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SUMMARY SHEET

1.	Proposed Federal Action:	Approve long-term water service contract for the Feather Water District from March 1, 2005 through February 28, 2030.
2.	Date Filed:	------, 2005
3.	Applicant:	Bureau of Reclamation Mid-Pacific Region 2800 Cottage Way Sacramento, CA 95825 Attention: Basia Trout Telephone: (530) 528-0512 FAX: (530) 528-0612
4.	Authority:	Section 3404(c) of the Central Valley Project Improvement Act (Title XXXIV of Public Law 102-575)
5.	Reclamation Facility:	Central Valley Project
6.	Nearest City:	Chico, California
7.	County:	Butte, California

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

ES.1 INTRODUCTION

In accordance with Section 3404(c) of the Central Valley Project Improvement Act (CVPIA), the Bureau of Reclamation (Reclamation) proposes to renew the long-term water service contract with the Feather Water District (District) in Sutter County, California for a period of 25 years. The District currently receives water under an interim contract that will expire on February 28, 2006. By renewing the long-term contract in early 2005, Reclamation would continue delivering Central Valley Project (CVP) water to the District for 25 years, from March 01, 2005, through February 28, 2030. Two alternatives that would accomplish the purpose and need of the proposed action, as well as a no action alternative, are evaluated in this environmental assessment (EA).

The Feather Water District is in the Sacramento Valley, approximately 25 miles north of Sacramento and eight miles south of Yuba City (Figure 1-1). The District is between the Feather River and the Sutter Bypass of the Sacramento River and encompasses approximately 9,300 acres, including roads, ditches, levees, and farm buildings. An annual average of approximately 7,550 acres is in agricultural production. The majority of the land is in permanent crops, primarily orchards and alfalfa/pasture, with relatively few acres planted to annual crops or fallowed in any given year. The District currently contracts for delivery of 20,000 acre-feet (a-f) per year of CVP water for agricultural purposes. No water has historically been delivered to the District for municipal or industrial use; however the District may receive deliveries from the CVP of "other water" (water made available from the CVP other than irrigation water used primarily for agriculture and livestock) at prices identical to those established for municipal and industrial uses.

ES.2 PURPOSE AND NEED FOR ACTION

The CVPIA, Title XXXIV of the Reclamation Projects Authorization and Adjustment Act of 1992 (Public Law 102-575), 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 3404(c) of the CVPIA directs the Secretary to:

> " . . . 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 . . . ."

Section 3409 of the CVPIA required the Secretary to prepare a programmatic environmental impact statement (PEIS) to evaluate the direct and indirect impacts and benefits of implementing CVPIA. Reclamation and the US Fish and Wildlife Service (Service), the co-leads for the PEIS, released the final PEIS in October 1999 (Reclamation 1999a). This EA tiers off the PEIS to evaluate potential site-specific environmental impacts of renewing the Feather Water District's long-term water service contract.

The purpose of this project is to renew the Feather Water District water service contract, consistent with the provisions of CVPIA. The proposed contract provides for the continued delivery of the same quantities of CVP water as were delivered under the prior long-term and interim contracts. The most significant changes in the alternatives include the terms and conditions of the contracts and tiered water pricing.

Long-term contract renewal (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 water uses consistent with requirements imposed by the State Water Resources Control Board (SWRCB) and the CVPIA;
- Incorporate certain administrative conditions into the renewed contract to ensure CVP continued compliance with current federal reclamation law and other applicable statutes; and
- Allow the continued reimbursement to the federal government for costs related to CVP construction and operation.

The area of analysis for this EA is the Feather Water District (Figure 1-2) and land in the vicinity of the District that may be affected by the proposed action. The analysis for this EA was conducted for projected conditions in 2026, the initially proposed 25-year contract renewal period. Because the process was delayed and the current proposed 25-year contract renewal period now ends in 2030, the analysis was revisited to review the economic effects resulting from the extension of the renewal period. Such basic

assumptions as land use and cropping patterns were determined not to have changed, because the future conditions were assumed at full delivery, so the results have also not changed. The analysis that was originally completed applies to the current proposed contract period of 2030.

ES.3 DESCRIPTION OF ALTERNATIVES

Three alternatives were identified for the renewal of the long-term contract between Reclamation and the Feather Water District. The alternatives present a range of water service agreement provisions that could be implemented for long-term contract renewal. The No Action Alternative consists of renewing the existing water service contract as described by the Preferred Alternative of the PEIS. In November 1999, Reclamation published a proposed long-term water service contract which is the basis of this EA's Alternative 2. In April 2000, the CVP Contractors presented an alternative long-term water service contract which is the basis of this EA's Alternative 1. Reclamation and the CVP Contractors continued to negotiate the CVP-wide terms and conditions with these proposals serving as "bookends." This EA considers these proposals with the No Action Alternative as bookends to be considered for the environmental documentation to evaluate the impacts and benefits of renewing the long-term water service contract.

Preferred Alternative

The Preferred Alternative is a negotiated position between the No Action Alternative, Alternative 1, and Alternative 2.

ES.4 SUMMARY OF CONCLUSIONS

Potential impacts associated with implementing the No Action Alternative, Alternative 1, and Alternative 2 are listed in Table ES-1 and described in detail in Chapter 3 of this EA. As shown in Table ES-1, no significant impacts would occur with implementation of these alternatives. Impacts associated with the Preferred Alternative are equally not significant.

Table ES-1
Summary of Potential Impacts

Resource	No Action Alternative	Alternative 1	Alternative 2
Agricultural Economics	CVP water use would range from 17,860 to 19,940 acre-feet and CVP water rates would range from $4.53 per acre-foot (tier 1) to $9.40 per acre-foot (tier 3). There would no substantial change in irrigated acres from existing conditions. Gross revenues would be approximately $16.7 million.	Same as under No Action Alternative.	Compared to the No Action Alternative, there would be increases in CVP water rates but water use quantities would be similar. Changes in irrigated acres would be minor in all types of water years. Gross and net revenues would decline minimally. There would be losses in jobs, economic output, and place-of-work income.
Water Resources	Tiered pricing might reduce the amount of water the District decides to purchase in years where more than 80 percent of the contract amount of water is made available. However, preliminary CVPM model results suggest that cropping patterns are not likely to change because of increased water pricing. Regional groundwater levels would continue to decline.	Same as under No Action Alternative.	Tiered pricing under Alternative 2 would be the same as under No Action only when the District receives 100 percent of its contract amount in each of the preceding five years; if it received less than the full contract amount, then the cost under Alternative 2 would be higher than under No Action. However, CVPM modeling results indicate there would be a negligible change in cropping patterns and little change in water use in the District. If the District opts to purchase all project water available to it each year, there should be no change in groundwater use.

Table ES-1
Summary of Potential Impacts *(continued)*

Resource	No Action Alternative	Alternative 1	Alternative 2
Land Use Resources	There would be minimal anticipated changes to agricultural land use under the No Action Alternative.	Same as under No Action Alternative.	The overall change on the amount of irrigated acreage would be small, less than two percent, under all water year scenarios. General cultivated and fallowed acreage patterns would be similar to historical patterns, and agricultural land use would be similar to existing conditions. Renewing the long-term water service contract therefore would not result in large adverse land use effects.
Biological Resources	No major adverse impacts to sensitive plant or animal species are expected to occur. Some impacts could occur to anadromous fish species as the pumps at both stations are not screened and there may be injury from exposure to contaminated agricultural discharge, increased water turbidity, and higher water temperatures. These would be less than significant impacts. There would be no impact to wetland or riparian habitat. There would be no adverse changes to plant or animal diversity/distribution and no fish or wildlife habitat degradation.	Same as under No Action Alternative.	Alternative 2 is expected to have minimal impacts to special status species including anadromous fish. Alternative 2 would not adversely affect wetlands, riparian habitats, or other special habitats. There would be no adverse changes to plant or animal diversity/distribution and no fish or wildlife habitat degradation.
Social Conditions and Environmental Justice	There would be no appreciable impact on Sutter County population, income, or employment rates. Minority or low-income populations would not be disproportionately affected.	Same as under No Action Alternative.	Overall employment impacts to Sutter County are likely to be minimal. Potential for a large impact to minority or low-income populations such as the migrant farmworker community is small due to the small size of the District and minimal anticipated changes in employment.

Table ES-1
Summary of Potential Impacts *(continued)*

Resource	No Action Alternative	Alternative 1	Alternative 2
Recreational Resources	No impacts to the use or enjoyment of the Feather River or other recreational opportunities in the project vicinity are expected under the No Action Alternative.	Same as under No Action Alternative.	No large impacts to the use or enjoyment of the Feather River or other recreational opportunities in the project vicinity are expected under the No Action Alternative.
Indian Trust Assets	No impacts to Indian Trust Assets would occur.	Same as under No Action Alternative.	Same as under No Action Alternative.
Cultural Resources	No direct impacts to cultural resources would be expected.	Same as under No Action Alternative.	No direct impacts to cultural resources would be expected.
	Indirect impacts could result if it were to lead to changes in agricultural practices or land use. However, the No Action Alternative would be expected to have a small potential for influencing decisions on future agricultural practices and land use.		Indirect impacts could result if it were to lead to changes in agricultural practices or land use. However, the potential for change in irrigated acreage is minimal and may result in additional pasturelands, which requires minimal disturbance and would have no effect on cultural resources.
Geology and Soils	No adverse impacts on soils are expected.	Same as under No Action Alternative.	No adverse impacts on soils are expected.
Air Quality	There would be no net increase in emissions and therefore No Action would not be subject to the Clean Air Act conformity rule.	Same as under No Action Alternative.	Same as under No Action Alternative.
Visual Resources	Anticipated changes to agricultural viewsheds under the No Action Alternative would be minimal.	Same as under No Action Alternative.	Agricultural viewsheds under Alternative 2 would be similar to existing conditions and the impact would be minimal.

1. PURPOSE AND NEED

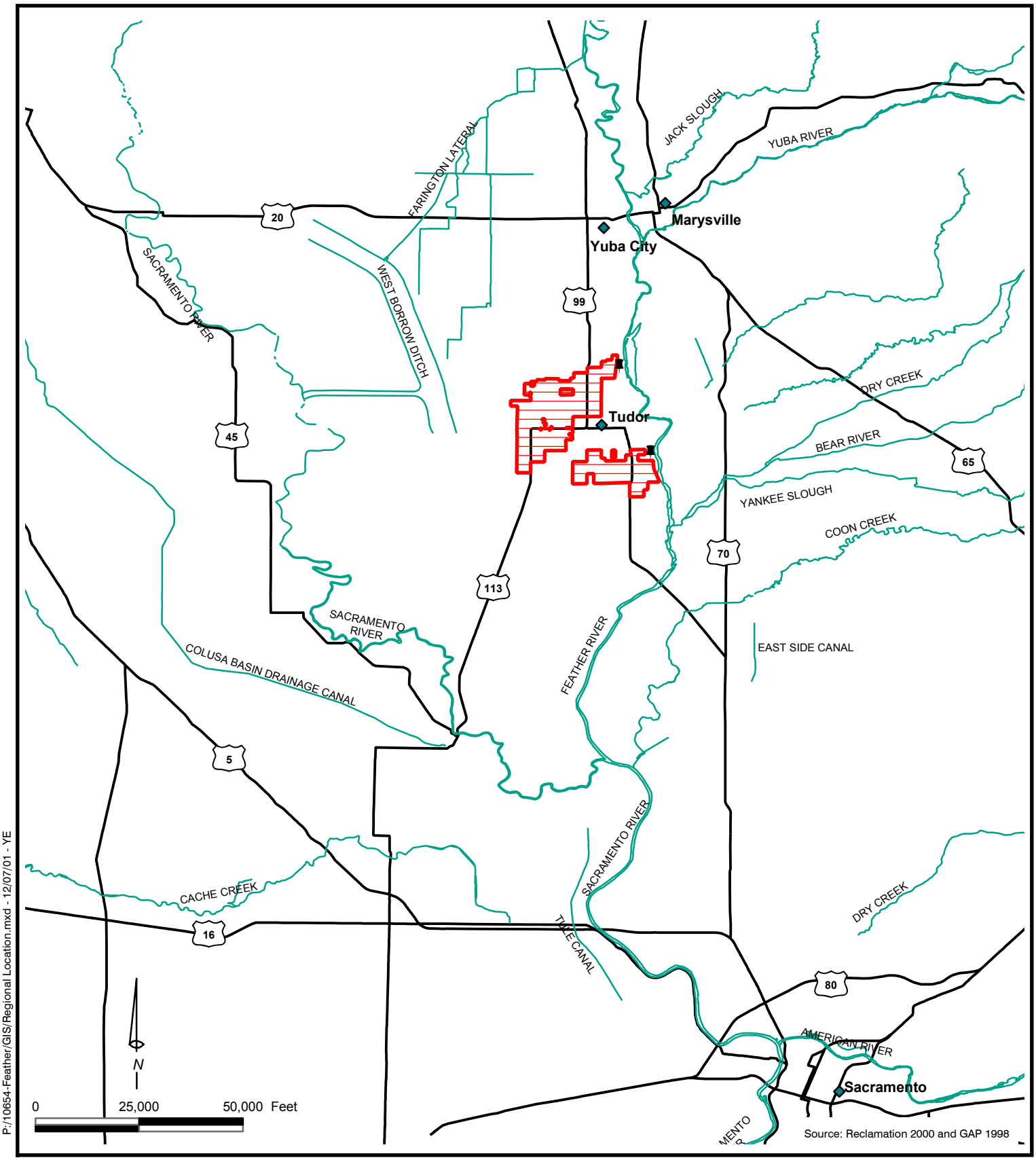
CHAPTER 1
PURPOSE AND NEED

1.1 INTRODUCTION

In accordance with Section 3404(c) of the Central Valley Project Improvement Act (CVPIA), the Bureau of Reclamation (Reclamation) proposes to renew the long-term water service contract with the Feather Water District (District) in Sutter County, California, for a period of 25 years. The District currently receives water under an interim contract that will expire on February 28, 2006. By renewing the long-term contract in early 2005, Reclamation would continue delivering Central Valley Project (CVP) water to the District for 25 years, from March 01, 2005, through February 28, 2030 (the location of the District is shown in Figure 1-1). Two alternatives that would accomplish the purpose and need of the proposed action, as well as a no action alternative, are evaluated in this environmental assessment (EA).

The District is in the Sacramento Valley, approximately 25 miles north of Sacramento and eight miles south of Yuba City. The District encompasses approximately 9,300 acres, including roads, ditches, levees, and farm buildings. It also includes riparian land between the District and the Feather River and wetlands (Gilsizer Slough) between the District and the dredged portion of Gilsizer Slough, whose water flows into the Sutter Bypass. Return flows from the District are recycled, with any leakage draining into the Sutter Bypass, and do not affect the Feather River (Figure 1-2).

An annual average of approximately 7,550 acres is in agricultural production, with approximately 7,300 acres being irrigated with water from the CVP. The District contracts for delivery of 20,000 acre-feet (a-f) per year of CVP water for agriculture. Historically, no water has been delivered to the District for municipal or industrial use, but the District may receive deliveries from the CVP of "other water" (water not used for crops or livestock, as defined in the contract) at prices identical to those established for municipal and industrial uses.



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The Feather Water District is located approximately 25 miles north of Sacramento and 8 miles south of Yuba City, near the confluence of the Feather and Sacramento rivers.

Legend

- Streams and Canals
- Water District Boundary
- Roads
- Pump Locations

Feather Water District Regional Location

Sutter County, California

Tetra Tech, Inc

Figure 1-1

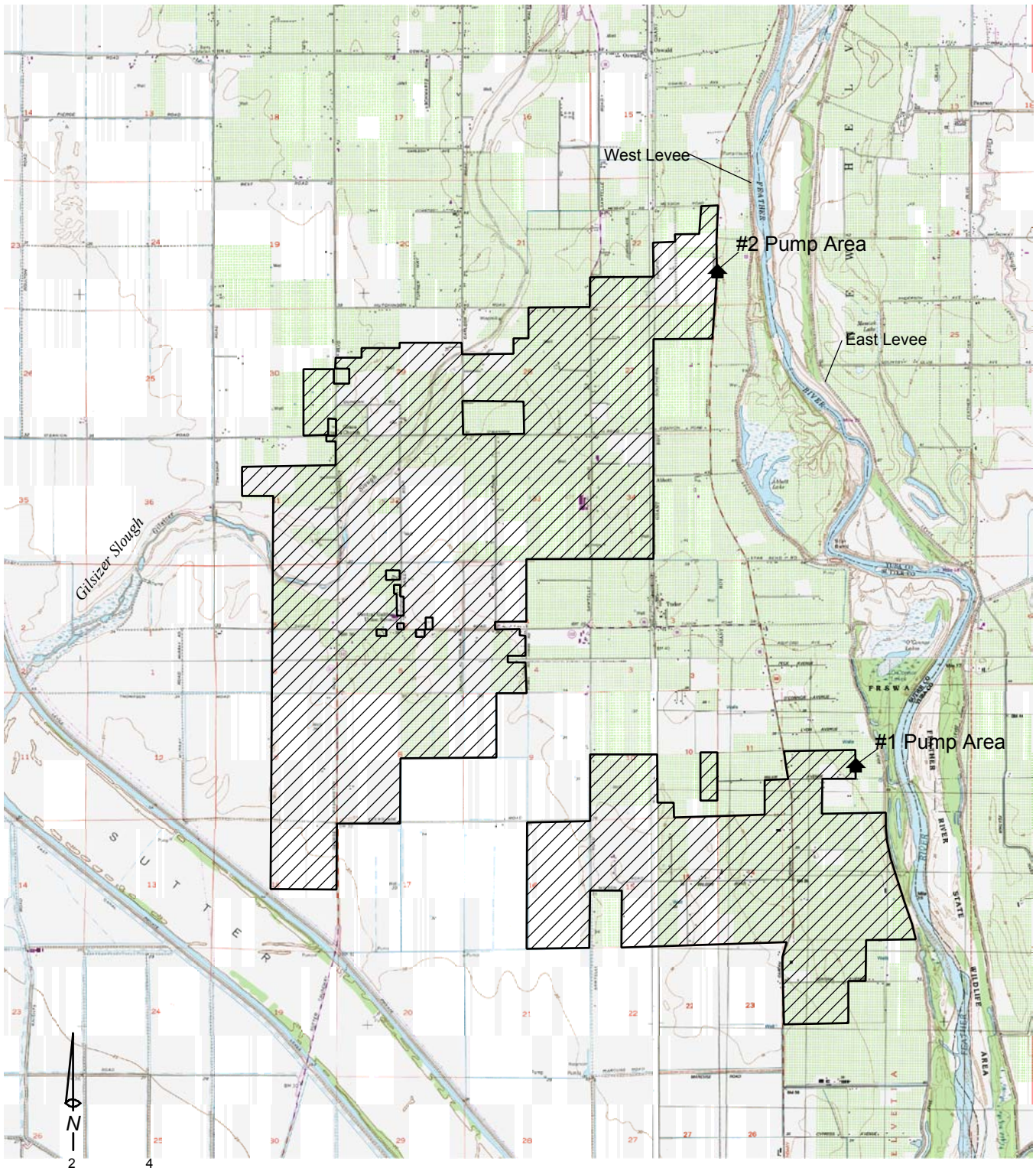
The District receives water from Oroville Dam via the lower Feather River, which is below Oroville Reservoir and is regulated by Oroville Dam, Thermalito Diversion Dam, and Thermalito Afterbay Outlet. Under normal operations, most of the Feather River flow is diverted at Thermalito Diversion Dam into Thermalito Forebay. The remainder of the flow, typically 600 cubic feet per second (cfs), flows through the historical river channel, the "low-flow channel." Water released by the forebay is used to generate power before being discharged into Thermalito Afterbay. Water is returned to the Feather River through Thermalito Afterbay Outlet, then it flows southward through the valley to the confluence with the Sacramento River at Verona, approximately 72 miles downstream of Oroville Dam. From June to September, when the District diverts water from the Feather River, enough CVP water from Shasta Dam is delivered (by exchange) in the Sacramento River at the confluence with the Feather River to supply the prior rights of the Sacramento River and the Sacramento-San Joaquin Delta users.

Water delivered to the District from Oroville Dam into the lower Feather River flows into two channels. Here, the water is lifted via a southern pump station at the end of Wilkie Avenue and a northern pump station east of the Garden Highway near Messick Road in Yuba City (Figure 1-2). The southern pump station is approximately 12.5 miles upstream of the Sacramento River. The northern pump station is approximately 17 miles upstream. Both pump stations are in dredged embayments at the ends of channels. The southern pump station is in a dredged embayment that is 200 feet long, 50 feet wide and approximately 45 feet deep. The southern pump station contains 4 (60 hp) pumps with 4 unscreened intakes that are 18" in diameter with a lift of approximately 45 feet. The northern pump station is in a dredged embayment that is 480 feet long, 320 feet wide and approximately 5 feet deep. At the end of the northern channel is a small side channel which is 96 feet wide that holds 4 (18") unscreened intakes and 4 (100 hp) pumps, with a lift of approximately 45 feet.. Both areas are perpendicular to the Feather River. The District distributes available water equally among water users, based on acreage and reclaims all surface flow runoff (e.g., tail water) and pumps it back into the system for redistribution.

Reclamation has prepared this EA to determine if renewing the District's long-term contract would result in any site-specific significant impacts on the natural or human environment. This EA has been prepared pursuant to and in accordance with the National Environmental Policy Act (NEPA) of 1969 (42 USC § 4321-4370d), the Council on Environmental Quality (CEQ) regulations on implementing NEPA (40 CFR Parts 1500-1508), and Reclamation's NEPA handbook (Bureau of Reclamation 1990).

1.2 PURPOSE AND NEED FOR ACTION

The CVPIA, Title XXXIV of the Reclamation Projects Authorization and Adjustment Act of 1992 (Public Law 102-575), 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 3404(c) of the CVPIA directs the Secretary of the Interior to:



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Source: Reclamation 2000, GAP 1998, Maptech

The Feather Water District encompasses approximately 9,300 acres, with an annual average of approximately 7,550 acres in agricultural production. #1 and #2 pumps are 12.5 and 16.8 miles upriver from the Sacramento River, respectively.

Legend

Water District Boundary

Feather Water District Service Area

Sutter County, California

Tetra Tech, Inc

Figure 1-2

> " . . . 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 . . . ."

Section 3409 of the CVPIA required the Secretary to prepare a programmatic environmental impact statement (PEIS) to evaluate the direct and indirect impacts and benefits of implementing the CVPIA. Reclamation and the US Fish and Wildlife Service (Service), a co-lead for the PEIS, released the final PEIS in October 1999 (Reclamation 1999a). This EA tiers off the PEIS to evaluate potential site-specific environmental impacts of renewing the District's long-term water service contract.

The purpose of this project is to renew the District's water service contract, consistent with the provisions of CVPIA. The project alternatives will include the terms and conditions of the contracts and tiered water pricing.

Long-term contract renewal (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 water uses consistent with requirements imposed by the State Water Resources Control Board (SWRCB) and the CVPIA;
- Incorporate certain administrative conditions into the renewed contract to ensure CVP continued compliance with current federal reclamation law and other applicable statutes; and
- Allow the continued reimbursement to the federal government for costs related to CVP construction and operation.

The area of analysis for this EA is the District (Figure 1-2) and land in the vicinity of the District that may be affected by the proposed action. The analysis for this EA was conducted for projected conditions in 2026, the initially proposed 25-year contract renewal period. Because the process was delayed and the current proposed 25-year contract renewal period now ends in 2030, the analysis was revisited to review the economic effects resulting from the extension of the renewal period. Such basic assumptions as land use and cropping patterns were determined to have not changed, because the future conditions were assumed at full delivery, so the results have also not changed. The analysis that was originally completed applies to the current proposed contract period of 2030.

1.3 PUBLIC INVOLVEMENT

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. Interested parties were encouraged to attend scoping meetings and informational workshops to comment on the environmental documents. Scoping meetings were held at eight locations throughout the CVP service area. Reclamation prepared a scoping report, documenting the process, in April 1999 (Reclamation 1999b).

The Draft EA was circulated for public and agency review for 30 days. This public comment period provided an opportunity for the public to review the issues addressed in the impact analysis and to offer comments on any aspect of the process. Comments on the Draft EA have been responded to and appropriate revisions were made in the Final EA. The Draft EA was revised and recirculated for public comment for a 30-day period in September 2003, and again in August 2004 following negotiations of the draft contract and finalization of the Biological Assessment.

1.4 RELATED 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 District's water service contract. Related studies and projects that have been conducted recently or are currently being completed are summarized in Table 1-1.

Table 1-1
Related Activities

Project or Study and Lead Agency	Summary
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.
Renewal of Sacramento River Settlement Contracts - Reclamation	
CALFED Bay-Delta Program – 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. CALFED is completing an EIR/EIS as part of this process. Renewal of Long-Term CVP Contracts is assumed within the CALFED EIR/EIS.
Coordinated Operating Agreement (COA) and Operations Criteria and Plan (OCAP) Update – US 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 State Water Project (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.

2. DESCRIPTION OF ALTERNATIVES

CHAPTER 2
DESCRIPTION OF ALTERNATIVES

2.1 INTRODUCTION

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

2.2 LONG-TERM WATER SERVICE CONTRACT NEGOTIATIONS PROCESS

The CVPIA states that the Secretary of the Interior 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. The CVPIA also states that no renewals shall be authorized until appropriate environmental review, including the PEIS, has been completed. The PEIS, completed in 1999, 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 Reclamation law, including modifications due to Reclamation Reform Act and applicable CVPIA requirements. The initial interim contract renewals were negotiated in 1994 with subsequent renewals for periods of up to two years to provide for continued water service. Many of the provisions from the interim contracts were assumed to be part of the contract renewal provisions in the description of the PEIS Preferred Alternative.

In 1998, the long-term contract renewal 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 provisions of the long-term contract applicable to all water service contractors 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 would be negotiated and, finally, contractor-specific provisions would be negotiated. The CVP-wide provisions were finalized in spring 2004; as of August 2005, contractor-specific provisions have been

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 contractors would be delayed until the completion of a water management studies 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 negotiations 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 2-1 at the end of this chapter.

2.3 ISSUES CONSIDERED AS PART OF LONG-TERM CONTRACT RENEWALS

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

2.3.1 Needs Analyses

The water rights granted to the CVP by the SWRCB requires the Federal government to determine if the water is being used in a beneficial manner. The needs analysis methodology was developed to indicate that the CVP water is being used beneficially. The needs analysis was computed for each District or water user/contractors 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 exceeded 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.

2.3.2 Changes in Water Service Areas

This environmental analysis does not consider future changes in 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.

2.3.3 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 CVPIA has allowed these transfers, as evaluated in the PEIS for the Preferred Alternative, the No Action Alternative 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 will continue to require separate environmental documents for proposed transfers and will work toward establishing criteria and protocols to allow rapid technical and environmental review of future proposed transfers.

2.4 DEVELOPMENT OF ALTERNATIVES

Three alternatives were identified for the renewal of the long-term contract between Reclamation and the District. The alternatives present a range of water service agreement provisions that could be implemented for long-term contract renewals. The No Action Alternative consists of renewing the existing water service contract 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 "bookends." These CVP-wide negotiations were finalized in spring 2004. This EA also considers these proposals with the No Action Alternative as bookends to be considered for the environmental documentation to evaluate the impacts and benefits of renewing the long-term water service contract.

2.4.1 No Action Alternative

The No Action Alternative assumes renewal of long-term CVP water service contracts for a period of 25 years in accordance with implementation of CVPIA as described in the PEIS Preferred Alternative. The PEIS Preferred Alternative 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 No Action Alternative in this EA assumes tiered pricing provisions and environmental commitments as described in the PEIS Preferred Alternative. The provisions of the No Action Alternative are summarized in Table 2-1. These

provisions were described in the Final PEIS and include the possibility for other agencies to reallocate CVP water supplies to meet fish and wildlife requirements.

Several applicable CVPIA provisions are summarized in the description of the No Action Alternative 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 Alternative is based upon use of a "80/10/10 Tiered Water Pricing from Contract Rate to Full Cost Rate," 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 operations 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 Charge on all deliveries of CVP water. Reclamation law and policy provides full or partial relief to irrigation contractors on Restoration Charges and the capital rate component of the water rate, and relief is based on local farm budgets. 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 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.

Because the PEIS, which established the No Action Alternative, uses 1994 irrigation and municipal/industrial CVP water rates, the prices of CVP water used in the No Action Alternative are based on the 1994 rates.

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 this criterion can be generally met by parcels greater than 2 acres. Based on this analysis, the CVP has generally applied a definition of five acres or less for municipal and industrial uses in the CVP for many years. The CVP contractors can seek a modification on a case by case basis for a demonstrated need of agricultural use on

smaller parcels and request such a modification from the Contracting Officer. The District does not have any M&I uses.

Water Measurement. The No Action Alternative includes water measurement at every agriculture turnout 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 No Action Alternative did not include additional measurement devices except as required by individual users' water conservation plans.

Water Conservation. The water conservation assumptions in the No Action Alternative 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 the 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.

2.4.2 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 these issues would require additional Federal actions with separate environmental documentation and would also limit the Secretary's obligation to achieve a reasonable balance among competing demands as required by the CVPIA. Currently Reclamation is completing the least cost plan to restore project yield in accordance with Section 3408(j) of CVPIA and under the CALFED program.*
- 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 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 O&M requirements - *It is recognized that transfers of O&M 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 O&M 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 No Action Alternative and those provisions are included in Alternative 1, as summarized in Table 2-1. 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 2-1.

Note that the tiered pricing requirements (including unit prices for CVP water) and definition of municipal and industrial users in Alternative 1 would be the same as in the No Action Alternative.

2.4.3 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 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 O&M to third parties - *O&M 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 the No Action Alternative and are included in Alternative 2, as summarized below and in Table 2-1. 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 "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 five 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 ten 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 ten 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. It should be noted that Category 1 and Category 2 volumes will change every year based upon the average deliveries for the "most recent five years," with limited exception, 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 contractors' existing water service contract. The quantity is the same as the No Action Alternative and Alternative 1. The terms "Contract Rate" and "Full Cost Rate" are discussed under Tiered Pricing for the No Action Alternative. The same Ability-to-Pay adjustments would be applicable to Restoration Payments and tiered water rates as described in the No Action Alternative.

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.

2.5 ALTERNATIVES CONSIDERED BUT ELIMINATED

2.5.1 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.

2.5.2 Reduction in Contract Amounts

Reduction of contract amounts was considered in certain cases but rejected from analysis. The reason for this is 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 immediately use water 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.

2.5.3 Greater or Lesser Water Deliveries

Alternatives with reduced water deliveries were not investigated because the Water Needs Assessment showed the District would require all the water it is entitled to under the existing contract. Alternatives with greater water deliveries were not investigated because increased water amounts are not available to the District under the CVPIA.

2.6 SELECTION OF THE PREFERRED ALTERNATIVE

The final contract language and the long-term contract renewal Preferred Alternative represents a negotiated position concluded in August 2005, between the No Action Alternative, Alternative 1, and Alternative 2 . In addition two provisions were omitted: the definition of "M&I Water," and the description of the "Operation and Maintenance by a Non-Federal Entity." The Preferred Alternative contract provisions agree with all the provisions of Alternative 2 except for the definition of "Charges."

The Preferred Alternative agrees with the provisions of Alternative 1 with regards to the definitions of "Category 1 and Category 2", the description of "Contract Total," "Term of Contract," and the definition of "Coordination and Cooperation."

The Preferred Alternative agrees with the No Action provision with regards to the description of "Landholder", "Term of Contract", "Rates and Method of Payment for Water."

The impacts of the Preferred Alternative are equal to or less than those identified for the three alternatives.

2.7 SUMMARY OF CONCLUSIONS

Potential impacts associated with implementing the No Action Alternative, Alternative 1, and Alternative 2 are listed in Table 2-2 and described in detail in Chapter 3 of this EA. As shown in Table 2-2, no significant impacts would occur with implementation of these alternatives. The impacts associated with the Preferred Alternative are equally not significant.

Table 2-1
Comparison of Contract Provisions Considered in Alternatives

Provision	No Action Alternative Based on PEIS and Interim Contracts	Alternative 1 Based on April 2000 Proposal from Contractors	Alternative 2 Based on November 1999 Proposal from Reclamation	Preferred Alternative Based on January 2005 (revised August 2005) agreed up contract
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 an important part of the urban and agricultural water supply.	Assumes CVP as an essential and irreplaceable part of the urban and agricultural water supply.	Same as No Action Alternative.	Same as No Action Alternative.
	Assumes increased use of water rights, the need to meet water quality standards and fish protection measures, and other measures that constrain the use of CVP water.	Assumes that CVPIA impaired ability of CVP to deliver water.	Same as No Action Alternative.	Same as No Action Alternative.
	Assumes the need for the 3408(j) study.	Assumes implementation of yield increase projects per 3408(j) study.	Same as No Action Alternative.	Same as No Action Alternative.
	Assumes that loss of water supply reliability would have an impact on socioeconomic conditions and would change land use.	Assumes that loss of water supply reliability would have adverse socioeconomic and environmental impacts in the CVP service area.	Same as No Action Alternative.	Same as No Action Alternative.
Definitions				
"Charges"	Charges are defined as payments required in addition to rates.	Assumes rewording of the definition of charges to exclude both rates and tiered pricing increments.	Same as No Action Alternative.	Charges are defined as payments required in addition to rates and tiered pricing component.
"Category 1 and Category 2"	Tiered pricing as in the PEIS.	Not included.	Tiered pricing for Categories 1 and 2.	Not included.
"Contract Total"	Contract total is described as total contract.	Same as No Action Alternative.	Described as basis for Category 1 to calculate tiered pricing.	Same as No Action Alternative.
"Landholder"	Landholder is 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.
"M&I Water"1	Assumes rewording to provide water for irrigation of land in units less than or equal	M&I1 water described for irrigation of land in units less than or equal to 2 acres.	Same as No Action Alternative.	Not included.

	to 5 acres as M&I water unless the contracting officer is satisfied the use is irrigation.			
Term of Contract	Assumes that contracts may be renewed.	States that contract shall be renewed.	Same as No Action Alternative.	Same as Alternative 1.
	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.	Same as No Action Alternative.
Water to be Made Available and Delivered to the Contractor	**Assumes water availability in any year with existing conditions. Assumes water delivery per contract provisions, if available.**	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.	Same as 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 that studies to increase yield shall be completed with necessary authorizations.	Same as No Action Alternative.	Same as No Action Alternative.
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.	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.	Assumes similar actions in No Action Alternative but applies to all water supplies.
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.
Non-interest Bearing Operation and	**Assumes language from existing**	Same as No Action Alternative.	Same as No Action Alternative.	Same as No Action Alternative.

Maintenance Deficits	**contracts.**			
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.	Same as No Action Alternative.
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 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 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 operate in accordance with existing rules.**	Assumes minor changes with respect to references to the right to seek relief.	Same as No Action Alternative.	Same as No Action Alternative.
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.
Charges for Delinquent Payments	**Assumes that CVP will operate in**	Same as No Action Alternative.	Same as No Action Alternative.	Same as No Action Alternative.

	accordance with existing rules.			
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.	Same as No Action Alternative.
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 the 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 responsibilities under this alternative.**	Assumes minor changes to language that would allow subsequent modification of operational responsibilities.	Assumes minor changes to language that would allow subsequent modification of operational responsibilities.	Omitted.
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.
Books, Records, and Reports	**Assumes s 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.	Same as No Action Alternative.
Assignment Limited	**Assumes that CVP will operate in accordance with existing rules.**	Assumes changes to facilitate assignments.	Same as No Action Alternative.	Same as No Action Alternative.
Severability	**Assumes that CVP**		Same as No Action	Same as No Action

	will operate in accordance with existing rules.	Same as No Action Alternative.	Alternative.	Alternative.
Resolution of Disputes	**Not included.**	Assumes a Dispute Resolution Process.	Not included.	Same as 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	Same as No Action Alternative.
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.	Same as No Action Alternative.

[1]The term "M&I water," or "municipal and industrial water," is not used in the contract with the Feather Water District; instead the term "other water" is used.

Table 2-2
Summary of Potential Impacts

Resource	No Action Alternative	Alternative 1	Alternative 2
Agricultural Economics	CVP water use would range from 17,860 to 19,940 acre-feet and CVP water rates would range from $4.53 per acre-foot (tier 1) to $9.40 per acre-foot (tier 3). There would no substantial change in irrigated acres from existing conditions. Gross revenues would be approximately $16.7 million.	Same as under No Action Alternative.	Compared to the No Action Alternative, there would be increases in CVP water rates but water use quantities would be similar. Changes in irrigated acres would be minor in all types of water years. Gross and net revenues would decline minimally. There would be losses in jobs, economic output, and place-of-work income.
Water Resources	Tiered pricing might reduce the amount of water the District decides to purchase in years where more than 80 percent of the contract amount of water is made available. However, preliminary CVPM model results suggest that cropping patterns are not likely to change because of increased water pricing. Regional groundwater levels would continue to decline.	Same as under No Action Alternative.	Tiered pricing under Alternative 2 would be the same as under No Action only when the District receives 100 percent of its contract amount in each of the preceding five years; if it received less than the full contract amount, then the cost under Alternative 2 would be higher than under No Action. However, CVPM modeling results indicate there would be a negligible change in cropping patterns and little change in water use in the District. If the District opts to purchase all project water available to it each year, there should be no change in groundwater use.

Table 2-2
Summary of Potential Impacts *(continued)*

Resource	No Action Alternative	Alternative 1	Alternative 2
Land Use Resources	There would be minimal anticipated changes to agricultural land use under the No Action Alternative.	Same as under No Action Alternative.	The overall change on the amount of irrigated acreage would be small, less than two percent, under all water year scenarios. General cultivated and fallowed acreage patterns would be similar to historical patterns, and agricultural land use would be similar to existing conditions. Renewing the long-term water contracts therefore would not result in large adverse land use effects.
Biological Resources	No major adverse impacts to sensitive plant or animal species are expected to occur. Some impacts could occur to anadromous fish species as the pumps at both stations are not screened and there may be injury from exposure to contaminated agricultural discharge, increased water turbidity, and higher water temperatures. These would be less than significant impacts. There would be no impact to wetland or riparian habitat. There would be no adverse changes to plant or animal diversity/distribution and no fish or wildlife habitat degradation.	Same as under No Action Alternative.	Alternative 2 is expected to have minimal impacts to special status species, except for potential impacts to anadromous fish until the pumps are screened. Alternative 2 would not adversely affect wetlands, riparian habitats, or other special habitats. There would be no adverse changes to plant or animal diversity/distribution and no fish or wildlife habitat degradation.
Social Conditions and Environmental Justice	There would be no appreciable impact on Sutter County population, income, or employment rates. Minority or low-income populations would not be disproportionately affected.	Same as under No Action Alternative.	Overall employment impacts to Sutter County are likely to be minimal. Potential for a large impact to minority or low-income populations such as the migrant farm worker community is small due to the small size of the District and minimal anticipated changes in employment.

Table 2-2
Summary of Potential Impacts *(continued)*

Resource	No Action Alternative	Alternative 1	Alternative 2
Recreational Resources	No impacts to the use or enjoyment of the Feather River or other recreational opportunities in the project vicinity are expected under the No Action Alternative.	Same as under No Action Alternative.	No large impacts to the use or enjoyment of the Feather River or other recreational opportunities in the project vicinity are expected under Alternative 2.
Indian Trust Assets	No impacts to Indian Trust Assets would occur.	Same as under No Action Alternative.	Same as under No Action Alternative.
Cultural Resources	No direct impacts to cultural resources would be expected. Indirect impacts could result if it were to lead to changes in agricultural practices or land use. However, the No Action Alternative would be expected to have a small potential for influencing decisions on future agricultural practices and land use.	Same as under No Action Alternative.	No direct impacts to cultural resources would be expected. Indirect impacts could result if it were to lead to changes in agricultural practices or land use. However, the potential for change in irrigated acreage is minimal and may result in additional pasture lands, which requires minimal disturbance and would have no effect on cultural resources.
Geology and Soils	No adverse impacts on soils are expected.	Same as under No Action Alternative.	No adverse impacts on soils are expected.
Air Quality	There would be no net increase in emissions and therefore No Action would not be subject to the Clean Air Act conformity rule.	Same as under No Action Alternative.	Same as under No Action Alternative.
Visual Resources	Anticipated changes to agricultural viewsheds under the No Action Alternative would be minimal.	Same as under No Action Alternative.	Agricultural viewsheds under Alternative 2 would be similar to existing conditions and the impact would be minimal.

3. AFFECTED ENVIRONMENT, ENVIRONMENTAL CONSEQUENCES, AND ENVIRONMENTAL COMMITMENTS

CHAPTER 3
AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This chapter begins with a summary of the CVPIA PEIS, off of which this EA tiers. The remainder of this chapter describes the affected environment and potential environmental consequences associated with long-term renewal of the CVP water service contract for the Feather Water District.

3.1 PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT

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 Central Valley Project Improvement Act. 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. Through the CVPIA, Interior is developing policies and programs to improve environmental conditions that were affected by operations, management, and physical facilities of the CVP. The CVPIA also includes tools to facilitate larger efforts in California to improve environmental conditions in the Central Valley and the San Francisco Bay-Delta system. The PEIS addressed potential impacts and benefits implementing provisions of the CVPIA. The PEIS was prepared by both Reclamation and the Service.

The analysis in the PEIS was intended to disclose the probable region-wide effects of implementing the CVPIA and provide a basis for selecting a decision among the alternatives. The PEIS was developed to allow subsequent environmental documents to incorporate PEIS analysis by reference and limit the need to reevaluate the region-wide and cumulative impacts of the CVPIA. In some cases, worst-case assumptions were used to maximize the utility of the analysis for tiering within the scope of the impacts analyzed in the PEIS.

As the project-specific actions are considered, the lead agencies must determine if the specific impacts were adequately analyzed in the PEIS. If the actions under consideration were previously evaluated and the impacts of such actions would not be greater than those analyzed in the PEIS or would not require additional mitigation measures, the actions could be considered part of the overall program approved in the PEIS Record of Decision (ROD). In such a case, an administrative decision could be made that no further environmental documentation would be necessary. If a tiered document is appropriate, the tiered document may be an EIS or an EA. The tiered documents can use the PEIS by reference to avoid duplication, and focus more narrowly on the new alternatives or more detailed site-specific effects. Therefore, only changes from the alternatives considered in the PEIS would be addressed in detail in the tiered documents.

3.1.1 Localized Impacts of PEIS on Preferred Alternative

The primary impact on CVP water service contractors, as described in the PEIS, is not due to contract provisions, but rather to the implementation of CVPIA. The re-allocation of CVP water to fish and wildlife purposes under CVPIA reduced the average annual CVP water deliveries to water service contractors from 2,270,000 acre-feet/year under the PEIS No-Action Alternative to 1,933,000 acre-feet/year under all of the PEIS alternatives, including the Preferred Alternative. The reduction in the District deliveries occurred as summarized below.

- Average Annual CVP Water Deliveries for Agricultural water service contractors located in the District decreased 12 percent from pre-CVPIA Affected Environment conditions.
- Average Annual CVP Water Deliveries for other water service contractors located in the District decreased four percent from pre-CVPIA Affected Environment conditions.

3.2 AGRICULTURAL ECONOMICS

3.2.1 Affected Environment

This section addresses potential direct and indirect economic impacts from renewing the District's long-term water service contract. Direct impacts include changes in output, income, employment, and other economic measures that occur in the sectors that directly use CVP water, whereas indirect and induced impacts are impacts that are passed through to other sectors of the economy not directly linked to use of CVP water. This section follows a format similar to the PEIS.

Water Use

The District's current contract provides for annual delivery of 20,000 acre-feet of CVP water. From 1981 to 1989, CVP deliveries to the District ranged from 14,000 to 24,000 acre-feet. Beginning in 1991, during the drought years, water deliveries dropped to approximately 9,000 to 10,000 acre-feet. Deliveries have returned to higher levels since that time. Delivery in 1999 was 16,395 acre-feet, although there is a slight discrepancy

with the water delivery recorded in the District records (M. Heaton 2000; Reclamation 2000c).

Water Pricing

The current cost of water for the District varies according to the quantity purchased. Water costs, net of any restoration charge, for certain years relevant to this EA are presented in Table 3-1. The District's water rates for the year 2000, including the restoration charge, are $20.97 per acre-foot ($13.87/acre-foot plus $7.10/acre-foot restoration charge). Water use in the District generally is metered at the user level.

Table 3-1
Water Rates Paid by the Feather Water District for Selected Years

	Tier 1	Tier 2	Tier 3
1994	$ 4.53	$ 6.97	$ 9.40
1999	$12.36	$14.67	$ 16.97
2000	$13.87	$16.49	$ 19.10

Source: Reclamation 2000; CH2MHill 2000.
Rates do not include restoration charges.

Cropping Patterns and Irrigated Acres

Data concerning the District's size and the amounts of arable and irrigable land are available from at least four sources: the State Water Resources Control Board, Reclamation, the District, and the Sutter County Tax Assessor. These numbers differ (sometimes widely), and the numbers used in various sections of the draft EA accordingly showed discrepancies, as a result of different definitions used to calculate the acreage. In order to resolve this discrepancy, the final EA will use 7,300 acres as the irrigated acreage in the District and will note any deviation from this. This avoids an erroneous impression of precision and makes the analyses of the EA easier to follow.

A majority of the irrigated acreage in the District (approximately 6,000 acres, or 82 percent) is devoted to orchards, especially peaches, prunes, and walnuts. Other crops produced include vegetables, wheat, alfalfa, and pasture. Approximately 900 acres of rice were produced in the District as late as 1989; however, rice acreage tends to fluctuate based on water availability. The rice acreage decreased to approximately 90 acres in the late 1990s and is now being phased out (Table 3-2).

Agricultural Production Costs and Revenues

Gross revenues for the District are estimated at approximately $16.7 million dollars (1995 dollars). Gross revenues are generated mostly from orchards and truck crops (Table 3-3). These estimates are derived from Central Valley Production Model (CVPM) and other data and may differ from actual revenues for the District.

Table 3-2
Feather Water District Irrigated Acreage

Crop Type	1989	Average 1995-1999
Rice	927	97
Orchard	4,709	5,571
Other	1,580	979
Fallow	N/A	635
Total	**7,216**	**7,283**

Source: Feather Water District 1993; Reclamation 2000c.

Table 3-3
Feather Water District Acreage, Revenue, and Water Use Estimates[1]
(1989)

		Gross Revenue Estimates		Water Use Estimates	
Crop	Acres	Per Acre ($)	Total (Thousand $)	Acre-feet/ Acre	Total Acre-feet
Rice[2]	927	559	518	6.65	6,165
Alfalfa/Pasture	485	585	284	3.83	1,858
Wheat	160	258	41	0.86	138
Dry Beans	120	516	62	1.91	229
Melons	480	2,232	1,071	1.81	869
Sugar Beets	160	895	143	3.26	522
Squash	175	4,750	831	1.81	317
Prunes	1,205	3,326	4,008	3.59	4,326
Peaches	2,280	3,632	8,281	3.59	8,185
Pears	430	1,062	457	3.59	1,544
Apples	60	1,062	64	3.59	215
Cherries	20	1,062	21	3.59	72
Walnuts	623	1,340	835	3.59	2,237
Almonds	91	1,292	118	2.87	261
Total	**7,216**	**22,569**	**16,734**		**26,936**

Assumptions: Pears, apples, and cherries use the same amount of water as other orchard crops.
Notes: Gross revenue and water use have been estimated for the purpose of assessing the magnitude of impacts caused by various alternatives. Estimates are not to be used for any other purpose and do not necessarily represent current conditions.
1995-1999 data show a much lower acreage of rice and therefore lower gross revenues and water use for that crop
Acreage figures for 1989 were used because that year is the representative year chosen by the District for the purposes of the water needs assessment (Reclamation 2000a).
Source: Feather Water District 1993; Reclamation 2000a.

Regional Economics

The District is within the economic region of Sutter and Yuba counties. The two-county economic region employs approximately 51,203 workers, out of a total labor force of 60,642. Annual employment growth has increased an average of 1.4 percent since 1990. Over the past decade, the mix of employment in the region has shifted slightly from manufacturing and wholesale trade to retail trade and services. Agriculture is considered the major industry in the region and employs 16.3 percent of the total workforce.

The agriculture, government, trade, and service sectors employ 61.5 percent of all workers. The remaining 38.5 percent of the work force is employed in five relatively small economic sectors: manufacturing, construction, transportation, finance/insurance, and mining.

Table 3-4
Sutter and Yuba County Employment Breakdown

Employment Statistics				
Area	**Employment**	**Unemployment**	**Labor Force**	**Unemployment Rate**
Sutter County	32,600	,100*	37,700	13.5 %
Yuba County	19,000	2,900*	21,900	13.3%
Total	51,600	7,410*	59,600	
Employment by Sector				
Sector	**Employment**			
Government	12,100	23.4%		
Trade	10,900	21.1%		
Services	8,800	17%		
Agriculture	8,400	16.3%		
Manufacturing	4,900	9.5%		
Construction	2,800	5.4%		
Transportation/Utility	2,200	4.3%		
FIRE (Finance, Insurance, Real Estate)	1,400	2.7%		
Mining	100	0.3%		
Total Employment	**51,600**	100%		

Source: State of California, Employment Development Department 2002.
*Note: The unemployment rate has been calculated using unrounded data.

3.2.2 Environmental Consequences

Methodology

The modeling approach used in this analysis is similar to that used for the PEIS. Analysis presented herein is based on data from the CVPM. CVPM runs were conducted for the different alternatives to reflect the specific water pricing conditions proposed under each alternative. All action alternatives are assessed as changes from the No Action Alternative.

The CVPM is divided into 21 Subregions. The District is in Subregion 5, covering most Feather River Region riparian and appropriative users. The District is the only water district in Subregion 5 that draws water from the CVP, and therefore most of the impacts derived from the CVPM runs for Subregion 5 can be allocated to the District. Exceptions to this rule are detailed, where appropriate, in the following discussions.

No Action Alternative

As discussed in Chapter 2 of this EA, the No Action Alternative would be renewal of the District's long-term contract under terms that are consistent with those proposed as part of the Preferred Alternative in the PEIS. The No Action Alternative includes pricing based on an 80/10/10-tiered approach up to the full cost rate. Data for the No Action Alternative are not identical to the baseline data shown above but are summaries of the conditions that are expected to prevail if the contract were implemented in accordance with terms and conditions outlined in Preferred Alternative of the PEIS.

Water Use and Rates

The No Action Alternative assumptions for water rates and water use are presented in Table 3-5.

Table 3-5
No Action Alternative Acres, Water Use, and Water Rates

Acres Irrigated with CVP water	7,300
Agricultural Gross Revenues ($ Millions)	16.7
CVP Water Use (Acre-feet)	
Average	19,940
Wet	20,800
Dry	17,860
1994 CVP Water Rates ($/Acre-foot)	
Tier 1	4.53
Tier 2	6.97
Tier 3	9.40

Source: CH2M Hill 2000.
Note: The wet year average use exceeded the 20,000 acre-feet contract amount, based on actual past use.

Irrigated Acres

Approximately 7,300 acres would be irrigated under this alternative (Table 3-5); this is the acreage used as the basis of the PEIS economic analysis, and it roughly approximates the amount of acreage currently legally irrigable with CVP water. No substantial change in irrigated acres from existing conditions would be expected.

Gross and Net Revenues

Gross revenues for the District are estimated at approximately $16.7 million dollars (1995 dollars). Gross revenues are generated mostly from orchards and truck crops (Table 3-3).

Alternative 1

Under Alternative 1, rates paid, the amount of water used, the amount of irrigated acres, and gross revenues for the District would be equivalent to that described for the No Action Alternative (Table 3-5).

Alternative 2

Because tiered pricing under Alternative 2 is based on a rolling average of water deliveries over the previous five years, nine water year sequences are assessed in the analysis for this alternative. These include the following:

Average-Average:	An average water year following a five-year sequence of average years
Wet-Average:	An average water year following a five-year sequence of wet years
Dry-Average:	An average water year following a five-year sequence of dry years
Average-Wet:	A wet water year following a five-year sequence of average years
Wet-Wet:	A wet water year following a five-year sequence of wet years
Dry-Wet:	A wet water year following a five-year sequence of dry years

Average-Dry:	A dry water year following a five-year sequence of average years
Wet-Dry:	A dry water year following a five-year sequence of wet years
Dry-Dry:	A dry water year following a five-year sequence of dry years

CVPM results for each of the nine water year sequences are presented as changes compared to the No Action Alternative.

Water Rates

The CVP water rates for each of the nine water year sequences described above, as well as the No Action Alternative tiered prices, are shown in Table 3-6, which also shows the available CVP water service supplies by tier and the blended price under each type of water year sequence. CVP water rates under Alternative 2 would range from $20.65 (tier 1) to $25.36 (tier 3) per acre-foot.

The quantity of water available to the District under each tier would depend on the amount of water available in the previous five years (Table 3-7). Moreover, the amount of water delivered varies among dry, wet, and average years. Therefore, in any given year, the quantity and blended price depend on the amount of water available in a six-year sequence. The weighted average prices (i.e., blended prices) were calculated for each sequence.

Blended prices range from $20.81 to $21.92 per acre-foot. Variations between types of water years are small (less than five percent). This variation is due to the fact that tier 3 rates for the District would be only $4.71, or approximately 23 percent, higher than tier 1 rates, and the amount used by the District is expected to be fairly stable across types of water years.

Water Use

Predicted water use by the District varies from approximately 20,000 acre-feet in average years to 17,900 acre-feet in dry years. These quantities are similar to the water use under the No Action Alternative. Compared to the No Action Alternative, changes in CVP water use caused by tiered pricing are less than 100 acre-feet in any year. Groundwater use shows little change in average years, but declines between 420 and 1,100 acre-feet in wet and dry years as a result of Alternative 2. The CVPM results indicate that water use in the District is not greatly affected by the tiered pricing proposal because, even with the new tiered prices, the marginal value of water in agricultural production is higher than its cost.

Within each type of water year (average, wet, or dry) there are slight variations in water use depending on the water available in the preceding five years. Such variations are the result of differences in blended prices caused by differences in the quantity of water available under each tier. Within each type of water year, variations in water use are relatively small because the blended rates do not vary substantially according to the preceding five years.

Table 3-6
Alternative 2 Water Rates and Usage
Following Average, Wet, or Dry Five-year Periods Compared to No Action

	Water Rates		Average	Wet	Dry	Average	Wet	Dry	Average	Wet	Dry
	No Action Rates ($/Acre-foot)	Alternative 2 Rates ($/Acre-foot)	Followed by Average			Followed by Wet			Followed by Dry		
			Water Use (1,000 Acre-feet):								
Tier 1	4.53	20.65	16.0	16.6	14.3	16.0	16.6	14.3	16.0	16.6	14.3
Tier 2	6.97	23.01	2.0	2.1	1.8	2.0	2.1	1.8	1.9	1.2	1.8
Tier 3	9.40	25.36	2.0	1.2	1.8	2.0	2.1	1.8	0.0	0.0	1.8
Category 2		25.36	0.0	0.0	2.1	0.9	0.0	2.9	0.0	0.0	0.0
Total			20.0	19.9	20.0	20.9	20.8	20.8	17.9	17.8	17.9
			Blended Price ($/Acre-foot):								
			21.35	**21.18**	**21.77**	**21.52**	**21.36**	**21.92**	**20.90**	**20.81**	**21.35**

Source: CH2M Hill 2000.

Table 3-7
Alternative 2 Applied Irrigation Water Changes Following Average, Wet, or Dry Five-Year Periods Compared to No Action (Acre-feet)

	Alternative 2 Average	Changes Compared to Average No Action			Alternative 2 Wet	Changes Compared to Wet No Action			Alternative 2 Dry	Changes Compared to Dry No Action		
Water Source		Average	Wet	Dry		Average	Wet	Dry		Average	Wet	Dry
		Followed by Average				Followed by Wet				Followed by Dry		
CVP Water	19,940	60	-40	60	20,800	100	0	0	17,860	40	-60	40
Groundwater	NA	-60	40	-60	NA	–1,090	- 990	-420	NA	-1,100	-1,000	-1,100

Source: CH2M Hill 2000.
Assumptions: 100% of Subregion 5 water use impact of tiered pricing is allocated to the Feather Water District.

Irrigated Acres

Changes in irrigated acres from the No Action Alternative are summarized in Table 3-8. Changes in acreage are minor (180 to 190 acres maximum) in all types of water years. The largest reduction in acreage is for rice in wet and dry periods. Rice is a crop with one of the lowest net revenues per acre-foot and generally would be one of the first crops to be reduced in the event of increased water costs. The overall impact on acreage remains very small under all water year scenarios. Very slight variations in irrigated acres between the different types of water year sequences are again due to slight increases or decreases in the blended water prices.

Table 3-8
Alternative 2 Changes in Irrigated Acres
Following Average, Wet, or Dry Five-Year Periods
Compared to Average, Wet, or Dry No Action

Crop Category	Changes Compared to Average No Action			Changes Compared to Wet No Action			Changes Compared to Dry No Action		
	Average	Wet	Dry	Average	Wet	Dry	Average	Wet	Dry
	Followed by Average			Followed by Wet			Followed by Dry		
Pasture	10	10	30	-30	-30	10	-40	-40	-40
Alfalfa	0	0	20	0	0	10	0	0	0
Sugar beets	0	0	0	0	0	0	0	0	0
Other field crops	0	0	-10	-10	-10	-10	-10	-10	-10
Rice	0	0	-20	-130	130	-70	-130	-130	-130
Truck crops	0	0	0	0	0	0	0	0	0
Tomatoes	0	0	0	0	0	0	0	0	0
Deciduous orchard	0	0	10	0	0	0	0	0	0
Small grain	0	0	-10	-10	-10	-10	-10	-10	-10
Subtropical orchard	0	0	0	0	0	0	0	0	0
Subtotal	**10**	**10**	**20**	**-180**	**-180**	**-70**	**-190**	**-190**	**-190**

Source: CH2M Hill 2000.
Assumptions: 100% of Subregion 5 acreage impacts are allocated to the Feather Water District.

Gross and Net Revenues

Gross revenues experience a slight decline under the Alternative 2 tiered pricing approach. This decline is minimal: on the order of $8,000 in a typical (average) year to up to $125,000 in wet and dry years. Compared to the total gross revenues of approximately $16.7 million, this decline represents 0.1 percent of gross revenues in average years and 0.8 percent in dry and wet years. Most of the decline in gross revenues would be related to decline in rice acreage (Table 3-9).

Because of a slight reduction in acreage of some crops under some water year scenarios, net revenue from farming also is expected to suffer a slight decline. The decline in net revenues due to reduction in acreage varies between $0 and $21,000 (Table 3-10).

Overall, the main impact on net revenues would come directly from an increase in water prices. District water users are predicted to spend an additional $287,000 to $338,000 on water because of the price increase.

Table 3-9
Alternative 2 Value of Production Following Average, Wet, or Dry Five-Year Periods Compared to Average, Wet, or Dry No Action (Thousand $)

Crop Category	Changes Compared to Average No Action			Changes Compared to Wet No Action			Changes Compared to Dry No Action		
	Average	Wet	Dry	Average	Wet	Dry	Average	Wet	Dry
	Followed by Average			Followed by Wet			Followed by Dry		
Pasture	1	0	3	-4	-4	2	-5	-5	-5
Alfalfa	0	0	7	-1	-1	1	-2	-2	-2
Sugar Beets	0	0	1	0	0	0	0	0	0
Other Field Crops	0	0	-2	-3	-3	-3	-3	-3	-3
Rice	-2	0	-21	-111	-111	-61	-112	-112	-112
Truck Crops	0	0	0	-1	-1	0	-1	-1	-1
Tomatoes	0	0	2	0	0	1	0	0	0
Deciduous Orchard	0	0	4	0	0	0	0	0	0
Small Grain	0	0	-1	-3	-3	-3	-3	-3	-3
Subtropical Orchard	0	0	0	0	0	0	0	0	0
Subtotal	**-2**	**0**	**-8**	**-123**	**-123**	**-64**	**-125**	**-126**	**-125**

Source: CH2M Hill 2000.
Assumptions: 100% of Subregion 5 gross revenue impacts are allocated to the Feather Water District.

Table 3-10
Alternative 2 Changes in Net Revenue Following Average, Wet, or Dry Five-Year Periods Compared to Average, Wet, or Dry No Action (Thousand $)

Cause of Net Revenue Change	Changes Compared to Average No Action			Changes Compared to Wet No Action			Changes Compared to Dry No Action		
	Average	Wet	Dry	Average	Wet	Dry	Average	Wet	Dry
	Followed by Average			Followed by Wet			Followed by Dry		
Fallowed Land	0	0	0	-20	-20	-10	-20	-21	-20
Groundwater Pumping	2	-1	2	33	30	13	38	34	38
Irrigation Cost	-1	-1	-1	-1	-1	-1	-1	-1	-1
CVP Water Cost	-323	-317	-332	-332	-328	-338	-292	-287	-300
Higher Crop Prices	0	0	6	0	0	0	0	0	0
Net Change	**-322**	**-319**	**-325**	**-320**	**-318**	**-333**	**-275**	**-274**	**-283**

Source: CH2M Hill 2000.
Notes: All values in 1992 dollars.
CVP Water Cost: the sign has been changed compared to CH2M Hill 2000.

Assumptions: Net revenue impact allocated to the Feather Water District as follows:

Fallowed Land	100%
Groundwater Pumping	100%
Irrigation Cost	100%
CVP Water Cost	100%
Higher Crop Prices	2% (proportional to the District's acreage in Region 5)

Other components of net revenues include groundwater pumping, labor and capital costs, and higher crop prices. These components are not expected to change greatly, due to the tiered pricing approach under Alternative 2.

Higher crop prices in the Dry-Average water year sequence are expected to contribute up to $6,000 of additional net revenues to the District water users in some years.

However, after a series of dry years, large amounts of CVP water would no longer be affordable and would not be purchased. The higher blended prices that result would force some subregions in California to reduce acreage, which, in turn, would result in generally higher crop prices and higher returns for the crops that remain in production. District farmers would not be expected to substantially reduce their water use despite higher water prices because the marginal value of water to agriculture is higher than its price. However, District farmers would benefit slightly from the higher crop prices that would result from reduced production in other parts of California. This contribution would, however, be minimal at the level of the District.

Therefore, overall net revenues for District farmers mostly would be affected directly through higher CVP water rates and not through changes in cropping patterns induced by changes in water rates.

Regional Impacts

This analysis identifies the regional economic impacts of the long-term contract renewal for the Average-Average water year sequence. This is the only sequence that represents long-run conditions for the District. The input-output model used in the regional economic analysis assumes a long-run equilibrium is reached; therefore, it is inappropriate to model short-run responses represented by the wet and dry year conditions. The dry-average water year sequence is not presented because the model did not predict the region would be affected permanently by a five-year dry sequence.

The results of this analysis are summarized in Table 3-11. The table presents the regional economic impacts by the source of the impact, including reduced agricultural output and the change in farm net incomes.

The impacts of Alternative 2 relative to the No Action Alternative include losses of about 16 jobs in the Sacramento Valley and losses of approximately $0.75 million dollars in output and $0.4 million in place-of-work income. Most of these impacts would be felt in the manufacturing, trade, and services sectors of the regional economy. Much of the economic impact of this alternative would fall outside the Sutter and Yuba county economic region. Thus, employment, output, and place-of-work income losses in Sutter and Yuba counties would be much smaller than those identified for the entire Sacramento Valley.

3.2.3 Cumulative Impacts

Alternative 1 would impose no crop acreage and revenue changes and Alternative 2 would impose relatively small crop acreage and revenue changes. Neither alternative would have large impacts on the regional economy. Therefore, implementation of Alternatives 1 and 2 would not contribute to cumulative environmental impacts in the region.

Table 3-11
Regional Impacts of Alternative 2 on the Sacramento Valley Economy

Average-Average Sequence						
	Employment (Number of Jobs)		Output (Millions $)		Place of Work Income ($ Millions)	
	Direct	Total	Direct	Total	Direct	Total
Reduced Output	0.043	0.086	0.002	0.005	0.001	0.003
Reduced Net Income	6.480	16.200	0.292	0.745	0.162	0.399
Total	**6.523**	**16.286**	**0.294**	**0.750**	**0.163**	**0.401**

Assumption: Sutter-Yuba impacts are proportional to Sacramento Valley impacts.

3.3 WATER RESOURCES

3.3.1 Affected Environment

Description of Study Area

The District is approximately eight miles south of Yuba City, in Sutter County. It borders the west bank of the Feather River, about ten miles north of its confluence with the Sacramento River. There are approximately 7,300 acres of irrigated land in the District, divided into 301 parcels. The distribution system consists of 33 miles of enclosed underground concrete pipelines. There are no water storage facilities in the District (Feather Water District 1993).

Prior to the passage of the CVPIA, the District typically received its full contract amount, but deliveries post-CVPIA have averaged about half the contract amount. From 1989 to 1999, the District diverted an average of 10,737 acre-feet of project water to irrigate an average of 6,859 acres. From 1995 to 1999 water use ranged from a low of 9,099 acre-feet in 1996 to 16,395 acre-feet in 1999 (Reclamation 2000c).

In 1952, the California Department of Water Resources (DWR) published DWR Bulletin No. 6, which described the results of an investigation of groundwater quality in Sutter County (DWR 1952). The investigation found that groundwater in the Tudor area contained chloride concentrations high enough to adversely affect agricultural production.

Shortly before the report was published, Sutter County applied for and received a permit from the SWRCB to divert up to 130 cubic feet per second (cfs) of water from the Feather River in the Tudor area. The permit was granted subject to the District entering into an agreement with Reclamation for exchange of water from the CVP, to supply prior water rights in the Sacramento-San Joaquin delta area via the Sacramento River. The District recycles irrigation return flows (tail water); the quality of this recycled water is adequate for irrigation. In May 1955, Sutter County submitted a proposal to the County Boundary Commission to form a water district to manage the diversion and distribution of water from the Feather River. In June, 1958, the District was formed (Feather Water District 1993).

In 1962, the District entered into a 32-year water service "exchange," or "replacement water," contract with Reclamation to receive up to 20,000 acre-feet of CVP water. The water is delivered by Reclamation at the confluence of the Sacramento and Feather rivers, to replace water that the District pumps out of the Feather River (Feather Water District 1993).

The region has a Mediterranean climate. The average annual precipitation from 1961 to 1990 was about 20 inches. The District estimates that direct precipitation accounts for about 5,500 acre-feet of water applied to the land annually. However, about 66 percent of the precipitation occurs during the period from November to March. Average monthly temperatures from 1961 to 1990 ranged from 45.5 to 79 degrees Fahrenheit. The average annual frost free period in the region is reported to be 275 days, but from 1961 to 1990 the temperature did not fall below freezing (Feather Water District 1993).

Surface Water

Feather River and Tributaries. The Feather River has a drainage area of 3,607 square miles. It is the largest tributary to the Sacramento River below Shasta Dam. Flows on the Feather River are regulated by Oroville Dam, which began operation in 1967 as part of the State Water Project (SWP). Prior to the construction of Oroville Dam, flows in the Feather River reflected natural runoff conditions, with peak flows in the months of March, April, and May. Following the construction of Oroville Dam, the average monthly flow pattern was modified to provide reduced flows during the spring months and increased flows during summer months.

Regulations and Agreements That Affect CVP Operations. Prior to the passage of CVPIA, the operation of the CVP was affected by SWRCB Decisions (D-) 1422 and 1485, and the Coordinated Operations Agreement (COA). D-1422 and D-1485 identify minimum water flow and water quality conditions at specified locations, which are to be maintained in part through the operation of the CVP. The COA specifies the responsibilities shared by the CVP and SWP for meeting the requirements of D-1485.

Beginning in 1987, a series of actions by the SWRCB, US Environmental Protection Agency (EPA), the National Marine Fisheries Services (now NOAA-Fisheries), and the Service affected interim water flow and water quality standards in the Delta. However, at the time CVPIA was enacted (October 1992), the water quality standard in the Delta remained D-1485, and the CVP and SWP were operated in accordance with the COA to maintain this requirement.

In December 1994, representatives of the federal and state governments and urban, agricultural, and environmental interests agreed to the implementation of a Bay-Delta protection plan through the SWRCB, to provide ecosystem protection for the Bay-Delta Estuary. SWRCB Order 95-06 superseded D-1485. The coordinated operations of the CVP and SWP continue to be based on the COA, but are modified as needed on an annual basis.

Operations of CVP Divisions and Facilities. The facilities included in CVP divisions north of the Delta, including the Trinity, Shasta, and Sacramento River divisions, are known collectively as the Northern CVP System. The District receives water from the Feather River, and that water is replaced, for Delta inflows, by water stored in the Shasta Division.

CVP Water Users. During development of the CVP, the United States entered into long-term contracts with many of the major water rights holders in the Central Valley. In part, the CVP is operated to satisfy downstream claims of water rights, to meet the obligations of the Sacramento River settlement contracts, and to deliver project water to CVP water service contractors.

Many of the CVP water rights originated from applications filed by the state in 1927 and 1938 to advance the California Water Plan. After the federal government was authorized to build the CVP, those water rights were transferred to Reclamation, which applied for the additional water rights needed for the CVP. In granting water rights, the SWRCB sets certain conditions within the permits to protect prior water rights, fish and wildlife needs, and other prerequisites it deems in the public interest.

CVP Water Service Contractors. Before construction of the CVP, many irrigators on the west side of the Sacramento Valley and elsewhere relied primarily on groundwater. With the completion of CVP facilities in these areas, the irrigators signed agreements with Reclamation for the delivery of CVP water as a supplemental supply. Several cities also have similar contracts.

CVP water service contracts are between the United States and individual water users or districts and provide for an allocated supply of CVP water to be applied for beneficial use. In addition to CVP water supply, a water service contract can include a supply of water that recognizes a previous water right. The purposes of a water service contract are to stipulate provisions under which a water supply is provided, to produce revenues sufficient to recover an appropriate share of capital investment, and to pay the annual operations and maintenance costs of the project.

Criteria for Water Deliveries to CVP Contractors. The criteria for deliveries to CVP contractors consider available water supplies and superior obligations on the use of the available water.

Criteria for Water Availability to CVP Contractors. Water availability for delivery to CVP water service contractors during periods of insufficient water supply is determined based on a combination of operational objectives, hydrologic conditions, and reservoir storage conditions. Reclamation is required to allocate shortages among water service contractors within the same service area, as individual contracts and CVP operational capabilities permit.

Feather River Settlement Contractors. The Feather River Settlement Contractors are water users who hold riparian and senior appropriative rights on the Feather River. As

the SWP was built, the state entered into contractual agreements with these existing water rights holders (e.g., water rights settlements). In general, agreements established the quantity of water the contractor is permitted to divert under independent senior water rights and outlined monthly supplemental SWP supply allocated by the state. Contract shortages are applied based on hydrologic conditions and storage in Lake Oroville. The District is not a settlement contractor.

Feather Water District. The District distributes available water equally among water users, based on acreage, and reclaims all surface flow runoff (e.g., tail water) and pumps it back into the system for redistribution. The District estimates that about 1,500 to 2,000 acre-feet of tail water is recycled in this way per year (Silva 2002). Water diversions from the Feather River are normally distributed over the growing season. From 1980 to 1988, for example, a period that the District considers to be representative, about 43 percent of the water was delivered in June and July, about 37 percent in May and August, about 18 percent in April and September, and about two percent in March and October (Feather Water District 1993). The water is diverted at two points at the northern and a southern ends of the District, and each diversion point is equipped with a pumping plant and small reservoir. The reservoirs are designed to maintain pressure in the distribution piping.

The District estimates that about 99 acre-feet of water is lost from conveyances in a "representative" year due to seepage and operational spills. Because the conveyance system is pipe, evaporation losses are negligible. The District estimates that in a "representative" year, about 600 acre-feet of applied water percolates below the root zone, recharging groundwater, while about 23,900 acre-feet of water is consumed by crops and lost to evaporation. The ratio of "deep percolation" to water used by crops is therefore about 2.5 percent in a representative year. The amount of water that goes to deep percolation can vary dramatically, depending on the amount of water available, irrigation practices, and cropping patterns. For example, in 1989, a wet year, the District estimated that deep percolation was nearly five times that in a representative year, or about 2,754 acre-feet, while crop water use was nearly the same as in the representative year. Deep percolation prevents salts from accumulating in the root zone of plants over time. Salt accumulation can result in reduced yields.

Water from the Feather River contains about 80 to 90 parts per million (ppm) total dissolved solids (TDS). Return flows contain about 400 to 450 ppm TDS. The quality of return flows is adequate for irrigation use.

Groundwater

The District owns two wells, which were installed in 1976 to supplement surface water supplies during drought years. The wells have capacities of 2,900 gallons per minute (gpm) (6.46 cfs, 12.8 af/day) and 4,100 gpm (9.14 cfs, 18.1 af/day).

Groundwater elevations in wells monitored by DWR since the 1940s and 1950s indicate that groundwater elevations rose noticeably after about 1965, suggesting that a switch from groundwater to surface water in this period allowed groundwater levels to recover.

Seasonal fluctuations in the water table are on the order of five to ten feet, and the water table is slightly more than 25 feet above msl in most wells. Because the elevation of the streams in the area (Feather River, Gilsizer Slough) is only a few feet lower than the surrounding land surface, the water table in the area is below the elevation of the streams, and the streams tend to lose water to recharge the groundwater aquifer. The direction of regional groundwater flow is generally toward the southwest, or about parallel to the Feather River.

The District wells were pumped during 1976-1977 and from 1990 to 1992. From 1990 to 1992 a little more than 8,000 acre-feet of groundwater per year was pumped, accounting for about half of the water used by the District during those three years. Groundwater contains about 300 ppm TDS. If groundwater were blended in equal parts with water taken from the Feather River (80 ppm), the resulting water would contain about 190 ppm of TDS.

Sacramento River Basin. The northern third of the Central Valley regional aquifer system is in the Sacramento River Region. This region extends from north of Redding to the Delta in the south. DWR identifies this portion of the Central Valley Aquifer as the Sacramento Valley and Redding basins, which cover over 5,500 square miles. This discussion refers to these basins collectively as the Sacramento Valley Basin.

In the Sacramento Valley Basin, a long-term dynamic link between the groundwater and surface water system has been maintained regionally. The greatest gains to streams from groundwater occurred during the 1940s when groundwater storage was highest in the Sacramento Valley basin. Discharge to streams was lowest during and immediately following the 1976 to 1977 drought and during the 1987 to 1992 droughts. In some areas of the southern portion of the Sacramento Valley region where groundwater levels have continued to decline, such as in Sacramento County, streams that formerly gained flow from the subsurface now lose flow through seepage to adjacent groundwater systems.

Aquifer recharge to the Sacramento Valley basin historically has been from deep percolation of rainfall, the infiltration from stream beds, and subsurface inflow along basin boundaries. Most of the recharge for the Central Valley occurs in the north and east sides of the valley where the precipitation is the greatest. With the introduction of agriculture to the region, aquifer recharge was augmented by deep percolation of applied agricultural water and seepage from irrigation distribution and drainage canals. The basin has an estimated perennial yield of 2.4 million acre-feet, and recent groundwater pumping in the Sacramento Valley basin was estimated to be near this perennial yield, suggesting that regional overdraft conditions are not prevalent (DWR 1994). One exception is the southwestern portion of the Sacramento Valley, near Davis, where overdraft conditions have occurred in recent years.

Land subsidence due to groundwater level declines has been identified in the southwestern part of the Sacramento River Region, near Davis and Zamora. By 1973 land subsidence in this area had exceeded approximately one foot and was reported to

be approximately two feet in the area east of Zamora and west of Arbuckle (Lofgren and Ireland 1973). Land subsidence monitoring has continued since 1973, and some localized land subsidence was reported in the Davis-Zamora area during the 1988-1992 drought (Dudley 1995). Groundwater quality is generally excellent; however, areas of local groundwater contamination or pollution exist.

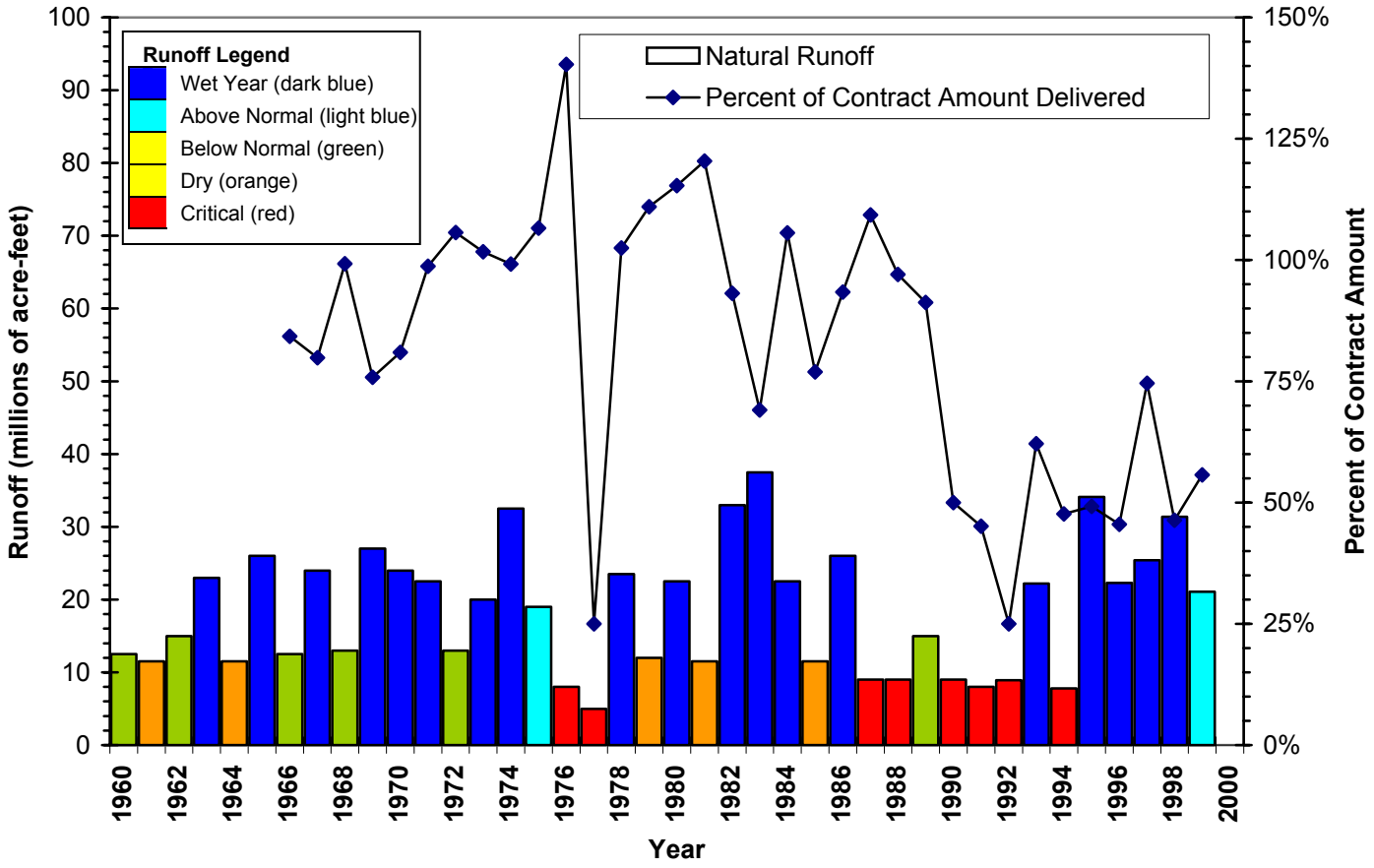
High water tables contribute to subsurface drainage problems in several areas of the Sacramento Valley basin. High water tables in portions of Colusa County, particularly along the Sacramento River, periodically impair subsurface drainage functions of the Colusa Basin Drain and other local drainage facilities. In many reaches of the Sacramento River, flows are confined to a broad, shallow engineered channel with stream bottom elevations higher than adjacent ground surface elevations. During extended periods of high streamflows, seepage-induced water logging can occur on adjoining farmlands, particularly in areas where local groundwater is in contact with the river.

Water Supply and Uses

The current (interim) contract with Reclamation provides for up to 20,000 acre-feet of replacement water. The District estimates that with the cropping pattern of a representative period, the amount of water required for irrigation is 24,146 acre-feet. In 1989, according to Reclamation estimates, 7,176 acres, out of a total area within the District of 9,850 acres (73 percent), were under irrigation. Although the District would like to irrigate all of its irrigable lands, water diversions in recent years have been substantially less than the contract maximum. From 1989 to 1999, the District diverted an average of 10,737 acre-feet of project water to irrigate an average of 6,859 acres. This amount of water represents about 54 percent of the contract allotment, and is about 1.6 acre-feet per acre of irrigated farmland. By comparison, Reclamation estimated that the per-acre crop water demand in 1989 was 3.0 acre-feet per acre.

Figure 3-1 shows the amount of water the District has diverted since 1966 as a percentage of the contract amount. The volume of unimpaired (natural) runoff that would enter the Sacramento Valley from the four main tributaries if the various water project facilities did not exist (also known as the Four River Index) is plotted to show the relationship between water diverted by the District and the broader hydrologic conditions affecting water supplies in the northern portion of the state. Water years are classified based on the inflow from these streams according to a formula called the

Figure 3-1
Comparison of Natural Runoff and Water Delivered to Feather Water District as a Percent of Contract Amount



Sacramento Valley 40-30-30 Index, which takes into account the water supply forecasts that influence decisions about how much water to store or release. The type of year is indicated by the color of the bar in the figure. Normal runoff is defined as 17.9 million acre-feet per year. Although there is not a direct correspondence between runoff or water year type and deliveries, the figure indicates that water diversions by the District generally have been decreasing since about 1975 and that the significant reduction in diversions seen during the last ten years is related to a sequence of low runoff years that began in 1987. The figure also illustrates that even with "wet" and "above normal" water years since 1994, the District has been unable to divert the full contract amount, or has chosen not to divert based on cropping patterns, temperatures, or precipitation.

Although the amount of water the District has diverted has exceeded the contract amount in the past, this no longer occurs (Silva 2002). The District does not transfer in or transfer out water to other water districts (Silva 2002).

Future improvements in water management by the federal and state water projects (e.g., CALFED) and initiatives to increase the amount of water storage may reduce the severity of the effects of low runoff, but ultimately the amount of water available for irrigation is heavily dependent on precipitation. In addition, competition for water among agricultural and M&I users and environmental uses is likely to increase. The tradeoffs between these uses are discussed in Section 3.2, Agricultural Economics.

The District service area is entirely agricultural, and the District does not provide water for domestic or industrial use, other than that associated with agriculture. In 1999, the principal irrigated crops in the District were orchards (about 5,900 acres in peaches, prunes, walnuts, apples, cherries, and plums), row crops (about 747 acres in melons and safflower), and grain (330 acres of wheat and rice). The amount of water needed by a given crop depends on soil characteristics and evapotranspiration (water evaporated from soil and transpired by plants). Over the years, acreage in row crops and rice has decreased and acreage in orchards has increased (Feather Water District 1993). Orchards are a permanent crop, with an expected life of 20 to 40 years, requiring a long-term commitment of water.

Flood and furrow irrigation have remained the primary irrigation methods in use in the District. The District calculated that 5,216 acres were watered by flood irrigation and 1,355 acres by furrow irrigation during 1989 (Feather Water District 1993).

3.3.2 Environmental Consequences

Groundwater can be affected by recharge from deep percolation of applied irrigation and by pumping. The amount of groundwater recharge depends on the irrigation method, soil, and crop and on the amount of water applied. Leaching requirements can be expressed as a ratio of the amount of deep percolation to applied water. Leaching requirements for individual crops range from about 0.003 for wheat to 0.08 for almonds and dry beans. For a given cropping pattern, the leaching requirement can be assumed to be constant. However, if the cropping pattern changes, the leaching requirement may change also.

No Action Alternative

Surface Water

Water Deliveries. Under the No Action Alternative, Reclamation would negotiate contract water quantities with the District based on the water needs assessment prepared by Reclamation (Reclamation 2000a). Table 3-12 summarizes the results of the Water Needs Assessment for the District.

Table 3-12
Summary of Water Needs Assessment Quantities
(all quantities are 2030 values)

Contract Amount (ac-ft)	Ground water Supply (ac-ft)	Net Transfers (ac-ft)	Total Water Supply (ac-ft)	Net Total Agr. Demand (ac-ft)	Unmet Demand (ac-ft)	Average Irrigated Acres (acres)	Average Water Required per acre
20,000	0	0	20,000	23,423	3,423	9,330[1]	2.50

Source: US Department of the Interior, Bureau of Reclamation 2000a.
[1]This figure may be wrong because it exceeds by nearly 1,000 acres the area of the District within which the Bureau of Reclamation permits CVP water to be used.

A comparison of Table 3-12 with the information provided above indicates that the primary difference between the proposed long-term contract and the interim contract is that Reclamation has reduced the per-acre estimate of agricultural water demand, while increasing the number of acres assumed to be irrigated within the District. The total unmet demand, which is the difference between the amount of water required by the crops and the amount of water delivered if 100 percent of the contract amount were purchased, would be 3,423 acre-feet. The maximum contract amount of 20,000 acre-feet would irrigate 8,000 acres at an average rate of 2.50 acre-feet per acre. If the maximum contract amount were applied to 9,330 acres, the average amount per acre would be 2.15 acre-feet per acre.

It is estimated that on average, districts would receive 100 percent of their contract quantity less than 75 percent of the time under the No Action Alternative. This assumption is based in part on the expected availability of water, and in part on the districts' reactions to tiered pricing. As discussed previously, one of the potential impacts of tiered pricing is that the District may elect to purchase less than the amount of water available to it.

If tiered pricing were not a factor, then the availability of water would depend solely on climate conditions and project operating rules. Over the long term, future project water supplies can be expected to be consistent with historic conditions (for example, as reflected in the Four River Index), provided that no long-term climate changes occur. As discussed previously, unimpaired runoff conditions are highly variable and historically have involved cycles of relatively low runoff or high runoff that persist for five to ten years or more. From the farmer's perspective, long-term average conditions are not necessarily as important as short-term fluctuations in supply. Farmers have

increasingly had to adjust in recent years to greater uncertainty in the availability and timing of water deliveries.

Under the No Action Alternative, water at the higher tier 2 and tier 3 prices will be available only in a certain percentage of years in which Reclamation is able to provide more than 80 percent of the contract allocation to contractors. In those years, the District may elect to purchase less than 100 percent of the contract amount. Any unpurchased water either would remain in storage, where it would be available to other water contractors, or for future beneficial use, or, in years when no storage capacity is available, the unsold water may have to be released. Releases needed to maintain flood storage capacity do not necessarily result in wasted water; these surplus flows may be beneficial to the environment. However, some of the potential beneficial use of the water would be lost.

As discussed in Section 3.2.1, diversions have averaged about 50 percent of the contract amount during the past ten years. An average of 7,000 acres have been irrigated over the past ten years, with each acre receiving about 1.6 acre-feet. (This analysis is based on the average of the acreages reported by the District since 1989, rather than on the figure of 7,300 acres that CH2M Hill used for the economic analysis and that is referenced in other sections of the EA.) Therefore, if the District received an average of 2.50 acre-feet for each acre under irrigation, this would represent an increase over the amount of water per acre it has received during the past ten years.

Assuming the current cropping pattern, where 2.50 acre-feet per acre is the maximum amount of water, on average, that can be beneficially used, then if the District continued to irrigate approximately 7,000 acres of land, as it has been doing for the past 20 years, the total amount of water that the District could purchase to irrigate this amount of land would be 17,500 acre-feet. This is equal to 87.5 percent of the total long-term contract amount. Sixteen thousand acre-feet of this water would be provided at the tier 1 price, and the remaining 1,500 acre-feet would be at the tier 2 price. The District could divert more than this amount of water if Reclamation had supplemental water to sell, if the District altered the cropping pattern in such a way that average beneficial use was greater than 2.50 acre-feet per acre, or if more acres were irrigated. Again assuming the current cropping pattern, the District could irrigate a total of 8,000 acres with its maximum allotment of 20,000 acre-feet, at an average rate of 2.50 acre-feet per acre. Because the District encompasses about 9,850 total acres, some of the acreage in the District can be expected to remain unirrigated even in years when the District is allocated 100 percent of its contract amount.

In recent years, the District reportedly has irrigated nearly 6,000 acres of permanent crops (orchards). Reclamation estimates that the net crop water requirement of deciduous orchard is 3.4 acre-feet per acre, so the total crop water requirement of 6,000 acres of orchards would be 20,400 acre-feet, which is roughly the total contract amount. Under the No Action Alternative, 2,000-acre feet of this water would be provided at the tier 2 price.

Because orchards are relatively high value crops, the farmers who own these lands can be expected to always opt to receive up to 20,000 acre-feet if it is available. The long-term profitability of these crops depends more on water availability than on its price. This would leave little or no water available for other lower-value crops. Land not used for high-value orchards probably would be most suitable for crops like wheat, which requires little irrigation, is grown during the winter, and receives much of its water needs from precipitation. In low-water years, all landowners would be required to reduce their water use, and permanent crops would be especially vulnerable. In wet years, when orchard owners request the maximum amount of water available, wheat growers may not be able to afford the higher cost of water from tiered pricing and might order only tier 1 water.

Compared to current conditions, without tiered pricing, the higher price of tier 2 and tier 3 water might result in a reduction in the amount of water the District decides to purchase in those years in which more than 80 percent of the contract amount of water is made available to the District. The reduction in water purchases (compared to existing conditions) would occur in years when water is relatively plentiful (high runoff years) and when the marginal demand for water (the demand for a little more water than has already been provided) is lowest. Assuming that adequate water storage capacity exists in the CVP, the unused water might be stored for future use, reducing shortages in subsequent years.

Tier 2 and 3 water would be available in periods when water was more abundant. In dry periods, when Reclamation cannot supply more than 80 percent of the contract amount, only tier 1 water would be available. Thus, under tiered pricing, the economic incentive to reduce water consumption occurs when water is most plentiful. Reduced consumption during periods of plentiful water still could lead to long-term benefits if the water can be stored for future beneficial use or if the water is redistributed to other users. Tiered pricing tends to encourage distribution to the highest economic use.

Because the District would be required to pass along tiered pricing to its customers, some farmers affected by the price of water might elect to shift to higher value crops, while others might elect to irrigate less land, using only lower-cost water. Farmers also might find ways of spreading the costs of water over a number of years, thereby reducing the effects of annual variability in price. Preliminary modeling results using the CVPM model suggest that the cropping pattern in the District is not very likely to change in response to increases in pricing because of the high percentage of orchards.

Groundwater

In the past, groundwater has been used to supplement surface water supplies only in critical water years. Shortages in water supply in either the CVP or the SWP could result in limitations on surface water use by the District. Tiered pricing under the No Action Alternative may serve to increase the amount of water in storage in the CVP system, thereby reducing the magnitude and frequency of water shortages in the CVP; however, these benefits are likely to be small and are expected to occur mainly in the shortage year immediately after a sequence of wet years. Minimum Feather River flow requirements

also may limit the amount of water that the District can divert in some years, although cooperation between the CVP and SWP is likely to reduce the probability that these conditions would occur independently. Under the No Action Alternative, regional groundwater levels would continue to decline throughout the study period (US Department of the Interior, Bureau of Reclamation 1999a). However, small increases in the depth to groundwater within the District are not likely to change the frequency at which the District opts to pump groundwater.

Alternative 1

Surface Water

The water pricing structure would be essentially the same under Alternative 1 as under the No Action Alternative. Therefore, water use would be the same as under the No Action Alternative.

Groundwater

Since surface water use would be the same as under the No Action Alternative, there would be no change in groundwater use, and groundwater impacts would also be the same as under the No Action Alternative.

Alternative 2

Surface Water

As under the No Action Alternative, 100 percent of the contract amount would not be available to the District in all years. However, if (because of the pricing scheme or other factors) some districts opted to purchase less than the amount of water available to them, this water could be available for redistribution to other districts that can better afford to purchase it. The ability to pay would depend on a number of factors that cannot be accurately predicted.

For Alternative 2, the lowest price (tier 1) would apply to an amount equal to 80 percent of the five-year rolling average of deliveries to the District. The rolling average is the average, recalculated each year, of the water used during the preceding five-years. Because the quantity delivered is a function of water supply availability as well as the District's water order, this pricing structure can be expected to have the overall effect of increasing the cost of water relative to the No Action Alternative. This is because reduced deliveries caused by dry hydrologic conditions will reduce the amount of water to which the tier 1 pricing applies in the five subsequent years. Similarly, the tier 3 price will increase if total deliveries are reduced because many of the costs that contribute to the full cost of the water are fixed and independent of the amount of water delivered. Water transfers are extremely rare in the District, so the possibility of transfers has not been factored into this analysis.

The tiered pricing schedule under Alternative 2 would be the same as that under the No Action Alternative only when the District received 100 percent of its contract amount in each of the preceding five years. If it received less than the full contract amount, then

the cost of the water under Alternative 2 would be higher than under the No Action Alternative.

Because the tier 1 price would apply to the amount of water calculated from the five-year rolling average of deliveries, the amount of tier 1 water available would not necessarily reflect the available water supply. The District might adopt a variety of strategies in response to the water price structure.

In one strategy, the District might elect to purchase up to some maximum quantity of water each year without regard to cost. If it decided to purchase up to 20,000 acre-feet, it would in effect be purchasing 100 percent of the water offered by Reclamation each year. In this case, the District would ensure that it received the maximum amount of tier 1 water. In practice, this strategy is likely to be followed by the District, because of its relatively large investment in permanent crops, whose long-term productivity and profitability is probably more dependent on the quantity of water than on the cost of water.

At the other end of the spectrum of strategies the amount of water purchased by the District could be so dependent on its cost that the District would elect to purchase only tier 1 water, and no tier 2 or tier 3 water. Under the tiered pricing scheme of Alternative 2, this scenario is not viable because it would result in a continuously decreasing quantity of tier 1 water being available.

Alternative 2 probably would have less chance of reducing agricultural water consumption in wet years than the No Action Alternative. The higher cost of the water probably would tend to cause farmers to shift to higher value crops and to encourage investment in water conservation as a strategy to reduce dependence on water supplies. However, this shift to higher value crops, such as those grown in orchards, could result in less flexibility in operations because fallowing would have a greater negative impact on a farmer's income.

Results of modeling with the CVPM model indicate that there would be negligible change in the cropping pattern and little change in water use in the District due to Alternative 2.

Groundwater

If, as expected, the District opts to purchase all of the project water available to it in each year, then there also should be no change in groundwater use under Alternative 2, compared to the No Action Alternative.

3.3.3 Cumulative Impacts

Since implementation of either Alternative 1 or 2 would result in only minor changes in water use compared to the No Action alternative, no cumulative impacts on water resources are expected.

3.4 LAND USE RESOURCES

3.4.1 Affected Environment

Agricultural Land Use

Introduction

The affected environment discussion for agricultural resources includes farmland classifications and agricultural land use. Although the potential impact on agricultural land use would be limited to the District, this discussion also addresses all of Sutter County because the economic effects resulting from impacts on agriculture would extend throughout the county.

Farmland Classifications

The Natural Resources Conservation Service (NRCS) is responsible for maintaining an inventory of the nation's farmlands. In order to map these lands, the NRCS designates four basic types of important farmland: prime farmland, farmland of statewide importance, unique farmland, and farmland of local importance. Prime farmland and farmland of statewide importance may be used for crops, pasture, range, forestry, or other uses but may not be used for urban or water uses. The California Department of Conservation Farmland Mapping and Monitoring Program maps California's important farmlands biennially.

Prime farmland is land best suited for producing food, feed, forage, fiber, and oilseed crops and also is available for these uses. Prime farmland has the soil quality, growing season, and moisture supply needed to produce a sustained high yield of crops when treated and managed (including managed for water) according to current farming methods.

Farmland of statewide importance is land other than prime farmland that has a good combination of physical and chemical characteristics for producing crops. These lands differ from prime farmland in that they may have minor shortcomings, such as greater slope or less ability to store soil moisture.

Unique farmland does not meet the criteria for prime farmland or farmland of statewide importance but is used for producing specific high-value food and fiber crops. It has the special combination of soil quality, location, growing season, and moisture supply needed to produce sustained high quality or high yields of a specific crop when treated and managed according to modern farming methods. Examples of such crops are citrus, olives, avocados, rice, grapes, and cut flowers.

Farmland of local importance is land other than prime, statewide, or unique that is producing crops or that has the capability of production and may be important to the local economy. These lands are identified by a local committee made up of concerned agencies that review the lands under this category at least every five years.

The Farmland Protection Act (P. L. 97-98) of 1981 requires all federal agencies to consider the effect of programs on farmland. Federal agencies are required to develop criteria to evaluate the effect of federal programs on the conversion of agricultural lands to nonagricultural uses. Federal agencies must, to the extent practicable, consider alternatives or mitigation that lessen the impact on farmland conversion.

The California Land Conservation Act of 1965 (Williamson Act) established a voluntary tax incentive program for preserving agricultural and open space land. To be eligible for the Williamson Act program, land must be within a county-designated agricultural preserve. Lands under Williamson Act contracts are restricted to agricultural use, and the property owner is taxed according to the income that the land is capable of generating in agriculture. Williamson Act contracts extend for ten years and are renewed automatically, unless a notice of nonrenewal is issued or an application for cancellation of the contract is approved. Cancellation of the contract requires that the purpose be consistent with the Williamson Act or that it be in the public interest.

Sutter County Agricultural Land Use

In 1998, there were approximately 356,000 acres of agricultural land in Sutter County, slightly decreased from approximately 358,700 acres in 1992. In 1998, there were approximately 170,200 acres of prime farmland, 113,700 acres of farmland of statewide importance, 22,200 acres of unique farmland, and 49,900 acres of grazing land. The total amount of irrigated farmland (defined as prime farmland, farmland of statewide importance, and unique farmland) also decreased during this period, from approximately 308,500 acres to 306,100 acres (California Department of Conservation 2000b).

According to the California Department of Conservation, approximately 720 acres of farmland in Sutter County were taken out of cultivation between 1996 and 1998. Of that, 54 acres (7.5 percent) were converted to urban use. Land taken out of cultivation but not urbanized can be farmed in the future (California Department of Conservation 2000b).

Sutter County leads California counties in the production of prunes and ranks among the states' leaders in the production of rice, honeydew melons, safflower, and English walnuts. Farmland in Sutter County is expected to face continuing development pressure. The California Department of Finance projects that Sutter County's population will grow from 84,200 in July 2000 to 161,600 in July 2020. The Farmland Mapping and Monitoring Program survey found that land conversion in Sutter County was occurring in the following areas: new houses on the fringes of Meridian and Sutter, new retail establishments in Yuba City, and farmland to grazing land, including 500 acres along the Feather River in the Nicolaus area, 320 acres in the Olivehurst area, and 80 acres in the Sutter Buttes area (California Department of Conservation 2000a).

Sutter County Land Use Designations

The County of Sutter Land Use Diagrams function as the official county policy in the allocation and distribution of different land uses in the unincorporated areas. According to the Land Use Diagrams for the County-wide General Plan, land within the District is designated as Agriculture (AG)-20 (20-acre minimum) or AG-80 (80-acre minimum).

The AG-20 and AG-80 land use designations are based on soil types and characteristics. The AG-20 and AG-80 designations identify land for producing food and fiber, including areas of prime agricultural soils. Lands designated AG-20 typically have soils with characteristics that are particularly suited for orchard crops, whereas lands designated AG-80 typically have soils with characteristics that are particularly suited for field crops, row crops, and range land. Typical land uses allowed in both AG-20 and AG-80 districts include crop production, orchards, grazing, pasture and rangeland, resource extraction activities, facilities that directly support agricultural operations, such as agricultural products processing, and necessary public utility and safety facilities (Sutter County 1996b). One principal dwelling unit is allowed per lot on both AG-20 and AG-80 designated lands.

Feather Water District

The District encompasses approximately 7,300 acres of irrigated land and serves 301 parcels with irrigation water. In 1999, 100 percent of this acreage was irrigated (Reclamation 1999). All lands served by the District are designated as either prime farmland or farmland of statewide importance.

In 1999, the major agriculture crops in the District were prunes (3,684 acres, approximately 50 percent of total irrigated acreage), followed by walnuts (979 acres) and peaches (967 acres). Table 3-13 shows changes in the amount of irrigated crops in the District from 1998 to 1999.

Municipal and Industrial Land Use

The District is approximately 27 miles northwest of the city of Sacramento and eight miles south of Yuba City. There are no municipal or industrial land uses within the District.

3.4.2 Environmental Consequences

Impacts on land use depend primarily on changes that may affect agricultural productivity and on conflicts with applicable land use plans of the community where they are located.

No Action Alternative

Under the No Action Alternative, no substantial change in irrigated acreage would be expected in the District. (see Section 3.2, Agricultural Economics). Therefore, there would be no anticipated changes to agricultural land use under the No Action Alternative.

Table 3-13
Feather Water District Irrigated Crops
1996, 1998, 1999

Crop Type	1998 (acres)	1999 (acres)	Net Acres Gained(+)/ Lost (-) 1996-1999
Apples	299.0	219.0	(-70)

Cherries	37.0	37.0	0.0
Dews	316.0	316.0	0.0
Melons	115.0	271.0	+156
Nursery	350.0	350.0	0.0
Peaches	887.0	967.0	+80
Pasture	31.0	31.0	0.0
Persimmons	9.0	9.0	0.0
Plums	18.0	18.0	0.0
Prunes	3,724.0	3,684.0	(-40)
Pumpkins	0.0	0.0	0.0
Rice	90.0	90.0	0.0
Row Crops	0.0	0.0	0.0
Safflower	160.0	160.0	0.0
Tomatoes	156.0	0.0	(-156)
Walnuts	979.0	979.0	0.0
Wheat	160.0	240.0	+80
TOTAL	**7,331.0**	**7,371.0**	**+40**

Source: Feather Water District 1999.

Alternative 1

Alternative 1 is assumed to have similar effects to land use resources as the No Action Alternative. Therefore, there are no environmental impacts of this alternative.

Alternative 2

Implementing Alternative 2 would not have a direct effect on land uses in the District service area. Renewing the long-term water contract under Alternative 2 would not involve constructing new facilities that would alter current land uses nor would it involve installing structures that would conflict with existing land use plans.

Under Alternative 2, changes in irrigated acreage would be small, ranging from an increase of 20 acres to a reduction of 190 acres in a series of dry years (see Section 3.2, Agricultural Economics). The largest reduction in acreage for a single crop type (up to 130 acres) would be for rice. However, the overall effect of this alternative on the amount of irrigated acreage would be small, less than two percent, under all water year scenarios. General cultivated and fallowed acreage patterns would be similar to historical patterns, and agricultural land use under Alternative 2 would be similar to conditions described in Section 3.4.1, Affected Environment.

Renewing the long-term water contract under Alternative 2 would contribute to the continued production of agricultural crops from lands within the District service area. Therefore, implementing Alternative 2 would not result in large adverse land use effects.

3.4.3 Cumulative Impacts

Implementation of Alternatives 1 and 2 would not contribute to cumulative impacts on land use.

3.5 BIOLOGICAL RESOURCES

3.5.1 Affected Environment

This section describes biological resources within the District and within approximately one-half mile of the District boundary. Vegetation, wildlife, sensitive habitats, and special status species within or in the vicinity of the District are described. Biological resources in the District include those that are limited or restricted in movement (plants, reptiles, small mammals) and those that are more mobile and can range onto and off the property from surrounding habitat areas, such as fish, birds, and large mammals.

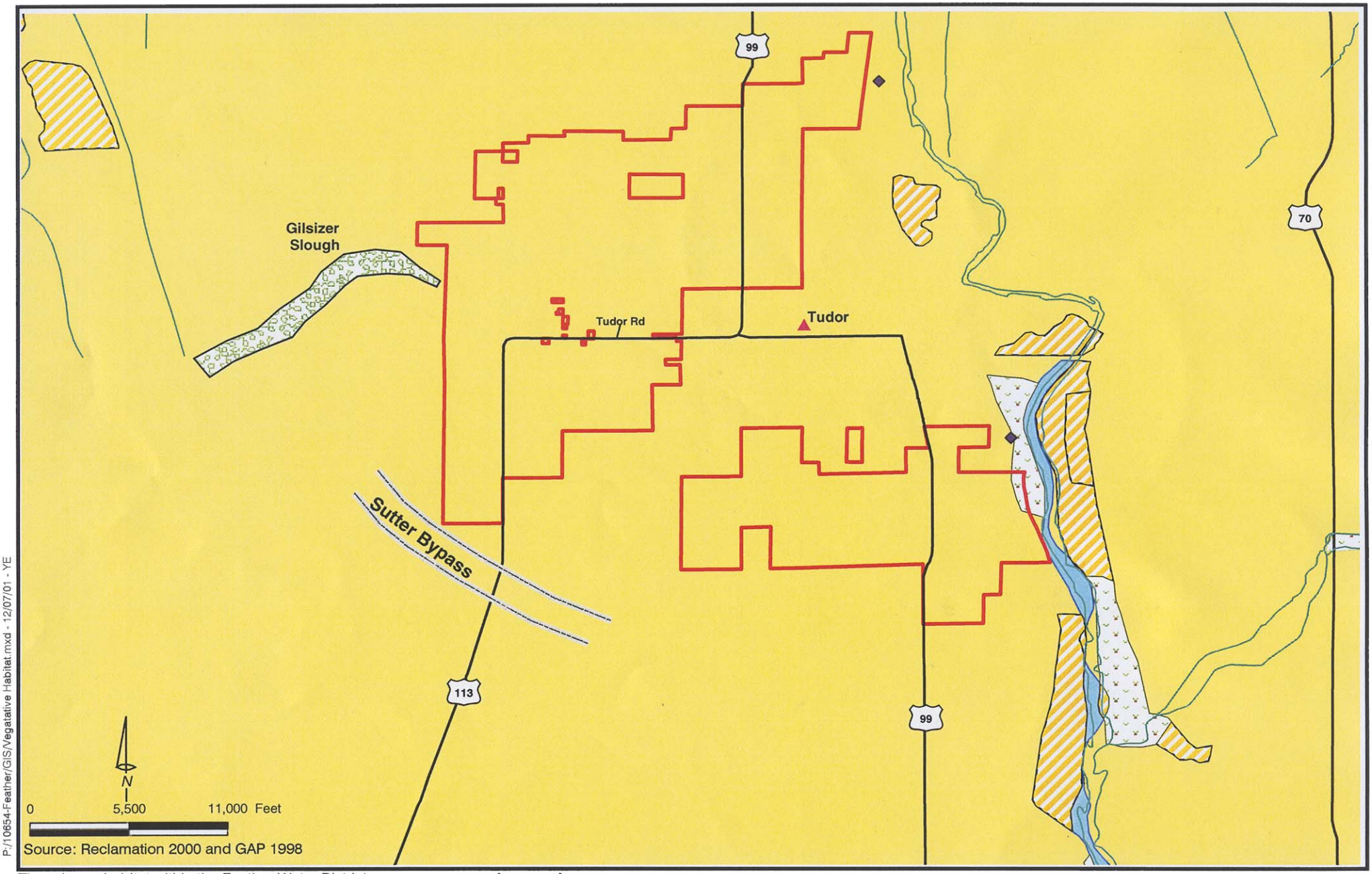
Biological resource data were collected from various sources, including the Sutter County General Plan (County of Sutter 1996) and the *Draft Programmatic Biological Opinion for Operation of the CVP and Implementation of the CVPIA* (Reclamation 2000). The Service provided current information on sensitive species and habitat on and near the property (see Attachment E for copies of agency letters). The California Natural Diversity Database (CNDDB) also was searched (CDFG 2000).

Typical and historical habitat in the region of the District includes freshwater wetland, riverine, riparian, and floodplain areas, salt marsh, interior grassland, and oak woodland. Land within the District is currently or has been historically in agricultural production (Figure 3-2). Several areas adjacent to the District are not agricultural. The Gilsizer Slough, which, like other major landscape features, is not managed by the District, passes through the northwestern section of the District. Within the District, the slough offers very limited habitat; however, as the slough approaches the levee for the Sutter bypass west of the District, it broadens into wetland habitat. A riparian corridor also parallels the Feather River, on the eastern edge of the District, between the Feather River and the levee.

The District maintains ditches within its jurisdiction by using procedures consistent with wildlife values. Ditches are cleared mostly by hand, and backhoes are used only to clear major obstructions.

Vegetation

Nonnative species predominate in the District. Most of the habitat in the District is agricultural or disturbed vegetation, consisting predominantly of permanent crops (orchards). Agricultural fields attract and support various birds and small animals but in general are characterized by having marginal value to biological resources. Over the last five years, approximately 90 acres of rice have been planted within the District. Rice and other heavily irrigated agricultural products may provide habitat for waterfowl.



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The primary habitat within the Feather Water District is agricultural land. Wetland and riparian habitat is located west and east of the District, respectively.

Legend

- Roads
- Streams and Canals
- Water District Boundary
- Agricultural Land
- Great Valley Cottonwood Riparian Forest
- Coastal and Valley Freshwater Marsh
- Great Valley Mixed Riparian Forest
- Other Water Bodies
- Pump Locations

Feather Water District Vegetative Habitat

Sutter County, California

Figure 3-2

Tetra Tech, Inc

Other disturbed areas within the District include buildings, paved locations, landscaping, and mowed or otherwise disturbed grassland. Grasses, shrubs, trees, and flowers typically used for landscaping do not provide high quality forage or habitat for wildlife species. The vegetation in disturbed areas generally tends to be weedy or nonnative grasses and forbs with low plant diversity and are often mowed.

The Gilsizer Slough west of the District and the riparian corridor along the Feather River east of the District are of good habitat quality. Gilsizer Slough is a freshwater wetland or marsh habitat characterized by a specialized community of aquatic-dependent plant species, such as the common tule *(Scirpus acutus),* cattail *(Typha latifolia),* sedges *(Carex* spp.*),* spike-rush *(Eleocharis* spp.*),* and rushes *(Juncus* spp.*).* Wetlands usually are defined by the types of plants and soils and inundation duration. Wetland types in this category include deep and shallow freshwater marshes, wet meadows, seasonal wetlands, saturated freshwater flats, and vegetated shallows. However, the Gilsizer Drainage District keeps the portions of the slough within the District free of any vegetation and maintains the slough for stormwater discharge from Yuba City.

The area along the Feather River, most of which is owned and administered by CDFG, consists of riparian or riverine vegetation that typically offers greater plant diversity than surrounding habitats. Typical species in shaded riverine aquatic habitat include cottonwoods *(Populus deltoides),* alders *(Alnus* spp.*),* willow *(Salix* spp.*),* common reed *(Phragmites communis),* giant reed *(Arundo donnax),* cattails *(Typhus* spp.*),* and grasses *(Dactylis* spp.*).* Riparian forests are dominated by cottonwood *(Populus fremontii)* and willow near the rivers, with sycamore *(Platanus racemosa),* box elder *(Acer negundo),* and valley oak *(Quercus lobata)* dominating the less frequently flooded higher terraces. Floodplain habitats above the riparian zone typically do not support wetland vegetation but are hydrologically linked to rivers and riparian forests by periodic flooding and can be considered with them as an ecological unit. However, all such habitat in the District is restricted to those small portions that lie between the levee and the Feather River.

Sensitive Habitats

The Service and NOAA-Fisheries have identified certain quadrangle maps (quads) within and adjacent to the District as proposed critical habitat for Central Valley winter-run Chinook salmon (*Oncorhynchus tshawytscha*). These are the Nicolaus, Sutter Causeway, Gilsizer Slough, and Olivehurst quads (NOAA-Fisheries 2000). Only the Gilsizer Slough quadrangle is within District boundaries.

Wildlife

Wildlife within the District typically would be species that have adapted to the human-influenced landscape, such as the cottontail *(Sylvilagus bachmani),* black-tailed hare *(Lepus californicus),* house mouse *(Mus musculus),* deer mouse *(Peromyscus maniculatus),* pocket gopher *(Thomomys bottae),* and squirrel species *(Citellus* spp.*).* Skunk *(Mephitis mephitis)* and fox *(Vulpes macrotis)* prey on the smaller mammal species. Bird species include the barn owl *(Tyto alba),* swallow *(Hirundo* spp.*),* northern mockingbird *(Mimus polyglottos),* European starling *(Sturnus vulgaris),* American crow *(Corvus brachyrhynchos),* western meadowlark *(Sturnella neglecta),* belted kingfisher *(Ceryle alcyon),* and western bluebird

(Sialia mexicana) and raptors, such as American kestrel *(Falco sparverius)* and northern harrier *(Circus cyaneus)*. The Feather River east of the District and the Sutter Bypass to the west provide habitat for open water species, including a variety of waterfowl.

Special Status Species

Special status species include those listed or proposed for listing by the Service or CDFG as endangered, threatened, or rare, as candidate species for listing, or as species of concern. Wildlife resources listed by the Service as potentially occurring in the vicinity of the District include invertebrates, fish, reptiles, amphibians, birds, and mammals (including bats) that can occur in the Gilsizer Slough quadrangle. Few of the species listed by the Service would be expected to occur within the District because agricultural and developed areas provide little habitat value for most of these species. Plants listed or proposed to be listed by the California Native Plant Society (CNPS) as rare or endangered also are included. Special status species are provided varying levels of legal protection under federal and state endangered species acts. The Service lists forty-two special status species as potentially occurring in Sutter County (Table 3-14). Few of the species listed are likely to occur at the District because of the lack of suitable habitat (Figure 3-3). Certain species that may occur are discussed below.

Invertebrates

The valley elderberry longhorn beetle (VELB) *(Desmocerus californicus dimorphus)* is a federally threatened species and is found in grasslands, woodlands, and upland areas near rivers in California's Central Valley. The VELB relies on elderberry shrubs *(Sambucus* ssp.*)* to reproduce. For one to two years of its life, the VELB exists as a tunneling larva within the stems, trunks, and leaves of the elderberry shrub. Adults emerge during spring, when they mate and lay eggs within the elderberry bark. Throughout its life cycle, the VELB feeds on different parts of the elderberry shrub (Thelander et al. 1994). The CNDDB has identified the VELB as occurring in the Nicolaus and Olivehurst quads, adjacent to but not in the District service area (CDFG 2004).

The vernal pool tadpole shrimp *(Lepidurus packardi)* is a federally endangered species that is found in grass-bottomed swales of unplowed grasslands in mud-bottomed and highly turbid pools. The vernal pool tadpole shrimp can also be found in aquatic areas, riparian forest, and riparian woodlands. It is known to inhabit pools varying in size from five square meters up to 36 hectares (Goals Project 2000).

This species is a secondary consumer that feeds on detritus, dead organic matter, and other invertebrates (Pennank 1989; Fryer 1987). Vernal pool tadpole eggs that have been deposited in the mud lay dormant throughout the dry season until the onset of the rainy season. The eggs hatch within a three-week period once the rain reestablishes vernal pools (Goals 2000).

Table 3-14
Special Status Species Listed by the Service as Potentially Occurring in the Gilsizer Slough Quad

Scientific Name	Common Name	Federal/State/ CNPS Status	Occurrence at the Feather Water District
Threatened and Endangered Species			
Invertebrates			
Lepidurus packardi	Vernal pool tadpole shrimp	E/-/-	U
Branchinecta lynchi	Vernal pool fairy shrimp	T/-/-	U
Desmocerus californicus dimorphus	Valley elderberry longhorn beetle	T/-/-	U
Branchinecta conservatio	Conservancy fairy shrimp	E/-/-	U
Fish			
Oncorhynchus tshawytscha	Winter-run Chinook salmon	E/E/-	U
Hypomesus transpacificus	Delta smelt	T/T/-	U
Oncorhynchus mykiss	Central Valley steelhead	T/-/-	U
Amphibians			
Rana aurora draytonii	California red-legged frog	T/CSC/-	U
Reptiles			
Thamnophis gigas	Giant garter snake	T/T/-	U
Birds			
Branta canadensis leucopareia	Aleutian Canada goose	DL/-/-	U
Haliaeetus leucocephalus	Bald eagle	T/T/-	U
Coccyzus americanus occidentalis	Western yellow-billed cuckoo	C/E/-	P
Falco peregrinus anatum	American peregrine falcon	DL/	U
Grus canadensis tabida	Greater sandhill crane	-/CA/-	U
Buteo swainsoni	Swainson's hawk	-/T/-	P
Plants			
Pseudobahia bahiifolia	Hartwegs golden sunburst	E/E/1B	U
Proposed Species			
Amphibians			
Ambystoma californiense	California tiger salamander	PT/-/-	U
Candidate Species			
Fish			
Oncorhynchus tshawytscha	Central Valley fall/late fall-run chinook salmon	C/-/-	U
Acipenser medirostris	Green sturgeon	C/	U
Birds			
Coccyzus americanus occidentalis	Western yellow-billed cuckoo	C/E/S1	P
Species of Concern			
Invertebrates			
Anthicus antiochensis	Antioch Dunes anthicid beetle	SC/-/-	U
Anthicus sacramento	Sacramento anthicid beetle	SC/-/-	U
Cicindela hirticollis abrupta	Sacramento Valley tiger beetle	SC/-/-	U
Linderiella occidentalis	California linderiella fairy shrimp	SC/-/-	P
Fish			
Lampetra ayresi	River lamprey	SC/-/-	U
Lampetra tridentata	Pacific lamprey	SC/-/-	U
Spirinchus thaleichthys	Long fin smelt	SC/CSC/-	U
Pogonichthys macrolepidotus	Sacramento splittail	SC/-/-	U
Amphibians			
Scaphiopus hammondii	Western spadefoot toad	SC/CSC/-	U
Rana boylii	Foothill yellow-legged frog	SC/-/-	U
Reptiles			
Clemmys marmorata marmorata	Northwestern pond turtle	SC/CSC/	P
Masticophis flagellum ruddocki	San Joaquin coachwhip	SC/-/-	U

Table 3-14
Special Status Species Listed by the Service as Potentially Occurring in the Gilsizer Slough Quad *(continued)*

Scientific Name	Common Name	Federal/State/ CNPS Status	Occurrence at the Feather Water District
Birds			
Agelaius tricolor	Tri-colored blackbird	SC/CSC/-	U
Athene cunicularia hypugea	Western burrowing owl	SC/CSC/-	U
Botaurus lentiginosus	American bittern	SC/-/-	U
Buteo regalis	Ferruginous hawk	SC/CSC/-	U
Carduelis lawrencei	Lawrence's goldfinch	SC/-/-	U
Charadrius montanus	Mountain plover	SC/-/-	U
Cypseloides niger	Black swift	SC/-/-	U
Elanus leucurus	White-tailed kite	SC/-/-	U
Empidonax traillii brewsteri	Little willow flycatcher	SC/E/-	U
Lanius ludovicianus	Loggerhead shrike	SC/-/-	U
Melanerpes lewis	Lewis's woodpecker	SC/-/-	U
Numenius americanus	Long-billed curlew	SC/-/-	U
Plegadis chihi	White-faced ibis	SC/CSC/-	U
Riparia riparia	Bank swallow	SC/T/-	P
Selasphorus rufus	Rufous hummingbird	SC/-/-	U
Toxostoma redivivum	California thrasher	SC/-/-	U
Mammals			
Myotis yumanensis	Yuma myotis bat	SC/CSC/-	U
Plecotus townsendii townsendii	Pacific (Townsend's) western big-eared bat	SC/CSC/-	U
Corynorhinus (=Plecotus) townsendii pallescens	Pale Townsends big-eared bat	SC/CSC/-	U
Myotis ciliolabrum	Small-footed myotis bat	SC/-/-	U
M. thysanodes	Fringed myotis bat	SC/-/-	U
M. volans	Long-legged myotis bat	SC/-/-	U
M. evotus	Long-eared myotis bat	SC/-/-	U
Perognathus inornatus inornatus	San Joaquin pocket mouse	SC/**/-	U
Eumops perotis californicus	Greater western mastiff-bat	SC/SC/-	U
Dipodomys californicus eximius	Marysville Heermann's kangaroo rat	SC/SC/-	U
Plants			
Astragalus tener var. *ferrisiae*	Ferris's milk-vetch	SC/-/-	U
Layia septentrionalis	Colusa layia	SC/-/-	U
Monardella douglasii ssp. *venosa*	Veiny monardella	SC*/-/1B	U
Hibiscus lasiocarpus	Rose-mallow	-/-/2	P
Critical Habitat			
Oncorhynchus tshawytscha	Central Valley winter-run Chinook salmon	PX	U

Source: US Fish and Wildlife Service 2000; CNDDB (Rarefind 2; September 2000)

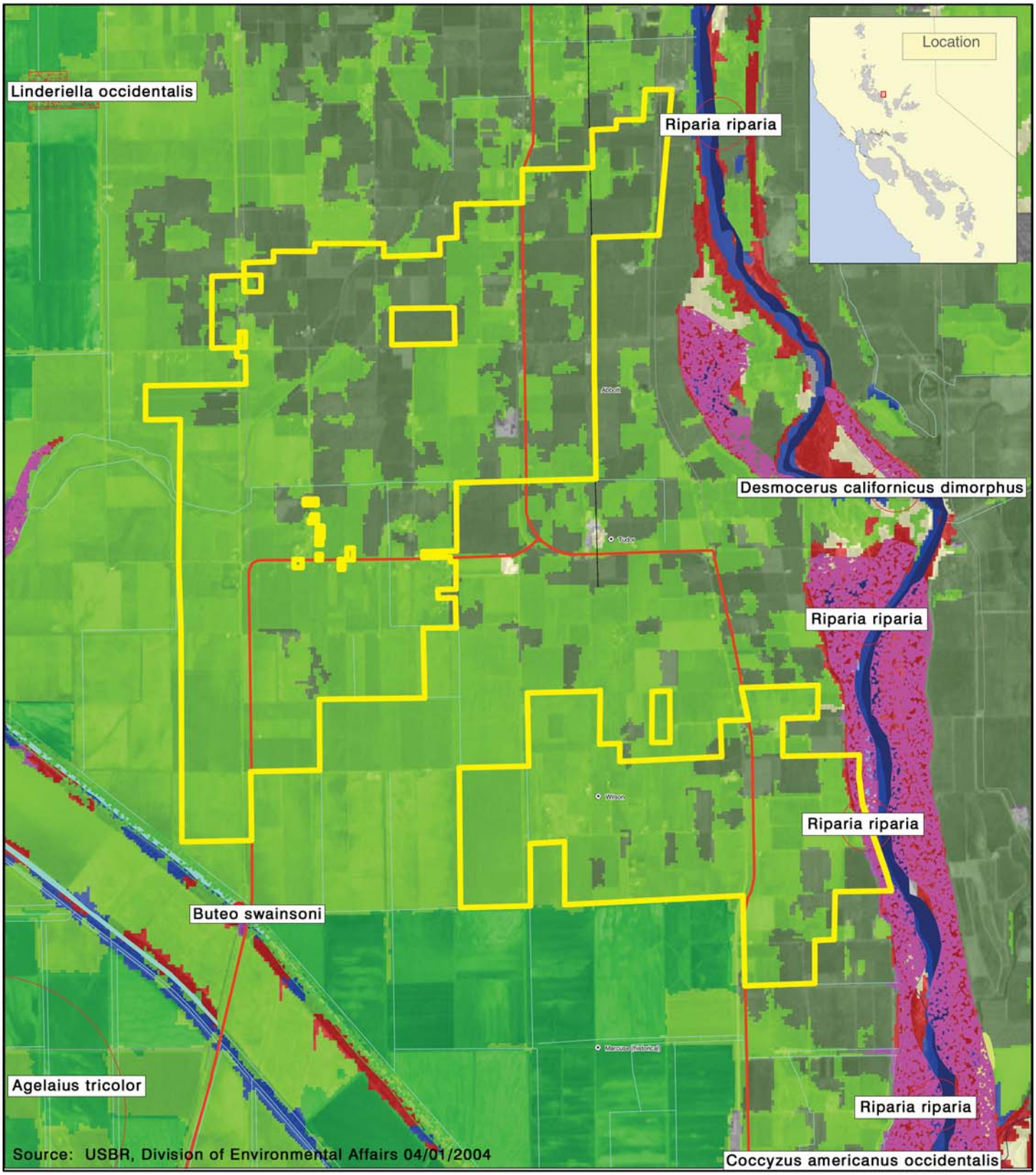
Notes:

Federal Status
E = Endangered
T = Threatened
PE = Proposed endangered
PT = Proposed threatened
PX = Proposed critical habitat
C = Candidate
SC = Species of concern
DL = Recently delisted
FPD = Federally proposed for delisting
* = Possibly extirpated from this quad

State Status
E = Endangered
T = Threatened
CSC = California species of special concern
R = Rare
CE= Candidate for listing as endangered
** = Restricted in distribution; declining

(CNPS) Status
1B = Rare, threatened, and endangered in California and elsewhere
2 = Rare, threatened, and endangered in California but more common elsewhere

Occurrence
C = Confirmed
P = Possible
U = Unlikely



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This figure includes the Gilsizer Slough USGS quad and a 2-mile buffer zone surrounding it. No listed species have been identified within Feather Water District.

Legend

- Vernal Pool
- Feather Water District
- Reclamation Dam

Known Occurrences of Special Status Species in the Project Area

Feather Water District, California

Figure 3-3

Tetra Tech, Inc.

The habitat of the listed vernal pool crustaceans is highly fragmented, resulting in small isolated populations. Ecological theory predicts that such populations will be highly susceptible to extinction due to chance events, inbreeding depression, or additional environmental disturbance. Should extinction occur in a population that has been fragmented, the opportunities for recolonization are thought to be greatly reduced due to geographical isolation from other populations. Suitable vernal pools are found in the action area but are confined to undeveloped areas. The CNDDB has identified the tadpole shrimp as occurring in the Nicolaus quad, adjacent to but outside the District boundaries. The California linderiella *(Linderiella occidentalis)* occurs in the Nicolaus quad and Gilsizer Slough.

Fish

Only three runs, or evolutionarily significant units (ESUs), of the Chinook salmon; one steelhead ESU; and the Sacramento splittail occurred historically in the project area. The splittail has been delisted, but the salmon species and the Delta smelt, whose habitat lies downstream of the project area, are described in detail below.

Salmonids (Chinook salmon, winter-run [E], spring-run [T], fall-run [PT], Central Valley fall/late fall-run [C])

There are three Central Valley Chinook salmon *(Oncorhynchus tshawytscha)* ESUs (fall/late-fall, winter, and spring) that are grouped based on the timing of their spawning migrations (Goals Project 2000). Spring-run Chinook salmon are not listed for Sutter County, although critical habitat is designated in the area.

The fall/late fall-run Chinook is a federally designated candidate species, spring-run Chinook is a federal and California-listed threatened species (not listed in Sutter County), and winter-run Chinook is a federally and California-listed endangered species.

There is no record of winter-run Chinook in the Feather River, but it is possible that occasional adult strays or nonnative may occur near the District's intakes, even though they are 12.5 miles and 17 miles upstream of the confluence of the Feather and Sacramento Rivers. Adults, as strong swimmers, should not be affected by the intakes, and the warm water to be expected in the diversion embayments is likely to deter nonnatal winter-run juveniles from foraging in the diversion embayments, should they occur in their vicinity.

Historically, the adult spring-run salmon immigration into the upper rivers and tributaries extended from mid-March through the end of July, with the peak in late May and early June (CDFG 1998). Spawning started in mid-August, peaked in early September, and ceased in late September. Spring-run salmon are expected to avoid entrainment, based on their swimming ability, the relatively low draw of the pumps, the presence of vulnerable juveniles in the stream during periods of little or no pumping activity, and the warm temperatures of the embayments acting to deter foraging in and around the diversion pumps.

The CNDDB shows no occurrences of winter-run, spring-run, or fall/late fall run Chinook salmon in the District or adjacent to the District, although Sutter County contains critical habitat for the winter-run Chinook salmon.

Central Valley Steelhead

The Central Valley steelhead *(Oncorhynchus mykiss),* a federally listed threatened species, historically spawned in perennial and seasonal tributaries throughout the Central Valley. The introduction of other races of steelhead has resulted in a population that can be found in the Central Valley in any month. This species is thought to occur in the Feather River (NOAA-Fisheries 2000).

Both adults and yearlings can reasonably be expected to migrate past the District's pumps. Both adults and yearlings are strong swimmers and would be unaffected by the weak flows toward the pumps, though the steelhead's greater temperature tolerance means there is the potential for individuals to approach the diversion embayments and pumps to forage. Most of the outmigration occurs from November to May, when diversions are minimal, if they occur at all; hence, steelhead would not be adversely affected. The CNDDB shows no occurrences of the steelhead in the District or adjacent to the District.

Delta Smelt

Delta smelt *(Hypomesus transpacificus)* is a federally listed threatened species. The delta smelt is adapted to living in fresh and brackish water. It occupies estuarine areas with salinities below two grams per liter, rarely occurring in estuarine waters with more than 10 to 12 ppt salinity, which is about one-third the salinity of seawater (Ganssle 1966, in Moyle 1976).

Water releases from Shasta Reservoir are made, as necessary, to ensure adequate flows in the Delta. Delta water requirements and upper river temperature requirements during most of the non-flood season determine the volume of the releases. The only times these requirements do not drive the volume of the Shasta Reservoir releases are those brief periods when the Delta requirements are met without special releases. The CNDDB shows no occurrences in the District or adjacent to the District.

Amphibians

The California red-legged frog *(Rana aurora draytonii)* is federally threatened and a California species of concern. It has been virtually extirpated from the floor of the Central Valley, despite its historic presence in numbers large enough for commercial harvest. It currently remains a concern only in the foothills of the Coast Range and in isolated drainages in the Sierra Nevada.

Reptiles

The northwestern pond turtle *(Clemmys marmorata marmorata)* is a federal and state species of special concern. This species inhabits freshwater ponds or streams and may occur in the freshwater marsh and shaded riverine aquatic habitat adjacent to the District. The

CNDDB has listed the turtle has occurring in the Nicolaus and Gilsizer Slough quads, which are outside the service area boundaries.

The giant garter snake *(Thamnophis gigas)* is a federally and state-listed threatened species. It occurs in scattered populations from Butte County south to the northern San Joaquin Valley. This species inhabits freshwater ponds or streams and occurs to the west of the District in the freshwater marsh and shaded riverine aquatic habitat of lower Gilsizer Slough, the Sutter Bypass, and adjacent rice fields. The CNDDB has identified the giant garter snake as occurring in the Sutter Causeway quad, west of the Sutter bypass, and in the Nicolaus quad, east of Hwy 70, which are outside the service area boundaries.

Birds

The American peregrine falcon *(Falco peregrinus anatum)* was delisted in 1999, and the bald eagle *(Haliaeetus leucocephalus)* has been proposed for delisting from federal threatened status. The Aleutian Canada goose *(Branta canadensis leucopareia)* was delisted as a federal threatened species. While these species could be found in this region of California, as they are sometimes associated with freshwater wetlands, they are not considered likely residents within or adjacent to the District. The bald eagle may be an occasional visitor, but habitat conditions within the District are not suitable for permanent residence. The property is not within the bald eagle's current nesting range, and only marginal feeding habitat occurs in the area for this species. The Swainson's hawk *(Buteo Swainsoni)* is a state-listed threatened species and, according to the CNDDB, has occurred in the Nicolaus, Gilsizer Slough, and Sutter Causeway quads. The tricolored blackbird *(Agelaius tricolor),* a federal and California species of concern, and the little willow flycatcher *(Empidonax trailii brewsteri),* a federal species of concern and a California endangered species, may occur as occasional visitors from area marshlands. The CNDDB lists the tricolored blackbird as occurring in the Sutter Causeway quad, on the east side of the Sutter bypass on the Gilsizer Slough, nine miles south-southwest of Yuba City. There is no occurrence information in the CNDDB for the willow flycatcher. The ferruginous hawk *(Buteo regalis),* a state species of concern, may occur on the property as a nonresident migrant. The western yellow-billed cuckoo, a federal candidate species and state endangered species, has been identified as occurring in the Nicolaus quad.

The greater sandhill crane *(Grus Canadensis tabida)* is state-listed as threatened. It breeds in wetlands and feeds in various habitat types, such as meadows, irrigated pastures, grain fields, bogs, fens, marshes, and nearby fields. For safety, cranes like to flock (roost) at night in an open expanse of shallow water. The sandhill crane used the Sacramento Valley heavily, mainly just south of Sacramento, but it can be found throughout the valley. It is possible that this species makes occasional use of areas within or around the District, depending on the amount of standing water available in the fields.

Mammals

Although the range of the San Joaquin pocket mouse *(Perognathus inornatus inornatus),* a federal species of concern, includes the District, it is generally found in habitats containing drier and poorer soils, where it can burrow. The soils found in the District

are generally not suitable for the pocket mouse. The CNDDB identifies occurrences in the Meridian quad, which is outside the District service area.

Plants

Of the three plant species designated by the Service as possibly occurring in the area, only rose-mallow *(Hibiscus lasiocarpus),* which is a CNPS species 2, may be found in the Gilsizer Slough and Sutter Causeway quads. It occurs in the freshwater wetlands and therefore may occur in the wetter areas adjacent to the District, but appropriate habitat is absent in the District.

3.5.2 Environmental Consequences

Regulatory Framework

Various federal, state, and local agencies have jurisdiction over biological resources in California. These include the Service and US Army Corps of Engineers (USACE), the CDFG, as well as the California regional water quality control boards and the US EPA, which have some authority over waters of the state and wetlands.

Federal

The Service enforces provisions of the Endangered Species Act (ESA) and regulates permits for taking threatened and endangered species through Section 7 for federal actions and Section 10 for private actions. The Service commonly provides species information for environmental surveys and comments on environmental documents.

NOAA-Fisheries enforces the Endangered Species Act for marine life and establishes essential fish habitat for anadromous fish, such as coho salmon.

The USACE is authorized by the Clean Water Act to regulate the placement or removal of fill in waters of the US, including wetlands, by issuing individual permits or through a series of general Nationwide Permits. The US EPA may veto USACE permits, although it rarely does so. In California, portions of the Clean Water Act, specifically Section 401, are regulated by regional water quality control boards, which issue clean water certifications for activities that fill waters of the state, including wetlands.

State

The CDFG enforces the California Endangered Species Act and other provisions of the California Fish and Game Code protecting various plant, fish, and wildlife species. The CDFG also regulates activities that affect the bed and bank of creeks, streams, rivers, lakes, and other waterbodies by issuing streambed alteration agreements to project applicants.

No Action Alternative

Special Status Plant or Animal Species. No adverse impacts on sensitive plant or animal species (Table 3-14) are expected to occur under the No Action Alternative. These species are habituated to a range of water flow conditions that occur within their habitats. Existing habitat would be subject to the historical range of variation and would

remain unchanged. Land use patterns under the No Action Alternative are expected to be similar to historical patterns. Minimal changes to acreage are expected. Biological resource use of the area under the No Action Alternative would be similar to conditions described in Section 3.5, Affected Environment.

Because the intake pumps are unscreened, there is the potential indirect effect of entraining Central Valley steelhead. Most of the outmigration occurs from November to May, when diversions are minimal, if they occur at all; hence steelhead should not be adversely affected.

Winter-run Chinook salmonid adults, as strong swimmers, should not be affected by the intakes, and the warm water to be expected in the diversion embayments is likely to deter nonnatal winter-run juveniles from foraging in the diversion embayments, should any occur in their vicinity. Because the intake pumps are unscreened, there is a potential indirect effect of entraining juvenile winter-run salmonids when water is being diverted.

Historically, the adult spring-run salmon immigration into the upper rivers and tributaries extended from mid-March through the end of July, with the peak in late May and early June (CDFG 1998). Spawning started in mid-August, peaked in early September, and ceased in late September. Because the pumps are unscreened, there is the potential indirect effect of entraining spring-run salmon, if present. Spring-run salmon are expected to avoid entrainment based on their swimming ability, the relatively low draw of the pumps, the presence of vulnerable juveniles in the stream during periods of little or no pumping activity, and the warm temperatures of the embayments deterring foraging in and around the diversion pumps.

Delta smelt do not occur in the lower Feather River and would not be threatened by entrainment in the District's water pumps because the water regimen would not be negatively affected by the contract renewal.

Endangered Species Act Consultation Findings. Reclamation consulted with NOAA Fisheries and the Service regarding potential impacts on threatened or endangered species, in compliance with the ESA. The Service provided Reclamation a letter on August 17, 2004 which concluded informal consultation for long term renewal of contracts, including the contract with the Feather Water District, with a finding that the proposed contract renewal is not likely to adversely affected listed species or critical habitat. Because of the similarities among the three contract alternatives, the NOAA Fisheries findings apply to the No Action Alternative as well as to Alternatives 1 and 2, and therefore are discussed here.

After consultation, the NOAA Fisheries Final Biological Opinion (BO) dated July 28, 2005, found that the proposed contract would not result in any adverse effects on designated or proposed critical habitat (see Appendix G). Because of this finding, NOAA Fisheries also found that the project would not be likely to adversely affect the essential fish habitat of Pacific salmon protected under the Magnuson-Stevens Fishery Conservation Act.

As a consequence of contract renewal, however, NOAA Fisheries anticipates incidental take of Central Valley spring-run Chinook salmon and Central Valley steelhead due to entrainment at the northern and southern diversion pumps during the months of May and June. The District generally does not take CVP water in May, and any water that is taken in May is minimal, with a relatively low draw of the pumps. In June, warm water temperatures in the embayments adjacent to the pumps deter foraging; therefore there would be fewer salmonids at risk at that time.

NOAA Fisheries also identified a potential risk of salmonid injury or death from exposure to contaminated agricultural discharge, increased water turbidity, and higher water temperatures. In NOAA Fisheries' view, injury or death from entrainment and other causes associated with contract renewal would affect less than 1 percent of the populations of Central Valley spring-run Chinook and Central Valley steelhead. This would be a less than significant impact, because of the relatively small number of fish affected and the limited risk of entrainment.

Although NOAA Fisheries determined that the level of take discussed above is not likely to jeopardize these species' continued existence, Reclamation has committed to following the terms and conditions identified in the BO. These terms and conditions include measures to minimize salmonid injury and mortality during the contract period to the maximum extent practicable. The measures include:

- Coordinating with the District and with NOAA Fisheries to minimize pumping of CVP replaced water from the Feather River, to the maximum extent practicable, during the months of May and June to minimize entrainment of juvenile salmonids, until the diversion pumps are screened in accordance with NOAA Fisheries fish screen criteria.

- Coordinating with the District, NOAA Fisheries and the California Department of Fish and Game to conduct fish entrainment monitoring at the pumping stations.

- Utilizing programs within Reclamation's authority to develop and implement water use efficiency projects with the District and other Central Valley water contractors to minimize water demand and the amount of water withdrawn from anadromous fish habitat.

- Developing and implementing a real-time juvenile salmonid monitoring program in the lower Feather River in cooperation and with assistance from the California Department of Water Resources, the California Department of Fish and Game and NOAA Fisheries, in order to adaptively manage water deliveries and diversions with the objective of minimizing entrainment of juvenile salmonids at the pumping facilities.

Wetland and Riparian Habitats. Wetland and riparian habitats occur west and east of the District. The wetland formed by Gilsizer Slough west of the District will experience

no real change in water flow under the No Action Alternative. A reduction in water purchased by the District and applied to its lands would have a minimal impact on the Gilsizer Slough because the District recycles all of its irrigation return flows. Such a pricing effect would likely be eclipsed by natural historic variation in flow, and additional sources of water also supply the Slough, which serves as part of the stormwater drainage system for Yuba City. Therefore, the changes under this alternative would not be considered adverse and there would be no impact on wetland habitat downstream of the District.

The Feather River riparian zone that occurs east of the District would not be adversely affected, and there would be no impact on this area. This area is not directly influenced by agricultural practices in the District, apart form the existing clearings containing the District's pumping plants.

Plant or Animal Species Diversity/Distribution and Fish and Wildlife Habitat Degradation. Most land in the District is agricultural and, as such, is disturbed habitat. Other development within the District, such as buildings, roads, and parking lots, further decreases the District area's ability to support a diversity of plant or wildlife species. Those species that live in the District are well adapted to humans and human activity. The No Action Alternative would not adversely affect habitat for species shown in Table 3-14. Any changes in water flow would be within the range of natural historic variation to habitat as a result of normal changes in water flow conditions and, as such, would be considered minimal. Land use changes within the District are expected to be similar to historical patterns. Minimal changes to acreage are expected.

Alternative 1

Alternative 1 is assumed to have similar impacts on biological resources as the No Action Alternative. No adverse impacts on sensitive plant or animal species, wetland and riparian habitat, or other plant or animal species are expected to occur under Alternative 1, other than the potential indirect effects of entraining juvenile salmonids and steelhead when project water is being diverted, and potential injury from exposure to contaminated agricultural discharge, increased water turbidity, and higher water temperatures (as discussed above under the No Action Alternative). As above, these potential effects would be less than significant, and would be further reduced by Reclamation's implementation of the measures identified in the BO.

Alternative 2

Special Status Plant or Animal Species. Alternative 2 is expected to have minimal impacts on special status species (Table 3-14), other than the potential indirect effect of entraining juvenile salmonids and steelhead when project water is being diverted and potential injury from exposure to contaminated agricultural discharge, increased water turbidity, and higher water temperatures (as discussed above under the No Action Alternative). As above, these potential effects would be less than significant, and would be further reduced by Reclamation's implementation of the measures identified in the BO.

Under this alternative, small areas of land could be fallowed or returned to agricultural production, depending on the type of water year (i.e., wet, dry, average) (see Section 3.2, Agricultural Economics). Lands within the District are or historically have been in agricultural production, so fallowing or irrigating additional lands is not expected to adversely affect sensitive species because these lands are of little habitat value. Bird species listed as threatened or endangered are either transient in the area or depend on native habitat and, as such, would not be adversely affected. Minimal impacts on special status species are expected.

Rice production in the District, which may provide beneficial habitat for wildlife, could increase during wet years under Alternative 2. The sandhill crane and other wetland bird species that tend to occur in agricultural areas, especially irrigated areas, may experience a beneficial impact, which would be minor because of the following reasons:

- The amount of rice production in the District is minute (approximately 90 acres) and is expected to continue to drop;
- Potential changes in rice production are predicted to be minor;
- There is alternative habitat in the area; and
- These species are transient in the area.

Wetland and Riparian Habitats. Implementing Alternative 2 would not adversely affect wetlands, riparian habitats, or other special habitats. Any reductions in water flow due to a different purchasing schedule is not expected to adversely affect Gilsizer Slough because such a pricing effect would likely be eclipsed by natural historic variation in flow. In addition, other sources of water also supply Gilsizer Slough. Therefore, there would be no adverse impacts on wetland habitat expected under this alternative.

As discussed under the No Action Alternative, the Feather River riparian zone would not be adversely affected under Alternative 2.

Plant or Animal Species Diversity/Distribution and Fish and Wildlife Habitat Degradation. As described under Alternative 1, most land in the District is agricultural and, as such, is disturbed. Other development within the District, such as buildings, roads, and parking lots, further decreases the District area's ability to support a diversity of plant or wildlife species. Those species that live in the District are well adapted to humans and human activity. Alternative 2 would not adversely affect habitat for species shown in Table 3-14. Impacts are expected to be minimal or nonexistent.

3.5.3 Cumulative Impacts

Implementation of Alternatives 1 or 2 would not contribute to cumulative impacts on biological resources.

3.6 SOCIAL CONDITIONS AND ENVIRONMENTAL JUSTICE

This section describes general economic and sociological characteristics of the project area. Most discussion is presented at the county level because impacts are unlikely to be felt solely within the boundaries of the District.

3.6.1 Affected Environment

Sutter County Population and Income

Sutter County is not densely populated despite its proximity to the Sacramento area. Roughly half of the county's 78,930 people live in Yuba City and Live Oak; the rest of the population lives in unincorporated areas of the county (Table 3-15). The Sutter County population grew an estimated 21 percent from 1990 to 2000, from 64,415 to 78,930 (Table 3-16), and is expected to grow by approximately 60 percent by 2029 (Sacramento Area Council of Governments 2002).

Sutter County incomes are substantially lower than the rest of the state. The 2000 median household income for Sutter County was $38,375, compared with a median household income for all of California of $47,493 (USDA 2002). Per capita incomes are similarly low, with a 2000 per capita income for Sutter County of $27,428, and a statewide per capita income of $26,742 (US Department of Commerce 2002).

Table 3-15
Sutter County Population Estimates, 2000

	Population
Live Oak	6,229
Yuba City	36,758
Incorporated Total	**42,987**
Unincorporated Sutter County	35,943
Total County	**78,930**

Source: California Department of Finance 2002a.

Table 3-16
County Population Totals and Projections

Year	Total
1990	64,415
1998	76,656
2000	78,930
Projections	
2005	88,520
2010	98,370
2015	109,280
2020	121,640
2029	132,764

Source: Sacramento Area Council of Governments 2002.

The US Census Bureau estimates that in 2000, roughly 15 percent of the Sutter County population lived in poverty, where the poverty threshold for a family of four is $15,569 (United States Census Bureau 2000a). According to the US Census Bureau (2000), approximately 19.2 percent of Sutter County children under 18 live in poverty (Department of Commerce 2002).

Employment

Figures for 2002 indicate total (farm and non-farm) civilian employment in Sutter County is 32,600 out of a total of 78,930 residents (US Census Bureau 2002). Unemployment levels in Sutter County are substantially higher than they are in the rest of the state or the rest of the county. December 2002 figures indicate that 13.5 percent of the Sutter County labor force is unemployed, as compared to 6.6 percent for the state of California and 5.8 percent for the country as a whole (California Employment Development Department 2002a).

Sutter County expects both population and employment in the county area to grow (Table 3-17), however projections indicate that 81 percent of the projected growth in the region is expected to result from increases in non-farm economic sectors, rather than agricultural growth (California Employment Development Department 2000c).

Table 3-17
Employment Projections for Sutter County

2005	2010	2015	2020	2029
28,628	33,332	36,294	41,019	48,925

Source: Sacramento Area Council of Governments 2002.

Agricultural employment figures vary seasonally. According to 2000 data, there are approximately 850 full-time farms in Sutter County (United States Department of Agriculture 2000). In 2000, total farm employment varied from 7,500 workers in May to 10,300 farm workers in July, which results in an estimate of between 8 and 12 farm workers employed per farm during the summer (California Employment Development Department 2000a). The differential between May and July indicates that a certain percentage of the farm worker population is made up of migrant or seasonal labor. Although reliance on demographic reporting is not appropriate because of underreporting and possible illegal status of migrant workers, estimates can made based on available information (Table 3-18). Based on these estimates, as many as 2,800 people may work as temporary labor on farms in Sutter County. As of August 1999, total farm employment in Sutter County was estimated at roughly 8,200 workers, but this figure does not separate temporary farm work from permanent full-time farm employment.

Table 3-18
Farms and Farm workers in Sutter County

Agricultural Workers	Farms	Estimated number of temporary workers	Total estimated workers per farm
7,500 – 10,300	850	2,800	8 - 12

Source: California Employee Development Department 2002.

Demographics and Environmental Justice

Executive Order 12898 requires federal agencies to identify and avoid disproportionate impacts on minority or low-income communities; therefore, it is important to identify any minority or low-income communities in the project area. From 1990 to 2000, the Sutter County population increased in all demographic categories, with the largest percentage increase being among Hispanics, who went from 16 percent to 22 percent of the Sutter County population. The largest numerical increase was among whites, which went from 46,262 in 1990 to 53,291 in 2000. Sutter County predicts a substantial jump in the percentage of ethnic minorities in the population, especially among black, Hispanic, and Asian residents (Table 3-19).

Ethnic minorities in Sutter County consistently have a lower income than whites. Data from 1989 indicates that the Hispanic population has an average per capita income that is less than half that of whites (Table 3-20).

Table 3-19
County Population Totals and Projections with Race/Ethnic Detail

Year	Total	White	Hispanic	Asian/Pacific Islander	Black	Native American
1990	64,415	46,262	10,592	5,748	987	826
1998	76,656	52,121	14,269	8,032	1,328	906
2000	78,930	53,291	17,529	9,045	1,509	1,225
	Projections					
2005	91,680	59,821	17,872	11,249	1,707	1,031
2010	100,437	63,525	20,663	13,205	1,932	1,112
2015	108,004	66,364	23,475	14,838	2,185	1,142
2020	116,408	68,936	26,951	16,908	2,397	1,216

Source: California Department of Finance 2002.

Table 3-20
Per Capita Income by Ethnic Group for 1989 (Dollars)

Year	White	Hispanic	Asian/ Pacific Islander	Black	Native American
1989	13,953	6,205	11,487	9,993	12,402

Source: Follas 2000.

Data for the census tract encompassing the District indicate that the majority population in the District is white (Table 3-21). The next largest population identified in 2000 is the Hispanic population. Asian/Pacific Islander, Black, and Native American residents form

a small percentage of the District population. Roughly 22 percent of those responding also indicated they had origins in Spanish-speaking countries; this population is likely to cross ethnic boundaries because Hispanic origin is not considered to be an ethnic classification for the purposes of the United States Census Bureau (US Census Bureau 2002).

Table 3-21
2002 Census Tract Data for Feather Water District

Total Population	White	Black	Asian/Pacific Islander	Native American	Hispanic	Other
2,885	84%	0.3%	2.5%	.70%	12.4%	.10

Source: US Census Bureau 2002.

Farm workers in California (especially migrant workers) tend to be both minority and low income. Based on government estimates of farm workers in Sutter County, it can be reasonably estimated that several hundred people of minority or low-income background may work as temporary labor on the farms in the District.

3.6.2 Environmental Consequences

No Action Alternative

As discussed in Section 3.2, Agricultural Economics, implementation of the No Action Alternative should result in no appreciable impact on Sutter County population, income, or employment rates. Sutter County projections indicate that non-farm employment will constitute most of the economic growth projected for the near future; therefore there would be little impact on Sutter County employment levels from implementing the No Action Alternative.

Minority or low-income populations, although expected to increase numerically over the project period, would not be disproportionately affected by the no action alternative. Therefore, there would be no environmental justice concerns raised by the No Action Alternative.

Alternative 1

Because Alternative 1 would result in the same water rates, acres irrigated, and agricultural revenues as under the No Action Alternative, the impacts on social conditions or environmental justice would be the same as under the No Action Alternative.

Alternative 2

Because Alternative 2 may affect water rates and quantities available under certain water year scenarios, implementing this alternative might have some impacts on employment in Sutter County and the District specifically, as compared to the No Action Alternative. As discussed in Section 3.2, Agricultural Economics, the intensity of impacts will

depend on whether the preceding five years were wet, dry, or average and on whether the particular year being considered is wet, dry, or average.

Agricultural producers could respond to changes in rates and available quantities of water by raising the prices of their produce, by changing to crops with lower water requirements or a higher per-unit value, by leaving more fields fallow, or by reducing outlay, such as labor and capital costs. The precise outcome of the increase in water prices probably will vary from farm to farm; however, it is possible that agricultural employment levels in the District will drop a certain amount, as a result of lower acreage in production or simple cash-flow problems.

Overall impacts on Sutter County are likely to be minimal because employment levels in the county are increasing and most of the increase is expected outside the agricultural industry. Some minor direct and indirect impacts on employment are possible as compared to the No Action Alternative, as detailed in the Agricultural Economics section of this document. However, Sutter County expects to add as many as 16,000 jobs by the year 2020; therefore the loss of up to 16 jobs in the multi-county Sacramento Valley area would have minimal impact.

The migrant farm worker community is almost by definition low income and is made up primarily of minorities. Therefore, any negative impact on agricultural employment will be reflected in the minority and low-income communities. The precise scale and nature of the impact is difficult to determine given the imprecise data available and the difficulty of adequately predicting choices on the part of farm operators in response to higher water costs. Nevertheless, due to the small area of the District and the minimal change anticipated, the potential for any impacts on the minority or low-income populations is small.

3.6.3 Cumulative Impacts

No cumulative impacts on social conditions or environmental justice are expected from implementation of any of the alternatives identified in this EA.

3.7 RECREATIONAL RESOURCES

Recreation can be an active or passive use of unimproved open space land or improved recreational facilities. Wildlife areas, areas of scenic, historic, and cultural value, lake shores, beaches, and rivers and streams are all examples of open space as a passive use that may have few or no improvements. Parks, golf courses, and sports clubs are all examples of recreation areas that provide for more active uses and have more facility improvements.

3.7.1 Affected Environment

Sutter County Recreational Resources

Sutter County does not have a park and recreation department and does not provide recreational facilities or opportunities through county programs under such a public agency. However, there are a variety of parks and recreational opportunities throughout

the unincorporated area. Most of these facilities are in the immediate periphery of Yuba City or along the Sacramento River. The facility closest to the District is Boyd's Pump, a park along the Feather River off Garden Highway near Oswald Road, about a mile and a half north of the District. This park provides paved parking and a boat ramp. Also, about a mile and a half north of the northern boundary of the District is the Mallard Lake Golf Course, south of Oswald Road. This is a privately-owned nine-hole public golf course on 41 acres that includes a driving range and miniature golf course (Sutter County 1996a).

State Recreational Resources

CDFG provides for and administers several thousand acres of recreational facilities in Sutter County. The state recreational resource nearest to the District is the Feather River Wildlife Area, which encompasses 2,265 acres. The Feather River Wildlife Area is divided into five management units, three of which are in the vicinity of and east of the District. Star Bend Management Unit is east of Garden Highway (State Highway 99), at the end of and south of Star Bend Road, and encompasses 50 acres. O'Connor Lakes Management Unit is east of Garden Highway, also at the end of and south of Star Bend Road, and contains approximately 364 acres. Lastly, Abbott Lake Management Unit is east of Garden Highway, at the end of and north of Star Bend Road, and encompasses approximately 438 acres (Sutter County 1996a).

Feather River

The Feather River is a key waterway in the Sacramento River region. Although complete data are not available to quantify trends in recreation use along the Feather River, most water-dependent and water-enhanced recreation activities along the Feather River are assumed to have increased with the population in the region. Water-dependent recreation on the Feather River consists of boat and shore fishing, pleasure boating, and swimming. Water-enhanced recreation activities include sightseeing, picnicking, and camping.

Recreation use on the Feather River is not well documented because boat and shore use is dispersed at access points in Butte, Yuba, and Sutter counties. Fishing is probably the most popular activity on the river, with American shad, salmon, striped bass, and steelhead the most frequently caught species. Sport catch of anadromous fish in the Feather River increased from approximately 990 chinook salmon landed in 1975 to 1,500 landed in 1990, although catch of steelhead decreased from approximately 2,900 in 1975 to 560 in 1990 (CDFG 1975 and Wixcom, personal communication, Reclamation 1997). The quality of fishing on the river is sensitive to river flow and water temperature. Changes in flows may affect the quality of boating by exposing or creating navigational hazards. Flows and water temperatures have also been found to substantially influence the presence of salmon, striped bass, and American shad populations in the river (CDFG 1975, as cited in Reclamation 1997).

Other Resources

Several transportation corridors in Sutter County provide access to recreational opportunities. For example, State Highway 99, which runs the length of the county and

bisects the District, provides access to valley and riparian environmental and recreation areas (Sutter County 1996a).

3.7.2 Environmental Consequences

Two types of changes related to recreation are considered in the following impact analysis, recreation opportunities and recreation use.

No Action Alternative

The quality of recreation on the Feather River is sensitive to water and air temperatures and the abundance of sport fish, and is less sensitive to normal fluctuations in river flows. Under this alternative there presumably would be no change in water flow conditions within the District. River-related recreation opportunities in the District project area and vicinity are expected to be similar to conditions described in Section 3.7.1, Affected Environment. No impacts on the use or enjoyment of the Feather River or other recreational opportunities in the District project vicinity are expected under the No Action Alternative.

Alternative 1

Alternative 1 is assumed to have similar effects to recreational resources as the No Action Alternative. Therefore, there are no environmental impacts of this alternative.

Alternative 2

Under Alternative 2, river-related recreational opportunities in the District project area and vicinity are expected to be similar to conditions described in Section 3.7.1, Affected Environment. Changes in Feather River water flows caused by this alternative are anticipated to be very small, and such changes would not be expected to strongly affect recreational use or enjoyment of this resource because such an effect would likely be eclipsed by natural historic variations in flows. No adverse impacts on the use or enjoyment of the Feather River or other recreation opportunities in the District project vicinity are expected under Alternative 2.

3.7.3 Cumulative Impacts

Implementing Alternatives 1 and 2 would not contribute to cumulative impacts on recreational resources.

3.8 INDIAN TRUST ASSETS

3.8.1 Affected Environment

This section describes Indian Trust Assets in and adjacent to the District that could be affected by renewing the District's water service contract. Indian Trust Assets are legal interests in property held in trust by the United States for Indian Tribes or individuals. The Secretary of the Interior is the trustee for the United States on behalf of recognized tribes. Examples of trust assets are lands, minerals, hunting and fishing rights, and water rights.

Reclamation, in carrying out its activities, shares the responsibility to protect and maintain Indian Trust Assets reserved by or granted to Indian tribes or individuals by treaty, statute, or Executive Order. Reclamation carries out its activities in a manner that, where possible, protects Indian Trust Assets and avoids impacts. When it is not possible to avoid impacts on trust assets, compensation or mitigation is provided in consultation with the affected tribes or individuals.

No federally recognized Indian tribes or assets are within the area of the District service area.

3.8.2 Environmental Consequences

No federally recognized Indian tribes or trust assets are in the affected area of the District, and no impacts on Indian Trust Assets would occur as a result of the long-term contract renewal under any of the alternatives.

3.8.3 Cumulative Impacts

Implementation of Alternatives 1 and 2 would not contribute to cumulative impacts on Indian Trust Assets.

3.9 CULTURAL RESOURCES

3.9.1 Affected Environment

Cultural resources are those aspects of the physical environment that relate to human culture and society and those cultural institutions that hold communities together and link them to their surroundings. Cultural resources include expressions of human culture and history in the physical environment, such as prehistoric or historic archaeological sites, buildings, structures, objects, districts, or other places, including natural features and biota that are considered to be important to a culture, subculture, or community. Cultural resources also include traditional lifeways and practices and community values and institutions.

The affected environment for cultural resources or area of potential effects (APE) consists of the District service area. The APE is the geographic area within which an undertaking may cause changes in the character or use of historic properties. The renewal of the water service contract between Reclamation and the District is a federal undertaking that has the potential to affect cultural resources in the 9,300 acre district.

Cultural Resource Types

Cultural resources have been organized into the categories of prehistoric resources, historic resources, and traditional cultural properties (TCP) and practices. These types are not exclusive, and a single cultural resource may have multiple components. Prehistoric cultural resources refer to any material remains, structures, and items used or modified by people before there was a Euro-American presence in the region. Historic cultural resources include architectural resources and other material remains and landscape alterations that have occurred since the arrival of Euro-Americans in the region. TCPs and practices refer to places or activities associated with the cultural

heritage or beliefs of a living community and that are important in maintaining cultural identity.

Regulatory Setting

The identification of cultural resources and Reclamation responsibilities with regard to cultural resources are addressed by a number of laws, regulations, executive orders, programmatic agreements, and other requirements. The principal federal law addressing cultural resources is the National Historic Preservation Act of 1966, as amended (16 United States Code Section 470), and implementing regulations (36 Code of Federal Regulations 800), that describe the process for identifying and evaluating historic properties, for assessing the effects of federal actions on historic properties, and for consulting to avoid, reduce, or minimize adverse effects. The term "historic properties" refers to cultural resources that meet specific criteria for eligibility for listing on the National Register of Historic Places (NRHP). This process does not require historic properties to be preserved, but does ensure that the decisions of federal agencies concerning the treatment of these places result from meaningful considerations of cultural and historic values and of the options available to protect the properties.

Under the National Historic Preservation Act (NHPA), cultural resources undergo an evaluation process to determine whether a resource is eligible for listing on the NRHP. Resources that are already listed, that are determined eligible for listing, or that are undetermined are afforded a level of consideration under the NHPA Section 106 process. Undetermined resources are those for which eligibility cannot be determined, based on current knowledge of the resource and where further work is needed to make an evaluation.

In order to be determined eligible for listing on the NRHP, a resource must meet one or more of the following criteria (36 CFR Part 60):

- Criterion A—associated with events that have made a significant contribution to the broad patterns of our history;
- Criterion B—associated with the lives of persons significant in our past;
- Criterion C—embodies the distinctive characteristics of a type, period, or method of construction; or
- Criterion D—yields or may be likely to yield information important in prehistory or history.

The resource also must retain most, if not all, of seven aspects of integrity: location, design, setting, workmanship, material, feeling, and association.

The identification and evaluation of cultural resources for NRHP-eligibility is the responsibility of the lead federal agency with the concurrence of the State Historic Preservation Officer (SHPO), in this case the California Office of Historic Preservation. The Advisory Council on Historic Preservation, an independent federal agency,

administers the provisions of Section 106 of the NHPA regarding cultural resources and has review and oversight responsibilities defined in 36 CFR 800.

Additional cultural resource management responsibilities of Reclamation are addressed in other sections of the NHPA. The provisions of the NHPA refer only to cultural resources that are tangible properties, and federal agencies are required by other statutes to consider impacts on traditional cultural and religious practices.

Other major federal laws, regulations, and Executive Orders that outline Reclamation's cultural resource responsibilities include the Archaeological Resources Protection Act (16 USC 470aa-47011), the American Indian Religious Freedom Act, as amended (42 USC 1996-1996a), NEPA (42 USC 4321-4370c), Native American Graves Protection and Repatriation Act (25 USC 3001-3013), Executive Order 11593 (Protection and Enhancement of the Cultural Environment), Executive Order 13006 (Locating Federal Facilities in Historic Properties in Our Nations Central Cities), Executive Order 13007 (Indian Sacred Sites), Executive Order 13084 (Consultation and Coordination with Indian Tribal Governments), and Presidential Memorandum: Government-to-Government Relations with Native American Tribal Governments. The role of Reclamation is to ensure that the process of water contract renewals complies with these standards and to ensure that provisions are in place for subsequent compliance by the water contract agencies. With little exception, virtually all of the potential effects to cultural resources related to water contract renewal arise from subsequent decisions under non-federal jurisdiction.

City and county governments have been granted some regulatory power to list and provide limited protection of cultural resources. This authority is usually exercised in the local permitting process for specific projects and is guided by general plans or similar documents. The Sutter County General Plan includes provisions for protecting "the custom and cultural qualities that make Sutter County unique" and further states that such resources "not only deserve recognition and preservation but prominence in the community"(Sutter County 1996a).

The responsibilities of local jurisdictions to address effects to cultural resources through permitting are generally triggered by compliance with the California Environmental Quality Act (CEQA). CEQA Guidelines addressing the significance of impacts on cultural resources are outlined in Title 14, Chapter 3, Section 15064.5. The criteria for consideration of resources under CEQA are similar, but somewhat broader than the federal standard. California maintains a "Register of Historical Resources" which includes all NRHP-listed properties, all California Registered Landmarks, as well as other formally nominated properties. Consideration is also afforded to resources included in local historic registers and to those resources that the CEQA lead agency determines meet the requirement for listing on the California Register (Public Resources Code SS5024.1, Title 14 California Code of Regulations, Section 4852). California also designates Points of Historical Interest, which are markers placed at historic locations to interpret past events to the public. Listing on a state or local register does not imply that

a resource would not meet federal NRHP criteria, only that formal action has only been taken on a local level.

During the preparation of the PEIS, Reclamation investigated the possibility of conducting Section 106 consultation on a programmatic basis. The preparations, in consultation with the OHP, determined that Reclamation should address its Section 106 responsibilities on a project-specific basis (Reclamation 1999).

Cultural Setting

Prehistoric Overview

The District is west of the Feather River in the southern part of Sutter County. It is part of the eastern Sacramento River Valley, an area rich in the evidence of prehistoric, historic, and ethnographic use. Before extensive reclamation projects, the valley bottomlands experienced seasonal flooding, which produced lush vegetation and attracted abundant wildlife. The waterways provided habitat for fish and mussels. Outside of the river corridors there were grasslands, oak groves, and other plants. These resources were extremely attractive to prehistoric inhabitants, and there is evidence of regional human use that dates back to around 6,000 BC (Reclamation 1999).

Several cultural chronologies have been proposed to describe the prehistory of the eastern Sacramento Valley. There is little consensus among researchers in the particular time sequences or in the terms used to describe them. These differences arise from attempts to generalize data from specific sites to adjacent areas and from likely cultural variations among the inhabitants. In late prehistoric times, for example, no fewer than five different ethnic groups occupied parts of the Sacramento Valley (Moratto 1984). A chronology formulated by Eric Ritter (1970), based on work in the Lake Oroville area along the Feather River in the foothills of Butte County, has been referenced for the Sacramento Valley in previous CVPIA cultural resource documentation and is used here (Reclamation 1997).

The earliest seasonal use of the area appears to have been by hunter-gatherers, probably from the Great Basin. Artifact assemblages indicate that this use was well established in several areas by approximately 2,000 BC. This Martis Complex is characterized by intensive use of basalt rather than obsidian for flaked stone tools, large roughly shaped projectile points, use of atlatl and dart, bowl mortars, cylindrical pestles, and basalt scrapers (Moratto 1984). The Mesilla Complex, dating from approximately 1000 BC to 1 AD, represents a continuation of many of the artifact assemblages of the Martis Complex, with the addition of chert projectile points, *Haliotis* and *Olivella* shell beads, charm stones, and bone tools (Moratto 1984, Ritter 1970).

Between 1 AD and 800 AD the prehistoric occupants of the region shifted their subsistence and settlement patterns toward a more sedentary way of life. Relatively permanent villages were established, from which smaller task groups moved out to procure deer, smaller game, fish, freshwater mussels, hard seeds and acorns. This cultural period is called the Bidwell Complex. Markers of this period include

archaeological sites with multiple activity locations, flexed burials, grooved and notched stones that were used as fishnet weights, milling stones and wood mortars. The use of large basalt points continued, and steatite cooking vessels were introduced (Moratto 1984, Ritter 1970).

The Sweetwater Complex, 800-1500 AD, is marked by changes in the form of the shell ornaments and the development of an industry of steatite cups, platters, bowls, and tubular smoking pipes. Evidence of the use of bow and arrow technology appears around this time also. Small lightweight projectile points are found, similar in style to Great Basin types. Mortuary styles also changed from flexed to extended burials around 1000 AD (Moratto 1984, Ritter 1970).

The Oroville Complex dates from 1500 AD to 1833 and overlaps with the entry of Euro-Americans into the region and the first records of contact with the native population, the Nisenan. During the early part of this period, there seems to be an increased emphasis on acorn processing in bedrock mortars. While acorns are an excellent food source, the processing of acorns is labor intensive and is associated with less mobile subsistence strategies and maintenance of larger populations. Several kinds of structures, including large circular dance houses, were erected (Moratto 1984). Burials from this period are flexed and were sometimes placed under stone cairns (Wilson and Towne 1978). There are ethnographic reports of cremations near the villages (Reclamation 1997). Additional artifacts that appeared during this period include incised bird bone tubes, gaming bones, and disc beads made from clamshell. In 1833, a great epidemic, either smallpox or malaria, swept through the Sacramento Valley wiping out entire villages of the Nisenan (Sutter County 1996a, Wilson and Towne 1978).

Historic Overview

Euro-American incursions came later to interior California than on the Pacific coast or in the Southwest. By 1776 Jose Canizares had explored areas south of present day Sacramento (Wilson and Towne 1978). In the early 19th century, the missions established by the Spanish on the coast were losing populations to disease and flight. The Nisenan received Indians escaping from the missions into their area. Expeditions were organized to the interior to recapture fugitives and to punish groups harboring mission escapees. Though not conclusive, the evidence strongly suggests that these military expeditions did capture native inhabitants of the Sacramento Valley for resettlement at the missions (Jackson 1994). In 1808 an expedition in service of the missions led by Gabriel Moraga crossed through Sutter County. Active native resistance led to a major battle in 1813 between the Spanish, under Luis Arguello, and Miwok tribelets near the mouth of the Consumnes River to the south (Wilson and Towne 1978). Displaced Miwok found their way to Nisenan villages. The same Luis Arguello led an expedition through the Sutter County area in 1817, describing and naming geographical features, including the Feather River. In the late 1820s trappers from the American and Hudson Bay Company, including Jedediah Smith, began trapping beaver in the area. It is likely that this influx led to the introduction of viruses, resulting in the epidemic that devastated Nisenan villages in 1833. Most remaining survivors fled from

the valley settlements to the hill country (Sutter County 1996a; Wilson and Towne 1978).

John Sutter founded one of the first major agricultural enterprises in the general area in 1841, eight miles south of present-day Yuba City. He planted grapes, pomegranates, figs, and peaches and also raised livestock. In 1848, the discovery of gold on Sutter's holdings in Coloma caused rapid change to all of California. Hundreds of thousands of people immigrated to the gold fields, causing widespread destruction of what was left of native culture and resource base. In 1850 the California Indian Indenture Act, in effect, permitted the enslavement of Native Americans. Kidnapping and selling Indian women and children was common, as were massacres (Heizer 1974). Along with their Maidu neighbors, many Nisenan were forcibly marched in 1863 to the Round Valley Reservation over 100 miles away, suffering many casualties en route (Sutter County 1996a).

There was little mining in Sutter County itself, but the area had resources that were valuable for supplying the mines, such as stands of lumber near the rivers and land suited for agriculture and livestock. The county was settled by ex-miners who recognized these potential opportunities. By the 1870s, however, hydraulic mining upstream was silting up the rivers. Local farmers formed the Anti-Debris Association, which won a suit in 1884 banning the practice. Agriculture thrived, with wheat, raisins, and peaches becoming important crops. Local farmers were innovative in developing new crop varieties and forming cooperatives to improve prices, combat high transportation costs, and process and distribute their products. Agriculture continues to be the most important industry in Sutter County (Sutter County 1996a).

Further growth of agriculture in the region was limited initially by unreliable precipitation and the need for protection from periodic flooding. On behalf of the federal government, Colonel B. S. Alexander studied the Sacramento and San Joaquin rivers in the 1870s and envisioned a system of canals to complete an exchange of water from the Sacramento to the San Joaquin Valley. A huge private irrigation enterprise was proposed in 1871 to address water shortages and agricultural irrigation in the Central Valley. Enthusiasm and investment for this project evaporated quickly, but incremental actions were taken in subsequent decades to address the ongoing water problems. In 1887 the California Legislature passed the Wright Act, which permitted the formation of irrigation districts. These districts sold bonds, constructed water storage and conveyance facilities, and allocated water among the farmers. The US Reclamation Service (now the Bureau of Reclamation) produced a report in 1904 outlining a large-scale plan for controlling the Sacramento River and its tributaries. In 1911 the state of California created the State Reclamation Board and authorized it to spend $33 million on a flood control project in the Central Valley. Between 1920 and 1932 a series of reports detailing water flow, drought conditions, flood control, and irrigation issues were synthesized by the State Engineer to provide the basis for the California State Water Plan. The federal government approved the basic concept and built the facilities outlined in the plan for the State Water Project beginning in 1935. The storage, delivery, power generation, and flood control facilities of the CVP were constructed over the next 50 years, including

facilities such as the Sutter Bypass in the project area (Pisani 1992; Stene 1994). Farmers in the irrigation districts are assessed for system construction and water use.

Sutter County experienced steady growth in population throughout the 20th century, from 5,886 people in 1910 to approximately 77,900 currently. Approximately half of the population now lives in Yuba City and Live Oak in the northeast part of the county. Several named settlements and railroad stops did not continue. According to the general plan, the county values the agricultural way of life and "seeks to balance economic growth with the protection of local customs and cultural qualities that make the county unique" (Sutter County 1996a).

Ethnographic Overview

At the time of European contact, the area now included in the District was within the territory of the Southern Maidu or Nisenan. The Nisenan territory included portions of the drainages of the Yuba, Bear, American, and Feather rivers. The Nisenan, together with the Maidu and Kankow, form a subgroup of the California Penutian linguistic family. Villages in the Feather River area were built on low rises along the river or on gentle slopes with southern exposure. Villages varied in size, from a few houses to 40 or 50 dome-shaped shelters covered with brush and earth. Politically, the villages would join together under the leadership of the headman of a specific village for decision-making, group hunts, and ceremonies. Each village or tribelet of villages controlled its territory, including hunting, fishing, and plant gathering locations (Wilson and Towne 1978).

The religious beliefs and practices of the Nisenan are known, but detailed descriptions are lacking, due to variations in practices, disruption of traditions from the impacts of Euro-American contact, and the reluctance of informants to discuss their beliefs. To the Nisenan, all natural objects were endowed with supernatural powers and they followed a calendar of ritual dances celebrating the appearance of the seasons and food resources. The Nisenan practiced an annual mourning ceremony in the fall to honor their dead. Accounts of the mourning ceremony by early travelers noted "large gatherings, wailing and faces covered with ashes." A major religious system common among central California groups was the Kuksu cult. Dancers disguised as deities performed esoteric rites in the dance house. Cult membership was limited to the initiated. A revival of the Kuksu cult was introduced after 1872, which included elements of the Ghost Dance religion that had spread among Native Americans from Plains Indian groups (Wilson and Towne 1978).

Native Americans account for less than two percent of the population in Sutter County today (Sutter County 1996). Populations of the Maidu groups, including the Nisenan, are estimated at approximately 2,500, living primarily on the rancherias of Auburn, Berry Creek, Chico, Enterprise, Greenville, Mooretown, Single Springs, and Susanville, as well as on the Round Valley Reservation (SDSU 1999). No rancherias are located within the District. In 1994 there was only one fluent speaker of the Nisenan, although efforts were in progress to produce instructional materials and to pass on songs (Hinton and Montijo 1994). In recent years there has been a revival of interest in traditional religious

practices and arts. Resources likely to be of concern to contemporary groups include village locations and burials and gathering locations for traditional foods or resources needed for basketry and regalia.

Inventory of Cultural Resources

Inventory information specific to the District has not been developed but data are available for Sutter County as a whole. Approximately 10,000 acres of 388,000 acres in Sutter County have been surveyed for archaeological resources. These survey sites are primarily prehistoric resources, but eighteen are historic or have historic components. Because of the low percentage of surveyed land and the relative lack of development, the potential for undiscovered and unrecorded archaeological sites is high (Reclamation 1997).

Recorded prehistoric resources in Sutter County include habitation sites, burials, temporary camps, milling stations, and lithic scatters. Recorded sites are densest along the rivers. Historic archaeological resources include the sites of early settlements and agricultural activities and refuse scatters (Reclamation 1997). No prehistoric or historic archaeological resources in Sutter County are listed formally on the NRHP, but many are likely to meet the criteria for NRHP and/or California Register of Historical Resources listing.

The Sutter County Historical Society has developed a list of 78 historic sites. These are primarily buildings and structures but also include locations where historic activities took place or the former locations of buildings and structures. Twenty-one of these also have been designated California Points of Historical Interest. The Live Oak Commercial District is the only NRHP-listed property in Sutter County (National Park Service 2000). There are two California State Landmarks and 22 points of historic interest in Sutter County (Sutter County 1996). Historic themes illustrated by these resources include architecture, economic and industrial history, exploration and settlement, government, religion, social, and education (Reclamation 1997). The two California State Landmarks are outside the District boundaries, and the rest of these sites are points of historic interest that have not been found eligible for the NRHP.

There are no known TCPs or traditional use areas (TUAs) that have been identified in Sutter County. Consultations with Indian tribes or other groups are required of Reclamation to identify any TCPs or TUAs that could be affected by the alternatives as part of their completion of the Section 106 process. In compliance with 36 CFR 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.

3.9.2 Environmental Consequences

Methodology

Potential impacts on cultural resources, in general, are assessed by applying the criteria of adverse effect, as defined in 36 CFR 800.5a. An adverse effect is found when an action may alter the characteristics of a historic property that qualifies it for inclusion on the NRHP in a manner that would diminish the integrity of the property's location, design, setting, workmanship, feeling, or association. Some examples of adverse effect to cultural resources include physical destruction or damage, alterations not consistent with the Secretary of the Interiors Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings, relocation of a property, isolation and restriction of access, introduction of visible, audible, or atmospheric elements out of character with the resource, neglect resulting in deterioration, or transfer, lease or sale of historic properties without adequate protections. Adverse effects may include reasonably foreseeable effects caused by the action that may occur later in time, be farther removed in distance, or be cumulative. Activities conducted under the alternatives are measured against the criteria of adverse effect to determine the potential for and intensity of impacts on cultural resources. Likewise under CEQA, a significant effect on the environment may result from actions that cause a substantial adverse change in the significance of an historical resource. The assessment of impacts on TCPs, TUAs, and cultural practices also requires a focused consultation effort with the affected community.

In the Section 106 process, Reclamation, as the lead federal agency, is responsible for applying the criteria of adverse effect and for developing mitigation efforts to avoid or reduce any impacts. This is done in consultation with the SHPO and other consulting parties identified in 36 CFR 800. Prior to implementing individual actions, Reclamation will complete the Section 106 process for the water contract renewal undertaking.

No Action Alternative

The No Action Alternative would continue the delivery of project water under terms consistent with the existing contract. No direct impacts on cultural resources would be expected under the No Action Alternative. Renewal of the long-term water service contract between Reclamation and the District would not require construction or other activities that could directly disturb the integrity of known or unrecorded cultural resources in the District. Actions by Reclamation under this alternative are within the range of existing conditions.

Indirect impacts on cultural resources could result from renewing the long-term water service contract under the terms of the No Action Alternative if it were to lead to changes in agricultural practices or land use. Certain crops require more ground-disturbing activities than others do, and changes in land use can affect cultural resources. These effects may be either positive or negative, depending on the presence of resources, location, and other factors associated with the changes. Renewal of long-term water contracts is one of many factors that could influence decisions in agricultural practices or land use. The potential for cultural resource impacts related to this

alternative is speculative and depends on future decisions by other parties. Since the No Action Alternative represents a continuation of current quantities of water delivery and pricing terms, it would be expected to have a small potential for influencing decisions on future agricultural practices and land use.

Alternative 1

Alternative 1 is assumed to have similar effects to cultural resources as the No Action Alternative. Therefore, no adverse environmental impacts are expected.

Alternative 2

No direct impacts are anticipated to cultural resources as a result of Alternative 2, as compared to the No Action Alternative. Alternative 2 does not include any provisions for construction or other activities that could directly disturb the integrity of known or unrecorded cultural resources in the District. Actions by Reclamation under this alternative are within the range of existing conditions.

Indirect impacts on cultural resources could result from renewing the long-term water service contract under the terms of Alternative 2. Implementation of Alternative 2 may increase the cost of water, resulting in a decrease of the quantity of water delivered to the District. These changes may contribute to changes in crops grown or patterns of land use in the District. Changes in agricultural practices and land use may affect cultural resources either positively or negatively, depending on the presence of resources, location, extent of ground disturbance, and other factors associated with the changes. Renewal of long-term water contracts is one of many factors that could influence decisions in agricultural practices or land use. The potential for cultural resource impacts related to this alternative is speculative and depends on future decisions by other parties. As discussed in Section 3.2, Agricultural Economics, the potential change in irrigated acreage under this alternative is minimal and may result in additional lands used as pasture. Pasture requires minimal disturbance compared to other agricultural uses and would have no effect on cultural resources.

3.9.3 Cumulative Impacts

Renewal of the long-term water contract under any of the alternatives is one of many factors that could influence decisions in agricultural practices or land use in the water districts. Demographic, economic, political, and a variety of other issues, independent of the contract renewal, are causing changes with direct and indirect effects to cultural resources. The contribution of the water renewal contract under the terms of the alternatives would be a minor factor in decisions that could cause impacts on cultural resources in the districts. Specific actions as the result of Alternatives 1 or 2 that lead to changes in land use or construction will require the effects to historic properties to be identified and evaluated.

3.10 GEOLOGY AND SOILS

3.10.1 Affected Environment

Geologic Setting

The District is underlain by Holocene age alluvial terrace deposits bordering the Feather River. The surface deposits in the region consist of alluvial overbank sediments deposited on floodplains and channels cut into the underlying Victor formation. This formation extends along most of the eastern Sacramento Valley and consists of a mixed composition of Sierran stream sediments deposited during the past 10,000 years. While stratified, there is little lateral continuity in strata because the courses of the Pleistocene streams meandered and overflowed their banks. Soils developed on the surface of the Victor formation contain a hardpan layer. The Victor formation is the most important source of groundwater on the east side of the valley south of the vicinity of Gridley (DWR 1978). The Sutter Buttes to the west of the District is a large igneous dome complex that intruded into and upwarped Cretaceous marine deposits.

Soils

Three soil associations occur within the District, including about 6,750 acres of Conejo-Tisdale soils, about 3,040 acres of Oswald-Gridley-Subaco soils, and about 60 acres of San Joaquin-Cometa soils. The soils are very similar in their characteristics. The Conejo-Tisdale association consists primarily of clay loam on alluvial terraces. The permeability is moderately slow and can be limiting for some crops. They are used for row crops, orchards, hay, and pasture. The Oswald-Gridley-Subaco soils are clay loams that occur on alluvial terraces, that have slow permeability, and that are moderately well drained. They are used mostly for irrigated crops, mainly rice. The San Joaquin-Cometa soils are sandy loams, with very slow permeability due to compaction and silica cementation. These soils are suitable for rice, vineyards, and irrigated or dry pasture.

3.10.2 Environmental Consequences

No Action Alternative

Soils

Most of the District (about 6,000 acres) is planted in permanent crops. Of the remaining 3,000 to 3,500 acres that are not in permanent crops, approximately 1,500 to 2,000 acres (about 15 to 20 percent of the District) would continue to be dry farmed or fallowed, due to lack of available irrigation water. This pattern of dry farming and fallowing has been practiced since the District was formed. No adverse impacts on soils are expected due to the No Action Alternative.

Alternative 1

Soils

Water use and cropping patterns under Alternative 1 are not expected to differ from the No Action Alternative. Therefore, no impacts on soils are expected.

Alternative 2

Soils

As with Alternative 1, water use and cropping patterns under Alternative 2 are not expected to differ substantially from the No Action Alternative. Therefore, no impacts on soils are expected.

3.10.3 Cumulative Impacts

Since the alternatives are not expected to result in any impacts on soils or geologic resources, no cumulative impacts are expected to occur either.

3.11 AIR QUALITY

3.11.1 Affected Environment

Ambient Air Quality

The EPA has established ambient air quality standards for several different pollutants, which are often referred to as criteria pollutants (ozone, nitrogen dioxide, carbon monoxide, sulfur dioxide, inhalable particulate matter [PM_{10}], and lead). Federal ambient air quality standards are based primarily on evidence of acute and chronic health effects. The state of California also has adopted ambient air quality standards, some of which are more stringent than the comparable federal standards.

The federal Clean Air Act requires each state to identify areas that have ambient air quality in violation of federal standards. States are required to develop, adopt, and implement a State Implementation Plan (SIP) to achieve, maintain, and enforce federal ambient air quality standards in these nonattainment areas. Deadlines for achieving the federal air quality standards vary according to air pollutant and the severity of existing air quality problems. The SIP must be submitted to and approved by EPA. SIP elements are developed on a pollutant-by-pollutant basis whenever one or more air quality standards are being violated.

The air pollutants of greatest concern in the Sacramento Valley are ozone and PM_{10}. Ozone and PM_{10} concentrations in Sutter County periodically exceed both state and federal ambient air quality standards; consequently, Sutter County is considered a nonattainment area for both ozone and PM_{10}.

Ozone is not emitted directly into the air but forms through chemical reactions that involve nitrogen oxide emissions and reactive organic compound emissions. Ozone is a strong oxidizing agent that reacts with a wide range of materials and biological tissues. Ozone is a respiratory irritant that can cause acute and chronic effects on the respiratory system. In addition, ozone causes substantial damage to leaf tissues of crops and natural vegetation and damages many materials by acting as a chemical oxidizing agent.

Suspended particulate matter represents a diverse mixture of solid and liquid material having size, shape, and density characteristics that allow the material to remain suspended in the air for measurable time periods. The physical and chemical

composition of suspended particulate matter is highly variable, resulting in a wide range of public health concerns. PM_{10} can be generated as a primary pollutant by abrasion or erosion processes and also can form through chemical reactions or by condensation of gaseous pollutants into fine aerosols.

Many components of suspended particulate matter are respiratory irritants; some components are primarily physical irritants; other components are chemical irritants (such as sulfates, nitrates, and various organic chemicals). Suspended particulate matter also can contain compounds (such as heavy metals and various organic compounds) that are toxic or carcinogenic.

Regulatory Considerations

Section 176(c) of the Clean Air Act requires federal agencies to ensure that actions undertaken in nonattainment or maintenance areas are consistent with the Clean Air Act and with federally enforceable air quality management plans. EPA has promulgated separate rules that establish conformity analysis procedures for highway/mass transit projects and for other (general) federal agency actions. General conformity requirements are potentially applicable to most other federal agency actions but apply only to those aspects of an action that involve ongoing federal agency responsibility and control over direct or indirect sources of air pollutant emissions.

The EPA conformity rule establishes a process that is intended to demonstrate that the proposed federal action:

- Would not cause or contribute to new violations of federal air quality standards;
- Would not increase the frequency or severity of existing violations of federal air quality standards; and
- Would not delay the timely attainment of federal air quality standards.

The EPA general conformity rule applies to federal actions occurring in nonattainment or maintenance areas when the net increase in total direct and indirect emissions of nonattainment pollutants (or their precursors) exceed specified thresholds. The emission thresholds that trigger requirements of the conformity rule are called de minimis levels. The conformity de minimis thresholds for Sutter County are 50 tons per year of reactive organic compound emissions, 50 tons per year of nitrogen oxide emissions, and 70 tons per year of PM_{10}.

3.11.2 Environmental Consequences

No Action Alternative

The No Action Alternative would continue CVP water deliveries to the District under the terms consistent with the Preferred Alternative in the PEIS. Water delivery systems are not in themselves large sources of air pollution emissions. The only identifiable sources of emissions are vehicles used for periodic inspections or maintenance of

system facilities. Emission quantities from such sources are small and would continue essentially at past levels. Thus, there would be no net increase in these emissions under the No Action Alternative.

Continuation of CVP water deliveries to the District would not result in any major changes in cropping patterns or agricultural management practices in the District. All agricultural lands in the District are currently in production, mostly for orchard crops. Thus, the No Action Alternative is not expected to have any indirect effects on air pollutant emissions associated with agricultural land use practices (agricultural equipment emissions, fugitive dust, emissions from agricultural burning, or emissions associated with pesticide use).

The No Action Alternative would not be subject to the EPA Clean Air Act conformity rule because there would be no net increase in direct or indirect emissions from sources that are under federal agency control.

Alternative 1

Alternative 1 is assumed to have similar air quality effects as the No Action Alternative. Therefore, there are no environmental impacts of this alternative.

Alternative 1 would not be subject to the EPA Clean Air Act conformity rule because there would be no net increase in direct or indirect emissions from sources that are under federal agency control.

Alternative 2

Air quality impacts associated with Alternative 2 would be essentially the same as those under the No Action Alternative.

Alternative 2 would not be subject to the EPA Clean Air Act conformity rule because there would be no net increase in direct or indirect emissions from sources that are under federal agency control.

3.11.3 Cumulative Impacts

Implementation of Alternatives 1 and 2 would not contribute to cumulative air quality impacts.

3.12 VISUAL RESOURCES

Physical form and visual character are the result of the interaction of natural and engineered elements. Natural elements, including topography, hydrology, vegetation, and climate, create the basic physical context; engineered elements, including buildings, roads, infrastructure, and settlement patterns, are secondary elements that act upon the natural context to establish a particular physical or visual environment.

In the rural setting of Sutter County, geographic features, including Sutter Buttes, the Feather, Sacramento, and Bear rivers and associated levee systems, localized drainage courses, Butte Sink, and the expansive valley floor, give shape and profile to the natural

environment. The county can be divided into two major geographic units—the valley and uplands. In addition, there are six major landscape features or categories of features that contribute to the overall visual and scenic quality of Sutter County, based on soil types, vegetation, and topography—uplands, dissected uplands, valley orchards, valley floor, Butte Sink (in the northwestern portion of the county, north of Butte Slough), and riparian.

The natural features that best describe the District are the valley floor and valley orchards. The valley floor is characterized by flat topography and open row or field crop type agricultural uses. This is the largest single physiographic area in Sutter County. The valley floor has an extremely low population density and is dominated by large-scale farming operations. Primary crops based on total acreage are rice, wheat, beans, tomatoes, and various types of hay. The valley orchards are relatively close to Sutter County's rivers and are typically flat. The primary orchard crops in Sutter County, based on acreages harvested are prunes, walnuts, peaches, and pears. Similarly, the primary orchard crops in the District are prunes, walnuts, and peaches (see Table 3-13 in Section 3.4, Land Use).

3.12.1 Affected Environment

Landscape Character Types

Landscape character types are described based on State of California Natural Landscape Provinces (US Forest Service 1976), represented by seven immense provinces with similar physiographies; that is, combinations of landform, vegetation cover, and surface water bodies. A province's landscape character types are based on its total visual character; no single physical characteristic dictates character type, although landform has a stronger influence than other characteristics (Reclamation 1997).

The District is encompassed by the Central Valley Province. This province is characterized as predominately lowlands and plains with few hills. This province is mostly agricultural, with areas of wetlands and oak lands, riparian areas along the major watercourses, and numerous small communities throughout the valley.

Wild and Scenic Rivers

Congress created the National Wild and Scenic Rivers System in 1968 (Public Law 90-542; USC 1271 *et seq.*), to preserve rivers and outstanding natural, cultural, or recreational features in a free-flowing condition. High priority is placed on visual resource management of these rivers to preserve or restore their scenic characteristics.

California also has its own system of protected rivers. The California Wild and Scenic Rivers System consists of rivers and river segments established by legislative action because of the extraordinary scenic, recreational, fishery, or wildlife values that the rivers or segments possess in their free-flowing condition.

From the viewpoint of visual resources assessment, all rivers designated as wild, scenic, or recreational by the federal government or state of California are regarded as having

high scenic quality. The Feather River is not identified under either the national or state wild and scenic river systems.

Scenic Highways

Scenic highways are roads designated as scenic by the state of California or local agencies. Scenic highways are recognized as having exceptional scenic qualities or affording panoramic vistas. There are no officially designated state scenic highways or roads eligible for designation in the District project area or in Sutter County (Caltrans 2000 and Caltrans 1992, as cited in Reclamation 1997). However, there are a number of visually and aesthetically scenic roadways throughout the county, particularly those along the Feather River (Sutter County 1996a).

3.12.2 Environmental Consequences

Impacts on visual resources depend primarily on changes in cropping patterns, which may result in increased fallowed lands and associated modified agricultural viewsheds.

No Action Alternative

Under the No Action Alternative, no substantial change in irrigated acreage would be expected in the District. (see Section 3.2, Agricultural Economics). Therefore, anticipated changes to agricultural viewsheds under the No Action Alternative would be minimal.

Alternative 1

Alternative 1 is assumed to have similar effects to visual resources as the No Action Alternative. Therefore, there are no visual resources impacts of this alternative.

Alternative 2

Under Alternative 2, changes in irrigated acreage would be small, ranging from an increase of 20 acres to a reduction of 190 acres in a series of dry years (see Section 3.2, Agricultural Economics). The largest reduction in acreage for a single crop type (up to 130 acres) would be for rice. However, the overall effect of this alternative on the amount of irrigated acreage would be small, less than two percent, under all water year scenarios. General cultivated and fallowed acreage patterns would be similar to historical patterns, and agricultural viewsheds under Alternative 2 would be similar to conditions described above in Affected Environment. This impact would be minimal.

3.12.3 Cumulative Impacts

Implementing Alternatives 1 and 2 would not contribute to cumulative impacts on visual resources.

4. CONSULTATION AND COORDINATION

CHAPTER 4
CONSULTATION AND COORDINATION

4.1 INTRODUCTION

Reclamation's compliance with many of the federal statutes, implementing regulations, and executive orders applicable to implementation of CVPIA was documented in the PEIS. Those requirements that were adequately addressed in the PEIS, and for which no further compliance issues have been identified, are briefly summarized below. Requirements for which additional consultation and coordination or further discussion of compliance issues are warranted are discussed in greater detail. Efforts by Reclamation to involve and include interested parties in the site-specific environmental review process also is presented.

4.2 PUBLIC INVOLVEMENT

NEPA requires an early and open process for determining issues that should be addressed and analyzed in the environmental document and to assist the decision-maker in making a determination to implement the proposed action or an alternative. This process is designed to involve and inform the public and federal, state, and local agencies as to the environmental consequences of a federal agency's actions. This is also to provide important information and analyses to promote better decision-making by the federal agency.

4.2.1 Public Scoping

The purpose of scoping is to identify potential environmental issues related to the proposed action. Public scoping began on October 15, 1998, with publication of a notice of intent (NOI) in the Federal Register to announce the preparation of environmental documents for renewal of long-term water service contracts. The NOI notified the public of the proposal, solicited written comments on the proposed action, and announced the dates and location of public scoping meetings. The public also was notified of the proposed action through press releases and direct mailings to over 3,000 interested parties. The public scoping period began at the time of publication of the NOI and concluded on January 8, 1999.

Scoping meetings were held at eight locations throughout the CVP service area. In addition, four workshops on Reclamation's water needs assessment process were conducted in conjunction with public scoping meetings. Approximately 560 comments were submitted at public meetings, and thirty-two comment letters were received during the scoping period.

Reclamation prepared a scoping report that documented the scoping process (Bureau of Reclamation 1999b). Comments received during scoping generally addressed the following issues (detailed discussion of scoping comments is presented in the Central Valley Project Long-term Contract Renewal Scoping Report):

- Public involvement and information gathering from water service contractors;
- The relationship of the site-specific environmental document to the PEIS;
- The geographic scope of analysis and the level of detail;
- The type of environmental documents to be prepared;
- Purpose and need of long-term contract renewals;
- Alternatives considered in the site-specific environmental documents;
- Impact issues, including water resources, socioeconomic issues, biological resources, including consultation, and impacts of water service contract terms; and
- Coordination with other parties and agencies;

In addition, public comments also addressed contract negotiation and water needs assessment issues. Although these comments were not specific to the environmental review for long-term contract renewal, they were included in the scoping report. Reclamation used comments and concerns expressed by the public during the scoping period to determine the scope of analysis, including the type of environmental document to be prepared for each area of the CVP, geographic variability of concerns, level of detail, resource areas to be evaluated, and development of alternatives.

4.2.2 Public Participation During Contract Negotiations

Public participation has continued throughout the contract negotiation process. Numerous contract negotiations have occurred since Reclamation presented the initial contract proposal in November of 1999. These negotiations have afforded the water service contractors the opportunity to comment on and discuss the contract provisions with Reclamation. In addition, the negotiation sessions are open to the public, and while the public is not able to comment during the negotiations, the public is kept apprised of the current status of contract negotiations and may comment at the conclusion of the negotiation session.

4.2.3 Public Comment on the Draft EA

The Draft EA and three revised draft EAs were circulated for public and agency review for 30 days each. This public comment period provided an opportunity for the public to review the issues addressed in the impact analysis and to comment on any aspect of the process. Comments on the draft EAs have been responded to and appropriate revisions have been incorporated into the final EA. The Draft EA was revised and recirculated for public comment for a 30-day period in September of 2003, and again in July of 2004 following negotiations of the draft contract and finalization of the Biological Assessments. The Draft EA was again revised in August of 2004 and recirculated for 30 days ending September 8, 2004.

4.3 CONSULTATION AND COORDINATION WITH OTHER AGENCIES

4.3.1 National Environmental Policy Act

This EA was prepared pursuant to and in accordance with NEPA and CEQ regulations on implementing NEPA (40 CFR 1500-1508). In accordance with NEPA this document tiers off the PEIS (40 CFR 1508.28) and evaluates the potential site-specific environmental and socioeconomic effects of renewal of the long-term water service contract for the District.

4.3.2 Endangered Species Act

Reclamation prepared a biological assessment to determine if the proposed action would affect listed threatened and endangered species. The biological assessment addresses all species affected by the CVP operation in the District. Reclamation requested formal consultation with NOAA Fisheries and the Service pursuant to the Endangered Species Act (ESA) on April 29, 2004.

The U.S. Fish and Wildlife Service provided Reclamation a letter on August 17, 2004 which concluded informal consultation for long term renewal of contracts, including the Feather Water District, with a finding that the proposed contract renewal is not likely to adversely affected listed species or critical habitat.

Formal consultation was initiated with NOAA Fisheries on October 22, 2004. On May 16, 2005, NOAA Fisheries issued a draft biological and conference opinion (BO) for the FWD contract renewal. On June 23, 2005, Reclamation requested NOAA Fisheries to finalize the BO and modify the terms and conditions to incorporate language changes that were discussed following the issuance of the draft opinion. The final BO was issued on July 28, 2005 and concluded that this project is not likely to jeopardize the continued existence of Sacramento River winter-run Chinook salmon, Central Valley spring-run Chinook salmon, and Central Valley steelhead, or adversely modify their designated or proposed critical habitat. The BO included an incidental take statement with reasonable and prudent measures and non-discretionary terms and conditions that are necessary and appropriate to minimize incidental take associated with the FWD contract renewal. The final BO is found in Appendix G.

The BO found that the proposed action would not result in any adverse effects on designated or proposed critical habitat. Because of this finding, NOAA Fisheries also found that the project would not be likely to adversely affect the essential fish habitat of Pacific salmon protected under the Magnuson-Stevens Fishery Conservation Act.

4.3.3 Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act (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.

4.3.4 National Historic Preservation Act

Section 106 of the National Historic preservation Act (NHPA) requires that federal agencies evaluate the effects of their undertakings on historical, archaeological, 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 in (or eligible for inclusion in) 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. Reclamation staff will complete the Section 106 consultation process prior to implementing any actions.

4.3.5 Indian Trust Assets

Indian Trust Assets (ITA) are legal interests in property held in trust by the United States for Indian tribes or individuals. Reclamation, in carrying out its activities, must take reasonable actions to protect and maintain ITA reserved by or granted to Indian tribes or individuals by treaty, statute, or Executive Order. Tribes in the Central Valley and Trinity area were notified during the preparation of the PEIS, and meetings were held with several tribes. Based on these coordination and consultation efforts, potential impacts to ITA were addressed. No federally recognized Indian tribes or trust assets are found in the affected area of the District, and no additional impacts to ITA would occur as a result of the long-term contract renewal under any of the alternatives.

4.3.6 Indian Sacred Sites on Federal Land

Executive Order 13007 provides that federal agencies with statutory or administrative responsibility for management of federal lands, to the extent practicable and as permitted by law, shall accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners, and shall avoid adversely affecting the physical integrity of such sacred sites. No federal lands are part of the proposed action evaluated in this EA; therefore, sacred sites are not included in the impact assessment of the EA.

4.3.7 Environmental Justice

Executive Order 12898 requires each federal agency to identify and address disproportionately high and adverse human health or environmental effects, including social or economic effects of programs, policies, and activities on minority and low-income populations. Potential environmental justice impacts have been evaluated in Section 3.5 of this EA. No disproportionate impacts on minority and low-income populations were identified.

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

Executive Order 12372 requires that federal agencies provide for opportunities for state and local officials to provide input on proposed federal assistance or development actions. Consistency of the proposed action with the plans and policies of the Sutter County General Plan (Sutter County 1996) have been considered, and input from state and local officials has been sought in developing the analysis for this EA. The Draft EAs were circulated to the appropriate state and local agencies to satisfy review and consultation requirements.

4.3.9 Flood Plain Management

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 proposed action would not affect instream flows or substantially alter land use patterns and therefore would not affect flood hazards or floodplain management.

4.3.10 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. Impacts on wetlands were considered as part of the alternatives evaluated in this EA, and no significant impacts were predicted.

4.3.11 Wild and Scenic Rivers Act

Under the Wild and Scenic Rivers Act, a federal agency may not assist in 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. None of the EA alternatives would affect flows in wild and scenic portions of rivers.

4.3.12 Farmland Protection Policy Act and Farmland Preservation

The Farmland Protection Policy Act of 1981 and the Memoranda on Farmland Preservation, dated August 30, 1976, and August 11, 1980, respectively, from CEQ require federal agencies to assess the potential of a proposed project to convert designated prime or unique farmland to 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 NRCS is the federal agency responsible for ensuring that these laws and polices are followed.

The increased price of CVP water under Alternative 2 in this EA may result in minor changes in cropping patterns or in minor fallowing of land (Section 3.3). No impacts would occur because fallowed land can still be used for non-irrigated agricultural practices, may remain in irrigation during wet water years, or may be returned to agricultural production at a later time. Potential impacts to important farmlands are anticipated to be minimal.

4.3.13 Clean Air Act

The federal Clean Air Act 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 Clean Air Act 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 SIP.

Analysis in this EA assumes that minimal changes in land use or agricultural practices would occur under any of the proposed alternatives. Current practices to control dust and soil erosion on lands that are seasonally fallowed would continue. No air quality impacts would occur under any of the alternatives.

4.3.14 Safe Drinking Water Act

The Safe Drinking Water Act (Pub. L 99-339) became law in 1974 and was reauthorized in 1986 and again in August 1996. Through this act, Congress gave the EPA the authority to set standards for contaminants in drinking water supplies. The California Department of Health Services has the primary enforcement responsibility. No changes in compliance are expected under any of the alternatives evaluated in this EA.

4.3.15 Clean Water Act

The Clean Water Act 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. Future compliance with the requirements of the act for implementation of the CVPIA was evaluated as part of the PEIS. No additional compliance issues have been identified in this EA.

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CHAPTER 5
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6. GLOSSARY OF TERMS AND ACRONYMS

CHAPTER 6
GLOSSARY OF TERMS AND ACRONYMS

6.1 GLOSSARY OF TERMS

A

Acre-foot—The quantity of water required to cover 1 acre to a depth of 1 foot. Equal to 1,233.5 cubic meters (43,560 cubic feet).

Anadromous—In general, this term is used to refer to fish, such as salmon or steelhead trout, that hatch in fresh water, migrate to and mature in the ocean, and return to freshwater as adults to spawn. Section 3403(a) of the CVPIA defines anadromous as "those stocks of salmon (including steelhead), striped bass, sturgeon, and American shad that ascend the Sacramento and San Joaquin rivers and their tributaries and the Sacramento-San Joaquin Delta to reproduce after maturing in San Francisco Bay or the Pacific Ocean."

Aquifer—An underground geologic formation in which water can be stored.

B

Bay-Delta Plan Accord—In December 1994, representatives of the state and federal governments and urban, agricultural and environmental interests agreed to the implementation of a Bay-Delta protection plan through the SWRCB, in order to provide ecosystem protection for the Bay-Delta Estuary. The Draft Bay-Delta Water Control Plan, released in May 1995, superseded D-1485.

Beneficial use—Those uses of water as defined in the State of California Water Code (Chapter 10 of Part 2 of Division 2), including but not limited to agricultural, domestic, municipal, industrial, power generation, fish and wildlife, recreation, and mining.

Biological opinion—Document issued under the authority of the Endangered Species Act stating the Service and/or the NOAA Fisheries finding as to whether a Federal action is likely to jeopardize the continued existence of a threatened or endangered species or result in the destruction or adverse modification of critical habitat. This document may include:

Critical habitat—A description of the specific areas with physical or biological features essential to the conservation of a listed species and which may require special management considerations or protection. These areas have been legally designated via Federal Register notices.

Jeopardy opinion—The Service or NOAA Fisheries opinion that an action is likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of critical habitat. The finding includes reasonable and prudent alternatives, if any.

No jeopardy opinion—The Service or NOAA Fisheries finding that an action is not likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of critical habitat.

C

CALFED—Joint federal and state program to address water-related issues in the Sacramento-San Joaquin rivers Delta.

Candidate species—Plant or animal species not yet officially listed as threatened or endangered, but which is undergoing status review by the Service or NOAA Fisheries.

Central Valley Project (CVP)—As defined by Section 3403(d) of the CVPIA, "all Federal reclamation projects located within or diverting water from or to the watershed of the Sacramento and San Joaquin rivers and their tributaries as authorized by the Act of August 26, 1937 (50 Stat. 850) and all Acts amendatory or supplemental thereto, ..."

Central Valley Project service area—As defined by Section 3403(e) of the CVPIA, "that area of the Central Valley and San Francisco Bay Area where water service has been expressly authorized pursuant to the various feasibility studies and consequent congressional authorizations for the Central Valley Project."

Central Valley Project water—As defined by Section 3403(f) of the CVPIA, "all water that is developed, diverted, stored, or delivered by the Secretary in accordance with the statutes authorizing the Central Valley Project in accordance with the terms and conditions of water rights acquired pursuant to California law."

Central Valley Project water service contractors—Water users that have contracted with the US Bureau of Reclamation for full or supplemental supply of water.

Conjunctive use—The planned use of groundwater in conjunction with surface water in overall management to optimize water resources.

Cost-of-service water rates—The water rate charged to recover all operating and capital costs, and individual contractor operating deficits, associated with the providing of water service. Components of operation and maintenance (O&M) and capital cost vary by contractor depending on services required for water delivery. Differs from full cost in that no charge for interest on capital is included.

Cubic feet per second—A measure of the volume rate of water movement. As a rate of streamflow, a cubic foot of water passing a reference section in 1 second of time. One cubic foot per second equals 0.0283 m /s (7.48 gallons per minute). One cubic foot per 3 second flowing for 24 hours produces approximately 2 acre-feet.

D

Decision-1485 (D-1485)—The SWRCB decision specifying water quality standards for the Sacramento-San Joaquin Delta and Suisun Marsh.

Dedicated water—Refers to the 800,000 acre feet of CVP yield identified in Section 3406(b)(2) of the CVPIA that the Secretary must dedicate and manage for the primary purpose of implementing the fish and wildlife purposes and measures of the act, to help California protect the Bay-Delta estuary, and to help meet legal obligations imposed on the CVP under state and federal law, including the Federal Endangered Species Act (ESA).

Dry-farmed—Crop production without the use of applied water.

E

Endangered species—Any species or subspecies of bird, mammal, fish, amphibian, reptile, or plant which is in serious danger of becoming extinct throughout all, or a significant portion of its range. Federally endangered species are officially designated by the Service or the NOAA Fisheries and published in the Federal Register.

Environmental assessment— A concise public document that a lead agency prepares pursuant to the National Environmental Policy Act when a project is not covered by a categorical exclusion and the lead agency does not know whether the impacts will be significant. The environmental assessment is the primary tool used by an agency to determine whether to prepare an environmental impact statement.

Ephemeral stream—Flows briefly only in direct response to precipitation.

Exotic species—Introduced species not native to the place where they are found.

F

Fallowed land—Cultivated land that lies idle during a growing season.

Full cost water rates—Adds an interest component to the cost-of-service water rates to recover costs of financing the construction of irrigation facilities placed in service. The interest component is calculated in accordance with the Reclamation Reform Act of 1982.

Full cost—As defined by Section 3403(g) of the CVPIA, "the meaning given such term in paragraph (3) of section 202 of the Reclamation Reform Act of 1982". As defined by Section 202(3)(A) of the Reclamation Reform Act of 1982, "an annual rate as determined by the Secretary that shall amortize the expenditures for construction properly allocable to irrigation facilities in service, including all operation and maintenance deficits funded, less payments, over such periods as may by required under Federal Reclamation law or applicable contract provisions, with interest on both accruing from the date of enactment of the Act on costs outstanding at that date, or from the date incurred in the case of costs arising subsequent to the date of enactment of this Act: Provided that operation,

maintenance and replacement charges required under Federal reclamation law, including this title, shall be collected in addition to the full cost charge."

G

Groundwater—Water stored underground in pore spaces between rocks and in other alluvial materials and in fractures of hard rock occurring in the saturated zone.

H

Habitat—Area where a plant or animal lives.

I

Intermittent or seasonal stream—Stream on or in contact with the groundwater table that flows only at certain times of the year when the groundwater table is high.

Irrigation water—Water made available from the project which is used primarily in the production of agricultural crops or livestock, including domestic use incidental thereto, and the watering of livestock. Irrigation water does not include water used for domestic uses such as the watering of landscaping or pasture for animals (e.g., horses) which are kept for personal enjoyment. It generally does not include water delivered to landholdings operated in units of fewer than five acres, unless the contractor establishes to the satisfaction of the contracting officer that the use of the water delivered to any such landholding is a use within this definition.

L

Land classification—An economic classification of variations in land reflecting its ability to sustain long-term agricultural production.

Land retirement—Permanent or long-term removal of land from agricultural production.

Long-term contract—Contracts with terms of more than ten years.

M

Municipal and industrial (M&I)—Water used for nonagricultural purposes, such as household and nonfarm commercial uses. The District's contract has no M&I water; instead the term "Other Water" is used.

O

Operating Non-federal Entity—A non-federal entity that operates and maintains federal facilities pursuant to an agreement with the United States.

Other Water—water made available from the CVP other than irrigation water (i.e., water used for agriculture or livestock). For the purposes of the contract, other water shall be paid for at rates identical to those established for municipal and industrial water.

P

Perennial stream—Flows continuously throughout the year.

Place of use—The geographic area specified in a water right permit or license issued by the California State Water Resources Control Board, wherein the water may be used.

Point of diversion—The point along a river or stream that a water right permit or license specifies water may be diverted to areas away from the river.

Programmatic environmental impact statement—EIS prepared prior to a federal agency's decision regarding a major program, plan, or policy. It is usually broad in scope and followed by subsequent more narrowly focused NEPA compliance documents such as site-specific environmental assessments and environmental impact statements.

R

Range—Geographic region in which a given plant or animal normally lives or grows.

Reclamation laws—As defined by Section 3403(I) of the CVPIA, "the Act of June 17, 1902 (82 Stat. 388) and all Acts amendatory thereof or supplemental thereto."

Repayment contract—As defined by Section 3403(k) of the CVPIA, "the same meaning as provided in sections 9(d) and 9(e) of the Reclamation Project Act of 1939 (53 Stat. 1187, 1195), as amended." See Appendix E, Feather Water District long-term water service contract

Reservoir—Artificially impounded body of water.

Restoration fund—As defined in Section 3403(l) of the CVPIA, "the Central Valley Project Restoration Fund established by this title."

Riparian—Areas along or adjacent to a river or stream bank whose waters provide soil moisture significantly in excess of that otherwise available through local precipitation.

S

Scoping—The process of defining the scope of a study, primarily with respect to the issues, geographic area, and alternatives to be considered. The term is typically used in association with environmental documents prepared under the National Environmental Policy Act.

Secretary—As defined by Section 3403(m) of the CVPIA, "the Secretary of the Interior."

Seepage—Water that escapes control through canal lining, stream banks, or other holding or conveyance systems.

Shasta Criteria—Establishes when a water year is considered critical, based on inflow to Shasta Lake. When inflows to Shasta Lake fall below the defined thresholds, the water year is defined as critical, and water deliveries to Sacramento River Settlement Contractors and San Joaquin River Exchange Contractors may be reduced up to 25 percent. A year is critical when the full natural inflow to Shasta Lake for the current water year (October 1 of the preceding calendar year through September 30 of the current calendar year) is equal to or less than 3.2 million acre-feet. This is considered a single-deficit. A year is also critical when the accumulated difference (deficiency) between 4 million acre-feet and the full natural inflow to Shasta Lake for successive previous years, plus the forecasted deficiency for the current water year, exceeds 800,000 acre-feet.

Shortages—Reductions in deliveries of contracted firm water. The amount of these reductions is expressed as the percent of full annual supply allocated.

Short-term contract—Contracts with a term of more than five years but fewer than ten years.

Subsidence—A local mass movement that involves principally the gradual downward settling or sinking of the earth's surface with little or no horizontal motion. It may be due to natural geologic processes or mass activity such as removal of subsurface solids, liquids, or gases, ground water extraction, and wetting of some types of moisture-deficient loose or porous deposits.

T

Threatened species—Legal status afforded to plant or animals species that are likely to become endangered within the foreseeable future throughout all or a significant portion of their range, as determined by the Service or the NOAA Fisheries.

Tiering—Procedure which allows an agency to avoid duplication of paperwork through incorporation by reference of the general discussions and relevant specific discussions from A NEPA document of broader scope into a subsequent NEPA document of narrower scope.

Total supply—Total water supply available to area (surface water plus groundwater).

Transfers, sales, and exchanges—A transfer or sale is a one way transaction to another contractor usually on an annual basis, but could be on a long-term basis. An exchange is a two way transaction wherein a contractor transfers a quantity of water to another contractor for a like amount to be returned at a later date. CVP contractors may transfer, sell and exchange to other contractors their contractual water supply only with written consent from the United States.

Tributary—A stream feeding into a larger stream or a lake.

Turn outs—The physical structures along main canal systems for distribution of water.

W

Water acquisition—The purchase of water from willing sellers.

Water rights—California recognizes riparian and appropriative water rights.

> ***Riparian water rights***—Exists for lands which abut a waterway, or which overly an underground stream. Generally, there is no riparian right to diffused surface waters or swamps. The extent of the frontage along a waterway in no way governs the quantity of the water right. Use of water through riparian rights must be on riparian land and within the watershed of the stream. Riparian rights may not be lost as a result of nonuse.
>
> ***Appropriative water rights***—Water rights based upon the principle of prior appropriations, or "first in time, first in right." In order to maintain appropriative water rights, the right to any water must be put to beneficial use. Nonuse of appropriative water rights may result in the loss of those water rights. In a conflict between a riparian water user and an upstream appropriator, the riparian user has priority, provided that the water is being used in a reasonable and beneficial manner.

Watershed—A region or area bounded peripherally by a water parting and draining ultimately to a particular watercourse or body of water.

Water year—Usually when related to hydrology, the period of time beginning October 1 of one year and ending September 30 of the following year and designated by the calendar year in which it ends.

Wetland—A zone periodically or continuously submerged or having high soil moisture, which has aquatic or riparian vegetation components, or both, and is maintained by water supplies significantly in excess of those otherwise available through local precipitation.

Wildlife habitat—An area that provides a water supply and vegetative habitat for wildlife.

6.2 ACRONYMS

Acronym	Full Phrase
ACHP	Advisory Council on Historic Preservation
a-f	acre-feet
APCD	Air Pollution Control District
APE	area of potential effect
AQMD	Air Quality Management District
BP	before present
Caltrans	California Department of Transportation
CAP	Clean Air Plan
CDFG	California Department of Fish and Game
CEQ	Council on Environmental Quality
CEQA	California Environmental Quality Act
cfs	cubic feet per second
CFR	Code of Federal Regulations
CNPS	California Native Plant Society
CNDDB	California Natural Diversity Database
CO	carbon monoxide
COA	Coordinated Operating Agreement
COE	US Army Corps of Engineers
CVGSM	Central Valley Groundwater - Surface Water Simulation Model
CVP	Central Valley Project
CVPIA	Central Valley Project Improvement Act
CVPM	Central Valley Production Model
CVP-OCAP	Central Valley Project Operations Criteria and Plan
CWA	Clean Water Act
D-1485	Decision 1485 (State Water Resources Control Board)
District	Feather Water District
DPR	California Department of Parks and Recreation
DWR	California Department of Water Resources
EA	environmental assessment
EIS	environmental impact statement
EPA	US Environmental Protection Agency
ESA	Endangered Species Act
ESU	Evolutionary Significant Unit
ET	evapotranspiration
ETAW	evapotranspiration of applied water
FONSI	finding of no significant impact
FWCA	Fish and Wildlife Coordination Act
gpm	gallons per minute
IMPLAN	regional economic input-output model
Interior	US Department of the Interior
ITA	Indian Trust Asset

Acronym	Full Phrase
mafy	million acre feet per year
M&I	municipal and industrial
MCL	maximum contaminant level
MOA	memorandum of agreement
NAGPRA	Native American Graves Protection Repatriation Act
NAHC	Native American Heritage Commission
NDDB	Natural Diversity Database
NEPA	National Environmental Policy Act
NHL	National Historic Landmark
NHPA	National Historic Preservation Act
NOAA Fisheries	National Oceanographic and Atmospheric Administration, Fisheries (formerly NMFS)
NOI	notice of intent
NPS	National Park Service
NRCS	National Resources Conservation District
NRHP	National Register of Historic Places
O&M	operations and maintenance
OHP	Office of Historic Preservation
PEIS	programmatic environmental impact statement
PM_{10}	particulate matter of 10 microns in aerometric diameter or less
ppb	parts per billion
ppm	parts per million
ppt	parts per trillion; parts per thousand
Reclamation	US Bureau of Reclamation
ROD	record of decision
ROG	reactive organic gases
ROI	region of influence
RRA	Reclamation Reform Act
Secretary	Secretary of the Interior
Service	US Fish and Wildlife Service
SIP	state implementation plan
SHPO	California State Historic Preservation Officer
SO_X	oxides of sulfur
SPW	state project water
SRA	shaded riverine aquatic
SVAB	Sacramento Valley Air Basin
SWP	State Water Project
SWRCB	State Water Resources Control Board
TCC	Tehama-Colusa Canal
TCPs	traditional cultural properties
TDS	total dissolved solids
TOC	total organic carbon
TOG	total organic gases
TUAs	traditional use areas
USACE	United States Army Corps of Engineers
USC	United States Code

APPENDIX A
LIST OF PREPARERS

APPENDIX A
LIST OF PREPARERS

Tetra Tech, Inc.

Dean Amundson
M.S., Environmental Policy
B.A., Environmental Studies
Years of Experience: 8
(Co-Project Manager)

Karen Bane
M.A., Biophysics
B.S., Physics
Years of Experience: 6
(Biological Resources)

David Batts
M.S., Natural Resource Planning and Management
B.S., International Development
Years of Experience: 8
(Biological Resources)

Constance Callahan
J.D., Environmental Law
B.A., Anthropology
Years of Experience: 7
(Social Conditions and Environmental Justice)

Kevin Doyle
B.A., Sociology
Continuing Studies in Anthropology/Archaeology, Historic Preservation, and Cultural Resource Management
Years of Experience: 16
(Cultural Resources)

Jessica Forrest
B.A., Biology / Environmental Science and Policy
Years of Experience: 2
(Land Use, Cumulative Impacts)

Karen E. Frye, AICP
B.S., Political Economy of Natural Resources
Years of Experience: 11
(Co-Project Manager)

Bindi Patel
M.E.M., Resource Economics & Policy
B.A., Geology
Years of Experience: 3

Robert Sculley
M.S., Ecology
B.S., Zoology
Years of Experience: 26
(Air Quality)

Jeff Skahill
B.S., Environmental Health
Years of Experience: 3
(GIS Specialist)

Randolph Varney
B.A., Technical and Professional Writing
Years of Experience: 15
(Technical Editing)

Tom Whitehead
M.S., Hydrology
B.S., Geology
Years of Experience: 16
(Water Resources, Soils and Geology)

Terry Witherspoon
M.C.P., City Planning
B.A., Architecture
Years of Experience: 11
(Recreation, Visual Resources, Land Use)

Ann Zoidis
M.A., Physiology and Behavioral Biology
B.S., Geology
Years of Experience: 15
(Biological Resources)

Consulting Services

Larry Dale
Ph.D., 1990, Agricultural Economics
M.S., Agricultural Economics
B.A., Economics
Years of Experience: 22
(Agricultural Economics)

APPENDIX B
ECONOMIC ANALYSIS

Economic Analysis of November 1999 Tiered Pricing Proposal for PEIS Preferred Alternative

Date: October 2, 2000

This submittal presents the results of an Economic Analysis of the application to the PEIS Preferred Alternative of the November 1999 unit rates for CVP water and Tiered Pricing Proposal.

The PEIS Preferred Alternative included assumptions for the tiered pricing of CVP water that were developed during the preparation of the Draft PEIS. Subsequent to completion of the Final PEIS, a different tiered pricing proposal was developed. In addition, the PEIS assumed 1992 CVP water rates. This analysis includes the 1999 water rates. This submittal applies the new water rates and the November 1999 proposal to the Preferred Alternative and compares the results to the impact analysis of the PEIS Preferred Alternative. The level of detail presented in this submittal is consistent with the level of detail presented in the main PEIS document and the technical appendices. Tables are presented in the same format as used in the PEIS.

The economic analysis includes an evaluation of agricultural economics using Central Valley Production Model (CVPM), municipal and industrial water use economics for CVP water using the spreadsheet presented with the PEIS, and regional economics using IMPLAN. This memorandum discusses the new assumptions in the November 1999 proposal. However, this memorandum does not discuss the basic assumptions used in the PEIS models and analytical tools. This memorandum must be used in conjunction with the Draft PEIS and Final PEIS, including the methodology and modeling technical appendices, to explain the overall assumptions for evaluating the Preferred Alternative in the PEIS.

For the Agricultural Land Use and Economics analysis, the methodology used for applying CVP water rates was modified to allow for the new tiered pricing and the use of blended rates to determine a total water rate for all CVP water applied by an irrigation district or agency. These changes result in changes in water use due to the affordability of CVP water supplies, not a change in reliability.

For the Municipal and Industrial Water Use Economics analysis, blended rates had been used in the PEIS analysis. In addition, this analysis assumes that the municipal and industrial users will be able to afford the calculated water costs, as described in the PEIS. Therefore, CVP water deliveries do not change for the municipal and industrial analysis. The Regional Economics analysis reflects only changes to agricultural and municipal and industrial sectors, but not recreation sectors.

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SECTION 1

AGRICULTURAL LAND USE AND ECONOMICS

CONTRACT RENEWAL PROPOSAL WITH BLENDED WATER RATES

In the November 1999 proposal, Reclamation has proposed that water sold to CVP water service contractors be sold according to tiered water rates as required by CVPIA section 3404. Reclamation has also proposed that two categories of water be identified. Category 1 water would be calculated as the average delivery of the previous five years, and would be split into three tiers according to the 80-10-10 quantities defined in the CVPIA. Category 2 water would be any water available in excess of the 5-year rolling average, up to the total contract amount as defined by the Needs Analysis.

Tier 1 water rates include the cost-of-service rate and any applicable Restoration charges and surcharges. Both the Restoration Charge and the capital component of the cost-of-service rate are subject to ability-to-pay limits. These limits are in effect for Bella Vista WD and Clear Creek CSD, contractors on the Corning and Tehama-Colusa Canals, and contractors receiving water from New Melones.

Tier 3 water rates include the full-cost rate (as defined in the Reclamation Reform Act) and any applicable Restoration Charges. No ability-to-pay relief is provided in this Tier. The Tier 2 water rate is the average of the applicable Tier 1 and Tier 3 rates. Category 2 water has the same rate as Tier 3.

For this proposal, it is assumed that water conservation guidelines allow contractors to blend the rate of CVP water delivered in any tier or Category, and that they do blend the rates. This is different from the assumption used to assess alternatives in the PEIS, in which contractors were assumed to sell CVP water to growers at tiered rates. Differences between PEIS pricing assumptions and this analysis are:

- This analysis assumes that contractors blend the price of all CVP water received at tiered rates into a single rate. Tiered rates to growers are assumed in the PEIS.

- The project water portion of Sacramento River settlement contracts are not subject to the new pricing policy in this analysis. In the PEIS it was assumed that it was subject to tiered rates.

- Rates are based on the Irrigation Water Rates spreadsheets provided by Reclamation in November 1999. PEIS rates used the 1994 Irrigation Water Rates manual.

- Ability-to-pay relief is incorporated using the current payment capacity studies for Shasta County irrigation contractors, Corning Canal contractors, Tehama-Colusa Canal contractors, and New Melones contractors. In the PEIS, payment capacity was based on a 1992 regional study (PEIS, 1999).

- In this analysis, ability to pay relief is provided in Tier 1, with none in Tier 3 - Tier 2 is the average of Tiers 1 and 3, and so provides 50% relief. In the PEIS, the same dollar amount of ability to pay relief is applied in all pricing tiers.

- A $7.00 per acre-foot Restoration Charge is assumed in this analysis. A $6.50 per acre-foot charge was used in the PEIS. The Friant surcharge was $7.00 per acre-foot in both studies.

- There is no lower bound on the usage of CVP water. In the PEIS each subregion was restricted to using at least the Tier 1 quantity of CVP supplies.

METHODOLOGY

Other than the differences listed above, the modeling approach and underlying data were the same as used for the PEIS. The Central Valley Production Model (CVPM) was used in this analysis, with modifications needed to assess the specific water pricing conditions proposed. Table 1 shows the regions of the CVPM and the corresponding service areas. 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. Based on groundwater hydrology as described in the PEIS, the following subregions are assumed to be unable to replace any CVP water with groundwater on a long term basis: Shasta County irrigation contractors (subregion 1), Corning Canal contractors (subregion 2), and the Tehama-Colusa service area (subregion 3B).

Water deliveries from the CVPIA Preferred Alternative were used (Reclamation CVPIA PEIS, 1999). These deliveries were allocated on a yearly basis into pricing tiers and categories according to the rules described above. Weighted average (i.e., blended) prices were calculated for each year, with quantities in each tier and category based on the previous five years of delivery. In any given year, the quantity and blended price of water depends on the six-year sequence leading up to and including the current year. Throughout this report the following conventions are use: an Average year represents the average 1922-1990 water delivery from the CVPIA Preferred Alternative (Reclamation CVPIA PEIS, 1999); a Wet year represents the average delivery for the period of 1967-1971 from the CVPIA Preferred Alternative; and a Dry year is the average 1928-1934 delivery from the CVPIA Preferred Alternative.

A total of nine water supply sequences are assessed in this analysis and compared to the CVPIA Preferred Alternative:

Average-Average:	An average water year following a five-year sequence of average years.
Wet-Average:	An average water year following a five-year sequence of wet years.
Dry-Average:	An average water year following a five-year sequence of dry years.
Average-Wet:	A wet water year following a five-year sequence of average years.
Wet-Wet:	A wet water year following a five-year sequence of wet years.
Dry-Wet:	A wet water year following a five-year sequence of dry years.

Average-Dry: A dry water year following a five-year sequence of average years.
Wet-Dry: A dry water year following a five-year sequence of wet years.
Dry-Dry: A dry water year following a five-year sequence of dry years.

The CVP water rates used for each of the nine sequences described above and the CVPIA Preferred Alternative tiered prices are shown in Table 3. Tables 4-12 show the available CVP water service contract supplies by tier and the blended price for each of the 22 subregions under the nine sequences proposed for the Long-Term Contract Renewal analysis.

Results are shown for each of the nine sequences presented as differences compared to the CVPIA Preferred Alternative. When calculating differences from the CVPIA Preferred Alternative, sequences ending in an Average, Wet and Dry years are compared to the Average, Wet and Dry year CVPIA Preferred Alternative results respectively.

IRRIGATED ACRES

Changes in irrigated acres from the Preferred Alternative are summarized by region in Table 13. A complete list of changes by crop and subregion is provided as Table 17.

Both the Average-Average and Wet-Average scenarios show little difference from the Preferred Alternative under the Average hydrology conditions. The Dry-Average sequence shows a larger reduction in irrigated acres almost all of which comes from the Sacramento River region. Compared to the Wet year Preferred Alternative results, there is a similar pattern for the three Long-Term Contract Renewal sequences ending with Wet years. For all three of the Long-Term Contract Renewal Sequences ending in a dry year there are minimal increases in irrigated acreage compared to the Dry year CPVIA Preferred Alternative results. Irrigated acres remain unchanged under all nine sequences in the San Felipe Division.

The reduction in acreage in Average and Wet years preceded by a series of Dry years is a result of higher CVP water costs. Since the quantity of Category 1 water is based on the average deliveries of the preceding five years, the quantity of water eligible for Category 1 classification shrinks when a sustained drought is experienced. When an average or wet year follows a drought period, water becomes available; however a large portion is classified as Category 2 and is priced at the full cost rate. This can be seen in Tables 6 and 9. When this relatively large block of full cost water is incorporated into the blended water price, all CVP supplies become more expensive, and sometimes unaffordable. This result is not seen in the dry-dry sequence because there is not excess water that gets classified as Category 2.

GROSS AND NET REVENUE

Gross revenue (value of production) impacts follow acreage impacts quite closely, and are shown by region in Table 14. Compared to the Average Preferred Alternative, a small reduction of less than $1 million is estimated for the Average-Average and Wet-Average scenarios, and a $39 million reduction is estimated in Dry-Average scenario. Gross revenue also declines compared to the Wet Preferred Alternative with approximately $5 million reductions in Average

and Wet years and a larger reduction of $29 million in the Dry-Wet scenario. In dry years preceded by all three hydrologic conditions, gross revenue is slightly higher when compared to the Preferred Alternative Dry year results. There were no changes in gross revenue for the San Felipe Division since there were no changes in irrigated acres compared to the CVPIA Preferred Alternative. A complete list of changes in gross revenue by crop and subregion is provided as Table 18.

Net revenue impacts are separated into five components; Fallowed land, Groundwater pumping costs, Irrigation Costs, CVP water costs and higher crop prices. The CVP water cost component represents the impact to net revenue from changes in both the quantity of CVP water used and the price of CVP water. Therefore when the blended CVP water price increases, farmers frequently use less water, and the net impact to the CVP water cost component can be positive even when the water price is higher. Table 15 summarizes the net income impacts by component. A negative entry in the table indicates a reduction in net revenue. A complete list of changes in net income by component for each subregion is provided as Table 19.

Relatively small net income impacts are seen in all water supply sequences at the State level. The Average-Average sequence compared to the Average year Preferred Alternative shows a decline of $2 million in net revenue for all of California. The Wet-Average scenario is estimated to have a net increase of approximately $4 million and the Dry-Average sequence a decrease of $12 million.

The net revenue impact in wet years relative to the Preferred Alternative wet results show a pattern similar to the Average year results. Dry years preceded by a series of Average and Wet years both show a net decrease in revenue of about $12 million while the Dry-Dry sequence results in a $15 million decrease in State wide net revenue relative the Preferred Alternative Dry results.
Notice that following a series of dry years, the net revenue component associated with crop prices often results in a positive impact to net revenue. This occurs because some subregions are forced to reduce acreage because of higher blended CVP water prices, resulting in higher crop prices received for acreage that remains in production.

There is a negative impact to net revenue from irrigation costs in the Sacramento and San Joaquin River regions in each of the nine Long-Term Contract Renewal sequences. This impact is derived from the irrigation efficiency improvements induced by higher CVP water prices in the Average year sequences. The change in irrigation efficiency carries through to the Wet and Dry year sequences because they are short run analyses and irrigation technology is fixed in the short run. The increase in irrigation efficiency results in a reduction in the total water used in some subregions while irrigated acreage remains constant.

WATER USE

Table 16 summarizes water use changes by region. A complete list of changes in CVP water use and groundwater use by subregion is provided as Table 20. Water supplies other than CVP project water and groundwater are unaffected and not shown. The San Joaquin River region and most of the sequences for the Sacramento River region show the typical response represented by a shift away from CVP supplies to groundwater as CVP water becomes more expensive under the new pricing schemes. The Tulare Lake region and the Sacramento River region during wet years preceded by a series of Average and Wet years show what would be considered an atypical response.

In the Sacramento River region when five years of Wet and Average conditions are followed by a Wet year, the model predicts that both groundwater and CVP water use will decline relative to the Preferred Alternative Wet condition. The decrease in groundwater use is mostly attributed to subregion 3b. In this subregion in a Wet year coming out of a series of Average or Wet years the blended price is cheaper than the Preferred Alternative Tier 2 water cost as well as the cost of pumping groundwater. Therefore there is a shift away from groundwater to CVP supplies. In Average years preceded by Average or Wet years, the subregion is prevented from shifting to CVP because they are already using their full CVP supply.

In the Tulare Lake region there is a pattern of shifting from groundwater to CVP water that can be attributed to subregions 17. This subregion shifts because under the blended pricing scheme the CVP water becomes cheaper than pumping groundwater; therefore they maximize their CVP water use.

In Average and Wet years preceded by a series of Dry years, there is a large decrease in CVP water use in both the Sacramento and San Joaquin River regions. This is driven by the relatively high cost of CVP supplies under these conditions. Since many subregions receive less water in Dry years or the water falls into the higher tiers and it becomes unaffordable, then the base from which the blended price tier quantities is calculated shrinks. This sets up a condition where an Average or Wet year comes along; the additional water is classified as Category 2 and assessed the full cost price. The CVP blended price is a weighted average of all CVP supplies therefore the cost for all CVP water increases and the supplies often become unaffordable.

LOCALIZED IMPACTS

Certain subregions are substantially affected by the proposed water pricing.

- The Tehama-Colusa Canal service area is the most-affected region. Limited groundwater availability and very high full-cost price relative to the value of water in agricultural production result in almost 60,000 acres out of production in the Dry-Average sequence and substantially higher cost for lands remaining in production. This analysis shows a one-year snapshot. Because water pricing is based on historic delivery, a region (such as the Tehama-Colusa Canal region)

may never be able to “buy its way” back out from a drought. Looked at over a sequence of dry years such as 1928-34 or 1987-92, many or most of the districts in this area could not survive as CVP contractors.

- The analysis predicts that the Delta subregion will make a complete switch to groundwater supplies in all nine hydrologic sequences, assuming groundwater is available in all parts of the service area.

- The analysis estimates that once an extended drought is experienced, the Delta-Mendota service area would switch from its CVP water service supply to groundwater, assuming groundwater is available in all parts of the service area.

- Westlands Water District and many of the Friant Unit contractors would likely continue purchasing CVP water. Since these areas continue to purchase CVP supplies in all years coming out of drought conditions, they would eventually build their base deliveries up or "buy their way" back to pre-drought tier quantities and prices.

TABLE 1
CVPM SUBREGIONS AND DESCRIPTIONS

CVPM Subregion	Description of Major Water Users
1	CVP Users: Anderson-Cottonwood, Clear Creek, Bella Vista, Sacramento River miscellaneous users.
2	CVP Users: Corning Canal, Kirkwood, Tehama, Sacramento River miscellaneous users.
3	CVP Users: Glenn-Colusa ID, Provident, Princeton-Codora, Glenn, Maxwell, and Colusa Basin Drain MWC.
3B	Tehama-Colusa Canal Service Area. CVP Users: Orland-Artois WD, most of County of Colusa, Davis, Dunnigan, Glide, Kanawha, La Grande, Westside WD.
4	CVP Users: Princeton-Codora-Glenn, Meridian Farms WC, Pelger Mutual WC, Recl. Dist. 1004, Recl. Dist. 108, Roberts Ditch, Sartain MWC, Sutter MWC, Swinford Tract IC, Tisdale Irrigation, Sacramento River miscellaneous users.
5	Most Feather River Region riparian and appropriative users.
6	Yolo, Solano Counties. CVP Users: Conaway Ranch, Sacramento River miscellaneous users.
7	Sacramento Co. north of American River. CVP Users: Natomas-Central MWC, Sacramento River miscellaneous users, Pleasant Grove-Verona, San Juan Suburban.
8	Sacramento Co. south of American River, San Joaquin Co.
9	Delta Regions. CVP Users: Banta Carbona, West Side, Plainview.
10	Delta Mendota Canal. CVP Users: Pacheco, Del Puerto, Hospital, Sunflower, West Stanislaus, Mustang, Orestimba, Patterson, Foothill, San Luis WD, Broadview, Eagle Field, Mercy Springs, Pool Exchange Contractors, Schedule II water rights, more.
11	Stanislaus River water rights: Modesto ID, Oakdale ID, South San Joaquin ID.
12	Turlock ID.
13	Merced ID. CVP Users: Madera, Chowchilla, Gravely Ford.
14	CVP Users: Westlands WD.
15	Tulare Lake Bed. CVP Users: Fresno Slough, James, Tranquility, Traction Ranch, Laguna, Real. Dist. 1606.
16	Eastern Fresno Co. CVP Users: Friant-Kern Canal. Fresno ID, Garfield, International.
17	CVP Users: Friant-Kern Canal. Hills Valley, Tri-Valley Orange Cove.
18	CVP Users: Friant-Kern Canal, County of Fresno, Lower Tule River ID, Pixley ID, portion of Rag Gulch, Ducor, County of Tulare, most of Delano Earlimart, Exeter, Ivanhoe, Lewis Cr., Lindmore, Lindsay-Strathmore, Porterville, Sausalito, Stone Corral, Tea Pot Dome, Terra Bella, Tulare.
19	Kern Co. SWP Service Area.
20	CVP Users: Friant-Kern Canal. Shafter-Wasco, S. San Joaquin.
21	CVP Users: Cross Valley Canal, Friant-Kern Canal. Arvin Edison.

TABLE 2

CVP WATER RATES USED FOR LONG TERM CONTRACT RENEWAL ANALYSIS ($)

CVPM Subregion	Tiered Water Rates Used for LTCR analysis			Proposed Blended Water Rates for Water Service Contracts								
				Average	Wet	Dry	Average	Wet	Dry	Average	Wet	Dry
	Tier 1	Tier 2	Tier 3	Followed by Average			Followed by Wet			Followed by Dry		
1	12.01	37.56	63.12	19.67	14.98	14.14	23.91	19.67	18.20	25.19	21.09	19.67
2	10.71	36.40	62.09	18.42	10.71	49.66	29.55	18.42	52.83	10.71	10.71	18.42
3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3B	10.25	40.73	71.21	19.39	10.25	58.15	32.35	19.39	61.42	10.25	10.25	19.39
4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
5	20.65	23.01	25.36	21.35	21.18	21.77	21.52	21.35	21.92	20.90	20.81	21.35
6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7	11.77	12.07	12.37	11.86	11.86	11.86	11.86	11.86	11.86	11.86	11.86	11.86
8	10.00	27.46	44.92	15.24	10.00	30.36	25.64	15.24	35.47	10.00	10.00	15.24
9	24.79	55.14	85.50	33.89	24.79	64.53	55.27	33.89	73.22	24.79	24.79	33.89
10	31.15	40.16	49.16	33.85	31.15	42.94	38.01	33.85	44.63	31.15	31.15	33.85
11	0.00	0.00	0.00	NA	NA	NA	NA	NA	NA	NA	NA	NA
12	0.00	0.00	0.00	NA	NA	NA	NA	NA	NA	NA	NA	NA
13	32.16	38.41	44.65	34.04	33.25	37.44	34.77	34.04	37.94	32.16	32.16	34.04
14	32.62	46.48	60.33	36.78	32.62	50.76	43.17	36.78	53.36	32.62	32.62	36.78
15	32.71	41.91	51.10	35.47	34.55	38.10	36.34	35.47	38.82	33.07	32.71	35.47
16	40.48	46.78	53.08	42.37	41.22	45.32	43.40	42.37	46.07	40.48	40.48	42.37
17	34.18	40.49	46.79	36.07	35.15	39.28	36.92	36.07	39.88	34.18	34.18	36.07
18	33.63	40.48	47.33	35.69	34.73	39.16	36.57	35.69	39.78	33.63	33.63	35.69
19	34.58	42.16	49.73	36.86	35.00	41.21	38.84	36.86	42.52	34.58	34.58	36.86
20	34.58	42.16	49.73	36.86	35.70	40.85	37.92	36.86	41.58	34.58	34.58	36.86
21	32.70	39.00	45.31	34.59	32.98	39.01	36.33	34.59	40.03	32.70	32.70	34.59

NOTES:

1. Blended rates used pricing components from the November, 1999 Irrigation Water Rates spreadsheets, Restoration Charge of $7.00
2. PEIS rates used regional estimates of payment capacity and allowed the same ATP relief in all tiers.
3. Blended rates use most recent available payment capacity studies from Reclamation, and allow ATP relief in Tier 1 but not in Tier 3.
4. Only Class 1 rates are shown for Friant Division. Friant surcharge is $7.00 in all rates.

TABLE 3

CVP WATER RATES USED IN PREFERRED ALTERNATIVE ($)

CVPM Subregion	Tiered Water Rates Used in the PEIS Preferred Alternative ($)		
	Tier 1	Tier 2	Tier 3
1	5.91	14.63	23.35
2	11.83	24.7	37.57
3	2.83	5.27	7.71
3B	17.16	36.225	55.29
4	5.32	7.625	9.93
5	4.53	6.965	9.4
6	4.53	6.82	9.11
7	6.63	8.83	11.03
8	4.53	7.095	9.66
9	28.54	35.245	41.95
10	33.46	40.015	46.57
11	0	0	0
12	0	0	0
13	33.65	39.395	45.14
14	39.31	54.385	69.46
15	28.16	34.875	41.59
16	38.25	44.255	50.26
17	35.58	41.905	48.23
18	35.01	41.255	47.5
19	36.68	42.885	49.09
20	36.68	42.885	49.09
21	35.4	42.01	48.62

NOTES:

1. PEIS rates used pricing components from the 1994 Irrigation Water Rates Manual, Restoration Charge of $6.50
2. PEIS rates used regional estimates of payment capacity and allowed the same ATP relief in all tiers.
3. Only Class 1 rates are shown for Friant Division. Friant surcharge is $7.00 in all rates.

TABLE 4

PROJECT WATER APPLIED BY PRICING TIERS
AVERAGE YEAR FOLLOWING AVERAGE 5-YEAR BASE CONDITION

CVPM Subregion	Tier 1	Tier 2	Tier 3	Category 2	Blended Price ($/AF)
	(1000 AF)				
1	9.4	1.2	1.2	-	$ 19.67
2	21.9	2.7	2.7	-	$ 18.42
3	-	-	-	-	NA
3B	159.7	20.0	20.0	-	$ 19.39
4	-	-	-	-	NA
5	16.0	2.0	2.0	-	$ 21.35
6	-	-	-	-	NA
7	12.0	1.5	1.5	-	$ 11.86
8	41.3	5.2	5.2	-	$ 15.24
9	22.5	2.8	2.8	-	$ 33.89
10	231.4	28.9	28.9	-	$ 33.85
11	-	-	-	-	
12	-	-	-	-	
13	153.6	19.2	19.2	-	$ 34.04
14	539.1	67.4	67.4	-	$ 36.78
15	32.3	4.0	4.0	-	$ 35.47
16	18.9	2.4	2.4	-	$ 42.37
17	34.9	4.4	4.4	-	$ 36.07
18	484.2	60.5	60.5	-	$ 35.69
19	13.1	1.6	1.6	-	$ 36.86
20	194.2	24.3	24.3	-	$ 36.86
21	129.7	16.2	16.2	-	$ 34.59

Table 5

PROJECT WATER APPLIED BY PRICING TIERS
AVERAGE YEAR FOLLOWING WET 5-YEAR BASE CONDITION

CVPM Subregion	Tier 1	Tier 2	Tier 3	Category 2	Blended Price ($/AF)
	(1000 AF)				
1	10.4	1.3	0.0	-	$ 14.98
2	27.3	-	-	-	$ 10.71
3	-	-	-	-	NA
3B	199.6	-	-	-	$ 10.25
4	-	-	-	-	NA
5	16.6	2.1	1.2	-	$ 21.18
6	-	-	-	-	NA
7	12.0	1.5	1.5	-	$ 11.86
8	51.6	-	-	-	$ 10.00
9	28.2	-	-	-	$ 24.79
10	289.2	-	-	-	$ 31.15
11	-	-	-	-	NA
12	-	-	-	-	NA
13	165.0	20.6	6.3	-	$ 33.25
14	673.8	-	-	-	$ 32.62
15	34.2	4.3	1.9	-	$ 34.55
16	21.0	2.6	0.1	-	$ 41.22
17	37.9	4.7	1.0	-	$ 35.15
18	523.8	65.5	15.9	-	$ 34.73
19	15.5	0.9	-	-	$ 35.00
20	211.7	26.5	4.6	-	$ 35.70
21	154.9	7.2	-	-	$ 32.98

Table 6

PROJECT WATER APPLIED BY PRICING TIERS
AVERAGE YEAR FOLLOWING DRY 5-YEAR BASE CONDITION

CVPM Subregion	Tier 1	Tier 2	Tier 3	Category 2	Blended Price ($/AF)
	(1000 AF)				
1	10.8	1.0	-	-	$ 14.14
2	6.2	0.8	0.8	19.6	$ 49.66
3	-	-	-	-	NA
3B	40.2	5.0	5.0	149.3	$ 58.15
4	-	-	-	-	NA
5	14.3	1.8	1.8	2.1	$ 21.77
6	-	-	-	-	NA
7	12.0	1.5	1.5	-	$ 11.86
8	20.2	2.5	2.5	26.3	$ 30.36
9	9.2	1.1	1.1	16.7	$ 64.53
10	94.0	11.8	11.8	171.7	$ 42.94
11	-	-	-	-	NA
12	-	-	-	-	NA
13	104.4	13.0	13.0	61.6	$ 37.44
14	219.1	27.4	27.4	400.0	$ 50.76
15	26.8	3.4	3.4	6.8	$ 38.10
16	13.7	1.7	1.7	6.5	$ 45.32
17	24.5	3.1	3.1	13.1	$ 39.28
18	339.7	42.5	42.5	180.6	$ 39.16
19	8.7	1.1	1.1	5.6	$ 41.21
20	133.9	16.7	16.7	75.3	$ 40.85
21	76.2	9.5	9.5	66.8	$ 39.01

Table 7

PROJECT WATER APPLIED BY PRICING TIERS
WET YEAR FOLLOWING AVERAGE 5-YEAR BASE CONDITION

CVPM Subregion	Tier 1	Tier 2	Tier 3	Category 2	Blended Price ($/AF)
	(1000 AF)				
1	9.4	1.2	1.2	1.3	$ 23.91
2	21.9	2.7	2.7	9.4	$ 29.55
3	-	-	-	-	NA
3B	159.7	20.0	20.0	66.6	$ 32.35
4	-	-	-	-	NA
5	16.0	2.0	2.0	0.9	$ 21.52
6	-	-	-	-	NA
7	12.0	1.5	1.5	-	$ 11.86
8	41.3	5.2	5.2	27.8	$ 25.64
9	22.5	2.8	2.8	19.9	$ 55.27
10	231.4	28.9	28.9	107.8	$ 38.01
11	-	-	-	-	NA
12	-	-	-	-	NA
13	153.6	19.2	19.2	14.3	$ 34.77
14	539.1	67.4	67.4	251.2	$ 43.17
15	32.3	4.0	4.0	2.4	$ 36.34
16	18.9	2.4	2.4	2.5	$ 43.40
17	34.9	4.4	4.4	3.8	$ 36.92
18	484.2	60.5	60.5	49.6	$ 36.57
19	13.1	1.6	1.6	3.0	$ 38.84
20	194.2	24.3	24.3	21.9	$ 37.92
21	129.7	16.2	16.2	31.5	$ 36.33

Table 8

PROJECT WATER BY PRICING TIERS
WET YEAR FOLLOWING WET 5-YEAR BASE CONDITION

CVPM Subregion	Tier 1	Tier 2	Tier 3	Category 2	Blended Price ($/AF)
	(1000 AF)				
1	10.4	1.3	1.3	-	$ 19.67
2	29.4	3.7	3.7	-	$ 18.42
3	-	-	-	-	NA
3B	212.9	26.6	26.6	-	$ 19.39
4	-	-	-	-	NA
5	16.6	2.1	2.1	-	$ 21.35
6	-	-	-	-	NA
7	12.0	1.5	1.5	-	$ 11.86
8	63.5	7.9	7.9	-	$ 15.24
9	38.5	4.8	4.8	-	$ 33.89
10	317.6	39.7	39.7	-	$ 33.85
11	-	-	-	-	NA
12	-	-	-	-	NA
13	165.0	20.6	20.6	-	$ 34.04
14	740.0	92.5	92.5	-	$ 36.78
15	34.2	4.3	4.3	-	$ 35.47
16	21.0	2.6	2.6	-	$ 42.37
17	37.9	4.7	4.7	-	$ 36.07
18	523.8	65.5	65.5	-	$ 35.69
19	15.5	1.9	1.9	-	$ 36.86
20	211.7	26.5	26.5	-	$ 36.86
21	154.9	19.4	19.4	-	$ 34.59

Table 9

PROJECT WATER APPLIED BY PRICING TIERS
WET YEAR FOLLOWING DRY 5-YEAR BASE CONDITION

CVPM Subregion	Tier 1	Tier 2	Tier 3	Category 2	Blended Price ($/AF)
	(1000 AF)				
1	10.8	1.3	0.9	-	$ 18.20
2	6.2	0.8	0.8	28.9	$ 52.83
3	-	-	-	-	NA
3B	40.2	5.0	5.0	215.9	$ 61.42
4	-	-	-	-	NA
5	14.3	1.8	1.8	2.9	$ 21.92
6	-	-	-	-	NA
7	12.0	1.5	1.5	-	$ 11.86
8	20.2	2.5	2.5	54.1	$ 35.47
9	9.2	1.1	1.1	36.7	$ 73.22
10	94.0	11.8	11.8	279.5	$ 44.63
11	-	-	-	-	NA
12	-	-	-	-	NA
13	104.4	13.0	13.0	75.9	$ 37.94
14	219.1	27.4	27.4	651.1	$ 53.36
15	26.8	3.4	3.4	9.1	$ 38.82
16	13.7	1.7	1.7	9.1	$ 46.07
17	24.5	3.1	3.1	16.8	$ 39.88
18	339.7	42.5	42.5	230.2	$ 39.78
19	8.7	1.1	1.1	8.5	$ 42.52
20	133.9	16.7	16.7	97.2	$ 41.58
21	76.2	9.5	9.5	98.3	$ 40.03

Table 10

PROJECT WATER APPLIED BY PRICING TIERS
DRY YEAR FOLLOWING AVERAGE 5-YEAR BASE CONDITION

CVPM Subregion	Tier 1	Tier 2	Tier 3	Category 2	Blended Price ($/AF)
	(1000 AF)				
1	9.4	1.2	1.2	1.7	$ 25.19
2	7.8	-	-	-	$ 10.71
3	-	-	-	-	NA
3B	50.3	-	-	-	$ 10.25
4	-	-	-	-	NA
5	16.0	1.9	-	-	$ 20.90
6	-	-	-	-	NA
7	12.0	1.5	1.5	-	$ 11.86
8	25.3	-	-	-	$ 10.00
9	11.5	-	-	-	$ 24.79
10	117.5	-	-	-	$ 31.15
11	-	-	-	-	NA
12	-	-	-	-	NA
13	130.4	-	-	-	$ 32.16
14	273.9	-	-	-	$ 32.62
15	32.3	1.3	-	-	$ 33.07
16	17.1	-	-	-	$ 40.48
17	30.6	-	-	-	$ 34.18
18	424.6	-	-	-	$ 33.63
19	10.9	-	-	-	$ 34.58
20	167.4	-	-	-	$ 34.58
21	95.3	-	-	-	$ 32.70

Table 11

PROJECT WATER APPLIED BY PRICING TIERS
DRY YEAR FOLLOWING WET 5-YEAR BASE CONDITION

CVPM Subregion	Tier 1	Tier 2	Tier 3	Category 2	Blended Price ($/AF)
	(1000 AF)				
1	10.4	1.3	1.3	0.4	$ 21.09
2	7.8	-	-	-	$ 10.71
3	-	-	-	-	NA
3B	50.3	-	-	-	$ 10.25
4	-	-	-	-	NA
5	16.6	1.2	-	-	$ 20.81
6	-	-	-	-	NA
7	12.0	1.5	1.5	-	$ 11.86
8	25.3	-	-	-	$ 10.00
9	11.5	-	-	-	$ 24.79
10	117.5	-	-	-	$ 31.15
11	-	-	-	-	NA
12	-	-	-	-	NA
13	130.4	-	-	-	$ 32.16
14	273.9	-	-	-	$ 32.62
15	33.6	-	-	-	$ 32.71
16	17.1	-	-	-	$ 40.48
17	30.6	-	-	-	$ 34.18
18	424.6	-	-	-	$ 33.63
19	10.9	-	-	-	$ 34.58
20	167.4	-	-	-	$ 34.58
21	95.3	-	-	-	$ 32.70

Table 12

PROJECT WATER BY PRICING TIERS
DRY YEAR FOLLOWING DRY 5-YEAR BASE CONDITION

CVPM Subregion	Tier 1	Tier 2	Tier 3	Category 2	Blended Price ($/AF)
	(1000 AF)				
1	10.8	1.3	1.3	-	$ 19.67
2	6.2	0.8	0.8	-	$ 18.42
3	-	-	-	-	NA
3B	40.2	5.0	5.0	-	$ 19.39
4	-	-	-	-	NA
5	14.3	1.8	1.8	-	$ 21.35
6	-	-	-	-	NA
7	12.0	1.5	1.5	-	$ 11.86
8	20.2	2.5	2.5	-	$ 15.24
9	9.2	1.1	1.1	-	$ 33.89
10	94.0	11.8	11.8	-	$ 33.85
11	-	-	-	-	NA
12	-	-	-	-	NA
13	104.4	13.0	13.0	-	$ 34.04
14	219.1	27.4	27.4	-	$ 36.78
15	26.8	3.4	3.4	-	$ 35.47
16	13.7	1.7	1.7	-	$ 42.37
17	24.5	3.1	3.1	-	$ 36.07
18	339.7	42.5	42.5	-	$ 35.69
19	8.7	1.1	1.1	-	$ 36.86
20	133.9	16.7	16.7	-	$ 36.86
21	76.2	9.5	9.5	-	$ 34.59

TABLE 13

IRRIGATED ACRES BY SUBREGION (1000 ACRES)

CVPM Subregion	Average Preferred Alternative	Change Compared to Average followed by Average			Wet Preferred Alternative	Change Compared to Wet followed by Wet			Dry Preferred Alternative	Change Compared to Dry followed by Dry		
		Average	Wet	Dry		Average	Wet	Dry		Average	Wet	Dry
Sacramento River	2015.5	-1.7	-0.8	-65.3	2020.0	-4.4	-4.4	-53.0	1984.8	0.1	0.1	0.0
San Joaquin River	2526.6	-0.2	-0.2	-1.2	2529.1	-1.7	-1.6	-1.9	2505.9	-0.1	-0.1	-0.1
Tulare Lake	1992.4	0.0	0.0	-0.2	1996.2	-1.2	-1.2	-1.3	1953.7	0.1	0.1	0.1
San Felipe	50.7	0.0	0.0	0.0	69.5	0.0	0.0	0.0	22.2	0.0	0.0	0.0
California Total	6585.2	-1.9	-1.0	-66.7	6614.8	-7.3	-7.3	-56.2	6466.6	0.1	0.1	0.1

TABLE 14

VALUE OF PRODUCTION BY SUBREGION (Million $)

CVPM Subregion	Average Preferred Alternative	Change Compared to Average followed by Average: Average	Wet	Dry	Wet Preferred Alternative	Change Compared to Wet PA followed by Wet: Average	Wet	Dry	Dry Preferred Alternative	Change Compared to Dry PA followed by Dry: Average	Wet	Dry
Sacramento River	1,825.3	-0.4	-0.2	-37.6	1,828.0	-1.6	-1.6	-26.8	1,810.0	0.4	0.4	0.3
San Joaquin River	4,402.3	-0.1	-0.1	-1.0	4,403.8	-0.9	-0.9	-1.1	4,384.2	-0.2	-0.2	-0.2
Tulare Lake	3,876.3	0.0	0.0	-0.3	3,879.4	-1.0	-1.0	-1.1	3,842.7	0.1	0.1	0.1
San Felipe	68.0	0.0	0.0	0.0	70.0	0.0	0.0	0.0	44.0	0.0	0.0	0.0
California Total	10,172.0	-0.5	-0.4	-38.8	10,181.2	-3.6	-3.6	-28.9	10,080.8	0.3	0.3	0.3

TABLE 15

NET REVENUE CHANGES BY REGION (Million $)

Cause of Net Revenue Change	Compared to Average Year PA			Compared to Wet Year PA			Compared to Dry Year PA		
	Average	Wet	Dry	Average	Wet	Dry	Average	Wet	Dry
	followed by Average			followed by Wet			followed by Dry		
Sacramento River									
Fallowed Land	-0.1	0.0	-6.7	-0.3	-0.3	-4.6	0.0	0.0	0.0
Groundwater Pumping Cost	-0.3	-0.3	-0.4	1.0	1.0	-4.5	-0.2	-0.2	-0.2
Irrigation Cost	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4
CVP Water Cost	-0.3	1.7	3.6	-5.1	-1.0	4.6	-0.1	-0.1	-0.7
Higher Crop Prices	0.0	0.0	1.9	0.1	0.1	1.0	0.0	0.0	0.0
Net Change	**-1.0**	**1.0**	**-1.9**	**-4.6**	**-0.5**	**-3.8**	**-0.6**	**-0.6**	**-1.2**
San Joaquin River									
Fallowed Land	0.0	0.0	-0.1	-0.2	-0.2	-0.2	0.0	0.0	0.0
Groundwater Pumping Cost	0.0	0.0	-10.3	-7.4	0.2	-14.1	-1.0	-1.0	-1.0
Irrigation Cost	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2
CVP Water Cost	1.0	4.0	2.3	7.9	6.1	6.2	-5.9	-5.9	-7.5
Higher Crop Prices	0.1	0.0	2.5	0.2	0.2	1.0	0.0	0.0	0.0
Net Change	**0.9**	**3.9**	**-5.7**	**0.4**	**6.1**	**-7.3**	**-7.0**	**-7.0**	**-8.6**
Tulare Lake									
Fallowed Land	0.0	0.0	0.0	-0.1	-0.1	-0.1	0.0	0.0	0.0
Groundwater Pumping Cost	0.1	0.1	0.1	1.0	1.0	1.0	-3.2	-3.2	-3.2
Irrigation Cost	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CVP Water Cost	-2.3	-1.2	-5.7	-3.1	-2.1	-6.4	-0.9	-0.9	-2.3
Higher Crop Prices	0.0	0.0	1.4	0.1	0.1	0.4	0.0	0.0	0.0
Net Change	**-2.1**	**-1.1**	**-4.2**	**-2.1**	**-1.1**	**-5.1**	**-4.1**	**-4.1**	**-5.5**
San Felipe									
Fallowed Land	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Groundwater Pumping Cost	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Irrigation Cost	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CVP Water Cost	-0.2	0.0	-0.6	-0.5	-0.2	-0.9	0.0	0.0	-0.1
Higher Crop Prices	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Net Change	**-0.2**	**0.0**	**-0.6**	**-0.5**	**-0.2**	**-0.9**	**0.0**	**0.0**	**-0.1**
Total									
Fallowed Land	-0.1	-0.1	-6.9	-0.6	-0.6	-4.9	0.0	0.0	0.0
Groundwater Pumping Cost	-0.2	-0.2	-10.5	-5.3	2.2	-17.6	-4.4	-4.4	-4.4
Irrigation Cost	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5
CVP Water Cost	-1.6	4.5	0.2	-0.3	3.1	4.5	-6.9	-6.8	-10.5
Higher Crop Prices	0.1	0.1	5.8	0.4	0.4	2.3	0.0	0.0	0.0
Net Change	**-2.3**	**3.7**	**-11.9**	**-6.3**	**4.6**	**-16.1**	**-11.7**	**-11.7**	**-15.3**

Note: A negative value in a cost category represents an increase in cost that produces a decrease in net revenue

TABLE 16
IRRIGATION WATER APPLIED BY REGION (1000 AF)

Region	Average Preferred Alternative	Change Compared to Average			Wet Preferred Alternative	Change Compared to Wet PA			Dry Preferred Alternative	Change Compared to Dry PA		
		Average	Wet	Dry		Average	Wet	Dry		Average	Wet	Dry
		followed by Average				followed by Wet				followed by Dry		
Sacramento River												
CVP Water*	625.9	-27.6	-23.4	-243.5	694.3	-2.4	-2.6	-305.5	402.1	-20.3	-20.3	-20.4
Groundwater	2,621.3	10.5	10.7	11.2	2,456.9	-24.5	-24.3	114.7	3,261.6	4.1	4.2	4.0
San Joaquin River												
CVP Water*	960.2	-8.7	-9.0	-269.0	1,226.6	-226.3	-21.0	-378.7	506	-17.5	-17.5	-17.5
Groundwater	3,606.2	3.3	3.5	260.0	2,974.2	215.1	10.3	366.8	4723	12.0	12.0	12.0
Tulare Lake												
CVP Water*	919.5	1.9	2.0	2.0	967.3	3.7	3.8	3.6	685.3	0.1	0.1	0.0
Groundwater	3,369.0	-1.8	-2.0	-2.0	2,683.5	-7.7	-7.7	-7.5	4,542.9	0.0400	0.0400	0.0400
San Felipe												
CVP Water*	71.0	0.0	0.0	0.0	71.0	0.0	0.0	0.0	71.0	0.0	0.0	0.0
Groundwater	na	na	na	na	na	na	na	na	na	na	na	na
Total												
CVP Water*	2,505.5	-34.4	-30.4	-510.5	2,888.2	-224.9	-19.9	-680.6	1,593.9	-37.7	-37.8	-37.8
Groundwater	9,596.5	11.9	12.3	269.2	8,114.6	182.8	-21.6	474.0	12,527.1	16.1	16.2	16.1

*CVP water applied is project water only. It excludes exchange contract delivery and the base supply portion of settlement contracts.

TABLE 17 IRRIGATED ACREAGE BY SUBREGION

CVPM Subregion	Crop Category	Preferred Alternative Average	hanges Compared to Average P Average	Wet	Dry	Preferred Alternative Wet	Changes Compared to Wet PA Average	Wet	Dry	Preferred Alternative Dry	Changes Compared to Dry PA Average	Wet	Dry
			Followed by Average				Followed by Wet				Followed by Dry		
1	Pasture	18.3	-1.2	-0.3	-0.1	18.3	-1.5	-1.5	-1.5	18.1	-1.8	-1.8	-1.8
	Alfalfa	0.9	0.0	0.0	0.0	0.9	0.0	0.0	0.0	0.9	0.0	0.0	0.0
	Other Field Crops	1.2	0.0	0.0	0.0	1.2	0.0	0.0	0.0	1.2	0.0	0.0	0.0
	Deciduous Orchard	3.8	0.0	0.0	0.0	3.8	0.0	0.0	0.0	3.8	0.0	0.0	0.0
	Small Grain	2.4	0.0	0.0	0.0	2.4	0.0	0.0	0.0	2.4	0.0	0.0	0.0
	Subtotal	**26.6**	**-1.3**	**-0.3**	**-0.1**	**26.5**	**-1.6**	**-1.6**	**-1.6**	**26.3**	**-1.9**	**-1.9**	**-1.9**
2	Pasture	34.1	0.0	0.0	-3.6	33.9	0.0	0.0	-5.9	33.1	0.0	0.0	0.0
	Alfalfa	9.5	0.0	0.0	-0.3	9.5	0.0	0.0	-0.6	9.4	0.0	0.0	0.0
	Sugar Beets	4.0	0.0	0.0	0.0	4.0	0.0	0.0	-0.1	4.0	0.0	0.0	0.0
	Other Field Crops	17.3	0.0	0.0	-0.5	17.2	0.0	0.0	-0.7	17.1	0.0	0.0	0.0
	Rice	4.5	0.0	0.0	-0.2	4.5	0.0	0.0	-0.3	4.5	0.0	0.0	0.0
	Truck Crops	15.5	0.0	0.0	0.0	15.5	0.0	0.0	0.0	15.5	0.0	0.0	0.0
	Deciduous Orchard	86.0	0.0	0.0	-0.1	86.0	0.0	0.0	0.0	86.0	0.0	0.0	0.0
	Small Grain	14.0	0.0	0.0	-0.2	13.9	0.0	0.0	-0.6	13.7	0.0	0.0	0.0
	Subtropical Orchard	10.2	0.0	0.0	0.0	10.2	0.0	0.0	0.0	10.2	0.0	0.0	0.0
	Subtotal	**195.0**	**0.0**	**0.0**	**-4.9**	**194.7**	**0.0**	**0.0**	**-8.2**	**193.5**	**0.0**	**0.0**	**0.0**
3	Pasture	7.8	0.0	0.0	0.0	7.9	0.0	0.0	0.0	7.5	0.0	0.0	0.0
	Alfalfa	18.2	0.0	0.0	0.0	18.3	0.0	0.0	0.0	18.0	0.0	0.0	0.0
	Sugar Beets	9.9	0.0	0.0	0.0	9.9	0.0	0.0	0.0	9.8	0.0	0.0	0.0
	Other Field Crops	15.7	0.0	0.0	0.0	15.8	0.0	0.0	0.0	15.5	0.0	0.0	0.0
	Rice	138.9	0.0	0.0	0.0	139.5	0.0	0.0	0.0	136.7	0.0	0.0	0.0
	Truck Crops	25.2	0.0	0.0	0.0	25.2	0.0	0.0	0.0	25.2	0.0	0.0	0.0
	Tomatoes	25.9	0.0	0.0	0.0	25.9	0.0	0.0	0.0	25.8	0.0	0.0	0.0
	Deciduous Orchard	17.8	0.0	0.0	0.0	17.8	0.0	0.0	0.0	17.8	0.0	0.0	0.0
	Small Grain	30.5	0.0	0.0	0.0	30.6	0.0	0.0	0.0	29.8	0.0	0.0	0.0
	Subtotal	**289.8**	**0.0**	**0.0**	**0.0**	**290.7**	**0.0**	**0.0**	**0.0**	**286.2**	**0.0**	**0.0**	**0.0**
3B	Pasture	5.7	0.0	0.0	-5.7	5.8	0.1	0.1	-1.5	4.3	0.0	0.0	0.0
	Alfalfa	10.1	0.0	0.0	-10.1	10.2	0.1	0.1	-2.6	7.6	0.0	0.0	0.0
	Sugar Beets	5.6	0.0	0.0	-5.3	5.6	0.0	0.0	-2.8	5.1	0.0	0.0	0.0
	Other Field Crops	13.4	0.0	0.0	-13.4	13.5	0.0	0.0	-13.5	10.4	0.0	0.0	0.0
	Rice	9.6	0.0	0.0	-9.6	9.7	0.1	0.1	-9.7	6.2	0.0	0.0	0.0
	Truck Crops	0.6	0.0	0.0	-0.1	0.6	0.0	0.0	0.0	0.6	0.0	0.0	0.0
	Tomatoes	6.1	0.0	0.0	-3.8	6.1	0.0	0.0	-1.8	5.7	0.0	0.0	0.0
	Deciduous Orchard	26.9	0.0	0.0	-3.3	26.9	0.0	0.0	0.0	26.9	0.0	0.0	0.0
	Small Grain	8.5	0.0	0.0	-8.5	8.6	0.0	0.0	-8.6	6.2	0.0	0.0	0.0
	Subtropical Orchard	1.0	0.0	0.0	-0.1	1.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0
	Subtotal	**87.6**	**0.0**	**0.0**	**-59.9**	**87.9**	**0.3**	**0.3**	**-40.4**	**74.0**	**0.0**	**0.0**	**0.0**

TABLE 17 IRRIGATED ACREAGE BY SUBREGION

CVPM Subregion	Crop Category	Preferred Alternative Average	hanges Compared to Average P Average	Wet	Dry	Preferred Alternative Wet	Changes Compared to Wet PA Average	Wet	Dry	Preferred Alternative Dry	Changes Compared to Dry PA Average	Wet	Dry
			Followed by Average				Followed by Wet				Followed by Dry		
4	Pasture	1.2	0.0	0.0	0.0	1.2	0.0	0.0	0.0	1.1	0.0	0.0	0.0
	Alfalfa	6.8	0.0	0.0	0.0	6.8	0.0	0.0	0.0	6.8	0.0	0.0	0.0
	Sugar Beets	10.3	0.0	0.0	0.0	10.3	0.0	0.0	0.0	10.3	0.0	0.0	0.0
	Other Field Crops	40.1	0.0	0.0	0.0	40.1	0.0	0.0	0.0	39.8	0.0	0.0	0.0
	Rice	87.8	0.0	0.0	0.0	87.9	0.0	0.0	0.0	87.1	0.0	0.0	0.0
	Truck Crops	17.1	0.0	0.0	0.0	17.1	0.0	0.0	0.0	17.1	0.0	0.0	0.0
	Tomatoes	34.1	0.0	0.0	0.0	34.1	0.0	0.0	0.0	34.0	0.0	0.0	0.0
	Deciduous Orchard	30.6	0.0	0.0	0.0	30.6	0.0	0.0	0.0	30.6	0.0	0.0	0.0
	Small Grain	47.5	0.0	0.0	0.0	47.6	0.0	0.0	0.0	46.8	0.0	0.0	0.0
	Subtotal	**275.3**	**0.0**	**0.0**	**0.0**	**275.7**	**0.0**	**0.0**	**-0.1**	**273.6**	**0.0**	**0.0**	**0.0**
5	Pasture	21.4	0.0	0.0	0.0	21.5	0.0	0.0	0.0	21.0	0.0	0.0	0.0
	Alfalfa	4.7	0.0	0.0	0.0	4.7	0.0	0.0	0.0	4.7	0.0	0.0	0.0
	Sugar Beets	2.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0
	Other Field Crops	15.4	0.0	0.0	0.0	15.4	0.0	0.0	0.0	15.4	0.0	0.0	0.0
	Rice	166.0	0.0	0.0	0.0	166.6	-0.1	-0.1	-0.1	165.2	-0.1	-0.1	-0.1
	Truck Crops	6.6	0.0	0.0	0.0	6.6	0.0	0.0	0.0	6.6	0.0	0.0	0.0
	Tomatoes	1.6	0.0	0.0	0.0	1.6	0.0	0.0	0.0	1.6	0.0	0.0	0.0
	Deciduous Orchard	121.6	0.0	0.0	0.0	121.6	0.0	0.0	0.0	121.6	0.0	0.0	0.0
	Small Grain	22.3	0.0	0.0	0.0	22.4	0.0	0.0	0.0	21.9	0.0	0.0	0.0
	Subtropical Orchard	2.5	0.0	0.0	0.0	2.5	0.0	0.0	0.0	2.5	0.0	0.0	0.0
	Subtotal	**364.1**	**0.0**	**0.0**	**0.0**	**364.9**	**-0.2**	**-0.2**	**-0.1**	**362.4**	**-0.2**	**-0.2**	**-0.2**
6	Pasture	12.1	0.0	0.0	0.0	12.5	-0.4	-0.4	-0.4	11.8	0.0	0.0	0.0
	Alfalfa	28.7	0.0	0.0	0.1	29.0	-0.3	-0.3	-0.3	28.6	0.0	0.0	0.0
	Sugar Beets	21.2	0.0	0.0	0.0	21.2	-0.1	-0.1	-0.1	21.1	0.0	0.0	0.0
	Other Field Crops	59.4	0.0	0.0	0.0	59.9	-0.5	-0.5	-0.5	59.1	0.0	0.0	0.0
	Rice	12.9	0.0	0.0	0.0	13.1	-0.2	-0.2	-0.2	12.8	0.0	0.0	0.0
	Truck Crops	3.4	0.0	0.0	0.0	3.4	0.0	0.0	0.0	3.4	0.0	0.0	0.0
	Tomatoes	45.8	0.0	0.0	0.0	45.9	-0.1	-0.1	-0.1	45.7	0.0	0.0	0.0
	Deciduous Orchard	24.6	0.0	0.0	0.0	24.6	0.0	0.0	0.0	24.6	0.0	0.0	0.0
	Small Grain	64.3	0.0	0.0	0.0	64.6	-0.4	-0.4	-0.4	63.3	0.2	0.2	0.2
	Grapes	8.0	0.0	0.0	0.0	8.0	0.0	0.0	0.0	8.0	0.0	0.0	0.0
	Subtotal	**280.2**	**0.0**	**0.0**	**0.0**	**282.2**	**-1.9**	**-1.9**	**-1.8**	**278.4**	**0.2**	**0.2**	**0.2**
7	Pasture	14.5	0.0	0.0	0.0	14.5	0.0	0.0	0.0	14.2	0.0	0.0	0.0
	Alfalfa	3.1	0.0	0.0	0.0	3.1	0.0	0.0	0.0	3.1	0.0	0.0	0.0
	Sugar Beets	2.5	0.0	0.0	0.0	2.5	0.0	0.0	0.0	2.5	0.0	0.0	0.0
	Other Field Crops	3.8	0.0	0.0	0.0	3.8	0.0	0.0	0.0	3.8	0.0	0.0	0.0
	Rice	48.3	0.0	0.0	0.0	48.3	0.0	0.0	0.0	47.9	0.0	0.0	0.0
	Truck Crops	0.3	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.3	0.0	0.0	0.0
	Tomatoes	0.5	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.5	0.0	0.0	0.0
	Deciduous Orchard	8.9	0.0	0.0	0.0	8.9	0.0	0.0	0.0	8.9	0.0	0.0	0.0
	Small Grain	9.4	0.0	0.0	0.0	9.3	0.0	0.0	0.0	9.2	0.0	0.0	0.0
	Grapes	0.2	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.2	0.0	0.0	0.0
	Subtotal	**91.4**	**0.0**	**0.0**	**0.0**	**91.5**	**0.0**	**0.0**	**0.0**	**90.5**	**0.0**	**0.0**	**0.0**

TABLE 17 IRRIGATED ACREAGE BY SUBREGION

CVPM Subregion	Crop Category	Preferred Alternative Average	Changes Compared to Average PA: Average	Wet	Dry	Preferred Alternative Wet	Changes Compared to Wet PA: Average	Wet	Dry	Preferred Alternative Dry	Changes Compared to Dry PA: Average	Wet	Dry
			Followed by Average				Followed by Wet				Followed by Dry		
8	Pasture	47.7	0.0	0.0	0.0	47.6	0.0	0.0	0.0	46.9	0.0	0.0	0.0
	Alfalfa	12.3	0.0	0.0	0.0	12.3	0.0	0.0	0.0	12.2	0.0	0.0	0.0
	Sugar Beets	12.8	0.0	0.0	0.0	12.8	0.0	0.0	0.0	12.8	0.0	0.0	0.0
	Other Field Crops	42.7	0.0	0.0	0.0	42.7	0.0	0.0	0.0	42.5	0.0	0.0	0.0
	Rice	4.5	0.0	0.0	0.0	4.5	0.0	0.0	0.0	4.5	0.0	0.0	0.0
	Truck Crops	17.1	0.0	0.0	0.0	17.1	0.0	0.0	0.0	17.1	0.0	0.0	0.0
	Tomatoes	12.9	0.0	0.0	0.0	12.9	0.0	0.0	0.0	12.9	0.0	0.0	0.0
	Deciduous Orchard	46.9	0.0	0.0	0.0	46.9	0.0	0.0	0.0	46.9	0.0	0.0	0.0
	Small Grain	29.0	0.0	0.0	0.0	29.1	0.0	0.0	0.0	28.2	0.0	0.0	0.0
	Grapes	58.9	0.0	0.0	0.0	58.9	0.0	0.0	0.0	58.9	0.0	0.0	0.0
	Subtotal	**284.8**	**0.0**	**0.0**	**0.0**	**284.9**	**0.0**	**0.0**	**0.0**	**282.8**	**0.0**	**0.0**	**0.0**
9	Pasture	24.6	-0.2	-0.2	-0.1	24.6	-0.4	-0.4	-0.4	23.4	0.7	0.7	0.7
	Alfalfa	43.8	-0.1	-0.1	0.0	43.8	-0.2	-0.2	-0.2	43.1	0.4	0.4	0.4
	Sugar Beets	28.6	0.0	0.0	0.0	28.6	-0.1	-0.1	0.0	28.5	0.1	0.1	0.1
	Other Field Crops	114.9	-0.2	-0.2	-0.2	115.0	-0.4	-0.4	-0.4	113.6	0.7	0.7	0.7
	Rice	0.9	0.0	0.0	0.0	0.9	0.0	0.0	0.0	0.9	0.0	0.0	0.0
	Truck Crops	46.0	0.0	0.0	0.0	46.0	0.0	0.0	0.0	46.0	0.0	0.0	0.0
	Tomatoes	42.5	0.0	0.0	0.0	42.5	0.0	0.0	0.0	42.3	0.1	0.1	0.1
	Deciduous Orchard	21.3	0.0	0.0	0.0	21.3	0.0	0.0	0.0	21.3	0.0	0.0	0.0
	Small Grain	96.8	-0.1	-0.1	-0.1	97.5	-0.3	-0.3	-0.3	93.7	1.0	1.0	1.0
	Grapes	5.8	0.0	0.0	0.0	5.8	0.0	0.0	0.0	5.8	0.0	0.0	0.0
	Subtotal	**425.0**	**-0.6**	**-0.6**	**-0.4**	**425.9**	**-1.5**	**-1.5**	**-1.4**	**418.4**	**3.0**	**3.0**	**3.0**
10	Pasture	13.3	0.0	0.0	-0.2	13.3	0.0	0.0	0.0	13.3	0.0	0.0	0.0
	Alfalfa	40.8	0.0	0.0	-0.3	40.9	-0.1	0.0	-0.1	40.8	0.0	0.0	0.0
	Sugar Beets	13.9	0.0	0.0	0.0	13.9	0.0	0.0	0.0	13.9	0.0	0.0	0.0
	Other Field Crops	48.2	0.0	0.0	-0.1	48.2	0.1	0.0	0.0	48.3	0.0	0.0	0.0
	Rice	2.9	0.0	0.0	0.0	2.9	0.0	0.0	0.0	2.9	0.0	0.0	0.0
	Truck Crops	112.9	0.0	0.0	0.0	112.9	0.0	0.0	0.0	113.0	0.0	0.0	0.0
	Tomatoes	40.2	0.0	0.0	0.0	40.2	0.0	0.0	0.0	40.2	0.0	0.0	0.0
	Deciduous Orchard	36.6	0.0	0.0	0.0	36.6	0.0	0.0	0.0	36.6	0.0	0.0	0.0
	Small Grain	14.0	0.0	0.0	0.0	14.0	0.1	0.0	0.1	14.0	0.0	0.0	0.0
	Grapes	1.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0
	Cotton	103.1	0.0	0.0	-0.5	103.1	-0.1	0.0	-0.1	103.1	0.0	0.0	0.0
	Subtropical Orchard	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0
	Subtotal	**427.1**	**0.0**	**0.0**	**-1.1**	**427.2**	**-0.1**	**0.0**	**-0.1**	**427.1**	**0.0**	**0.0**	**0.0**
11	Pasture	42.9	0.0	0.0	0.0	43.0	0.0	0.0	0.0	42.7	0.0	0.0	0.0
	Alfalfa	8.4	0.0	0.0	0.0	8.4	0.0	0.0	0.0	8.3	0.0	0.0	0.0
	Sugar Beets	0.4	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.4	0.0	0.0	0.0
	Other Field Crops	17.8	0.0	0.0	0.0	17.9	0.0	0.0	0.0	17.8	0.0	0.0	0.0
	Rice	4.4	0.0	0.0	0.0	4.4	0.0	0.0	0.0	4.4	0.0	0.0	0.0
	Truck Crops	6.3	0.0	0.0	0.0	6.3	0.0	0.0	0.0	6.3	0.0	0.0	0.0
	Tomatoes	0.8	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.8	0.0	0.0	0.0
	Deciduous Orchard	80.8	0.0	0.0	0.0	80.8	0.0	0.0	0.0	80.8	0.0	0.0	0.0
	Small Grain	1.8	0.0	0.0	0.0	1.8	0.0	0.0	0.0	1.8	0.0	0.0	0.0
	Grapes	10.4	0.0	0.0	0.0	10.4	0.0	0.0	0.0	10.4	0.0	0.0	0.0
	Subtotal	**174.0**	**0.0**	**0.0**	**0.0**	**174.2**	**0.0**	**0.0**	**0.0**	**173.7**	**0.0**	**0.0**	**0.0**

TABLE 17 IRRIGATED ACREAGE BY SUBREGION

CVPM Subregion	Crop Category	Preferred Alternative Average	Changes Compared to Average PA: Average	Wet	Dry	Preferred Alternative Wet	Changes Compared to Wet PA: Average	Wet	Dry	Preferred Alternative Dry	Changes Compared to Dry PA: Average	Wet	Dry
			Followed by Average				Followed by Wet				Followed by Dry		
12	Pasture	18.3	0.0	0.0	0.0	18.0	0.0	0.0	0.0	18.0	0.0	0.0	0.0
	Alfalfa	18.2	0.0	0.0	0.0	18.1	0.0	0.0	0.0	18.1	0.0	0.0	0.0
	Sugar Beets	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0
	Other Field Crops	41.2	0.0	0.0	0.0	41.0	0.0	0.0	0.0	41.0	0.0	0.0	0.0
	Truck Crops	3.0	0.0	0.0	0.0	3.0	0.0	0.0	0.0	3.0	0.0	0.0	0.0
	Deciduous Orchard	94.0	0.0	0.0	0.0	94.0	0.0	0.0	0.0	94.0	0.0	0.0	0.0
	Small Grain	10.0	0.0	0.0	0.0	10.0	0.0	0.0	0.0	9.9	0.0	0.0	0.0
	Grapes	14.0	0.0	0.0	0.0	14.0	0.0	0.0	0.0	14.0	0.0	0.0	0.0
	Cotton	1.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0
	Subtropical Orchard	1.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0
	Subtotal	**200.8**	**0.0**	**0.0**	**0.0**	**200.2**	**0.0**	**0.0**	**0.0**	**200.1**	**0.0**	**0.0**	**0.0**
13	Pasture	39.6	0.0	0.0	0.0	39.9	-0.2	-0.2	-0.3	39.5	-0.3	-0.3	-0.3
	Alfalfa	41.8	0.0	0.0	0.1	42.1	-0.2	-0.2	-0.2	41.8	-0.2	-0.2	-0.2
	Sugar Beets	5.0	0.0	0.0	0.0	5.0	0.0	0.0	0.0	5.0	0.0	0.0	0.0
	Other Field Crops	54.8	0.0	0.0	0.0	55.0	-0.1	-0.1	-0.2	54.6	-0.1	-0.1	-0.1
	Rice	3.9	0.0	0.0	0.0	3.9	0.0	0.0	0.0	3.9	0.0	0.0	0.0
	Truck Crops	18.0	0.0	0.0	0.0	18.0	0.0	0.0	0.0	18.0	0.0	0.0	0.0
	Tomatoes	7.0	0.0	0.0	0.0	7.0	0.0	0.0	0.0	7.0	0.0	0.0	0.0
	Deciduous Orchard	135.0	0.0	0.0	0.0	135.0	0.0	0.0	0.0	135.0	0.0	0.0	0.0
	Small Grain	46.9	0.0	0.0	0.0	47.2	-0.1	-0.1	-0.1	46.4	-0.1	-0.1	-0.1
	Grapes	99.0	0.0	0.0	0.0	99.0	0.0	0.0	0.0	99.0	0.0	0.0	0.0
	Cotton	71.8	0.0	0.0	0.0	72.1	-0.2	-0.2	-0.3	71.6	-0.2	-0.2	-0.2
	Subtropical Orchard	9.9	0.0	0.0	0.0	9.9	0.0	0.0	0.0	9.9	0.0	0.0	0.0
	Subtotal	**532.5**	**0.0**	**0.0**	**0.0**	**534.1**	**-0.9**	**-0.9**	**-1.1**	**531.6**	**-0.9**	**-0.9**	**-0.9**
14	Pasture	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0
	Alfalfa	14.0	0.0	0.0	0.0	14.0	0.0	0.0	0.0	13.4	0.0	0.0	0.0
	Sugar Beets	4.8	0.0	0.0	0.0	4.8	0.0	0.0	0.0	4.8	0.0	0.0	0.0
	Other Field Crops	18.4	0.0	0.0	0.0	18.3	0.0	0.0	0.0	17.9	0.0	0.0	0.0
	Truck Crops	136.4	0.0	0.0	0.0	136.4	0.0	0.0	0.0	136.2	0.0	0.0	0.0
	Tomatoes	77.0	0.0	0.0	0.1	77.0	0.0	0.0	0.0	76.2	0.0	0.0	0.0
	Deciduous Orchard	24.9	0.0	0.0	0.0	24.9	0.0	0.0	0.0	24.9	0.0	0.0	0.0
	Small Grain	10.4	0.0	0.0	0.0	10.4	0.0	0.0	0.0	9.7	0.0	0.0	0.0
	Grapes	7.0	0.0	0.0	0.0	7.0	0.0	0.0	0.0	7.0	0.0	0.0	0.0
	Cotton	206.5	0.0	0.0	-0.1	206.6	0.0	0.0	0.0	198.8	0.0	0.0	0.0
	Subtropical Orchard	1.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0
	Subtotal	**500.4**	**0.0**	**0.0**	**0.0**	**500.5**	**0.0**	**0.0**	**0.0**	**489.9**	**0.0**	**0.0**	**0.0**
15	Pasture	3.9	0.0	0.0	0.0	3.9	0.0	0.0	0.0	3.7	0.0	0.0	0.0
	Alfalfa	83.1	0.0	0.0	0.2	83.4	0.0	0.0	0.1	80.6	0.0	0.0	0.0
	Sugar Beets	5.0	0.0	0.0	0.0	5.0	0.0	0.0	0.0	5.0	0.0	0.0	0.0
	Other Field Crops	86.0	0.0	0.0	0.0	86.1	0.0	0.0	0.0	84.2	0.0	0.0	0.0
	Rice	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0
	Truck Crops	12.0	0.0	0.0	0.0	12.0	0.0	0.0	0.0	12.0	0.0	0.0	0.0
	Tomatoes	2.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0
	Deciduous Orchard	38.0	0.0	0.0	0.0	38.0	0.0	0.0	0.0	38.0	0.0	0.0	0.0
	Small Grain	71.0	0.0	0.0	0.0	71.6	0.0	0.0	0.0	67.9	0.0	0.0	0.0
	Grapes	56.0	0.0	0.0	0.0	56.0	0.0	0.0	0.0	56.0	0.0	0.0	0.0
	Cotton	242.1	0.0	0.0	-0.2	242.7	0.0	0.0	-0.1	235.5	0.0	0.0	0.0
	Subtropical Orchard	1.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0
	Subtotal	**600.1**	**0.0**	**0.0**	**-0.1**	**601.7**	**0.0**	**0.0**	**0.0**	**585.9**	**0.0**	**0.0**	**0.0**

TABLE 17 IRRIGATED ACREAGE BY SUBREGION

CVPM Subregion	Crop Category	Preferred Alternative Average	Changes Compared to Average PA: Average	Wet	Dry	Preferred Alternative Wet	Changes Compared to Wet PA: Average	Wet	Dry	Preferred Alternative Dry	Changes Compared to Dry PA: Average	Wet	Dry
			Followed by Average				Followed by Wet				Followed by Dry		
16	Pasture	6.2	0.0	0.0	0.0	6.3	-0.2	-0.2	-0.1	6.1	0.0	0.0	0.0
	Alfalfa	5.1	0.0	0.0	0.0	5.2	-0.1	-0.1	-0.1	5.1	0.0	0.0	0.0
	Other Field Crops	6.1	0.0	0.0	0.0	6.1	-0.1	-0.1	-0.1	6.0	0.0	0.0	0.0
	Truck Crops	5.0	0.0	0.0	0.0	5.0	0.0	0.0	0.0	5.0	0.0	0.0	0.0
	Deciduous Orchard	16.0	0.0	0.0	0.0	16.0	0.0	0.0	0.0	16.0	0.0	0.0	0.0
	Small Grain	4.0	0.0	0.0	0.0	4.1	0.0	0.0	0.0	4.0	0.0	0.0	0.0
	Grapes	55.0	0.0	0.0	0.0	55.0	0.0	0.0	0.0	55.0	0.0	0.0	0.0
	Cotton	5.0	0.0	0.0	0.0	5.1	0.0	0.0	0.0	5.0	0.0	0.0	0.0
	Subtropical Orchard	9.0	0.0	0.0	0.0	9.0	0.0	0.0	0.0	9.0	0.0	0.0	0.0
	Subtotal	**111.4**	**-0.1**	**-0.1**	**0.0**	**111.8**	**-0.4**	**-0.4**	**-0.4**	**111.3**	**-0.1**	**-0.1**	**-0.1**
17	Pasture	3.0	0.0	0.0	0.0	3.0	0.0	0.0	0.0	2.3	0.0	0.0	0.0
	Alfalfa	5.0	0.0	0.0	0.0	5.0	0.0	0.0	0.0	4.0	0.0	0.0	0.0
	Sugar Beets	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0
	Other Field Crops	8.0	0.0	0.0	0.0	8.0	0.0	0.0	0.0	7.1	0.0	0.0	0.0
	Truck Crops	10.0	0.0	0.0	0.0	10.0	0.0	0.0	0.0	10.0	0.0	0.0	0.0
	Tomatoes	1.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0
	Deciduous Orchard	73.0	0.0	0.0	0.0	73.0	0.0	0.0	0.0	73.0	0.0	0.0	0.0
	Small Grain	6.0	0.0	0.0	0.0	6.0	0.0	0.0	0.0	5.3	0.0	0.0	0.0
	Grapes	109.0	0.0	0.0	0.0	109.0	0.0	0.0	0.0	109.0	0.0	0.0	0.0
	Cotton	10.0	0.0	0.0	0.0	10.0	0.0	0.0	0.0	8.7	0.0	0.0	0.0
	Subtropical Orchard	35.0	0.0	0.0	0.0	35.0	0.0	0.0	0.0	35.0	0.0	0.0	0.0
	Subtotal	**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	Pasture	4.0	0.0	0.0	0.0	4.1	0.0	0.0	0.0	3.7	0.0	0.0	0.0
	Alfalfa	62.2	0.0	0.0	0.1	62.8	-0.3	-0.3	-0.2	59.0	0.0	0.0	0.0
	Sugar Beets	1.9	0.0	0.0	0.0	1.9	0.0	0.0	0.0	1.9	0.0	0.0	0.0
	Other Field Crops	78.1	0.0	0.0	-0.1	78.5	-0.2	-0.2	-0.2	75.3	0.0	0.0	0.0
	Truck Crops	13.0	0.0	0.0	0.0	13.0	0.0	0.0	0.0	13.0	0.0	0.0	0.0
	Tomatoes	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Deciduous Orchard	69.0	0.0	0.0	0.0	69.0	0.0	0.0	0.0	69.0	0.0	0.0	0.0
	Small Grain	41.0	0.0	0.0	0.0	41.4	-0.1	-0.1	-0.1	38.8	0.1	0.1	0.1
	Grapes	56.0	0.0	0.0	0.0	56.0	0.0	0.0	0.0	56.0	0.0	0.0	0.0
	Cotton	170.3	0.0	0.0	-0.1	171.2	-0.5	-0.5	-0.5	163.7	0.0	0.0	0.1
	Subtropical Orchard	97.0	0.0	0.0	0.0	97.0	0.0	0.0	0.0	97.0	0.0	0.0	0.0
	Subtotal	**592.5**	**0.0**	**0.0**	**-0.1**	**594.9**	**-1.2**	**-1.2**	**-1.2**	**577.2**	**0.1**	**0.1**	**0.1**
19	Pasture	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Alfalfa	25.8	0.0	0.0	0.0	25.9	0.0	0.0	0.0	25.2	0.0	0.0	0.0
	Sugar Beets	4.9	0.0	0.0	0.0	5.0	0.0	0.0	0.0	4.9	0.0	0.0	0.0
	Other Field Crops	6.7	0.0	0.0	0.0	6.7	0.0	0.0	0.0	6.7	0.0	0.0	0.0
	Truck Crops	24.0	0.0	0.0	0.0	24.0	0.0	0.0	0.0	24.0	0.0	0.0	0.0
	Tomatoes	1.7	0.0	0.0	0.0	1.7	0.0	0.0	0.0	1.7	0.0	0.0	0.0
	Deciduous Orchard	50.9	0.0	0.0	0.0	50.9	0.0	0.0	0.0	50.9	0.0	0.0	0.0
	Small Grain	7.6	0.0	0.0	0.0	7.6	0.0	0.0	0.0	7.2	0.0	0.0	0.0
	Grapes	10.0	0.0	0.0	0.0	10.0	0.0	0.0	0.0	10.0	0.0	0.0	0.0
	Cotton	117.9	0.0	0.0	-0.1	117.8	0.0	0.0	0.0	115.1	0.0	0.0	0.0
	Subtropical Orchard	4.0	0.0	0.0	0.0	4.0	0.0	0.0	0.0	4.0	0.0	0.0	0.0
	Subtotal	**253.6**	**0.0**	**0.0**	**0.0**	**253.6**	**0.0**	**0.0**	**0.0**	**249.7**	**0.0**	**0.0**	**0.0**

TABLE 17 IRRIGATED ACREAGE BY SUBREGION

CVPM Subregion	Crop Category	Preferred Alternative Average	hanges Compared to Average P Average	Wet	Dry	Preferred Alternative Wet	Changes Compared to Wet PA Average	Wet	Dry	Preferred Alternative Dry	Changes Compared to Dry PA Average	Wet	Dry
			Followed by Average				Followed by Wet				Followed by Dry		
20	Pasture	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Alfalfa	12.0	0.0	0.0	0.0	12.1	0.0	0.0	0.0	11.0	0.0	0.0	0.0
	Sugar Beets	0.5	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.5	0.0	0.0	0.0
	Other Field Crops	3.0	0.0	0.0	0.0	3.0	0.0	0.0	0.0	2.9	0.0	0.0	0.0
	Truck Crops	41.0	0.0	0.0	0.0	41.0	0.0	0.0	0.0	40.9	0.0	0.0	0.0
	Tomatoes	0.3	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.3	0.0	0.0	0.0
	Deciduous Orchard	52.0	0.0	0.0	0.0	52.0	0.0	0.0	0.0	52.0	0.0	0.0	0.0
	Small Grain	1.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.9	0.0	0.0	0.0
	Grapes	33.0	0.0	0.0	0.0	33.0	0.0	0.0	0.0	33.0	0.0	0.0	0.0
	Cotton	33.0	0.0	0.0	0.0	33.1	0.0	0.0	0.0	30.8	0.0	0.0	0.0
	Subtropical Orchard	27.0	0.0	0.0	0.0	27.0	0.0	0.0	0.0	27.0	0.0	0.0	0.0
	Subtotal	**202.8**	**0.0**	**0.0**	**0.0**	**203.0**	**0.0**	**0.0**	**0.0**	**199.3**	**0.0**	**0.0**	**0.0**
21	Pasture	0.8	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.8	0.0	0.0	0.0
	Alfalfa	27.6	0.0	0.0	0.0	27.7	0.0	0.0	0.0	27.3	0.0	0.0	0.0
	Sugar Beets	7.4	0.0	0.0	0.0	7.4	0.0	0.0	0.0	7.4	0.0	0.0	0.0
	Other Field Crops	16.1	0.0	0.0	0.0	16.0	0.0	0.0	0.0	16.0	0.0	0.0	0.0
	Rice	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Truck Crops	107.8	0.0	0.0	0.0	107.8	0.0	0.0	0.0	107.8	0.0	0.0	0.0
	Tomatoes	1.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0
	Deciduous Orchard	25.0	0.0	0.0	0.0	25.0	0.0	0.0	0.0	25.0	0.0	0.0	0.0
	Small Grain	1.8	0.0	0.0	0.0	1.9	0.0	0.0	0.0	1.8	0.0	0.0	0.0
	Grapes	36.9	0.0	0.0	0.0	36.9	0.0	0.0	0.0	36.9	0.0	0.0	0.0
	Cotton	120.8	0.0	0.0	-0.1	120.8	0.0	0.0	0.0	119.3	0.0	0.0	0.0
	Subtropical Orchard	14.0	0.0	0.0	0.0	14.0	0.0	0.0	0.0	14.0	0.0	0.0	0.0
	Subtotal	**359.2**	**0.0**	**0.0**	**0.0**	**359.2**	**0.0**	**0.0**	**0.0**	**357.2**	**0.0**	**0.0**	**0.0**

NOTES:
1. All acreage values in thousands.
2. A negative value represents a lower acreage in an alternative than in the Preferred Alternative.
3. Not all 12 crops are grown in all subregions.
4. Subregions 3 and 3B should be added together to get the complete subregion 3. 3B represents the area within this subregion served by the Tehama Colusa Canal.

TABLE 18 VALUE OF PRODUCTION BY SUBREGION (Million $)

CVPM Subregion	Crop Category	Preferred Alternative Average	Changes Compared to Average PA: Average	Wet	Dry	Preferred Alternative Wet	Changes Compared to Wet PA: Average	Wet	Dry	Preferred Alternative Dry	Changes Compared to Dry PA: Average	Wet	Dry
			Followed by Average				Followed by Wet				Followed by Dry		
1	Pasture	2.7	-0.2	0.0	0.0	2.6	-0.2	-0.2	-0.2	2.6	-0.3	-0.3	-0.3
	Alfalfa	0.5	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.5	0.0	0.0	0.0
	Other Field Crops	0.5	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.5	0.0	0.0	0.0
	Deciduous Orchard	4.0	0.0	0.0	0.0	4.0	0.0	0.0	0.0	4.0	0.0	0.0	0.0
	Small Grain	0.7	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.7	0.0	0.0	0.0
	Subtotal	**8.4**	**-0.2**	**-0.1**	**0.0**	**8.3**	**-0.3**	**-0.3**	**-0.3**	**8.3**	**-0.3**	**-0.3**	**-0.3**
2	Pasture	4.9	0.0	0.0	-0.5	4.9	0.0	0.0	-0.8	4.8	0.0	0.0	0.0
	Alfalfa	5.1	0.0	0.0	-0.2	5.1	0.0	0.0	-0.3	5.0	0.0	0.0	0.0
	Sugar Beets	2.9	0.0	0.0	0.0	2.9	0.0	0.0	0.0	2.9	0.0	0.0	0.0
	Other Field Crops	7.8	0.0	0.0	-0.2	7.8	0.0	0.0	-0.3	7.7	0.0	0.0	0.0
	Rice	3.8	0.0	0.0	-0.1	3.8	0.0	0.0	-0.3	3.8	0.0	0.0	0.0
	Truck Crops	55.1	0.0	0.0	-0.1	55.1	0.0	0.0	-0.1	55.1	0.0	0.0	0.0
	Deciduous Orchard	91.3	0.0	0.0	-0.1	91.3	0.0	0.0	0.0	91.3	0.0	0.0	0.0
	Small Grain	4.0	0.0	0.0	-0.1	3.9	0.0	0.0	-0.2	3.9	0.0	0.0	0.0
	Subtropical Orchard	14.6	0.0	0.0	0.0	14.6	0.0	0.0	0.0	14.6	0.0	0.0	0.0
	Subtotal	**189.5**	**0.0**	**0.0**	**-1.3**	**189.4**	**0.0**	**0.0**	**-2.1**	**189.1**	**0.0**	**0.0**	**0.0**
3	Pasture	1.1	0.0	0.0	0.0	1.1	0.0	0.0	0.0	1.1	0.0	0.0	0.0
	Alfalfa	9.7	0.0	0.0	0.0	9.7	0.0	0.0	0.0	9.6	0.0	0.0	0.0
	Sugar Beets	7.3	0.0	0.0	0.0	7.3	0.0	0.0	0.0	7.2	0.0	0.0	0.0
	Other Field Crops	7.1	0.0	0.0	0.0	7.1	0.0	0.0	0.0	7.0	0.0	0.0	0.0
	Rice	118.1	0.0	0.0	0.0	118.6	0.0	0.0	0.0	116.2	0.0	0.0	0.0
	Truck Crops	89.6	0.0	0.0	0.0	89.6	0.0	0.0	0.0	89.6	0.0	0.0	0.0
	Tomatoes	37.9	0.0	0.0	0.0	38.0	0.0	0.0	0.0	37.9	0.0	0.0	0.0
	Deciduous Orchard	18.9	0.0	0.0	0.0	18.9	0.0	0.0	0.0	18.9	0.0	0.0	0.0
	Small Grain	8.7	0.0	0.0	0.0	8.7	0.0	0.0	0.0	8.5	0.0	0.0	0.0
	Subtotal	**298.4**	**0.0**	**0.0**	**0.0**	**299.0**	**0.0**	**0.0**	**0.0**	**295.9**	**0.0**	**0.0**	**0.0**
3B	Pasture	0.8	0.0	0.0	-0.8	0.8	0.0	0.0	-0.2	0.6	0.0	0.0	0.0
	Alfalfa	5.4	0.0	0.0	-5.4	5.4	0.0	0.0	-1.4	4.1	0.0	0.0	0.0
	Sugar Beets	4.1	0.0	0.0	-3.9	4.1	0.0	0.0	-2.0	3.8	0.0	0.0	0.0
	Other Field Crops	6.1	0.0	0.0	-6.0	6.1	0.0	0.0	-6.1	4.7	0.0	0.0	0.0
	Rice	8.2	0.0	0.0	-8.2	8.2	0.0	0.0	-8.2	5.2	0.0	0.0	0.0
	Truck Crops	2.0	0.0	0.0	-0.2	2.0	0.0	0.0	-0.1	2.0	0.0	0.0	0.0
	Tomatoes	8.9	0.0	0.0	-5.6	8.9	0.0	0.0	-2.7	8.4	0.0	0.0	0.0
	Deciduous Orchard	28.6	0.0	0.0	-3.5	28.6	0.0	0.0	0.0	28.6	0.0	0.0	0.0
	Small Grain	2.4	0.0	0.0	-2.4	2.4	0.0	0.0	-2.4	1.8	0.0	0.0	0.0
	Subtropical Orchard	1.4	0.0	0.0	-0.1	1.4	0.0	0.0	0.0	1.4	0.0	0.0	0.0
	Subtotal	**67.9**	**0.0**	**0.0**	**-36.2**	**68.1**	**0.1**	**0.1**	**-23.1**	**60.5**	**0.0**	**0.0**	**0.0**

TABLE 18 VALUE OF PRODUCTION BY SUBREGION (Million $)

CVPM Subregion	Crop Category	Preferred Alternative Average	Changes Compared to Average PA: Average	Wet	Dry	Preferred Alternative Wet	Changes Compared to Wet PA: Average	Wet	Dry	Preferred Alternative Dry	Changes Compared to Dry PA: Average	Wet	Dry
			Followed by Average				Followed by Wet				Followed by Dry		
4	Pasture	0.2	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.2	0.0	0.0	0.0
	Alfalfa	3.6	0.0	0.0	0.0	3.7	0.0	0.0	0.0	3.6	0.0	0.0	0.0
	Sugar Beets	7.5	0.0	0.0	0.0	7.5	0.0	0.0	0.0	7.5	0.0	0.0	0.0
	Other Field Crops	18.0	0.0	0.0	0.0	18.1	0.0	0.0	0.0	17.9	0.0	0.0	0.0
	Rice	74.6	0.0	0.0	0.0	74.8	0.0	0.0	0.0	74.1	0.0	0.0	0.0
	Truck Crops	60.8	0.0	0.0	0.0	60.8	0.0	0.0	0.0	60.8	0.0	0.0	0.0
	Tomatoes	49.9	0.0	0.0	0.0	49.9	0.0	0.0	0.0	49.9	0.0	0.0	0.0
	Deciduous Orchard	32.5	0.0	0.0	0.0	32.5	0.0	0.0	0.0	32.5	0.0	0.0	0.0
	Small Grain	13.5	0.0	0.0	0.0	13.5	0.0	0.0	0.0	13.3	0.0	0.0	0.0
	Subtotal	**260.7**	**0.0**	**0.0**	**0.0**	**260.9**	**0.0**	**0.0**	**0.0**	**259.7**	**0.0**	**0.0**	**0.0**
5	Pasture	3.1	0.0	0.0	0.0	3.1	0.0	0.0	0.0	3.0	0.0	0.0	0.0
	Alfalfa	2.5	0.0	0.0	0.0	2.5	0.0	0.0	0.0	2.5	0.0	0.0	0.0
	Sugar Beets	1.5	0.0	0.0	0.0	1.5	0.0	0.0	0.0	1.5	0.0	0.0	0.0
	Other Field Crops	6.9	0.0	0.0	0.0	6.9	0.0	0.0	0.0	6.9	0.0	0.0	0.0
	Rice	141.2	0.0	0.0	0.0	141.7	-0.1	-0.1	-0.1	140.5	-0.1	-0.1	-0.1
	Truck Crops	23.5	0.0	0.0	0.0	23.5	0.0	0.0	0.0	23.5	0.0	0.0	0.0
	Tomatoes	2.3	0.0	0.0	0.0	2.3	0.0	0.0	0.0	2.3	0.0	0.0	0.0
	Deciduous Orchard	129.1	0.0	0.0	0.0	129.1	0.0	0.0	0.0	129.1	0.0	0.0	0.0
	Small Grain	6.3	0.0	0.0	0.0	6.3	0.0	0.0	0.0	6.2	0.0	0.0	0.0
	Subtropical Orchard	3.6	0.0	0.0	0.0	3.6	0.0	0.0	0.0	3.6	0.0	0.0	0.0
	Subtotal	**320.0**	**0.0**	**0.0**	**0.0**	**320.5**	**-0.1**	**-0.1**	**-0.1**	**319.1**	**-0.1**	**-0.1**	**-0.1**
6	Pasture	1.7	0.0	0.0	0.0	1.8	-0.1	-0.1	-0.1	1.7	0.0	0.0	0.0
	Alfalfa	16.8	0.0	0.0	0.0	17.0	-0.2	-0.2	-0.2	16.8	0.0	0.0	0.0
	Sugar Beets	16.2	0.0	0.0	0.0	16.3	-0.1	-0.1	0.0	16.2	0.0	0.0	0.0
	Other Field Crops	28.9	0.0	0.0	0.0	29.2	-0.2	-0.2	-0.2	28.8	0.0	0.0	0.0
	Rice	10.6	0.0	0.0	0.0	10.8	-0.2	-0.2	-0.2	10.5	0.0	0.0	0.0
	Truck Crops	14.1	0.0	0.0	0.0	14.1	0.0	0.0	0.0	14.1	0.0	0.0	0.0
	Tomatoes	70.0	0.0	0.0	0.0	70.2	-0.1	-0.1	-0.1	70.0	0.0	0.0	0.0
	Deciduous Orchard	26.2	0.0	0.0	0.0	26.2	0.0	0.0	0.0	26.2	0.0	0.0	0.0
	Small Grain	21.9	0.0	0.0	0.0	22.0	-0.1	-0.1	-0.1	21.5	0.1	0.1	0.1
	Grapes	13.8	0.0	0.0	0.0	13.8	0.0	0.0	0.0	13.8	0.0	0.0	0.0
	Subtotal	**220.3**	**0.0**	**0.0**	**0.0**	**221.2**	**-0.9**	**-0.9**	**-0.9**	**219.6**	**0.0**	**0.0**	**0.0**
7	Pasture	2.1	0.0	0.0	0.0	2.1	0.0	0.0	0.0	2.1	0.0	0.0	0.0
	Alfalfa	1.8	0.0	0.0	0.0	1.8	0.0	0.0	0.0	1.8	0.0	0.0	0.0
	Sugar Beets	1.9	0.0	0.0	0.0	1.9	0.0	0.0	0.0	1.9	0.0	0.0	0.0
	Other Field Crops	1.8	0.0	0.0	0.0	1.8	0.0	0.0	0.0	1.8	0.0	0.0	0.0
	Rice	39.6	0.0	0.0	0.0	39.7	0.0	0.0	0.0	39.3	0.0	0.0	0.0
	Truck Crops	1.2	0.0	0.0	0.0	1.2	0.0	0.0	0.0	1.2	0.0	0.0	0.0
	Tomatoes	0.8	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.8	0.0	0.0	0.0
	Deciduous Orchard	9.5	0.0	0.0	0.0	9.5	0.0	0.0	0.0	9.5	0.0	0.0	0.0
	Small Grain	3.2	0.0	0.0	0.0	3.2	0.0	0.0	0.0	3.1	0.0	0.0	0.0
	Grapes	0.3	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.3	0.0	0.0	0.0
	Subtotal	**62.3**	**0.0**	**0.0**	**0.0**	**62.4**	**0.0**	**0.0**	**0.0**	**61.9**	**0.0**	**0.0**	**0.0**

TABLE 18 VALUE OF PRODUCTION BY SUBREGION (Million $)

CVPM Subregion	Crop Category	Preferred Alternative Average	Changes Compared to Average PA: Average	Wet	Dry	Preferred Alternative Wet	Changes Compared to Wet PA: Average	Wet	Dry	Preferred Alternative Dry	Changes Compared to Dry PA: Average	Wet	Dry
			Followed by Average				Followed by Wet				Followed by Dry		
8	Pasture	6.9	0.0	0.0	0.0	6.9	0.0	0.0	0.0	6.8	0.0	0.0	0.0
	Alfalfa	7.2	0.0	0.0	0.0	7.2	0.0	0.0	0.0	7.2	0.0	0.0	0.0
	Sugar Beets	9.8	0.0	0.0	0.0	9.8	0.0	0.0	0.0	9.8	0.0	0.0	0.0
	Other Field Crops	20.8	0.0	0.0	0.0	20.8	0.0	0.0	0.0	20.7	0.0	0.0	0.0
	Rice	3.7	0.0	0.0	0.0	3.7	0.0	0.0	0.0	3.7	0.0	0.0	0.0
	Truck Crops	70.9	0.0	0.0	0.0	70.9	0.0	0.0	0.0	70.9	0.0	0.0	0.0
	Tomatoes	19.8	0.0	0.0	0.0	19.8	0.0	0.0	0.0	19.7	0.0	0.0	0.0
	Deciduous Orchard	49.9	0.0	0.0	0.0	49.9	0.0	0.0	0.0	49.9	0.0	0.0	0.0
	Small Grain	9.2	0.0	0.0	0.0	9.2	0.0	0.0	0.0	8.9	0.0	0.0	0.0
	Grapes	101.7	0.0	0.0	0.0	101.7	0.0	0.0	0.0	101.7	0.0	0.0	0.0
	Subtotal	**299.9**	**0.0**	**0.0**	**0.0**	**300.0**	**0.0**	**0.0**	**0.0**	**299.3**	**0.0**	**0.0**	**0.0**
9	Pasture	3.6	0.0	0.0	0.0	3.6	-0.1	-0.1	-0.1	3.4	0.1	0.1	0.1
	Alfalfa	25.6	-0.1	-0.1	0.0	25.7	-0.1	-0.1	-0.1	25.2	0.2	0.2	0.2
	Sugar Beets	22.0	0.0	0.0	0.0	22.0	0.0	0.0	0.0	21.9	0.1	0.1	0.1
	Other Field Crops	55.9	-0.1	-0.1	-0.1	56.0	-0.2	-0.2	-0.2	55.3	0.3	0.3	0.3
	Rice	0.7	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.7	0.0	0.0	0.0
	Truck Crops	190.8	0.0	0.0	0.0	190.8	0.0	0.0	0.0	190.6	0.1	0.1	0.1
	Tomatoes	64.9	0.0	0.0	0.0	65.0	-0.1	-0.1	0.0	64.8	0.1	0.1	0.1
	Deciduous Orchard	22.7	0.0	0.0	0.0	22.7	0.0	0.0	0.0	22.7	0.0	0.0	0.0
	Small Grain	30.7	0.0	0.0	0.0	30.9	-0.1	-0.1	-0.1	29.7	0.3	0.3	0.3
	Grapes	10.0	0.0	0.0	0.0	10.0	0.0	0.0	0.0	10.0	0.0	0.0	0.0
	Subtotal	**426.8**	**-0.3**	**-0.3**	**-0.1**	**427.2**	**-0.6**	**-0.6**	**-0.6**	**424.2**	**1.2**	**1.2**	**1.2**
10	Pasture	3.1	0.0	0.0	0.0	3.1	0.0	0.0	0.0	3.1	0.0	0.0	0.0
	Alfalfa	23.6	0.0	0.0	-0.2	23.6	-0.1	0.0	-0.1	23.6	0.0	0.0	0.0
	Sugar Beets	12.2	0.0	0.0	0.0	12.2	0.0	0.0	0.0	12.2	0.0	0.0	0.0
	Other Field Crops	31.0	0.0	0.0	-0.1	31.0	0.0	0.0	0.0	31.0	0.0	0.0	0.0
	Rice	2.3	0.0	0.0	0.0	2.3	0.0	0.0	0.0	2.3	0.0	0.0	0.0
	Truck Crops	718.0	0.0	0.0	0.0	717.9	0.1	0.0	0.1	718.1	0.0	0.0	0.0
	Tomatoes	60.1	0.0	0.0	0.0	60.1	0.0	0.0	0.0	60.1	0.0	0.0	0.0
	Deciduous Orchard	52.4	0.0	0.0	0.0	52.4	0.0	0.0	0.0	52.4	0.0	0.0	0.0
	Small Grain	7.6	0.0	0.0	0.0	7.5	0.1	0.0	0.1	7.6	0.0	0.0	0.0
	Grapes	1.9	0.0	0.0	0.0	1.9	0.0	0.0	0.0	1.9	0.0	0.0	0.0
	Cotton	102.6	0.0	0.0	-0.5	102.7	-0.1	0.0	-0.1	102.6	0.0	0.0	0.0
	Subtropical Orchard	0.4	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.4	0.0	0.0	0.0
	Subtotal	**1015.1**	**0.0**	**0.0**	**-0.8**	**1015.1**	**0.0**	**0.0**	**0.0**	**1015.2**	**0.0**	**0.0**	**0.0**
11	Pasture	10.0	0.0	0.0	0.0	10.0	0.0	0.0	0.0	9.9	0.0	0.0	0.0
	Alfalfa	4.8	0.0	0.0	0.0	4.8	0.0	0.0	0.0	4.8	0.0	0.0	0.0
	Sugar Beets	0.3	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.3	0.0	0.0	0.0
	Other Field Crops	11.5	0.0	0.0	0.0	11.5	0.0	0.0	0.0	11.4	0.0	0.0	0.0
	Rice	3.5	0.0	0.0	0.0	3.6	0.0	0.0	0.0	3.5	0.0	0.0	0.0
	Truck Crops	40.1	0.0	0.0	0.0	40.1	0.0	0.0	0.0	40.0	0.0	0.0	0.0
	Tomatoes	1.2	0.0	0.0	0.0	1.2	0.0	0.0	0.0	1.2	0.0	0.0	0.0
	Deciduous Orchard	115.8	0.0	0.0	0.0	115.8	0.0	0.0	0.0	115.8	0.0	0.0	0.0
	Small Grain	1.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0
	Grapes	19.4	0.0	0.0	0.0	19.4	0.0	0.0	0.0	19.4	0.0	0.0	0.0
	Subtotal	**207.6**	**0.0**	**0.0**	**0.0**	**207.6**	**0.0**	**0.0**	**0.0**	**207.5**	**0.0**	**0.0**	**0.0**

TABLE 18 VALUE OF PRODUCTION BY SUBREGION (Million $)

CVPM Subregion	Crop Category	Preferred Alternative Average	Changes Compared to Average PA: Average	Wet	Dry	Preferred Alternative Wet	Changes Compared to Wet PA: Average	Wet	Dry	Preferred Alternative Dry	Changes Compared to Dry PA: Average	Wet	Dry
			Followed by Average				Followed by Wet				Followed by Dry		
12	Pasture	4.2	0.0	0.0	0.0	4.2	0.0	0.0	0.0	4.2	0.0	0.0	0.0
	Alfalfa	10.5	0.0	0.0	0.0	10.4	0.0	0.0	0.0	10.5	0.0	0.0	0.0
	Sugar Beets	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0
	Other Field Crops	26.5	0.0	0.0	0.0	26.4	0.0	0.0	0.0	26.3	0.0	0.0	0.0
	Truck Crops	19.1	0.0	0.0	0.0	19.1	0.0	0.0	0.0	19.1	0.0	0.0	0.0
	Deciduous Orchard	134.7	0.0	0.0	0.0	134.7	0.0	0.0	0.0	134.7	0.0	0.0	0.0
	Small Grain	5.4	0.0	0.0	0.0	5.4	0.0	0.0	0.0	5.3	0.0	0.0	0.0
	Grapes	26.2	0.0	0.0	0.0	26.2	0.0	0.0	0.0	26.2	0.0	0.0	0.0
	Cotton	1.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0
	Subtropical Orchard	3.5	0.0	0.0	0.0	3.5	0.0	0.0	0.0	3.5	0.0	0.0	0.0
	Subtotal	**231.2**	**0.0**	**0.0**	**0.0**	**230.9**	**0.0**	**0.0**	**0.0**	**230.8**	**0.0**	**0.0**	**0.0**
13	Pasture	9.2	0.0	0.0	0.0	9.3	-0.1	-0.1	-0.1	9.2	-0.1	-0.1	-0.1
	Alfalfa	24.2	0.0	0.0	0.0	24.3	-0.1	-0.1	-0.1	24.2	-0.1	-0.1	-0.1
	Sugar Beets	4.4	0.0	0.0	0.0	4.4	0.0	0.0	0.0	4.4	0.0	0.0	0.0
	Other Field Crops	35.2	0.0	0.0	0.0	35.4	-0.1	-0.1	-0.1	35.1	-0.1	-0.1	-0.1
	Rice	3.1	0.0	0.0	0.0	3.1	0.0	0.0	0.0	3.1	0.0	0.0	0.0
	Truck Crops	114.4	0.0	0.0	0.0	114.4	0.0	0.0	0.0	114.4	0.0	0.0	0.0
	Tomatoes	10.5	0.0	0.0	0.0	10.5	0.0	0.0	0.0	10.5	0.0	0.0	0.0
	Deciduous Orchard	193.4	0.0	0.0	0.0	193.4	0.0	0.0	0.0	193.4	0.0	0.0	0.0
	Small Grain	25.3	0.0	0.0	0.0	25.4	0.0	0.0	-0.1	25.0	0.0	0.0	0.0
	Grapes	184.9	0.0	0.0	0.0	184.9	0.0	0.0	0.0	184.9	0.0	0.0	0.0
	Cotton	71.4	0.0	0.0	-0.1	71.8	-0.2	-0.2	-0.3	71.2	-0.2	-0.2	-0.2
	Subtropical Orchard	34.7	0.0	0.0	0.0	34.7	0.0	0.0	0.0	34.7	0.0	0.0	0.0
	Subtotal	**710.6**	**0.0**	**0.0**	**0.0**	**711.5**	**-0.5**	**-0.5**	**-0.7**	**709.9**	**-0.6**	**-0.6**	**-0.6**
14	Pasture	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Alfalfa	8.6	0.0	0.0	0.0	8.6	0.0	0.0	0.0	8.2	0.0	0.0	0.0
	Sugar Beets	3.9	0.0	0.0	0.0	4.0	0.0	0.0	0.0	3.9	0.0	0.0	0.0
	Other Field Crops	11.0	0.0	0.0	0.0	10.9	0.0	0.0	0.0	10.7	0.0	0.0	0.0
	Truck Crops	817.9	0.0	0.0	0.0	817.8	0.0	0.0	0.0	816.9	0.0	0.0	0.0
	Tomatoes	114.6	0.0	0.0	0.1	114.6	0.0	0.0	0.0	113.3	0.0	0.0	0.0
	Deciduous Orchard	38.5	0.0	0.0	0.0	38.5	0.0	0.0	0.0	38.5	0.0	0.0	0.0
	Small Grain	5.2	0.0	0.0	0.0	5.2	0.0	0.0	0.0	4.9	0.0	0.0	0.0
	Grapes	15.1	0.0	0.0	0.0	15.1	0.0	0.0	0.0	15.1	0.0	0.0	0.0
	Cotton	234.6	0.0	0.0	-0.1	234.7	0.0	0.0	0.0	225.8	0.0	0.0	0.0
	Subtropical Orchard	3.7	0.0	0.0	0.0	3.7	0.0	0.0	0.0	3.7	0.0	0.0	0.0
	Subtotal	**1253.1**	**0.0**	**0.0**	**0.0**	**1253.1**	**0.0**	**0.0**	**0.0**	**1241.1**	**0.0**	**0.0**	**0.0**
15	Pasture	0.9	0.0	0.0	0.0	0.9	0.0	0.0	0.0	0.9	0.0	0.0	0.0
	Alfalfa	51.3	0.0	0.0	0.1	51.4	0.0	0.0	0.0	49.7	0.0	0.0	0.0
	Sugar Beets	4.1	0.0	0.0	0.0	4.1	0.0	0.0	0.0	4.0	0.0	0.0	0.0
	Other Field Crops	51.2	0.0	0.0	0.0	51.3	0.0	0.0	0.0	50.2	0.0	0.0	0.0
	Rice	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0
	Truck Crops	72.0	0.0	0.0	0.0	72.0	0.0	0.0	0.0	71.9	0.0	0.0	0.0
	Tomatoes	3.0	0.0	0.0	0.0	3.0	0.0	0.0	0.0	3.0	0.0	0.0	0.0
	Deciduous Orchard	58.7	0.0	0.0	0.0	58.7	0.0	0.0	0.0	58.7	0.0	0.0	0.0
	Small Grain	41.6	0.0	0.0	0.0	41.9	0.0	0.0	0.0	39.7	0.0	0.0	0.0
	Grapes	121.7	0.0	0.0	0.0	121.7	0.0	0.0	0.0	121.7	0.0	0.0	0.0
	Cotton	275.0	0.0	0.0	-0.2	275.7	0.0	0.0	-0.1	267.5	0.0	0.0	0.0
	Subtropical Orchard	3.7	0.0	0.0	0.0	3.7	0.0	0.0	0.0	3.7	0.0	0.0	0.0
	Subtotal	**683.2**	**0.0**	**0.0**	**-0.1**	**684.5**	**0.0**	**0.0**	**0.0**	**671.1**	**0.0**	**0.0**	**0.0**

TABLE 18 VALUE OF PRODUCTION BY SUBREGION (Million $)

CVPM Subregion	Crop Category	Preferred Alternative Average	Changes Compared to Average PA: Average	Wet	Dry	Preferred Alternative Wet	Changes Compared to Wet PA: Average	Wet	Dry	Preferred Alternative Dry	Changes Compared to Dry PA: Average	Wet	Dry
			Followed by Average				Followed by Wet				Followed by Dry		
16	Pasture	1.4	0.0	0.0	0.0	1.5	0.0	0.0	0.0	1.4	0.0	0.0	0.0
	Alfalfa	3.1	0.0	0.0	0.0	3.2	0.0	0.0	0.0	3.1	0.0	0.0	0.0
	Other Field Crops	3.6	0.0	0.0	0.0	3.6	0.0	0.0	0.0	3.6	0.0	0.0	0.0
	Truck Crops	30.0	0.0	0.0	0.0	30.0	0.0	0.0	0.0	30.0	0.0	0.0	0.0
	Deciduous Orchard	24.7	0.0	0.0	0.0	24.7	0.0	0.0	0.0	24.7	0.0	0.0	0.0
	Small Grain	2.4	0.0	0.0	0.0	2.4	0.0	0.0	0.0	2.3	0.0	0.0	0.0
	Grapes	119.6	0.0	0.0	0.0	119.6	0.0	0.0	0.0	119.6	0.0	0.0	0.0
	Cotton	5.7	0.0	0.0	0.0	5.8	-0.1	-0.1	-0.1	5.7	0.0	0.0	0.0
	Subtropical Orchard	33.7	0.0	0.0	0.0	33.7	0.0	0.0	0.0	33.7	0.0	0.0	0.0
	Subtotal	**224.3**	**0.0**	**0.0**	**0.0**	**224.5**	**-0.2**	**-0.2**	**-0.2**	**224.2**	**0.0**	**0.0**	**0.0**
17	Pasture	0.7	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.5	0.0	0.0	0.0
	Alfalfa	3.1	0.0	0.0	0.0	3.1	0.0	0.0	0.0	2.5	0.0	0.0	0.0
	Sugar Beets	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0
	Other Field Crops	4.8	0.0	0.0	0.0	4.8	0.0	0.0	0.0	4.2	0.0	0.0	0.0
	Truck Crops	60.0	0.0	0.0	0.0	60.0	0.0	0.0	0.0	59.7	0.0	0.0	0.0
	Tomatoes	1.5	0.0	0.0	0.0	1.5	0.0	0.0	0.0	1.4	0.0	0.0	0.0
	Deciduous Orchard	112.8	0.0	0.0	0.0	112.8	0.0	0.0	0.0	112.8	0.0	0.0	0.0
	Small Grain	3.5	0.0	0.0	0.0	3.5	0.0	0.0	0.0	3.1	0.0	0.0	0.0
	Grapes	236.9	0.0	0.0	0.0	236.9	0.0	0.0	0.0	236.9	0.0	0.0	0.0
	Cotton	11.4	0.0	0.0	0.0	11.4	0.0	0.0	0.0	9.9	0.0	0.0	0.0
	Subtropical Orchard	131.0	0.0	0.0	0.0	131.0	0.0	0.0	0.0	131.0	0.0	0.0	0.0
	Subtotal	**565.7**	**0.0**	**0.0**	**0.0**	**565.7**	**0.0**	**0.0**	**0.0**	**562.0**	**0.0**	**0.0**	**0.0**
18	Pasture	0.9	0.0	0.0	0.0	0.9	0.0	0.0	0.0	0.8	0.0	0.0	0.0
	Alfalfa	38.4	0.0	0.0	0.1	38.7	-0.2	-0.2	-0.2	36.4	0.0	0.0	0.0
	Sugar Beets	1.6	0.0	0.0	0.0	1.6	0.0	0.0	0.0	1.5	0.0	0.0	0.0
	Other Field Crops	46.5	0.0	0.0	0.0	46.7	-0.1	-0.1	-0.1	44.8	0.0	0.0	0.0
	Truck Crops	78.0	0.0	0.0	0.0	78.0	0.0	0.0	0.0	77.9	0.0	0.0	0.0
	Tomatoes	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Deciduous Orchard	106.6	0.0	0.0	0.0	106.6	0.0	0.0	0.0	106.6	0.0	0.0	0.0
	Small Grain	24.0	0.0	0.0	0.0	24.3	-0.1	-0.1	-0.1	22.7	0.1	0.1	0.1
	Grapes	121.7	0.0	0.0	0.0	121.7	0.0	0.0	0.0	121.7	0.0	0.0	0.0
	Cotton	193.5	0.0	0.0	-0.1	194.6	-0.6	-0.6	-0.6	186.0	0.0	0.0	0.0
	Subtropical Orchard	363.1	0.0	0.0	0.0	363.1	0.0	0.0	0.0	363.1	0.0	0.0	0.0
	Subtotal	**974.2**	**0.0**	**0.0**	**-0.1**	**976.1**	**-1.0**	**-1.0**	**-1.0**	**961.5**	**0.1**	**0.1**	**0.1**
19	Pasture	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Alfalfa	15.7	0.0	0.0	0.0	15.7	0.0	0.0	0.0	15.3	0.0	0.0	0.0
	Sugar Beets	4.3	0.0	0.0	0.0	4.3	0.0	0.0	0.0	4.2	0.0	0.0	0.0
	Other Field Crops	4.5	0.0	0.0	0.0	4.5	0.0	0.0	0.0	4.5	0.0	0.0	0.0
	Truck Crops	147.1	0.0	0.0	0.0	147.0	0.0	0.0	0.0	147.0	0.0	0.0	0.0
	Tomatoes	2.7	0.0	0.0	0.0	2.7	0.0	0.0	0.0	2.7	0.0	0.0	0.0
	Deciduous Orchard	80.2	0.0	0.0	0.0	80.2	0.0	0.0	0.0	80.2	0.0	0.0	0.0
	Small Grain	3.6	0.0	0.0	0.0	3.6	0.0	0.0	0.0	3.5	0.0	0.0	0.0
	Grapes	33.0	0.0	0.0	0.0	33.0	0.0	0.0	0.0	33.0	0.0	0.0	0.0
	Cotton	125.2	0.0	0.0	-0.1	125.1	0.0	0.0	0.0	122.2	0.0	0.0	0.0
	Subtropical Orchard	17.1	0.0	0.0	0.0	17.1	0.0	0.0	0.0	17.1	0.0	0.0	0.0
	Subtotal	**433.3**	**0.0**	**0.0**	**0.0**	**433.3**	**0.0**	**0.0**	**0.0**	**429.7**	**0.0**	**0.0**	**0.0**

TABLE 18 VALUE OF PRODUCTION BY SUBREGION (Million $)

CVPM Subregion	Crop Category	Preferred Alternative Average	Changes Compared to Average PA: Average	Wet	Dry	Preferred Alternative Wet	Changes Compared to Wet PA: Average	Wet	Dry	Preferred Alternative Dry	Changes Compared to Dry PA: Average	Wet	Dry
			Followed by Average				Followed by Wet				Followed by Dry		
20	Pasture	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Alfalfa	7.3	0.0	0.0	0.0	7.3	0.0	0.0	0.0	6.7	0.0	0.0	0.0
	Sugar Beets	0.4	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.4	0.0	0.0	0.0
	Other Field Crops	2.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0	1.9	0.0	0.0	0.0
	Truck Crops	251.6	0.0	0.0	0.0	251.6	0.0	0.0	0.0	251.2	0.0	0.0	0.0
	Tomatoes	0.5	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.5	0.0	0.0	0.0
	Deciduous Orchard	81.8	0.0	0.0	0.0	81.8	0.0	0.0	0.0	81.8	0.0	0.0	0.0
	Small Grain	0.5	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.4	0.0	0.0	0.0
	Grapes	109.1	0.0	0.0	0.0	109.1	0.0	0.0	0.0	109.1	0.0	0.0	0.0
	Cotton	35.0	0.0	0.0	0.0	35.2	0.0	0.0	0.0	32.7	0.0	0.0	0.0
	Subtropical Orchard	115.6	0.0	0.0	0.0	115.6	0.0	0.0	0.0	115.6	0.0	0.0	0.0
	Subtotal	**603.9**	**0.0**	**0.0**	**0.0**	**604.1**	**0.0**	**0.0**	**0.0**	**600.4**	**0.0**	**0.0**	**0.0**
21	Pasture	0.2	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.2	0.0	0.0	0.0
	Alfalfa	16.8	0.0	0.0	0.0	16.8	0.0	0.0	0.0	16.6	0.0	0.0	0.0
	Sugar Beets	6.4	0.0	0.0	0.0	6.4	0.0	0.0	0.0	6.3	0.0	0.0	0.0
	Other Field Crops	10.8	0.0	0.0	0.0	10.8	0.0	0.0	0.0	10.8	0.0	0.0	0.0
	Rice	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Truck Crops	661.4	0.0	0.0	0.0	661.3	0.0	0.0	0.1	661.3	0.0	0.0	0.0
	Tomatoes	1.6	0.0	0.0	0.0	1.6	0.0	0.0	0.0	1.6	0.0	0.0	0.0
	Deciduous Orchard	39.3	0.0	0.0	0.0	39.3	0.0	0.0	0.0	39.3	0.0	0.0	0.0
	Small Grain	0.9	0.0	0.0	0.0	0.9	0.0	0.0	0.0	0.9	0.0	0.0	0.0
	Grapes	122.1	0.0	0.0	0.0	122.1	0.0	0.0	0.0	122.1	0.0	0.0	0.0
	Cotton	128.3	0.0	0.0	-0.1	128.3	0.0	0.0	0.0	126.7	0.0	0.0	0.0
	Subtropical Orchard	59.9	0.0	0.0	0.0	59.9	0.0	0.0	0.0	59.9	0.0	0.0	0.0
	Subtotal	**1047.6**	**0.0**	**0.0**	**0.0**	**1047.6**	**0.0**	**0.0**	**0.0**	**1045.7**	**0.0**	**0.0**	**0.0**

NOTES:
1. All values in millions of 1992 dollars.
2. A negative value represents a lower gross revenue in an alternative than in the Preferred Alternative.
3. Not all 12 crops are grown in all subregions.
4. Subregions 3 and 3B should be added together to get the complete subregion 3. 3B represents the area within this subregion served by the Tehama Colusa Canal.

TABLE 19 CHANGES IN NET REVENUE BY SUBREGION (Million $)

CVPM Subregion	Cause of Net Revenue Change		Change Compared to Average PA				Change Compared to Wet PA				Change Compared to Dry PA		
			Average	Wet	Dry		Average	Wet	Dry		Average	Wet	Dry
			Followed By Average				Followed By Wet				Followed By Dry		
1	Fallowed Land	1.8	-0.1	0.0	0.0	1.8	-0.1	-0.1	-0.1	1.7	-0.1	-0.1	-0.1
	Groundwater Pumping Cost	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.1	0.1	0.1
	Irrigation Cost	2.3	-0.2	-0.2	-0.2	-2.3	-0.2	-0.2	-0.2	-2.3	-0.2	-0.2	-0.2
	CVP Water Cost	0.6	0.3	0.2	0.1	-0.7	0.4	0.4	0.4	-0.7	0.4	0.4	0.4
	Higher Crop Prices	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Net Change		**0.1**	**0.0**	**0.0**	**-1.2**	**0.2**	**0.2**	**0.2**	**-1.2**	**0.2**	**0.2**	**0.2**
2	Fallowed Land	30.1	0.0	0.0	-0.3	30.1	0.0	0.0	-0.4	30.0	0.0	0.0	0.0
	Groundwater Pumping Cost	20.4	0.0	0.0	0.0	-19.9	0.0	0.0	0.0	-24.6	0.0	0.0	0.0
	Irrigation Cost	22.1	0.0	0.0	0.0	-22.1	0.0	0.0	0.0	-21.9	0.0	0.0	0.0
	CVP Water Cost	0.4	-0.2	0.0	0.1	-0.6	-0.6	-0.2	0.5	-0.1	0.0	0.0	-0.1
	Higher Crop Prices	0.1	0.0	0.0	0.2	0.1	0.0	0.0	0.0	0.2	0.0	0.0	0.0
	Net Change		**-0.2**	**0.0**	**0.0**	**-12.4**	**-0.6**	**-0.2**	**0.1**	**-16.5**	**0.0**	**0.0**	**-0.1**
3	Fallowed Land	39.3	0.0	0.0	0.0	39.4	0.0	0.0	0.0	38.9	0.0	0.0	0.0
	Groundwater Pumping Cost	9.0	0.0	0.0	0.0	-7.9	0.0	0.0	0.0	-14.5	0.0	0.0	0.0
	Irrigation Cost	21.2	0.0	0.0	0.0	-21.3	0.0	0.0	0.0	-21.0	0.0	0.0	0.0
	CVP Water Cost	1.6	0.0	0.0	0.0	-1.6	-0.2	-0.2	-0.2	-1.4	-0.3	-0.3	-0.3
	Higher Crop Prices	0.2	0.0	0.0	0.3	0.1	0.0	0.0	0.2	0.4	0.0	0.0	0.0
	Net Change		**0.0**	**0.0**	**0.3**	**8.7**	**-0.2**	**-0.2**	**0.0**	**2.4**	**-0.3**	**-0.3**	**-0.3**
3B	Fallowed Land	11.9	0.0	0.0	-6.4	11.9	0.0	0.0	-3.8	10.6	0.0	0.0	0.0
	Groundwater Pumping Cost	3.0	0.0	0.0	0.0	-1.8	1.4	1.4	-4.1	-8.3	0.0	0.0	0.0
	Irrigation Cost	9.0	0.0	0.0	0.0	-9.1	0.0	0.0	0.0	-7.7	0.0	0.0	0.0
	CVP Water Cost	3.7	-0.4	1.4	3.7	-4.2	-4.7	-1.2	4.2	-0.9	0.2	0.2	-0.3
	Higher Crop Prices	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
	Net Change		**-0.4**	**1.4**	**-2.8**	**-3.1**	**-3.3**	**0.2**	**-3.7**	**-6.3**	**0.2**	**0.2**	**-0.3**
4	Fallowed Land	34.3	0.0	0.0	0.0	34.3	0.0	0.0	0.0	34.1	0.0	0.0	0.0
	Groundwater Pumping Cost	9.3	0.0	0.0	0.0	-8.5	0.0	0.0	0.0	-13.5	0.0	0.0	0.0
	Irrigation Cost	20.2	0.0	0.0	0.0	-20.3	0.0	0.0	0.0	-20.1	0.0	0.0	0.0
	CVP Water Cost	1.3	0.0	0.0	0.0	-1.3	-0.1	-0.1	-0.1	-1.1	-0.2	-0.2	-0.2
	Higher Crop Prices	0.2	0.0	0.0	0.3	0.1	0.0	0.0	0.1	0.3	0.0	0.0	0.0
	Net Change		**0.0**	**0.0**	**0.3**	**4.4**	**-0.1**	**-0.1**	**0.0**	**-0.3**	**-0.2**	**-0.2**	**-0.2**
5	Fallowed Land	53.4	0.0	0.0	0.0	53.5	0.0	0.0	0.0	53.2	0.0	0.0	0.0
	Groundwater Pumping Cost	14.9	0.0	0.0	0.0	-13.0	0.0	0.0	0.0	-18.7	0.0	0.0	0.0
	Irrigation Cost	22.5	0.0	0.0	0.0	-22.6	0.0	0.0	0.0	-22.4	0.0	0.0	0.0
	CVP Water Cost	0.2	-0.3	-0.3	-0.3	-0.2	-0.3	-0.3	-0.3	-0.2	-0.3	-0.3	-0.3
	Higher Crop Prices	0.1	0.0	0.0	0.3	0.1	0.0	0.0	0.1	0.2	0.0	0.0	0.0
	Net Change		**-0.3**	**-0.3**	**0.0**	**17.7**	**-0.3**	**-0.3**	**-0.2**	**12.1**	**-0.3**	**-0.3**	**-0.3**

TABLE 19 CHANGES IN NET REVENUE BY SUBREGION (Million $)

CVPM Subregion	Cause of Net Revenue Change		Change Compared to Average PA				Change Compared to Wet PA				Change Compared to Dry PA		
			Average	Wet	Dry		Average	Wet	Dry		Average	Wet	Dry
			Followed By Average				Followed By Wet				Followed By Dry		
6	Fallowed Land	32.3	0.0	0.0	0.0	32.5	-0.2	-0.2	-0.2	32.2	0.0	0.0	0.0
	Groundwater Pumping Cost	14.9	0.0	0.0	0.0	-14.4	0.3	0.3	0.3	-17.6	-0.1	-0.1	-0.1
	Irrigation Cost	21.6	0.0	0.0	0.0	-21.8	0.0	0.0	0.0	-21.5	0.0	0.0	0.0
	CVP Water Cost	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Higher Crop Prices	0.3	0.0	0.0	0.4	0.2	0.0	0.0	0.2	0.5	0.0	0.0	0.0
	Net Change		**0.0**	**0.0**	**0.4**	**-3.6**	**0.1**	**0.1**	**0.3**	**-6.4**	**-0.1**	**-0.1**	**-0.1**
7	Fallowed Land	10.5	0.0	0.0	0.0	10.5	0.0	0.0	0.0	10.4	0.0	0.0	0.0
	Groundwater Pumping Cost	7.6	0.0	0.0	0.0	-6.9	0.0	0.0	0.0	-9.1	0.0	0.0	0.0
	Irrigation Cost	4.4	0.0	0.0	0.0	-4.4	0.0	0.0	0.0	-4.3	0.0	0.0	0.0
	CVP Water Cost	0.3	-0.1	-0.1	-0.1	-0.3	-0.1	-0.1	-0.1	-0.2	-0.1	-0.1	-0.1
	Higher Crop Prices	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0
	Net Change		**-0.1**	**-0.1**	**0.0**	**-1.0**	**-0.1**	**-0.1**	**0.0**	**-3.1**	**-0.1**	**-0.1**	**-0.1**
8	Fallowed Land	46.4	0.0	0.0	0.0	46.5	0.0	0.0	0.0	46.4	0.0	0.0	0.0
	Groundwater Pumping Cost	30.8	0.0	0.0	0.0	-29.1	0.1	0.1	0.1	-35.4	-0.1	-0.1	-0.1
	Irrigation Cost	21.1	0.0	0.0	0.0	-21.1	0.0	0.0	0.0	-21.0	0.0	0.0	0.0
	CVP Water Cost	0.3	-0.8	-0.5	-1.6	-0.5	-2.0	-1.2	-2.8	-0.1	-0.3	-0.3	-0.4
	Higher Crop Prices	0.2	0.0	0.0	0.2	0.2	0.0	0.0	0.1	0.3	0.0	0.0	0.0
	Net Change		**-0.8**	**-0.5**	**-1.3**	**-4.1**	**-1.9**	**-1.0**	**-2.5**	**-9.8**	**-0.3**	**-0.3**	**-0.5**
9	Fallowed Land	52.9	-0.1	-0.1	0.0	52.9	-0.1	-0.1	-0.1	52.4	0.2	0.2	0.2
	Groundwater Pumping Cost	2.5	-0.6	-0.6	-0.6	-2.1	-1.2	-1.2	-1.2	-3.2	-0.4	-0.4	-0.4
	Irrigation Cost	34.4	-0.3	-0.3	-0.3	-34.4	-0.3	-0.3	-0.3	-33.9	-0.3	-0.3	-0.3
	CVP Water Cost	1.2	1.2	1.2	1.2	-2.0	2.0	2.0	2.0	-0.5	0.5	0.5	0.5
	Higher Crop Prices	0.3	0.0	0.0	0.5	0.3	0.0	0.0	0.2	0.6	0.0	0.0	0.0
	Net Change		**0.3**	**0.3**	**0.7**	**14.5**	**0.5**	**0.5**	**0.7**	**15.5**	**0.0**	**0.0**	**0.0**
10	Fallowed Land	97.8	0.0	0.0	-0.1	97.8	0.0	0.0	0.0	97.8	0.0	0.0	0.0
	Groundwater Pumping Cost	15.4	0.0	0.0	-6.8	-12.5	-8.3	-0.8	-8.6	-20.6	0.0	0.0	0.0
	Irrigation Cost	38.9	0.0	0.0	0.0	-38.9	0.0	0.0	0.0	-38.9	0.0	0.0	0.0
	CVP Water Cost	6.3	-0.1	0.4	6.3	-8.1	7.9	0.7	8.1	-3.2	0.2	0.2	-0.1
	Higher Crop Prices	0.5	0.0	0.0	0.4	0.4	0.0	0.0	0.2	0.9	0.0	0.0	0.0
	Net Change		**-0.1**	**0.4**	**-0.1**	**38.7**	**-0.5**	**0.0**	**-0.3**	**36.0**	**0.2**	**0.2**	**-0.1**
11	Fallowed Land	35.5	0.0	0.0	0.0	35.5	0.0	0.0	0.0	35.4	0.0	0.0	0.0
	Groundwater Pumping Cost	1.0	0.0	0.0	0.0	-0.8	0.0	0.0	0.0	-1.1	0.0	0.0	0.0
	Irrigation Cost	16.0	0.0	0.0	0.0	-16.0	0.0	0.0	0.0	-16.0	0.0	0.0	0.0
	CVP Water Cost	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Higher Crop Prices	0.1	0.0	0.0	0.3	0.1	0.0	0.0	0.1	0.2	0.0	0.0	0.0
	Net Change		**0.0**	**0.0**	**0.3**	**18.7**	**0.0**	**0.0**	**0.1**	**18.6**	**0.0**	**0.0**	**0.0**

TABLE 19 CHANGES IN NET REVENUE BY SUBREGION (Million $)

CVPM Subregion	Cause of Net Revenue Change		Change Compared to Average PA				Change Compared to Wet PA				Change Compared to Dry PA		
			Average	Wet	Dry		Average	Wet	Dry		Average	Wet	Dry
			Followed By Average				Followed By Wet				Followed By Dry		
12	Fallowed Land	41.8	0.0	0.0	0.0	41.7	0.0	0.0	0.0	41.7	0.0	0.0	0.0
	Groundwater Pumping Cost	6.1	0.0	0.0	0.0	-4.8	0.0	0.0	0.0	-8.4	0.0	0.0	0.0
	Irrigation Cost	19.9	0.0	0.0	0.0	-19.8	0.0	0.0	0.0	-19.8	0.0	0.0	0.0
	CVP Water Cost	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Higher Crop Prices	0.1	0.0	0.0	0.3	0.1	0.0	0.0	0.1	0.2	0.0	0.0	0.0
	Net Change		**0.0**	**0.0**	**0.3**	**17.2**	**0.0**	**0.0**	**0.1**	**13.7**	**0.0**	**0.0**	**0.0**
13	Fallowed Land	112.2	0.0	0.0	0.0	112.3	-0.1	-0.1	-0.1	112.1	-0.1	-0.1	-0.1
	Groundwater Pumping Cost	38.4	0.8	0.7	-2.7	-33.9	1.6	1.6	-4.9	-50.7	0.2	0.2	0.2
	Irrigation Cost	53.6	0.0	0.0	0.0	-53.8	0.0	0.0	0.0	-53.6	0.0	0.0	0.0
	CVP Water Cost	6.8	-0.8	-0.6	2.1	-6.4	-1.7	-1.5	4.3	-5.4	-0.2	-0.2	-0.4
	Higher Crop Prices	0.4	0.0	0.0	0.5	0.4	0.0	0.0	0.2	0.8	0.0	0.0	0.0
	Net Change		**0.0**	**0.1**	**-0.1**	**18.7**	**-0.1**	**0.0**	**-0.5**	**3.3**	**-0.1**	**-0.1**	**-0.3**
14	Fallowed Land	111.5	0.0	0.0	0.0	111.5	0.0	0.0	0.0	110.3	0.0	0.0	0.0
	Groundwater Pumping Cost	81.1	0.0	0.0	0.0	-58.3	0.0	0.0	0.0	-118.6	0.0	0.0	0.0
	Irrigation Cost	62.8	0.0	0.0	0.0	-62.8	0.0	0.0	0.0	-61.1	0.0	0.0	0.0
	CVP Water Cost	32.8	1.3	3.5	-6.0	-45.1	1.8	6.4	-5.5	-14.4	-6.3	-6.3	-7.3
	Higher Crop Prices	0.7	0.0	0.0	0.5	0.6	0.0	0.0	0.2	1.2	0.0	0.0	0.0
	Net Change		**1.3**	**3.5**	**-5.6**	**-53.9**	**1.8**	**6.4**	**-5.3**	**-82.6**	**-6.3**	**-6.3**	**-7.3**
15	Fallowed Land	94.1	0.0	0.0	0.0	94.2	0.0	0.0	0.0	92.6	0.0	0.0	0.0
	Groundwater Pumping Cost	81.0	0.0	0.0	0.0	-69.3	0.3	0.3	0.3	-102.9	-1.5	-1.5	-1.5
	Irrigation Cost	61.8	0.0	0.0	0.0	-61.9	0.0	0.0	0.0	-60.3	0.0	0.0	0.0
	CVP Water Cost	1.8	-0.3	-0.2	-0.4	-1.9	-0.2	-0.2	-0.3	-1.5	-0.4	-0.4	-0.5
	Higher Crop Prices	0.7	0.0	0.0	0.4	0.6	0.1	0.0	0.2	1.5	0.0	0.0	0.0
	Net Change		**-0.3**	**-0.2**	**0.1**	**-38.3**	**0.2**	**0.2**	**0.2**	**-70.7**	**-1.9**	**-1.9**	**-1.9**
16	Fallowed Land	37.3	0.0	0.0	0.0	37.3	0.0	0.0	0.0	37.3	0.0	0.0	0.0
	Groundwater Pumping Cost	1.9	-0.6	-0.6	-0.6	0.0	-0.5	-0.5	-0.5	-4.3	-0.5	-0.5	-0.5
	Irrigation Cost	11.0	0.0	0.0	0.0	-11.1	0.0	0.0	0.0	-11.0	0.0	0.0	0.0
	CVP Water Cost	0.7	0.7	0.7	0.7	-0.7	0.7	0.7	0.7	-0.5	0.5	0.5	0.5
	Higher Crop Prices	0.1	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.2	0.0	0.0	0.0
	Net Change		**0.0**	**0.0**	**0.1**	**25.7**	**0.1**	**0.1**	**0.1**	**21.6**	**0.0**	**0.0**	**0.0**
17	Fallowed Land	95.8	0.0	0.0	0.0	95.8	0.0	0.0	0.0	95.2	0.0	0.0	0.0
	Groundwater Pumping Cost	17.7	0.2	0.2	0.2	-12.7	0.3	0.3	0.3	-25.5	0.0	0.0	0.0
	Irrigation Cost	27.8	0.0	0.0	0.0	-27.8	0.0	0.0	0.0	-27.4	0.0	0.0	0.0
	CVP Water Cost	1.4	-0.1	-0.1	-0.3	-1.2	-0.4	-0.3	-0.5	-1.1	0.0	0.0	-0.1
	Higher Crop Prices	0.2	0.0	0.0	0.2	0.2	0.0	0.0	0.0	0.2	0.0	0.0	0.0
	Net Change		**0.0**	**0.1**	**0.1**	**54.2**	**0.0**	**0.0**	**-0.1**	**41.5**	**0.0**	**0.0**	**-0.1**

TABLE 19 CHANGES IN NET REVENUE BY SUBREGION (Million $)

CVPM Subregion	Cause of Net Revenue Change		Change Compared to Average PA: Average Followed By Average	Wet Followed By Average	Dry Followed By Average		Change Compared to Wet PA: Average Followed By Wet	Wet Followed By Wet	Dry Followed By Wet		Change Compared to Dry PA: Average Followed By Dry	Wet Followed By Dry	Dry Followed By Dry
18	Fallowed Land	153.6	0.0	0.0	0.0	153.9	-0.1	-0.1	-0.1	151.9	0.0	0.0	0.0
	Groundwater Pumping Cost	57.9	0.0	0.0	0.0	-46.2	0.2	0.2	0.2	-78.0	0.0	0.0	0.0
	Irrigation Cost	64.9	0.0	0.0	0.0	-65.1	0.0	0.0	0.0	-63.2	0.0	0.0	0.0
	CVP Water Cost	17.7	-1.5	-1.0	-3.3	-17.7	-2.2	-1.7	-3.9	-15.2	0.8	0.8	0.0
	Higher Crop Prices	0.6	0.0	0.0	0.4	0.5	0.0	0.0	0.1	1.1	0.0	0.0	0.0
	Net Change		**-1.5**	**-1.0**	**-2.9**	**25.3**	**-2.1**	**-1.6**	**-3.7**	**-3.4**	**0.8**	**0.8**	**0.0**
19	Fallowed Land	54.3	0.0	0.0	0.0	54.3	0.0	0.0	0.0	53.9	0.0	0.0	0.0
	Groundwater Pumping Cost	31.6	0.0	0.0	0.0	-21.3	0.2	0.2	0.2	-51.5	-1.2	-1.2	-1.2
	Irrigation Cost	28.8	0.0	0.0	0.0	-28.8	0.0	0.0	0.0	-28.3	0.0	0.0	0.0
	CVP Water Cost	0.5	-0.5	-0.5	-0.6	-0.6	-0.5	-0.5	-0.5	-0.4	-0.5	-0.5	-0.5
	Higher Crop Prices	0.3	0.0	0.0	0.2	0.3	0.0	0.0	0.1	0.6	0.0	0.0	0.0
	Net Change		**-0.5**	**-0.5**	**-0.3**	**3.9**	**-0.3**	**-0.3**	**-0.3**	**-25.7**	**-1.8**	**-1.8**	**-1.8**
20	Fallowed Land	81.5	0.0	0.0	0.0	81.5	0.0	0.0	0.0	81.0	0.0	0.0	0.0
	Groundwater Pumping Cost	24.7	0.0	0.0	0.0	-19.7	0.0	0.0	0.0	-36.6	-0.2	-0.2	-0.2
	Irrigation Cost	20.9	0.0	0.0	0.0	-20.9	0.0	0.0	0.0	-20.5	0.0	0.0	0.0
	CVP Water Cost	9.2	-0.1	0.2	-0.9	-9.5	-0.3	-0.1	-1.1	-7.0	-0.2	-0.2	-0.5
	Higher Crop Prices	0.2	0.0	0.0	0.2	0.2	0.0	0.0	0.0	0.3	0.0	0.0	0.0
	Net Change		**-0.1**	**0.2**	**-0.8**	**31.5**	**-0.3**	**0.0**	**-1.1**	**17.2**	**-0.3**	**-0.3**	**-0.7**
21	Fallowed Land	112.4	0.0	0.0	0.0	112.4	0.0	0.0	0.0	112.1	0.0	0.0	0.0
	Groundwater Pumping Cost	49.3	0.0	0.0	0.0	-37.6	0.2	0.2	0.2	-68.4	-0.8	-0.8	-0.8
	Irrigation Cost	37.1	0.0	0.0	0.0	-37.1	0.0	0.0	0.0	-36.8	0.0	0.0	0.0
	CVP Water Cost	8.4	0.1	0.3	-0.5	-9.6	0.2	0.5	-0.4	-5.5	-0.7	-0.7	-0.9
	Higher Crop Prices	0.4	0.0	0.0	0.2	0.4	0.0	0.0	0.1	0.7	0.0	0.0	0.0
	Net Change		**0.1**	**0.3**	**-0.3**	**28.5**	**0.4**	**0.7**	**-0.1**	**2.1**	**-1.5**	**-1.5**	**-1.7**
Total	Fallowed Land		-0.1	0.0	-6.8	1100.4	-0.4	-0.3	-4.6	1093.0	-0.2	-0.2	-0.2
	Groundwater Pumping		0.4	0.4	-9.9	-364.0	-4.4	3.1	-16.6	-616.9	-4.0	-4.0	-4.0
	Irrigation Cost		-0.3	-0.3	-0.3	-503.5	-0.3	-0.3	-0.3	-496.0	-0.3	-0.3	-0.3
	CVP Water Cost		-1.3	4.3	2.3	-91.1	0.0	2.9	6.5	-42.5	-8.0	-7.9	-10.7
	Higher Crop Prices		0.1	0.0	4.7	4.1	0.4	0.4	1.9	8.6	0.0	0.0	0.0
	Net Change		**-1.1**	**4.4**	**-10.0**	**146.0**	**-4.6**	**5.8**	**-13.2**	**-53.9**	**-12.4**	**-12.4**	**-15.1**

Notes:
1. All values in millions of 1992 dollars
2. A negative value represents a reduction in net revenue compared to the Preferred Alternative
3. Subregions 3 and 3B should be added together to get the complete subregion 3. 3B represents the area within this subregion served by the Tehama Colusa Canal
4. PA is the Preferred Alternative

TABLE 20 IRRIGATION WATER APPLIED BY SUBREGION

CVPM Subregion	Water Source	Preferred Alternative Average	Changes Compared to Average PA			Preferred Alternative Wet	Changes Compared to Wet PA			Preferred Alternative Dry	Changes Compared to Dry PA		
			Average	Wet	Dry		Average	Wet	Dry		Average	Wet	Dry
			Followed by Average				Followed by Wet				Followed by Dry		
1	CVP Water	19.3	-10.8	-6.4	-5.4	20.5	-13.0	-13.0	-13.0	21.0	-13.5	-13.5	-13.5
	Groundwater	3.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	-1.5	-1.5	-1.5
2	CVP Water	27.7	0.0	0.0	-21.6	37.1	0.0	0.1	-36.7	8.2	0.0	0.0	0.0
	Groundwater	512.1	0.0	0.0	0.0	506.4	0.0	-0.1	0.0	584.7	0.0	0.0	0.0
3	CVP Water	170.4	0.0	0.0	0.0	174.2	0.0	0.0	0.0	154.3	0.0	0.0	0.0
	Groundwater	248.9	0.0	0.0	0.0	227.0	0.0	0.0	0.0	355.3	0.0	0.0	0.0
3B	CVP Water	199.6	0.1	0.0	-199.6	227.0	39.3	39.1	-227.0	50.3	0.0	0.0	-0.1
	Groundwater	78.7	-0.1	0.0	0.0	50.4	-38.4	-38.2	99.6	191.9	0.0	0.0	0.0
4	CVP Water	129.8	0.0	0.0	0.0	133.1	0.0	0.0	0.0	113.9	0.0	0.0	0.0
	Groundwater	326.6	0.0	0.0	0.0	305.1	0.0	0.0	0.0	442.8	0.0	0.0	0.0
5	CVP Water	19.9	0.1	0.0	0.1	20.8	0.1	0.0	0.0	17.9	0.0	-0.1	0.0
	Groundwater	492.6	-0.1	0.0	-0.1	449.3	-1.1	-1.0	-0.4	588.7	-1.1	-1.0	-1.1
6	CVP Water	2.2	0.0	0.0	0.0	2.4	0.0	0.0	0.0	1.8	0.0	0.0	0.0
	Groundwater	452.8	0.0	0.0	0.0	447.6	-6.4	-6.4	-6.0	521.0	0.0	0.0	0.0
7	CVP Water	22.0	0.0	0.0	0.0	22.6	0.0	0.0	0.0	19.1	0.0	0.0	0.0
	Groundwater	193.2	0.0	0.0	0.0	177.9	0.0	0.0	0.0	217.5	0.0	0.0	0.0
8	CVP Water	51.6	0.1	0.0	-0.1	79.4	0.1	-0.1	-0.1	25.3	0.0	0.0	-0.1
	Groundwater	756.4	-0.1	0.0	0.1	717.3	0.0	0.0	0.0	851.3	-0.2	-0.2	-0.1
9	CVP Water	28.2	-28.2	-28.2	-28.2	48.1	-48.1	-48.1	-48.1	11.5	-11.5	-11.5	-11.5
	Groundwater	80.3	17.9	17.9	18.7	70.2	35.6	35.6	36.0	100.1	11.5	11.5	11.4
10	CVP Water	183.4	0.0	0.0	-183.4	234.4	-228.4	-22.8	-234.4	92.1	0.0	0.0	0.0
	Groundwater	496.2	0.0	0.0	179.4	414.4	227.7	22.7	233.7	632.4	0.0	0.0	-0.1
11	CVP Water	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Groundwater	34.1	0.0	0.0	0.0	26.8	0.0	0.0	0.0	34.5	0.0	0.0	0.0
12	CVP Water	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Groundwater	173.1	0.0	0.0	0.0	141.8	0.0	0.0	0.0	228.2	0.0	0.0	0.0
13	CVP Water	163.6	16.7	16.6	-60.2	159.0	33.2	33.1	-113.1	128.2	0.0	0.0	0.0
	Groundwater	912.5	-16.7	-16.6	60.2	812.0	-36.2	-36.2	109.1	1,181.4	-3.8	-3.8	-3.8
14	CVP Water	524.4	0.1	0.0	0.1	719.0	0.1	0.0	0.0	230.2	0.0	0.0	0.0
	Groundwater	826.3	-0.1	0.0	-0.1	603.6	-0.1	0.0	0.0	1,176.4	0.0	0.0	0.0
15	CVP Water	35.1	0.0	0.1	0.1	38.1	0.0	0.1	0.0	28.6	0.0	0.0	0.0
	Groundwater	1,276.6	0.0	-0.1	-0.1	1,099.1	0.0	0.0	0.0	1,600.7	0.0	0.0	0.0
16	CVP Water	16.2	-16.2	-16.2	-16.2	15.7	-15.7	-15.7	-15.7	12.9	-12.9	-12.9	-12.9
	Groundwater	49.6	14.9	14.8	15.0	0.0	13.2	13.2	13.2	107.3	11.5	11.5	11.5
17	CVP Water	34.6	3.9	3.8	4.0	32.5	7.4	7.3	7.4	27.1	0.0	0.0	0.1
	Groundwater	415.1	-3.8	-3.8	-3.9	303.2	-7.4	-7.2	-7.4	577.4	0.0	0.0	0.0
18	CVP Water	517.3	0.0	0.0	0.1	526.3	0.0	0.0	0.1	399.0	0.0	0.0	0.1
	Groundwater	1,018.0	0.0	0.0	-0.1	821.8	-4.0	-4.0	-3.8	1,334.9	0.0	0.0	0.0

TABLE 20 IRRIGATION WATER APPLIED BY SUBREGION

CVPM Subregion	Water Source	Preferred Alternative Average	Changes Compared to Average PA			Preferred Alternative Wet	Changes Compared to Wet PA			Preferred Alternative Dry	Changes Compared to Dry PA		
			Average	Wet	Dry		Average	Wet	Dry		Average	Wet	Dry
			Followed by Average				Followed by Wet				Followed by Dry		
19	CVP Water	13.3	-0.1	0.0	0.1	15.4	-0.1	-0.1	0.0	9.4	0.0	0.0	0.0
	Groundwater	366.8	0.1	0.0	-0.1	250.7	0.0	0.0	0.0	578.4	0.0	0.0	0.0
20	CVP Water	208.7	0.1	0.1	-0.2	219.8	0.1	0.1	-0.1	154.1	0.0	0.0	-0.1
	Groundwater	303.6	-0.1	-0.1	0.1	244.8	0.0	0.0	0.0	437.3	0.0	0.0	0.0
21	CVP Water	138.3	0.0	0.0	-0.1	163.0	0.0	0.1	-0.1	89.3	0.0	0.0	-0.1
	Groundwater	579.4	0.0	0.0	0.1	445.2	0.0	-0.1	0.0	783.1	0.0	0.0	0.0
Total	CVP Water	2,505.5	-34.4	-30.4	-510.5	2,888.2	-224.9	-19.8	-680.6	1,593.9	-37.7	-37.8	-37.8
	Groundwater	9,596.5	11.9	12.3	269.2	8,114.6	182.8	-21.6	474.0	12,527.1	16.1	16.2	16.1

Notes:
1. All quantities in thousands of acre-feet
2. A negative value represents a lower quantitity than in the Preferred Alternative
3. Subregions 3 and 3B should be added together to get the complete subregion 3. 3B represents the area within this subregion served by the Tehama Colusa Canal
4. PA is the Preferred Alternative

TABLE 21 SUBREGION ANALYSIS OF SIGNIFICANT CHANGES IN WATER USE

Subregion	Outcome	Explanation
1	Decrease in CVP use and no GW substitution in all sequences	Less CVP water is used than in the Preferred Alternative because the blended price is 140% to 330% higher than the Preferred Alternative Tier 1 (the only tier of water that was used for this scenario). For hydrologic reasons, subregion 1 is restricted from switching to groundwater.
2	Decrease in CVP use and no GW substitution in Dry to Average and Dry to Wet sequences	Less CVP water is used than in the Preferred Alternative because the blended prices for the Dry to Average and Dry to Wet sequences are 320% and 345% higher than the Preferred Alternative Tier 1 price (the only water tier that was used for this scenario). For hydrologic reasons, subregion 2 is restricted from switching to groundwater.
3B	Decrease CVP and no GW substitution in Dry to Average sequence	Less CVP water is used than in the Preferred Alternative because the blended price is 240% higher than the Tier 1 price from the Preferred Alternative, which is the only tier of water that was used. For hydrologic reasons the region is restricted from switching to groundwater in this long-run scenario.
3B	Decrease in CVP use and GW substitution in Dry to Wet sequence	CVP water use decreases because the blended price is 260% higher than the Preferred Alternative Tier 1 price. The model allowed a shift to groundwater on a short run basis to provide water to permanent crops during the wet year when groundwater would have been recharged.
3B	Shift from Groundwater to CVP water in Average to Wet and Wet to Wet sequences	In the Preferred Alternative wet year analysis subregion 3B has 39 TAF of water that falls in Tiers 2 or 3. Under the LTCR blended pricing mechanism all of the subregions CVP water is priced at a level that is lower than the Preferred Alternative Tier 2. This additional affordable CVP water is used resulting in less groundwater being pumped.
9	Shift from CVP to Groundwater in all sequences	The blended price of CVP water in subregion 9 is greater than the groundwater pumping cost resulting in the shift from CVP to groundwater.
10	Shift from CVP to Groundwater in Dry to Average and Average, Wet and Dry to Wet sequences	Due to an increase in the CVP price relative to the Preferred Alternative, the depth to which groundwater can be affordably pumped increases resulting in the shift from CVP supplies to groundwater.
13	Shift from groundwater to CVP in Average to Average, Wet to Average, Average to Wet and Wet to Wet sequences	In the Preferred Alternative Average and Wet conditions subregion 13 had water classified as Tier 2 or Tier 3 which was not affordable, and pumped groundwater to supplement it's Tier 1 supply down to a depth at which it was no longer affordable. In the LTCR sequences, the blended price is less expensive than the Preferred Alternative upper Tier price, therefore a shift is made from the deepest groundwater to the now affordable CVP supply.

TABLE 21 SUBREGION ANALYSIS OF SIGNIFICANT CHANGES IN WATER USE

Subregion	Outcome	Explanation
13	Shift from CVP to Groundwater in Dry to Average and Dry to Wet sequences	Under the LTCR blended price mechanism, when coming out of a drought into a Average or Wet year the blended price increases. In these situations, shallow groundwater is less expensive than the CVP blended price. As more groundwater is pumped the cost increases as the pump lift increases and the cost eventually becomes greater than the CVP blended price. When this happens the remainder of the subregions water supply is taken from the CVP supplies.
16	Shift from CVP to Groundwater in all sequences	The blended price of CVP water in subregion 16 is greater than the groundwater pumping cost resulting in the shift from CVP to groundwater.
17	Shift from groundwater to CVP	In the Preferred Alternative Average and Wet conditions this subregion had water classified as Tier 2 or Tier 3 which was not affordable. The subregion pumped groundwater down to a depth at which it was no longer affordable to supplement the CVP water is was able to afford. In the LTCR sequences, the blended price is less expensive than the least expensive CVP tier that was not used, therefor a shift is made from the deepest groundwater to the now affordable CVP supply.
19	Shift from CVP to Groundwater in Dry to Dry sequence	The blended pricing causes the Dry to Dry CVP water cost to rise higher than the groundwater pumping cost resulting in the shift from CVP to groundwater.

SECTION 2
REGIONAL ECONOMICS

REGIONAL ECONOMICS

This analysis identifies the regional economic impacts of two out of the nine total Long-Term Contract Renewal sequences; an Average year following an Average five-year base condition, and an Average year following a Dry five-year base condition. The regional economic analysis is restricted to these sequences because they are the only sequences that represent long-run conditions. The Input-Output model used in the regional economic analysis assumes a long run equilibrium is reached, therefore it is inappropriate to model short run responses represented by the Wet and Dry year conditions. While the Average year following the Dry five-year base condition is not strictly a long-run scenario, as described in the Agricultural and Land Use and Economics section, there are some regions that will be permanently impacted by a five year series of drought years. Because of this, the results can be considered long run.

The assumptions and baseline data used in this analysis are the same as what was used in the Preferred Alternative. Tables 23 and 24 show the results of the Average year following an Average five-year base condition, Tables 25 and 26 the Average year following a Wet five-year base condition, and Tables 27 and 28 the Average year following a Dry five-year base condition. Tables 23, 25, and 27 present the impacts by economic sectors that are aggregations of Standard Industrial Classification (SIC)industries. Tables 24, 26, and 28 present the regional economic impacts broken out by the source of the impact including reduced agricultural output, changes in net farm income, and changes in M&I water costs. Note that regional economic impacts are not reported for the North Coast or the Central and South Coast regions because the rolling five year average tiered pricing mechanism has no impact on these regions.

AVERAGE YEAR FOLLOWING AVERAGE FIVE-YEAR BASE CONDITION

Table 23 shows the employment, output and income effects on all sectors in each regional economy of the long-term contract renewals. Most of the impacts are felt in the Manufacturing, Trade and Services sectors. These impacts are derived from the impact to net income. The economic impacts by region from each source can be seen in Table 24. Reduction in net income resulting from changes in CVP water cost, groundwater pumping, irrigation costs and changes in crop prices have the greatest impact at the statewide level.

AVERAGE YEAR FOLLOWING DRY FIVE-YEAR BASE CONDITION

Table 27 shows the employment, output and income effects for each regional economy and the State as a whole broken out by the impacted sectors. Table 28 shows how each of the impact sources contribute to the total impact. The reduction in agricultural output in the Sacramento River region relative to the Preferred Alternative dominates the statewide impact.

TABLE 22

REGIONAL ECONOMIC IMPACTS ON ALL SECTORS: AVERAGE YEAR FOLLOWING AVERAGE 5-YEAR BASE CONDITION COMPARED TO THE PREFERRED ALTERNATIVE AVERAGE YEAR CONDITION

	Impacts on all Sectors					
	Employment (# of jobs)		Output ($MM)		PoW Income ($MM)	
Region Directly Impacted	Direct	Total	Direct	Total	Direct	Total
Sacramento River						
Agriculture						
Reduced Output	-10	-20	-0.5	-1.2	-0.2	-0.6
Reduced Net Income	-20	-50	-0.9	-2.3	-0.5	-1.3
Total Agriculture	-30	-60	-1.4	-3.5	-0.7	-1.9
M&I Water Costs	-60	-130	-3.9	-8.5	-2.0	-4.7
TOTAL 1/	**-90**	**-190**	-5.3	-12.0	-2.8	-6.6
San Joaquin River						
Agriculture						
Reduced Output	0	0	-0.2	-0.3	-0.1	-0.2
Reduced Net Income	20	40	0.8	1.8	0.5	1.0
Total Agriculture	20	30	0.7	1.5	0.4	0.9
M&I Water Costs	-80	-150	-5.0	-9.4	-2.6	-5.1
TOTAL 1/	**-60**	**-120**	-4.3	-7.9	-2.2	-4.2
Tulare Lake						
Agriculture						
Reduced Output	0	0	0.0	0.0	0.0	0.0
Reduced Net Income	-50	-80	-2.1	-4.1	-1.1	-2.2
Total Agriculture	-50	-80	-2.1	-4.1	-1.1	-2.2
M&I Water Costs	0	0	0.0	0.0	0.0	0.0
TOTAL 1/	**-50**	**-80**	-2.1	-4.1	-1.1	-2.2
Bay Area						
Agriculture						
Reduced Output	0	0	0.0	0.0	0.0	0.0
Reduced Net Income	0	-10	-0.2	-0.4	-0.1	-0.2
Total Agriculture	0	-10	-0.2	-0.4	-0.1	-0.2
M&I Water Costs	-60	-130	-4.4	-9.4	-2.4	-5.4
TOTAL 1/	**-60**	**-130**	-4.6	-9.8	-2.5	-5.6
California Total						
Agriculture						
Reduced Output	-10	-20	-0.7	-1.5	-0.3	-0.8
Reduced Net Income	-50	-100	-2.3	-5.0	-1.2	-2.7
Total Agriculture	-60	-120	-3.0	-6.5	-1.6	-3.5
M&I Water Costs	-200	-410	-13.3	-27.4	-7.0	-15.1
TOTAL 1/	**-260**	**-530**	**-16.3**	**-33.9**	**-8.6**	**-18.6**

Note: (1) May differ from sum of elements due to rounding.

TABLE 23

REGIONAL ECONOMIC IMPACT: AVERAGE YEAR FOLLOWING AVERAGE 5-YEAR BASE CONDITION COMPARED TO THE PREFERRED ALTERNATIVE AVERAGE YEAR CONDITION

	Employment (# of jobs)		Output ($MM)		PoW Income ($MM)	
Region and Affected Sector	**Direct**	**Total**	**Direct**	**Total**	**Direct**	**Total**
Sacramento River						
Agric., Frst., Fish.	-10	-10	-0.4	-0.5	-0.2	-0.3
Mining	0	0	0.0	0.0	0.0	0.0
Construction	0	0	0.0	-0.2	0.0	-0.1
Manufacturing	-10	-20	-1.6	-2.2	-0.6	-0.8
TCU	0	-10	-0.2	-0.9	-0.1	-0.5
Trade	-40	-70	-1.1	-2.1	-0.7	-1.3
FIRE	-10	-20	-0.8	-2.6	-0.5	-1.7
Services	-20	-60	-0.9	-2.8	-0.6	-1.7
Government	0	-10	-0.2	-0.7	-0.1	-0.3
Misc	0	0	0.0	0.0	0.0	0.0
TOTAL/1	**-90**	**-190**	**-5.3**	**-12.0**	**-2.8**	**-6.6**
San Joaquin River						
Agric., Frst., Fish.	0	-10	-0.2	-0.3	-0.1	-0.1
Mining	0	0	-0.1	-0.1	0.0	0.0
Construction	0	0	0.0	-0.1	0.0	-0.1
Manufacturing	-10	-10	-0.8	-1.1	-0.2	-0.3
TCU	0	-10	-0.3	-0.6	-0.2	-0.3
Trade	-10	-30	-0.4	-1.1	-0.2	-0.6
FIRE	-10	-20	-1.1	-2.1	-0.7	-1.3
Services	-30	-50	-1.2	-2.2	-0.7	-1.3
Government	0	0	-0.2	-0.3	-0.1	-0.1
Misc	0	0	0.0	0.0	0.0	0.0
TOTAL/1	**-60**	**-120**	**-4.3**	**-7.9**	**-2.2**	**-4.2**
Tulare Lake						
Agric., Frst., Fish.	0	0	0.0	0.0	0.0	0.0
Mining	0	0	0.0	0.0	0.0	0.0
Construction	0	0	0.0	0.0	0.0	0.0
Manufacturing	-10	-10	-1.0	-1.3	-0.4	-1.3
TCU	0	0	0.0	-0.2	0.0	-0.2
Trade	-40	-50	-1.0	-1.4	-0.7	-1.4
FIRE	0	0	0.0	-0.4	0.0	-0.4
Services	0	-10	0.0	-0.6	0.0	-0.6
Government	0	0	0.0	-0.1	0.0	-0.1
Misc	0	0	0.0	0.0	0.0	0.0
TOTAL/1	**-50**	**-80**	**-2.1**	**-4.1**	**-1.1**	**-4.1**

TABLE 23

REGIONAL ECONOMIC IMPACT: AVERAGE YEAR FOLLOWING AVERAGE 5-YEAR BASE CONDITION COMPARED TO THE PREFERRED ALTERNATIVE AVERAGE YEAR CONDITION

	Employment (# of jobs)		Output ($MM)		PoW Income ($MM)	
Region and Affected Sector	**Direct**	**Total**	**Direct**	**Total**	**Direct**	**Total**
Bay Area						
Agric., Frst., Fish.	0	0	0.0	-0.1	0.0	0.0
Mining	0	0	0.0	0.0	0.0	0.0
Construction	0	0	0.0	-0.1	0.0	-0.1
Manufacturing	-10	-10	-1.2	-1.9	-0.4	-0.7
TCU	0	-10	-0.3	-0.8	-0.2	-0.4
Trade	-20	-40	-0.9	-1.7	-0.5	-1.0
FIRE	-10	-20	-1.0	-2.3	-0.6	-1.5
Services	-20	-50	-1.1	-2.6	-0.7	-1.6
Government	0	0	-0.2	-0.3	-0.1	-0.1
Misc	0	0	0.0	0.0	0.0	0.0
TOTAL/1	**-60**	**-130**	**-4.6**	**-9.8**	**-2.5**	**-5.6**
California Total						
Agric., Frst., Fish.	-10	-20	-0.6	-0.9	-0.3	-0.5
Mining	0	0	-0.1	-0.1	0.0	0.0
Construction	0	-10	0.0	-0.5	0.0	-0.3
Manufacturing	-30	-50	-4.7	-6.5	-1.6	-3.1
TCU	-10	-20	-0.8	-2.5	-0.4	-1.4
Trade	-110	-190	-3.4	-6.3	-2.2	-4.4
FIRE	-20	-60	-2.9	-7.4	-1.8	-4.9
Services	-70	-180	-3.2	-8.1	-1.9	-5.2
Government	0	-10	-0.6	-1.4	-0.3	-0.7
Misc	0	0	-0.1	-0.1	-0.1	-0.1
TOTAL/1	**-260**	**-530**	**-16.3**	**-33.9**	**-8.6**	**-20.5**

Note:(1) May differ from sum of elements due to rounding.

Table 24

REGIONAL ECONOMIC IMPACTS ON ALL SECTORS: AVERAGE YEAR FOLLOWING WET 5-YEAR BASE CONDITION COMPARED TO THE PREFERRED ALTERNATIVE AVERAGE YEAR CONDITION

	Impacts on all Sectors					
	Employment (# of jobs)		Output ($MM)		PoW Income ($MM)	
Region Directly Impacted	**Direct**	**Total**	**Direct**	**Total**	**Direct**	**Total**
Sacramento River						
Agriculture						
Reduced Output	0	-10	-0.4	-0.8	-0.2	-0.4
Reduced Net Income	30	50	1.0	2.6	0.5	1.4
Total Agriculture	20	40	0.6	1.8	0.4	1.0
M&I Water Costs	-60	-130	-3.9	-8.5	-2.0	-4.7
TOTAL 1/	**-40**	**-90**	**-3.3**	**-6.7**	**-1.6**	**-3.6**
San Joaquin River						
Agriculture						
Reduced Output	0	0	-0.2	-0.3	-0.1	-0.2
Reduced Net Income	100	170	3.7	8.1	2.1	4.5
Total Agriculture	90	160	3.6	7.8	2.0	4.4
M&I Water Costs	-80	-150	-5.0	-9.4	-2.6	-5.1
TOTAL 1/	**20**	**10**	**-1.4**	**-1.6**	**-0.6**	**-0.7**
Tulare Lake						
Agriculture						
Reduced Output	0	0	0.0	0.0	0.0	0.0
Reduced Net Income	-30	-40	-1.1	-2.1	-0.6	-1.1
Total Agriculture	-30	-40	-1.1	-2.1	-0.6	-1.1
M&I Water Costs	0	0	0.0	0.0	0.0	0.0
TOTAL 1/	**-30**	**-40**	**-1.1**	**-2.1**	**-0.6**	**-1.1**
Bay Area						
Agriculture						
Reduced Output	0	0	0.0	0.0	0.0	0.0
Reduced Net Income	0	0	-0.1	-0.2	0.0	-0.1
Total Agriculture	0	0	-0.1	-0.2	0.0	-0.1
M&I Water Costs	-60	-130	-4.4	-9.4	-2.4	-5.4
TOTAL 1/	**-60**	**-130**	**-4.5**	**-9.6**	**-2.5**	**-5.5**
California Total						
Agriculture						
Reduced Output	0	-10	-0.5	-1.1	-0.2	-0.6
Reduced Net Income	100	180	3.6	8.4	2.0	4.7
Total Agriculture	100	170	3.0	7.3	1.7	4.2
M&I Water Costs	-200	-410	-13.3	-27.4	-7.0	-15.1
TOTAL 1/	**-100**	**-240**	**-10.3**	**-20.1**	**-5.3**	**-11.0**

Note: (1) May differ from sum of elements due to rounding.

TABLE 25

REGIONAL ECONOMIC IMPACT: AVERAGE YEAR FOLLOWING WET 5-YEAR BASE CONDITION COMPARED TO THE PREFERRED ALTERNATIVE AVERAGE YEAR CONDITION

	Employment (# of jobs)		Output ($MM)		PoW Income ($MM)	
Region and Affected Sect	**Direct**	**Total**	**Direct**	**Total**	**Direct**	**Total**
Sacramento River						
Agric., Frst., Fish.	0	-10	-0.2	-0.3	-0.1	-0.2
Mining	0	0	0.0	0.0	0.0	0.0
Construction	0	0	0.0	-0.1	0.0	-0.1
Manufacturing	0	-10	-0.7	-0.9	-0.2	-0.3
TCU	0	0	-0.2	-0.6	-0.1	-0.3
Trade	0	-10	-0.2	-0.7	0.0	-0.3
FIRE	-10	-20	-0.8	-1.8	-0.5	-1.1
Services	-20	-40	-0.9	-1.9	-0.6	-1.1
Government	0	0	-0.2	-0.5	-0.1	-0.2
Misc	0	0	0.0	0.0	0.0	0.0
TOTAL/1	**-40**	**-90**	**-3.3**	**-6.7**	**-1.6**	**-3.6**
San Joaquin River						
Agric., Frst., Fish.	0	0	-0.1	-0.2	-0.1	-0.1
Mining	0	0	-0.1	-0.1	0.0	0.0
Construction	0	0	0.0	-0.1	0.0	0.0
Manufacturing	10	10	0.6	0.8	0.3	0.4
TCU	0	0	-0.3	-0.4	-0.2	-0.2
Trade	60	60	1.0	1.1	0.8	0.9
FIRE	-10	-10	-1.1	-1.2	-0.7	-0.8
Services	-30	-30	-1.2	-1.2	-0.7	-0.7
Government	0	0	-0.2	-0.2	-0.1	-0.1
Misc	0	0	0.0	0.0	0.0	0.0
TOTAL/1	**20**	**10**	**-1.4**	**-1.6**	**-0.6**	**-0.7**
Tulare Lake						
Agric., Frst., Fish.	0	0	0.0	0.0	0.0	0.0
Mining	0	0	0.0	0.0	0.0	0.0
Construction	0	0	0.0	0.0	0.0	0.0
Manufacturing	0	-10	-0.5	-0.7	-0.2	-0.7
TCU	0	0	0.0	-0.1	0.0	-0.1
Trade	-20	-30	-0.5	-0.7	-0.4	-0.7
FIRE	0	0	0.0	-0.2	0.0	-0.2
Services	0	-10	0.0	-0.3	0.0	-0.3
Government	0	0	0.0	0.0	0.0	0.0
Misc	0	0	0.0	0.0	0.0	0.0
TOTAL/1	**-30**	**-40**	**-1.1**	**-2.1**	**-0.6**	**-2.1**

TABLE 25

REGIONAL ECONOMIC IMPACT: AVERAGE YEAR FOLLOWING WET 5-YEAR BASE CONDITION COMPARED TO THE PREFERRED ALTERNATIVE AVERAGE YEAR CONDITION

	Employment (# of jobs)		Output ($MM)		PoW Income ($MM)	
Region and Affected Sect	**Direct**	**Total**	**Direct**	**Total**	**Direct**	**Total**
Bay Area						
Agric., Frst., Fish.	0	0	0.0	-0.1	0.0	0.0
Mining	0	0	0.0	0.0	0.0	0.0
Construction	0	0	0.0	-0.1	0.0	-0.1
Manufacturing	-10	-10	-1.2	-1.9	-0.4	-0.7
TCU	0	-10	-0.3	-0.8	-0.2	-0.4
Trade	-20	-40	-0.8	-1.6	-0.5	-1.0
FIRE	-10	-10	-1.0	-2.2	-0.6	-1.5
Services	-20	-50	-1.1	-2.6	-0.7	-1.6
Government	0	0	-0.2	-0.3	-0.1	-0.1
Misc	0	0	0.0	0.0	0.0	0.0
TOTAL/1	**-60**	**-130**	**-4.5**	**-9.6**	**-2.5**	**-5.5**
California Total						
Agric., Frst., Fish.	-10	-10	-0.4	-0.7	-0.2	-0.3
Mining	0	0	-0.1	-0.1	0.0	0.0
Construction	0	0	0.0	-0.3	0.0	-0.2
Manufacturing	-10	-10	-1.7	-2.7	-0.5	-1.2
TCU	-10	-10	-0.8	-1.8	-0.4	-1.0
Trade	20	-20	-0.5	-1.9	-0.1	-1.2
FIRE	-20	-40	-2.9	-5.5	-1.8	-3.6
Services	-70	-130	-3.2	-5.9	-1.9	-3.8
Government	0	-10	-0.6	-1.0	-0.3	-0.5
Misc	0	0	-0.1	-0.1	-0.1	-0.1
TOTAL/1	**-100**	**-250**	**-10.3**	**-20.1**	**-5.3**	**-12.0**

Note:(1) May differ from sum of elements due to rounding.

TABLE 26

REGIONAL ECONOMIC IMPACTS ON ALL SECTORS: AVERAGE YEAR FOLLOWING DRY 5-YEAR BASE CONDITION COMPARED TO THE PREFERRED ALTERNATIVE AVERAGE YEAR CONDITION

	Impacts on all Sectors					
	Employment (# of jobs)		Output ($MM)		PoW Income ($MM)	
Region Directly Impacted	**Direct**	**Total**	**Direct**	**Total**	**Direct**	**Total**
Sacramento River						
Agriculture						
Reduced Output	-700	-2240	-92.1	-194.5	-30.8	-86.9
Reduced Net Income	130	240	4.7	12.4	2.6	6.9
Total Agriculture	-570	-2000	-87.4	-182.1	-28.2	-80.0
M&I Water Costs	-60	-140	0.4	-0.9	-0.2	-0.5
TOTAL 1/	**-630**	**-2140**	**-91.8**	**-191.6**	**-30.5**	**-85.2**
San Joaquin River						
Agriculture						
Reduced Output	-10	-20	-0.7	-1.5	-0.3	-0.7
Reduced Net Income	-140	-240	-5.4	-11.7	-3.0	-6.5
Total Agriculture	-150	-270	-6.1	-13.2	-3.3	-7.3
M&I Water Costs	-80	-150	0.0	0.0	0.0	0.0
TOTAL 1/	**-230**	**-420**	**-11.0**	**-22.7**	**-5.9**	**-12.4**
Tulare Lake						
Agriculture						
Reduced Output	0	-10	-0.2	-0.5	-0.1	-0.2
Reduced Net Income	-100	-170	-3.6	-7.1	-1.9	-3.8
Total Agriculture	-100	-170	-3.8	-7.6	-2.0	-4.0
M&I Water Costs	0	0	0.0	0.0	0.0	0.0
TOTAL 1/	**-100**	**-170**	**-4.4**	**-8.8**	**-2.3**	**-4.6**
Bay Area						
Agriculture						
Reduced Output	0	0	0.0	0.0	0.0	0.0
Reduced Net Income	-10	-20	-0.6	-1.4	-0.3	-0.8
Total Agriculture	-10	-20	-0.6	-1.4	-0.3	-0.8
M&I Water Costs	-60	-130	-0.5	-1.1	-0.3	-0.6
TOTAL 1/	**-70**	**-150**	**-5.0**	**-10.8**	**-2.8**	**-6.2**
California Total						
Agriculture						
Reduced Output	-710	-2270	-93.0	-196.5	-31.2	-87.9
Reduced Net Income	-120	-190	-4.8	-7.8	-2.6	-4.1
Total Agriculture	-830	-2460	-97.8	-204.3	-33.8	-92.0
M&I Water Costs	-200	-420	-0.1	-1.9	-0.5	-1.1
TOTAL 1/	**-1030**	**-2880**	**-112.2**	**-233.8**	**-41.4**	**-108.3**

Note: (1) May differ from sum of elements due to rounding.

TABLE 27

REGIONAL ECONOMIC IMPACT: AVERAGE YEAR FOLLOWING DRY 5-YEAR BASE CONDITION COMPARED TO THE PREFERRED ALTERNATIVE AVERAGE YEAR CONDITION

	Employment (# of jobs)		Output ($MM)		PoW Income ($MM)	
Region and Affected Sector	**Direct**	**Total**	**Direct**	**Total**	**Direct**	**Total**
Region and Affected Sector	**Direct**	**Total**	**Direct**	**Total**	**Direct**	**Total**
Sacramento River						
Agric., Frst., Fish.	-450	-630	-26.1	-33.0	-13.4	-16.6
Mining	0	0	0.0	-0.1	0.0	0.0
Construction	0	-30	0.0	-2.1	0.0	-1.2
Manufacturing	-230	-290	-64.9	-73.1	-16.9	-19.8
TCU	0	-120	-0.2	-16.8	-0.1	-7.5
Trade	90	-310	1.6	-13.8	1.2	-8.1
FIRE	-10	-200	-0.9	-22.7	-0.5	-14.6
Services	-20	-500	-1.0	-22.8	-0.6	-13.8
Government	0	-50	-0.2	-7.2	-0.1	-3.5
Misc	0	0	0.0	0.0	0.0	0.0
TOTAL/1	**-630**	**-2130**	**-91.8**	**-191.6**	**-30.5**	**-85.2**
San Joaquin River						
Agric., Frst., Fish.	-10	-20	-0.8	-1.2	-0.4	-0.5
Mining	0	0	-0.1	-0.1	0.0	0.0
Construction	0	0	0.0	-0.3	0.0	-0.1
Manufacturing	-30	-40	-3.8	-5.1	-1.4	-1.9
TCU	0	-10	-0.3	-1.2	-0.2	-0.6
Trade	-140	-210	-3.6	-5.8	-2.4	-3.7
FIRE	-10	-30	-1.1	-4.2	-0.7	-2.7
Services	-30	-100	-1.2	-4.3	-0.7	-2.6
Government	0	-10	-0.2	-0.5	-0.1	-0.2
Misc	0	0	0.0	0.0	0.0	0.0
TOTAL/1	**-230**	**-420**	**-11.0**	**-22.7**	**-5.9**	**-12.4**
Tulare Lake						
Agric., Frst., Fish.	0	-10	-0.3	-0.4	-0.1	-0.4
Mining	0	0	0.0	0.0	0.0	0.0
Construction	0	0	0.0	-0.1	0.0	-0.1
Manufacturing	-20	-20	-2.1	-2.7	-0.7	-2.7
TCU	0	0	0.0	-0.4	0.0	-0.4
Trade	-80	-110	-2.1	-2.9	-1.5	-2.9
FIRE	0	-10	0.0	-0.9	0.0	-0.9
Services	0	-30	0.0	-1.2	0.0	-1.2
Government	0	0	0.0	-0.2	0.0	-0.2
Misc	0	0	0.0	0.0	0.0	0.0
TOTAL/1	**-100**	**-170**	**-4.4**	**-8.8**	**-2.3**	**-8.8**

TABLE 27

REGIONAL ECONOMIC IMPACT: AVERAGE YEAR FOLLOWING DRY 5-YEAR BASE CONDITION COMPARED TO THE PREFERRED ALTERNATIVE AVERAGE YEAR CONDITION

Region and Affected Sector	Employment (# of jobs)		Output ($MM)		PoW Income ($MM)	
	Direct	Total	Direct	Total	Direct	Total
Region and Affected Sector	**Direct**	**Total**	**Direct**	**Total**	**Direct**	**Total**
Bay Area						
Agric., Frst., Fish.	0	0	0.0	-0.1	0.0	0.0
Mining	0	0	0.0	0.0	0.0	0.0
Construction	0	0	0.0	-0.1	0.0	-0.1
Manufacturing	-10	-10	-1.4	-2.2	-0.5	-0.8
TCU	0	-10	-0.3	-0.8	-0.2	-0.4
Trade	-30	-50	-1.1	-2.0	-0.7	-1.3
FIRE	-10	-20	-1.0	-2.4	-0.6	-1.6
Services	-20	-60	-1.1	-2.8	-0.7	-1.8
Government	0	0	-0.2	-0.3	-0.1	-0.2
Misc	0	0	0.0	0.0	0.0	0.0
TOTAL/1	-70	-150	-5.0	-10.8	-2.8	-6.2
California Total						
Agric., Frst., Fish.	-470	-660	-27.2	-34.6	-13.9	-17.5
Mining	0	0	-0.1	-0.2	0.0	-0.1
Construction	0	-40	0.0	-2.6	0.0	-1.5
Manufacturing	-290	-370	-72.2	-83.1	-19.6	-25.2
TCU	-10	-140	-0.8	-19.3	-0.4	-8.9
Trade	-170	-680	-5.0	-24.5	-3.3	-16.0
FIRE	-20	-260	-2.9	-30.2	-1.8	-19.8
Services	-70	-680	-3.3	-31.1	-2.0	-19.3
Government	0	-60	-0.6	-8.2	-0.3	-4.1
Misc	0	0	-0.1	-0.1	-0.1	-0.1
TOTAL/1	-1030	-2880	-112.2	-233.8	-41.4	-112.5

Note:(1) May differ from sum of elements due to rounding.

SECTION 3

MUNICIPAL AND INDUSTRIAL WATER USE ECONOMICS

MUNICIPAL AND INDUSTRIAL ECONOMICS

The municipal and industrial economics analysis is based upon the Average-Average tiered pricing scenario. This analysis is based upon the impacts to CVP contractors. This is different than the municipal and industrial economic analysis that was included in the PEIS.

The PEIS municipal and industrial water cost analysis primarily evaluated the impacts on the need and cost to transfer water to non-CVP municipalities. Therefore, the analysis included water costs for many non-CVP water users. For example, the municipality in the San Joaquin River Basin was based upon the Cities of Stockton and Fresno water costs which are not based on CVP water, as described in the Municipal Water Costs Methodology and Modeling Technical Appendix to the PEIS.

The analysis included in the following table is based only on CVP contractors in order to define the cost of CVP water under the Tiered Water Pricing proposal.

TABLE 28

SUMMARY OF M&I ECONOMICS ANALYSIS FOR AVERAGE YEAR CONDITIONS FOR REGIONAL ECONOMICS

Result	Preferred Alternative Average	Change from the Preferred Alternative Average		
		Average-Average	Dry-Average	Wet-Average
Average Condition				
Supplies, 1,000 acre-feet (1)				
Sacramento Valley	929.0	0.0	0.0	0.0
Bay Area	1024.0	0.0	0.0	0.0
San Joaquin Valley	704.0	0.0	0.0	0.0
Central and South Coast	5921.0	0.0	0.0	0.0
Average Condition				
Economic Costs, Million $ (2)				
Sacramento Valley	1.1	4.1	4.3	4.1
Bay Area	3.5	4.6	4.6	4.6
San Joaquin Valley	0.3	5.2	5.2	5.2
Central and South Coast	649.0	0.0	0.0	0.0

NOTES:

Water transfers not considered as replacement supplies in this comparison.

(1) After purchase or development of non-transfer replacement supplies to make supply equal demand.

(2) Total costs include replacement supplies, restoration payments and metering. A negative cost means a net gain is estimated.

APPENDIX C
DISTRIBUTION LIST

APPENDIX C
DISTRIBUTION LIST

Director, Office of Environmental Policy and Compliance
US Department of the Interior
Main Interior Building, MS 2340
1849 C Street, NW
Washington DC 20240

Ms. Patricia Port
US Department of the Interior
Office of Environmental Policy and Compliance
1111 Jackson St., Suite 520
Oakland, CA 94607

David Farrel
Federal Activities Office
US Environmental Protection Agency, Region IX
75 Hawthorne Street
San Francisco, CA 94105

Harry Mossman, Biologist
US Fish and Wildlife Service
Special Status Species, Sacramento Field Office
2800 Cottage Way #W-2605
Sacramento, CA 95825-1888

Wayne S. White
Field Supervisor
U.S. Fish and Wildlife Service
2800 Cottage Way
Sacramento, CA 95825

National Marine Fisheries Service
Central Valley Team Leader
650 Capitol Mall, Suite 6070
Sacramento CA 96814-4706

Mr. Rodney McInnis
Acting Regional Administrator
National Marine Fisheries Service
501 West Ocean Blvd., Suite 4200
Long Beach, CA 90802

Office of the Solicitor
Pacific Southwest Region
2800 Cottage Way
Sacramento CA 95825

Western Area Power Administration
114 Parkshore Drive
Folsom CA 95630

Nina A. Bicknese
Bureau of Reclamation
Mid Pacific Regional Office
Environmental Affairs Division. MP 150
2800 Cottage Way, Sacramento, CA 95825

Frank Michny
Bureau of Reclamation
Mid-Pacific Region
Environmental Affairs Division. MP 150
2800 Cottage Way, Sacramento, CA 95824

Donna Tegelman
Bureau of Reclamation
Mid-Pacific Region, MP 400
2800 Cottage Way, Sacramento, CA 95824

Don Bultema
Bureau of Reclamation
P.O. Box 988
1140 West Wood St.
Willows, CA 95988

Buford Holt
Bureau of Reclamation
16349 Shasta Dam Blvd.
Shasta Lake CA 96019-8400

Carl Wilcox
California Department of Fish and Game, Region 3
P.O. Box 47
Yountville, CA 94599

Duane Massa, Fishery Biologist
California Department of Fish and Game
Feather & Yuba River Anadromous Fisheries
1701 Nimbus Road, Suite "A"
Rancho Cordova, CA 95670

Daniel Abeyta
Historic Preservation Officer
California State Historic Preservation Office
P.O. Box 942896
Sacramento, CA 94296-0001

California Department of Water Resources
1416 9th Street
Sacramento CA 95814
State Water Resources Control Board
901 P Street
Sacramento CA 95814

Diane Riddle and Gita Kapahi
SWRCB, Division of Water Rights,
P.O. Box 2000
Sacramento, CA 95812

Governor's Office of Planning and Research
California State Clearinghouse
1400 Tenth Street, Room 121
P.O. Box 3044
Sacramento, CA 95812-3044

State Attorney General's Office
Land Law Section
1515 Clay Street - 20th Floor
Oakland CA 94612

CALFED Bay-Delta Program
1416 9th Street
Sacramento CA 95814

Gail Gould
Sutter County Community Services Department
Planning Division
1160 Civic Center Boulevard, Suite E
Yuba City, CA 95993

Trinity County Natural Resources
PO Box 156
Hayfork CA 96041-0156

County of Fresno
2220 Tulare Street
Fresno CA 93721

SMUD
PO Box 15830
Sacramento CA 95852-1830

Francis Silva, Manager
Feather Water District
280 Wilkie Avenue
Yuba City CA 95991

Westlands Water District
PO Box 6056
Fresno CA 93703

Santa Clara Valley Water District
5750 Almaden Expressway
San Jose CA 95118

Mr. Fred Schmidt
Colorado State University Libraries
Monographs Acquisitions Service
Fort Collins, CO 80523-1019

Hal Candee
Natural Resources Defense Council
71 Stevenson Street, Suite 1825
San Francisco CA 94105

Sacramento River Preservation Trust
PO Box 5366
Chico CA 95927

Editor, Spillway
PO Box 8362
Berkeley CA 94707-8362

Jack McLaughlin
676 King Avenue
Yuba City CA 95991-2808

Griswold LaSalle Cobb Dowd & Gin,
L.L.P.
PO Box 330
Hanford CA 93232

Mr. Jack McLaughlin
676 King Avenue
Yuba City CA 95991-2808

Duane Morris
100 Spear Street, #1500
San Francisco CA 94105

Law Office of
DANIEL F. GALLERY
926 'J' Street, Suite 505
Sacramento, CA 95814-2786

Kronick Moskovitz Tiedemann & Girard
1800 30th Street, Suite 320
Bakersfield CA 93301

Downey Brand Seymour & Rohwer
555 Capitol Mall
Sacramento CA 95814-4686

Henry Logolusa & Blum
441-C South Madera Avenue
Kerman CA 93630

Kleinschmidt
133 L Street Suite C
Sacramento CA 95814

Regina M. Cutler
Attorney at Law
Morisset, Schlosser, Jozwiak & McGaw
801 Second Avenue, 1115 Norton Building
Seattle, WA 98104-1509

APPENDIX D
SPECIAL STATUS SPECIES

APPENDIX D
SPECIAL STATUS SPECIES

Special Status Species Listed by the Service as Potentially Occurring at the Feather Water District

Scientific Name	Common Name	Federal/State/ CNPS Status	Occurrence at the Feather Water District
Threatened and Endangered Species			
Invertebrates			
Lepidurus packardi	Vernal pool tadpole shrimp	E/-/-	U
Branchinecta lynchi	Vernal pool fairy shrimp	T/-/-	U
Desmocerus californicus dimorphus	Valley elderberry longhorn beetle	T/-/-	P
Branchinecta conservatio	Conservancy fairy shrimp	E/-/-	U
Fish			
Oncorhynchus tshawytscha	Winter-run chinook salmon	E/E/-	U
Oncorhynchus tshawytscha	Central Valley spring-run chinook salmon	T/T/-	P
Oncorhynchus mykiss	Central Valley steelhead	T/-/-	P
Pogonichthys macrolepidotus	Sacramento splittail	T/CSC/-	P
Hypomesus transpacificus	Delta smelt	T/T/-	U
Amphibians			
Rana aurora draytonii	California red-legged frog	T/CSC/-	P
Reptiles			
Thamnophis gigas	Giant garter snake	T/T/-	P
Birds			
Branta canadensis leucopareia	Aleutian Canada goose	T/-/-	P
Falco peregrinus anatum	American peregrine falcon	DL/E/-	P
Plants			
Pseudobahia bahiifolia	Hartwegs golden sunburst	E/E/1B	U
Proposed Species			
Birds			
Charadrius montanus	Mountain plover	PT/CSC/-	U
Candidate Species			
Fish			
Oncorhynchus tshawytscha	Central Valley fall/late fall-run chinook salmon	C/-/-	U

Scientific Name	Common Name	Federal/State/ CNPS Status	Occurrence at the Feather Water District
Amphibians			
Ambystoma californiense	California tiger salamander	C/CSC/-	U
Species of Concern			
Invertebrates			
Anthicus sacramento	Sacramento anthicid beetle	SC/-/-	P
Cicindela hirticollis abrupta	Sacramento Valley tiger beetle	SC/-/-	P
Linderiella occidentalis	California linderiella fairy shrimp	SC/-/-	U
Fish			
Acipenser medirostris	Green sturgeon	SC/CSC/-	U
Lampetra tridentata	Pacific lamprey	SC/-/-	U
Spirinchus thaleichthys	Long fin smelt	SC/CSC/-	U
Amphibians			
Scaphiopus hammondii	Western spadefoot toad	SC/CSC/-	U
Reptiles			
Clemmys marmorata marmorata	Northwestern pond turtle	SC/CSC/	P
Birds			
Agelaius tricolor	Tri-colored blackbird	SC/CSC/-	P
Buteo swainsoni	Swainson's hawk	SC/T/-	P
Riparia riparia	Bank swallow	SC/T/-	U
Buteo regalis	Ferruginous hawk	SC/CSC/-	P
Empidonax traillii brewsteri	Little willow flycatcher	SC/E/-	P
Athene cunicularia hypugea	Western burrowing owl	SC/CSC/-	U
Plegadis chihi	White-faced ibis	SC/CSC/-	U
Mammals			
Myotis yumanensis	Yuma myotis bat	SC/CSC/-	U
Plecotus townsendii townsendii	Pacific (Townsend's) western big-eared bat	SC/CSC/-	U
Corynorhinus (=Plecotus) townsendii pallescens	Pale Townsend's big-eared bat	SC/CSC/-	U
Myotis ciliolabrum	Small-footed myotis bat	SC/-/-	U
M. thysanodes	Fringed myotis bat	SC/-/-	U
M. volans	Long-legged myotis bat	SC/-/-	U
M. evotus	Long-eared myotis bat	SC/-/-	U
Perognathus inornatus inornatus	San Joaquin pocket mouse	SC/**/-	P
Eumops perotis californicus	Greater western mastiff-bat	SC/SC/-	U
Dipodomys californicus eximius	Marysville Heermann's kangaroo rat	SC/SC/-	P
Plants			
Monardella douglasii ssp. *venosa*	Veiny monardella	SC*/-/1B	U

Source: Service 2000; CDFG 2000

Notes:

Federal Status
- E = Endangered
- T = Threatened
- PE = Proposed endangered
- PT = Proposed threatened
- C = Candidate
- SC = Species of concern
- DL = Recently delisted
- * = Possibly extirpated from this quad

State Status
- E = Endangered
- T = Threatened
- CSC = California species of special concern
- R = Rare
- CE= Candidate for listing as endangered
- ** = Restricted in distribution; declining

CNPS Status
- 1B = Rare, threatened, and endangered in California and elsewhere
- 2 = Rare, threatened, and endangered in California but more common elsewhere

Occurrence
- C = Confirmed
- P = Possible
- U = Unlikely

APPENDIX E
PUBLIC COMMENTS AND RESPONSES

APPENDIX E
PUBLIC COMMENTS AND RESPONSES

E.1 INTRODUCTION

The following pages show all the comments received on the Revised Draft EA and the Bureau's responses to those comments. The Bureau reviewed and considered all comments and determined whether or not the comments warranted further analysis and documentation. The Bureau noted in the individual responses when further analysis or changes were made.

E.2 INDEX

APPENDIX E
PUBLIC COMMENTS AND RESPONSES

E.1 INTRODUCTION

The following pages show all the comments received on the Revised Draft EA and the Bureau's responses to those comments. The Bureau reviewed and considered all comments and determined whether or not the comments warranted further analysis and documentation. The Bureau noted in the individual responses when further analysis or changes were made.

E.2 INDEX

Comments

Hoopa Valley Tribe

LAW OFFICES
MORISSET, SCHLOSSER, JOZWIAK & McGAW
A PROFESSIONAL SERVICE CORPORATION

REGINA M. CUTLER (WA, OR)
FRANK R. JOZWIAK (WA)
KYME A.M. McGAW (WA)
MASON D. MORISSET (WA)
THOMAS P. SCHLOSSER (WA)
ROB ROY SMITH (WA, OR, ID)

OF COUNSEL
SHARON I. HAENSLY (WA)

COMPTROLLER
M. ANN BERNHEISEL

1115 NORTON BUILDING
801 SECOND AVENUE
SEATTLE, WA 98104-1509

TELEPHONE: (206) 386-5200
FACSIMILE: (206) 386-7322

WWW.MSAJ.COM

September 17, 2004

Ms. Basia Trout
Bureau of Reclamation
P.O. Box 159
Red Bluff, CA 96080

Email: btrout@mp.usbr.gov

Re: Comments on Revised Draft Environmental Assessment and Draft FONSI for Feather Water District Long Term Contract Renewals (July 2004).

Dear Ms. Trout:

On behalf of the Hoopa Valley Indian Tribe, we have reviewed and now submit the following comments on the above referenced Draft Revised Environmental Assessment (REA) and Draft Finding of No Significant Impact (FONSI). These comments reflect the Tribe's ongoing concern with management of the Central Valley Project ("CVP"), which includes the Trinity River Division. We have separately commented on the absence of language in the proposed long-term contract renewals that would assure protection of the Tribe's fisheries. Because of the CVP's effect on fisheries reserved for the Tribe, we are committed to ensuring that Reclamation actions subject to the National Environmental Policy Act (NEPA) reflect and comply with court decisions requiring, for example, that mitigation measures imposed as a result of consultation under Section 7 of the Endangered Species Act be addressed in draft environmental review documentation prepared pursuant to NEPA. *See e.g. Westlands v. United States*, 275 F.Supp.2d 1157 (E.D. Cal. 2002*), rev'd on other grounds*, No. 03-15194 (9th Cir. July 13, 2004) (discussed below). This approach ensures that the public is fully informed and has the opportunity to comment and participate in the decision-making process on all aspects of projects affecting the human environment.

H-1

Reclamation has tentatively concluded that the proposed project, the Feather Water District's water service contracts for the delivery of up to 20,000 acre-feet of CVP water for a term of 25 years, will have no significant impact requiring an Environmental Impact Statement. Draft FONSI at 1. That conclusion, however, is unsupported in a number of particulars described below. It also relies in part on deferral of consideration of impacts to threatened and endangered species pending completion of consultation with NOAA-Fisheries and the Fish and Wildlife Service. *Id.* at 4. Such an approach is legally impermissible.

Responses

H-1

The No Action Alternative consists of renewing existing water service contracts as described by the Preferred Alternative of the PEIS. The No Action Alternative together with negotiated proposals for CVP-wide terms and conditions are the basis for the action alternatives. The preferred alternative essentially maintains the status quo apart from changes mandated by the CVPIA. The analysis displays the increment of change between the No Action Alternative and the other alternatives.

Hoopa Valley Tribe (cont'd)

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1. Scope of Analysis

The REA states that it is limited in its scope to determining whether renewal of Feather River District long-term water service contracts will have "site specific" impacts. Draft EA at ES-2. This focus on site-specific impacts is reflected in the document's "area of analysis" as the land within the district and counties of the Feather River District project area and vicinity that may be affected by renewal of these 18 contracts. Draft EA at ES-2. Accordingly, there is no analysis of how the associated diversions will affect other portions of the CVP service area, such as the Trinity River basin or the Bay/Delta region. For example, it is likely that an alternative requiring lower volumes of diversions would make more water from the Feather River available at its confluence with the Sacramento River, thus making greater supplies available for Sacramento River water users, fish and wildlife needs in the Sacramento River. This could reduce the need to rely on diversion from the Trinity River for those purposes. Lower level diversions from the Feather River to contractors may also provide higher Sacramento River flow into the Delta, thus improving water quality in the Delta and the availability of Delta resources for fishery, agricultural, municipal and industrial uses in southern California. The EA presents no analysis of the interrelationship between these diversions and other portions of the CVP. This glaring and fatal omission *is* a result both of the site-specific focus of the document and the improvident omission of lower volume-diversion alternatives from the range of alternatives considered.

The EA states that its site-specific focus is warranted by the fact that the document is "tiered" off a Programmatic Environmental Impact Statement (PEIS) prepared in October 1999, which evaluated the impacts of implementing the CVPIA, including the renewal of existing long-term contracts. However, the EA also acknowledges that the PEIS preferred alternative included a set of contract terms and conditions represented by the No Action alternative of this EA, and that the final Feather River renewal contract will not incorporate that particular set of terms and conditions. Draft EA at 2-8 (stating that final contracts will include terms negotiated between Alternatives 1 and 2). It is therefore possible that the actual contract terms will have CVP-wide impacts that were not analyzed in the CVPIA PEIS.

For example, the PEIS preferred alternative assumed that tiered pricing would be a component of any renewal contracts. The lack of tiered pricing in the proposed contracts may have significant effects on volumes of water actually requested for delivery under the contracts, which in turn will affect CVP-wide availability and reliability of supplies, carryover storage, and the finances resources available to the Bureau to fund fishery and wildlife measures required by the CVPIA. The set of impacts addressed on a programmatic and CVP-wide level in the PEIS therefore may be very different from the impacts that will actually result from implementation of the proposed action as presented in this EA.

Comments

Hoopa Valley Tribe (cont'd)

Bureau of Reclamation
ATTN: Basia Trout
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Page 3

2. Failure to Include an Alternative that Includes Contract Language Reflecting CVPIA Mandated Fishery Restoration Flows.

H-2

The proposed action is the renewal of Feather River District contracts for 25 years. The language of the proposed contract is not specifically analyzed in the REA, but was made available to the public on July 2, 2004. The Feather River contract, like other proposed CVP renewal contracts states generally that deliveries (and by implication the diversions necessary to accomplish those deliveries) will comply with the requirements of federal law. The contract language does not specifically reference the requirements of federal law that require priority be given to providing sufficient flows to protect and restore specified anadromous fisheries, including those of the Trinity River, *e.g.* Trinity River Act of 1955, Pub. L. 84-386, 69 Stat. 719 (1955); CVPIA § 3406(b)(23); *see also* Solicitor's Opinion, "Proposed Contract with Grasslands Water District," U.S. Dept. of Interior (Dec. 7, 1979). The EA should have considered an alternative that incorporates language specifically referencing those obligations.

On October 23, 2003, the Hoopa Valley Tribe ("Tribe") filed an administrative appeal of the Bureau Regional Director's denial of the Tribe's request that language referencing the instream fishery flow requirements of the Trinity River be incorporated into the terms of long-term renewal contracts between the Bureau of Reclamation ("Bureau") and Central Valley Project ("CVP") water service contractors. This language is authorized by section 3404 of the Central Valley Project Improvement Act, Pub. L. 102-575, 106 Stat. 4600 (1992) ("CVPIA"), which subjects new and renewal CVP water service contracts to the fishery restoration provisions of the CVPIA, which includes the Bureau's obligation to meet the fishery restoration requirements of the Trinity River as established by the Trinity River Flow Evaluation-Final Report ("Flow Study"). *See* CVPIA § 3406(b)(23).

Contract language acknowledging Trinity River restoration requirements also reflects long-standing congressional directives that prioritize Trinity fishery releases over transbasin diversions to Central Valley contractors and is consistent with the federal government's trust responsibility to protect and preserve the Hoopa Valley Tribe's federally reserved fishing right. The Tribe's request was narrowly tailored to require compliance with scientifically based fishery flow requirements set forth in the Flow Study. Those requirements must be implemented pursuant to CVPIA § 3406(b)(23), and should be included as conditions on supply made available for delivery to Central Valley Project contractors.

The decisions of the federal courts since the enactment of the CVPIA make clear that the Bureau can and should reduce quantities of water delivered when fishery needs demand greater allocations. *See O'Neill v. United States*, 50 F.3d 677, 686 (9th Cir. 1998) (holding that the CVPIA modified priority of water users and thus changed contractual obligations under pre-existing long-term water delivery contracts); *NRDC v. Houston*, 146 F.3d 1118, 1126 (9th Cir. 1998) (invalidating CVP renewal contracts for failure to comply with environmental requirements); *Klamath Water Users Protective Ass'n v. Patterson*, 204 F.3d 1206, 1213 (9th Cir. 1999) (recognizing Bureau's responsibility to manage project operations to "meet the requirements of the ESA, requirements that override the water rights of the Irrigators"). The

Responses

H-2

Fishery restoration flows are issues related to the operation of facilities to store and deliver water to the contractors, and were addressed in the PEIS and again in the OCAP BA/BO consultation; whereas the contracts that are the subject of this EA concern the delivery of water and the class of use (ag, M&I). In addition, the CVPIA has separate programs dealing specifically with fishery restoration flows.

Your comments concern issues affecting availability of stored water, whereas the EA addresses the delivery of water when it is available.

Comments

Hoopa Valley Tribe (cont'd)

Ninth Circuit has expressly recognized the Bureau's obligation to operate to meet the water needs of vested tribal fishing rights. *Klamath Water Users*, 204 F.3d at 1214 (holding that the Bureau has "a responsibility to divert the water and resources needed to fulfill the Tribes' rights, rights that take precedence over any alleged rights of the Irrigators"). Accordingly, the terms of interim renewal contracts should expressly acknowledge those requirements, and the impacts of incorporating those requirements into the contracts should be assessed in an EIS.

Express subordination of water service delivery obligations to fishery restoration needs is hardly unprecedented. *E.g., id.* The Bureau has historically included fishery restoration requirements as among the conditions on supply available to satisfy interim renewal contracts. For example, in *California Trout v. Schaefer*, 58 F.3d 469 (9th Cir. 1995), the court noted that an interim renewal contract for allocations from the New Melones Reservoir provided "a maximum of 75,000 acre-feet of water annually, subject to availability after the Bureau satisfied the water needs of in-basin users and higher priority out-of-basin users." *Id.* at 471 (emphasis added). The "in-basin" needs given priority under that contract included those of "fish and wildlife resources" in the Stanislaus River Basin established under CVPIA § 3406(c)(2). *Id.* Given that precedent, the Bureau should consider an alternative heeding the command of CVPIA § 3404(c) in the terms of interim renewal contracts.

Improper Deferral of Mitigation.

H-3

The EA improperly defers consideration of impacts to and mitigation measures for threatened and endangered species pending completion of ESA § 7 consultation with NOAA-Fisheries and the Fish and Wildlife Service. Draft FONSI at 2-3; Draft EA at 4-3. Such an approach is impermissible under NEPA, as illustrated by the ruling in *Westlands*, 275 F.Supp. 2d at 1182 -1185, *rev'd in part on other grounds*, No. 03-15194 (9th Cir. July 13, 2004). In that case, the court found that a Draft Environmental Impact Statement (DEIS) did not adequately analyze the impact of the proposed action on certain ESA-listed species. *Id.* at 1183. Further, the court found that the DEIS "did not consider or identify mitigation measures" for those impacts, other than to "specify that mitigation for impacts…would consist of consulting with the Service on impacts and implementing any required conservation measures." *Id.* The court concluded that Reclamation violated NEPA.

That is precisely the approach adopted in this document, which acknowledges that ESA § 7 consultation both on the CVP-OCAP and on the localized impacts of the particular contracts at issue here has yet to be completed. It is likely that significant mitigation requirements will be imposed because of that consultation, as the EA acknowledges that at a minimum, there will be potential indirect impacts to anadromous fish species due to lack of screening at pump intakes. REA at ES-5, Table ES-1 and 3-40 through 3-42. In the words of the *Westlands* court, this approach "defers consideration of mitigation efforts" and "precludes the parties from meaningful analysis." *Id.* at 1184. See also *id.* at 1188 ("The omission of discussion of mitigation measures foreclosed any public input on the issues of whether and what CVP operations management alternatives existed and were feasible; and whether alternate water sources existed or if reduced flows could reduce the impact on species and other CVP users.").

Responses

H-3

The Draft NEPA document reflects Reclamation's assessment of impacts on listed species based on our Biological Assessment. The NEPA document will be amended, if necessary, in the Final EA to reflect any findings of the Biological Opinions that differ. The decision of what action, if any, to take will be based on the Final EA, not the Draft.

Comments

Hoopa Valley Tribe (cont'd)

Moreover, to the extent that mitigation measures are imposed as a result of deferred ESA § 7 consultation, either in the form of Reasonable and Prudent Measures (RPMs) or other terms and conditions that may have significant impacts beyond those of the proposed action standing alone, the *Westlands* case requires that the environmental impacts of those mitigation measures be discussed "with reasonable thoroughness." *Id.* at 1192. These measures and their environmental impacts must be disclosed to the public in a process that "included public participation", *i.e.* they must be disclosed in a manner that allows meaningful public scrutiny, comment, and participation. *Id.* at 1198. By omitting discussion of species impacts until after completion of consultation with the fisheries agencies, the Draft EA/FONSI for interim contract renewals fails to meet these requirements.

We are particularly concerned about the potential effects that may arise from RPMs under consideration by NOAA Fisheries in their review of the CVP-OCAP. As you know, NOAA is considering including in their Biological Opinion RPMs setting minimum flows in the Feather River. Such terms and conditions may have discrete as well as cumulative impacts on water supplies available for diversion to meet the contractual obligations proposed here, as well as impacts to fishery and power resources that are not fully disclosed and addressed in this draft EA. The public has thus been deprived of the opportunity to meaningfully review the cumulative impacts of diverting up to 20,000 acre feet of water from the Feather River and the associated actions that will be required under the ESA to mitigate the effect of those diversions.

3. Inadequate Discussion of Alternatives.

H-4

The Draft EA is also insufficient because it lacks an adequate discussion of the "environmental impacts of the proposed action and alternatives" 40 C.F.R. § 1508.9. Council on Environmental Quality (CEQ) regulations require that an environmental assessment "shall include" a discussion of the environmental impacts "of the proposed action and alternatives...." *Id.* The Draft EA/FONSI, however, discusses only three alternatives: no action, the Bureau's proposed contract terms, and the Contractor's proposed contract terms. The EA does not identify actual proposed terms of the renewed contracts, but states that, as a result of ongoing negotiations between contractors and the Bureau, the actual terms of contracts to be executed will fall somewhere in between the "bookends" represented by the three alternatives. Draft EA at ES-3; *Id.* at 2-8. The EA thus fails to identify a preferred alternative that accurately describes the actual action and associated effects. This approach is somewhat disingenuous in light of the fact that on July 2, 2004 the Bureau announced that it had concluded negotiation on contract terms and at that time released the negotiated terms for a 60-day public review. *See* Bureau of Reclamation Press Release No. MP-04-054 (available at << http://www.usbr.gov/mp/mp140/news/2004/MP-04-050.html >>).

Responses

H-4

The EA and the scope of the analysis were developed consistent with NEPA regulations and guidance from the Council on Environmental Quality (CEQ), and in conformance with the direction provided by NRDC vs Patterson, Civ. No. S-88-1658 (Patterson) which specifically addressed the application of NEPA relative to contract renewals. In Patterson the court found that "…ongoing projects and activities require NEPA procedures only when they undergo changes amounting in themselves to further "major action." The court went further to state that the NEPA statutory requirement applies only to those changes. The analysis in the EA finds the renewals of the contract to be a continuation of previous contracts with minor financial and administrative changes with no changes in either the volumes of water under contract or the places of use. Moreover, most do not involve any change in the type of use, such as the addition of M&I uses. The analysis in the EA addresses the proposed changes to the contract and the potential environmental effects of those changes. As indicated in the EA, these contract changes would not result in significant effects to the environment.

The two action alternatives represent the terms of the final contract, and a copy of a representative contract is provided in Appendix F of the final EA.

Comments

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H-5

The analysis also expressly excludes from consideration a number of reasonable alternatives, including non-renewal, and renewal at reduced delivery amounts that would more accurately reflect current delivery constraints. *See* Draft EA at 2-7 through 2-8. These alternatives warrant further consideration. A comparative analysis of differential environmental impacts of a wide range of alternatives to the proposed action must be undertaken in order to allow the public a meaningful opportunity to assess the proposed action.

5. M&I Shortage Policy

H-6

The terms of the contracts at issue, as disclosed on July 2, 2004, do not specifically reference Reclamation's proposed revised M&I Shortage Policy, which has been under development for a number of years and has yet to be completed or subjected to necessary review under NEPA or the ESA. According to the Project Description for the Biological Assessment on the CVP-OCAP, any contract that does not specifically refer to the revised policy will not be subject to its provisions. Long Term CVP and SWP OCAP Biological Assessment (June 30, 2004) at p. 2-20. The Draft EA does not discuss the revised policy, its impacts or implications. In the event that the revised M&I Shortage Policy is completed prior to execution of these contracts, and the final contracts as released for public comment on July 2, 2004 are further revised to reflect that policy, recirculation of this EA will be necessary in order to assess the impacts of incorporating those revised shortage provisions into these contracts.[1]

6. Indian Trust Assets and Lack of Analysis of Cumulative Effects

H-7

The draft FONSI states that "continued delivery of project water to the existing contracts will not affect any Indian Trust Assets because existing rights will not be affected." Draft FONSI at 3. That statement fails to acknowledge the nature of water rights associated with tribal fishing rights. For example, the Hoopa Valley Tribe's federally protected fishing right guarantees to the Tribe the right to a fishery that is supportive of a moderate standard of living. As has been repeatedly acknowledged by the federal courts, tribes are entitled to sufficient water in rivers flowing through their lands to support a fishery that will meet those needs. Accordingly, as the needs of the Tribe and the fishery change, so do the water rights associated with the need to sustain that fishery. We accordingly remain very concerned that contractually dedicating the vast amounts of water that are specified in the CVP long term contracts will make it increasingly difficult for the CVP to adequately protect tribal fishery resources, as the limited supply that is available for these purposes is subject to increasingly greater demands as a result of foreseeable drought, global warming, population growth, and urban development. The EA fails to adequately address the cumulative impacts of these various factors on the Bureau's ability to provide for and protect the fishery resources within its charge. *See e.g.* CVPIA § 3406

[1] This is particularly relevant in light of the contract provisions allowing the District to receive "other water" (*i.e.* for uses other than agriculture or livestock) at prices established for M&I users. *See* REA at ES-1.

Responses

H-5

The alternatives present a range of water service agreement provisions that could be implemented for long term contract renewals. The No Action Alternative consists of renewing existing water service contracts as described by the Preferred Alternative of the PEIS. The No Action alternative together with negotiated proposals for CVP-wide terms and conditions are the basis for the alternatives. Reduction of contract amounts were considered in certain cases but rejected from analysis. The needs analyses performed resulted in a need for water which equals or exceeds the current total contract amount. The existing and proposed renewal contracts both include provisions for reductions in deliveries in those years in which insufficient water is available.

Non-renewal of existing contracts is considered infeasible based on Section 3404(c) of the CVPIA. Reclamation is mandated by law to renew the contracts and thus lacks discretion to not renew the contracts.

H-6

Those impacts are being discussed in a separate EA specific to the revised M&I policy.

H-7

Those issues were the subject of the Trinity River EIS and the PEIS. They do not need to be reanalyzed in documents focused upon the maximum quantities under contract. As noted in a prior response the requirements for flows in the Trinity Basin affect how much water is available to fulfill contracts, whereas this document addresses the maximum amount that would be delivered. This EA addresses how much may be delivered if available, whereas the comment addresses factors affecting how much will be available.

Hoopa Valley Tribe (cont'd)

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(b)(23) (identifying trust responsibility to protect the fishery resources of the Hoopa Valley Tribe as constraint on operation of CVP facilities).

Thank you for allowing us the opportunity to comment on the Draft EA/FONSI. We trust that our comments will be appropriately considered and addressed in any final NEPA documentation for this proposed action.

Sincerely yours,

MORISSET, SCHLOSSER, JOZWIAK & McGAW

Thomas P. Schlosser
Regina M. Cutler
Attorneys for the Hoopa Valley Tribe

cc: Bennett Raley
Kirk Rodgers
Steve Thompson

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California State Clearinghouse

STATE OF CALIFORNIA
Governor's Office of Planning and Research
State Clearinghouse and Planning Unit

Arnold Schwarzenegger
Governor

Jan Boel
Acting Director

September 9, 2004

Basia Trout
U.S. Bureau of Reclamation
Red Bluff Field Office
22500 Altube Avenue
Red Bluff, CA 96080

Subject: Renewal of Long-term Contracts for the Feather Water District
SCH#: 2004084001

Dear Basia Trout:

The State Clearinghouse submitted the above named Environmental Assessment to selected state agencies for review. The review period closed on September 8, 2004, and no state agencies submitted comments by that date. This letter acknowledges that you have complied with the State Clearinghouse review requirements for draft environmental documents, pursuant to the California Environmental Quality Act.

Please call the State Clearinghouse at (916) 445-0613 if you have any questions regarding the environmental review process. If you have a question about the above-named project, please refer to the ten-digit State Clearinghouse number when contacting this office.

Sincerely,

Terry Roberts

Terry Roberts
Director, State Clearinghouse

1400 TENTH STREET P.O. BOX 3044 SACRAMENTO, CALIFORNIA 95812-3044
TEL (916) 445-0613 FAX (916) 323-3018 www.opr.ca.gov

California State Clearinghouse (cont'd)

eport
State Clearinghouse Data Base

SCH#	**2004084001**
Project Title	Renewal of Long-term Contracts for the Feather Water District
Lead Agency	U.S. Bureau of Reclamation
Type	**EA** Environmental Assessment
Description	Renewal of a long-term water service contract with Feather Water District for a period of 25 years or 40 years, depending on water use.

Lead Agency Contact

Name	Basia Trout		
Agency	U.S. Bureau of Reclamation		
Phone	530-520-0512	***Fax***	
email			
Address	Red Bluff Field Office 22500 Altube Avenue		
City	Red Bluff	***State*** CA ***Zip*** 96080	

Project Location

County	Sutter			
City	Yuba City			
Region				
Cross Streets	State Highways 99 and 113			
Parcel No.				
Township		***Range***	***Section***	***Base***

Proximity to:

Highways	99, 113
Airports	
Railways	
Waterways	Feather River
Schools	
Land Use	

Project Issues	Aesthetic/Visual; Agricultural Land; Air Quality; Archaeologic-Historic; Cumulative Effects; Economics/Jobs; Geologic/Seismic; Landuse; Recreation/Parks; Soil Erosion/Compaction/Grading; Vegetation; Water Quality; Water Supply; Wetland/Riparian; Wildlife
Reviewing Agencies	Resources Agency; Regional Water Quality Control Bd., Region 5 (Sacramento); Department of Parks and Recreation; Native American Heritage Commission; Department of Health Services; Office of Historic Preservation; Reclamation Board; Department of Fish and Game, Region 2; Department of Water Resources; Caltrans, District 3; State Water Resources Control Board, Division of Water Rights

Date Received 08/10/2004 ***Start of Review*** 08/10/2004 ***End of Review*** 09/08/2004

Note: Blanks in data fields result from insufficient information provided by lead agency.