SUPPLEMENTAL
CROSS VALLEY CONTRACTORS
LONG-TERM CONTRACT RENEWAL
ENVIRONMENTAL ASSESSMENT

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ACRONYMS AND ABBREVIATIONS

AAQS	ambient air quality standard
AEWSD	Arvin Edison Water Storage District
af	acre-feet
af/yr	acre-feet per year
AFRP	Anadromous Fish Restoration Program
AG	Agricultural
APE	area of potential effect
CAA	Clean Air Act
CALFED	CALFED Bay-Delta Program
CEQ	Council on Environmental Quality
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
COE	Army Corp of Engineers
CRHR	California Register of Historic Resources
CVC	Cross Valley Contractor
CVGSM	Central Valley Groundwater-Surface Water Simulation Model
CVP	Central Valley Project
CVPM	Central Valley Production Model
CVPIA	Central Valley Project Improvement Act
CWA	Clean Water Act
Delta	Sacramento-San Joaquin River Delta
DWR	Department of Water Resources
EA	Environmental assessment
EIR	Environmental Impact Report
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
EWA	Environmental Water Account
FKC	Friant Kern Canal
FWCA	Fish and Wildlife Coordination Act
FWUA	Friant Water Users Authority
HABS/HAER	Historic American Building Survey/Historic American Engineering Register
HVID	Hills Valley Irrigation District
ITA	Indian Trust Assets
JPOD	Joint Point of Diversion
KTRG	Kern Tulare and Rag Gulch Water Districts
LTCR	long-term contract renewal
LTRID	Lower Tule River Irrigation District
M&I	municipal and industrial
mg/L	milligrams per liter
NAA	No action alternative
NAHC	California Native American Heritage Commission
NEPA	National Environmental Policy Act
NHPA	Natural Historic Preservation Act
NOAA	National Oceanographic and Atmospheric Administration

ACRONYMS AND ABBREVIATIONS

NOI	Notice of Intent
NRDC	National Resource Defense Council
O&M	Operation and Maintenance
PDA	Public domain allotments
PEIS	Programmatic Environmental Impact Statement
PID	Pixley Irrigation District
$PM_{10, 2.5}$	particulate matter less than or equal to 10 or 2.5 microns
PoW	Place of work
Reclamation	U.S. Bureau of Reclamation
Regional Board	Central Valley Regional Water Quality Control Board
ROD	Record of Decision
RRA	Reclamation Reform Act
SANJASM	San Joaquin Area Simulation Model
SDWA	Safe Water Drinking Act
Secretary	Secretary of the Interior
Service	U.S. Fish and Wildlife Service
SIP	State Implementation Plan
SJRRHRP	San Joaquin River Riparian Habitat Restoration Program
SOD	South of Delta
State Board	State Water Resources Control Board
SWP	State Water Project
USFS	U.S. Forest Service
VMS	visual management system
$\mu g/m^3$	micrograms per cubic meter

GLOSSARY OF TERMS

Category 1 Water	Quantity of project water that is reasonably likely to be available during a year for delivery to the contractor, and will be calculated on an annual basis as the average quantity of delivered water provided to the contractor during the most recent 5-year period for which the contracting officer has completed or finalized total water deliveries for project rate-setting purposes.
Category 2 Water	Additional quantity of project water in excess of category 1 water that may be delivered to the contractor in some years.
Contract Rate	The water service rate required in the contractor's current contract. Depending on the contract, this rate may be fixed, adjustable, cost-of-service, or other.
Contract Total	That quantity of CVP water identified on an annual basis as Category 1 Water and used in calculating the Tiered Pricing Component.
Cost-of-Service Rate	The annual rate established pursuant to the then applicable water rate-setting policies that will recover all costs assigned to the irrigation and municipal and industrial water supply functions, respectively, within the established repayment period.
Fixed Rate	Flat rate established in the original long-term water service contract. The fixed rate for irrigation typically ranges between $2.00 – 8.00 per acre-foot. Municipal and industrial fixed rates typically range from $9.00 – 18.50 per acre-foot.
Friant Class 1	Portion of the Friant Division two-class system of water allocation. Class 1 water is that supply of water (amounts to first 800,000 acre-feet) stored at Friant Dam which would be available for delivery from the Friant-Kern and Madera Canals as a dependable water supply during each irrigation season.
Friant Class 2	Portion of the Friant Division two-class system of water allocation. Class 2 water is that supply of non-storable water which becomes available in addition to the supply of Class 1 water and which because of its uncertainty as to availability and time occurrence, would not be dependable in character and would be furnished only if and when is available as determined by the United States.
Full Cost Rate	Irrigation and M&I cost-of-service rates that repay capital with interest using interest rates and methodology set under Reclamation Reform Act Section 202(3).

Repayment Period	The time frame for recovery of the capital investment of a project. The repayment period for CVP In-Basin facilities is fiscal year 1981 through fiscal year 2030. The repayment period for CVP Out-of-Basin facilities extends from fiscal year 1987 through fiscal year 2036.
Tier Water Pricing	The payments per acre-foot of CVP water calculated pursuant to Article 7(b) of the renewal contract that are required to be remitted to the U.S. in support of tiered water pricing charges pursuant to the CVPIA.

BACKGROUND

The U.S. Bureau of Reclamation (Reclamation) published the Draft Cross Valley Contractors (CVCs) Long-Term Contract Renewal (LTCR) Environmental Assessment (EA) on October 16, 2000. The Draft EA presented an evaluation of the potential impacts and benefits for Reclamation to renew the long-term water service contracts to deliver water from the Central Valley Project (CVP) to the CVCs for agricultural, municipal, and industrial uses. The Draft EA was available for public comment through December 8, 2000. Comments submitted to Reclamation on the Draft EA during the comment period were addressed in the Cross Valley Contractors Long-Term Contract Renewal EA, Final, January 2001.

The January 2001 Final Cross Valley Contractors Long-Term Contract Renewal EA consisted of the following:

- A discussion of the relationship between the Final and Draft EA (Section I);
- A discussion of the approach and organization applied in the Final EA to address issues presented in the comment letters and communications (Section I);
- A list of commenters on the Draft EA (Section I);
- A summary of the public involvement efforts (Section I);
- Errata to the Draft EA (Section II); and
- Comments and responses (Section III).

The CVCs have not signed their long-term renewable contracts and currently have entered into interim renewable contracts. Environmental review pursuant to the National Environmental Policy Act (NEPA) has been completed for each interim renewable contract and provisions. Reclamation has determined an updated EA is needed to disclose new information and developments for the CVC's long-term renewable contract and provisions since the Final EA was completed in 2001 (Reclamation 2000; 2001).

This 2004 Supplemental EA combines and incorporates the appropriate revisions documented in the January 2001 Final EA (Reclamation 2001). Due to the span of time between the issuance of a Final EA and Finding of No Significant Impact and the anticipated execution of long-term contracts for the CVCs, this updated EA is prepared to update, clarify, and provide new information including other ongoing related projects or activities that have progressed, delayed, or terminated.

For the purposes of this 2004 Supplemental EA, it is assumed that the long-term contracts will be executed in Contract Year 2005 and expire in 2030.

The CVCs have CVP supplies through Friant supplies and In-Delta supplies. The Friant supplies are only available when all the other Friant supplies have been met and water is available in Lake Millerton. The Friant supplies, if available, would result in a reduction in quantity from the In-Delta supplies. The Friant supplies are not common due to the unreliability of available Friant supplies. The In-Delta supplies are made available in the Delta. However, due to conveyance constraints on the CVP, the In-Delta supplies are not conveyed through CVP facilities. The CVCs must find a way to get their supplies and have several options and mechanisms to obtain their In-Delta supplies. The mechanisms for conveyance and the relevant contract provisions are

discussed below. It should be noted that some of the options are included within the scope of this EA and approval process, and others would require subsequent environmental review and approval.

Typically, the CVP water is made available in the Delta by Reclamation. DWR conveys this CVP water through the California Aqueduct (State Water Project facility) when, and if, all other State Water Project (SWP) requirements have been met. The water is delivered to the Cross Valley Canal. Historically, Arvin Edison Water Storage District (AEWSD) obtained this water and used it beneficially. A like amount of Friant water, as described in the CVC/AEWSD Memorandum of Understanding for Exchange Arrangements, that would have flowed to AEWSD in the Friant Kern Canal would be diverted by the CVCs and used beneficially. CVP power is used to convey the water in the SWP facilities under this scenario. This mechanism has occurred historically and is within the scope of this EA and approval process.

DWR delivers CVP water through the SWP facilities to Reaches 9 through 13 of the Cross Valley Canal by direct delivery and/or by exchange arrangements under Article 5 of the CVP contracts to AEWSD or others.

The CVCs and other water districts have indicated an interest in engaging in exchanges similar to the exchanges that occurred with AEWSD in the past. These other exchange arrangements under Article 5 have developed throughout the interim contract renewal process to provide improved flexibility for the CVCs to obtain their CVP supplies. The long-term contract envisions exchange arrangements with other water districts. This EA and approval process is focused on the long-term renewable contracts and the continued delivery of CVP water to the Delta for the CVCs. Exchange arrangements between the CVCs and AEWSD have occurred historically and are included in this EA and approval.

Reclamation has completed environmental review under NEPA for Article 5 exchanges between Lower Tule River Irrigation District and Tulare Lake Basin Water Storage District. This EA will expire in February 2005.

The exchange arrangements with other contractors not listed above would require subsequent or separate environmental documents prior to approval.

Exchange arrangements with other districts, other than with AEWSD, have either been covered under separate environmental analysis or will be covered under a subsequent environmental analysis and are not within the scope of the LTCR approval process and EA.

As mentioned earlier, the CVCs may obtain their CVP water supplies out of Millerton Lake of the Friant CVP facilities. This option is highly variable and intermittent. Under certain hydrological or other conditions, when excess water is available behind Friant Dam and all other Friant water supplies have been met, the CVCs may obtain supplies directly from the Friant facilities out of the Friant-Kern Canal. The In-Delta supplies would be reduced by a like amount.

Article 55 of the Monterey Agreement related to the SWP contracts allow for the SWP contractor to use their SWP increment of capacity to convey the CVP water based on exchanges or transfers from the CVCs. Under this scenario, the SWP contractor would request DWR to

convey the CVP water if capacity exists in the Aqueduct. This option results in elevating the position for the CVCs on the hierarchy for DWR to convey the water. The use of CVP power to convey conveyance of CVP water under this scenario would occur under the then existing Reclamation policies and mutually agreeable terms with DWR. It should be noted that requests for water conveyed under Article 55 for the CVC is not part of the long-term contracts. Separate environmental review and analysis would be required for the conveyance of water under Article 55 of the SWP contracts. This Supplemental EA includes this option for disclosure purposes and discusses it further in the cumulative effects analysis.

Refer to Section 3, Surface Water Supplies, for a more detailed description of the conveyance and delivery methods.

EXECUTIVE SUMMARY

INTRODUCTION

The U.S. Bureau of Reclamation (Reclamation) is preparing an environmental assessment (EA) to renew Cross Valley Contractor (CVC) water service contracts, consistent with the provisions of Central Valley Project Improvement Act (CVPIA). The project alternatives will include the terms and conditions of the contracts.

Long-term contract renewal is necessary to:

- Continue beneficial use of water, developed and managed as part of the Central Valley Project (CVP), with a reasonable balance among competing demands, including the needs of irrigation and domestic uses; fish and wildlife protection, restoration, and mitigation; fish and wildlife enhancement; power generation; and other water uses consistent with requirements imposed by the State Water Resources Control Board and the CVPIA.

- Incorporate certain administrative conditions into the renewed contracts to ensure CVP continued compliance with current federal reclamation law and other applicable statutes.

- Allow the continued reimbursement to the federal government for costs related to CVP construction and operation.

The LTCRs require environmental documentation prepared at the division or unit level. The EA analyzes the localized impacts of continued water delivery to eight CVCs resulting from a LTCR for a period of 25 years (Table ES-1). For purposes of this EA, it is assumed that the LTCRs will be executed in Contract Year 2005 and expire in 2030.

Table ES-1
Cross Valley Contractors Contract Amounts

Cross Valley Contractors	Maximum Contract Amount (af/yr)
County of Fresno	3,000
Hills Valley Irrigation District	3,345
Kern-Tulare Water District	40,000
Lower Tule River Irrigation District	31,102
Pixley Irrigation District	31,102
Rag Gulch Water District	13,300
Tri-Valley Water District	1,142
County of Tulare	5,308

In 1975, the locally financed Cross Valley Canal began operations which routed water from the California Aqueduct to the eastside of the valley through a series of six lift pumps. The Cross Valley Canal begins at the California Aqueduct near Taft and conveys water across the valley to

the Friant-Kern Canal (FKC) near Bakersfield (refer to Figure PN-1). The CVCs are located on the east side of the San Joaquin Valley and are among the Friant Division contractors. The CVCs have access to the FKC and can obtain supplies from the FKC. However, the CVC's main source of CVP water is from the Delta. Most of the CVCs do not have direct capability to obtain their Delta supplies from the Cross Valley Canal. Therefore, exchanges between the CVC's Delta water and the Friant Division contractor's Friant water have occurred. Historically, the CVC's Delta water supplies have been delivered to the AEWSD in exchange for a portion of AEWSD water supply available through Millerton Lake. Water is exchanged through a water service agreement between AEWSD and the CVCs. The LTCR envisions additional exchanges of water through service agreements between the CVCs and other Friant Division contractors or non-CVP contractors providing deliveries of water to the CVCs. These other contractors are located in the lower San Joaquin Valley. Refer to Chapter 3, Surface Water Supplies, for a more detailed description.

Description of Alternatives

The No Action Alternative (NAA) assumes renewal of long-term CVP water service contracts for a period of 25 years in accordance with minimum implementation of CVPIA as described in the Programmatic Environmental Impact Statement (PEIS) Preferred Alternative. The PEIS Preferred Action assumes that most contract provisions will be similar to the provisions in the 1997 CVP Interim Renewal Contracts, which included contract terms and conditions consistent with the requirements for the CVPIA. In addition, the NAA assumes tiered pricing provisions and environmental commitments as described in the PEIS Preferred Alternative. The provisions of the NAA also are summarized in Table DA-1.

These provisions were described in the Final PEIS. These issues include tiered water pricing, definition of municipal and industrial water users, water measurement, and water conservation.

Alternative 1

Alternative 1 is based upon the proposal presented by CVP water service contractors to Reclamation in April 2000. However, there were several issues included in the April 2000 proposal that could not be included in Alternative 1 because they are not consistent with existing federal or state requirements or would require a separate federal action.

Alternative 2

Alternative 2 is based upon the proposal presented by Reclamation to CVP water service contractors in November 1999. However, there were several provisions included in the November 1999 proposal that could not be included in Alternative 2 because they would require a separate federal action.

The November 1999 proposal did include several provisions that were different than the assumptions for NAA and included in Alternative 2. The primary differences are related to tiered pricing and the definition of municipal and industrial users.

SUMMARY OF IMPACTS

The potential impacts associated with the alternatives are summarized below and are described in detail in Section 3 of the EA (Table ES-2).

Table ES-2

Summary of Potential Impacts

Resources	No Action Alternative	Alternative 1	Alternative 2
Surface Water	Contractors will continue to use available surface water and pump groundwater. The surface water available to the contractors is reduced from the historic levels because of pumping constraints at the Delta and the impacts of this reduction are described in the PEIS.	Similar effect as the NAA.	In most years this alternative would result in little or no change in water use from the NAA. In other years, Cross Valley Contractors would tend to switch from groundwater to surface water. This change will not have an effect on the San Joaquin River flows or other streams in the region. Changes in surface water use will not result in additional diversions from the Delta or changes to San Luis Reservoir storage. Alternative 2 will not affect the deliveries in the Friant-Kern Canal or storage in Millerton Lake.
Water Supply	Historic mixed uses of both groundwater and CVP surface water in the CVC's service areas are expected to continue. More emphasis on groundwater use is expected during periods when CVP surface water is limited or expensive. Overall, the diversions from the Delta to meet south of Delta demands are less under the NAA than historically observed.	Similar effect as the NAA.	Minimal changes are anticipated for irrigated acres in most year types for most of the subbasins. Contractors may switch from groundwater to surface water in certain years because of tiered water pricing. CVP water may be purchased by the CVCs from east side or west side Contractors from Friant, San Luis Reservoir and the Delta. The total diversions from the Delta are not anticipated to change with the tiered pricing. Most of the CVCs physically receive water from Millerton Lake through an exchange. Changes in CVP water

Table ES-2
Summary of Potential Impacts

Resources	No Action Alternative	Alternative 1	Alternative 2
			management because of this alternative would not affect this exchange.
Groundwater	During dry water conditions groundwater usage increases in response to decreases in surface water supplies. Contractors return to greater surface water usage after the dry conditions end. It is assumed that Contractors will return to greater use of CVP water in years when water is available from the Delta at the conclusion of the dry period.	Similar effect as the NAA.	A single year of decreased groundwater pumping will not adversely or beneficially affect the groundwater basin. Over the long term, the groundwater use in subbasin 17 would decrease. This would have a beneficial impact on the groundwater basin.
Water Quality	Water quality in the rivers and groundwater of the Cross Valley Contractor service area under the NAA is not anticipated to change from past conditions. Factors that tend to influence water quality, such as agricultural runoff, will continue similar to historic conditions; however, the average delivery south-of-the-Delta is projected to decline from historic conditions. This may increase groundwater demands and result in the application of water of a lesser quality than surface water. Continued application of this water under the NAA may influence water quality over the long term.	Similar effect as the NAA.	A decrease in groundwater pumping in subbasins 17, 18 and 20 is anticipated. This decrease in pumping should have a small, but unquantifiable, benefit to water quality as farmers switch to better-quality surface water.

Table ES-2

Summary of Potential Impacts

Resources	No Action Alternative	Alternative 1	Alternative 2
Fisheries	Water use is expected to continue as in the past using CVP surface water supplies from the Delta, Friant and groundwater. Groundwater has typically been more important during dry years when CVP water is less available; therefore, no impacts on fisheries are predicted. Contract Renewal would continue water deliveries accommodating land uses existing under the NAA. No habitat supporting special-status species would be converted to agricultural, municipal, or industrial use when compared to the NAA.	Similar effect as the NAA.	Through an exchange agreement between AEWSD (a long-term Friant Division contractor) and the CVCs, water from Millerton Lake is delivered to the eight CVCs and their subcontractors using the Friant-Kern Canal. The AEWSD receives Delta water allocated to the CVCs conveyed through the SWP California Aqueduct and across the Cross Valley Canal. These actions could result in different timing in the movement of water in the Cross Valley Canal.
Land Use	The Cross Valley Contractors account for approximately 18% of the irrigated acreage in the three subregions. The estimated irrigated acres in the three subregions for an average water year are 1,055,500 acres. In a wet year, the total irrigated acres increase by about 2,800 acres (0.3%). In a dry year, the irrigated acres decrease by about 23,600 acres (2.2%).	Similar effect as the NAA.	Compared to the NAA, in average and dry years there is no change in irrigated acreage. In wet years there is a decrease in irrigated acres by 1,200 (0.1%).
Biological	Existing Cross Valley management will continue under current conditions. No impacts to vegetation and wildlife are expected, since no additional infrastructure (e.g., dams, increased dam heights, canals, etc.) will be constructed. Additionally, under this alternative, there will be no increase in	Similar effect as the NAA.	The additional water cost could result in an increase in the amount of lands left fallow. If fallowed lands are restored to native conditions, they could provide habitat for regional vegetation and wildlife.

Table ES-2
Summary of Potential Impacts

Resources	No Action Alternative	Alternative 1	Alternative 2
	deliveries and no conversion of existing natural habitat into farmland.		A decrease in some agricultural crops (e.g., alfalfa and grain crops), however, could potentially impact the amount of nesting and feeding habitat for wildlife in the area. While a reduction in the amount of alfalfa or grain acreage could impact some species, restoration of these lands to a more natural condition would likely provide benefits to listed and other species considered sensitive. As the cost of water increases, the opportunity to provide wetland habitat in the Cross Valley region decreases. However, if water use decreases, more water may be available to flow down the San Joaquin, Chowchilla, and Fresno Rivers. Increased flows along these waterways would enhance the riparian zones, resulting in enhanced habitat quality for wildlife.
Recreational	The existing CVP and SWP facilities including the Delta, Lake Millerton and river systems will continue to operate under current conditions. The recreational resources do not change.	Similar effect as the NAA.	Similar effect as the NAA.
Socioeconomic	Gross revenues for the Cross Valley subregions are about $120 million and produce about 22% of valley-wide net income.	Similar effect as the NAA.	A reduction of $1 million is estimated for gross revenue or less than 1% in all scenarios ending in a wet year. The maximum net revenue changes less than 1% in all scenarios. Total employment output and

Table ES-2
Summary of Potential Impacts

Resources	No Action Alternative	Alternative 1	Alternative 2
			place-of-work income impact is less than 1%.
Cultural	The NAA would not result in direct impacts to eligible or cultural resources. Water apportioned under the NAA may be used to alter the use of a landscape, either through inundation, irrigation-related construction, or some other change which could impact cultural resources. The entities responsible at this level for potential impacts to cultural resources are the contracting agencies – the individual water districts.	Similar effect as the NAA.	Similar effect as the NAA.
Indian Trust Assets (ITAs)	NAA is a continuation of existing conditions, therefore, there would be no impact to the single ITA, the Table Mountain Rancheria located in the area of the Cross Valley Contractors (Fresno County Water Works #34).	Similar effect as the NAA, no impact on ITAs.	Similar effect as the NAA, no impact on ITAs.
Social Conditions	The existing Cross Valley operations do not change and social conditions are unchanged.	Similar effect as the NAA.	Similar effect as the NAA.
Air Quality	The existing Cross Valley operations do not change and air quality is unchanged.	Similar effect as the NAA.	Similar effect as the NAA.
Geology and Soils	The existing Cross Valley operations do not change and geology and soil conditions are unchanged.	Similar effect as the NAA.	Over the long term the groundwater use in subbasin 17 would decrease. Retired or fallowed agricultural production lands will have a cover crop planted in the last year of

Table ES-2
Summary of Potential Impacts

Resources	No Action Alternative	Alternative 1	Alternative 2
			cultivation.
Visual	The existing Cross Valley operations do not change and visual conditions are unchanged.	Similar effect as the NAA.	Similar effect as the NAA.

SECTION 1

PURPOSE AND NEED

INTRODUCTION

Reclamation proposes to renew long-term water service contracts delivering CVP water for agricultural irrigation or for municipal and industrial uses to eight water service contractors known as the CVCs. These eight CVCs are located in Fresno, Kern, and Tulare Counties (See Figure PN-1). These water service contractors currently receive CVP water under contracts that will expire in 2005. The long-term water service contracts proposed in this EA would continue to deliver the same amount of CVP water as the existing contracts for a period of 25 years. Table PN-1 lists the eight CVCs and contract amounts. The location of the proposed action is depicted in Figure PN-1. The analysis period for this EA is the term of the long-term contracts.

Table PN-1
Cross Valley Contractor Water Service Contracts

Cross Valley Contractors	Maximum Contract Amount (acre-feet/year)
County of Fresno[1]	3,000
Hills Valley Irrigation District	3,346
Kern-Tulare Water District	40,000
Lower Tule River Irrigation District	31,102
Pixley Irrigation District	31,102
Rag Gulch Water District	13,300
Tri-Valley Water District	1,142
County of Tulare[2]	5,308

Source: FWUA 1998
Note:
[1]Includes County of Fresno subcontract to Fresno County Waterworks #34.
[2]Includes County of Tulare subcontracts with Alpaugh Irrigation District, Atwell Island Water District, Hills Valley Irrigation District, Sausalito Irrigation District, Smallwood Vineyards, Stone Corral Irrigation District, City of Lindsay, Strathmore Public Utility District, Styrotek, Inc., and City of Visalia.

This EA has been prepared pursuant to and in accordance with the National Environmental Policy Act (NEPA) of 1969 (42 USC Section 4321-4370d) and the Council on Environmental Quality (CEQ) regulations on implementing NEPA (40 Code of Federal Regulations [CFR] Parts 1500-1508).

PURPOSE AND NEED FOR THE ACTION

Reclamation is responsible for operational control of the CVP, including securing payment for the cost of water facilities and operations and maintenance established in the water service contract with the Federal government. In addition, as a duly authorized representative, Reclamation administers all actions pertaining to the establishment of water service contracts on behalf of the Secretary of the Interior.

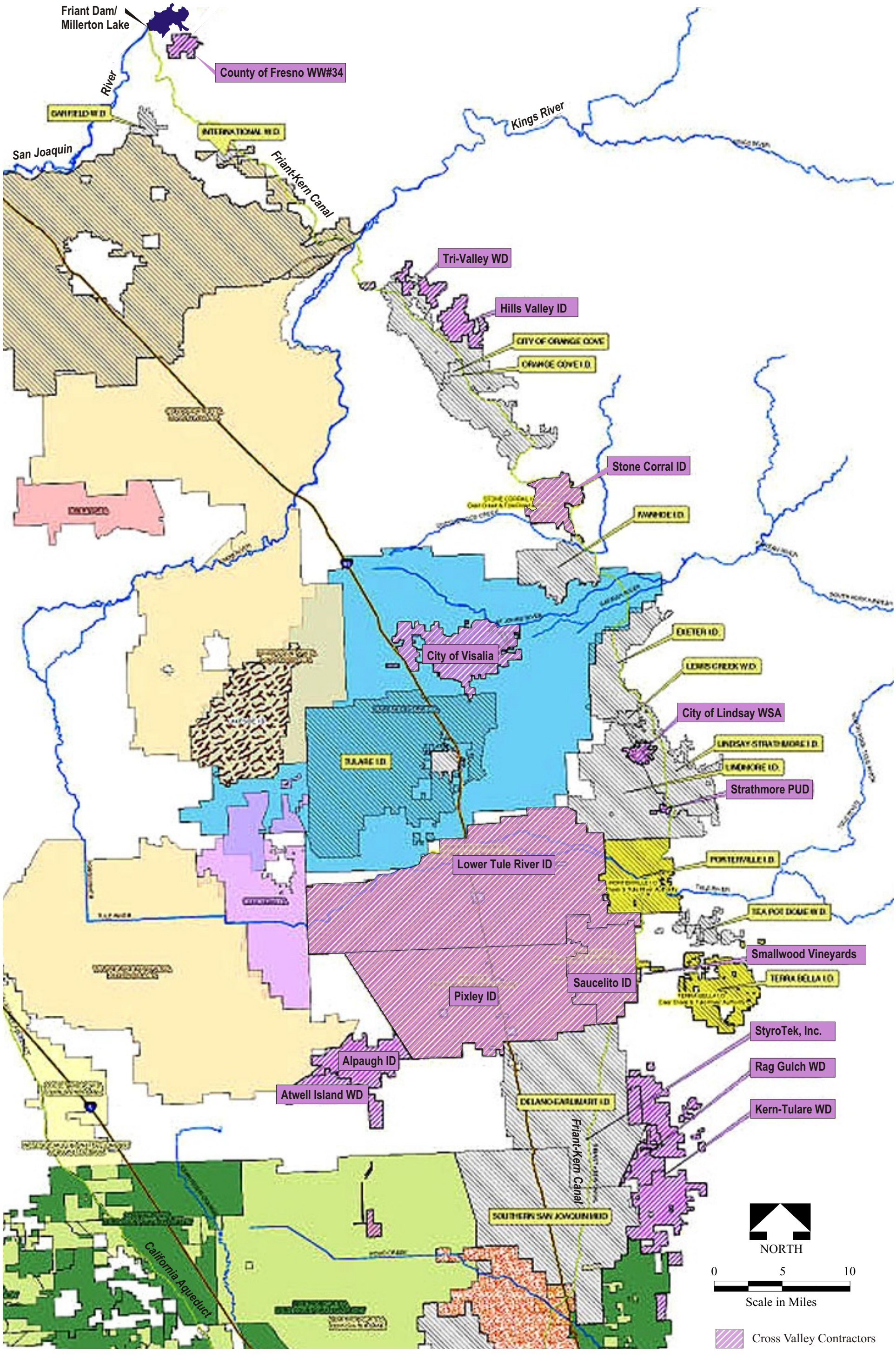

Figure PN-1. Cross Valley Contractors

The purpose of this action is to renew the CVC's long-term water service contracts, consistent with Reclamation authority and all applicable State and Federal laws, including the CVPIA (H.R. 429, Public Law 102-575). The project alternatives will include the terms and conditions of the long-term contracts and tiered water pricing.

The LTCR is needed to:

- Continue beneficial use of water, developed and managed as part of the CVP, with a reasonable balance among competing demands, including the needs of irrigation and domestic uses; fish and wildlife protection, restoration, and mitigation; fish and wildlife enhancement; power generation; recreation; and other uses consistent with requirements imposed by the State Water Resources Control Board (State Board) and the CVPIA.

- Incorporate certain administrative conditions into the renewed contract to ensure CVP continued compliance with current Federal Reclamation law and other applicable statues.

- Allow the continued reimbursement to the federal government for costs related to CVP construction and operation.

BASIS TO RENEW CENTRAL VALLEY PROJECT WATER SERVICE CONTRACTS

The River and Harbors Act of 1935 included the initial authorization for the CVP. The Central Valley Project Authorization Act of 1937 re-authorized the CVP and allowed the Secretary of the Interior (Secretary) to enter into repayment contracts and other necessary contracts with "all agencies with which contracts are authorized under reclamation law".

Public Law 88-44, the Reclamation Project Act of 1939, provided for repayment of construction charges and authorized sale of CVP water to municipalities and other public corporations and agencies, plant investment, and certain irrigation water deliveries to leased lands. This act required the Secretary to comply with laws of the State relating to the control, appropriation, use, or distribution of water used in irrigation or vested rights acquired there under. This Act also provided that the Secretary include provision for contract renewal upon request of the other party to any long-term contract for municipal, domestic, or industrial water supply. The contract renewal would be subject to renegotiation of: (1) the charges set forth in the contract in the light of circumstances prevailing at the time of renewal; and (2) any other matters with respect to which the right to renegotiate is reserved in the contract. The Act also states that the Secretary shall, upon request, provide in any such long-term contract that the other party to the contract shall, during the term of the contract and of any renewal (subject to fulfillment of other obligations), have a first right to a stated share or quantity of the CVP water supply available for municipal, domestic, industrial, or irrigation use.

Sections 9(c) of the Reclamation Project Act of 1939 authorized the Secretary to enter into contracts to furnish water for municipal water supply or miscellaneous purposes, provided that

such contracts require repayment to the United States over a period not to exceed forty years. Section 9(e) of the Reclamation Project Act of 1939 allowed the Secretary to enter into either short- or long-term contracts to furnish water for irrigation purposes, with each such contract to be for a period not to exceed forty years.

The Water Service Contracts Act of 1944 provided for delivery of specific quantities of irrigation, municipal, and industrial water to contractors.

The Reclamation Project Act of 1956 provided the right of renewal of long-term repayment or water service contracts for agricultural contractors for a term not to exceed 40 years. The Reclamation Project Act of June 21, 1963, Renewal of Water Supply Contracts, extended the right of renewal of long-term repayment or water service contracts for municipal and industrial (M&I) contractors.

On October 30, 1992, the President signed into law the Reclamation Projects Authorization and Adjustment Act of 1992 (Public Law 102-575) that included Title XXXIV, the CVPIA. The CVPIA amended the previous authorizations of the CVP to include fish and wildlife protection, restoration, and mitigation as project purposes having equal priority with irrigation and domestic uses and fish and wildlife enhancement as a project purpose equal to power generation. Section 3409 of the CVPIA required the Secretary to prepare a PEIS to evaluate the direct and indirect impacts and benefits of implementing the CVPIA. That PEIS was prepared under the NEPA by Reclamation and U.S. Fish and Wildlife Service (Service). Reclamation released a Draft PEIS on November 7, 1997. An extended comment period closed on April 17, 1998. Reclamation and the Service released the Final PEIS in October 1999 and the joint Record of Decision in January 2001.

Section 3404(c) of the CVPIA directs the Secretary to renew existing CVP water service and repayment contracts following completion of the PEIS and other needed environmental documentation by stating that:

> "...the Secretary shall, upon request, renew any existing long-term repayment or water service contract for the delivery of water for a period of 25 years and may renew such contracts for successive periods of up to 25 years each....(after) appropriate environmental review, including preparation of the environmental impact statement required in section 3409 (i.e., the PEIS)..."

Section 3404(c) of the CVPIA clearly indicates that 25 years will be the upper limit for long-term irrigation repayment and water service contracts within the CVP. However, Section 3404(c) did not amend the provisions of Section 9(c) of the Reclamation Project Act of 1939 and the Act of June 21, 1963 which authorized renewal of M&I water contract terms for up to 40 years. These 1939 and 1963 authorizations remain in place as guidance for establishing the terms of M&I contracts.

BASIS TO RENEW CROSS VALLEY CONTRACTORS WATER SERVICE CONTRACTS

The Central Valley Project Authorization Act of 1937 authorized construction of the initial CVP project features for navigation, flood-control, waste storage, construction of distribution systems, and hydropower generation. The River and Harbors Act of 1940 further authorized construction of CVP facilities and mandated that dams and reservoirs be used first for river regulation, improvement of navigation, and flood control; second for irrigation and domestic users; and third for power. This authorization was amended by the American River Division Authorization Act of 1949, Trinity River Act of 1955, San Luis Authorization Act of 1960, River and Harbors Act of 1962, Auburn-Folsom South Unit Authorization Act of 1967, and San Felipe Division Authorization Act of 1967.

Section 3404(c) of the CVPIA provides for long-term renewal of interim and existing long-term CVP water service contracts. The long-term renewable contract language recognizes the deliveries of CVP water supplies are necessary to achieve repayment of the CVP as required by law.

RELATIONSHIP OF THIS DOCUMENT TO THE 1999 CVPIA PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT

The CVPIA PEIS provided a programmatic evaluation of the impacts of implementing the CVPIA (Reclamation, 1991a; USFWS, 2000). Four alternatives, 17 supplemental analyses, the Preferred Alternative, and the No Action Alternative were evaluated in the PEIS.

The impact analysis in the PEIS was completed at a subregional level but presented within the PEIS on a regional basis for the Sacramento Valley, San Joaquin Valley, and Tulare Lake regions. The PEIS No-Action Alternative assumed that existing water service contracts would be renewed under the same terms as expiring contracts. The CVPIA PEIS included a Preferred Alternative that addressed the regional impacts and benefits of the general method that Reclamation anticipated implementation of the CVPIA, including long-term contract renewal.

The PEIS evaluated the impacts and benefits of long-term contract renewals under the CVPIA. Following completion of the PEIS, Reclamation began preparing more specific information related to long-term water service contract renewals, including this document to address specific impacts related to contract renewals for the CVCs. This document is tiered from the PEIS, and includes the Preferred Alternative of the PEIS as the No Action Alternative.

The PEIS and the Biological Opinion prepared for the implementation of the CVPIA considered and addressed impacts caused by CVP actions. The renewal of the long-term contracts would not change operations and maintenance. Reclamation is currently consulting with the Service and National Oceanographic and Atmospheric Administration (NOAA) for the Operations Criteria and Plan for the CVP and SWP facilities. Therefore this document does not need to address operations of the CVP.

OTHER RELATED DOCUMENTS OR ACTIVITIES

There are several activities being implemented by Reclamation as part of the obligation to manage and operate the CVP. The following discussion identifies these activities and describes their relation to the renewal of the CVC's water service contracts.

There are related activities that are currently being implemented or planned by Reclamation and other agencies related to the use and availability of CVP water. Additionally, Reclamation is implementing many activities related to the CVPIA and similar to those presented in the PEIS. Related studies and projects are summarized in Table PN-2. Preliminary information from these studies has been used to assess the cumulative impact analysis for each of the disciplines presented in the EA.

Table PN-2
Related Activities

Project or Study and Lead Agency	Summary
CALFED Framework and ROD (CALFED)	Established in May 1995, the consortium of federal and state agencies is charged with the development of a long-term solution to the Delta water concerns. This process could change the Bay-Delta operations criteria, provide additional conveyance and storage facilities that would affect Delta exports, and identify actions that may need to be met by the CVP and other water rights holders. Because the outcome of this study was not known, a conservative assumption was used in the PEIS. It was assumed in the Draft PEIS that the Bay-Delta Plan Accord criteria would be the long-term plan for the Delta. CALFED has completed the EIR/EIS as part of this process and a ROD was signed August 28, 2000.
Place of Use EIR for CVP water supplies - Reclamation/State Board	Some areas adjacent to the existing CVP service area have been served with CVP water. This process considered the impacts of expanding the State Board designated Consolidated Place of Use. The State Board and Reclamation are preparing the EIR as part of the approval process. The PEIS assumes that this process will be completed by the Year 2030.
San Joaquin River Comprehensive Plan (CVPIA Section 3406.c.1)	Congress directed Reclamation to develop a comprehensive plan to address fish, wildlife, and habitat concerns on the San Joaquin River. The objective was to identify improvements needed to reestablish and sustain anadromous fisheries from Friant Dam to the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (CVPIA Section 3406.c.1). Although the San Joaquin

Table PN-2
Related Activities

Project or Study and Lead Agency	Summary
	River comprehensive plan was initiated in 1992, strong public opposition to the study was received during a public outreach program in 1995. A majority of the fears stemmed from the possible impacts to the existing agricultural and economic structure in areas adjacent to the San Joaquin River. Based on stakeholder opposition, Congress eliminated project funding and the study was terminated in 1996.
San Joaquin River Riparian Habitat Restoration Program (SJRRHRP)	The SJRRHRP was formed in 1997, at the request of FWUA and NRDC, to pursue riparian habitat restoration studies and efforts along the San Joaquin River corridor from Friant Dam to the confluence with the Merced River. SJRRHRP is a CVPIA project and therefore is co-managed by Reclamation and the Service. The FWUA, NRDC, the Pacific Coast Federation of Fishermen's Associations, San Joaquin River Exchange Contractors Water Authority, Service, and the Bureau of Reclamation are active on the management team. In its three years, the program has completed numerous biological and physical baseline reports and is presently pursuing several other projects and studies along the program reach. The SJRRHRP will continue to pursue studies and projects that are consistent with the mutual goals of Friant and the NRDC coalition. Water for this program does not presently include the CVPIA's specific 800,000 af for environmental purposes. The water for this activity came from willing sellers.
San Joaquin River Riparian Flow Pilot Program	As an outgrowth to the SJRRHRP and a pending lawsuit (NRDC vs. Patterson), a pilot study was conducted by stakeholders including Reclamation, FWUA, NRDC, Pacific Coast Federation of Fishermen's Associations, and other environmental, conservation, and irrigation interests. Approximately 35,000 af of CVP water was released from Millerton Lake to the lower San Joaquin River as an experiment to enhance riparian flows. The objective of this one-time pilot study was to evaluate impacts of high flows on flood-carrying capacities, changes in the river's geomorphology, interaction of augmented river flows to local groundwater conditions, river channel losses, and to promote riparian habitat. Evaluations were conducted on the ability to use high flows to promote dispersion and enhance germination of native riparian willow and cottonwood trees and encourage survival of young seedlings along a 52-mile

Table PN-2
Related Activities

Project or Study and Lead Agency	Summary
	stretch between Friant Dam and Mendota Pool in Fresno and Madera Counties. Seedlings from the upper reaches of the San Joaquin River would be disbursed to lower portions of the river with less riparian growth. This one-time release would enhance growth along the San Joaquin River which typically receives little to no water. Under the terms of the pilot project agreement, FWUA users supplied 35,000 af of CVP water. However, an exchange arrangement would replace the water donated by the FWUA users. Reclamation would replace the 35,000 af by redirecting water from the Delta that otherwise would have been scheduled for use at Mendota Pool. The redirected water would be conveyed down the California Aqueduct to the Cross Valley Canal in Kern County to complete the return of water to the Friant users. Additionally, Reclamation purchased and supplied 15,000 af of CVP water to make up for potentially significant river channel conveyance losses incurred between Friant Dam and Mendota Pool. This replacement water was also conveyed through the California Aqueduct to the Cross Valley Canal for delivery to the Friant users. The 1999 Pilot Program began on July 3, 1999, and concluded on February 29, 2000. Water for this activity came from willing sellers. No new water was allocated from the CVP. The 2000 Pilot Project was conducted by the SJRRHRP and involved a program of water releases on a 62.5-mile stretch of the main stream of the San Joaquin River. The project will generate data to guide the development of a long-term riparian habitat restoration plan for the San Joaquin River. The pilot study will provide information to: (1) help determine what is preventing successful seedling establishment on the San Joaquin River between Gravelly Ford and Mendota Pool and (2) refine the hydrologic and hydraulic modeling for the river including the validation of existing models and information on the groundwater and surface water conditions in the project area. Key issues are potential effects on water surface elevations and flooding, levee stability, energy production, and biological resource enhancement. In 2001, efforts were initiated to partner with the San Joaquin River Parkway and Conservation Trust, Inc. for the development of an Invasive Plant Control and Revegetation Prioritization Plan for the San Joaquin

Table PN-2
Related Activities

Project or Study and Lead Agency	Summary
	River from Friant Dam to the confluence of the Merced River. The goal in 2001 was to rehydrate the affected root zones to minimize seedling loss in the 16.4 mile dewatered reach of the San Joaquin River between Gravelly Ford and Mendota Dam to allow germane vegetative response data to be collected. Quarterly terrestrial species surveys were initiated by the Endangered Species Recovery Program in Reach 2 of the San Joaquin River to supplement the 2001 pilot study baseline information. These surveys included searches for the riparian brush rabbit and valley elderberry beetle. In 2002, completed a finalized report documenting the data collected from the multi-year vegetation and physical process monitoring program initiated during the 1999 San Joaquin River Flow Release Pilot Project, dated January 2002. Contractor completed and prepared the "Baseline Vegetation and Physical Variable Data Collection Summary – San Joaquin River Pilot Project 2000" report dated January 2002.
Water Acquisition	Section 3406(b)(3) of CVPIA states, "The Secretary...is authorized and directed to develop and implement a program in coordination and in conformance with the plan required under section 3406(b)(1) for the acquisition of a water supply to supplement the quantity of water dedicated to fish and wildlife purposes under section 3406(b)(2) and to fulfill the Secretary's obligations under paragraph 3406(d)(2) of this title. The program should identify how the Secretary intends to utilize, in particular, the following options: 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.

Table PN-2
Related Activities

Project or Study and Lead Agency	Summary
	The water acquisition program has sought sources of water to augment the current CVP supply by an amount dedicated to fish and wildlife under the CVPIA. Any of the means to augment water supply identified in CVPIA would continue after the renewal of long-term contracts and, therefore, represent an additional water use in the Friant Division and South of Delta.
Friant Inflow Analysis	Reclamation is currently investigating the potential water supply benefits of working with the owners of reservoirs upstream of Millerton Lake to manage the upper basin water supply. The analysis is at the appraisal level stage and currently has no direct effect on this EA. The project could identify alternatives to manage the basin water supply that would increase the supply in certain water year types or provide a water supply to a new use. If alternatives are developed in subsequent phases of the project that would alter reservoir operations in the basin, environmental documentation will be prepared to address the changes.
Coordinated Operating Agreement (COA) and Operations Criteria and Plan (OCAP) Update – U.S. Bureau of Reclamation and California Department of Water Resources.	Provisions and requirements of the CVPIA, SWRCB Order 1641, the CALFED Bay-Delta Program, and other agency mandates require that the existing operational roles and responsibilities of the SWP and CVP be reviewed and updated to provide appropriate long-term operating criteria and procedures for the two primary water storage and delivery projects affecting waterways of the Central Valley.
Long-Term Contract Renewal of Other Existing CVP Water Service Contracts - Reclamation	Reclamation is in negotiation with other CVP water contractors for renewal of long-term contracts, including contractors for the American River Division, Feather Water District, Shasta-Trinity Divisions, Sacramento Canals Unit, San Luis Unit Contra Costa Unit, San Felipe Unit, Delta Mendota Canal Unit, The San Joaquin National Veterans Cemetery, the City of Lindsay, The City of Fresno, and Mercy Springs Water District Contract portion assigned to Santa Clara Valley Water District, Westlands Water District, and Pajaro Valley Water Management Agency.
Vernalis Adaptive Management Plan	The Vernalis Adaptive Management Plan (VAMP) provides protective measures for fall-run Chinook

Table PN-2
Related Activities

Project or Study and Lead Agency	Summary
	salmon and gathers scientific information on survival of salmon smolts through the Delta. The VAMP will be implemented through experimental flows on the San Joaquin River and export pumping rates with temporary fish barrier on Old River during the 1-month period each year, from approximately April 15 to May 15. Additional attraction flows are targeted for October. The VAMP includes water acquisition for a pulse flow at Vernalis during the April and May period, and other flows identified to meet anadromous fish flow objectives. The San Joaquin River Group Authority, Reclamation, and the Service prepared a Final EIS/EIR for the water acquisition component of VAMP in January 1999.

PUBLIC INVOLVEMENT PROCESS

On October 15, 1998, Reclamation published a notice of intent (NOI) in the Federal Register to announce the preparation of environmental documents for long-term renewal of CVP water service contracts. Scoping meetings were held at eight locations throughout the CVP service area. Reclamation completed a scoping report in April 1999.

Reclamation started the preparation of this EA during the scoping phase. Scoping served as a fact-finding process that helped identify public concerns and recommendations about the NEPA process, issues that would be addressed in this EA, and the scope and level of detail for analyses. On October 6, 1999, a meeting with a representative of the Friant Water Users Authority (FWUA) was held in Sacramento, California to discuss the possible issues of concern to the water users.

Reclamation published the Draft Cross Valley Canal Contractors Long-Term Contract Renewal EA on October 16, 2000. The Draft EA presented an evaluation of the potential impacts and benefits for Reclamation to renew the long-term water service contracts to deliver water from the CVP to the CVCs for agricultural, municipal, and industrial uses. The Draft EA was available for public comment through December 8, 2000. Comments submitted to Reclamation on the Draft EA during the comment period were addressed in the Cross Valley Contractors Long-Term Contract Renewal EA, Final, January 2001. This Supplemental EA required modifications to incorporate the 2000 Draft EA with the 2001 Final EA and to provide clarifications and updates. Only the responses in the 2001 Final EA requiring changes to the 2000 Draft EA are presented in this Supplemental EA. However, all the comment letters and responses are included as Appendix G.

The January 2001 Final Cross Valley Contractors Long-Term Contract Renewal EA consisted of the following:

- A discussion of the relationship between the Final and Draft EA (Section I);
- A discussion of the approach and organization applied in the Final EA to address issues presented in the comment letters and communications (Section I);
- A list of commenter on the Draft EA (Section I);
- A summary of the public involvement efforts (Section I);
- Errata to the Draft EA (Section II); and
- Comments and responses (Section III).

The entire 2001 Final EA is included in this document as Appendix G.

It should be noted that the 2001 Final EA included the Preferred Alternative and analysis. The Preferred Alternative is the Final Long-Term Contract Renewals and provisions. During the interim years and interim contract renewals, the Preferred Alternative (contract provisions) for the CVC's LTCRs has undergone additional changes. This Supplemental EA includes the Preferred Alternative. The Preferred Alternative is within the "bookends" for the action alternatives of Alternatives 1 and 2.

LOCALIZED IMPACTS OF PEIS ON PREFERRED ALTERNATIVE

The primary impact to CVP water service contractors, as described in the PEIS, is not due to contract provisions, but rather to the implementation of the CVPIA. The re-allocation of CVP water to fish and wildlife purposes under the CVPIA reduced average annual CVP water deliveries to water service contractors from 2,270,000 acre-feet/year (af\yr) under the PEIS No Action Alternative to 1,933,000 af\yr under all of the PEIS alternatives, including the Preferred Alternative. The reduction occurred differently for various classifications of users and will vary depending on the annual allocated quantity received by the contractors and the system capacity for the deliveries.

- Average Annual CVP Water Deliveries for Cross Valley agricultural water service contractors decreased 18 percent from pre-CVPIA Affected Environment conditions.

- Average Annual CVP Water Deliveries for Cross Valley municipal water service contractors decreased 6 percent from pre-CVPIA Affected Environment conditions.

STUDY AREA AND SCOPE OF THIS EA

This environmental review and analysis is focused on the renewal of the long-term renewable contracts allowing for continued CVP water (up to 128,300 af/y) for the CVCs.

The focus of impacts on environmental resources is within the CVC's service areas located in Fresno, Kern, and Tulare counties. For the purposes of this document, the service area is defined as the CVC's district boundaries and service areas receiving CVP water including the County of

Fresno CVP water service area and the water district boundaries for Hills Valley Irrigation District, Kern-Tulare Water District, Lower Tule River Irrigation District, Pixley Irrigation District, Rag Gulch Water District, Tri-Valley Water District, and County of Tulare including its subcontractor's boundaries.

The Department of Water Resources (DWR) is a co-signer of the CVC's LTCR contracts due to the use of State Water Project (SWP) facilities to convey the water to the CVC if and when possible. If DWR is unable to convey this water, the CVCs must find other methods to obtain their In-Delta supplies or the water is not released from upstream storage

There are several facilities included within the scope of this EA. The relevant facilities include the Delta, SWP Pumping Facilities, California Aqueduct, San Luis Canal, Cross Valley Canal, and FKC. These facilities provide flexibility and methods for conveying water throughout the lower San Joaquin Valley and to the CVCs.

As stated earlier, the long-term renewal contracts envision exchanges under Article 5 involving others, besides AEWSD, and are identified in this updated EA for informational purposes. Subsequent and separate environmental analysis and review are required prior to approval. Exchanges between Lower Tule River Irrigation District/Tulare Lake Basin Water Storage District and CVCs/CVP Contractors have undergone separate environmental coverage. Therefore, the impacts to environmental resources within the service areas of these non-CVP contractors and their water supplies are not within the scope and analysis in this EA.

It is acknowledged that some exchanges under Article 5 may result in an imbalance of the quantity of water returned from the CVC to the exchanger in comparison to the amount of water made available for exchange by the exchanger. Due to the sporadic timing, short periods of availability, short notice, the exchange agreements between the CVC and other contractors are negotiated to compensate for the water imbalances. The demands for water by any of the contractor's customers are on a typical agricultural pattern or an urban water demand pattern. Due to the uncertainty of conveyance capability by DWR in any given year, the CVC's CVP supplies are unreliable and intermittent. In some cases, DWR has a short window of opportunity to convey the CVC's CVP water. This opportunity may not be within the growing season or may come all at once and cannot be used at the time of delivery. In certain conditions, DWR delivers the CVC's water at a time when the value of water is low when the exchanger obtains delivery of the water. The exchange water may be provided back to the CVC during the growing season when the value of the water is higher. Therefore, the exchange arrangements may include compensation to offset the difference in the value of water. However, a like amount of water may be delivered to the exchanger and the CVC. The contracts state that the exchange arrangements are not transfers subject to Section 3405(a) of the CVPIA.

This EA therefore recognizes the value of the timing of availability of supplies related to exchanges and the impact of deliverable exchange supply availability on the long-term balance between exchanged quantities. The EA further recognizes that one of the mechanisms for mitigating the differential in the timing of the availability of exchange supplies is a reduction in the

quantity of water provided to the exchanger in the negotiated transaction, as compared to the quantity of water delivered for exchange by the exchanger or is carried into subsequent years.

Two of the CVCs do not participate in a water exchange with AEWSD. Pixley Irrigation District and the Lower Tule River Irrigation District have discontinued the exchange with AEWSD and have historically transferred their water to other CVP water districts. These two CVCs use the proceeds from the transfer to purchase available water from willing sellers. As with all transfers, Reclamation continues to address such transfers with separate environmental documents.

The Kern Tulare and Rag Gulch Water Districts (KTRG) have existing siphon facilities which can provide access directly from the Cross Valley and Friant-Kern Canals. These siphon facilities allow for direct deliveries of the In-Delta supplies if and when DWR conveys the water to Reach 12E on the Cross Valley Canal. Due to the timing of deliveries, KTRG would likely enter into exchange arrangements to re-regulate their supplies to align with irrigation demands. KTRG's existing siphon facilities are within the scope and analysis of this EA.

STUDY PERIOD

For purposes of this Supplemental EA, it is assumed that the LTCRs will be executed in Contract Year 2005 and expire in 2030. Thus, the analysis for this EA was conducted for projected conditions in the Year 2030, which will extend through the first period of renewal for the 25-year long-term water service contracts. Interim time period conditions were not considered or evaluated with respect to changes in the CVP contract.

SECTION 2

DESCRIPTION OF ALTERNATIVES

INTRODUCTION

This section summarizes the long-term water service contract negotiations process and descriptions of the alternatives considered in this EA.

Long-Term Water Service Contract Negotiation Process

The CVPIA states that the Secretary shall, upon request, renew any existing long-term irrigation repayment or water service contract for the delivery of CVP water for a period of 25 years and may renew such contracts for successive periods of up to 25 years each. Consistent with the 1963 Act, M&I contracts shall be renewed for successive periods up to 40 years each under terms and conditions that are mutually agreeable. The CVPIA also states that no renewals shall be authorized until appropriate environmental review, including the PEIS, has been completed. The PEIS provides a programmatic environmental analysis and identifies the need for site-specific environmental documents for the long-term contract renewal process.

The CVPIA also states that contracts which expire prior to the completion of the PEIS may be renewed for interim periods. The interim renewal contracts reflect existing Federal Reclamation law, including modifications due to the Reclamation Reform Act and applicable CVPIA requirements. The initial interim contract renewals were negotiated in 1994 with subsequent renewals for periods of 2 years or less to provide for continued water service. The provisions from the interim contracts were assumed to be part of the contract renewal provisions in the description of the PEIS Preferred Alternative. Changes to contract provisions during interim contract renewals or negotiations for the LTCRs would require disclosure and environmental analysis in the tiered environmental documents. Environmental documents have been prepared for each of the interim contract renewals pursuant to the National Environmental Policy Act (NEPA). The interim contracts and environmental documents are available at http://www.usbr.gov/mp/cvpia/3404c/index.html or by contacting Reclamation.

In 1998, the LTCR process was initiated. Reclamation reviewed the interim contract provisions that were consistent with Reclamation law and other requirements, comments from the Draft PEIS, and comments obtained during the interim contract renewal process. Reclamation proposed that the overall provisions of the long-term contract would be negotiated with representatives of all CVP water service contractors. Following the acceptance of the CVP-wide provisions, Reclamation proposed that division-specific provisions and, finally, contractor-specific provisions would be negotiated. Reclamation also proposed that all water service contracts except for Central San Joaquin Irrigation District, Stockton East Water District, and Colusa Drain Mutual Water Company would be renewed pursuant to this action. Contract renewals for these three districts would be delayed until the completion of a water management study for their primary sources of CVP water, the Stanislaus River and the Sacramento River.

Reclamation published the initial proposed contract in November 1999. There were several negotiation sessions throughout the next six months. The CVP water service contractors published

a counter-proposal in April 2000. The November 1999 proposal represents one "bookend" for negotiations and the April 2000 proposal represents the other “bookend.” The results of the negotiations are reflected in the subsequent proposals. The primary differences between the proposals are summarized in Table DA-1. For purposes of this Supplemental EA, it is assumed that the LTCRs will be executed in Contract Year 2005 and expire in 2030.

Issues Considered as Part of Long-Term Contract Renewals

The LTCR process addressed several other issues in addition to the contract provisions. These issues include the needs analyses, changes in service areas, and water transfers.

Needs Analyses

The water rights granted to the CVP by the SWRCB require the Federal government to determine that the water is being used in a beneficial manner. The Contractors assert that compliance with state laws and permits is the basis of the right to continue beneficial use of water provided under the contracts. The needs analysis methodology was developed to indicate that the CVP water is being used beneficially. The needs analysis was computed for each District within the various divisions or units of the CVP using a multiple-step approach. First, the existing water demand was calculated for each district. For agricultural contractors, crop acreage, cropping patterns, crop water needs, effective precipitation, and conveyance losses were reviewed. For municipal and industrial contractors, residential, commercial, industrial, institutional, recreational, and environmental uses; landscape coefficients; system losses; and landscape acreage were reviewed. Second, future changes in water demands based upon crops, municipal and industrial expansion, and changes in efficiencies were reviewed. Third, existing and future non-CVP water supplies were identified for each district, including groundwater and other surface water supplies. The initial calculation of CVP water needs was limited by the assumption that groundwater pumping would not exceed the safe yield of the aquifer. In addition, the actual water needs were calculated at each division or unit level to allow for intra-regional transfers on an annual basis.

Beneficial and efficient future water demands were identified for each district. The demands were compared to available non-CVP water supplies to determine the need for CVP water. If the need was less than contract amounts, the CVP water service contract amount could be reduced. Because the CVP was initially established as a supplemental water supply for areas without adequate supplies, the needs for most districts are at least equal to the CVP water service contract and frequently exceed the previous contract amount. However, this environmental analysis does not include increased total contract amounts. Therefore, the CVP contract amount will be limited by the existing CVP contract quantity.

Changes in Water Service Areas

This environmental analysis does not consider changes in future water service area boundaries for use of CVP water. Any future changes to water service area boundaries for use of CVP water will be evaluated in separate technical and environmental analyses.

Water Transfers

Several different types of transfers are considered for long-term contract renewals. Intra-CVP contract transfers have occurred regularly throughout the CVP and are frequently limited to scheduling changes between adjoining districts. Reclamation has historically issued and will continue to address these types of transfers under separate environmental analysis.

It is recognized that water transfers will continue to occur, and that the CVP long-term contracts will provide the mechanism. Because the CVPIA has allowed these transfers, as evaluated in the PEIS for the Preferred Alternative, the No Action Alternative (NAA) includes water transfer provisions. These provisions for transfers are also included in both Alternatives 1 and 2. However, it is difficult to identify all of the water transfer programs that could occur with CVP water in the next 25 years. Reclamation would continue with separate environmental documents for proposed transfers in establishing criteria and protocols to allow rapid technical and environmental review of future proposed transfers.

Municipal and Industrial Usage

The long-term contracts for the CVCs do not reference the M&I shortage policy. The CVP water supplies for the CVCs are intermittent, unreliable, and in some years not conveyed by DWR. It is unlikely landowners in these districts would rely on this water to develop lands or make permanent land use change decisions. Proposed projects that would result in changes in reliability of this water are speculative at this time. The Biological Opinion issued by the Service in 2001 for the Long-term Contract Renewal for the Friant Division and CVCs stated that in order to "…reach a no jeopardy conclusion for this opinion, the following actions are not covered by this opinion and will require separate determinations regarding potential affects on threatened and endangered species and critical habitat pursuant to section 7 and/or section 10 of ESA:

- Any future assignments of Central Valley Project water involving Friant or Cross Valley Canal contractors;
- Transfers involving Friant or Cross Valley Canal contractors;
- Inclusions and exclusions to Friant or Cross Valley Canal contractor district boundaries;
- Future changes in purpose of use from Ag only to Ag/M&I involving Friant contractors;
- Any changes in purpose of use."

DWR Contract

During the initial stages of developing this Supplemental EA the negotiated contract language for DWR was not available. The parties have agreed that a three-way contract between Reclamation, DWR, and the CVCs is appropriate because DWR provides a conveyance system for CVP water. Therefore, a summary of the long-term service contracts that includes the DWR language to convey such water and the impacts to resources has been added. Public access to copies of the three-way contracts with the Contracting Officer (Reclamation), DWR and the contractor are available through the Reclamation Mid-Pacific website (Appendix F). The DWR contract language is summarized below.

- DWR operates the SWP and is willing to convey the CVP water when capacity exists in the California Aqueduct. DWR is providing only conveyance and storage services and bears no responsibility for the availability of CVP water for such conveyance.

- The CVC will provide a schedule of CVP deliveries. DWR has sole discretion to convey and/or store CVP water after SWP contractor needs are met including the Environmental Water Account and similar programs. If DWR and Reclamation are unable to meet approved schedules for the CVCs, the sole remedy is to adjust the overpayment.

- Reclamation will make CVP water available in Clifton Court Forebay at such times and rates of flow as the Contracting Officer and DWR agree. DWR shall convey this water pursuant to the contracts for direct delivery in the Cross Valley Canal and/or by exchange arrangements with AEWSD and others. Exchange arrangements with other than AEWSD shall be submitted to Reclamation for approval. DWR shall have no obligation to make exchange arrangements or be responsible for CVP water transported in facilities that DWR will pump and convey. DWR may use the turnout at Reach 12E of the California Aqueduct or to other existing points of diversion mutually agreed to in writing by DWR and contractor. DWR may store the CVP water in the Federal share of San Luis Reservoir for later release and delivery to the CVCs or may replace water delivered to the contractor from DWR's share of San Luis Reservoir prior to receiving water from Reclamation. Reclamation will return a like amount of water available to DWR. Reclamation shall compensate DWR for water conveyance and storage losses incurred by DWR to deliver water to the CVCs. Reclamation will provide CVP power through exchange or otherwise to compensate DWR to convey this water pursuant to the contracts.

- The CVC will compensate DWR directly for the conveyance of the water pursuant to the contracts. DWR will submit monthly invoices for all conveyance charges for the previous month. Charges and payments are set forth in DWR annual Bulletin 132, in Exhibit C, Articles 8, 10 and 22 of the contracts.

- Sales, transfers and exchanges under Article 9 of the contract require DWR approval if DWR facilities are used to convey such water. Conveyance of non-CVP water is permissible only after written approval by DWR if SWP facilities are utilized. No assignment or transfer of any rights to use SWP facilities authorized in the contracts shall be valid without advance written approval by DWR.

The potential impacts from the DWR contact language in the preferred alternative is listed below.

Resources	Potential Impacts of Conveyance by DWR in Preferred Alternative
Surface Water	DWR operates the SWP in coordination with the CVP in accordance with the Operations Manual (including any subsequent modifications thereto) and Operations and Criteria Plan. No changes in availability or diversions of water would occur as a result of the Proposed Action.
Water Supply	The Proposed Action would not change water supplies for CVP, SWP, and/or deliveries for fish and wildlife purposes. DWR would convey this water if capacity exists and all SWP requirements are met. If DWR does not pump the CVCs water and it is not released from upstream reservoirs, the CVP water reverts to the CVP pool.
Groundwater	DWR would convey the CVP water when capacity exists in the SWP facilities as in the past. The CVCs would continue conjunctive use of groundwater and surface water to meet demands as in the past.
Water Quality	No changes in quantities or origins of water would occur. Commingling of CVP and SWP water would occur in Clifton Court Forebay and SWP facilities as in the past. Water quality would not change.
Fisheries	DWR and Reclamation pump as much water as permitted subject to operational and environmental constraints. The amount of water pumped does not change. However, the label and recipient of the water may differ. The CVP and SWP operations in the Delta are coordinated in the Operations and Criteria Plan. Reclamation is currently consulting with the fisheries agencies on the Operations and Criteria Plan. The conveyance of this water does not change operations.
Land Use	DWR conveys this water at such times capacity exists. In some years the CVP water is not conveyed due to other priorities for the SWP. The CV Contractor's CVP water is unreliable and no long term land use changes are likely to occur as a result of the Proposed Action.
Biological	DWR conveys the CVP water in existing facilities and no significant impacts would occur to biological resources.
Recreational	The conveyance of the CVP water in the SWP would have no significant impacts to recreational opportunities. DWR would convey similar amounts of water in SWP facilities with or without the CVP water.

Resources	Potential Impacts of Conveyance by DWR in Preferred Alternative
Socioeconomic	Reclamation furnishes power to convey the CVP water in SWP facilities as in the past. The CV Contractors compensate DWR for the conveyance similar to charges to SWP contractors. Reclamation would compensate DWR for conveyance or storage losses. The conveyance of CVP water in SWP facilities is secondary to SWP requirements and no significant impacts would occur to socioeconomics for CVP, SWP contractors, or third parties.
Cultural	DWR would convey this water in existing facilities and no disturbances to cultural resources would occur.
Indian Trust Resources	DWR would convey this water in existing facilities and no impacts would occur to Indian Trust Resources.
Social Conditions	The conveyance of CVP water in existing SWP facilities would have no significant impacts to social conditions.
Air Quality	The conveyance of CVP water would not increase pumping or degrade air quality.
Geology and Soils	No land disturbing or construction of new facilities is required to convey and deliver this water to the CV Contractors.
Visual	DWR would convey CVP water in existing facilities and no aesthetic changes would occur.

Development of Alternatives

Three alternatives were identified for the renewal of long-term contracts between Reclamation and the Cross Valley Contractors.

The alternatives present a range of water service agreement provisions that could be implemented for long-term contract renewals. The NAA consists of renewing existing water service contracts as described by the Preferred Alternative of the PEIS. In November 1999, Reclamation published a proposed long-term water service contract. In April 2000, the CVP Contractors presented an alternative long-term water service contract. Reclamation and the CVP Contractors continued to negotiate the CVP-wide terms and conditions with these proposals serving as a “bookend”. This EA also considers these proposals with the NAA as bookends in the environmental documentation to evaluate the impacts and benefits of the renewing long-term water service contracts.

No Action Alternative

The NAA assumes renewal of long-term CVP water service contracts for a period of 25 years in accordance with implementation of the CVPIA as described in the PEIS Preferred Alternative. The

PEIS Preferred Action assumed that most contract provisions would be similar to many of the provisions in the 1997 CVP Interim Renewal Contracts, which included contract terms and conditions consistent with applicable CVPIA requirements. In addition, the NAA assumes tiered pricing provisions and environmental commitments as described in the PEIS Preferred Alternative. The provisions of the NAA are summarized in Table DA-1.These provisions were described in the Final PEIS.

Several applicable CVPIA provisions are summarized in the description of the NAA as they are addressed in a different manner in Alternatives 1 and/or 2, and therefore could result in changes in environmental impacts or benefits. These issues include tiered water pricing, definition of municipal and industrial water users, water measurement, and water conservation.

Tiered Water Pricing. Tiered water pricing in the No Action Alterative is based upon use of a "80/10/10 Tiered Water Pricing from Contract Rate to Full Cost" including appropriate Ability-to-Pay limitations. Under this approach, the first 80 percent of the maximum contract total would be priced at the applicable Contract Rate. The next 10 percent of the contract total would be priced at a rate equal to the average of the Contract Rate and Full Cost Rate. The final 10 percent of the contract total would be priced at Full Cost Rate. The terms "Contract Rate" and "Full Cost Rate" are defined by the CVP rate setting policies, and P.L. 99-546 and the Reclamation Reform Act (RRA), respectively. The Contract Rate for irrigation and M&I water includes the contractor's allocated share of CVP main project Operation and Maintenance (O&M), O&M deficit (if any), and capital cost. The contract rate for irrigation water does not include interest on capital. The contract rate for M&I water includes interest on capital computed at the CVP M&I interest rate. The Full Cost rate for irrigation and M&I water includes interest at the RRA interest rate.

In addition to the CVP water rate, contractors are required to pay a Restoration payment on all deliveries of CVP water. Federal Reclamation law and policy provides full or partial relief to irrigation contractors on Restoration Payments and the capital rate component of the water rate. Ability-to-pay relief, relative to the irrigation water rate, is fully applicable only to the first 80 percent of the contract total. Ability-to-pay relief is not applicable to the third tier water rate. The second tier may reflect partial Ability-to-pay relief, as it is equal to the average of the first and third tiers. The relief could be up to 100 percent of the capital cost repayment, and is based upon local farm budgets. The Ability-to-Pay law and policy do not apply to CVP operation and maintenance costs, municipal or industrial water rates, CVP distribution facilities, or non-CVP water costs.

Definition of Municipal and Industrial Users. The definition of municipal and industrial users was established in portions of a 1982 Reclamation policy memorandum. In many instances, the definition of municipal users is easily definable. However, with respect to small tracts of land, the 1982 memorandum identified agricultural water as agricultural water service to tracts that can support $5,000 gross income for a commercial farm operation. The memorandum indicates that these criteria can be generally met by parcels greater than 2 acres. Based on this analysis, the CVP has generally applied a definition of 5 acres or less for municipal and industrial uses in the CVP for many years. The CVP contractors can seek a modification for a demonstrated need of agricultural use on parcels between 2 and 5 acres in size and request such a modification from the Contracting Officer.

Water Measurement. The NAA includes water measurement at every turnout or connection to measure CVP water deliveries. It is assumed that if other sources are commingled with the CVP water, including groundwater or other surface waters, that the measurement devices would report gross water deliveries. Additional calculations would be required to determine the exact quantity of CVP water. However, if groundwater or other surface waters are delivered by other means to the users, the NAA did not include additional measurement devices except as required by individual users' water conservation plans.

Water Conservation. The water conservation assumptions in the NAA include water conservation actions for municipal and on-farm uses assumed in the DWR Bulletin 160-93, and conservation plans completed under the 1982 Reclamation Reform Act consistent with criteria and requirements of the CVPIA. Such criteria address cost-effective Best Management Practices that are economical and appropriate, including measurement devices, pricing structures, demand management, public information, and financial incentives.

Alternative 1

Alternative 1 is based upon the proposal presented by CVP water service contractors to Reclamation in April 2000. However, there were several issues included in the April 2000 proposal that could not be included in Alternative 1 because they are not consistent with existing Federal or state requirements or would require a separate Federal action, as described below.

- The April 2000 proposal includes Terms and Conditions to provide a highly reliable water supply, and provisions to improve the water supply capabilities of the CVP facilities and operations to meet this goal. These issues were not included in Alternative 1 because the issues would require additional Federal actions with separate environmental documentation and also limit the Secretary's obligation to achieve a reasonable balance among competing demands as required by the CVPIA. Currently Reclamation is completing a supplement to the 1995 Least Cost Plan to restore project yield in accordance with Section 3408(j) of the CVPIA. This activity is funded by Water & Energy. Integrated Resource Plans are currently under development with site specific focus.

- The April 2000 proposal includes language to require renewal of contracts after 25 years upon request of the contractor. The study period for this EA is 25 years which coincides with the contract period applicable to irrigation contracts and required by the CVPIA. Renewal after 25 years would be a new Federal Action and would require new environmental documentation.

- The April 2000 proposal did not include provisions for compliance with biological opinions. Biological consultations are required by the Consultation and Coordination requirements established by Executive Order for all Reclamation activities. These are binding on Reclamation and provisions are needed to address this requirement.

- The April 2000 proposal included provisions for water transfers. It is recognized that water transfers will continue, and that the CVP long-term contracts will provide the mechanisms

for the transfers. However, it would be difficult to identify all of the water transfer programs that could occur with CVP water in the next 25 years. Reclamation would continue with separate environmental documents for transfers, and will establish criteria for rapid technical and environmental review of proposed transfers.

- The April 2000 proposal includes provisions for transfer of operations and maintenance requirements. It is recognized that transfers of operation and maintenance to the group of contractors will continue and that the CVP long-term contracts will provide the mechanisms for such transfers. However, it would be difficult to identify all of the operation and maintenance transfer programs that could occur with CVP water in the next 25 years. Reclamation would require separate environmental documents for such transfers.

- The April 2000 proposal includes provisions for resolution of disputes. Assumptions for resolution of disputes were not included in Alternative 1 and at this time would not appear to affect environmental conditions.

- The April 2000 proposal includes provisions for expansion of the CVP service areas by the existing CVP water contractors. The study area for the long-term contract renewal process is defined by the existing service area boundaries. Expansion of the service area boundaries would be a new Federal Action and would require separate environmental documentation.

The April 2000 proposal did include several provisions that were different than the assumptions for NAA and those provisions are included in Alternative 1, as summarized in Table DA-2. The April 2000 proposal also included several provisions that involve specific language changes that would not significantly modify CVP operations in a manner that would affect the environment as compared to the No-Action Alternative but could affect specific operations of a contractor, as described in Table DA-2.

It should be noted that the tiered pricing requirements (including unit prices for CVP water) and definition of municipal/industrial users in Alternative 1 would be the same as in the NAA.

Alternative 2

Alternative 2 is based upon the proposal presented by Reclamation to CVP water service contractors in November 1999. However, there were several provisions included in the November 1999 proposal that are not being included in Alternative 2. These provisions would constitute a separate Federal action, as described below.

- The November 1999 proposal includes provisions for the contractor to request approval from Reclamation of proposed water transfers - *Water transfers were not included in Alternative 2 because such actions cannot now be definitely described and essentially constitute a separate Federal action and require separate environmental documentation.*

- The November 1999 proposal includes provisions for transfer of operations and maintenance third parties - *Operations and maintenance transfers were not included in*

Alternative 2 because these actions would be a separate Federal action and require separate environmental documentation.

The November 1999 proposal did include several provisions that were different than the assumptions for NAA and included in Alternative 2, as summarized below and in Table DA-1. The primary differences are related to tiered pricing and the definition of municipal and industrial users.

Tiered Water Pricing. Tiered water pricing in Alternative 2 is based upon a definition of a "Category 1" and "Category 2" water supplies. "Category 1" is defined as the quantity of CVP water that is reasonably likely to be available for delivery to a contractor, and is calculated on an annual basis as the average quantity of delivered water during the most recent 5 year period. For the purposes of this Alternative, the “Category 1” water supply is defined as the “contract total”. "Category 2" is defined as that additional quantity of CVP water in excess of Category 1 water that may be delivered to a contractor in some years. Under Alternative 2, the first 80 percent of Category 1 volume would be priced at the applicable Contract Rate for the CVP. The next 10 percent of the Category 1 volume would be priced at a rate equal to the average between the Contract Rate and Full Cost Rate as defined by Reclamation law and policy. The final 10 percent of the Category 1 volume would be priced at the Full Cost Rate as required by the CVPIA. All Category 2 water, when available, would be priced at Full Cost Rate (Figure DA-1). It should be noted that Category 1 and Category 2 volumes will change every year based upon the average deliveries for the "most recent 5 years," with limited exceptions, based upon the findings of the water needs assessment. Alternative 2 assumes the sum of Category 1 and Category 2 water is equal to the maximum quantity included in the contractor’s existing water service contract. The quantity is the same as the NAA and Alternative 1. The terms "Contract Rate" and "Full Cost Rate" are discussed under Tiered Pricing for the NAA. The same Ability-to-Pay adjustments would be applicable to Restoration Payments and tiered water rates as described in the NAA.

<table>
<tr><th>Water Rate</th><th>Contractual Entitlement
Full Contract Amount</th><th>Water Classification</th></tr>
<tr><td rowspan="2">Tier 3
Full Cost Rate</td><td>Threshold</td><td>Category 2</td></tr>
<tr><td>90 % of Threshold</td><td rowspan="3">Category 1</td></tr>
<tr><td>Tier 2
Avg. of Contract Rate
and Full Cost Rate</td><td>80 % of Threshold</td></tr>
<tr><td>Tier 1
Contract Rate</td><td></td></tr>
</table>

Figure DA-1
Category and Tier Water Pricing Relationship

The prices of CVP water used in Alternative 2 are based upon irrigation and municipal/industrial CVP water rates presented in the November 17, 1999 Financial Workshop Handouts 1 and 2.

Definition of Municipal and Industrial Users. The definition of municipal and industrial water includes all tracts less than or equal to 5 acres, unless the Contracting Officer is satisfied that the use of such water meets the definition of "Irrigation Water".

ALTERNATIVES CONSIDERED BUT ELIMINATED

Nonrenewal of Long-Term Contracts

Nonrenewal of existing contracts is considered infeasible based on Section 3404(c) of the CVPIA. This alternative was considered but eliminated from analysis in this EA because Reclamation has no discretion not to renew the contracts.

Reduction in Contract Amounts

Reduction of contract amounts was considered in certain cases but rejected from analysis. The reason for this was twofold. Water needs analyses have been completed for all contracts and in almost all cases the needs exceed or equal the current total contract amount. Secondly, in order to implement good water management, the contractors need to be able to store or immediately use water available in wetter years when more water is available. By quantifying contract amounts in terms of the needs analyses and the CVP delivery capability, the contractors can make their own economic decisions. Allowing the contractors to retain the full water quantity gives the contractors assurance that the water will be available to them for storage investments. In addition the CVPIA, in and of itself, achieves a balance in part through its dedication of significant amounts of CVP water and actions to acquire water for environmental purposes.

SELECTION OF THE PREFERRED ALTERNATIVE

Three alternatives were identified in the draft EA for the renewal of long-term contracts between Reclamation and the 8 CVCs. The alternatives presented a range of water service agreement provisions that could be implemented for long-term contract renewals. The NAA consists of renewing existing water service contracts as described by the Preferred Alternative of the PEIS. In November 1999, Reclamation published a proposed long-term water service contract. In April 2000, the CVP Contractors presented an alternative long-term service contract. Reclamation and CVP contractors continued to negotiate the CVP-wide terms and conditions with these proposals serving as the basis for an analysis of such “bookends”. The final contract language and the long-term renewal proposed action represents a negotiated position between Alternatives 1 and 2. The Preferred Alternative falls within the “bookends,” and has the same impact for all resource areas as the NAA and Alternative 1. Table DA-1 provides the contract provisions of all the alternatives including the Preferred Alternative. Table DA-2 provides a summary of the potential impacts for the alternatives including the Preferred Alternative.

Table DA-1
Comparison of Contract Provisions Considered in Alternatives

Provision	No Action Alternative Based on PEIS and Interim Contracts	Alternative 1 Based on April 2000 Proposal	Alternative 2 Based on November 1999 Proposal	Preferred Alternative Based on Final Negotiated Contracts
Explanatory Recitals	Assumes water rights held by CVP from SWRCB for use by water service contractors under CVP policies	Assumes CVP Water Right as being held in trust for project beneficiaries that may become the owners of the perpetual right.	Same as No Action Alternative	Same as No Action Alternative
	Assumes that CVP is a significant part of the urban and agricultural water supply of users	Assumes CVP as a significant, essential, and irreplaceable part of the urban and agricultural water supply of users	Same as No Action Alternative	Assumes CVP has been relied upon and considered essential by contractors
	Assumes increased use of water rights, need to meet water quality standards and fish protection measures, and other measures constrained use of CVP	Assumes that CVPIA impaired ability of CVP to deliver water	Same as No Action Alternative	No recital concerning this issue
	Assumes the need for the 3408(j) study	Assumes implementation of yield increase projects per 3408(j) study	Same as No Action Alternative	Assumes Secretary through coordination, cooperation and partnership will pursue measures to improve water supply
	Assumes that loss of water supply reliability would have impact on socioeconomic conditions and change land use	Assumes that loss of water supply reliability would have significant adverse socioeconomic and environmental impacts in CVP service area	Same as No Action Alternative	Assumes water rights held by CVP from SWRCB for use by water service contractors under CVP policies
In-Delta Supplies	Not previously defined	Not previously defined	Not previously defined	CVP water made available in the Delta
Friant Supplies	Not previously defined	Not previously defined	Not previously defined	CVP water available to CV Contractors only after all Friant Division requirements are met

Table DA-1
Comparison of Contract Provisions Considered in Alternatives

Provision	No Action Alternative Based on PEIS and Interim Contracts	Alternative 1 Based on April 2000 Proposal	Alternative 2 Based on November 1999 Proposal	Preferred Alternative Based on Final Negotiated Contracts
Definitions				
"Charges"	Charges defined as payments required in addition to Rates	Assumes rewording of definition of Charges to exclude both Rates and Tiered Pricing Increments	Same as No Action Alternative	Same as Alternative 1
"Category 1 and Category 2"	Tiered Pricing as in PEIS	Not included	Tiered Pricing for Categories 1 and 2	Same as Alternative 1
"Landholder"	Landholder described in existing Reclamation Law	Assumes rewording to specifically define Landholder with respect to ownership, leases, and operations	Assumes rewording to specifically define Landholder with respect to ownership and leases	Same as No Action Alternative
Contract Total	Contract Total described as Total Contract	Same as NAA	Described as basis for Category 1 to calculate Tiered Pricing	Same as No Action Alternative
"M&I Water"	Assumes rewording to provide water for irrigation of land in units less than or equal to 5 acres as M&I water unless Contracting Officer satisfied use is irrigation	M&I water described for irrigation of land in units less than or equal to 2 acres	Same as No Action Alternative	Includes M&I water for human uses

Table DA-1
Comparison of Contract Provisions Considered in Alternatives

Provision	No Action Alternative Based on PEIS and Interim Contracts	Alternative 1 Based on April 2000 Proposal	Alternative 2 Based on November 1999 Proposal	Preferred Alternative Based on Final Negotiated Contracts
Term of Contract - Right to Use Contract	Assumes that contracts may be renewed	States that contract shall be renewed	Same as No Action Alternative	Assumes contracts shall be renewed subject to conditions for Ag and unconditioned for M&I
	Assumes convertibility of contract to a 9(d) contract same as existing contracts	Includes conditions that are related to negotiations of the terms and costs associated with conversion to a 9(d) contract	Same as No Action Alternative	10 years from execution of the contract and every 5 years thereafter
Water to be Made Available and Delivered to the Contractor	Assumes water availability with existing conditions	Similar to No Action Alternative	Actual water availability in a year is unaffected by Categories 1 and 2.	Similar to No Action Alternative
	Assumes compliance with Biological Opinions and other environmental documents for contracting	Not included	Same as No Action Alternative	Similar to No Action Alternative
	Assumes that current operating policies strive to minimize impacts to CVP water users	Assumes that CVP operations will be conducted in a manner to minimize shortages and studies to increase yield shall be completed with necessary authorizations	Same as No Action Alternative	Same as No Action Alternative and Alternative 1
Time for Delivery of Water	Assumes methods for determining timing of deliveries as in existing contracts	Assumes minor changes related to timing of submittal of schedule	Same as No Action Alternative	Same as No Action Alternative
Point of Diversion and Responsibility for Distribution of Water	Assumes methods for determining point of diversion as in existing contracts	Assumes minor changes related to reporting	Same as No Action Alternative	DWR may use additional existing points of diversions on the Aqueduct

Table DA-1
Comparison of Contract Provisions Considered in Alternatives

Provision	No Action Alternative Based on PEIS and Interim Contracts	Alternative 1 Based on April 2000 Proposal	Alternative 2 Based on November 1999 Proposal	Preferred Alternative Based on Final Negotiated Contracts
Friant Delivery	Assumes methods for determining point of diversion as in existing contracts	Assumes minor changes related to reporting	Same as No Action Alternative	Same as No Action Alternative
Measurement of Water Within District	Assumes measurement for each turnout or connection for facilities that are used to deliver CVP water as well as other water supplies	Assumes measurement at delivery points	Assumes similar actions in No Action Alternative but applies to all water supplies	Same as Alternative 2
Rates and Method of Payment for Water	Assumes Tiered Pricing is total water quantity. Assumes advanced payment for rates for 2 months.	Assumes Tiered Pricing is total water quantity. Assumes advanced payment for rates for 1 month.	Assumes Tiered Pricing is total water quantity. Assumes advanced payment for rates for 6 months.	Same as No Action Alternative
Sales, Transfers, or Exchanges of Water **Article 9**	Assumes continuation of transfers with the rate for transferred water being the higher of the sellers or purchasers CVP cost of service rate	Assumes continuation of transfers with the rate for transferred water being the purchasers CVP cost of service rate	Same as No Action Alternative	Assumes continuation of transfers with rate for transferred water being transferor's rate adjusted for additional or reduced costs related to transfer and adjusted to remove any ability to pay relief Exchange arrangements with AEWSD and others including other sources of water
	Assumes continuation of exchange arrangements with AEWSD of CVP water to allow deliveries	Assumes continuation of exchange arrangements with AEWSD of CVP water to allow deliveries	Same as No Action Alternative	

Table DA-1
Comparison of Contract Provisions Considered in Alternatives

Provision	No Action Alternative Based on PEIS and Interim Contracts	Alternative 1 Based on April 2000 Proposal	Alternative 2 Based on November 1999 Proposal	Preferred Alternative Based on Final Negotiated Contracts
Exchanges of Water Article 5				
Application of Payments and Adjustments	Assumes payments will be applied as in existing contracts	Assumes minor changes associated with methods described for overpayment	Same as No Action Alternative	Similar to Alternative 1 but requires $1,000 or greater overpayment of refund
Temporary Reduction - Return Flows	Assumes that current operating policies strive to minimize impacts to CVP water users	Assumes minor changes associated with methods described for discontinuance or reduction of payment obligations	Same as No Action Alternative	Same as No Action Alternative
Constraints on Availability of Project Water	Assumes that current operating policies strive to minimize impacts to CVP water users	Assumes Contractors do not consent to future Congressional enactments which may impact	Same as No Action Alternative	Same as No Action Alternative
Unavoidable Groundwater Percolation	Assumes that some of applied CVP water will percolate to groundwater	Same as No Action Alternative	Same as Same as No Action Alternative	Same as No Action Alternative
Rules and Regulations	Assumes that CVP will operate in accordance with then-existing rules	Assumes minor changes with right to non-concur with future enactments retained by Contractors	Same as No Action Alternative	Same as No Action Alternative
Water and Air Pollution Control	Assumes that CVP will operate in accordance with then existing rules	Same as No Action Alternative	Same as No Action Alternative	Same as No Action Alternative
Quality of Water	Assumes that CVP will operate in accordance with the existing rules without obligation to operate towards water quality goals	Same as No Action Alternative	Same as No Action Alternative	Same as No Action Alternative
Water Acquired by the Contractor Other than from the United States	Assumes that CVP will operate in accordance with existing rules	Assumes changes associated with payment following repayment of funds	Same as No Action Alternative	Same as No Action Alternative
Opinions and Determinations	PEIS recognizes that CVP will be operated in accordance with existing rules	Assumes minor changes with respect to references to the right to seek relief	Same as No Action Alternative	Similar to Alternative 1

Table DA-1
Comparison of Contract Provisions Considered in Alternatives

Provision	No Action Alternative Based on PEIS and Interim Contracts	Alternative 1 Based on April 2000 Proposal	Alternative 2 Based on November 1999 Proposal	Preferred Alternative Based on Final Negotiated Contracts
Coordination and Cooperation	Not included	Assumes that coordination and cooperation between CVP operations and users should be implemented and CVP users should participate in CVP operational decisions	Not included	Similar to Alternative 1 except parties retain exclusive decision making authority
Charges for Delinquent Payments	Assumes that CVP will operate in accordance with existing rules	Same as No Action Alternative	Same as No Action Alternative	Same as No Action Alternative
Equal Opportunity	Assumes that CVP will operate in accordance with existing rules	Same as No Action Alternative	Same as No Action Alternative	Same as No Action Alternative
General Obligation	Assumes that CVP will operate in accordance with existing rules	Similar to No Action Alternative	Same as No Action Alternative	Similar to Alternative 1 assumes no requirement for contractor to levy in advance
Compliance with Civil Rights Laws and Regulations	Assumes that CVP will operate in accordance with existing rules	Same as No Action Alternative	Same as No Action Alternative	Same as No Action Alternative
Privacy Act Compliance	Assumes that CVP will operate in accordance with existing rules	Same as No Action Alternative	Same as No Action Alternative	Same as No Action Alternative
Contractor to Pay Certain Miscellaneous Costs	Assumes that CVP will operate in accordance with existing rules	Similar to No Action Alternative	Same as No Action Alternative	Same as No Action Alternative
Water Conservation	Assumes compliance with conservation programs established by Reclamation and the State	Assumes conditions similar to No Action Alternative with the ability to use State standards which may or may not be identical to Reclamation's requirements	Same as No Action Alternative	Same as No Action Alternative
Existing or Acquired Water or Water Rights	Assumes that CVP will operate in accordance with existing rules	Same as No Action Alternative	Same as No Action Alternative	Same as No Action Alternative
Operation and Maintenance by Non-federal Entity	Assumes that CVP will operate in accordance with existing rules and no additional changes to operation	Assumes minor changes to language that would allow subsequent modification of	Assumes minor changes to language that would allow subsequent modification of	Same as Alternative 2

Table DA-1
Comparison of Contract Provisions Considered in Alternatives

Provision	No Action Alternative Based on PEIS and Interim Contracts	Alternative 1 Based on April 2000 Proposal	Alternative 2 Based on November 1999 Proposal	Preferred Alternative Based on Final Negotiated Contracts
	responsibilities under this alternative	operational responsibilities	operational responsibilities	
Contingent on Appropriation or Allotment of Funds	Assumes that CVP will operate in accordance with existing rules	Assumes minor changes to language	Same as No Action Alternative	Same as No Action Alternative
Subcontractors	Subcontractors are equally bound to meet the contract provisions as contractor	Same as No Action Alternative	Same as No Action Alternative	Same as No Action Alternative
Books, Records, and Reports	Assumes that CVP will operate in accordance with existing rules	Assumes changes for record keeping for both CVP operations and CVP users	Same as No Action Alternative	Similar to Alternative 1
Assignment Limited	Assumes that CVP will operate in accordance with existing rules	Assumes changes to facilitate assignments	Same as No Action Alternative	Similar to Alternative 1
Severability	Assumes that CVP will operate in accordance with existing rules	Same as No Action Alternative	Same as No Action Alternative	Same as No Action Alternative
Resolution of Disputes	Not included	Assumes a Dispute Resolution Process	Not included	Similar to Alternative 1
Officials Not to Benefit	Assumes that CVP will operate in accordance with existing rules	Same as No Action Alternative	Same as No Action Alternative	Same as No Action Alternative
Changes in Contractor's Service Area	Assumes no change in CVP water service areas absent Contracting Officer consent	Assumes changes to limit rationale used for non-consent and sets time limit for assumed consent	Same as No Action Alternative	Similar to Alternative 1 however, no time limit assumed consent
Notices	Assumes that CVP will operate in accordance with existing rules	Same as No Action Alternative	Same as No Action Alternative	Same as No Action Alternative
Confirmation of Contract	Assumes Court confirmation of contract	Not included - Assumption is Court confirmation not required	Same as No Action Alternative	Similar to Alternative 2 however, provision that contract not binding until court confirms is deleted

Table DA-2
Summary of Potential Alternative Impacts

Resources	No Action Alternative	Alternative 1	Alternative 2	Preferred Alternative
Surface Water	Contractors will continue to use available surface water and pump groundwater. The surface water available to the contractors is reduced from the historic levels because of pumping constraints at the Delta and the impacts of this reduction are described in the PEIS. Under certain conditions, DWR does not have an opportunity to convey the CVCs water resulting in increased groundwater pumping on a small scale. The CVCs seek other means to obtain their CVP supplies by selling the water and using the money to purchase local supplies.	Similar effect as the No Action Alternative	In most years this alternative would result in little or no change in water use from the No Action Alternative. In other years, Cross Valley Contractors would tend to switch from groundwater to surface water. This change will not have an effect on the San Joaquin River flows or other streams in the region. Changes in surface water use will not result in additional diversions from the Delta or changes to San Luis reservoir storage. Friant water supplies could be used to meet supplies for the CVCs if all other requirements are met. Alternative 2 will not affect the deliveries in the Friant-Kern Canal or storage in Millerton Lake.	Similar effect as the No Action Alternative
Water Supply	Historic mixed uses of both groundwater and CVP surface water in the Cross Valley Service area are expected to continue. More emphasis on groundwater use is expected during periods when CVP surface water is limited or expensive. Overall, the	Similar effect as the No Action Alternative	Minimal changes are anticipated for irrigated acres in most year types for most of the subbasins. Contractors may switch from groundwater to surface water in certain years because of tiered water pricing. The additional	Similar effect as the No Action Alternative

Table DA-2
Summary of Potential Alternative Impacts

Resources	No Action Alternative	Alternative 1	Alternative 2	Preferred Alternative
	diversions from the Delta to meet south of Delta demands are less under the No Action Alternative than historically observed.		CVP water purchased by the Contractors would come from San Luis Reservoir and the Delta. The total diversions from the Delta are not anticipated to change with the tiered pricing. Some Contractors receive water from Millerton Lake through an exchange with Arvin Edison Water Storage District. Changes in CVP water management because of this alternative would not affect this exchange.	
Groundwater	During dry conditions, groundwater usage increases in response to decreases in surface water supplies. Contractors return to greater surface water usage after the dry conditions end. It is assumed that Contractors will return to greater use of CVP water in years when water is available from the Delta at the conclusion of the dry period.	Similar effect as the No Action Alternative.	A single year of decreased groundwater pumping will not adversely or beneficially affect the groundwater basin. Over the long term, the groundwater use in subbasin 17 would decrease. This would have a beneficial impact on the groundwater basin.	Similar effect as the No Action Alternative
Water Quality	Water quality in the rivers and groundwater of the Cross Valley Canal Contractor service area under the No Action Alternative is not anticipated to change from past	Similar effect as the No Action Alternative	A decrease in groundwater pumping in subbasins 17, 18, and 20 is anticipated. This decrease in pumping should have a small, but unquantifiable,	Similar effect as the No Action Alternative

Table DA-2
Summary of Potential Alternative Impacts

Resources	No Action Alternative	Alternative 1	Alternative 2	Preferred Alternative
	conditions. Factors that tend to influence water quality, such as agricultural runoff, will be similar to historic conditions. However, the average delivery south-of-the-Delta is projected to decline from historic conditions. This may increase groundwater demands and result in application of water of a lesser quality than surface water. Continued application of this water under the No Action Alternative may influence water quality over the long term.		benefit to water quality as farmers switch to better-quality surface water.	
Fisheries	Water use is expected to continue as in the past using both CVP surface water supplies and groundwater. Groundwater has typically been more important during dry years when CVP water is less available. Therefore no impacts on fisheries are predicted.	Similar effect as the No Action Alternative	Water would remain in Millerton lake until purchased by Cross Valley users. Water not purchased would likely be picked up by other users. It could result in different timing in the movement of water in the Cross Valley Canal. Water would continue to be made available in the Delta and conveyed through SWP facilities if all other requirements have been met or held in upstream reservoirs. Either scenario could result in different timing of water in the	Similar effect as the No Action Alternative and Alternative 1

Table DA-2
Summary of Potential Alternative Impacts

Resources	No Action Alternative	Alternative 1	Alternative 2	Preferred Alternative
			Cross Valley Canal.	
Land Use	The Cross Valley Contractors account for approximately 18% of the irrigated acreage in the three subregions. The estimated irrigated acreage in the three subregions for an average water year is 1,055,500 acres. In a wet year the total irrigated acres increases by about 2,800 acres (0.3%). In a dry year the irrigated acres decrease by about 23,600 acres (2.2%).	Similar effect as the No Action Alternative	Compared to the No Action Alternative, in average and dry years there is no change in irrigated acreage. In wet years there is a decrease in irrigated acres by 1,200 (0.1%).	Similar effect as the No Action Alternative and Alternative 1
Biological	Existing Cross Valley management will continue under current conditions. No impacts to vegetation and wildlife are expected, since no additional infrastructure (e.g., dams, increased dam heights, canals, etc.) will be constructed. Additionally, under this alternative, there will be no increase in deliveries and no conversion of existing natural habitat into farmland.	Similar effect as the No Action Alternative.	The additional water cost could result in an increase in the amount of lands left fallow. If fallowed lands are restored to native conditions, they could provide habitat for regional vegetation and wildlife. A decrease in some agricultural crops (e.g., alfalfa and grain crops) however, could potentially impact the amount of nesting and feeding habitat for wildlife in the area. While a reduction in the amount of alfalfa or grain acreage could impact some species, restoration of these lands to a more natural	Similar effect as the No Action Alternative and Alternative 1

Table DA-2
Summary of Potential Alternative Impacts

Resources	No Action Alternative	Alternative 1	Alternative 2	Preferred Alternative
			condition would likely provide benefits to listed and other species considered sensitive. As the cost of water increases, the opportunity to provide wetland habitat by private landowners generally decreases. This could result in a decrease in availability of wetland habitat in the Cross Valley region. However, if water use decreases, more water may be available to flow down the San Joaquin, Chowchilla, and Fresno Rivers. Increased flows along these waterways would enhance the riparian zones, resulting in enhanced habitat quality for wildlife.	
Recreational	The existing facilities will continue to operate under current conditions. The recreational resources do not change.	Similar effect as the No Action Alternative	Similar to the No Action Alternative	Similar effect as the No Action Alternative and Alternatives 1 and 2
Socioeconomic	Gross revenue for the Cross Valley subregions is about $120 million and produces about 22% of the valley-wide net income.	Similar effect as the No Action Alternative	A reduction of $1 million is estimated for gross revenue or less than 1% in all economic scenarios ending in a wet year. The maximum net revenue changes less than 1% in all scenarios. Total employment	Similar effect as the No Action Alternative and Alternative 1

Table DA-2
Summary of Potential Alternative Impacts

Resources	No Action Alternative	Alternative 1	Alternative 2	Preferred Alternative
			output and place-of-work income impact is less than 1%.	
Cultural	The No Action Alternative would not result in direct impacts to eligible or cultural resources. Water would continue to be made available in the Delta for the CVC and no new construction would be required. Water apportioned under the No Action Alternative may be used to alter the use of a landscape, either through inundation, irrigation-related construction, or some other change which could impact cultural resources. The entities responsible at this level for potential impacts to cultural resources are the contracting agencies - the individual water districts.	Similar effect as the No Action Alternative	Similar effect to the No Action Alternative.	Similar effect as the No Action Alternative and Alternatives 1 and 2
Indian Trust Assets (ITAs)	No Action Alternative is a continuation of existing conditions; therefore, there would be no changes to the single ITA, the Table Mountain Rancheria, located in the area of the Cross Valley Contractors (Fresno County Water Works #34.)	Similar effect as the No Action Alternative	Similar effect as the No Action Alternative	Similar effect as the No Action Alternative and Alternatives 1 and 2; no impact to ITAs
Social Conditions	The existing Cross Valley operations do not change and	Similar effect as the No Action Alternative	Similar effect as the No Action Alternative	Similar effect as the No Action Alternative and Alternatives 1

Table DA-2
Summary of Potential Alternative Impacts

Resources	No Action Alternative	Alternative 1	Alternative 2	Preferred Alternative
	social conditions are unchanged.			and 2
Air Quality	The existing Cross Valley operations do not change and air quality is unchanged.	Similar effect as the No Action Alternative	Similar effect as the No Action Alternative	Similar effect as the No Action Alternative and Alternatives 1 and 2
Geology and Soils	The existing Cross Valley operations do not change and geology and soil conditions are unchanged.	Similar effect as the No Action Alternative	Over the long term the groundwater use in subbasin 17 would decrease. Retired or fallowed agricultural production lands will have a cover crop planted in the last year of cultivation.	Similar effect as the No Action Alternative and Alternative 1
Visual	The existing Cross Valley operations do not change and visual conditions are unchanged.	Similar effect as the No Action Alternative	Similar effect as the No Action Alternative	Similar effect as the No Action Alternative and Alternatives 1 and 2

SECTION 3

AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

INTRODUCTION

This section presents the existing conditions for the environmental resource topics and discusses the impacts expected to occur as a result of implementing the LTCRs. The environmental consequences and mitigation measures are provided for the NAA and Alternatives 1 and 2 considered in the Study Area as described under the affected environment. The period of analysis was conducted for the projected conditions in the Year 2030, the first period of renewal for the 25-year LTCRs. Considering the purpose of this project is to renew long-term water service contracts, the resource areas considered relevant and appropriate for the EA included the following:

- Surface Water
- Water Supply
- Groundwater Resources
- Water Quality
- Fisheries Resources
- Land Use Resources
- Biological Resources
- Recreational Resources
- Socioeconomic Resources
- Cultural Resources
- Social Conditions
- Air Quality
- Geology and Soils
- Visual Resources

SURFACE WATER

Affected Environment

Cross Valley Contractors Delta Water Supplies

Each year on February 15th, Reclamation announces the delivery level for CVP water to the contractors. The Cross Valley CVP long-term renewable contracts are for an annual delivery of up to 128,300 af/yr of water, depending on availability. The delivery level for contractors south and north of the Delta will typically be different. Because deliveries throughout the CVP are influenced by the total available supply, contractors south of the Delta are influenced by the ability to convey the water south of the Delta. That is, limitations on the Tracy Pumping Plant, Harvey O. Banks Pumping Plant, and available storage in San Luis Reservoir control the amount of water that can be delivered south of the Delta. Recent constraints placed on export pumping through the Bay-Delta Plan Accord, endangered species actions, and the final decision on

CVPIA Section 3406 (b)(2) water all constrain the diversion of water at the CVP and SWP export facilities.

Reclamation makes the CVC's CVP annual water allocations available in the Delta (In-Delta supplies).

In-Delta Water Supply

Cross Valley Contractor Water Allocation

Reclamation makes the CVC's annual allocation available in the Delta. CVC allocation will be the same as the CVP South of Delta (SOD) agricultural allocation and will be based on the CVP water allocation in the pre-1992 CVP operations used in the CVPIA (b2) accounting. Should the SOD agricultural allocation increase, the CVC allocation will increase by a like percentage. The CVC allocation is the additional In-Delta allocation that Reclamation determines is available, after considering all CVP needs, hydrologic conditions, operational constraints and requirement for the CVCs to obtain conveyance outside of the LTCR conveyance agreement with DWR.

This operational scenario takes into consideration the CVP water supply to all SOD contractors considering upstream water supply, power, and operational constraints before the 1995 Water Quality Plan and endangered species requirements constrained Delta CVP operations.

The CVC supply will not be made available until it has been determined that this additional delivery will not harm other SOD contractors or other project purposes.

Reclamation will evaluate the capacity of the CVP facility operation, Harvey O. Banks Pumping Plant capacity, and CVP water supply to meet the requested schedules. Due to the dependence on real-time demands and available CVP water supply to meet the requested schedules, deliveries will require continual coordination with Reclamation.

DWR pumps and conveys the CVP water to the CVCs up to the SOD irrigation allocation. Water deliveries originating at the Delta are diverted through the Harvey O. Banks Pumping Plant of the SWP. Although the diversion occurs through SWP facilities, the water supply is part of the CVP and therefore subject to any requirements placed on CVP deliveries.

Delta Facilities

The PEIS provides a description of the overall CVP facilities and the Delta. The Delta provides for the transport of water through the Central Valley and acts as a hub around which the CVP and SWP revolve. The Delta facilities provide for the transport of water through both the Sacramento-San Joaquin River and the San Francisco Bay-Delta Estuary and for the delivery of water to CVP contractors in both the San Joaquin Valley and eastern Contra Costa County. The CVP supply for the south of Delta contractors in the San Joaquin Valley originates primarily as controlled releases from CVP reservoirs on the Sacramento River system that are transported via the Sacramento River to the Delta.

Joint CVP and SWP Facilities, Operations South of Delta

Additional information on the overall CVP, SWP and river systems is provided in the PEIS. The SWP and CVP operate two diversion facilities in the Delta. The relevant facility to the CVCs is the Banks Pumping Plant that lifts water into the California Aqueduct from the Clifton Court Forebay and the Tracy Pumping Plant that lifts water into the Delta Mendota Canal. The California Aqueduct is the State's largest and longest water conveyance system, beginning at the Banks Pumping Plant and extending to Lake Perris south of Riverside, in Southern California. Water in the California Aqueduct flows from the Delta to O'Neill Forebay, from which a portion of the flow is lifted to the joint CVP/SWP San Luis Reservoir for storage. Flows continue down the California Aqueduct to the Cross Valley Canal. Under certain conditions, the CVC's CVP water is pumped at the Tracy Pumping Plant, conveyed in the Delta Mendota Canal, diverted to the O'Neill Forebay, and conveyed in the California Aqueduct to the Cross Valley Canal.

San Luis Reservoir

The San Luis Reservoir and B.F. Sisk Dam are located at the base of the foothills on the west side of the San Joaquin Valley. The Reservoir and Dam are part of a joint-use facility serving the SWP and CVP. The Dam and Reservoir were designed and constructed by the federal government and are currently operated and maintained by the State. The Reservoir has a capacity of 2,027,840 af, of which the SWP has 55 percent and the CVP has 45 percent usage.

Conveyance of Delta CVP Water to the CVCs

Reclamation delivers CVP water into DWR's Clifton Court Forebay in the Delta. DWR conveys the CVP water directly through the SWP facilities to the Cross Valley Canal, or may temporarily store the water in San Luis Reservoir for delivery to the Cross Valley Canal at a later time.

Under the temporary storage scenario, DWR conveys the CVC's CVP water from the Delta to the state (DWR) or federal share of the San Luis Reservoir for later release and delivery to the CVC. DWR also has this option of replacing water delivered to the CVC from DWR's share of San Luis Reservoir prior to receiving CVP water from Reclamation if DWR determines that capacity is available for such conveyance, storage or exchange. Such deliveries of CVP water will not occur if an increase in cost or adverse affects to SWP operations and the quantity or quality of water deliveries to SWP contractors would result. The CVP water is ultimately delivered to the Cross Valley Canal and the CVCs as described below subject to capacity or other constraints. If the CVP water is not delivered to the Cross Valley Canal, then other SWP users would put it to beneficial use and DWR would not charge Reclamation or the CVCs for the power for pumping or conveying of this water.

Under the direct delivery scenario, DWR diverts water for the CVCs from the Delta at the Harvey O. Banks Pumping Plant through the California Aqueduct, and to the SWP's portion of San Luis Reservoir. Historically, from San Luis Reservoir, the water is conveyed via the California Aqueduct to the Cross Valley Canal Reach 12-E turnout in Kern County and delivered to AEWSD. The AEWSD takes delivery of the Delta CVP water, then "exchanges" Friant CVP water that is delivered to the CVCs on the Friant-Kern Canal. The KTRG share common

facilities and have direct access to the Cross Valley Canal. KTRG may coordinate with other Cross Valley Canal users to pump this water across the San Joaquin Valley to their siphons. Due to the unpredictable timing of DWR deliveries and the conveyance of other water occurring in the Cross Valley Canal, KTRG may not be able to take direct delivery off the Cross Valley Canal and may arrange for an exchange with AEWSD or others. It is anticipated other contractors, in addition to AEWSD, would participate in exchanges with the CVCs. However, subsequent environmental analysis would be required for these other exchanges. Pixley Irrigation District and the Lower Tule River Irrigation District have discontinued the exchange with AEWSD and have transferred their water to other CVP water districts. The two CVCs use the proceeds from the transfer to purchase available water from willing sellers. As with all transfers of CVP water, Reclamation continues to address such transfers with separate environmental documents.

Conveyance

Conveyance and storage of CVP water by DWR is subject to capacity available at state facilities in excess of the capacity determined by DWR, to be needed for all SWP operations or any services to long-term SWP contractors. The method of conveyance of the CVC water cannot impact other CVP contractors or the CVP as a whole. CVP water conveyed under Article 55 of an SWP contract may not impact other CVC deliveries or other CVP uses for joint point. Reclamation will not furnish conveyance losses for CVP water conveyed under Article 55 of an SWP contract.

Due to the constraints of pumping and conveyance capacity in the CVP facilities in and south of the Delta, the CVCs must find alternate ways for the water to be conveyed to their districts. DWR is willing to pump and convey the CVP water through SWP facilities up to the SOD irrigation allocation as part of the three-party LTCR. CVP power is provided to DWR to convey the CVP water. Reclamation and DWR may exchange federal and state water and power in accordance with the Operations Manual to balance supplies. The Operations Manual sets forth detailed operations and management procedures prepared by DWR, Reclamation and the Contractors. Although DWR is willing to convey CVP water for the CVCs, there is a hierarchy in the SWP pumping facilities deliveries. Other priorities must be met by DWR before such conveyance of CVP water can occur. In some years no CVP water is conveyed. Under certain conditions, DWR could pump and convey the water at one time outside of the growing season and when it is not optimal for agricultural irrigation. Therefore, the CVCs would exchange the water with other contractors to allow for better timing on a demand schedule and for improved management of this water.

Article 55 of the SWP contracts provides for another method for CVP water supplies to be delivered to the CVCs. The SWP facilities may be used by a SWP contractor to move non-SWP (i.e., CVP) water in place of the SWP water. A SWP contractor may request DWR to pump and convey the CVC's CVP water through SWP facilities. Under this scenario, the CVCs may receive a higher priority on DWR's pumping hierarchy. Reclamation does not provide for conveyance losses of CVP water conveyed in SWP facilities other than under the provision of the LTCR conveyance agreement. Additionally, CVP power is not used to move water under Article 55 of the SWP contracts at this time. Pumping and conveyance of CVP water through

SWP projects would occur under the then existing Reclamation policies and mutually agreed upon terms with DWR. Subsequent environmental analysis and approvals would be required for conveyance agreements under Article 55 and are not within the scope of this EA and approval.

Priorities of Pumping

The CVCs shall have a primary priority to pumping capacity made available by the SWP for CVP purposes up to the allocation made for CVP irrigation contractors SOD. The priority of CVC-Primary allocation pumped at Banks will be in accordance with the CALFED Record of Decision and the 2002 Interim Protocols for the Operation of the Environmental Water Account (EWA). The priorities for pumping are as follows:

- Banks Pumping Plant
  SWP (from highest to lowest priority)
  - SWP pumping
  - Water Transfers for SWP contractors
  - Joint Point of Diversion (JPOD) use for specific CVP Contractors (includes CVC, San Joaquin National Cemetery, and Musco Olive Co.) Also includes make-up pumping for export curtailments
  - Wheeling for CVP and EWA
  - Water transfers for others

- Tracy Pumping Plant
  CVP (from highest to lowest priority)
  - CVP pumping
  - Refuge Level 4
  - Cross Valley Canal
  - EWA
  - Water transfers for others

The sharing of the available capacity at Banks Pumping Plant will be determined by Reclamation. Banks conveyance capacity made available by DWR and not utilized by the CVC or Stage 2 JPOD may be utilized by the other. The use of Stage 2 JPOD and San Luis Reservoir storage to meet west side demands should allow for a coordinated operation of the available Banks pumping capacity to meet the needs of both the CVC and CVP project water users in most years.

The stages of JPOD in SWRCB D-1641 are:

Stage 1 - for water service to CVC and Musco Olive, and to recover export reductions taken to benefit fish.

Stage 2 - for any purpose authorized under the current project water right permits.

Stage 3 - for any purpose authorized up t the physical capacity of the diversion facilities.

Each stage of JPOD has regulatory terms and conditions which must be satisfied in order to implement JPOD.

Power Provisions

CVP project power will be available for CVP water made available to CVC in accordance with this Operations Manual and conveyed through federal facilities, or conveyed through Banks in accordance with the CVC conveyance agreement with DWR for delivery of CVP water by Reclamation under the respective CVC water service contracts. Project power is currently not made available for CVP water conveyed under Article 55 of a SWP contract.

Kern Tulare and Rag Gulch Siphons

The KTRG constructed siphons on the east side of the Cross Valley Canal and the west side of the Friant-Kern Canal and have direct access to the CVP supplies from the Delta. With direct accessibility to CVP supplies, KTRG no longer relies on exchanges with Friant water. The KTRG have entered into arrangements to facilitate deliveries on a demand schedule.

Article 5 Exchanges

The Article 5 of the CVP contract exchanges are necessary in order for most of the CVCs to receive their CVP supplies. As stated, the Article 5 exchanges would require separate environmental analysis and approval with the exception of exchanges under the 1975 Memorandum of Understanding with AEWSD. Article 5 exchanges with AEWSD have occurred historically and are considered within the scope of analysis and approval for the LTCRs.

Typically, an exchange occurs whereby Delta water is swapped with Friant water involving AEWSD under Article 5 of the long-term contracts. Exchanges with CVP and other water districts have occurred in recent years. Reclamation anticipates additional districts would be exchange partners with the CVCs. These other exchange partners are described in this updated EA for informational purposes as follows:

The LTCRs between Reclamation and the CVCs include Article 5, Point of Diversion and Responsibility for Distribution of Water. Article 5 contains important provisions governing future exchanges of water. The entire Article 5 is included in the long-term contract example located in Appendix F of this EA. Article 5(a) of the Cross Valley contract reads in part:

"The parties acknowledge that Project Water to be furnished to the Contractor pursuant to this Contract shall be delivered to the Contractor, shall be conveyed by DWR, and delivered to the Contractor by direct delivery via the Cross Valley Canal and/or by exchange arrangements involving Arvin-Edison Water Storage Districts or others. The parties further acknowledge that such exchange arrangements are not transfers subject to Section 3405(a) of CVPIA. Notwithstanding Article 9, (transfers) such exchange arrangements, other than the previously approved exchange arrangements with Arvin-Edison Water

Storage District, shall be submitted to the Contracting Officer for approval in accordance with the same criteria historically applied by the Contracting Officer or with the then existing Project-wide criteria."

Article 5 exchange arrangements with AEWSD would continue, as in the past, under each of the alternatives. Exchange arrangements with CVCs and CVP contractors such as Lower Tule River Irrigation and Tulare Lake Basin Water Storage District would continue, as in the past, within the terms of the existing environmental documents. Potential exchange arrangements with others require separate environmental review and are discussed below:

1) Cross Valley CVP – State Water Project Water

Possible exchanges of this nature would be with the SWP contractors including the Kern County Water Agency and the Tulare Lake Basin Water Storage District. Because each agency has SWP storage in San Luis Reservoir, such exchanges would enable CVCs to receive deliveries when demands exist and allow the Kern County Water Agency and Tulare Lake Basin Water Storage District to integration CVC diversions into their demand schedules.

2) Cross Valley CVP – Non-Project Water Supply

Possible exchanges of this nature would be with interests in Kern County and the Tulare Lake Basin. CVC water would be delivered to such interests through SWP facilities in exchange for local stream supplies from the Kings, Kaweah, Tule and/or Kern Rivers. In some cases, such exchanges could be three party exchanges. In all cases, the exchanges would simply substitute local stream deliveries for direct or CVP exchange deliveries.

3) Cross-Valley CVP – Other CVP Project Supply

Potential exchanges in this category could involve the Shafter-Wasco Irrigation District or three party exchanges involving the Tulare Lake Basin and the Fresno Irrigation District.

Due to the unreliability and timing of water deliveries, the exchange arrangements could result in an imbalance of water. This imbalance has occurred historically with AEWSD. The exchange agreements between the CVC and an exchanger may include compensatory arrangements for such imbalances.

Contractors will be required to send Annual Reports to Reclamation of all exchanges during the previous year. This information is required because Reclamation must determine the balance for the use of water within 10 percent of existing contract levels.

Cross Valley Contractors Friant Water Supplies

Friant Direct Supplies

The LTCRs provide for the CVC water supplies to come directly from the Friant Unit. However, all Friant Division water requirements must be met prior to making this water available to the CVCs. Therefore, the frequency and availability of Friant supplies for the CVCs is low. In rare occasions when Friant supplies are made available, water is conveyed down the Friant Kern Canal directly to the CVCs with an equal reduction of the Delta water supplies occurs.

Friant Direct Supplies via Exchanges

The CVC's CVP supplies originate from the Sacramento River in the Delta and are exchanged with Friant water supplies. Historically, this water was conveyed through the California Aqueduct for the CVCs and physically delivered to AEWSD. In return, a portion of the CVP water from the AEWSD CVP contract from the Friant Unit that would have been delivered to AEWSD is physically delivered to the CVCs.

Friant Facilities and Resources

Upper San Joaquin River

Runoff from the Sierra Nevada mountains in San Joaquin Valley occurs between late winter to early summer and fall. Above Friant Dam, the San Joaquin River drains an area of approximately 1,676 square miles and has an annual average unimpaired runoff of 1.7 million af/yr. The historical unimpaired runoff ranges from 0.4 to 4.6 million af/yr with a median of 1.4 million af/yr. Several reservoirs in the upper portion of the San Joaquin River watershed, including Mammoth Pool and Shaver Lake, are primarily used for hydroelectric power generation and have a combined storage capacity of approximately 620,000 af/yr.

The majority of the annual flow has been diverted in the Friant-Kern and Madera Canals with peak monthly flows occurring in July. Average monthly releases from Friant Dam to the San Joaquin River since 1941 have included minimum releases to satisfy water rights above Gravelly Ford and flood control releases with minor contributions from agricultural and urban return flows.

San Joaquin River between Gravelly Ford and Fremont Ford

Gravelly Ford, located downstream of Friant Dam, is a sandy and gravelly section of the San Joaquin River that is subject to high river flow losses. The section of the San Joaquin River between Gravelly Ford and the Mendota Pool spans approximately 17 miles and is generally dry except when releases are made from Friant Dam for flood control.

During flood control operations, flood flows can be diverted to the Chowchilla Bypass up to its capacity of 6,500 cubic feet per second. The Chowchilla Bypass runs northwest, intercepts flows in the Fresno River, and discharges to the Chowchilla River. The East Side Bypass begins at the

Chowchilla River and runs northwesterly to rejoin the San Joaquin River above Fremont Ford. Together, the Chowchilla and Eastside bypasses intercept flows of the San Joaquin, Fresno, and Chowchilla rivers, and other lesser east side San Joaquin River tributaries, to provide flood protection for downstream agricultural lands. These bypasses are located in highly permeable soils, and much of the water recharges groundwater.

Flows in the San Joaquin River that pass the Chowchilla Bypass enter the Mendota Pool. The Mendota Pool was formed in 1871 by the construction of Mendota Dam on the San Joaquin River by water rights holders, and is the point at which the San Joaquin River turns northward. The Mendota Pool has a capacity of approximately 50,000 af/yr and serves as a forebay for diversions to the Main and Outside Canals. The Delta-Mendota Canal, which conveys CVP water from the Delta to San Joaquin River Exchange Contractors, terminates at the Mendota Pool. Water also enters Mendota Pool from the south, via Fresno Slough (sometimes referred to as James Bypass), which conveys overflows from the Kings River in the Tulare Lake Basin to the San Joaquin River.

Millerton Lake

Millerton Lake is formed by Friant Dam and has a capacity of 520,000 acre-feet. Millerton Lake serves both as a flood control facility and a water supply facility. Operations are coordinated with upstream hydroelectric utility-owned reservoirs and the Army Corp of Engineers during flood periods. Up to 390,000 acre-feet per year of Millerton Lake is reserved for flood control storage. Part or all of the dedicated flood control storage may be used for conservation storage, depending on the time of year and the current flood hazard. Flood control operations of Millerton Lake are influenced by the storage available in upstream reservoirs (Figure SW-2).

Environmental Consequences

There is the potential for changes in surface water flows as a result of this project because of changes in water use patterns and the use of surface water and groundwater.

Changing the price structure of water delivered to the CVCs could influence the amount of CVP water purchased in a given year. However, water diversions from the Delta to meet the demands south of the Delta are projected to decrease from historic levels because of implementation of the CVPIA (Reclamation, 1999). A decrease from historic levels would increase the scarcity of water, and water users would adjust water use practices to accommodate the supply. The potential environmental effects are described below.

No Action Alternative

Under the NAA, the CVCs will continue to use available surface water and pump groundwater. The surface water available to the contractors is reduced from the historic levels because of pumping constraints at the Delta. The impacts of this reduction are described in the PEIS (Reclamation 1999).

Alternative 1

Alternative 1 has similar environmental effects as the NAA and therefore will not have an impact on the surface water resources of the Cross Valley service area or the Delta.

Alternative 2

The economic analysis of Alternative 2 indicates that in most years this alternative would result in little or no change in water use from the NAA. In other years, the CVCs would tend to switch from groundwater to surface water (see Water Supply Section). This change will not have an effect on the flow regime of the Rivers or other streams in the region. The change in surface water use will not result in additional diversions from the Delta from the diversions analyzed in the PEIS. San Luis Reservoir storage will not change from the conditions described in the PEIS.

The surface water elevation in Millerton Lake is dependent upon the availability of surface runoff for the year, storage and discharge of upstream reservoirs, and the timing of demand for irrigation water. Typically, the CVCs receive Millerton Lake water through an exchange with AEWSD. Alternative 2 will not affect the deliveries in the Friant-Kern Canal or storage in Millerton Lake.

Cumulative Effects

The cumulative effects of all foreseeable projects will be to place additional demands on the available water supply. These projects may also put additional water in local rivers. Implementation of Alternatives 1 or 2 will not influence the cumulative effects of these other projects on water resources.

Based on historical trends in surface water use south of the Delta and information presented in the Central Valley Production Model (CVPM) simulations there are no projected impacts on water supply and thus no contribution to cumulative effects on the water supply.

WATER SUPPLY

Affected Environment

Delta Diversions

Water deliveries to the CVCs originate at the Delta and are diverted through the Harvey O. Banks Pumping Plant of the SWP. Although the diversion occurs through SWP facilities, the water supply is part of the CVP and therefore subject to any limitations placed on CVP deliveries.

Cross Valley Canal and Cross Valley CVP Contractors

The CVCs are located along the east side of the San Joaquin Valley and are inter-dispersed among the Friant Division Contractors. In 1975, the CVCs entered into long-term renewable

contracts with Reclamation. The CVP contracts for the CVCs have historically allowed for both agricultural and M&I uses.

The CVCs joined in the cost sharing with a group of contractors to construct the Cross Valley Canal. In 1975, the locally financed Cross Valley Canal was completed, bringing water from the California Aqueduct through a series of six lift pumps to the east side of the southern San Joaquin Valley to the Friant-Kern Canal near the city of Bakersfield. The Cross Valley Canal provides improved flexibility in managing water supplies in the lower San Joaquin Valley allowing Friant and Delta water to be conveyed east to west by gravity or west to east by pumping. The Cross Valley Canal also conveys non-CVP and non-SWP water to non-CVP and non-SWP contractors. The operations on the Cross Valley Canal require extensive coordination among the users for conveyance and deliveries. Exchanges of water among the water districts are common. Reclamation only has jurisdiction and approval of exchanges involving CVP water. CVP water exchanges under Article 5 and 9 would undergo separate environmental analysis and review with the exception of Article 5 exchanges involving AEWSD for the purpose of facilitating the delivery of CVP supplies to the CVC pursuant to the 1975 Memorandum of Understanding. These exchanges with AEWSD are necessary and have occurred historically. Therefore, they are within the scope of this LTCR approval process and environmental analysis.

The CVP supplies for the CVCs are unpredictable due to the constraints in deliveries from the Delta. The CVCs swap the Delta water for Friant water resulting in higher costs for the CVCs. In order for the CVCs to obtain their Delta supplies through an exchange with the Friant Division Contractors, the runoff on the San Joaquin River must be sufficient to declare a full Class 1 and a minimum percent of Class 2 supply. If these conditions are not met, the CVCs do not receive a full supply and the cost of this water, due to exchange provisions, increases significantly. These combined conditions result in higher costs of water for the CVCs compared to neighboring Friant Division Contractors. In dry years the costs for CVCs per acre foot may double. This is due to fixed contract costs and is independent of the runoff conditions and hydrology. These fixed contract costs are typically the operations and maintenance, pumping and watermaster costs. Table WS-1 lists the CVP contract supplies for each of the CVCs.

Table WS-1
Cross Valley Contractor Contracts

Cross Valley Contractors	CVP Maximum Contract Amount (af)	Type of Contract
County of Fresno	3,000	Ag/M&I
Hills Valley Irrigation District	3,346	Ag/M&I
Kern-Tulare Water District	40,000	Ag/M&I
Lower Tule River Irrigation District	31,102	Ag/M&I
Pixley Irrigation District	31,102	Ag/M&I
Rag Gulch Water District	13,300	Ag/M&I
Tri-Valley Water District	1,142	Ag/M&I
County of Tulare	5,308	Ag/M&I

Source: Reclamation 1999c; 1999d

Friant-Kern Canal

Since completion of Friant Dam in 1941, the majority of the annual flow has been diverted to the 152 mile-long Friant-Kern Canal and the 36 mile-long Madera Canal. Millerton Lake storage is used to furnish an average annual supplemental canal side water supply of about 800,000 af of Class 1 and about 1,400,000 af of Class 2 water to the Friant-Kern canal and Madera Canals.

The Friant-Kern Canal extends south from Friant Dam in Fresno County to Kern County near Bakersfield. The Canal diverts water to extensive areas in the Tulare Lake Basin that lack, or are deficient, in water supplies. Individual irrigation districts integrate CVP water supplies with water supplies from the Kings, Kaweah, Tule, and Kern rivers and through exchange agreements between Friant-Kern and CVCs. The CVCs can take Friant water as their contractual supply after all of the Friant Division needs are met.

Environmental Consequences

There is the potential for changes in surface water flows as a result of this project because of changes in water use patterns and the use of surface water and groundwater.

Changing the price structure of water delivered to the CVCs could influence the amount of CVP water purchased in a given year. However, water diversions from the Delta to meet the demands south of the Delta are projected to decrease from historic levels because of implementation of the CVPIA (Reclamation 1999; 1999a). A decrease from historic levels would increase the scarcity of water, and water users would adjust water use practices to accommodate the supply. The potential environmental effects are described below.

No Action Alternative

Based on the historic use of both groundwater and surface water in the CVC's service areas, contractors are expected to continue mixed use of CVP surface water and groundwater, with greater emphasis on groundwater use during periods when CVP surface water is limited or expensive. CVCs with alternate sources of non-CVP surface water would continue to utilize those supplies as in the past and when available. The water supply to CVCs under the NAA was described in the PEIS. Overall, the diversions from the Delta to meet south-of-Delta demands are less under the NAA than historically observed (Reclamation 1999; 1999a).

Reclamation prepared water needs assessments for the CVCs to evaluate the water supply needs in the future (2026). This analysis resulted in an estimate of about 158,200 af of unmet demand in 2026 (Table WS-2). That is, there is an additional need for water in the CVC's service area, independent of this project.

Table WS-2
Water Needs Assessments

Cross Valley Contractor	Maximum Water Contract Amount (acre-feet/yr)	Unmet Demand (acre-feet)
Tri-Valley WD	1,142	1,142
Fresno, County of	3,000	1,122
Hills Valley ID	3,346	3,092
Kern-Tulare WD	40,000	7,517
Lower Tule River ID	31,102	23,318
Pixley ID	31,102	112,507
Rag Gulch WD	13,300	9,460
Tulare, County of	5,308	*
Total	128,300	158,158

Source: Reclamation 2000a; 2000b

Note: If the Unmet Demand is within 25 percent of the contract supply for contracts of 5,000 to 20,000 acre-feet, then it is assumed that the "surplus" increment can be put to beneficial use. If the Unmet Demand is within 10 percent of the contract supply for contracts greater then 20,000 acre-feet, then it is assumed that the "surplus" increment can be put to beneficial use. For contracts less than 5,000 acre-feet, it was determined that the full amount could be put to beneficial use and, a needs assessment was not done.

* Applies to Alphaugh I.D. and Atwell Island I.D.

Alternative 1

The environmental effects of Alternative 1 are similar to the NAA and therefore there are no significant effects from the implementation of this alternative.

Alternative 2

The economic conditions and water use under this alternative were analyzed with the CVPM model (see Socioeconomics section). The analysis summarized the changes in irrigated acreage by subbasins as compared to irrigated acreage under the NAA. The results for the subbasins relevant to the CVC service area are summarized in Table WS-3. The irrigation districts that correspond to the subbasins are shown in Table WS-4. This particular analysis illustrates that minimal changes are anticipated for most year types.

Table WS-3
Changes in Water Use in the CVPM Subbasins
(Changes from NAA in thousands of acre-feet/year)

Changes in Water Use for a Average Year that Follows a 5-Year Period that is:

	Average		Wet		Dry	
CVPM Subbasins	Surface Water	Ground Water	Surface Water	Ground Water	Surface Water	Ground Water
17	3.9	-3.8	3.8	-3.8	4.0	-3.9
18	0.0	0.0	0.0	0.0	0.1	-0.1
20	0.1	-0.1	0.1	-0.1	-0.2	0.1

Changes in Water Use for a Wet Year that Follows a 5-Year Period that is:

	Average		Wet		Dry	
CVPM Subbasins	Surface Water	Ground Water	Surface Water	Ground Water	Surface Water	Ground Water
17	7.4	-7.4	7.3	-7.2	7.4	-7.4
18	0.0	-4.0	0.0	-4.0	0.1	-3.8
20	0.1	0.0	0.0	0.0	-0.1	0.0

Changes in Water Use for a Dry Year that Follows a 5-Year Period that is:

	Average		Wet		Dry	
CVPM Subbasins	Surface Water	Ground Water	Surface Water	Ground Water	Surface Water	Ground Water
17	0.0	0.0	0.0	0.0	0.1	0.0
18	0.0	0.0	0.0	0.0	0.1	0.0
20	0.0	0.0	0.0	0.0	-0.1	0.0

Note: A positive number represents an increase in the use of water and a negative number represents a decrease in water use from the NAA.

Table WS-4
Irrigation Districts within CVPM Economic Subbasins

CVPM Subbasin	**Cross Valley Contractor**
17	Hills Valley, Tri-Valley.
18	County of Fresno, Lower Tule River Irrigation District, Pixley Irrigation District, Rag Gulch, County of Tulare, Kern-Tulare Water District
20	Rag Gulch, Kern-Tulare Water District

The largest change in annual water use is projected to occur in wet years. A change is also simulated in average years for subbasin 17. The change is up to 7,400 af for subbasin 17 in a wet year following a period of 5 dry years. The change reflects a switch from groundwater to surface water for that combination of year-type and previous five years, but not a reduction in water use.

Impact Change in CVP Water Use in Certain Years

The CVCs may switch from surface water to groundwater in certain years because of tiered water pricing. In certain years, the CVCs may purchase additional water supplies. Purchased water by the CVCs would come from San Luis Reservoir, Delta, or Friant. This does not represent a new water supply, but rather, part of the water supply described in the PEIS. Overall, the diversion from the Delta or Friant would not change because of a one-year increase in CVP water use in the CVC service area. The total diversions from the Delta or Friant are not anticipated to change with the tiered pricing with no impact anticipated. The CVCs receive water physically from Millerton Lake through exchanges. Changes in CVP water use because of this alternative would not affect this exchange.

Cumulative Effects

Cumulative Effects of No Action, Alternative 1, and 2

Based on historical trends in surface water use south of the Delta and information presented in the CVPM simulations there are no projected impacts on water supply and thus no contribution to cumulative effects on the water supply.

GROUNDWATER RESOURCES

Affected Environment

The CVCs are located in the Tulare Lake groundwater hydrologic region. In the Tulare Lake Region, water users are located in the Kings, Kaweah, Tule, and northern portion of the Kern County subbasins.

Recharge of the semi-confined aquifer in the region is primarily derived from seepage from streams and canals, infiltration of applied water, and subsurface inflow. Precipitation on the valley floor provides some recharge, but only in wet years. Seepage from streams and canals is highly variable depending on annual hydrologic conditions. Recharge to the lower confined aquifer takes place largely through lateral inflow from the semi-confined aquifer.

Groundwater Storage and Production

The usable storage capacity of the Tulare Lake Region is about 28 million af. The most recent estimate for groundwater extraction without lowering groundwater levels over the long-term (perennial yield) is approximately 4.6 million acre-feet for the Tulare Lake Region. This

perennial yield is directly dependent upon the amount of recharge received by the groundwater basin, which may be different in the future than it has been in the past.

Groundwater pumping ranged from 1.6 million acre-feet in 1922 to 4.7 million acre-feet in 1977. Groundwater pumping has been rising steadily through the 1970s, and has varied greatly from year to year depending on hydrologic conditions. The largest year-to-year fluctuation occurred during the 1976 - 1977 drought period. Immediately following the drought, hydrologic wet and above normal conditions for the years 1978 to 1980, resulted in reduced pumping. However, urban growth during the 1980s has contributed to an increase in groundwater use. In addition, increased groundwater pumping in the late-1980s and early-1990s occurred as a result of reduced surface water deliveries to CVP water users due to the imposition of environmental requirements on the operation of surface water facilities, and critically dry hydrologic conditions during the 1987 to 1992 drought period. DWR estimated recent groundwater pumping for 1990 conditions (normalized) in the Tulare Lake Region at 5.2 million acre-feet. This exceeds the estimated perennial yield in the Tulare Lake Region by approximately 630,000 af. All of the subbasins within Tulare Lake Region experience some overdraft.

During the 10-year period from spring 1970 to spring 1980, semi-confined groundwater levels generally dropped in the Tulare Lake Region. In portions of Fresno, Kings, Kern, and Tulare counties, semi-confined groundwater levels dropped as much as 50 feet since spring 1970. The semi-confined aquifer in the Tulare Lake Region showed little change between spring 1980 and spring 1988.

The California Department of Water Resources collects and summarizes groundwater data for wells across the Tulare Lake Basin. These data show the historical trends in groundwater elevation for the basins in the CVCs service area (Figure GW-1). The data is subdivided into several basins that are defined by geologic and hydrologic conditions. The subbasins and the associated water districts are shown in Table GW-1.

Table GW-1
Groundwater Subbasins and Water Service Areas in the Cross Valley Contractor Service Area

Groundwater Subbasin	Water/Irrigation District
Kings Basin	County of Fresno
	Hills Valley Irrigation District
	Tri-Valley Water District
Kaweah Basin	City of Visalia
Tule Basin	Pixley Irrigation District
	Rag Gulch Water District
	Lower Tule River Irrigation District
Kern County	Kern-Tulare Water District
	County of Tulare

Kings Basin

The Kings Basin includes the area around Fresno, extending to the foothills. The water supply for this basin is the Kings and San Joaquin Rivers. The basin declined following the drought in the early 1990's and has not yet recovered. The portion of the basin near Orange Cove declined during the drought but has recovered to pre-drought conditions (Figure GW-2).

Kaweah Basin

The Kaweah Basin encompasses the area around the City of Visalia and is supplied from the Kaweah River. Groundwater levels decline over 20 feet during the drought but have recovered somewhat. North of Visalia, groundwater levels have not completely recovered (Figure GW-3).

Tule Basin

The Tule Basin includes the area from Porterville to Delano and is supplied from the Tule River. Groundwater levels in the Tule Basin declined during the drought but have recovered somewhat. Near Delano however, the groundwater elevation remains about 20 feet lower than the pre-drought conditions (Figure GW-4).

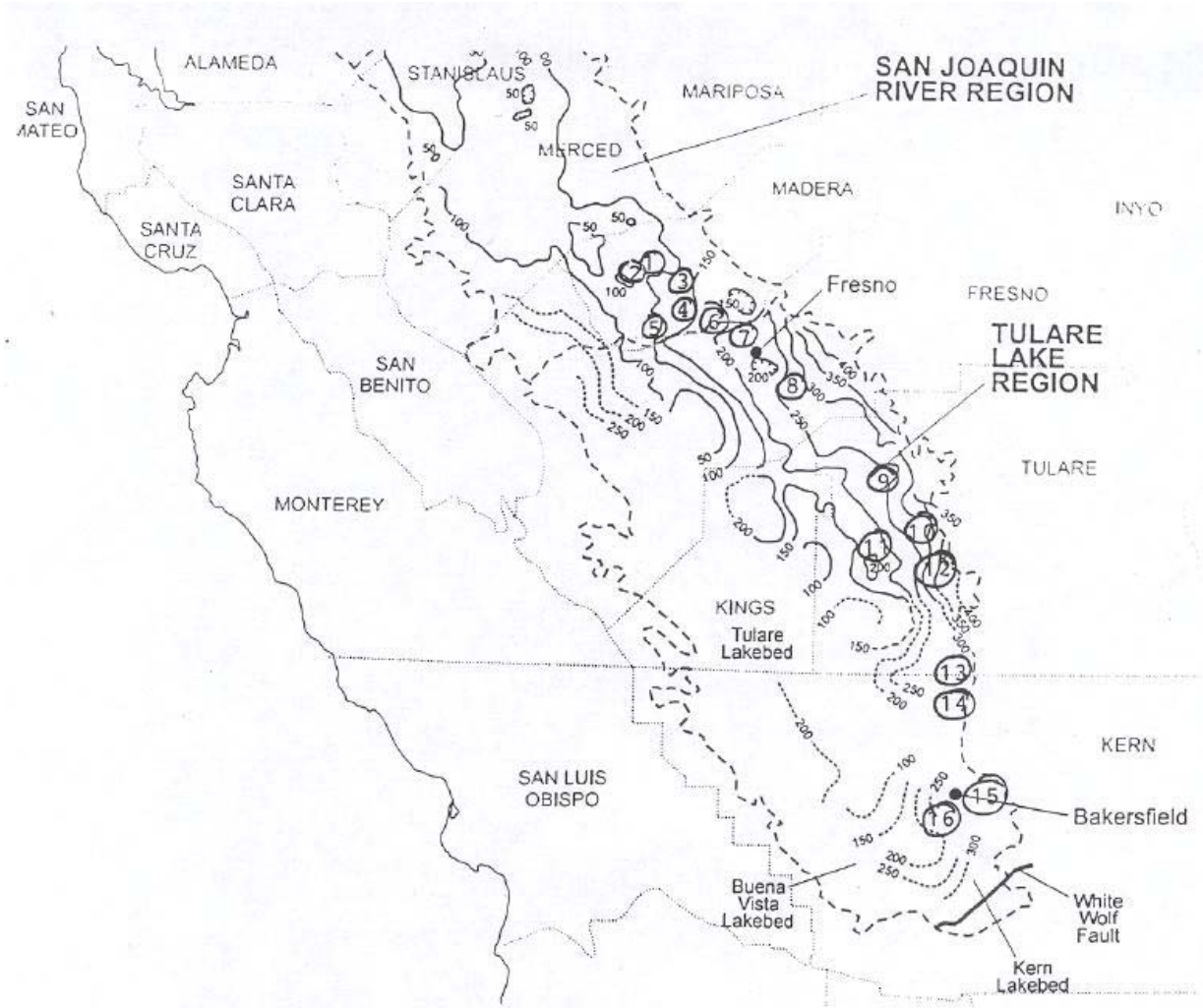

FIGURE GW-1
MONITORING WELLS IN THE SAN JOAQUIN VALLEY

Kern County Basin

The Kern County Basin includes the area south of Bakersfield and is supplied from the Kern River (Figure GW-5). The basin declined steadily until the mid 1970's when it began to recover. The basin declined in the early 1990's in response to drought conditions but has begun to recover.

Environmental Consequences

Typically, contractors supplement CVP surface water by pumping and applying groundwater. Even during times of normal surface water availability, a number of areas within the service area require supplemental groundwater to meet their irrigation needs. While the general trend for the past 50 years throughout the region has been one of declining groundwater elevations, many of the major groundwater aquifers in the area experienced dramatic drawdown during the late-1980s and early-1990s (Figures GW-1 to GW-5). While most of these aquifers have begun to recover to near pre-drawdown levels, the recovery rates have been widely variable. Furthermore, data from monitoring wells indicate that recovery from the late-1980s early-1990s drawdown has not occurred in some areas. In these areas, groundwater elevations remain near the historic low levels reached during the dry period in the early 1990's.

As discussed in the Water Supply section, both the volume pumped and the overall requirement for supplemental groundwater are anticipated to vary on both regional and sub-regional (local) bases depending on the combination of years. Overall, however, the CVPM simulations indicate that localized changes in groundwater pumping in one area will be offset by changes in use of CVP water and reduced pumping elsewhere in the region; the net result being no change in groundwater basin status compared to the current water distribution and use program.

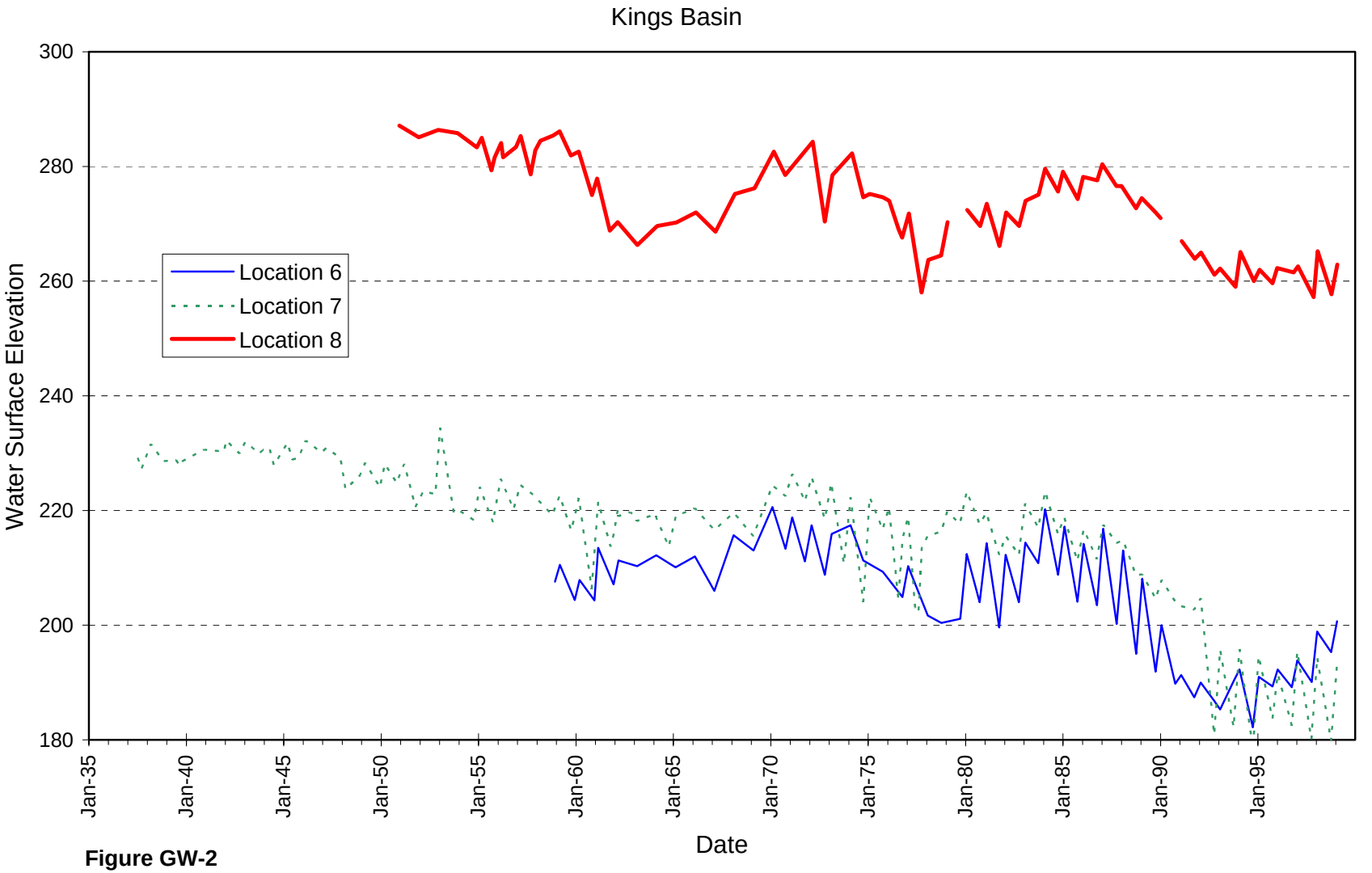

Figure GW-2
Ground Water Conditions in the Kings Subbasin

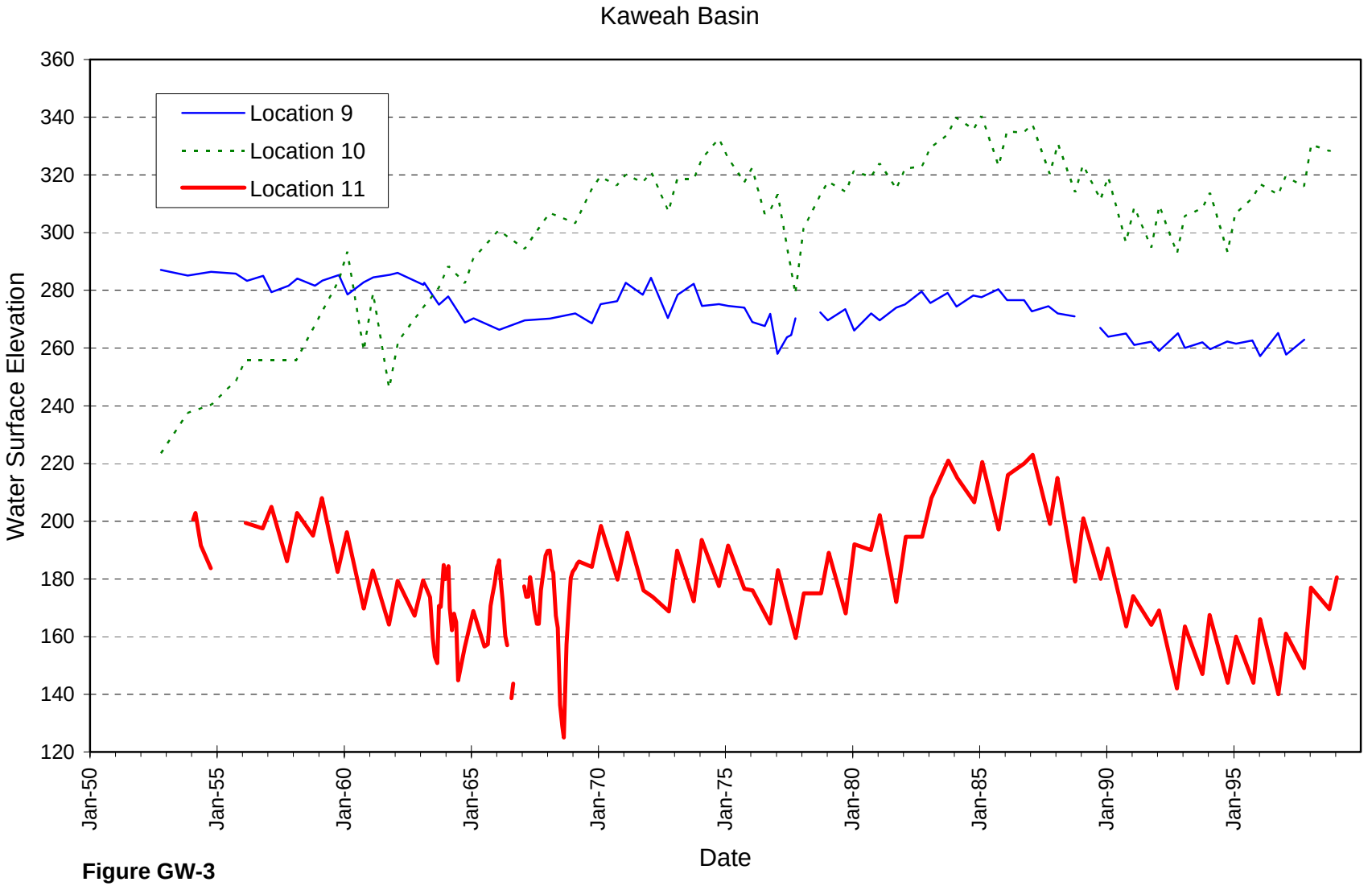

Figure GW-3
Ground Water Conditions in the Kaweah Subbasin

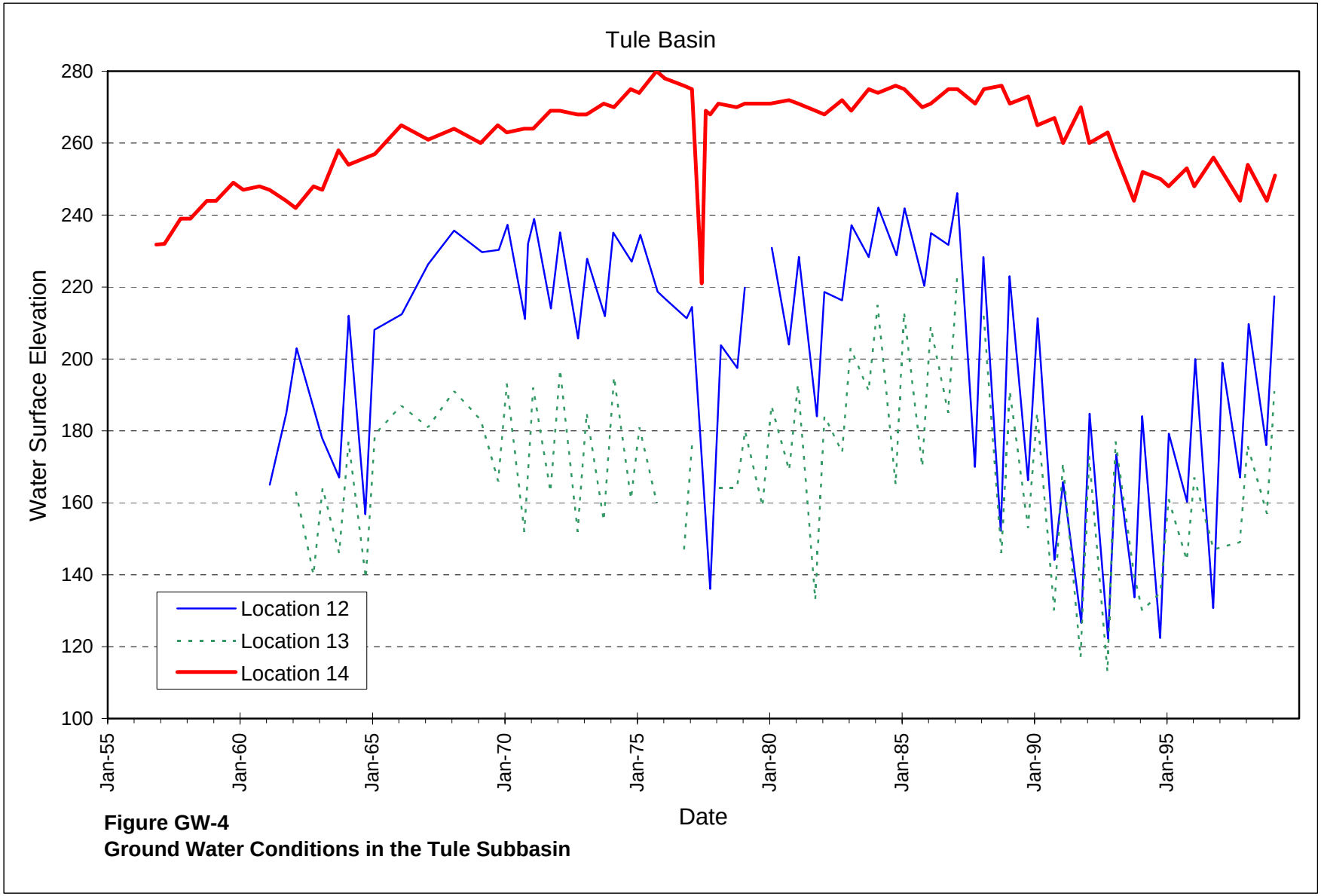

Figure GW-4
Ground Water Conditions in the Tule Subbasin

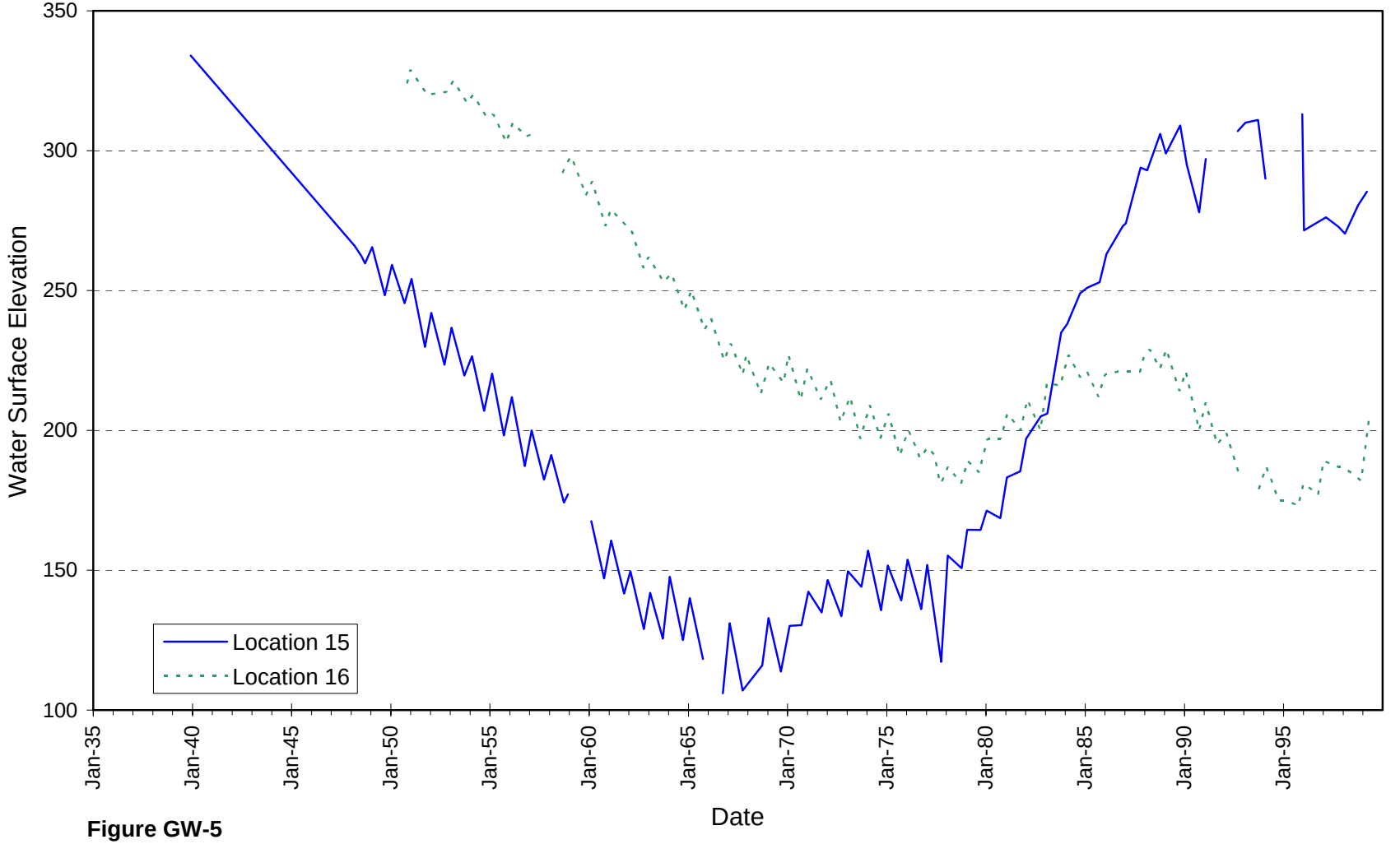

Figure GW-5
Ground Water Conditions in the Kern Subbasin

No Action Alternative

The available surface water supply for the CVC service area and the required supplemental groundwater needed under the NAA is described in the PEIS. For most years, groundwater use will increase over historic conditions because of the reduced supply available from the Delta. Potential adverse effects associated with increased groundwater usage include changes to the chemical composition of agricultural runoff, decreases in soil quality due to salt accumulation, diminution of groundwater elevations, soil subsidence, and groundwater quality. These conditions are described in the PEIS for the Preferred Alternative.

It is assumed that the Contractors will return to greater use of CVP water in years when water is available from the Delta. This should allow the groundwater table to recharge and reduce the effects described above.

Alternative 1

Alternative 1 is similar to the NAA except for administrative differences and will have similar environmental effects as the NAA. Therefore, there are no environmental impacts from this alternative on the groundwater resources of the region.

Alternative 2

Under Alternative 2, potential environmental consequences associated with groundwater resources would most likely occur during years of decreased CVP water availability. The use of surface water and groundwater in the Cross Valley service area was simulated in CVPM for various combinations of water year types (Table GW-2).

Table GW-2
Change in Groundwater Use in the CVPM Subbasins (Change from NAA in thousands of acre-feet/year)

Change in Water Use for an Average Year that Follows a 5-Year Period that is:			
CVPM Subbasins	**Average**	**Wet**	**Dry**
17	-3.8	-3.8	-3.9
18	0.0	0.0	-0.1
20	-0.1	-0.1	0.0
17	-7.4	-7.2	-7.4
18	-4.0	-4.0	-3.8

Table GW-2
Change in Groundwater Use in the CVPM Subbasins (Change from NAA in thousands of acre-feet/year)

Change in Water Use for an Average Year that Follows a 5-Year Period that is:			
CVPM Subbasins	**Average**	**Wet**	**Dry**
20	0.0	0.0	0.0
17	0.0	0.0	0.0
18	0.0	0.0	0.0
20	0.0	0.0	0.0

Note: A positive number represents an increase in the use of water and a negative number represents a decrease in water use from the NAA.

Analyses of the economic and water use changes associated with Alternative 1 relative to the NAA show that within the CVCs service area (primarily subbasins 17 and 18), water users will decrease groundwater use for some year types. The maximum shift is 7,400 af in subbasin 17. Under most of the scenarios evaluated, the regional groundwater use will result in the same impacts as the NAA.

Under Alternative 2, a single year of decreased groundwater pumping will not adversely or beneficially affect the groundwater basin. Over the long term, the groundwater use in subbasin 17 would decrease, based on the CVPM simulations.

Cumulative Effects

A number of ongoing and planned activities related to surface water in the San Joaquin Valley may place additional demands on CVP water resources. Specifically, plans to restore riparian habitat, anadromous fish habitat (the Anadromous Fish Restoration Program [AFRP]) would require additional water supplies. These demands will likely place additional pressure on the surface and groundwater resources of the region. Implementation of Alternative 1 or 2 will not influence the cumulative effects those other actions.

The recent deregulation of the power industry in California may lead to increased costs for electricity. This in turn would affect the contractors who use electric pumps to extract groundwater. It is unknown whether changing power costs would result in a change in the groundwater use in the region.

WATER QUALITY

Affected Environment

The following describes the affected environment for water quality within the CVC service area and associated waterways. The affected water quality in the Tulare Lake Basin considers surface water quality and groundwater quality.

Surface Water Quality

Surface water quality in the San Joaquin River Basin is affected by several factors, including natural runoff, agricultural return flows, biostimulation, construction, logging, grazing, operations of flow regulating facilities, urbanization, and recreation. The upper reaches of the rivers draining to the San Joaquin River Basin originate in large drainage areas high on the west side of the Sierra Nevada. The water in these rivers is generally soft with low mineral concentrations. As these streams flow from the Sierra Nevada foothills across the eastern valley floor, their mineral concentration steadily increases. This increase in concentration is fairly uniform for each of the east side streams.

Above Millerton Lake and downstream towards Mendota Pool, water quality is generally excellent. The reach from Gravelly Ford to Mendota Pool (about 17 miles) is frequently dry except during flood control releases because all water released from Millerton Lake is diverted upstream to satisfy water rights agreements, or percolates to groundwater.

Wildlife refuges and duck clubs contribute water of degraded quality to the San Joaquin River. The refuges begin flooding operations in the fall to maintain habitat for migratory waterfowl, primarily with water delivered from the Delta via the Delta-Mendota Canal. The salinity of the water in the ponds may increase during the fall due to evaporation and following winter seasons with low precipitation, often contributing poor quality water to the San Joaquin River when the ponds are drained in the spring.

The quality of the water often deteriorates as water travels the complex Delta tributaries and channels, especially during dry and critical water years when annual precipitation is low. In addition to uneven distribution and limited rainfall, other factors and sources influencing Delta water quality. These factors include infiltration of seawater with high salinity and bromides, releases of organic carbon from peat soils of the Delta islands, phytoplankton growth and decay in rivers and channels, agricultural practices and drainage discharges, urban runoff and discharges, and recirculation of Delta waters through the San Joaquin Valley.

Water quality data collected near or in the Delta from 1998 to 2001 indicates that seawater influence is the primary source of salinity and bromide throughout the western Delta. Salinity levels and bromide at the diversion and Delta channel monitoring stations generally varied with their distance from the Mallard Island station at the west end of the Delta closest to the San Francisco and Suisun bays where seawater influence was the greatest. Salinity was significantly lower at Delta channel and diversion stations than at the San Joaquin River due to the dilutional

effects of water from the Sacramento River. The stations at the north end of the Delta are not influenced by seawater; therefore, bromide concentrations were very low.

This dilutional effect was not observed with total organic carbon, which implies that some organic carbon was produced within the Delta. The total organic carbon in the Delta rivers, channels, and diversion stations was high. At each tributary station, organic carbon was generally significantly higher during the wet months when there was rain in the watershed than during the dry months. The data suggest major organic carbon sources from runoff from watersheds in the Sacramento and San Joaquin valleys, urban runoff, agricultural drainage, and river and channel phytoplankton production (DWR 2003).

Groundwater Quality

The quality of the water often deteriorates as water travels the complex Delta tributaries and channels, especially during dry and critical water years when annual precipitation is low. In addition to uneven distribution and limited rainfall, other factors and sources influencing Delta water quality. These factors include infiltration of seawater with high salinity and bromides, releases of organic carbon from peat soils of the Delta islands, phytoplankton growth and decay in rivers and channels, agricultural practices and drainage discharges, urban runoff and discharges, and recirculation of Delta waters through the San Joaquin Valley.

Total Dissolved Solids

Total dissolved solids (TDS) concentrations vary considerably in the San Joaquin River Region, depending upon the groundwater zone. Characteristics of TDS in the Tulare Lake Region are similar to those occurring in the San Joaquin River Region. This distribution reflects the low concentrations of dissolved solids in recharge water that originates in the Sierra Nevada, and the predominant regional groundwater flow pattern. In the center and on the east side, TDS concentrations generally do not exceed 500 milligram per liter (mg/l).

Boron

In the southern portion of the Tulare Lake Region, high concentrations of boron are generally found in areas southwest to Bakersfield (greater than 3 mg/l) and southeast of Bakersfield (1 to 4 mg/l). Groundwater in the Cross Valley area is not identified as a concern for elevated concentrations of boron.

Nitrate-Nitrite

Several small areas of the Tulare Lake Region contain nitrate-nitrite (NO_3-N) concentrations in excess of 10 mg/l. These include areas south and north of Bakersfield, around the Fresno metropolitan area, and scattered areas of the Sierra Nevada foothills in the Hanford-Visalia area. Municipal use of groundwater as a drinking water supply is also impaired due to elevated nitrate concentrations in the Madera area and throughout the Tulare Lake Region.

Arsenic

In the Tulare Lake Region agricultural use of groundwater is impaired due to elevated arsenic concentrations in the Tulare Lake Region, particularly in areas of the Kern basin near Bakersfield. Groundwater in the Cross Valley area is not identified as a concern for elevated concentrations of arsenic.

Dibromochloropropane

Dibromochloropropane (DBCP) has been detected in many groundwater wells in the San Joaquin River Region and the Tulare Lake Region. Municipal use of groundwater as drinking water supply is impaired due to elevated DBCP concentrations near several cities including Chowchilla, Madera, Merced, Visalia, Bakersfield, Fresno area, and scattered locations in southwest Tulare County.

Environmental Consequences

Groundwater quality in the CVC's service area could be adversely affected during protracted dry conditions. During these times it is expected that many Contractors may increase their pumping and use of groundwater.

No Action Alternative

Water quality in the rivers and groundwater of the CVCs service area under the NAA is not anticipated to change significantly from past conditions. Factors that tend to influence water quality, such as agricultural runoff, will continue similar to historic conditions. However, as shown in the PEIS, the average delivery south-of-the-Delta is projected to decline from historic conditions. This may increase reliance on groundwater to meet irrigation demands. Depending on the quality of the groundwater used, the shift to groundwater may result in application of water of a lesser quality than surface water. Continued application of this water under the NAA may influence water quality over the long term.

Alternative 1

Alternative 1 is similar to the NAA except for administrative differences and will have similar effects to groundwater as the NAA. Therefore, there are no environmental impacts of this alternative.

Alternative 2

The Groundwater Section of this report described the potential impact associated with decreases in groundwater pumping in subbasins 17, 18, and 20. This decrease in pumping should have a small, but unquantifiable, benefit to water quality as farmers switch to better-quality surface water.

Cumulative Effects

The water demands associated with the foreseeable projects will increase the demand for the limited water resources of the area. This may increase the use of poorer quality groundwater on irrigated lands. However, projects that supply additional water to the San Joaquin River as part of restoration efforts will tend to improve water quality. Implementation of this project will not influence the cumulative effects of foreseeable projects on water quality.

FISHERIES RESOURCES

Affected Environment

Reclamation formally consulted with U.S. Fish and Wildlife Service (Service) and NOAA and Biological Opinions were issued in 2001 for the LTCR for the CVCs.

Reclamation is currently developing a separate biological assessment for the Operations Criteria and Plan for the operations on the joint CVP and SWP facilities and includes the in-Delta supplies for the CVCs. A Biological Opinion is anticipated in Summer 2004 from the Service and NOAA.

The fisheries resources affected by the CVCs include the FKC, San Joaquin River, Delta, San Luis Reservoir, and California Aqueduct. The fish found in CVP waters include both native and introduced fish species based on records of the Department of Fish and Game and other sources (Table FR-1). The status of fish species in terms of the Federal Endangered Species Act (ESA) and special status for the State of California also is identified in Table FR-1. Chinook salmon and steelhead trout that migrate through the San Joaquin River to and from its tributaries are both listed under the ESA.

Table FR-1
Fish Species of Waters Associated with the Cross Valley Canal

Species	San Joaquin River (below Friant Dam)
Lamprey *Lampetra spp.*	N
White sturgeon *Acipenser transmontanus*	N
American shad *Alosa sapidissina*	I
Threadfin shad *Dorosoma petenense*	I
Chinook salmon *Oncorhynchus tshawytscha*	N, FPT
Steelhead *Oncorhynchus mykiss*	N, FT
Rainbow trout *Oncorhynchus mykiss*	N
Kokanee *Oncorhynchus nerka*	

Table FR-1
Fish Species of Waters Associated with the Cross Valley Canal

Species	San Joaquin River (below Friant Dam)
Brook trout *Salvelinus fontinalis*	I
Brown trout *Salmo trutta*	I
Carp *Cyprinus carpio*	I
Goldfish *Carassius auratus*	I
Golden shiner *Notemigonus crysoleucas*	I
Blackfish *Orthodon microlepidotus*	N
Hardhead *Mylopharodon conocephalus*	N, SC
Hitch *Lavinia exilicauda*	N
Sacramento pikeminnow *Ptychocheilus grandis*	N
Sacramento sucker *Catostomus occidentalus*	N
Channel catfish *Ictalurus punctatus*	I
White catfish *Ictalurus catus*	I
Brown bullhead *Ictalurus nebulosus*	I
Mosquitofish *Gambusia affinis*	I
Mississippi siverside *Menidia audens*	
Three spine Stickleback *Gasterosteus aculeatus*	N
Striped bass *Morone saxatilis*	
Black crappie *Pomoxis nigromaculatus*	I
White crappie *Pomoxis annularis*	I
Warmouth *Lepomis gulosis*	I
Green sunfish *Lepomis cyanellus*	I
Bluegill *Lepomis macrochirus*	I
Redear sunfish *Lepomis microlophus*	I
Largemouth bass *Micropterus salmoides*	I
Spotted bass *Micropterus punctulatus*	
Smallmouth bass *Micropterus dolomieui*	I
Sculpin *Cottus spp.*	N

Note:

N	Native	SC	State listed as Special Concern
I	Introduced	FE	Federally listed Endangered
SE	State listed as Endangered	FT	Federally listed Threatened
ST	State listed as Threatened	FPE	Federally Proposed Endangered
SCE	State Candidate Endangered	FPT	Federally Proposed Threatened
SCT	State Candidate Threatened		

Table FR-2

Listed Species with Moderate Potential to Occur in the Delta and South of Delta

Common Name	Scientific Name	Federal Status	Critical Habitat*
Central Valley spring-run Chinook salmon	*Oncorhynchus tshawytscha*	FT	No
Central Valley steelhead	*Oncorhynchus mykiss*	FT	No
Delta smelt	*Hypomesus transpacificus*	FT	Yes
Sacramento splittail	*Pogonichthys macrolepidotus*	FT	No

Note: *This designation indicates that critical habitat established for a particular species is located in one or more of the quad maps areas that are included within the CVC service area. The critical habitat may or may not exist within the CVCs service areas (i.e., the project area).

Federal: FE = listed as endangered under the federal ESA.
FT = listed as threatened under the federal ESA.
PE = proposed for federal listing as endangered under the federal ESA.
PT = proposed for federal listing as threatened under the federal ESA.

Anadromous Fish Restoration Program (AFRP)

CVPIA Section 3406(b)(1) states, "The Secretary...is authorized and directed to...develop within three years of enactment and implement a program 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..." The section also states, "this goal shall not apply to the San Joaquin River between Friant Dam and the Mendota Pool."

The Service and Reclamation approached implementing the directive to "at least double natural production of anadromous fish" by developing the AFRP. The AFRP is the cornerstone of many actions aimed at restoring natural production of anadromous fish in the Central Valley and includes partnerships, local involvement, public support, adaptive management, and flexibility.

To plan and implement a comprehensive program, the AFRP requires ongoing, intensive public involvement at two levels. The first level is programmatic, involving efforts to plan a comprehensive program. The second level is action-specific and involved implementing specific actions in individual watersheds. At the action-specific level, the AFRP worked with local agencies and local watershed workgroups.

After public review and revision, the Department of the Interior released a Revised Draft Restoration Plan for the AFRP in June 1997. The Restoration Plan presented the overall goal, objectives, and strategies of the AFRP and described how the AFRP identified and prioritized nearly 300 restoration actions and evaluations. The Restoration Plan is a programmatic-level description of the AFRP, and is used to guide implementation of all CVPIA sections. In the future, a detailed implementation plan will be completed. This plan will be an evolving document, updated over time as additional information is gathered, partnerships are formed, and actions are implemented. Water for this activity will come from willing sellers. No new water

will be allocated from the CVP.

Fish Species or Communities Included

Fish in the canal may include the non-anadromous fish species found in the mainstream of the San Joaquin River downstream of Friant Dam. The fish found in the mainstream of the San Joaquin River downstream of Friant Dam include native and introduced non-anadromous fish as well as anadromous fish. As identified above, two of the anadromous salmonid species that migrate through the San Joaquin River are listed under the ESA.

In order to characterize the life histories and habitat use of the fish found in the waters associated with the project, we have selected target species to represent the fish community. The target species for the San Joaquin River include ESA-listed salmonids, recreational species, and native minnows. Below Friant Dam, Chinook salmon, steelhead trout, Sacramento pikeminnow, and largemouth bass were selected to represent the requirements of fishes in the mainstream San Joaquin River.

Life History of San Joaquin River Fishes Below Friant Dam

Life History of Chinook Salmon

Adult Chinook salmon migrate up the San Joaquin River from the Delta to gain access to spawning and rearing areas in the Stanislaus, Tuolumne and Merced Rivers. These rivers provide the cold, freshwater sites with suitable gravel required for successful reproduction. Female Chinook salmon deposit their eggs in redds, or nests, which they excavate in gravel areas of relatively swift water. The eggs are fertilized by one or more males. Fecundity varies among different populations and with body size. All adult Chinook salmon die after spawning. Females generally prefer gravel ranging from 1 to 6 inches in diameter, depths exceeding 0.5 foot, and water velocities ranging from 1.5 to 2.5 feet per second (Vogel and Marine 1991). There is currently no spawning in the San Joaquin River by Chinook Salmon.

Incubation time is inversely related to water temperature. Eggs generally hatch in approximately six to nine weeks, and newly emerged fry remain in the gravel for another two to four weeks until the yolk is absorbed. Maximum survival of incubating eggs and larvae occurs at water temperatures between 41 and 56 degrees Fahrenheit. Incubation occurs only in the tributaries.

After emerging, Chinook salmon fry begin to feed and grow in the stream environment. Chinook salmon fry tend to seek shallow, near shore habitat with low water velocities and move to progressively deeper, faster water as they grow. In streams, Chinook salmon fry feed mainly on drifting terrestrial and aquatic insects, but zooplankton become more important in the lower river reaches and estuaries. Juveniles typically rear in freshwater for two to three months before migrating to sea. The San Joaquin River is used as a migration corridor for downstream moving fry and smolts and may be used for rearing as well.

Chinook salmon in the Central Valley appear to exhibit stream-type (spring run) and ocean-type

(fall-run) behavior (Healy 1991). An ocean-type life history pattern is characterized as having juveniles that migrate seaward as smolts in their first year of life and an adult stage that spawns shortly after entering freshwater. Juvenile Chinook salmon typically spend two to three months in freshwater before emigrating as smolts; this is the dominant pattern. Stream-type behavior is indicative of Chinook salmon that remain in freshwater for at least one year prior to emigrating as smolts and an adult stage that has a substantial residency time prior to becoming sexually ripe and spawning. Fall run Chinook is the only run of salmon remaining in the San Joaquin Basin.

During the smolting process, juvenile Chinook salmon undergo physiological, morphological, and behavioral changes that stimulate emigration and prepare them for ocean life. Chinook salmon spend two to four years maturing in the ocean before returning to their natal streams to spawn. Most Chinook salmon mature at two (primarily males) and three years of age, while a smaller proportion matures at four.

Fall-Run Chinook Salmon

Adult fall-run Chinook salmon migrate through the Sacramento-San Joaquin River Delta and into Central Valley rivers from July through December and spawn from October through December. Peak spawning usually takes place in October and November. Egg incubation begins in October and can extend into March, but in some years could occur as late as mid-May.

Chinook salmon fry (juveniles less than 2 inches long) generally emerge from December through March, with peak emergence by the end of January. Generally, fry emigrate from December through March and smolt from April through June, and a small proportion of the population emigrates as yearlings from October through December.

Two principal movements of juvenile fall-run Chinook salmon out of the tributaries have been identified. Fry begin leaving the tributaries in January, with peak abundance occurring in February and March. In general, fry movement increases in concert with high winter flows. A later emigration of smolts takes place from April through June. It is unknown if fry rear in the estuary and emigrate as smolts during the normal smolt emigration period. Smolts arriving in the estuary from upstream rearing areas migrate quickly through the Delta and Suisun and San Pablo bays.

Factors Affecting Abundance

The following discussion highlights those factors that have been specifically identified as having important effects on Chinook salmon abundance in the San Joaquin River Basin and that can be altered by changes in project operations. Only life history stages using the mainstream San Joaquin River would be affected including adult upstream migration, rearing and juvenile migration.

Upstream Migration

Flows in the San Joaquin River have been inadequate during fall, resulting in delaying the

upstream migration past Stockton or the straying of adult salmon into agricultural drainage ditches, primarily Mud and Salt sloughs. Barriers (electrical and physical) were installed across the San Joaquin River upstream of the Merced River confluence in 1992 to prevent salmon migration into these sloughs and help guide them into the Merced River.

Water Temperature. Chinook salmon migrated into the lower San Joaquin River as water temperatures declined from 72 to 66 degrees Fahrenheit (Hallock et. al. 1970).

Water Quality. Low dissolved oxygen levels (less than 5 parts per million) and high water temperatures (greater than 66 degrees Fahrenheit) in the San Joaquin River near Stockton delayed or blocked the migration of adult Chinook salmon during the 1960s (Hallock et al. 1970). Since 1964, fall migration problems have been reduced by improved wastewater treatment and installation of a physical barrier at the head of Old River in dry years to direct most of the San Joaquin flows down the main channel past Stockton. Despite these efforts, low dissolved oxygen levels recurred during recent drought conditions. Proposed remedial measures include increasing tributary outflow, evaluating and monitoring dredging activity in the Delta, and further evaluating the fall barrier at Old River (San Joaquin River Management Council 1992).

Juvenile Rearing

Flow. Streamflow has been identified as the primary factor affecting abundance of Chinook salmon stocks in the San Joaquin River Basin. Streamflow reductions after April and May in the Merced and Tuolumne rivers result in poor survival conditions for Chinook salmon juveniles that remain in these tributaries beyond these months. High mortality generally results from reduced living space, high water temperatures, and increased predation. Current interim instream flow requirements in the Stanislaus River provide adequate flow conditions through the Chinook salmon rearing period (CDFG 1987).

Water Temperature. Generally, water temperatures below major dams on the San Joaquin River tributaries become unsuitable for Chinook salmon rearing in May or June, causing high mortality of juvenile Chinook salmon that have not yet emigrated. In the Stanislaus River, however, releases of cold hypolimnetic water from New Melones Reservoir have improved water temperatures during the late spring rearing period relative to pre-impoundment conditions (Reclamation 1986; 1986b).

Water Quality. Selenium in agricultural drainage water poses a potential risk to juvenile Chinook salmon in the San Joaquin River. Selenium is directly toxic to fish at elevated levels in the water column and through bioaccumulation in body tissues. Growth and survival of juvenile Chinook salmon are adversely affected by exposure to dissolved and dietary selenium, but harmful levels have not been detected in the major rearing areas of the San Joaquin River (CDFG 1987b).

Juvenile Emigration

Flow. Spring flows in the San Joaquin River and major tributaries during the Chinook salmon

emigration period appear to have a major influence on the number of adults returning to the San Joaquin River Basin. Positive correlations exist between spring flows in the San Joaquin River and total Chinook salmon spawning escapement 2.5 years later. Greater inflow has been required to maintain Chinook salmon escapement after the operation of the SWP. Similar relationships for San Joaquin River tributary stocks indicate that the flow required to maintain a given spawning escapement level increased following operation of the CVP and SWP. Over time, increases in the significance of other mortality factors, such as increased Delta exports, have diminished the positive effects of incremental increases in spring flows (DFG 1987; 1987b).

Smolts migrating down the San Joaquin River and through the southern Delta frequently encounter low flows, high temperatures, and high diversion rates. Currently proposed spring outflow recommendations for the Merced, Tuolumne, and Stanislaus rivers are designed to improve survival of juvenile salmon migrating down the tributaries, the mainstream San Joaquin River, and through the Delta. Recent evaluations have focused on the effectiveness of releasing short-duration, high-amplitude flows (i.e., pulsed flows) from tributary streams in conjunction with reduced Delta exports.

Water Temperature. Declining streamflow during the spring emigration period of fall-run Chinook salmon coincides with rising air temperatures and increased agricultural return flows to the San Joaquin River, often resulting in deleterious water temperatures along much of the emigration route in the lower San Joaquin River. In May, water temperatures in the San Joaquin River near Vernalis often reach high chronic stress levels (greater than 67.6 degrees Fahrenheit) at flows of 5,000 cubic feet per second or less. Under these conditions, up to half the production of San Joaquin River Chinook salmon can be subjected to harmful water temperatures (CDFG 1987)

Life History of Steelhead Trout

Life history aspects of the few steelhead in the San Joaquin River system are likely similar to those described below for the Sacramento River system. Although remaining steelhead use the mainstream San Joaquin River as a migration corridor there is very little known about present steelhead use of the San Joaquin River. Upstream spawning migration runs in the Mokelumne River extend from September through January (CDFG 1991).

Steelhead are generally classified into two races, depending on whether they begin their upstream migration in winter or summer. Historically, only winter steelhead trout were native to the Sacramento River Basin. However, summer steelhead have been introduced into the basin, along with strains of winter steelhead from the Eel, the Mad, the Rogue (Oregon) and the Washougal (Washington) river basins. Because of these introduced individuals, the genetic composition of the native steelhead trout could have been modified.

It is possible that adult steelhead can be found in freshwater during every month of the year due to the influence of introduced genetic strains, modified and unnatural flow and/or temperature regimes throughout the basin.

Upstream Migration

Upstream migration occurs generally from July through February, depending on prevailing flow and temperature conditions. On the Sacramento River tributaries, relatively early attraction of steelhead trout can be triggered by occasional reservoir releases of cold water and natural high-water conditions. The upstream migration run can consist of both sexually mature adults and immature individuals who have spent only a few months at sea.

The smaller steelhead, sometimes called fall steelhead, begin entering the river in July, peak in November, spawn primarily in late December and January, and complete spawning by mid-February. The larger winter steelhead migrate upstream during mid-December through February, spawn in late January through early March, and complete spawning by April 1. Steelhead stocks in the Sacramento River appear to respond to environmental conditions to a greater degree than do pure native stocks.

While adult steelhead are in freshwater, they rarely eat and consequently grow very little (Pauley et al. 1986).

Spawning

There has not been any recent documented steelhead spawning in the mainstream of the San Joaquin River.

Juvenile Rearing

Unlike Chinook salmon, steelhead rear year round in the tributary streams. There is no steelhead rearing in the mainstream San Joaquin River.

Juvenile Emigration

With most stocks of steelhead, juveniles emigrate downstream to the ocean in November through May (Schaffter 1980); however, most Sacramento River steelhead migrate in spring and early summer (Flosi et. al. 1998). Sacramento River steelhead generally migrate as one-year-olds at a length of 6 to 8 inches (Barnhart 1986; Reynolds 1993). Emigration rates are influenced by water temperatures and current velocities. Although some steelhead have been collected in most months at the state and federal pumping plants in the Delta, the peak numbers salvaged at these facilities have been primarily in March and April in most years.

Factors affecting steelhead trout abundance in the San Joaquin River Basin are similar to those described in detail for San Joaquin River fall-run Chinook salmon. The primary factors limiting abundance and distribution are dams, water diversions, poor water quality, and riparian impacts. Low summer flows and concurrent high water temperatures preclude the necessary year-round rearing habitat for steelhead trout below the impassable dams (Friant, Crocker Huffman, LaGrange, Goodwin, and Camanche) on the mainstream San Joaquin River and its major tributaries.

Life History of Sacramento Pikeminnow

The Sacramento pikeminnow (formerly Sacramento squawfish) is common in the larger intermittent and permanent streams of the Sierra Nevada foothills and valley floor. While pikeminnow do best in undisturbed streams, they are still found in the San Joaquin River below Friant Dam. Pikeminnow spend much of their time in deep, well-shaded pools of clear streams. They do not do well in disturbed environments inhabited by abundant introduced species.

Pikeminnow are predatory fishes, and prior to the introduction of other large pisciverous species, were undoubtedly at the top of the aquatic food chain in the Central Valley and surrounding foothills. Pikeminnow feed throughout the water column on a variety of prey. Prey item selection is dependent on availability, season and other species present. Pikeminnow will exploit potential prey not being utilized by other competing species. Typically, pikeminnow less than 7 inches will feed on aquatic insects, while pikeminnow greater than 7 inches will feed on other smaller fish.

Adult pikeminnow are rather sedentary in habit; they are found in the same habitat for much of their life. There they spend much of their time under submerged rocks or logs, where they ambush their prey. At dusk they will come out and actively forage for food. Juveniles swim about in schools in shallow water of large stream pools or reservoirs.

Growth in Sacramento pikeminnow varies by season and habitat. Pikeminnow grow fastest from the time they hatched from their eggs in May until the stream flows recede in July. Some growth takes place again during the winter months when stream flows increase, though colder temperatures probably keep the fish from growing as fast as they do in the early summer months. Fish in larger permanent streams also grow faster than in small intermittent streams.

Sacramento pikeminnow are sexually mature by the third or fourth summer at approximately 8 inches. Ripe fish migrate upstream in April and May to spawn in gravel riffles when temperatures exceed 57 degrees Fahrenheit. In reservoirs they may spawn in gravel areas close to shore.

Spawning

Spawning behavior is probably similar to that of the northern pikeminnow. During spawning, large numbers of pikeminnow congregate over a gravel substrate where a single female may be pursued by up to six males. Spawning takes place when the female dips close to the bottom and releases a small number of eggs, which are simultaneously fertilized by one or more males that are in her company. The fertilized eggs continue to sink where they adhere to the bottom.

Egg Incubation and Emergence

In northern pikeminnow, the eggs hatch in four to seven days at 64 degrees Fahrenheit. In another seven days the fry then begin schooling in the shallows.

Factors Affecting Abundance

Introduced Species

Introduced species are perhaps the greatest threat to native cyprinids in the Central Valley. Predation from large piscivorous fishes, such as largemouth bass have reduced the abundance (or extirpated) of many native cyprinid species.

Flow

Receding water levels can expose eggs to desiccation. Reduced flows may also limit the available habitat. Deep pools may become too shallow and no longer suitable to pikeminnow.

Temperature

Temperatures outside the preferred life history ranges will have an adverse affect on the pikeminnow population. Unseasonal temperatures below the preferred range may stunt growth or delay spawning or hatching.

Life History of Largemouth Bass

Largemouth bass were first introduced into California in 1874 and have since spread to most suitable waters. They are abundant in reservoirs and river backwaters throughout the Central Valley and are normally found in warm, quiet waters with low turbidity and beds of aquatic plants. Largemouth bass provide an important sport fishery component of the Central Valley reservoirs and are one of the most sought after warm-water game fish in California. Largemouth bass are extremely vulnerable to angling, and at least half the population of legal-size fish is caught annually in many reservoir. Overtime, the catch rate declines and the fish caught are smaller on the average. Reservoir aging reduces cover and forage fish, which reduces largemouth bass populations (Von Geldern 1974).

Largemouth bass spawn for the first time during their second or third spring. Spawning activity usually begins in April, when water temperature reaches 61 degrees Fahrenheit, but could continue through June. Males build nests in sand, gravel, or debris-littered bottoms at a depth of 3 to 6 feet. Receding water levels can strand nests and expose them to desiccation. The eggs adhere to the substrate and hatch in two to five days. The sac fry usually spend five to eight days in or around the nest.

For the first month or two, fry remain in the shallows and feed mainly on rotifers and small crustaceans. By the time they are 2 to 3 inches long, they feed primarily on aquatic insects and fish fry. After reaching a length of 4 inches, largemouth bass feed primarily on fish and large aquatic invertebrates. Juvenile bass smaller than 4 inches rely on cover in shallow water to escape predation. Optimal temperatures for growth are 68 to 86°F. Bass may grow to 15-inches by the fourth or fifth year.

Food availability for largemouth bass may be affected by competition and by the amount of cover available to prey. Competition effects are likely to be most severe for young-of-the-year bass because they feed on zooplankton and other small invertebrates favored by many other fishes. In reservoirs such as Millerton Lake, competition with threadfin shad can depress the growth and survival of young bass, by reducing invertebrate populations used as food (Goodson 1965).

Largemouth bass are extremely vulnerable to angling, and at least half the population of legal-size fish is caught annually in many reservoirs. Over time, the catch rate declines and the fish caught are smaller on the average. Competition between young bass and other plankton feeding fish, primarily threadfin shad, also reduces largemouth bass populations.

Factors Affecting Abundance

Flow

Receding water levels during incubation can expose some eggs to desiccation. Reduced flows may also limit the available habitat and cover.

Temperature

Temperatures outside the preferred life history ranges will have an adverse affect on the largemouth population. Unseasonal temperatures below the preferred range may stunt growth or delay spawning or hatching.

Environmental Consequences

Potential environmental consequences of the project included changes to surface water storage and flows because of changes to the amount of CVP water purchased. For fishery issues, these equate to changes in the amount of water moving through the Cross Valley Canal, changes in surface water storage in Millerton Lake or changes in streamflows in the San Joaquin River. These potential effects are discussed below.

The level of significance for fisheries impacts is defined as a change in surface storage, or river flow of a magnitude that would have a substantial adverse effect on fish habitat during a critical life history phase.

No Action Alternative

Water use is expected to continue as it has using both CVP surface water supplies and groundwater. Groundwater has typically been more important during dry years when CVP water is less available. The surface water resources of the Delta under the NAA are discussed in the Preferred Alternative of the PEIS.

Alternative 1

Alternative 1 is similar to the NAA. Therefore, there are no impacts to fishery resources under this alternative.

Alternative 2

The analysis of the blended water pricing structure indicates that in some periods, contractors will purchase less CVP water and rely more on groundwater (CH2M Hill 2000). The largest shift would occur in a wet year following five dry years. According to the economic analysis in the PEIS, this situation would result in a reduction of surface water use of approximately 113,100 acre-feet for one subunit from Millerton Lake. This water would remain in Millerton Lake until purchased by CVP Contractors.

Water not purchased would most likely be picked up by other users. The timing for distribution of this water is speculative and depends on many factors. It could result in different timing in the movement of water in the Cross Valley Canal.

Cumulative Effects

Alternatives 1 and 2 have little or no change in surface water associated with them and therefore, they essentially do not contribute to the cumulative effect.

Restoration actions in the Delta may improve conditions for fish. Therefore water resources of the Delta are discussed in the PEIS.

LAND USE RESOURCES

Affected Environment

The service areas of the eight CVCs are located along the eastern edge of the southern San Joaquin Valley, stretching from Fresno County on the north to Bakersfield on the south (Figure PN-1). Contracted maximum CVP water deliveries of 128,300 af (see Section 1, Table PN-1) are conveyed from the Delta via the California Aqueduct to the Cross Valley Canal where is it typically delivered to an exchanger with an alternate source of surface water. The alternate source of surface water has historically been CVP water from Friant and has been delivered to over 190,000 acres of irrigated farmland within the service areas of the eight CVCs and their subcontractors (Table LU-1). Water deliveries are used primarily for irrigation, but a small amount of water is used for M&I purposes.

In addition to the eight CVCs receiving irrigation deliveries under Cross Valley water service contracts, Atwell Island Water District, Alpaugh Irrigation District, and the eight other subcontractors receive irrigation deliveries under subcontracts with the County of Tulare. In terms of acreage, the districts range in size from approximately 1,800 to 90,000 acres, with

almost 800 farming entities averaging 246 acres each (Table LU-1). The actual number of landowners is much higher than the number of farming entities because many farming entities farm leased lands in addition to owned land.

Table LU-1
Listing of Irrigated Acreage and Farm Size for the Cross Valley Contractors

Contractor	Approx. No. of Farming Entities	Agriculture Acreage (acres) [a]	Average Operating Farm Size(acres)
County of Tulare (subcontractors)			
Alpaugh Irrigation District	190	7,243 [b]	32
Atwell Island Water District	58	4,450 [b,c]	75
City of Visalia	0	0	0
Styrotek, Inc.	0	0	0
City of Lindsay	0	0	0
Hills Valley Irrigation District		(see below)	
Smallwood Vineyards	--	155	--
Saucelito Irrigation District	--	19,456 [f]	--
Stone Corral Irrigation District	--	6,395 [f]	--
Strathmore PUD	0	0	0
County of Fresno	0	0	0
Hills Valley Irrigation District	25	2,323 [d]	92
Kern-Tulare Water District	31	16,321 [b,e]	652
Lower Tule River Irrigation District	259	93,885 [f]	347
Pixley Irrigation District	118	60,629 [b]	527
Rag Gulch Water District	13	36,431 [b,e]	395
Tri-Valley Water District	87	1,863 [d]	21
Total	781	209,129	246 (average)

Source: Friant Water Users Authority 1998; David Scroggs, 1999; 2004

Note: a Based on district boundaries and includes irrigated and non-irrigated lands.
b 1993 Tulare County data
c 1996 Kings County data
d 1994 Fresno County data
e 1990 Kern County data
f 1999 Tulare County data
-- No data

The Friant Division delivers water to the CVCs via exchanges in addition to the Friant Division contractors. The service area of the CVC's contracts cover a major portion of three counties (Fresno, Tulare, and Kern). The three California counties account for $8.27 billion in gross agricultural production, or over 30 percent of California's total production (Table LU-2). The leading agricultural commodities in the counties served by the CVCs are grapes, milk, cotton, almonds, and citrus, which accounted for nearly $4 billion in gross agricultural production in 1998. The leading crops in terms of acreage in the CVCs service areas are alfalfa, corn, cotton, wheat, orchards, and vineyards.

Table LU-2
Ranking of Cross Valley Contractor Counties by Total Value of Agricultural Production

1998 CA Rank	County	1998 Production ($1,000)	% of Total CA Value	Cumulative Percentage	Leading Crops
1	Fresno	3,286,806	12.0	12.2	Grapes, poultry, cotton, tomatoes, milk
2	Kern	2,067,678	8.5	30.7	Grapes, citrus, almonds, cotton, milk
3	Tulare	2,922,057	8.3	23.0	Milk, oranges, grapes, cattle & calves, alfalfa

Source: USDA 1999

In 1996, approximately 50 different crops, totaling over 182,000 acres, were produced within the CVCs service area. These various crops are summarized using the 22 categories developed by Reclamation as part of its Water Needs Analysis for LTCR negotiations with CVP contractors (Table LU-3). Each crop group name represents crops with similar seasonal crop water requirements. Crop acreages for 1996 are being used by Reclamation as representative of existing conditions in its Water Needs Analysis. Yearly total irrigated acreages vary depending on fallowing and double cropping.

Table LU-3
Cross Valley Contractors – 1996 Crop Acreages [a]

Reclamation Crop Group Name	Acres
Alfalfa	35,040
Almonds	4,455
Barley	1,660
Beans (dry)	502
Corn (field)	34,393
Cotton	32,182
Deciduous Orchard	5,177
Grains	5,621
Melons	516
Miscellaneous Truck/Field Crops (high)	158
Miscellaneous Truck/Field Crops (low)	828
Miscellaneous Truck/Field Crops (medium)	2,077

Table LU-3
Cross Valley Contractors – 1996 Crop Acreages [a]

Reclamation Crop Group Name	Acres
Pasture (improved)	2,696
Subtropical Orchard	15,453
Sugar Beets	931
Vineyard	15,379
Wheat	25,120
Total	**182,188**

Source: Reclamation 2000b

Note: **a** The crop acreage numbers include 1995 data for Rancho Terra Bella. Tri-Valley Water District is exempt from reporting crop water needs. No 1996 data was available for County of Fresno and Tulare.

Water for communities and other M&I users in the CVCs service area comes almost entirely from pumping of groundwater. The quality of the groundwater, for the most part, does not require treatment prior to use. There are no major population centers in the CVC service area. The only significant use of Cross Valley CVP water for M&I purposes is by the Strathmore Public Utility District (PUD), City of Lindsay, and County of Fresno. The PUD is under subcontract with Tulare County and supplies the only source of water for the City of Strathmore. The City of Lindsay receives 2,500 af of Friant Class 1 water as a Friant contractor and 50 af as a Tulare County subcontractor. The City of Visalia receives 300 af as a Tulare County subcontractor for golf course irrigations. Styrotek, Inc. receives 45 af for the manufacturing of shipping containers. Fresno County water is used for delivery to homes, the golf course and landscape irrigation at the Brighton Crest development near Millerton Lake.

Conversion of Agricultural Land to Alternative Uses

The conversion of agricultural land to alternate uses is not a significant issue for the CVCs because of the lack of major population centers in their service areas. Exceptions are the cities of Fresno, Tulare, Visalia and Delano that have experiences rates of growth similar to the rest of the State of California. Homeowners are drawn to the San Joaquin Valley due to the relatively affordable housing compared to other areas. The growth trends in California are a major issue for the San Joaquin Valley and its agricultural-based economy. The California Water Plan Update, Bulletin 160-98, predicts that over 130,000 acres of irrigated crop acreage will come out of production between 1995 and 2020. Although retirement or conversion of agricultural land on the west side of the valley from irrigated crop production to dryland farming or wildlife habitat will account for a significant portion of this acreage, conversion of agricultural lands to urban uses will account for much of the predicted 130,000 acre decrease. During the period 1992 to 1997, of the counties receiving CVC irrigation water deliveries, only Fresno County showed increases in the amount of lands in farms and in the average size of farms (Table LU-4).

Table LU-4
Agricultural Land Trends 1992-1997

	Land in Farms (acres)			Average Size of Farms (acres)		
County	**1992**	**1997**	**% Change**	**1992**	**1997**	**% Change**
Fresno	1,774,664	1,881,418	12.2	253	285	+13
Tulare	1,354,262	1,309,525	-3	248	240	-3
Kern	NA	NA		NA	NA	

Source:USDA 1997
Note: NA Not Available

Historically, agricultural lands receiving CVP water that are converted to urban uses have not continued to use CVP water. The land use change generally results in a change in water supply, from agricultural to a urban community water system. Groundwater is generally preferred for a community water system. The CVP water is generally reallocated to other agricultural lands in the district or used to recharge groundwater.

Environmental Consequences

Growth-Inducement Impacts

Under NEPA, the potential for growth-inducing impacts as indirect effects of a project are to be considered. A project will not cause an indirect effect unless the effect would not occur "but for" the project. The growth-induced impact evaluation is based on whether implementation of Alternative 1 or 2 in the Cross Valley service area would result in increased growth, and the presumed growth and impact to protected species is reasonably certain to occur. Based on the following factors, the implementation of Alternative 1 or 2 as compared to the NAA would not result in growth-inducing impacts in the Cross Valley service area.

- The purpose of this project is to renew water service contracts, consistent with the provisions of the CVPIA. This would continue beneficial use of water developed and managed as part of the CVP, with a reasonable balance among competing demands, including the needs of irrigation and domestic uses; fish and wildlife protection, restoration, and mitigation; fish and wildlife enhancement; power generation; recreation; and other water uses, consistent with requirements imposed by the State Board and the CVPIA.

- The LTCRs do not include an increase in the total contract volumes and will be limited by the existing CVP contract. Because there is no new water, the contract does not induce greater economic development or growth in the Study Area.

- The LTCRs do not involve construction, enlargement, or alteration of the facilities in the Study Area. The construction of new CVP facilities or enlargement of existing conveyance systems are not included in the LTCRs to induce growth.

- Considering the decreased availability of CVP water to contractors and the predicted fallowing of agricultural lands, it is not likely that the Contractors will be converting native lands to agricultural lands as a result of the proposed actions.

The following assumptions were used in the impact analysis:

- Contracts will be renewed under all alternatives.
- No new expansion of CVP deliveries or place of use will occur during the contract period of 25 years.
- No new farmland will be brought into production during the contract period of 25 years.
- No additional land retirement beyond that assumed in the CVPIA PEIS.

The primary factors that will impact land use are the availability and price of water. Water supply availability and pricing mechanisms of the alternatives are discussed in Section 2, Description of Alternatives.

Alternatives Impact Analysis

The technical memorandum "Economic Analysis of November 1999 Tiered Pricing Proposal for PEIS Alternative" (CH2M Hill 2000) updated the economic analysis presented in the PEIS using 1999 water rates and Reclamation's November 1999 Tiered Pricing Proposal (Category 1 and 2 water).

The analysis presented in the memorandum applied the new water rates and the November 1999 proposal to the Preferred Alternative and compared the results to the impact analysis of the PEIS Preferred Alternative. The PEIS Preferred Alternative is this EA's NAA; and for the land use impact analysis, the impacts of Alternative 1 are assumed to be the same as the NAA since water supply and pricing are the same in each, and the only differences in the alternatives are administrative.

The application of the 1999 water rates and Reclamation's tiered pricing proposal to the PEIS Preferred Alternative represents Alternative 2 in this EA. Therefore, the analysis presented in the technical memorandum represents a comparison of Alternative 2 with the NAA.

Agricultural Land Use

The agricultural land use and economic analysis in the technical memorandum assumed that contractors blend the price of all CVP water received at tiered prices into a single rate. Tiered rates to growers are assumed in the PEIS.

The modeling and underlying data were the same as used in the PEIS. Groundwater hydrology was not assessed as it was in the PEIS alternatives. Therefore, for purposes of analysis, most regions were assumed to have access to replacement groundwater if needed, including the CVCs service area.

The economic analysis and data presented in the technical memorandum were derived from the CVPM which was used in the PEIS. This model breaks crop production down into regions and subregions. The CVCs service area is contained within the Tulare Lake Region. At the subregion level, the CVC's service area is contained in subregions 17, 18, and 20, but does not account for all of the acreage included in the CVPM for these subregions. The CVPM also includes non-CVP lands in its analysis. The CVC's service area lands represent approximately 18 percent of the land included in the three subregions and therefore the irrigated acres in the Affected Environment will not match the irrigated acreage used in this impact analysis. However, for this analysis, the impacts generated by the CVPM for subregions 17, 18 and 20 will be considered the same as the impacts to the CVC's service area.

No Action Alternative

The NAA serves as a basis to measure impacts of the other alternatives. The NAA and Alternative 1 irrigated acreage numbers are assumed to be the same as those shown in the table for the PEIS Preferred Alternative.

Table LU-5 summarizes the estimated irrigated acres by subregion for the NAA and Alternative 1. The estimated number of irrigated acres in the three subregions for an average water year is 1,055,500 acres. In a wet year the total irrigated acres of the three subregions only increases by an estimated 2,800 acres or approximately 0.3 percent. In a dry year the irrigated acreage within the three subregions is estimated to decrease by an estimated 23,600 acres, or approximately 2.2 percent.

Table LU-5
Irrigated Acreage, No Action Alternative

Subregion	Average Year	Wet Year	Dry Year
17	260.1	260.3	255.3
18	592.5	594.9	577.2
20	202.5	203.0	199.3
Total	1,055.4	1,058.2	1,031.8

Source: CH2M HILL 2000
Note: All acreage values in thousands af.

These changes are relatively small because of the high percentage of land in the subregions planted in permanent crops and the availability of groundwater as a replacement for decreased

CVP supplies. The subregion which shows the greatest decrease in acres in a dry year is subregion 18. This is due to the large amount of cotton grown in the subregion and the fact that the CVPM attributes acreage reduction in dry years primarily to cotton and other row crops, such as alfalfa.

Alternative 1

As previously stated, for this analysis, the NAA and Alternative 1 have the same environmental consequences because of their similarities and the fact that the only differences are administrative between the parties to the contracts.

Alternative 2

Alternative 2 includes tiered water prices based on the November 1999 proposal to the Preferred Alternative (Category 1 and 2) and 1999 water rates. The impacts to irrigated acreage within the three subregions are detailed in the CH2M Hill technical memorandum and are summarized in Table LU-6 (CH2M Hill 2000). The table shows the comparison of average, wet, and dry NAA irrigated acreage to the Alternate 2 acreages estimated to be irrigated in average, wet, and dry years following a series of average, wet, and dry years (5-year average-Category 1 water). The number of acres shown in Table LU-6 includes all of the land in the subregions (CVP and non-CVP) and is assumed to represent the impacts to the CVC's service area.

Table LU-6
Irrigated Acreage Alternative 2

		Changes compared to Average NAA				Changes compared to Wet NAA				Changes compared to Dry NAA		
		Avg	Wet	Dry		Avg	Wet	Dry		Avg	Wet	Dry
Subregion	NAA Avg	Followed by Average			NAA Wet	Followed by Wet			NAA Dry	Followed by Dry		
17	260.1	0.0	0.0	0.0	260.3	0.0	0.0	0.0	255.3	0.0	0.0	0.0
18	592.5	0.0	0.0	-0.1	594.9	-1.2	-1.2	-1.2	577.2	0.1	0.1	0.1
20	202.8	0.0	0.0	0.0	203.0	0.0	0.0	0.0	199.3	0.0	0.0	0.0
Total	1,055.4	0.0	0.0	-0.1	1,058.2	-1.2	-1.2	-1.2	1,031.8	0.1	0.1	0.1

Source: CH2M Hill 2000
Note: All values in thousands af.

In all average years under Alternative 2 there is virtually no change in irrigated acreage as compared to the NAA average year. For all dry years under Alternative 2 there is virtually no change in irrigated acreage as compared to the NAA dry year. In wet years under Alternative 2 there are reductions in irrigated acres of 1,200 acres (0.1 percent) as compared to the NAA wet year. This reduction occurs in subregion 18 and is comprised of reductions in cotton, alfalfa, and

other field crop acreage.

Cumulative Effects

The implementation of any of the three alternatives along with any other foreseeable actions would have little or no impact on agricultural and M&I land use in the CVCs service area. Therefore, the implementation of any of the three alternatives with other foreseeable actions would not result in any addition to the cumulative impacts that would substantially alter historical agricultural or M&I land use.

BIOLOGICAL RESOURCES

Affected Environment

The CVC's service areas cover an extensive area in the San Joaquin Valley including parts of Fresno, Tulare, and Kern Counties, and a very small portion in southeastern Kings County (Atwell Island Water District). The following sections discuss the vegetation and wildlife resources that may be affected by the project. Appendix A presents a list of federal and California special-status species that are known to inhabit these counties.

Cross Valley Canal

The Cross Valley Canal right-of-way is not considered desirable habitat due to routine maintenance, traffic, and weed and pest control. The concrete lined canal does not allow vegetation to become established within the canal. Therefore, the continued operation of the Cross Valley Canal will not result in any significant biological impacts.

Contract Service Area

Major land use within the CVCs service area includes natural or native habitats (44,411 acres), agriculture (249,151 acres), and urban areas (6,112 acres) (Table BR-1). Major natural areas include grasslands (native and nonnative), oak woodlands, riparian areas, and freshwater aquatic communities (seasonal wetlands, vernal pools, and ponds) (Holland 1986; Mayer and Laudenslayer 1988; Holland and Keil 1989; 1989; Hickman 1993; Harvey 1995). Tables BR-2 and BR-3 lists those special-status species most likely to occur within the CVCs service area. Agricultural areas include row crops, vineyards, orchards, grains, cotton, pastures, and dairies.

Table BR-1
Summary of CVP Cross Valley Contractor Land Use or Habitat Types

Contractor	Habitat Type (acres) Agriculture[a]	Natural or Native[b]	Urban
County of Tulare			
Alpaugh ID[c]	7,243	3,346	96
Atwell Island WD[c,d]	4,450	2,687	0

Table BR-1
Summary of CVP Cross Valley Contractor Land Use or Habitat Types

Contractor	Habitat Type (acres) Agriculture[a]	Natural or Native[b]	Urban
City of Lindsay	0	--	--
City of Visalia	0	--	--
Hills Valley ID		(see below)	
Smallwood Vineyards	155	--	--
Saucelito ID[g]	19,456	184	97
Stone Corral ID[g]	6,395	480	10
Strathmore PUD	0	--	--
Styrotek, Inc.	0	--	--
Hills Valley ID[e]	2,323	910	40
Kern-Tulare WD[c,f]	16,321	9,078	106
Lower Tule River ID[g]	93,885	77,988	1,240
Pixley ID[c]	60,629	11,583	1,302
Rag Gulch WD[c,f]	36,431	5,879	3,214
Tri-Valley WD[e]	1,863	2,476	114
County of Fresno	0	--	--
Total	249,151	44,411	6,112

Source: David Scroggs, DWR pers. comm. 1999
Note:
a Includes irrigated and non-irrigated lands
b Includes wetland and riparian habitats
c 1993 Tulare County data
d 1996 Kings County data
e 1994 Fresno County data
f 1990 Kern County data
g 1999 Tulare County data
-- data not available

Table BR-2
Special Status Species Observed or Expected in the Cross Valley Contractor Service Area

Common Name	Scientific Name	Federal Status	State Status
Plants			
Hoover's Woolly-star	*Eriastrum hooveri*	T	None
Bakersfield Cactus	*Opuntia basilaris var. treleasei*	E	E
San Joaquin Woollythreads	*Lembertia congdonii*	E	None
California Jewelflower	*Caulanthus californicus*	E	E
Kern Mallow	*Eremalche kernensis*	E	None
Hairy Orcutt Grass	*Orcuttia pilosa*	E	E
Hoover's Spurge	*Chamaesyce hooveri*	T	None
Invertebrates			
Vernal Pool Fairy Shrimp	*Branchinecta lynchi*	E	None
Vernal Pool Tadpole Shrimp	*Lepidurus packardi*	E	None
Valley Longhorn Elderberry Beetle	*Desmocerus californicus dimorphus*	T	None

Table BR-2
Special Status Species Observed or Expected in the
Cross Valley Contractor Service Area

Common Name	Scientific Name	Federal Status	State Status
Threatened or Endangered Animals			
Blunt-nosed Leopard Lizard	*Gambelia silus*	E	E
Swainson's Hawk	*Buteo swainsoni*	None	T
American Peregrine Falcon	*Falco peregrinus anatum*	Delisted	E
Least Bell's Vireo	*Vireo bellii pusillus*	E	E
Fresno Kangaroo Rat	*Dipodomys nitratoides exilis*	E	E
Tipton Kangaroo Rat	*Dipodomys nitratoides nitratoides*	E	E
San Joaquin Kit Fox	*Vulpes macrotis mutica*	E	T
Species of Concern			
California Tiger Salamander	*Ambystoma californiense*	FC	SC
Western Spadefoot	*Scaphiopus hammondi*	None	SC
Western Pond Turtle	*Clemmys marmorata*	None	SC
California Horned Lizard	*Phrynosoma coronatum frontale*	None	SC
American White Pelican	*Pelecanus erythrorhynchos*	None	SC
Double-crested Cormorant	*Phalacrocorax auritus*	None	SC
White-faced Ibis	*Plegadis chihi*	None	SC
Osprey Pandion	*Pandion haliaetus*	None	SC
Northern Harrier	*Circus cyaneus*	None	SC
Sharp-shinned hawk	*Accipiter striatus*	None	SC
Cooper's Hawk	*Accipiter cooperii*	None	SC
Ferruginous Hawk	*Buteo regalis*	None	SC
Golden Eagle	*Aquila chrysaetos*	None	SC
Merlin	*Falco columbarius*	None	SC
Prairie Falcon	*Falco mexicanus*	None	SC
Western Snowy Plover	*Charadrius alexandrinus nivosus*	None	SC
Mountain Plover	*Charadrius montanus*	FC	SC
Long-billed Curlew	*Numenius americanus*	None	SC
California Gull	*Larus californicus*	None	SC
California Horned Lark	*Eremophila alpestris actia*	None	SC
Yellow Warbler	*Dendroica petechia*	None	SC
Tricolored Blackbird	*Agelaius tricolor*	None	SC
Townsend's Big-eared Bat	*Corynorhinus townsendii*	None	SC
Pallid Bat	*Antrozous pallidus*	None	SC
Tulare Grasshopper Mouse	*Onychomys torridus ramona tularensis*	None	SC

Note:
E Endangered
T Threatened
FC Candidate Species
SC Species of special concern

Table BR-3
Vascular Plants Listed as Rare or Endangered by the California Native Plant Society Observed or Expected to Occur in the Cross Valley Contractor Service Area

Common Name	Scientific Name	California Native Plant Society List
Coulter's Goldfields	*Lasthenia glabrata ssp. coulteri*	1B
Hispid Bird's-beak	*Cordylanthus mollis ssp. hispidus*	1B
Jared's Pepper-grass	*Lepidium jaredii ssp. jaredii*	1B
Lost Hills Crownscale	*Atriplex vallicola*	1B
Munz's Tidy-tips	*Layia munzii*	1B
Panoche Pepper-grass	*Lepidium jaredii ssp. album`*	1B
Recurved Larkspur	*Delphinium recurvatum*	1B
Sanford's Arrowhead	*Sagittaria sanfordii*	1B
Slough Thistle	*Cirsium crassicaule*	1B
Spiney-sepaled Button Celery	*Eryngium spinosepalum*	1B
Stinkbells	*Fritillaria agrestis*	4
Tree Anemone	*Carpenteria californica*	1B

Note:
Vascular plants listed as rare or endangered by the California Native Plant Society (Skinner and Pavlik 1994), but which have no designated status under state endangered species legislation, are defined as follows:
List 1B. Plants rare, threatened, or endangered in California and elsewhere.
List 2. Plants rare, threatened, or endangered in California, but more numerous elsewhere.
List 3. Plants about which we need more information - A review list.
List 4. Plants of limited distribution - A watch list.

Habitats within the Cross Valley Contractor Service Area

Valley Grassland Community (includes Non-native Grasslands, Valley Needlegrass Grassland, Valley Sacaton Grassland, Valley Wildrye Grassland, and Wildflower Fields). Grassland communities within the natural areas of the CVC's service areas can be divided into non-native grasslands and relic native communities. Non-native Grassland is the most wide-spread and intermingles with remnant native communities of all types. It is dominated by non-native, annual grass species such as wild oats (*Avena fatua*), ripgut brome (*Bromus diandrus*), soft chess (*B. hordeaceus)*, red foxtail chess (*Bromus madritensis rubens*), foxtail (*Hordeum murinum*), wild rye (*Lolium multiflorum*), and annual fescues (*Vulpia sp.*). The most common non-native forbs include mustard (*Brassica sp.*) and filaree (*Erodium sp.*).

Relic native communities include Valley Needlegrass Grassland, Valley Sacaton Grassland, Valley Wildrye Grassland, and Wildflower fields. Valley Needlegrass Grassland typically occurs on fine-textured soils in openings in oak savanna. Once dominated by perennial bunch grasses such as purple needlegrass (*Nassella pulchra*) and slender needle grass (*N. lepida*), most remnants are dominated by introduced annual species. Valley Sacaton Grasslands occur on poorly drained, alkaline soils. Dominant species include perennial, bunch grass alkali sacaton (*Sporobolus airoides*) and salt grass (*Distichlis spicata*). Valley Wildrye Grassland occurs on

moist sites at low elevations, often in openings in riparian forest habitats. Soils are typically subalkaline and experience seasonal flooding. The sod-forming perennial grass leymus (*Leymus triticoides*) dominates. Remnant wildflower fields are dominated by non-native annual grass species and are characterized by brilliant displays of spring-blooming forbs such as California poppy (*Eschscholzia californica*), lupine (*Lupinus sp.*), trefoil, rusty popcornflower, and layia (*Layia sp.*). Other common native forbs include fiddleneck (*Amsinckia sp.*), gilia (*Gilia sp.*), goldfields (*Lasthenia californica*), linanthus (Linanthus sp.), owl's clover (Orthocarpus spp.), and phacelia (Phacelia spp.). These are all spring flowering plants and most are annuals. Common summer and fall flowering plants include tarweeds (*Lagophylla spp.*), turkey mullein, vinegar weed, and buckwheat (*Eriogonum spp.*). An annual native grass species would include wild barley (*Hordeum depressum*). Some of the grassland areas also have vernal pools present, which have their own unique characteristics (see vernal pool description below).

Resident grassland birds of Study Area include the Western Meadowlark (*Sturnella neglecta*), Mourning Dove (*Zenaida macroura*), Western Kingbird (*Tyrannus verticalis*), Burrowing Owls (*Athene cunicularia*), and Horned Larks (*Eremophila alpestris*). In the winter these species are joined by American Pipits (Anthus rubescens) and Savannah Sparrows (*Passerculus sandwichensis*) among others. Raptors, which nest and roost in adjacent riparian habitats, hunt here. Raptors that would be expected in the grassland area include the White-tail Kite (*Elanus caeruleus*), Red-tailed Hawk (*Buteo jamaicensis*), Golden Eagle (*Aquila chrysaetos*), American Kestrel (*Falco sparverius*), Barn Owl (*Tyto alba*), Great Horned Owl (*Bubo virginianus*), Short-eared Owl (*Asio flammeus*), Turkey Vulture (*Cathartes aura*), Northern Harrier (*Circus cyaneus*), and Prairie Falcon (*Falco mexicanus*).

Large populations of small mammals provide a primary source of prey for many predators. The most obvious small mammal, the California ground squirrel (*Spermophilus beecheyi*), occurs in numerous scattered colonies. Grasslands also provide an abundant food supply for small mammals such as the deer mouse (*Peromyscus maniculatus*), Botta's pocket gopher (*Thomomys bottae*), the black-tailed hare (Lepus californicus), western harvest mouse (*Reithrodontomys megalotis*), and California vole (*Microtus californicus*).

In turn, these small mammals serve as prey for coyotes (*Canis latrans*), red foxes (*Vulpes vulpes*), badgers (*Taxidea taxus*), the endangered San Joaquin kit fox (*Vulpes macrotis mutica*), and avian predators.

Annual grasslands provide habitat for a variety of amphibian and reptile species. The Gilbert's skink (*Eumeces gilberti*) and western fence lizard (*Sceloporus occidentalis*) occur here, especially along fence lines and grassland edges where they are close to cover. Gopher snakes (*Pituophis melanoleucus*) commonly hunt lizards and small mammals in grasslands. Other reptilian species expected to occur include the common garter snake, California horned lizard (*Phrynosoma coronatum* frontale), western rattlesnake (*Crotalus viridis*) and the endangered blunt-nosed leopard lizard (*Gambelia silus*).

Oak Woodland Communities. Oak woodlands occur at elevations ranging from 10 to 1,500 meters (30 to 5,000 feet) in the foothills of the Sierra mountain range and San Joaquin Valley.

These woodlands are dominated by trees that are 5 to 21 meters (15 to 70 feet) in height and vary from open savannas to dense, closed-canopy communities. The most common type consists of scattered trees and scrubs with an understory of grasses and forbs. Oak woodland areas are often more dense on the north-facing slopes compared to the south-facing slopes. At higher elevations, oak woodlands are often more dense and have a greater species diversity compared to lower levels. The understory of an oak woodland includes grasses and forbs previously described above and shrubs such as California buckeye and redbud (*Cercis occidentalis*). There are two groups of Oak Woodland Communities in the San Joaquin Valley region; 1) Valley Oak Woodland Communities and 2) Foothill Woodland Communities. Valley Oak Woodland is the predominant type that exists within the Cross Valley Canal contract service area.

Valley Oak Communities (includes Valley Oak Woodland). Valley Oak Woodlands mix into foothill woodlands, but are generally restricted to deep alluvial valley soils at low elevations which parallel riparian communities. Other oak species tend to occur on shallower soils on slopes. Valley oak stand densities range from open savanna to dense forest savanna and valley oak is often the only canopy species. The understory is typically composed of non-native grasses and forbs as described above. Most of the valley oaks in the San Joaquin Valley have been removed for cultivation and urbanization. A few scattered stands remain in the valley in areas around dwellings and in parks. Unfortunately very little regeneration has occurred, primarily due to livestock grazing.

Valley oak woodlands provide important food and cover for many species of wildlife. Oak trees are used for foraging, shelter, nesting, and loafing by a variety of avian and mammalian species. Avian species that would be expected in an valley oak community include the Red-shouldered Hawk, Red-tailed Hawk, California Quail, Plain Titmouse, Western Scrub-jay, Spotted (or *Rufous-sided*) Towhee (*Pipilo maculatus*), Bewick's Wren, Bushtit (*Psaltriparus minimus*), and Acorn Woodpecker. Mammalian species include the mule deer, western gray squirrel (*Sciurus griseus*), bobcat, coyote, western harvest mouse, Botta's pocket gopher, California vole, and deer mouse. Reptilian species include the western fence lizard, common garter snake, and western rattlesnake.

Riparian Communities occur along the rivers, numerous creeks, and sloughs within the Cross Valley Canal service contract area. Riparian communities usually consist of one or more deciduous tree species plus an assortment of shrubs and herbs that border streams, rivers, lakes, and springs. Trees vary from tall, dense forests to a scattering of a few individual trees. The extent of riparian vegetation also varies depending on the size and nature of the banks and floodplains, by the amount of water carried by the waterway, and the depth of the aquifers. The existence of a riparian community is dependent upon a permanent water supply. The microenvironment varies depending on seasonal fluctuation of light availability to the understory. During the winter, deciduous trees are dormant and leafless, allowing direct sunlight to the understory vegetation. Some of the herbaceous plants and shrubs grow and flower with the addition of sunlight. During the summer, broadleaf deciduous trees can provide dense shade, resulting in decreased sunlight, which provides for cooler temperatures and higher humidity within the riparian corridor.

Valley and Foothill Riparian Communities (includes Great Valley Willow Scrub, Great Valley Cottonwood Riparian Forest, White Alder Riparian Forest, Great Valley Mixed Riparian Forest, and Great Valley Oak Riparian Forest). Valley and Foothill Riparian Communities occur from the Central Valley floor to the lower elevation margins of the montane coniferous forest of cismontane California. These riparian zones can vary from broad valley floodplain forests to narrow, steep canyon streams. The dominant trees or shrubs include: white alder, Oregon ash, western sycamore, Fremont's cottonwood, valley oak, red willow, Gooding's (or black) willow, and arroyo willow (*Salix lasiolepis*). Common evergreens include interior live oak, California bay-laurel (Umbellularia californica), and a noxious exotic weed, salt cedar or Tamarisk. Common shrubs include: seep willow (*Baccharis salicifolia*), button-willow (*Cephalanthus occidentalis*), dogwoods (*Cornus spp*.), California wild rose (*Rosa californica*), blackberries (*Rubus spp.*), elderberries (*Sambucus spp*.), California grape (*Vitis californica*), and poison oak. Herbaceous species include: spikenard (*Aralia californica),* mugwort (*Artemisia douglasiana*), sedges (*Carex spp*.), flat-sedges (*Cyperus spp*.), spike-rushes (*Eleocharis spp*.), willow-herbs (Epilobium spp.), horsetails (*Equisetum spp*.), rushes (*Juncus spp*.), monkeyflowers (*Mimulus spp*.), watercress (*Nasturtium officinale*), bulrushes (*Scirpus spp*.), stinging nettle (*Urtica holosericea*), and cattail. Below is a brief description of the specific riparian communities that potentially could occur within the Cross Valley Canal contract service area.

Great Valley Willow Scrub occupies frequently inundated floodplains and banks of major rivers and smaller streams. It is characterized by dense, shrubby thickets dominated by willow species including narrow-leaved willow (*Salix exigua*), arroyo willow, red willow, and dusky willow (*S. melanopsis*). Associated species include California wild rose and Fremont's cottonwood.

Great Valley Cottonwood Riparian Forest occurs in alluvial soils near streams that provide subsurface irrigation year-round. These sites are subject to spring inundation. Characteristic species include Fremont's cottonwood, assorted willows, box elder (*Acer negundo*), and Oregon ash.

White Alder Riparian Forest occurs along rapidly flowing, well aerated, perennial, canyon streams that experience substantial scouring and high flows during spring runoff. Canyons are typically deeply incised, resulting in a narrow riparian corridor.

Great Valley Mixed Riparian Forest occur further back from river and stream banks, where flooding and scouring events are less frequent and severe. Dominant species are typically winter deciduous and include California walnut (*Juglans hindsii*), white alder, western sycamore, Fremont's cottonwood, box elder, and assorted willow species.

Great Valley Oak Riparian also occurs further back from river and stream banks, where less physical disturbance occurs during flooding. Dominant species include valley oak, California walnut, white alder, western sycamore, Oregon ash, blackberries, and poison oak.

Valley and Foothill Riparian Communities provide food, cover, water, migration and movement corridors, escape, nesting, and thermal cover for a wide diversity of wildlife species. Expected wildlife species would be similar to species previously described in the Oak Woodland and

Valley Grassland Communities. Additional species include water dependent species such as the Wood Duck (*Aix sponsa*), Mallard (*Anas platyrhynchos*), Great Blue Heron (*Ardea herodias*), Great Egret (*Ardea alba*), Snowy Egret (*Egretta thula*), and beaver.

Freshwater Aquatic Communities. Freshwater aquatic communities occur in still and flowing waters and can range in size from small pools to small reservoirs or stock ponds throughout the CVC's service area. Areas that are seasonally wet also support freshwater aquatic environments. Aquatic communities vary and are dependent on several interacting environmental factors including: species composition, water depths, water level fluctuations, water flow rates, water and air temperatures, other climatic variables, pH, dissolved salts, organic content of the water, nature and depth of bottom sediments, and history of the body of water. Deep, open water areas support submergent or floating aquatic plant communities. Shallow water areas generally support emergent vegetation. Seasonal wetlands are temporary and usually become dry during the summer. Water levels in artificial reservoirs (i.e. livestock or farm ponds, irrigation storage ponds) often fluctuate, preventing well-developed aquatic communities from becoming established. There are two main types of freshwater aquatic communities present: 1) limnetic communities which occur in open water and 2) littoral communities which occur in shallow water and along shores of open bodies of water. Littoral communities include freshwater marshes, bogs, montane meadows, and vernal pools.

Limnetic Plant Communities (includes lakes, reservoirs, irrigation, and stock ponds). Limnetic plant communities have both algal and higher plant components. The algal component is primarily plankton with a variety of algal species. Vascular plants include: hornwort (*Ceratophyllum demersum*), elodea (*Elodea canadensis*), quillwort (*Isoetes spp*.), water-milfoil (*Myriophyllum spp*.), water-nymphs (*Najas spp*.), and pondweeds (*Potamogeton spp*.). Floating plants include: water fern (*Azolla filoculoides*), hornwort, duckweed (*Lemna spp*.) water buttercup (*Ranunculus aquatilis*), and bladderwort (*Utricularia spp.*).

Open ponds provide feeding and loafing areas for a variety of birds including the Eared Grebe (*Podiceps nigricollis*), Western Grebe (*Aechmophorus occidentalis*), Clark's Grebe (*A. clarkii*), American White Pelican (*Pelecanus erythrorhynchos*), Double-crested Cormorant (*Phalacrocorax auritus*), American Coot, and waterfowl such as the Canvasback (*Aythya valisineria*), Redhead (*Aythya americana)*, Lesser Scaup (*Aythya affinis*), Mallard, Northern Pintail (*Anas acuta*), Northern Shoveler (*Anas clypeata*), and Canada Goose (*Branta canadensis*). Depending on their location, reservoirs provide a water source for a variety of terrestrial wildlife including coyotes, badgers, striped skunks, weasels, California Quail, and passerine birds.

Freshwater Marsh Communities (includes Freshwater Seeps, Valley Freshwater Marsh, and Vernal Marsh). Freshwater marsh communities develop in locations with slow-moving or stagnant water. These communities occur along margins of ponds and lakes and in the floodplains of slow moving streams and rivers. Marshes can also develop where seepage from springs or shallow water tables allow rooted aquatic plants to become established. Common marsh plants include sedges (*Carex spp*.), spikerushes, bulrushes, bur reeds (*Sparganium spp*.), cattail, Tule (*Scirpus acutus*), water hemlock (*Cicuta maculata*), willow-herbs (*Epilobium spp*.),

common monkeyflower (*Mimulus guttatus*), watercress, smartweeds (*Polygonum spp*.), dock (*Rumex spp*.), pondweed, duckweed, and widgeongrass (*Ruppia spp*.).

Freshwater marshes are among the most productive wildlife habitats in California, providing a diversity of habitats for a wide variety of wildlife species. This habitat provides foraging, loafing, and cover areas for species such as the Mallard, Northern Pintail, Gadwall (*Anas strepera*), Green-winged Teal (*Anas crecca)*, Cinnamon Teal (*Anas cyanoptera*), Canada Goose, White-fronted Goose (*Anser albifrons*), American Coot, American Bittern (*Botaurus lentiginosus*), Green Heron (*Butorides striatus*), Great Egret, Snowy Egret, Great Blue Heron, Northern Harrier, Red-tailed hawk, dowitcher (*Limnodromus sp*.), Least Sandpiper (*Calidris minutilla*), Western Sandpiper (*Calidris mauri*), Black-bellied Plover (*Pluvialis squatarola*), Killdeer (*Charadrius vociferus*), Dunlin (*Calidris alpina*), American Avocet (*Recurvirostra americana)*, and Black-necked Stilt (*Himantopus mexicanus*). Mammals include the California vole, muskrat (*Ondatra zibethicus*), raccoon (*Procyon lotor*), coyote, striped skunk, and long-tailed weasel. Amphibians and reptiles that depend on or utilize freshwater marshes include the western toad, western spadefoot (*Scaphiopus hammondi*), pacific treefrog, western pond turtle, and gopher snake.

Vernal Pool Communities (includes Northern Hardpan Vernal Pools, Northern Basalt Flow Vernal Pools, and Northern Volcanic Mudflow Vernal Pools). Vernal pools are seasonal, shallow, ephemeral bodies of water that occupy depressions in grassland and woodland areas. The pools are underlain by an impervious layer of hardpan, claypan, or bedrock covered with a layer of clay or silt, which results in the collection and ponding of water during winter and spring rains. These pools are generally a few centimeters deep and seldom are more than a meter in depth. The pools gradually dry, resulting in a series of concentric rings of herbaceous vegetation forming around the pool margins.

Species composition in the pools varies in accordance with chemical and physical properties such as salinity, alkalinity (pH), depth, and duration of the pool. Most species that occur within vernal pools are endemic to California and require seasonal inundation followed by desiccation to complete their life cycles. Relative to other community types, vernal pools still support a high percentage of native vegetative cover. Vernal pools are characterized by herbaceous plants that begin as aquatic plants and make a transition to a dry land environment as the pools dry in late spring and summer. Most vernal pool vegetation is comprised of annual herbs with some deeply rooted rhizome type perennials. Vernal pool plant species include: foxtail, water starwort (*Callitriche spp*.), hairgrass (*Deschampsia danthonioides*), downingia (*Downingia spp*.), rush (*Juncus spp.*), flowering quillwort (*Lilaea scilloides*), meadowfoam (*Limnanthes douglasii*), tricolor monkeyflower (*Mimulus tricolor*), orcuttia (*Orcuttia spp*.), allocarya (*Plagiobothrys spp*.), popcornflower, woolyheads (*Psilocarphus spp*.), quillwort, water-clover fern, white brodiaea (*Brodiaea hyacinthina*), slender spikerush (*Eleocharis acicularis*), and coyote thistle (*Eryngium spp*.). Vernal pools lack trees or shrubs. The Cross Valley Canal contract service area contains several distinct types of vernal pools including Northern Hardpan, Northern Basalt Flow, and Northern Volcanic Mudflow Vernal Pools.

Animal species that are vernal pool dependent include special-status species such as the fairy

shrimp (*Branchinecta lynchi*), longhorn fairy shrimp (*Branchinecta longiantenna*), vernal pool tadpole shrimp (*Lepidurus packardi*), California tiger salamander (*Ambystoma californiense*), and western spadefoot. Common invertebrate species would include the California linderiella (*Linderiella occidentalis*). Migrating birds such the Mallard, Cinnamon Teal, Black-necked Stilt, and Greater Yellowlegs feed and loaf in vernal pools during spring migration. Other avian and mammalian species that would utilize a vernal pool and its surrounding area include species that are listed in the Grassland Community section.

Anthropogenic Communities and Agricultural Areas. Much of the San Joaquin Valley's vegetation has been altered by human activities including urbanization, roads and highways, livestock grazing, and agriculture. Communities dominated by introduced plants and established or maintained by human disturbance are referred to as anthropogenic communities. Anthropogenic communities include: 1) agrestal communities, 2) pastoral communities, 3) ruderal communities, 4) plantations, and 5) the urban mix. Agrestal communities are in areas that have been disturbed by cultivation and thrive in the same environment as agricultural crops. Pastoral communities are dominated by species that are adapted to livestock grazing. Valley grassland communities have become a type of pastoral community. Ruderal communities are highly disturbed areas such as roadsides and similar disturbed sites in towns and cities. Plantations are areas that have been planted with trees such as windbreaks and orchards. Urban mix habitats are areas where nonnative plant species have escaped or been planted in and around urban and residential developments. It is not uncommon to find a mix of native and non-native plants in urban open areas. The local urban mix is difficult to classify due to the variety and vast number of cultivated species introduced into the urban setting.

Anthropogenic Communities provide some wildlife habitat values to native animal species, as well as to non-native species such as the House Sparrow (*Passer domesticus*), European Starling (*Sturnus vulgaris*), Rock Dove (*Columba livia*), black rat (*Rattus rattus*), and house mouse (*Mus musculus*). Wintering waterfowl and coots could be expected to forage on park and golf course lawns. Trees and shrubs provide nesting, roosting, and foraging areas for native species such as the Northern Mockingbird (*Mimus polyglottos*), Mourning Dove, Brewer's Blackbird (*Euphagus cyanocephalus*), American Crow (*Corvus brachyrhynchos*), and Raven (*Corvus corax*), as well as for hummingbirds, and other song birds. Mammals that would be expected in an urban setting include the Virginia opossum, striped skunk, Botta's pocket gopher, ground and tree squirrels, and bats.

Agricultural areas provide cover, foraging, and loafing areas for a variety of wildlife. Pre-irrigated grain fields provide food and loafing areas for migrating and wintering waterfowl, shorebirds, gulls, and terns. Standing grain and alfalfa fields provide feeding, nesting, and escape cover for ducks such as the Mallard, Gadwall, and Cinnamon Teal, and for blackbirds. Grain and alfalfa fields support rodent populations which in turn provide hunting areas for avian and mammalian predators. Irrigated alfalfa fields provide foraging areas for gulls and egrets. Open, fallow fields provide areas for wintering species such as the Mountain Plover (*Charadrius montanus*). Fallow fields with vegetation can provide cover and food for small mammals, which provide hunting areas for avian and terrestrial predators. Orchards provide nesting and roosting areas for species such as Mourning Doves and other passerines, as well as, habitat for

mammalian species such as the California ground squirrel (Zeiner 1988; 1988a; 1988b).

Environmental Consequences

No Action Alternative

Under the NAA, all existing CVC water management continues to operate under current existing conditions. No significant impacts to vegetation and wildlife are expected, since no additional infrastructure (e.g., dams, increase in dam heights, canals, etc.) will be constructed. Additionally, under this alternative, there will be no increase in deliveries and no conversion of existing natural habitat into farmland.

Alternative 1

Alternative 1 is similar to the NAA. Therefore, there are no impacts to biological resources under this alternative.

Alternative 2

This Alternative is similar to the NAA and Alternative 1, but additional water costs above Alternative 1 costs could potentially increase the amount of fallowed lands and further decrease affordable water for private wetlands within the service area.

Primary reasons for the development and maintenance of private wetlands in the region include duck clubs, the economic benefits realized by landowners through the Food Securities Act Wetland Program (administered through the Natural Resources Conservation Service-NRCS), and larger initiatives currently being planned or developed in the region (e.g., Central Valley Joint Venture and Ducks Unlimited's Valley Care Program). Many of these efforts require the allocation and purchase of water to be successful.

Increased water costs may create a barrier to future development of these programs. In addition, the increased costs could reduce the amount of water available to any lands that are currently under the Wetland Reserve Program, or other private wetlands such as waterfowl hunting clubs. As the cost of water increases, the opportunity to provide wetland habitat by private landowners generally decreases. This could result in some decrease in availability of wetland habitat in the CVCs service area.

Cumulative Effects

No Action Alternative

Under this Alternative, management of water supplies and operations for CVP deliveries to the CVCs will continue to operate as under the current existing conditions. No changes in land use will be created by the project, therefore no cumulative impact on biological resources is anticipated.

Alternative 1

Cumulative impacts for this Alternative would be similar to those described under the NAA. In general little or no change in current land use will be created through this action. Should implementation of this alternative result in some acreage currently in agriculture being fallowed, such fallowing could have an incremental positive effect on sensitive vegetation and wildlife of the region by providing more natural habitat conditions where none currently exist. Hence, no negative cumulative impact on biological resources is anticipated.

Alternative 2

The potential for cumulative impacts for the Alternative would be similar to Alternative 1. Therefore, there would be no demonstrable contribution to cumulative effects.

RECREATIONAL RESOURCES

Affected Environment

While recreational boating, camping, picnicking, and sightseeing are water-dependant opportunities within the central and lower San Joaquin Valley, waterfowl hunting and fishing are the primary water-dependant recreational activities affected by CVP water deliveries. Water from the CVP supports regional hunting and fishing activities by flooding the waterfowl refuges and hunting areas and conveying water through canals that support warm water fishing opportunities. The PEIS has based its assessment of impacts on recreational resources primarily upon projected changes in water levels at reservoirs and in rivers, changes in refuge conditions, and the associated changes in visitor usage. Data were compiled and are presented to characterize recreation conditions at lakes, reservoirs, and rivers in the PEIS. Additionally, the PEIS provides a description of the affected environment including facilities and activities at national wildlife refuges, wildlife management areas, and private hunting clubs in the central and lower San Joaquin Valley (Reclamation 1999; 199a). The Pixley National Wildlife Refuge is the only wildlife refuge within the CVC's service area.

In 1991, 39 private water fowl hunting clubs were reported for the Tulare Basin Region (i.e., Kern and Tulare counties), totaling approximate 15,700 acres. These hunting clubs flooded approximately 4,800 acres annually with hunting activity at about 8,200 hunter days. Flooded acres on water districts used for hunting were estimated to account for 22 percent (1,016 acres) of the total area flooded for water fowl hunting in the Tulare Basin Region (Reclamation 1994a).

Sportfishing in the Tulare Basin Region was projected to account for 11.8 million angler days in 1990. Fishing occurs primarily on rivers and lakes on the west slope of the Sierra Nevada and along the California Aqueduct. Most sportfishing that occurs in the CVP canals is for resident warmwater species, although no portion of the Friant-Kern, Madera, and Cross Valley canals is designated for public access fishing. Fishing in the canals is limited because of the small number

of fish in the canals, access constraints, and the availability of fishing opportunities on nearby reservoirs and rivers (Reclamation 1986).

The PEIS discussed recreational resources and opportunities on the reservoirs, rivers and regions.

Environmental Consequences

No Action Alternative

The facilities associated in the deliveries of CVP water to the CVCs would continue to operate in a manner consistent with historic conditions. Reservoir and river fluctuations would remain dependent upon the volume of inflow, the volume of water in storage, and the volume of water needed to meet downstream needs. During drier periods or multiple years of prolonged drought, surface water elevations would be subject to substantial decline as water is released to meet downstream needs and demands.

Recreational activities on reservoirs and rivers are expected to respond according to the water storage volumes, similar to past reservoir elevation patterns. With surface water reductions during drought years, water recreationists would travel greater distances from existing roadways for access lakes and rivers. However, no recreational uses would be precluded during periods of drawdown. These conditions would not change under the NAA.

Water deliveries to the Pixley National Wildlife Refuge would not change.

Alternative 1

Impacts to recreational resources associated with Alternative 1 are assumed to have similar effects as the NAA. No change would occur in the operation of the reservoirs, rivers, or water deliveries to the wildlife refuge. Recreation opportunities would not change under Alternative 1 and there are no impacts from this alternative.

Alternative 2

The impact to Alternative 2 is similar to the NAA. The facilities associated with the delivery of CVP water to the CVCs would continue to operate in a manner consistent with historic conditions. Reservoir and river fluctuations would remain dependent upon the volume of inflow, the volume of water in storage, and the volume of water released to meet downstream needs. Recreation opportunities on the reservoirs, rivers and in the region would not change because no change would occur in operation to provide water to the CVCs or to the wildlife refuge. The recreational opportunities and uses anticipated under the NAA would also apply to Alternative 2. There is no impact of this alternative on recreational resources in this region.

Cumulative Effects

Reservoir and river fluctuations would remain dependant on volume inflow, storage, and downstream needs. Delta water would continue to be pumped and conveyed to the CVCs and other South of Delta contractors as in the past. Under certain conditions, DWR may not have an opportunity to convey the Delta water to the CVCs and the water would be provided to meet SWP needs without change to CVCs allocations. This amount of water would be minimal, up to 128,300 af/y and would not contribute to any significant cumulative impacts for recreational opportunities. Implementation of Alternatives 1 or 2 would not contribute to the cumulative impacts from other projects to recreational resource in the central or lower San Joaquin regions.

SOCIOECONOMIC RESOURCES

Affected Environment

The CVCs service area is a part of the economy of the San Joaquin Valley. In conjunction with implementing CVPIA, substantial changes in agricultural production, income, and employment are possible. In addition, economic impacts on agriculture will have a multiplier or induced impact effect on the rest of the regional and statewide economy. In this section the economic impacts of the LTCR will be evaluated.

The CVCs service areas are located within portions of Fresno, Kern, Tulare, and a small portion in Southeastern Kings County (Atwell Island Water District) encompass portions of the most important agricultural production areas in the Central Valley and the state. All of these counties have a per capita income lower than the state average and unemployment rates approaching double the state average based on 1997 data (Table SE-1).

Table SE-1
County-Level Socioeconomic Data

County	1997 Population	1997 Civilian Labor Force	1997 Employment	1997 Per Capita Income	1997 Unemployment Rate (%)
Fresno	786,800	376,200	322,500	$18,329	14.3%
Kern	639,800	279,300	245,400	$17,848	12.1%
Tulare	360,400	163,800	138,200	$16,144	15.6%
Totals	2,105,700	957,100	824,300		
California Average	– –	15,511,600	14,391,500	$25,368	6.3%
California Total	33,252,000				

Sources: EDD 1999, EDD 1999a; CDF 1998

The three largest counties encompassing the service area are amongst the state's top counties for agricultural production value, generating over 30 percent of the state's production value in 1998 and contain 1 percent of the irrigated land in California (Table SE-2 and SE-3).

Table SE-2
Cross Valley Contractor County Agricultural Production

County	1998 California Rank	1998 Production ($1,000)	% of Total California Value	Leading Crops
Fresno	1	3,286,806	12.0	Grapes, Cotton, Poultry
Kern	2	2,922,057	8.5	Grapes, Cotton, Almonds
Tulare	3	2,067,678	8.3	Milk, Grapes, Oranges
Totals		8,276,541	28.9%	
California Total	– –	26,941,832	– –	

Source: USDA 1999

Due to its heavy agricultural focus, 82 percent of the service area's land is irrigated. The CVCs service area receives water from the CVP, other surface water sources, and groundwater pumped from on-farm sources. In 1987, total farm deliveries of water amounted to 273,631 af. On farm groundwater contributed 82 percent (224,309 af) of the contractor's total farm deliveries. Surface water supplied from the CVP totaled 64,320 af, but combined with non-project surface water (2,048 af) and taking losses of 17,046 af into consideration, the total net surface water delivered to the contractors was 49,322 af.

Table SE-3
Irrigated Acreage and CVP Deliveries

County	District	1996 Irrigated Acreage[1]	Maximum Contract Amount (af)
Cross Valley		161,980	
Fresno	Hills Valley Irrigation District	3,353	954
Kern	Kern-Tulare Water District	13,700	40,000
Tulare	Lower Tule River Irrigation District	86,371	31,102
Tulare	Pixley Irrigation District	53,385	31,102
Kern/Tulare	Rag Gulch Water District	5,171	13,300

Source: Reclamation 1999b
Notes: Tri-Valley Water District is exempt from reporting crop water needs information. No data are available for the Fresno and Tulare Counties for 1996.
1 Irrigated acres are based on a hydrologic year from October to September.

The CVCs service area produces a diverse range of crops on 161,980 acres agricultural land, grains and field crops, nuts, cotton, and vegetables (Table SE-4). Several of the districts were not required to report crop water use information in 1996 due to limited irrigation acreage. From the reported information, alfalfa was the most plentiful crop in the area with over 19 percent of the crop land devoted to its harvest. Lower Tule River Irrigation District led the contractors in acreage for most of its major crops. The District had over 20,000 and 19,000 acres of alfalfa and cotton, respectively. Cotton and corn were planted on over 17 percent and 13 percent, respectively, of CVCs agricultural land. Ten other crops each contributed less than 10 percent of the crop land in the service area (Reclamation 1999b).

Table SE-4
1996 District Crop Acreage

Crop	Hills Valley Irrigation District	Kern-Tulare Water District	Lower Tule River Irrigation District	Pixley Irrigation District	Rag Gulch Water District	Total
Alfalfa	0	80	20,635	11,284	320	32,319
Almonds	0	529	0	0	0	529
Barley	154	0	0	0	0	154
Citrus	2,444	0	88	0	0	2,532
Corn	0	0	22,629	0	0	22,629
Cotton	0	0	19,024	8,961	0	27,985
Deciduous Orchard	56	934	3772	487	55	5,304
Grain	0	0	11,118	0	0	11,118
Grapes	494	4,193	2,810	4,511	3,479	15,487
Miscellaneous	0	0	0	22,573	0	22,573
Misc. Field	0	0	890	0	0	890
Misc. Truck	0	0	0	986	0	986
Nuts	85	0	3,359	3,219	0	6,663
Olives	120	0	0	0	0	120
Pasture	0	0	551	1,364	0	1,915
Pumpkins	0	100	0	0	0	100
Subtropical Orchard	0	7,707	0	0	1,077	8,784
Sugar Beet	0	0	418	0	0	418
Truck Crop	0	0	1,077	0	0	1,077
Wheat	0	157	0	0	240	397
Total	3,353	13,700	86,371	53,385	5,171	161,980

Source: Reclamation 1999b
Note: Tri-Valley Water District is exempt from reporting crop water needs information.
No data are available for the County of Fresno and the County of Tulare for 1996.
Lower Tule River Irrigation District included in Friant Division EA.

Within the Kern County portion of the CVCs service area, the most abundant of the seven crops were from subtropical orchards, which occupy approximately 8,800 acres. Citrus fruits were the primary crop in the Hills Valley Irrigation District. Located in Fresno County, Hills Valley Irrigation District produces approximately 73 percent of the CVCs citrus crop (Reclamation 1999b).

The CVCs service area is a significant contributor to the production of several crops in California. Of the 706,731 acres of the grapes grown in California, 51 percent are within the three counties that encompass the CVCs service area (Figure SE-2). The Cross Valley unit is also a substantial supplier of cotton (CASS 1995).

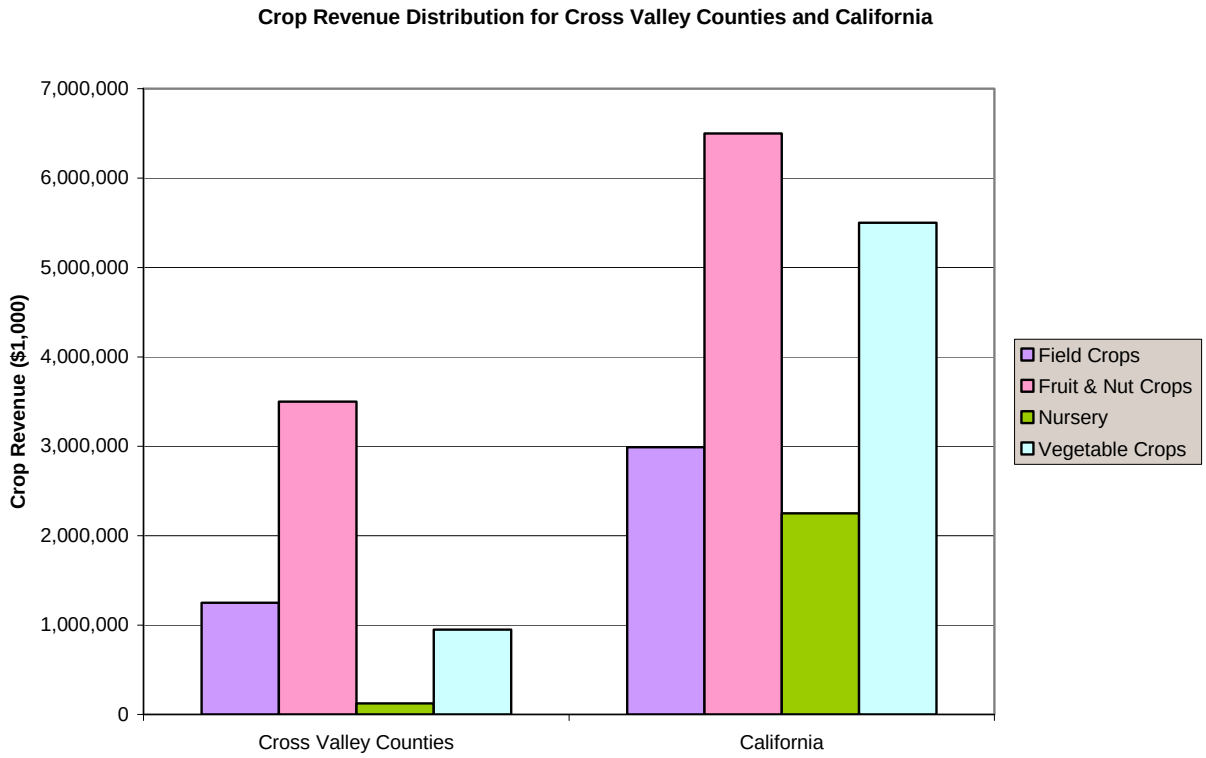

Figure SE-2
Crop Revenue Distribution for Cross Valley Counties and California
Source: Reclamation 1999b

CVP contract rates for project water in the service area average $21.95 per af. Hills Valley Irrigation District has the least expensive rate of $21.09/af and County of Tulare is the most expensive at $23.83/af (Reclamation 1999b).

On-farm water application efficiency is a function of evapotranspiration and the amount of water delivered to the farm. Application efficiencies in the Central Valley range from around 50 to 80 percent (Reclamation, 1999a). The CVCs lie in the high part of that range. With an average

efficiency of 79 percent. Groundwater replenishment averages approximately 73,000 af/yr (FWUA1998).

In 1996, the CVCs service area generated almost $120 million in crop revenue (Table SE-5), which is 1 percent of the revenue for its three counties. The Lower Tule River Irrigation District generated over half of that revenue with $58 million in 1996. Hills Valley Irrigation District and Kern-Tulare Water District each contributed approximately 17 percent of the service area's production (Reclamation, 1999a , 1999b). The greatest revenues generally came from the crops with the highest irrigated acreages. Grapes were the largest revenue producers contributing $34 million dollars. Cotton and alfalfa crops followed with $28 and $22 million in revenue respectively. The top two districts made up 75 percent of the Cross Valley service area's revenue and had contracts for only 53 percent of its water (Table SE-6).

Table SE-5
1996 Crop Revenue ($)

Crop	Hills Valley Irrigation District	Kern-Tulare Water District	Lower Tule River Irrigation District	Pixley Irrigation District	Rag Gulch Water District	Total
Alfalfa	$0	$53,680	$13,846,000	$7,571,564	$214,720	$21,685,964
Almonds	$0	$842,168	$0	$0	$0	$842,168
Barley	$32,543	$0	$0	$0	$0	$32,543
Citrus	$9,100,935	$0	$328,000	$0	$0	$9,428,935
Corn	$0	$0	$10,590,000	$0	$0	$10,590,000
Cotton	$0	$0	$19,214,000	$9,050,610	$0	$28,264,610
Deciduous Orchard	--	--	--	--	--	$0
Grain	$0	$0	$2,713,000	$0	$0	$2,713,000
Grapes	$1,085,333	$9,218,311	$6,178,000	$9,917,434	$7,648,582	$34,047,659
Miscellaneous	--	--	--	--	--	$0
Misc. Truck	$0	$0	$4,867,000	$4,455,734	$0	$9,322,734
Nuts	--	--	--	--	--	$0
Olives	$227,160	$0	$0	$0	$0	$227,160
Pasture	$0	$0	$90,000	$222,332	$0	$312,332
Pumpkins	--	--	--	--	--	$0
Subtropical Orchard	--	--	--	--	--	$0
Sugar Beets	$0	$0	$380,000	$0	$0	$380,000
Wheat	$0	$51,025	$0	$0	$78,000	$129,025
Total	$10,445,971	$10,165,184	$58,206,000	$31,217,674	$7,941,302	$117,976,131

Sources: 1999, Reclamation 1999a
Note: Crop revenue for Lower Tule River Irrigation District includes revenue received as both a Cross Valley and Friant Contractor.

Table SE-6
District Crop Revenue and Contract Water

Reporting Districts	Maximum Contract Amount (af/yr)	1996 Crop Revenue ($)	Cumulative Revenue ($)
Lower Tule River Irrigation District	31,102	$58,206,000	$58,206,000
Pixley Irrigation District	31,102	$31,217,674	$31,217,674
Hills Valley Irrigation District	2,146	$10,445,971	$41,663,644
Kern-Tulare Water District	40,000	$10,165,184	$51,828,828
Rag Gulch Water District	13,300	$7,941,302	$59,770,129

Sources: FWUA 1998; Reclamation 2000a; 2000b

Environmental Consequences

The majority of the data presented in this assessment is derived from the CVPM. The CVPM, as defined in the Draft PEIS, is "a regional model of irrigated agricultural production and economics that simulates the decisions of agricultural producers (farmers) in the Central Valley of California." The CVPM contains 22 crop production regions. The CVCs service area falls into three of the CVPM's 22 subregions that include subregions 17, 18, and 20. While the Contractors service area is contained within these three subregions, it should be noted that the existing conditions as described in this section for the service area are less than 100 percent of the production units used in the CVPM, because the CVPM subregions include both CVP and non-CVP users. For example, the total irrigated acreage from the affected environment section of this EA will be different (lower) than the irrigated acreage used in this analysis. For the purposes of these analyses, the impacts generated by the CVPM for subregions 17, 18, and 20 (Cross Valley subregions) will be considered the same as the impacts to the CVCs service area.

No Action Alternative

The impacts to acreage, agricultural output, and employment are reported from the Final PEIS Alternative 1, dated October 1999. The assumptions used in the analysis and the results are detailed in that report. The PEIS Alternative 1 output was considered equivalent to the output for the PEIS Preferred Alternative and was applied to the NAA for this EA. The NAA for this EA includes dedication of water for alternative uses, restoration payments, tiered water prices, and land retirement.

The distribution of the crop acreages among the service area's CVPM subregions estimated for the NAA in the average year water condition total 1,055,000 acres. In a wet year this total is raised by less than 1 percent. In a dry year the total drops by about 2 percent, which is a change of less than 1 percent of the Central Valley total irrigated acreage for an average year. CVPM subregion 18 contributed to the majority of this drop in acreage, losing 15,000 acres in a dry year (Table SE-7). These changes are relatively small, and they are consistent with changes due to weather and commodity demand.

Table SE-7
Cross Valley Contractor Subregion Irrigated Acreage in the No Action Alternative

CVPM Subregion	Average Year (1922-90)	Wet Year (1967-71)	Dry Year (1928-34)
17	260	260	256
18	592	595	577
20	203	204	199
Total	1,055	1,059	1,032

Source: Reclamation 1999a
Note: All acreage values in thousands

Gross revenues for the Cross Valley subregions for the PEIS NAA average total to $2.1 billion, which is 21 percent of total Central Valley Contractor's gross revenue. In a dry year gross revenue falls by less than 1 percent of this total, with subregion 18 once again contributing half of the lost revenue. In a wet year gross revenue is increased by less than 1 percent of the average year total (Table SE-8).

Table SE-8
Cross Valley Contractor Subregion Gross Revenue (Value of Production) in the No Action Alternative

CVPM Subregion	Average Year 1922-1990	Wet Year 1967-1971	Dry Year 1928-1934
17	565.7	565.7	562.0
18	974.2	976.1	961.5
20	603.9	604.1	600.4
Total	2,143.8	2,145.9	2,123.9

Source: CH2M Hill 2000
Note: All values in millions of 1992 dollars

The Cross Valley subregions produce about 22 percent of the Central Valley net income total. In a wet year net income decreases to about 4 percent, of the Central Valley net total with the majority of the decrease resulting from irrigation cost. In a dry year, net income decreases even more, to about 2 percent of the Central Valley total, with the majority of the decrease resulting from groundwater pumping cost (Table SE-9).

Table SE-9
Cross Valley Contractor Subregion Net Revenue in the No Action Alternative

CVPM Subregion	Average Year 1922-1990	Wet Year 1967-1971	Dry Year 1928-1934
17	142.9	54.2	41.5
18	294.7	25.3	-3.4
20	136.5	31.5	17.2
Total	574.1	111.0	55.3

Source: CH2M Hill 2000
Note:
All values in millions of 1992 dollars

Compared to the NAA average, there is an increase in total groundwater usage of about 610 af and a decrease in total CVP water usage of about 180 af under the NAA dry scenario of the PEIS. The NAA wet scenario shows a decrease in total groundwater use of about 370 af and a slight increase in total CVP water use of about 20 af compared to the NAA Average scenario (Table SE-10). These water source estimates give insight into the insignificant changes in agricultural output and revenue summarized in the previous sections. While there is insignificant change in output and revenue under the NAA, there is a substantial tradeoff between CVP water and groundwater, with total groundwater use in a dry year increasing by 35 percent and in a wet year decreasing by 27 percent. The evidence shows that when surface water supplies are restricted farmers will switch to groundwater, greatly softening the economic impacts of changes in CVP supplies. It should be noted, that in production areas where groundwater resources are not readily available or are of poor quality, localized impacts could result.

Table SE-10
Cross Valley Contractor Subregion Irrigation Water Applied

CVPM Subregion	Water Source	Average Year (1922-90)	Wet Year (1967-71)	Dry Year (1928-34)
17	CVP Water	34.6	32.5	27.1
	Groundwater	415.1	303.2	577.4
18	CVP Water	517.3	526.3	399.0
	Groundwater	1,018.0	821.8	1,334.9
20	CVP Water	208.7	219.8	154.1
	Groundwater	303.6	244.8	437.3
Total	CVP Water	760.6	778.6	580.2
	Groundwater	1,736.7	1,369.8	2,349.6

Source: CH2M Hill 2000
Note: All values in thousands af.

The PEIS estimated the total employment impacts for California to be about 2,790 jobs, $183 million in output, and $79.6 million in place-of-work (PoW) income. Most of these impacts occur in agricultural regions where CVP water prices cause substantial decreases in agricultural output. The estimates from the PEIS IMPLAN employment multipliers indicate about 20 jobs per million dollars of output (See Draft Technical Appendix, Regional Economics, Table II-2, Page II-5). Therefore, the less than 1 percent increase in wet year Central Valley output will increase total employment in the Central Valley by about 130 jobs. The dry year analysis shows that a less than 1 percent decrease in output for the Central Valley will result in a decrease of about 935 jobs for the region, a very small percentage of the total regional employment impact of the implementation of PEIS. These numbers do not indicate a small percentage. Therefore, it is concluded that no significant employment impacts are likely to occur.

Alternative 1

The impacts are similar to the NAA. Therefore, impacts on agricultural output and revenue and employment impacts are not anticipated within the CVCs service area.

Alternative 2

The impacts to acreage, agricultural output, and employment are derived from the *"Economic Analysis of November 1999 Tiered Pricing Proposal for PEIS Preferred Alternative"*(CH2M Hill 2000). The assumptions are used in the analysis and the results are detailed in that report. This alternative includes tiered water prices based on the November 1999 proposal to the PEIS Preferred Alternative and 1999 water rates.

Changes in irrigated acreage within CVCs service area from the NAA are summarized by crop in Table SE-11. Less than 1 percent of the service area's irrigated acres are lost compared with the NAA wet, when a wet year follows a series of dry years. This reduction is the largest in irrigated acreage due to the implementation of the tiered pricing procedure described in Alternative 2. According to this tiered pricing procedure, the amount of water that is eligible for Category 1 classification shrinks when a series of dry years is experienced because of the fact that the quantity of Category 1 water is based on the average deliveries of the previous five years. This being the case, when a series of average or dry years is followed by a wet year a large portion of the water that is available is classified as Category 2 and is priced at the Full Cost Rate. When this Full Cost Rate water is, integrated into the blended water price, all CVP water supplies become more expensive. The less than 1 percent change in irrigated acreage in the dry-wet scenario, like change under the NAA, is relatively small and is consistent with changes due to weather and commodity demand.

Table SE-11
Cross Valley Contractor Subregion Irrigated Acreage in Alternative 2

CVPM Subregion	Changes Compared to Average NAA			Changes Compared to Wet NAA			Changes Compared to Dry NAA		
	Avg.	Wet	Dry	Avg.	Wet	Dry	Avg.	Wet	Dry
	Followed by Average			Followed by Wet			Followed by Dry		
17	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	0.0	0.0	-0.1	-1.2	-1.2	-1.2	0.1	0.1	0.1
20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	0.0	0.0	-0.1	-1.2	-1.2	-1.2	0.1	0.1	0.1

Source: CH2M Hill 2000
Note: All values in thousand acres.

Gross revenue impacts are very similar to the acreage impacts, and are shown in Table SE-12. Compared to the NAA wet, a reduction of $1 million is estimated for all scenarios ending in a wet year. Each of these scenarios impacts gross revenue in the Cross Valley subregions by less than 1 percent, if at all.

Table SE-12
Cross Valley Contractor Subregion Gross Revenue (Value of Production) in Alternative 2

CVPM Subregion	Changes Compared to Average NAA			Changes Compared to Wet NAA			Changes Compared to Dry NAA		
	Avg.	Wet	Dry	Avg.	Wet	Dry	Avg.	Wet	Dry
	Followed by Average			Followed by Wet			Followed by Dry		
17	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	0.0	0.0	-0.1	-1.0	-1.0	-1.0	0.1	0.1	0.1
20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	0.0	0.0	-0.1	-1	-1	-1	0.1	0.1	0.1

Source: CH2M Hill 2000
Note: All values in millions of dollars.

Estimated changes in net revenue within the service area are the largest for the dry-wet and dry-average scenarios. For the series of dry years followed by a wet year, net revenue is decreased by less than 1 percent of the contractor's total net revenue compared to the NAA average year results. When dry years were followed by an average year the net revenue decreased by an even smaller percentage (Table SE-13). When a dry year follows a series of average or wet years, there is a positive impact to net revenue. This positive impact, however small, has two probable causes: (1) some of Cross Valley's subregions are forced to reduce their acreage because of higher blended CVP water prices, resulting in higher crop prices received for acreage that

remains in production, and (2) more revenue is available due to CVP water cost because large amounts of CVP water are no longer affordable and are not purchased. CVPM subregion 18 in Tulare County has the highest increase in net revenue due to CVP water cost.

Table SE-13
Cross Valley Contractor Subregion Net Revenue in Alternative 2

CVPM Subregion	Changes Compared to Average NAA			Changes Compared to Wet NAA			Changes Compared to Dry NAA		
	Avg.	Wet	Dry	Avg.	Wet	Dry	Avg.	Wet	Dry
	Followed by Average			Followed by Wet			Followed by Dry		
17	0.0	0.1	0.1	0.0	0.0	-0.1	0.0	0.0	-0.1
18	-1.5	-1.0	-2.9	-2.1	-1.6	-3.7	0.8	0.8	0.0
20	-0.1	0.2	-0.8	-0.3	0.0	-1.1	-0.3	-0.3	-0.7
Total	-1.6	-0.7	-3.6	-2.4	-1.6	-4.9	0.5	0.5	-0.8

Source: CH2M Hill 2000
Note: All values in millions of dollars.

Compared to the NAA wet year within the service area, CVP water usage increases by less than 1 percent and groundwater usage decreases by less than 1 percent under the dry-wet scenario (Table SE-14). A general shift occurs towards CVP water and away from groundwater under all scenarios as CVP water becomes cheaper than pumping groundwater under the blended pricing scheme proposed under Alternative 2, which in turn leads individuals to maximize their CVP water use. These data differ from the evidence provided under the NAA analysis but, in fact, show an almost negligible difference in comparison with that analysis. In the Alternative 2 analysis, water supplies other than CVP project water and groundwater are unaffected and not shown.

Table SE-14
Cross Valley Contractor Subregion Irrigation Water Applied in Alternative 2

CVPM Subregion	Water Source	Changes Compared to Average NAA			Changes Compared to Wet NAA			Changes Compared to Dry NAA		
		Avg.	Wet	Dry	Avg.	Wet	Dry	Avg.	Wet	Dry
		Followed by Average			Followed by Wet			Followed by Dry		
17	CVP Water	3.9	3.8	4.0	7.4	7.3	7.4	0.0	0.0	0.1
	Groundwater	-3.8	-3.8	-3.9	-7.4	-7.2	-7.4	0.0	0.0	0.0
18	CVP Water	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.1
	Groundwater	0.0	0.0	-0.1	-4.0	-4.0	-3.8	0.0	0.0	0.0
20	CVP Water	0.1	0.1	-0.2	0.1	0.1	-0.1	0.0	0.0	-0.1
	Groundwater	-0.1	-0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0

Table SE-14
Cross Valley Contractor Subregion Irrigation Water Applied in Alternative 2

CVPM Subregion	Water Source	Changes Compared to Average NAA			Changes Compared to Wet NAA			Changes Compared to Dry NAA		
		Avg. Followed by Average	Wet	Dry	Avg. Followed by Wet	Wet	Dry	Avg. Followed by Dry	Wet	Dry
Total	CVP Water	4.0	3.9	3.9	7.5	7.4	7.4	0.0	0.0	0.1
	Groundwater	-3.9	-3.9	-3.9	-11.4	-11.2	-11.2	0.0	0.0	0.0

Source: CH2M Hill 2000
Note: All values in thousands af.

The Alternative 2 analysis estimated the total California impacts for the average-average scenario compared to the NAA to include total direct and indirect losses of about 530 jobs, $34 million in output, and $18.6 million of PoW income. Each of these losses amounts to less than 1 percent of the Central Valley total. Under the average-dry scenario, the negative total impacts to the state economy for jobs, output, and PoW income also do not exceed 1 percent of the Central Valley totals. The average-wet sequence produces even smaller negative impacts than the average-dry scenario. It is concluded, therefore, that there will be no impact to the total regional employment due to the implementation of Alternative 2.

Cumulative Effects

Implementation of Alternatives 1 and 2 would continue a historic pattern of water use within the CVCs service area. These alternatives in combination with other foreseeable actions would likely have little or no impact on agricultural water deliveries and maintain historical average water supplies. Therefore, the implementation of either of the alternatives would not result in any addition to cumulative impacts that would substantially affect agricultural output, revenue, and employment.

CULTURAL RESOURCES

Affected Environment

For cultural resources (archaeological and historical sites, and traditional cultural properties), the area of potential effect (APE) consists of the service areas of the water districts included in the CVCs service area. The service area consists of eight water districts in Fresno, Kern, and Tulare counties and includes mostly agricultural users but also some municipal and industrial users.

Information Sources and Background Data

The general background discussion provided below was developed from published sources including *California Archaeology* by Michael Moratto (1984) and the *Handbook of North American Indians, Volume 8, California (1978).* The background discussion includes a presentation that establishes the environmental, prehistoric, ethnographic, and historic context for the APE. Specific cultural resource data for the project APE were obtained from the Central California Information Center at California State University Stanislaus and the Southern San Joaquin Valley Information Center at California State University Bakersfield. The Information Centers are part of the California Historical Resources Information System. All recorded archaeological and historical site records for the Study Area were obtained from the Information Centers.

The California Native American Heritage Commission (NAHC) was contacted to request a review of their Sacred Lands files. The NAHC also provided names of Native American groups and individuals it believes might have specific knowledge of traditional cultural properties or other cultural sites on the subject lands. These lists were forwarded to Reclamation, which is conducting government-to-government consultation with federally recognized tribes.

Environmental Setting

The CVCs service area is comprised mostly of valley and foothill lands located in Fresno, Kern, and Tulare counties. This area contains a wide variety of natural habitats, including prairie, oak savanna, marsh, and riparian wetland. The San Joaquin River is the major drainage system for the valley, fed by the Fresno, Kings, Tule, and Kern rivers. Before modern reclamation projects, the San Joaquin Valley contained more than 5000 square kilometers of wetlands, which provided habitat for numerous species, including waterfowl, anadromous and nonanadromous fish, deer, elk, bear, wolves, and smaller mammals. Much of the CVCs service area is located in the ecotone at the base of the Sierra Nevada foothills, an area which blends the resources of the lowland prairie, oak savanna, and coniferous forest and is concomitantly rich in ecological diversity (Moratto 1984). The climate of the area is of the inland Mediterranean type, with hot, dry summers and cool, wet winters. Precipitation for the area averages 50 cm (20 inches), although the valley is wetter in the north and drier in the south.

Cultural Setting

Prehistory

Human presence in San Joaquin Valley is demonstrated from at least 6000 BC, based on a radiocarbon date obtained from an archaeological site located on the western shore of Buena Vista Lake in the southern end of the valley. According to a scheme proposed in the 1930s, this site fits into the earliest phase of three chronological periods that have been employed to organize the prehistory of California. This first phase, known as the Early Horizon and spanning 8000 to 2500 years before present, is associated with an early, hunting-focused culture attracted to the vast herds of large game that frequented the waterways of the valley. This phase was

followed by the emergence of a cultural pattern, known as the Middle Horizon, which was more heavily focused on the collection of seeds and other plant food. This phase occurred approximately 2500 to 1100 years ago. The third phase - the Late Horizon, 1100 to 200 before present, includes the Yokuts and their immediate antecedents and saw a shift to a diversified subsistence strategy that encompassed a wide range of plant and animal foods. While this chronological scheme, known as the Central California Taxonomic System, has been revised over the years, it is still used by many archaeologists, albeit in a modified and refined fashion (Wallace 1978).

The material culture and burial practices of the aboriginal populations of the central and southern San Joaquin Valley share features with both the cultures of the Delta and with those of the Santa Barbara coast. Similarities to the Delta region can be seen in the presence of bone sweat scrapers, decorated bone spatulae, and beads of olivella and haliotis shell. However, limpet shell ornaments, a well-developed steatite industry, and the use of wooden grave markers are characteristics shared with the Santa Barbara coast (Elsasser 1978). Burials in the San Joaquin Valley tend to be extended in the Early Horizon, semiflexed in the Middle Horizon, and tightly flexed in the Late Horizon and Protohistoric periods. The amount of burial goods also seems to increase over time (Moratto 1984).

Archaeological research in San Joaquin Valley, especially the southern part, has been limited. Aside from a few large sites around Buena Vista Lake, the area of the valley south of Stockton has not been intensively investigated. The far northern end of San Joaquin Valley, around the Delta, has been more intensively investigated, but is outside the Study Area. It is likely that future investigations will further help to clarify the archaeological record for the area.

Ethnography

Most of the territory encompassed by the CVCs service area was occupied at the time of contact by the Yokuts group, the various branches of which occupied most of San Joaquin Valley, its eastern and western foothills, and the eastern part of Delta. The Yokuts language is a member of the Penutian stock, which includes the Miwok and Costanoan (or Ohlone) groups. The Penutian peoples are thought to have entered central California from the northwestern Great Basin beginning around 1500 BC (Moratto 1984) and to have gradually displaced the previous inhabitants, speakers of Hokan and Uto-Aztecan stocks. This hypothetical population movement is associated chronologically with the development of the Windmiller pattern in Sacramento Valley, a cultural pattern characterized by diversified food-gathering strategies, including highly developed hunting and fishing technology; the pattern also features extended burials oriented towards the west.

North Valley Yokuts

The territory of the North Valley Yokuts extended from Fresno north to the edge of the Delta, west to the crest of the Diablo Range, and east to the lower foothills of the Sierra. The life of the North Yokuts was centered along the San Joaquin River and its many tributaries, which is flanked by dry, treeless grasslands along its length. The principal food sources for this group

were salmon and acorns, both of which were plentiful in areas along the rivers. Procurement of avifauna, big game hunting, and seed collecting also played an important role in subsistence.

Round, single-family dwellings built of reeds were the primary structure in North Yokuts villages, which were usually located on mounds to minimize flood hazards. Basketry and other fiber weaving work constituted the primary craft, accompanied by a lithics industry that manufactured tools from locally obtainable chert, jasper, and chalcedony. Footpaths connected villages, though river travel was also very important. Trade with neighboring peoples such as the Costanoans and Miwok was common.

Disruption of native lifeways began with the establishment of missions in the San Francisco Bay region and the forced conversion, often by kidnapping, of the indigenous peoples of the area. With the secularization of the missions in 1834, many former neophytes, including many North Yokuts, returned to their native regions or villages. The resumption of native lifeways, however, was interrupted by the onset of the Gold Rush. The northern San Joaquin Valley was the principal corridor for the thousands of miners who headed for the Sierra Nevada; later it was a prime choice for farmland. Most of the Native American people and villages in the way of this settlement were annihilated (Wallace 1978).

South Valley Yokuts

The historic homeland of the South Valley Yokuts encompassed the San Joaquin Valley south of Fresno and the surrounding foothills. The most notable aspect of this area was the presence of two large shallow lakes, Buena Vista and Tulare, and numerous rivers, channels, sloughs, and marshes. About 15 South Valley Yokuts groups inhabited this area, each with a different, yet mutually intelligible dialect. Each of these groups averaged about 350 persons. They occupied permanent dwellings, constructed of woven tules, which could house a single family or as many as ten.

The rich estuarine and riverine resources provided by the local environment enabled a more sedentary existence than was typical of most California groups. Diet consisted largely of fish, waterfowl, shellfish, grass seeds, and tule roots. Most toolstone was imported, while other implements, such as arrow shafts or baskets, were made from tule reeds.

The first European contact with the South Valley Yokuts was in 1772, soon after the first Spanish settlement in California. The area was influenced only lightly by missionization: the difficult marshy terrain made it difficult to find either new converts or runaways from mission authority. It was only with the establishment of farms and ranches in the Southern Valley after the Gold Rush that the South Valley Yokuts were dispossessed of their land. Today a small remnant of the group lives on the Tule River and Santa Rosa reservations (Wallace 1978).

Foothill Yokuts

The Foothill Yokuts are distinguished from their valley cousins both by their distinct dialects and their foothill habitat. Most Foothill Yokut villages were located between 2,000 and 4,000

feet in the Sierra Foothills, a zone which incorporates diverse life zones including chaparral, coniferous forest, and oak woodland. Their subsistence was focused on hunting and gathering and was highly diversified, with fish playing a much smaller part than in the valley. As in the valley, basketry and stone work were the major crafts, although some simple pottery is attested from central foothills groups (Wallace 1978). Fresno County Waterworks # 34 is within the territory of the Gashowu group of Foothill Yokuts.

Native American Sites

Native American habitation has left many traces on the landscape. The most intensive settlement was located along watercourses, of which the valley had many. In the north part of San Joaquin Valley numerous village sites were located on mounds on or near the natural levees that flank many parts of the San Joaquin River. In the south valley, village sites have been discovered along the shores of the former Buena Vista and Tulare lakes, and more are likely to exist along other waterways. Village sites, often marked by a mound, are characterized by extensive subsurface deposits and sometimes contain human burial sites.

Other types of Native American sites include lithic surface scatters of lithic and other artifacts, which may indicate a temporary camp or specialized tool processing area. Also many bedrock or boulder milling/food-processing stations, characterized by cupules and slicks in the rocks. These stations are often located at natural bedrock outcrops or along perennial streams, which may deposit large boulders of suitable material along their course. Trails, rock art, and isolated artifacts or flakes are other traces of Native American occupation that may be present in the Study Area.

History

The first Europeans to enter the Study Area were Pedro Fages and his expedition, who explored the San Joaquin Valley in 1772. However, most subsequent Spanish settlement in California was concentrated along the coast and adjacent valleys. When Mexico became independent, the government began to give land grants to settlers, including a few in the southern valley in the early 1830s. These settlements often provided the nucleus for present-day cities.

Until the late 1850s, the San Joaquin Valley was sparsely settled by Europeans. Extensive areas of marsh were a hindrance to farming. By the mid-1860s, however, American settlers were beginning to reclaim and drain land for agriculture and ranching. By the 1870s, the San Joaquin Valley was the center of California's wheat production. The introduction of canning technology and transcontinental rail led to widespread diversification and development of specialty crops such as fruits and nuts. About the same time, exploitation of the petroleum resources of the valley began, and continues today. The need for a steady supply of water to irrigate the increasing acreage of farmed land led to the incorporation of water districts, and in 1933 to the introduction of the State Water Plan, which grew into the CVP.

Historic Sites

The Study Area includes a large number of historic sites. The majority of these occur within the confines of historic settlements such as Visalia. However, many other types of historic features that may be found in the landscape include, but are not limited to historic structures; linear features such as roads, trails, railroads, and telegraph lines; features related to historic water transportation, such as canals, ditches, and channels; and homestead - and ranch - related structures.

Cultural Resources Baseline Data

This section presents the results of a record search conducted at the Southern San Joaquin Valley Information Center of the California Historical Resources Information System. A more detailed presentation is provided in the confidential technical appendix to this EA.

Information Sources

Because of the irregular boundaries of the various water districts encompassed in the CVC service area, the USGS 7.5' quadrangles with coverages including one or more Cross Valley water districts were searched in their entirety. The information requested included:

- A list of recorded historic and prehistoric archaeological sites
- Archaeological sites reported to the Information Center, but not formally recorded
- The California Inventory of Historical Resources for the project counties
- California Points of Historical Interest within the Study Area
- The Directory of Properties in the Historic Properties Data File for the project counties, which includes all properties assessed for the National Register of Historic Places (NRHP) (through September 1999)
- The list of Archaeological Determinations of Eligibility, which includes archaeological sites assessed for inclusion in the NRHP, state, or local registries (through June 1999)

The NAHC also performed a search of their sacred lands file for the Study Area. Numerous sacred sites and other traditional cultural properties are located in or near the CVCs service area. However, specific information is confidential. Reclamation is currently conducting government-to-government contacts with federally recognized tribes who may have information about such sites.

Data Limitations

The data retrieved from the Information Centers carry a number of limitations. Most significant is the fact that only a small percentage of California has been subjected to intensive archaeological survey. Estimated survey percentages for the counties of the CVC service area are as follows (See Draft PEIS II:42, II:50):

- Fresno-5 percent
- Kern-5 percent
- Kings-<1 percent
- Tulare-2 percent

Most archaeological surveys are project-driven; that is, they are conducted in response to a proposed change in land use or new ground-disturbing activity requiring agency review. Therefore, lists of known sites reflect the number of studies performed and do not necessarily reflect the actual density or distribution of archaeological sites. It is likely that the agricultural land that comprises most of the CVCs service area has not undergone significant changes in land use that would trigger archaeological investigation. Therefore, it seems probable that even less of the land in the CVCs service area has been surveyed than the above percentages would indicate.

In addition, it is likely that historic archaeological sites are underrepresented in the Information Center database, since the recording of historic sites was not common until the 1970s. In addition, the Information Center records may be incomplete because of a backlog in data entry or the failure of individuals or agencies to submit site records or reports. Such information is not reflected in the data presented below.

The data presented in the attached tables distinguish between historic resources that are part of the built environment and those that are archaeological in nature. For the purposes of this report, built environment resources include historic structures or features, such as canals or houses, that are still in use. Archaeological resources, on the other hand, are defined as historic features or structures that are no longer an active part of the built environment. Therefore, inhabited houses or working canals are included in the built environment of the tables, whereas abandoned houses or disused railroad grades are counted as historic archaeological resources.

Search Results

From the record search results, a database was prepared that included the information listed above. Because of the highly irregular boundaries of the water districts within the APE, sites were included in a 500-meter buffer zone outside of the apparent district boundaries to ensure complete coverage. Therefore, the number of sites listed below may slightly exceed those actually within the APE.

There are 117 historic or archaeological resources are known within the CVCs service area. Of these, 57 (48.7 percent) are prehistoric archaeological sites; 10 (8.5 percent) are historic archaeological sites; 2 (1.7 percent) have both prehistoric and historic archaeological components; and 47 (40.2 percent) are part of the built environment (Table CR-1). Only those districts with known cultural resources located within their respective boundaries are presented in the Tables R-1 to CR-4.

Table CR-1
Cultural Resources in the Cross Valley Contractor Service Area

District	Prehistoric Sites	Historic Sites	Multicomponent Sites	Built Environment	Total
Alpaugh Irrigation District	3				3
Atwell Island Water District			1		1
City of Visalia	2	0		45	47
Fresno County Water Works #34	36	5	1		42
Hills Valley Irrigation District	4	1			5
Pixley Irrigation District	4	2		3	9
Tri-Valley Water District	8	2			10
Total	57	10	2	48	117

A majority of the built environment resources (45 [93.8 percent]) are located in the City of Visalia water district and are urban in nature, mostly homes, bridges, and canals. Among the prehistoric resources 37 (62.7 percent) are located within Fresno County Water Works #34, a heavily surveyed area south of Millerton Lake. Few resources remain within the other districts of the CVCs service area. As noted above, it is likely that this paucity of sites reflects a lack of cultural resource inventories within the given areas, rather than the absence of historic or prehistoric resources (See Tables CR-2, CR-3).

Table CR-2
Prehistoric Archaeological Resources and Register Status

District	Not NRHP/CRHR eligible	Unevaluated/ status unknown	Total
Alpaugh Irrigation District		3	3
Atwell Island Water District*		1	1
City of Visalia		2	2
Fresno County Water Works #34*	1	36	37
Hills Valley Irrigation District		4	4
Pixley Irrigation District		4	4
Tri-Valley Water District		8	8
Total	1	58	59

Note: Districts marked with a * have one multicomponent site which is counted on both historic and prehistoric tables.

Table CR-3
Historic Archaeological Resources and Register Status

District	NRHP/CRHR eligible	Unevaluated/ status unknown	Total
Atwell Island Irrigation District*		1	1
Fresno County Water Works #34*		6	6
Hills Valley Irrigation District		1	1
Pixley Irrigation District	1	1	2
Tri-Valley Water District		2	2
Totals	1	11	12

Note: Districts marked with a * have one multicomponent site that is counted on both historic and prehistoric tables.

Three built environment resources in the CVCs service area are on the NRHP, all of them within Visalia city limits. One historic bridge is listed on the Historic American Building Survey/Historic American Engineering Register (HABS/HAER). Beyond this, 36 historic properties in the CVCs service area have been determined eligible for the NRHP. Thirty-five of these are within the City of Visalia water service area, and one is within the Pixley Irrigation District, in downtown Pixley. Of the remaining known resources, two have been determined ineligible for NHRP or California Register of Historic Resources(CRHR), and the rest are unassessed or of unknown status (Table CR-4).

Table CR-4
Built Environment Resources and Register Status

District	NRHP or other register	NRHP/ CRHR eligible	Not NRHP eligible	Unevaluated / status unknown	Not eligible but HABS/ HAER listed	Total
City of Visalia	3	36	1	4	1	45
Pixley Irrigation District	0	0	0	3	0	3
Totals	3	36	1	7	1	48

Regulatory Setting

For federal purposes, a historic property is a cultural resource that is significant under the criteria of eligibility for the NRHP, as defined under 36 CFR Section 60.4. Historic properties must possess integrity of location, design, workmanship, feeling, and association, and must meet at least one of the following criteria:

- Association with events that have made significant contributions to the broad patterns of the history of the U.S.
- Association with the lives of people significant in U.S. history.
- Embody the distinctive characteristics of a type, period, or method of construction; or represent the work of a master, or possess high artistic value, or represent a significant and distinguishable entity whose components may lack individual distinction.
- Has yielded, or is likely to yield, information important in history or prehistory.

California State Landmarks are assigned a sequential number as they are identified and compiled. Landmarks above number 770 are automatically included in the CRHR while landmarks below number 770 require individual evaluation for inclusion on the CRHR or NRHP.

Environmental Consequences

This section describes the basis for:

- Determining which cultural resources located within the project area have been included, or are considered eligible for inclusion on the NHRP, or are considered significant in accordance with the California Environmental Quality Act (CEQA); and whether additional such resources may remain undiscovered within the water service areas encompassed by the CVCs service area.
- Identifying and assessing the potential effects of the contract renewal alternatives under consideration on eligible or potentially eligible or significant cultural resources.

No Action Alternative

The Preferred Alternative is provided in the PEIS for CVPIA. This is the NAA for the CVC EA. The NAA is described in detail in Section 2. The NAA serves as a baseline for comparison with the other alternatives in the EA. It describes the conditions in the absence of a federal project. Developed from the PEIS Preferred Alternative, the NAA assumes existing facilities to provide CVP water to the CVCs would continue to use the existing management practices for the CVP,

SWP and Cross Valley Canal. The NAA uses the full contract amount from the previous year. This contract amount does not change whether the contractor takes the water or not; only what is available. Changes to the management direction could affect operation of the CVP water facilities, repayment methods and pricing structures for water and power, water contract renewals, and compliance with federal and state water quality requirements.

Because the NAA assumes renewal of the long-term contracts, it would be considered a federal undertaking. Continued delivery of CVP water to the CVCs would constitute a project with potential for adverse environmental effects pursuant to NEPA.

Impacts could occur due to mowing or trenching through an archaeological site, leveling of a mound, and repeated changes in reservoir impoundment levels, which could result in increased surficial erosion that could expose previously buried sites.

The many archaeological sites within the CVCs service area include documented and undocumented prehistoric and historic sites and features, and groups of sites that may qualify as NRHP districts. As well as visible surface manifestations, these sites may include or be primarily composed of subsurface accumulations of cultural material. The importance of such a site, therefore, rests not only on the age and materials present but also on the horizontal and vertical integrity of the soil and its contents.

Under the NAA, all existing CVCs service area management will continue to operate under current existing conditions. No impacts to cultural resources are expected, since no additional infrastructure (i.e. dams, increase in dam heights, canals, etc.) will be constructed. Additionally, under this alternative, there will be no increase in deliveries and no conversion of existing natural habitat into farmland or other uses.

In those long-term renewal contract actions that are not within the range of existing conditions and will affect historic properties, a commitment will be made that Reclamation will comply with Section 106 of the National Historic Preservation Act. In some instances the responsibility to address affects to cultural resources will be with the local government as part of their CEQA compliance for their actions. Such actions are approved locally and at the state level. Reclamation would need to consider the effects to historic properties when Reclamation approves new lands being brought into an irrigation district (Inclusions) and when Reclamation approves a change in use that could lead to an effect on historic property.

In compliance with 36 CFR Section 800.4(a)(4), Reclamation has sent letters to Indian tribes requesting their input regarding the identification of any properties to which they might attach religious and cultural significance to within the area of potential effect. To date no comments or formal responses have been received from the tribes.

Alternative 1

Alternative 1 is similar to the NAA. Therefore, there are no impacts to cultural resources under this alternative.

Alternative 2

Alternative 2 is similar to the NAA. Therefore, there are no impacts to cultural resources under this alternative.

Cumulative Effects

Under all three Alternatives, all CVCs service area management will continue to operate under the existing conditions. No changes in land use will be created by the project, therefore, no cumulative impact on cultural resources is anticipated.

SOCIAL CONDITIONS

Affected Environment

The social conditions in the CVCs service area are described with factors such as employment level, educational opportunities, the income level, the community social structure, and the need for public social assistance programs. These conditions were described in detail for the Tulare Lake Region in the PEIS and are summarized below.

The CVCs service area is predominately rural with numerous small cities. Large communities, such as Fresno and Bakersfield, are also located in the vicinity of the CVCs service area. The regional economic indicators of social well being are all measures of the social conditions within a region. For the Tulare Lake Region, the unemployment rate is higher than in urban areas (Table SC-1), attributed to a large seasonal labor market and limited availability of employment in other industries. Unemployment for Fresno, Kern, and Tulare counties ranged from 12.1 to 15.6 percent in 1997 while statewide unemployment was 6.3 percent (see Table SE-1). As the farming economy declines, the employment opportunities also decline.

Table SC-1
Regional Demographic and Economic Indicators of Social Well Being

Issues	Tulare Lake Region
Population in 1992	1,031,000
Median Family Income in 1990	$37,000 - $32,000
Per Capita Income in 1990	$10,000 to $12,000
Poverty Rate in 1990	17% to 23%
Median House Costs in 1990	$80,000
Unemployment Rate in 1992	15%

Source: EDD 1999; 1999a

The ethnicity of the CVCs service area is predominately white with Hispanic peoples comprising about 30 percent of the population in the Tulare Lake Region (Table SC-2). The statewide estimates for poverty and unemployment levels within these ethnic groups are shown in Table SC-3.

Table SC-2
Ethnicity by Tulare Lake Region

Ethnicity (percentage)	Tulare Lake Region (percentage)
White	60
Black	4
Asian	3
Hispanic	33

Source: EDD 1999; 1999a

Table SC-3
Poverty and Unemployment Rates

Ethnicity (percentage)	Poverty Rate	Unemployment Rate
White	6	4
Black	21	7
Asian	11	4
Hispanic	18	7

Source: EDD 1999; 1999a; CDF 1998

The largest employment opportunity in the region is agricultural. Agricultural employment affects local communities not only as direct labor (farmers, farm workers) but also indirectly through farm equipment, farm supplies, and farm commodity processing.

Within the CVCs service area are two major social groups: farmers, and farm workers and agribusiness workers (EDD 1999). Farmers are individuals who own farmland or manage farm operations. Typically, farmers live within 15 miles of the farm and spend about 85 percent of farm production costs locally (EDD 1999). Farm workers are people employed to work on a farm, including permanent and seasonal workers. About 41 percent of the farm workers are seasonal employees. Agribusiness workers are those individuals who are indirectly involved with farm production and employed in businesses that serve the farming community. In 1999, 18.3 to 19 percent civilian labor force were employed in agriculture in Fresno and Kern Counties. Agriculture accounts for 27 percent of total employment in Tulare County (EDD 1999).

Environmental Consequences

Environmental Justice

Executive Order 12898 requires that federal agencies address, as appropriate, disproportionately

high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the U.S. and its territories. This action would not have a disproportionately high adverse affect on any one ethnic group more than another including land owners, farmers, and farm workers. However, this action would reflect more on the individual education and skill level and the type of labor requirements necessary for the agricultural production and services, notably the indirect impacts to farm laborers who are generally economically disadvantaged (Reclamation 1999a).

The renewal of the long-term contracts would allow for the continued delivery of CVP water at historic amounts to the CVCs providing collateral for lenders to secure loans for landowners and farmers. The long-term availability of CVP water contributes to the stability for the agricultural business and associated employment opportunities for migrant workers and disadvantaged populations.

Indian Trust Assets

Indian trust assets (ITA) are legal interests in assets held in trust by the federal government for Indian tribes or individuals. The trust relationship usually stems from a treaty, executive order, or act of Congress. Assets are anything that holds monetary value. Assets can be real property, physical assets, or intangible property rights. Examples of trust assets are lands, minerals, hunting and fishing rights, and water rights. In addition, such assets include the right to access certain traditional areas and perform traditional ceremonies.

The federal government maintains a responsibility to protect ITAs and to avoid adverse impacts where possible. Appropriate mitigation or compensation is required in consultation with affected Indian tribes when impacts cannot be avoided. Secretarial Order No. 3175, issued November 1993, clarifies the responsibility of the federal government in developing procedures for identifying, protecting, and maintaining ITAs.

Within 15 miles east of the CVCs service area, there are approximately 10 public domain allotments (PDAs) located in Fresno and Tulare counties. The PDAs, owned by native Americans, are small parcels of land that are frequently held in trust. Any land held in trust for native Americans whether PDA or rancheria, is an ITA. One of the ITAs is located within the CVCs water service districts the Table Mountain Rancheria is in the Fresno County Water Works #34.

Under the proposed alternatives, the continued delivery of CVP project water to the existing contractors would not affect any ITAs, because existing rights would not be affected, and there are no physical changes to the existing facilities included in the NAA nor are any new facilities constructed. There are no proposed changes in reservoir operations that would interfere with any water rights claims, nor will it reduce the diversion of water to the Table Mountain Rancheria through the Fresno County Water Works #34. In addition, there will be no increase in CVP deliveries, land use changes, or conversion of existing natural habitat into farmland or other uses. Consequently, none of the alternatives proposed would affect ITAs located east of the CVCs service area nor are any known ITAs served by the CVCs.

No Action Alternative

Under the NAA, all existing coordination and operations associated with the delivery of CVP water to the CVCs will continue as under current conditions. No new or additional facilities will be constructed. Unemployment in the CVCs service area will remain higher than the statewide unemployment rates. Agriculture will remain a large employer in the region.

Alternative 1

Impacts to social conditions associated with the Alternative 1 are expected to have similar effects to social conditions as the NAA. Therefore, there are no impacts from this alternative.

Alternative 2

Maximum reduction in irrigated acres was identified in an economic analysis using the wet water year following a 5-year sequence of dry years scenario (CH2M Hill 2000). Under this scenario, the economic analysis identified a reduction of 0.1 percent irrigated acres in the region. This reduction in irrigated acreage would result in no impact to the CVCs service area.

Cumulative Effects

Implementation of any of the alternatives would have no impact to the future social conditions to the cumulative action. The alternative would not contribute to the cumulative impacts of social conditions in the CVCs service area.

AIR QUALITY

Affected Environment

The CVCs service area is within the San Joaquin Valley Air Basin. Comprising about 24,840 square miles, the air basin represents approximately 16 percent of the geographic area of California and is the second largest air basin in California populated by an estimated 2.9 million persons. Major urban centers in the air basin include Bakersfield, Fresno, Modesto and Stockton.

Air quality is regulated through both federal and California Ambient Air Quality Standards (AAQS). Federal AAQS establish primary and secondary national AAQS. National primary standards define air quality levels that are protective of public health while the secondary standards are protective of the public welfare (e.g., degrade the environment, impair visibility, or damage vegetation and property). The potential impacts to these national and state AAQS from implementation of the CVPIA are discussed and evaluated in the PEIS. However, the PEIS does suggest local regional conditions may require further evaluation. Consequently, the air quality assessment tiers off the PEIS by focusing on regional particulate emissions associated with contract renewals for the CVCs.

In 1987, the AAQS established fine particulate matter less than or equal to 10 microns (PM10) at 150 micrograms per cubic meter (µg/m3) of air during a 24-hour period and 50 µg/m3 on an annual basis. In 1997, PM standards were promulgated by EPA. As a subset of PM10, PM2.5 are particles with an aerodynamic diameter less than or equal to a nominal 2.5 microns. The PM2.5 24-hour and annual arithmetic standards are 65 and 15 µg/m3, respectively.

By contrast, the California 24-hour and annual average standards are considerably more stringent than the federal 24-hour standards. The state standard is 50 µg/m3 on a 24-hour basis while the annual geometric standard is 30 µg/m3. Air basins that exceeded these values were determined to be nonattainment for PM10. The EPA classified the San Joaquin Valley Air Basin as a serious PM nonattainment area effective February 8, 1993. The San Joaquin Valley Unified Air Pollution Control District is currently implementing a PM10 attainment plan to meet the federal standard (SJVUAPCD 1994).

The San Joaquin Valley Air Basin Mediterranean-like climate generally consists of hot dry summers and cool wet winters. Approximately 90 percent of the rainfall occurs between November and April, with little or no precipitation occurring from late spring to early fall. The San Joaquin Valley floor is characterized by hot, dry summers and cooler winters. The average mean temperature over a 30-year period is 65°F. High daily temperature readings in summer average 95°F in the valley. The valley also experiences mild winters; the winter average daily low temperature is 45°F. Over the last 30 years, the valley averaged 106 days a year at 90°F or hotter and 40 days a year at 100°F or hotter. The daily summer temperature variation can exceed 30°F. The valley has an "inland Mediterranean" climate with an average of over 260 sunny days per year.

Semipermanent systems of high barometric pressure fronts frequently establish themselves over the Air Basin, deflecting low pressure systems that might otherwise bring cleansing rain and winds. The strength and duration of the inversion determines the amount of atmospheric mixing that will occur, which subsequently contributes to PM10 concentrations in the Air Basin. Low wind speeds, combined with low inversion layers in the winter, create a climate conducive to high PM10 concentrations (SJVUAPCD 1994).

Environmental Consequences

Particulate sources that could be affected by contract renewals relate to dust sources associated with retirement and fallowing of agricultural land, the use of heavy farm equipment, and application of pesticides and fertilizers.

No Action Alternative

Under the NAA, the renewal of the contract would not involve the construction of any new facilities or result in land-disturbing activities that could contribute to particulate emissions or construction equipment exhaust.

Continued water supply deliveries will support both existing and future urban and agricultural land uses. However, these land uses do contribute to air pollutants, including emissions of reactive organic gases creating ozone, particulates, and other pollutants. The pollutant emission volume and rate from these land uses is not expected to vary between the NAA and the alternatives.

In the NAA, agricultural land uses in the Central Valley would include similar crops and cropping patterns. It is assumed that retired or fallowed lands would be reseeded with grasses and grazed by livestock or occasionally dryland farmed. These cultivation measures are similar to methods used on lands that have been historically fallowed due to crop rotation or periodic cropping pattern changes.

The current policies and practices of regulatory agencies would continue at the present level of intensity, including the continuation of air quality monitoring and air quality compliance programs within the Air Pollution Control District. Particulate emission programs target PM10 from general and specific emissions sources in past years, and are associated with reductions of PM10 in the Central Valley. However, it is recognized that this region is in nonattainment for particulates and further efforts to reduce particulate emission in the future are likely to occur. Therefore, because the cultivated and fallowed acreage patterns are similar to historical patterns, it is anticipated that air quality under the NAA would be similar to recent conditions described in the Affected Environment.

Alternative 1

Irrigated acreage under Alternative 1 would be similar to the NAA. It is assumed that the lands to be retired or fallowed would go to seed with grasses and would be grazed by livestock or occasionally dryland farmed. These cultivation measures are similar to methods used on lands that have been historically fallowed due to crop rotation or periodic cropping pattern changes. Therefore, due to limited changes in land use it is anticipated that the level of wind erosion potential would not increase under Alternative 1 as compared to the NAA.

The retirement and fallowing of land would also be associated with reductions in the use of farm equipment and application of pesticides and fertilizers. However, because the percentage of land that would be affected by these changes is small, it is anticipated that air quality conditions resulting from vehicle emissions and pesticide and fertilizer use would not change under Alternative 1 as compared to the NAA.

Alternative 2

The maximum reduction in irrigated acres as compared to the NAA was identified in an economic analysis using the wet water year following a 5-year sequence of dry years scenario (CH2M Hill 2000). Under this scenario, the economic analysis identified a maximum reduction of less than 0.1 percent of the irrigated acres in the CVCs service area.

It is assumed that the lands to be retired or fallowed would go to seed with grasses and be grazed

by livestock or occasionally dryland farmed. These cultivation measures are similar to methods used on lands that have been historically fallowed due to crop rotation or periodic cropping pattern changes. Therefore, due to less than minor changes in land use, it is anticipated that the level of regional wind erosion potential would not increase under Alternative 2 as compared to the NAA.

The retirement and fallowing of land would also be associated with reductions in the use of farm equipment and application of pesticides and fertilizers. However, because the percentage of land that would be affected by these changes is small, it is anticipated that air quality conditions resulting from vehicle emissions and pesticide and fertilizer use would not change under Alternative 2 as compared to the NAA.

Cumulative Effects

Implementation of Alternative 1 and 2 would not contribute to the cumulative impact of air quality. The alternatives do not consider construction of new facilities, generally emission sources that contribute to the cumulative impact.

GEOLOGY AND SOILS

Affected Environment

The CVCs service area is located in the southern San Joaquin Valley north of the city of Bakersfield. The geology and soils impact analysis is primarily based upon soil erosion impacts from changes in agricultural land use and stream flows. A brief discussion of the soils of the southern San Joaquin Valley follows.

The Sierra Nevada is the tallest and most continuous mountain range in California. In the southern Sierra Nevada, elevations range from about 400 feet at the edge of San Joaquin Valley and to 14,000 feet or more at the crest. The Sierra Nevada Province is generally composed of Mesozoic Sierran granitic batholith and associated older metamorphic rocks. The shallow soils of the lower Sierra Nevada foothills to an elevation of about 3,500 feet are moderately deep to deep. The gently rolling to steep foothills surface layer ranges from coarse sandy loam to clay, with a high percentages of clean, well sorted gravel and sand. In general, alluvial sediments of the western and southern parts of the valley tend to have lower permeability than eastside deposits (USDA 1971).

The San Joaquin Valley is composed of tertiary sediments and volcanics. The alluvial fans and plains consist of unconsolidated continental deposits that extend from the edges of the valley toward the valley floor. Derived entirely from runoff from the Sierra Nevada, the alluvial material formed a level to rolling landscape. Soils formed in light to moderately coarse textured alluvium were derived from weathered granitic and sedimentary rock. The alluvial plains cover most of the valley floor and make up some of the intensely developed agricultural lands. The level to gently sloping soils of the valley surface layer ranges from sandy loam to clay. The

valley soils are very deep to moderately deep and are well drained (USDA 1982).

Local wind erosion rates climatic factors, soil surface roughness, width of field, and quantity of vegetative cover affect soils and wind erosion of soils. Climatic factors incorporate the moisture of the surface soil. Soil taken out of irrigation and allowed to remain barren with no cover vegetation will have greater losses to wind erosion than the same soils under a good crop and land management program with irrigation. Wind erosion not only impacts vegetation, but also public health, through fugitive particulate emissions. Soils may become shallower, organic matter and needed plant nutrients could be removed, and young plants may be damaged from soil losses and windborne particulates.

Several types of water-based soil erosion exist. In order of increasing erodibility they are sheet, splash, and rill and gully erosion. Some factors that influence the erodibility of soils include land slope, surface texture and structure, infiltration rate, permeability, particle size, and the presence of organic or other cementing materials. Level land erodes less than sloped land because flow velocities are less. Based on this factor alone, terrace and upland soils would be more susceptible to water erosion than soils on the valley floor.

Environmental Consequences

Impacts on soil resources are considered significant if the project results in changes in agricultural land use which may result in increased erosion potential, land subsidence which may result in increased bank erosion and associated siltation problems, land subsidence from groundwater overdraft, and decreases in soil quality due to salt accumulation.

No Action Alternative

Water supplies to lands within the CVCs service area would be delivered to the contractors in accordance with the CVPIA and the individual long-term service contracts. All the alternatives would provide water supplies to the respective contracting agencies for their respective contract amount. In the case of agricultural water deliveries, the continued delivery of CVP water would continue the productive use of prime farmlands that are found in the service area.

Implementation of either the NAA or alternatives would not result in impacts to soil. Retired or fallowed lands are assumed to have cover crops planted in the last year of cultivation. The existing policies and programs of Reclamation, as expressed in the CVPIA, provide for protection and conservation of unique soil, mineral, and geologic resources within the service contract area. These plans guide future land and resource use within the CVP service area.

Increased river releases would be in accordance with the CVP operational criteria that include steamflow limitations to protect aquatic species and prevent scouring and bank erosion. Reclamation coordinates the operation of CVP reservoirs with California Department of Fish and Game and the Service to schedule releases that create pulse flows to help “push” the fish downstream.

Alternative 1

Impacts associated with Alternative 1 are expected to have similar impacts as the NAA. Continued application of streamflow considerations in reservoir operations will be applied and will not increase streambed erosion.

Retired or fallowed agricultural production lands are assumed to have a cover crop planted in the last year of cultivation. The cultivation measures and future land use changes are not anticipated to increase the level of erosion as compared to the NAA.

Increased river releases would be in accordance with the CVP operational criteria which include steamflow limitations to protect aquatic species and prevent scouring and bank erosion. Reclamation coordinates the operation of CVP reservoirs with California Department of Fish and Game and the service to schedule releases that create pulse flows to help "push" the fish downstream. Continued application of streamflow considerations in reservoir operations will apply and will not result in additional streambed erosion.

Alternative 2

There would be no reduction to the impact from Alternative 2. The maximum reduction as compared to the NAA in irrigated acres was identified in an economic analysis using the wet water year follow a 5-year sequence of dry years scenario (CH2M Hill 2000). Under this scenario, the economic analysis identified a reduction of 0.1 percent irrigated acres in the Cross Valley service area.
Retired or fallowed agricultural production lands are assumed to have a cover crop planted in the last year of cultivation. The cultivation measures and future land use changes are not anticipated to increase the level of erosion as compared to the NAA. Continued application of streamflow considerations in reservoir operations will be applied and will not increase streambed erosion.

Under Alternative 2, a single year of decreased groundwater pumping will not adversely or beneficially affect the groundwater basin. Over the long term the groundwater use in subbasin 17 would decrease, based on the CVPM simulations.

Cumulative Effects

The CVCs management and operations will continue with no impact to the existing conditions. Implementation of Alternative 1 or 2 would not contribute to the cumulative impact to the geology and soil from other activities.

VISUAL RESOURCES

Affected Environment

The visual resources focus in the CVCs service area are visual resources located in the eastern

portions of the San Joaquin River Region which, includes the Cross Valley Canal.

Visual resource classification is provided using the U.S. Forest Service (USFS) landscape character types and the Visual Management System (VMS). Landscape character types are based on landscapes with similar physiographies (i.e., combinations of landforms), vegetative cover types, and surface water bodies. Based on its total visual character; no single physical characteristic dictates character type, although landform has a stronger influence than other characteristics. The USFS has established criteria for application of VMS to most landscape features occurring in the State of California (USFS 1976). Landscape character is rated as follows:

- Variety Class A landscapes are distinctive landscapes with high visual quality. They contain outstanding feature attractions and distinctive varieties in form, line, color, texture, landform, vegetation, and water features. As a rule, Class A landscapes are favored by photographers.

- Variety Class B landscapes are quality landscapes with some variety in form, line, color, or texture. Major, visually dominant features are absent. In general, such landscapes are considered pleasant to view, but are not notably the subject of photographers.

- Variety Class C landscapes are low quality visual landscapes. They are sometimes described as monotonous because they lack variety of form, line, color, and/or texture.

The VMS evaluates the relationship between landforms, vegetation, water, air, and non-man-made structures. The quality of a landscape scene is evaluated using the following criteria: landscape character (based on the public perception of the view), visual sensitivity (based on the proximity of the viewer to the viewshed), and deviations from the characteristic landscape (based on the presence and design of manmade alterations to the landscape). Man-made alterations that borrow from the character of the landscape are considered more harmonious than those that do not borrow their form, line, color, and/or texture from the surrounding area (USFS 1973).

The San Joaquin River and Tulare Lake Regions include two provinces: the Sierra Foothills and Low Coastal Mountain and the Central Valley. Principal CVP facilities in the eastern portions of the San Joaquin River Region include the Cross Valley Canal. The canal offers relatively few road travel viewing opportunities. The canal enhances the visual interest of the landscapes in which it occurs, but the flat land and land uses prevent frequent viewing by travelers on major routes. The service area is predominantly considered Variety Class C, with extensive areas of monotonous landscape. The management standard is maximum modification or modification. Exceptions are those areas where the foothills join the Central Valley to form entrant valleys of agricultural land surrounded by grass-covered and wooded hills, which are considered Variety Class B. The management standard is maximum modification or modification. Urban areas are considered Variety Class C, with management standards of maximum modification and modification.

Environmental Consequences

Impacts to visual resources are dependent upon (1) changes in cropping patterns, which may result in increased fallowed lands and associated modified agricultural viewshed, and (2) releases from storage reservoirs, which may result in a "bathtub ring" caused by the appearance of unvegetated soil at the shoreline between the water surface and the high water line. The VMS is used to inventory visual resources and to subsequently provide a means of identifying visual resource management standards for incorporation into forest management plans (USFS 1973).

No Action Alternative

The renewal of the contract would not involve the construction of any new facilities or result in land-disturbing activities that could alter the visual environment. Retired or fallowed agricultural production lands are assumed to have a cover crop planted in the last year of cultivation. General cultivated and fallowed acreage patterns would be similar to historic patterns. The NAA would not have a demonstrable effect on the unique or scenic landscape features.

Alternative 1

Similar to the NAA, Alternative 1 does not involve the construction of any new facilities or result in land-disturbing activities that could alter the visual environment. General cultivated and fallowed acreage patterns would be similar to historic patterns. Alternative 1 would have similar effects to visual resources as the NAA. Therefore, there are no impacts from this alternative.

Alternative 2

The acreage of production lands fallowed would be reduced by a minimal amount. The maximum reduction in irrigated acres was identified in an economic analysis using the wet water year following in a 5-year sequence of dry years scenario (CH2M Hill 2000). Under this scenario, the economic analysis identified a reduction of less than 1 percent of the irrigated acres in the CVCs service area.

Additionally, retired or fallowed agricultural production lands are assumed to have a cover crop planted in the last year of cultivation. Little change would occur in the agricultural viewshed under Alternative 2 in comparison with the NAA. There would be no impact from Alternative 2 to the visual resources.

Cumulative Effects

Implementation of Alternative 1 or 2 would not contribute to the cumulative effects of this resource area.

SECTION 4

CONSULTATION AND COORDINATION

INTRODUCTION

On October 16, 2000, Reclamation published the Draft Cross Valley Contractors Long-Term Contract Renewal EA. Comments were submitted to Reclamation on the Draft EA and responded to in the document, Cross Valley Contractors Long-Term Contract Renewal EA, Final, January 2001. This 2004 Supplemental EA updates the 2000 EA and responds to comments documented in the January 2001 Final EA.

Prior to preparation of this EA, input was solicited and incorporated from a broad range of cooperating and consulting agencies and the public. This section summarizes the public involvement program and key issues raised by the public and interest groups. This section also addresses the manner in which Federal statutes, implementing regulations, and executive orders potentially applicable to implementation of the CVPIA have been addressed. The conclusions of compliance are based on the Environmental Consequences presented in Section 3. The compliance summaries apply only to the alternatives discussed in this EA and not the development of concurrent CVPIA implementation programs.

PUBLIC INVOLVEMENT

Reclamation started the preparation of this EA with Scoping Meetings. Scoping served as a fact-finding process to identify public concerns and recommendations about the long-term contract renewal issues that would be addressed in this EA and the scope and level of detail for analyses. Scoping activities began in October 1998 after a Notice of Intent to prepare environmental documentation for long-term contract renewals was filed in the Federal Register. The scoping period formally ended in January 1999. The Scoping Report was released in summer of 1999.

Public input continued during long-term contract negotiations to define the contract language. Discussions also were held with the San Felipe Division long-term water service contractors during the preparation of this document.

At public scoping meetings, Reclamation provided information about long-term contract renewal process and solicited public comments, questions, and concerns. At these meetings, participants had numerous comments and questions about how important issues would be considered both in the PEIS and the long-term contract renewal process. The majority of the comments received during the Scoping process addressed the Needs Assessment methodology to be used as part of the long-term contract renewal process. Contract renewal negotiation issues also were addressed. The least number of comments addressed environmental review issues.

Reclamation received numerous comments about issues to be considered in the PEIS and methodologies for analyzing impacts. Comments considering the development of alternatives were considered in the formation of the alternatives. However, it was determined to focus the description of alternatives on the contract proposals and address issues related to water supply improvements to be addressed by CALFED and the Least Cost Yield study. Considerations of comments on methods to address impacts were considered in the development of the Environmental Consequences section of this EA. However, the impact analysis focused on the

comparison of the alternatives with the projected NAA, not the Existing Conditions scenario.

Based upon the comments received and the determination to focus the alternatives on the language in the proposed contracts, the level of detail for this EA was determined. It was also determined that based upon the minimal number of differences between Alternatives 1 and 2, an EIS would not be necessary.

Reclamation published the Draft Cross Valley Contractors Long-Term Contract Renewal EA on October 16, 2000. The Draft EA presented an evaluation of the potential impacts and benefits for Reclamation to renew the long-term water service contracts to deliver water from the CVP to the Cross Valley contractors for agriculture, municipal, and industrial uses. The Draft EA was available for public comment through December 8, 2000. Comments submitted to Reclamation on the Draft EA during the comment period were addressed in the Cross Valley Contractors Long-Term Contract Renewal EA, Final, January 2001.

The January 2001 Final Cross Valley Contractors Long-Term Contract Renewal EA consisted of the following:

- A discussion of the relationship between the Final and Draft EA (Section I);
- A discussion of the approach and organization applied in the Final EA to address issues presented in the comment letters and communications (Section I);
- A list of commentors on the Draft EA (Section I);
- A summary of the public involvement efforts (Section I);
- Errata to the Draft EA (Section II); and
- Comments and responses (Section III).

This 2004 Supplemental EA incorporates comments documented in the January 2001 Final EA.

CONSULTATION WITH OTHER AGENCIES

This EA was prepared in accordance with the policies and regulations for the following issues. Brief discussions of these issues and how compliance was addressed in this EA is discussed in the previous sections. Work is continuing on each of these requirements. As individual projects are implemented, compliance requirements will be considered.

- National Environmental Policy Act
- California Environmental Quality Act
- Endangered Species Act
- Fish and Wildlife Coordination Act
- National Historic Preservation Act
- Indian Trust Assets
- Indian Sacred Sites on Federal Land
- Environmental Justice
- State, Area-wide, and Local Plan and Program Consistency
- Floodplain Management
- Wetlands Protection
- Wild and Scenic Rivers Act

- Farmland Protection Policy Act and Farmland Preservation
- Clean Air Act
- Safe Drinking Water Act
- Clean Water Act

National Environmental Policy Act

This EA was prepared pursuant to regulations implementing the National Environmental Policy Act (NEPA) (42 USC 4321 et seq.). NEPA provides a commitment that Federal agencies will consider the environmental effects of their actions. This EA provides information regarding the NAA and alternatives, environmental impacts of the alternatives, potential mitigation measures, and adverse environmental impacts that cannot be avoided.

California Environmental Quality Act

Implementation, funding and permitting actions carried out by State and local agencies must comply with the California Environmental Quality Act (CEQA). The CEQA requirements are similar to NEPA requirements. This EA could be used as a basis for preparation of a CEQA document.

Fish and Wildlife Coordination Act

The FWCA requires that Reclamation consult with fish and wildlife agencies (federal and state) on all water development projects that could affect biological resources. The implementation of the CVPIA, of which this action is a part, has been jointly analyzed by Reclamation and the Service and is being jointly implemented. This continuous consultation and consideration of the views of the Service in addition to their review of this document and consideration of their comments satisfies any applicable requirements of the FWCA.

Endangered Species Act

Reclamation has prepared a biological assessment to determine if the preferred alternative will affect listed, threatened, and endangered species. The biological assessment addresses all species affected by the CVP operation for the Friant Division Contractors.

In 2001, Reclamation consulted with NOAA (formerly known as the National Marine Fisheries Service) and the Service on the proposed action. The terms and conditions, reasonable and prudent measures, and all environmental commitments identified in the Biological Opinions from NOAA and the Service are hereby incorporated by reference.

Reclamation is in separate consultation with NOAA and the Service on the Operations Criteria and Plan for the operations on the joint CVP and SWP facilities and includes the In-Delta supplies for the CVCs. The Biological Opinions from NOAA and Service are anticipated in the summer 2005.

Reclamation will informally consult with the NOAA and the Service on this Amended EA and proposed action. Decisions on execution of a final Finding of No Significant Impact are

predicated on completion of these Section 7 consultations. At present, Reclamation believes this proposed contractual action will not significantly affect any listed species.

National Historic Preservation Act

Section 106 of the National Historic Preservation Act (NHPA) requires that Federal agencies evaluate the effects of Federal undertakings on historical, archeological, and cultural resources and afford the Advisory Council on Historic Preservation opportunities to comment on the proposed undertaking. The first step in the process is to identify cultural resources included on (or eligible for inclusion on) the National Register of Historic Places that are located in or near the project area. The second step is to identify the possible effects of proposed actions. The lead agency must examine whether feasible alternatives exist that would avoid such effects. If an effect cannot reasonably be avoided, measures must be taken to minimize or mitigate potential adverse effects.

During preparation of this EA, information from the State Clearinghouse was collected. The counties within San Felipe Division have initiated separate consultations with respect to their land use planning activities. It was determined by the State Historic Preservation Office that compliance with Section 106 should be coordinated on a project-specific basis.

Indian Trust Assets

The United States Government's trust responsibility for Indian resources requires Reclamation and other agencies to take measures to protect and maintain trust resources. These responsibilities include taking reasonable actions to preserve and restore tribal resources. Indian Trust Assets (ITAs) are legal interests in property and rights held in trust by the United States for Indian tribes or individuals. Indian reservations, rancherias, and allotments are common ITAs.

During preparation of EA, it was determined, based upon information provided by Reclamation, that one ITA, the Table Mountain Rancheria, is located within a subcontractor of the County of Fresno, the Fresno County Water Works #34.

The renewal of the long-term contract for Fresno County Water Works #34 would not result in negative impacts to Table Mountain Rancheria. Contract supplies would not change. A copy of this Supplemental EA will be sent to the Indian tribe.

Indian Sacred Sites on Federal Land

Executive Order 13007 provides that in managing Federal lands, each Federal agency with statutory or administrative responsibility for management of Federal lands shall, to the extent practicable and as permitted by law, accommodate access to and ceremonial use of Indian sacred sites by Indian religious practioners, and avoid adversely affecting the physical integrity of such sacred sites. No sacred sites were identified during the scoping or planning process and, therefore, were not included in the impact assessment of this EA.

Environmental Justice

Executive Order 12898 requires each Federal agency to achieve environmental justice as part of its mission, by identifying and addressing disproportionately high and adverse human health or environmental effects, including social or economic effects, of programs, policies, and activities on minority populations and low-income populations of the United States. This EA has evaluated the environmental, social, and economic impacts on minority and low-income populations in the impact assessment of alternatives.

State, Area-wide, and Local Plan and Program Consistency

Agencies must consider the consistency of a proposed action with approved state and local plans and laws. This EA was prepared with extensive information from local planning agencies.

Floodplain Management

If a Federal agency program will affect a floodplain, the agency must consider alternatives to avoid adverse effects in the flood plain or to minimize potential harm. Executive Order 11988 requires Federal agencies to evaluate the potential effects of any actions they might take in a floodplain and to ensure that planning, programs, and budget requests reflect consideration of flood hazards and floodplain management. The alternatives would not affect floodplain management as compared to the NAA.

Wetlands Protection

Executive Order 11990 authorizes Federal agencies to take actions to minimize the destruction, loss, or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands when undertaking Federal activities and programs. Any agency considering a proposal that might affect wetlands must evaluate factors affecting wetland quality and survival. These factors should include the proposal's effects on the public health, safety, and welfare due to modifications in water supply and water quality; maintenance of natural ecosystems and conservation of flora and fauna; and other recreational, scientific, and cultural uses. The alternatives would not affect wetlands as compared to the NAA.

Wild and Scenic Rivers Act

The Wild and Scenic Rivers Act designates qualifying free-flowing river segments as wild, scenic, or recreational. The Act establishes requirements applicable to water resource projects affecting wild, scenic, or recreational rivers within the National Wild and Scenic Rivers System, as well as rivers designated on the National Rivers Inventory. Under the Act, a Federal agency may not assist the construction of a water resources project that would have a direct and adverse effect on the free-flowing, scenic, and natural values of a wild or scenic river. If the project would affect the free-flowing characteristics of a designated river, or unreasonably diminish the scenic, recreational and fish and wildlife values present in the area, such activities should be undertaken in a manner that would minimize adverse impacts and should be developed in consultation with the National Park Service. None of the EA alternatives would affect flows in wild and scenic portions of rivers.

Farmland Protection Policy Act and Farmland Preservation

Two policies require federal agencies to include assessments of the potential effects of a proposed project on prime and unique farmland. These policies are the Farmland Protection Policy Act of 1981 and the Memoranda on Farmland Preservation, dated August 30, 1976, and August 11, 1980, respectively, from the U.S. Council on Environmental Quality. Under requirements set forth in these policies, federal agencies must determine these effects before taking any action that could result in converting designated prime or unique farmland for nonagricultural purposes. If implementing a project would adversely affect farmland preservation, the agencies must consider alternatives to lessen those effects. Federal agencies also must ensure that their programs, to the extent practicable, are compatible with state, local, and private programs to protect farmland. The SCS is the federal agency responsible for ensuring that these laws and polices are followed. No specific consultation was conducted during preparation of this EA. The alternatives would not affect agricultural or urban lands as compared to the NAA.

Clean Air Act

The Federal Clean Air Act (CAA) was enacted to protect and enhance the nation's air quality in order to promote public health and welfare and the productive capacity of the nation's population. The CAA requires an evaluation of any federal action to determine its potential impact on air quality in the project region. Coordination is required with the appropriate local air quality management district as well as with the EPA. This coordination would determine whether the project conforms to the Federal Implementation Plan and the State Implementation Plan (SIP).

Section 176 of the CAA (42 U.S.C. Section 7506(c)) prohibits federal agencies from engaging in or supporting in any way an action or activity that does not conform to an applicable SIP. Actions and activities must conform to a SIP's purpose of eliminating or reducing the severity and number of violations of the national ambient air quality standards and in attaining those standards expeditiously. EPA promulgated conformity regulations (codified in 40 CFR Section 93.150 et seq.).

The alternatives assume that current practices to control dust and soil erosion on lands that are seasonally fallowed would continue and the land use agencies would continue to work with the air quality districts. Therefore, it assumes that no air quality impacts would occur due to the alternatives as compared to the NAA.

Safe Drinking Water Act

The Safe Drinking Water Act (SDWA) (PL 99-339) became law in 1974 and was reauthorized in 1986 and again in August 1996. Through the SDWA, Congress gave the EPA the authority to set standards for contaminants in drinking water supplies. Amendments to the SDWA provide more flexibility, more state responsibility, and more problem prevention approaches. The law changes the standard-setting procedure for drinking water and establishes a State Revolving Loan Fund to help public water systems improve their facilities and to ensure compliance with drinking water regulations and to support state drinking water program activities.

Under the SDWA provisions, the California Department of Health Services has the primary enforcement responsibility. The California Health and Safety Code establishes this authority and stipulates drinking water quality and monitoring standards. To maintain primacy, a state's drinking water regulations cannot be less stringent than the federal standards. The analysis of the EA alternatives as compared to the SDWA requirements indicated that there were no changes in compliance as compared to the NAA.

Clean Water Act

The Clean Water Act (CWA) gave the EPA the authority to develop a program to make all waters of the United States "fishable and swimmable." This program has included identifying existing and proposed beneficial uses and methods to protect and/or restore those beneficial uses. The CWA contains many provisions, including provisions that regulate the discharge of pollutants into the water bodies. The discharges may be direct flows from point sources, such as an effluent from a wastewater treatment plant, or a non-point source, such as eroded soil particles from a construction site. The analysis of the EA alternatives as compared to the CWA requirements indicated that there were no changes in compliance as compared to the NAA.

SECTION 5

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