (CVPIA)** - Reclamation is undertaking a series of actions to manage the water resources of the CVP to benefit a wide variety of uses. These actions are being taken to meet the requirements of legislation such as the CVPIA and other requirements established through federal legislation. Major ongoing actions by Reclamation that directly affect the distribution and delivery of water to CVP water contractors or may have a direct effect on the operations of the CVP are described below.

  The CVPIA requires Reclamation to implement a series of actions designed to improve the operations of the CVP to provide greater benefit to fish and wildlife resources. The actions expected to be implemented include both short-term and long-term programs to comply with requirements of the federal Endangered Species Act. Specific provisions of the CVPIA that could affect the lands and resources of the CVP water contractors include:

-- **3404 - Limitations on Contracting and Contract Reform** - Asserts that water delivery contracts shall be renewed on request and describes conditions for renewing existing contracts.

-- **3405(a) - Water Transfers** - Authorizes individuals or districts to transfer some or all of their water, with conditions.

-- **3405(b) - Water Meters** - Requires that all CVP surface water delivery systems be equipped with water-measuring devices.

-- **3405(c) - State and Federal Water Quality Standards** - Requires that CVP water contractors be responsible for meeting applicable water quality standards in agricultural drainage.

-- **3405(d) - Water Pricing Reform** - Imposes a tiered water pricing structure on water sold to CVP contractors.

-- **3405(e) - Water Conservation Standards** - Requires the development of criteria for evaluation of water conservation plans.

-- **3406(d)(1) - Level 2 Refuge Water Supply** - Requires that Level 2 water be delivered to assigned refuges. Level 2 supplies are the historical average annual water supplies available to the national wildlife refuges and state wildlife areas addressed in the 1989 Report on Refuge Water Supply Investigations.

-- **3406(d)(2) - Level 4 Refuge Water Supply** - Requires that, within 10 years, Level 4 water be delivered to assigned refuges within 10 years. Level 4 supplies are the total quantity of water required for the optimum management of each of the national wildlife refuges and state wildlife areas addressed in the 1989 Report on Refuge Water Supply Investigations.

-- **3408(d) - Use of Project Facilities for Water Banking** - Authorizes agreements to allow CVP water contractors to use CVP facilities for water banking, with conditions.

-- **3408(h) - Land Retirement** - Authorizes purchase of agricultural lands and associated water rights from willing sellers, with conditions.

-- **3411 - Compliance with State Water Law and the Coordinated Operating Agreement** - Requires modifications to water rights permits and licenses for changes to purpose of use or place of use to comply with federal obligations of the Coordinated Operating Agreement.

-- **Long-Term Contract Renewals** - This program will be implemented upon completion of the CVPIA Programmatic EIS. It will be designed to provide CVP water to water contractors for a period of up to 25 years, while meeting the compliance requirements of the federal Endangered Species Act.

-- **Amended Point of Diversion** - There is a petition before the SWRCB that would change Reclamation's existing water rights permits to add the existing water pumping plant at Tracy as a point of diversion and re-diversion, and would remove the maximum 4,600 cfs

pumping limit from Reclamation's water right permit.

6.3.2 Private- and Local Government-Sponsored Projects that May Contribute to Cumulative Impacts

Private- and local government-sponsored land and water developments in CVP water contractor service areas outside the authorized POU may contribute to cumulative impacts by proposing projects, rezoning parcels, and redesignating land uses within the local jurisdictions. Changes in zoning and land uses could result in a wide range of environmental impacts, including loss of vegetation and habitat, associated effects on wildlife, air emissions, impacts on soil (erosion), and impacts on water quality.

Changes in demand for agricultural products could contribute to a wide range of environmental impacts on lands outside the authorized POU, including loss of vegetation and habitat, effects on wildlife, impacts on air quality, soils, and water quality. Examples of this include (1) if changes in demand for crops occur resulting in an increase in crop value, more lands may be brought into production; or (2) if changes in demand for crops occur resulting in a decrease in crop value, lands may become non-productive or converted to a different crop type. In addition, if the price of water becomes too high, lands may be converted to an M&I use, which would result in impacts associated with increased urbanization.

As described in Section 5, Reclamation is committed to monitoring future land use changes to ensure that CVP water is not used in a manner that is inconsistent with the federal Endangered Species Act. However, there are no restrictions on local management agencies regarding approval of future land development projects that would need CVP water.

6.4 Analysis of Cumulative Effects

The proposed project would increase the acreage of the authorized POU by about 834,667 acres, an increase of 6 percent over the current 13-million-acre POU. Of these lands, about 683,393 acres are undeveloped, and 151,274 acres have already been developed with either CVP water or other water. Although the proposed project would not directly affect land uses or change existing environmental conditions, the availability of CVP water could support future land development and land use changes that may be implemented by local land management authorities or individual land owners.

Only 21,678 acres of the total 683,393 undeveloped acres (3.2 percent) could receive CVP water without the individual CVP water contractors reallocating the distribution of their contracted water within their areas.

6.4.1 Cumulative Effects on Wildlife Habitats and Threatened or Endangered Species

Future land development that could be supported by the proposed project could potentially increase the loss of wildlife habitats by about 21,678 acres, assuming historical water deliver patterns. Additional acreage in the immediate vicinity of areas served CVP water could also be developed if CVP water percolates into the groundwater system and is pumped and reapplied to other agricultural lands. This loss of habitat would be significantly adverse if habitat for species designated as threatened or endangered were adversely affected. As noted in Section 4, such habitats are found in each of the CVP water contractor areas being addressed in this EIR.

Mitigation is available to avoid impacts to these species' habitats. As noted by the FWS (1995), the implementation of the FWS mitigation program would (1) ensure that the use of CVP water is consistent with the federal Endangered Species Act, (2) effectively avoid impacts to these species, and (3) likely improve conditions throughout the Central Valley. A similar mitigation program is recommended in Section 5 of this EIR to avoid impacts to the habitats and species designated pursuant to the California Endangered Species Act. This additional mitigation would effectively avoid additional impacts to state-listed species. Therefore, the proposed project would not contribute to adverse cumulative impacts on threatened and endangered vegetation and wildlife species.

6.4.2 Cumulative Effects on Air Quality

Future municipal and industrial development on lands served CVP water could contribute to increases in air emissions of hydrocarbons, nitrogen oxides, sulfur oxides, and other pollutants associated with urban development. Future agricultural development could increase emissions of PM_{10} and other particulates. However, the total contribution resulting from future development on lands that would be served CVP water would be minor when compared to the existing total municipal, industrial, and agricultural air emission sources.

Mitigation is available to reduce or minimize air emissions from future development. Air Pollution Control Districts (APCDs) are obligated pursuant to federal and state statutes to implement actions to prevent the deterioration of local and regional air quality. Mitigation includes project-specific measures that would be assigned, as needed, by the local APCDs during their review of future individual development projects. Therefore, the proposed project would not contribute to adverse cumulative impacts on air quality.

6.4.3 Cumulative Effects on Groundwater Resources

Future development on CVP-served lands outside the authorized POU would not need to rely on local surface or groundwater if the proposed project is implemented. Therefore, the relocation of the authorized POU would not contribute to declines in local groundwater resources.

In agricultural lands, local groundwater sources may be enhanced if CVP water is applied at rates that promote deep percolation. These waters could be eligible for withdrawal for reuse if available in sufficient quantities and quality. This is considered a beneficial impact, and would not contribute to adverse cumulative effects on groundwater resources.

Contamination of shallow groundwater resources could occur if lands containing trace elements are irrigated by CVP water associated with the proposed project. The concentration of trace elements in shallow groundwater could pose potential adverse impacts in local areas. Mitigation is recommended in Section 5 to avoid future impacts resulting from the concentration of trace elements in shallow groundwater. Implementation of this mitigation would effectively avoid or reduce potential impacts to groundwater quality to a nonsignificant level, and would result in no cumulative adverse impact on groundwater in the Central Valley.

6.4.4 Cumulative Effects on Land Use

As noted in Section 4 of this EIR, the proposed expansion of the authorized POU would likely result in land use changes. The availability of CVP water could support future development, as determined appropriate by local land management authorities. Such development would be consistent with local land use policies and plans. Therefore, no cumulative adverse effect on land use would occur with implementation of the proposed project.