

DRAFT REPORT

Sacramento River Settlement Contractors Environmental Impact Statement

Prepared for
U.S. Bureau of Reclamation

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CH2MHILL

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ACRONYMS AND ABBREVIATIONS

µg/m ³	micrograms per cubic meter
°F	degrees Fahrenheit
Accord	Bay-Delta Accord
ACID	Anderson-Cottonwood Irrigation District
AF	acre-feet
AFY	acre-feet per year
BLM	Bureau of Land Management
BWMP	Basinwide Water Management Plan
CAAQS	California Ambient Air Quality Standards
CDFG	California Department of Fish and Game
CDMWC	Colusa Drain Mutual Water Company
CFR	Code of Federal Regulations
CNPS	California Native Plant Society
COE	Corps of Engineers
CVP	Central Valley Project
CVPIA	Central Valley Project Improvement Act
D	Decision
Department	California Department of Water Resources
DPR	Department of Parks and Recreation
du	
EDD	Employment Development Department
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
EPA	U.S. Environmental Agency
GCID	Glenn-Colusa Irrigation District
gpd	gallons per day
KAFY	thousand acre-feet per year
M&I	municipal and industrial
MAF	million acre-feet
MFWC	Meridian Farms Water Company
MID	Maxwell Irrigation District
NAAQS	National Ambient Air Quality Standards
NCMWC	Natomas Central Mutual Water Company
NEPA	National Environmental Policy Act
NOAA-Fisheries	National Oceanic and Atmospheric Administration - Fisheries
NPS	National Park Service
OCAP	Operations Criteria and Plan
PCGID	Princeton-Codora-Glenn Irrigation District
PEIS	Programmatic Environmental Impact Statement
PID	Provident Irrigation District
RD 1004	Reclamation District No. 1004
Plan	Bay-Delta Water Quality Control Plan

Acronyms and Abbreviations

PM ₁₀	particulate matter less than 10 (respirable) microns in diameter
PM _{2.5}	particulate matter less than 2.5 (fine) microns in diameter
PMWC	Pelger Mutual Water Company
ppm	parts per million
ppm	parts per million
RD 108	Reclamation District No. 108
Reclamation	U.S. Bureau of Reclamation
Regional Criteria	Regional Criteria for Evaluating Water Management Plans for the Sacramento River Contractors
Regional Plan	Regional Water Management Plan
Service	U.S. Fish and Wildlife Service
SMWC	Sutter Mutual Water Company
SRSC	Sacramento River Settlement Contractor
State Board	State Water Resources Control Board
SVAB	Sacramento Valley Air Basin
SWP	State Water Project
USDA	U.S. Department of Agriculture
USFS	U.S. Forest Service
WMA	Wildlife Management Area
WQCP	Water Quality Control Plan

CHAPTER 1

PURPOSE AND NEED

INTRODUCTION

This Environmental Impact Statement (EIS) evaluates the potential impacts and benefits for the U.S. Bureau of Reclamation (Reclamation), as lead agency, to renew the long-term Sacramento River Settlement Contracts (Settlement Contracts) between Reclamation and the Sacramento River Settlement Contractors (SRSC). The Settlement Contracts provide for an agreement regarding the SRSCs' diversions of natural flow from the Sacramento River and tributaries thereto, and Reclamation's delivery of Central Valley Project (CVP) water for agricultural and municipal and industrial (M&I) uses.

The SRSCs consist of 145 contractors that can be categorized into the following three groups:

- Irrigation Districts/Water Districts/Mutual Water Companies/Municipalities
- Individuals – Standard-form Contract
- Individuals – Short-form Contract

As part of this action, Reclamation also proposes to renew its contract with the CDMWC. CDMWC's contract provides for payment of water diverted from the Colusa Basin Drain that would otherwise flow into the Sacramento River to satisfy the rights of senior water right holders. Water in the drain stems from return flows resulting from diversions by upstream SRSC's; therefore, Reclamation determined that the EIS should also evaluate the effects of renewing the CDMWC contract.

Together, 145 SRSCs have rights to divert approximately 2.2 million acre-feet (MAF) per year from the Sacramento River (except during critical years as defined under the Settlement Contracts). The CDMWC has a contract entitlement that requires Reclamation to release up to an additional 100,000 acre-feet per year (AFY) into the Sacramento River, as part of a negotiated water rights settlement. All of these contractors are listed in Appendix A.

The contract amounts range from 4 to 825,000 AFY. The 20 largest SRSCs listed in Table 1-1 account for approximately 95 percent of the total contracted amount.

With the exception of Sutter Mutual Water Company (SMWC) and Anderson-Cottonwood Irrigation District (ACID), the renewed contracts would provide for the continued diversions and delivery of the same quantities of water as the existing Settlement Contracts. For SMWC and ACID, the renewed contracts include slightly reduced contract amounts. Table 1-1 shows the contract amounts under the existing contracts for 20 of the largest SRSCs.

The contract renewals also provide for continued diversions and delivery of water to the same lands and for the same purposes, with one exception. Natomas Central Mutual Water Company (NCMWC) has requested a change in authorized use from agricultural to M&I in the Metro Air Park portion of its service area.

The term of these Settlement Contracts was not to exceed 40 years, and these contracts were scheduled to expire on March 31, 2004. On December 1, 2003, however, Congress passed Public Law 108-37. Section 218 of that Act states,

“The Secretary of the Interior shall extend the term of the Sacramento River Settlement Contracts, long- and short-form, entered into by the United States with various districts and individuals, section 14 of the Reclamation Project Act of 1939 (53 Stat. 1197), for a period of 2 additional years after the date on which each of the contracts, respectively, would expire but for this section, or until renewal contracts are executed, whichever occurs earlier.”

Pursuant to this congressional mandate, Reclamation has issued written notices to the SRSCs confirming that all terms and conditions of their existing Settlement Contracts will remain in full force and effect during the extension period.

TABLE 1-1

TWENTY LARGEST (AF) EXISTING SRSC CONTRACT TOTALS

Contractors ^a	CVP Project Water		Base Supply	TOTAL
	Agricultural	M&I	Water Rights	
ACID	10,000		165,000	175,000
GCID	105,000		720,000	825,000
MID	6,000		11,980	17,980
MFWC	12,000		23,000	35,000
NCMWC	22,000		98,200	120,200
PMWC	1,750		7,110	8,860
Pleasant Grove-Verona	2,500		23,790	26,290
PCGID	15,000		52,810	67,810
PID	5,000		49,730	54,730
RD 1004	15,000		56,400	71,400
RD 108	33,000		199,000	232,000
City of Redding		3,150	17,850	21,000
SMWC	95,000		172,900	267,900
Tisdale Irrigation Company	2,000		7,900	9,900
Conaway Conservancy Group	672		50,190	50,862
Davis Ranch	9,800		22,000	31,800
Lomo Cold Storage	6,410		700	7,110
M & T Chico Ranch, Inc.	16,980		976	17,956
Reynen	2,000		8,070	10,070
River Garden Farms	500		29,300	29,800
Subtotal^b	360,612	3,150	1,716,906	2,080,668
Miscellaneous Users (125 users)	40,858		94,825	135,683
145 SRSCs Subtotal	401,470	3,150	1,811,731	2,216,351

TABLE 1-1

TWENTY LARGEST (AF) EXISTING SRSC CONTRACT TOTALS

Contractors ^a	CVP Project Water		Base Supply	TOTAL
	Agricultural	M&I	Water Rights	
CDMWC	100,000			100,000
Totals	501,470	3,150	1,811,731	2,316,351
20 Largest SRSC Contractors – Percent of Total				93.9%
All Other Miscellaneous SRSC Users – Percent of Total				6.1%
^a A complete list of SRSCs is provided in Table 3-7. ^b This subtotal represents water diverted by the 20 contractors for which Reclamation prepared needs analyses. The threshold for needs analyses was 2,000 irrigable acres or more for irrigation use or 2,000 AFY for M&I use. These 20 contractors represent 94 percent of the total water diverted by the SRSCs. The remaining 125 contractors divert the remaining 6 percent. Notes: GCID = Glenn-Colusa Irrigation District MID = Maxwell Irrigation District MFWC = Meridian Farms Water Company PMWC = Pelger Mutual Water Company PCGID = Princeton-Codora-Glenn Irrigation District PID = Provident Irrigation District RD 1004 = Reclamation District No. 1004 RD 108 = Reclamation District No. 108				

PURPOSE OF AND NEED FOR THE ACTION

The purpose of this project is to renew the Settlement Contracts, consistent with the applicable provisions of federal Reclamation law and state law.

Long-term contract renewal of the SRSCs is needed for the following reasons:

- To ensure SRSCs of the use of both the regulated and unregulated flow of the Sacramento River and its tributaries, and to provide for the efficient and economical operation of the CVP by, and the reimbursement to, the United States for expenditures made for the CVP.
- 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 (State Board) and by the Central Valley Project Improvement Act (CVPIA).
- To incorporate certain administrative conditions into the renewed contracts to ensure the CVP's continued compliance with current federal Reclamation law and other applicable statutes.

BASIS FOR SETTLEMENT CONTRACT RENEWALS

Reclamation has authority, under several statutes dating from 1902 to 1992¹, to enter into agreements with the SRSCs to settle disputes over the respective rights of the parties to divert and use water from the Sacramento River. These disputes were settled by an agreement that specifies the quantity of water that can be diverted free of charge (Base Supply), and the quantity that would be paid for by the SRSCs (Project Water). This agreement resulted in the Settlement Contracts. The conditions associated with the delivery of CVP water include, but are not limited to, the following:

- The terms and conditions included within Reclamation's applicable state water right permits/licenses
- The amounts of water each contractor can put to reasonable and beneficial use
- For irrigation water, the number of acres of irrigable and eligible lands within the contractor's boundaries that are also within the authorized CVP service area and the places of use designated in the applicable CVP water right permits/licenses

These conditions do not allow Reclamation to limit or regulate Base Supply water except as provided in the Settlement Contracts.

The Settlement Contracts are distinct from the water service contracts that the United States has executed with other CVP contractors. Unlike the CVP water service contractors, the SRSCs hold senior vested water rights that allow them to divert significant quantities of natural flow from the Sacramento River, regardless of whether they have a contract for CVP supplies.

DECISION TO PREPARE AN ENVIRONMENTAL IMPACT STATEMENT

In determining whether to prepare an EIS, Reclamation noted that public comments and input from public meetings, among other factors, suggested that the relatively complex history and unique attributes of the Settlement Contracts including their integral role in the operation of the CVP are not widely understood. As a result, the proposal to renew the Settlement Contracts was determined to potentially involve substantial public uncertainty and controversy regarding the nature of the proposal itself and its potential effects on the quality of the human and natural environment. Although initial analysis indicated that renewal of the contracts under the Preferred Alternative would not result in any appreciable changes to the environment, Reclamation determined that it was appropriate to prepare an EIS given the potential for controversy. This EIS provides a detailed explanation of the proposal and any potential for changes in the physical environment, therefore minimizing uncertainty and maximizing the role of public information and environmental considerations in

¹ Renewal of the Settlement Contracts is being undertaken pursuant to the following authorities: the Act of June 17, 1902 (32 Stat. 388), and acts amendatory or supplementary thereto, including, but not limited to, the Acts of August 26, 1937 (50 Stat. 844), as amended and supplemented, August 4, 1939 (53 Stat. 1187), as amended and supplemented, including, but not limited to, Sections 9 and 14 thereto, July 2, 1956 (70 Stat. 483), or June 21, 1963 (77 Stat. 68), October 12, 1982 (96 Stat. 1262), October 27, 1986 (100 Stat. 3050), as amended, and Title XXXIV of the Act of October 30, 1992 (106 Stat. 4706).

Reclamation's decision-making process consistent with the goals of the National Environmental Policy Act (NEPA).

HISTORY OF THE SACRAMENTO RIVER SETTLEMENT CONTRACTORS

The CVP was first authorized as a federal project in 1935, and includes facilities on the Trinity, Sacramento, and American Rivers; Sacramento-San Joaquin Delta; San Joaquin and Stanislaus Rivers; and offstream storage and conveyance facilities associated with the San Luis Reservoir and Delta-Mendota Canal. Construction of dams on the Sacramento and Trinity Rivers substantially modified the flows of the Sacramento River. Prior to construction of the CVP, individuals and entities along the Sacramento River were diverting water for irrigation and M&I use under various claims of right. To settle the controversy over assertions of water rights, the United States, acting through Reclamation, negotiated contracts that provided for agreement on diversion of natural flows and CVP water service.

The SRSCs include various irrigation districts, reclamation districts, mutual water companies, and partnerships located in the Sacramento River Basin in Northern California. All of the SRSCs have senior vested water rights under California law to divert surface water from the Sacramento River. Without these contracts it would have been difficult, if not impossible, for the United States to develop the balance of the CVP. As a result, these contracts have become known as the Sacramento River Water Rights Settlement Contracts or Settlement Contracts.

Most SRSCs have claims to water rights that pre-exist the CVP. For example, GCID water rights date back to at least 1883, and include pre-1914 water rights and post-1914 appropriative water rights licenses². These collective water rights include adjudicated decreed rights on Stony Creek and pre- and post-1914 water rights on the Sacramento River. Because of the nature of the rights GCID holds, the exact magnitude of these rights has never been fully quantified. However, the claimed rights exceed 1 MAF annually. GCID, ACID and City of Redding are the only SRSCs with claims to pre-1914 water rights. The other SRSCs have claims to post-1914 water rights on the Sacramento River or its tributaries, with relatively small amounts of riparian rights. As discussed above, when the CVP was authorized, the prior water rights of the SRSCs were recognized. It was acknowledged that for the CVP to be constructed and operated, and water rights confirmed, the SRSCs' protests to the granting of CVP water rights must be resolved.

Ultimately, in 1964, GCID and Reclamation entered into the first of the Settlement Contracts, and others followed shortly thereafter using the same basic form of agreement. Using jointly conducted studies and negotiations, the SRSCs and Reclamation arrived at mutually agreeable quantities of Base Supply and Project Water. For each SRSC, a large portion of the

² With respect to appropriative water rights in California, the year of 1914 was a significant turning point. In that year, the Water Commission Act became effective, establishing for the first time statutory procedures for appropriating water (those procedures do not apply to riparian water uses). Because that act was not effective until December 19, 1914, water rights obtained prior to that date were not governed by those statutory procedures. Such rights are known as "pre-1914" rights. Thus, pre-1914 rights are rights to appropriate water that were acquired prior to 1914. The key to acquiring and maintaining a pre-1914 right was beneficial use.

water quantities addressed in each contract is referred to as Base Supply, which is diverted without charge. In addition, and in consideration of SRSCs' willingness to settle on a Base Supply quantity, Reclamation agreed to provide the SRSCs with certain designated monthly quantities of CVP water, referred to as "Project Water," primarily in the months of July, August and September. This Project Water is provided to the SRSCs and is subject to all of the pricing and other requirements of federal Reclamation law.

The Settlement Contracts were negotiated documents. The Settlement Contracts recognize the prior direct diversion rights of the SRSCs. However, as an outgrowth of the negotiations, it was agreed that the SRSCs would take an average yield of their water rights from the flow of the Sacramento River and its tributaries thereto, in return for the benefit of the certainty of flow provided by the operation of the CVP. Conversely, the United States received, among other things, certainty as to its operation of the CVP, and avoided litigation, including the potential for a lengthy and expensive adjudication of CVP and other water rights in the Sacramento River watershed. The original contracts, entered into in 1964 for a period of 40 years, were scheduled to expire on March 31, 2004. As discussed above, Congress extended the terms of the contracts for 2 years pursuant to Public Law 108-37.

On October 30, 1992, the CVPIA was signed into law. This act modifies the authorized purposes of the CVP and requires a wide range of environmental improvements and potential changes in how the CVP is operated. It also specifically addresses contract renewals by setting new contract lengths for repayment and water service contracts, and allowed interim renewals until a Programmatic Environmental Impact Statement, prepared pursuant to the compliance with NEPA, was complete with a Record of Decision in January 2001. The CVPIA distinguishes between Settlement Contracts and other types of CVP contracts such as repayment or water service contracts.

STUDY AREA

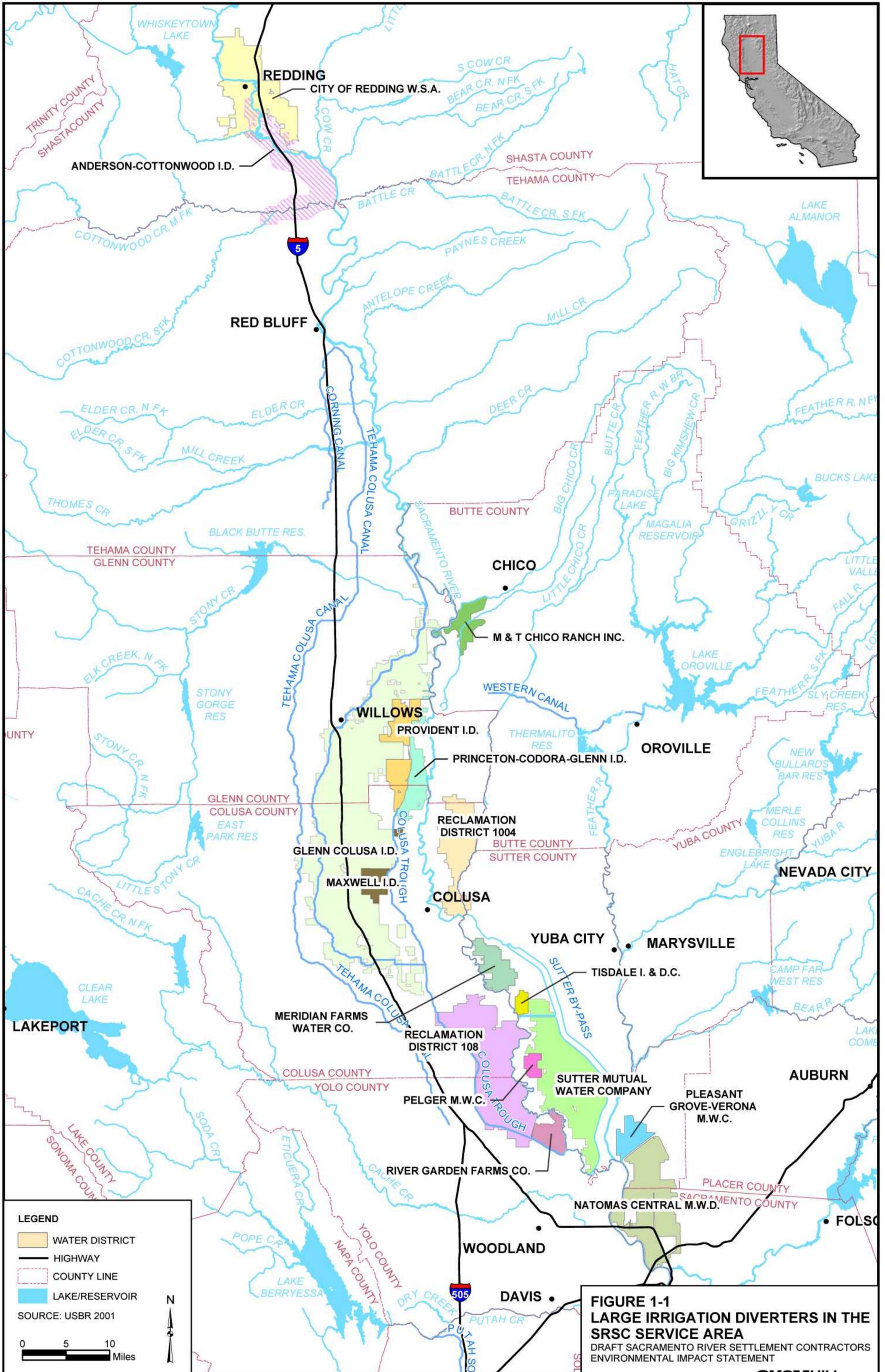
The study area boundaries for this EIS are presented on Figure 1-1. This area includes the service areas of each of the SRSCs, as listed in Appendix A. Each lies wholly within the CVP service area.

STUDY PERIOD

The analysis for this EIS was conducted for projected conditions in the year 2044, which will extend through the first period of renewal for the 40-year Settlement Contracts. No interim time conditions were considered or evaluated with respect to build-out conditions or changes in the Settlement Contract.

PUBLIC INVOLVEMENT PROCESS

Reclamation began preparing this EIS during the scoping phase of the NEPA environmental impact study process. Scoping activities began on July 19, 2001, when Reclamation issued a



**FIGURE 1-1
LARGE IRRIGATION DIVERTERS IN THE
SRSC SERVICE AREA**
DRAFT SACRAMENTO RIVER SETTLEMENT CONTRACTORS
ENVIRONMENTAL IMPACT STATEMENT

Notice of Intent for the preparation of a NEPA document for the renewal of the SRSCs. Reclamation then held three scoping meetings and prepared a scoping report, which is included as Appendix B. Scoping served as a fact-finding process that helped identify public concerns and recommendations about the NEPA process, issues that would be addressed in this EIS, and the scope and level of detail for analysis.

RELATED PROJECTS

Several activities are being implemented by Reclamation as part of the obligation to manage and operate the CVP or are directly related to the contract renewals. The following discussion identifies these activities and describes their relationship to the renewal of the Settlement Contracts. Table 1-2 summarizes additional related studies and projects that have been conducted recently or are currently being completed.

TABLE 1-2

RELATED PROJECTS

Project or Study and Lead Agency	Summary
Long-term Contract Renewal of Existing CVP Water Service Contracts – Reclamation	Reclamation is negotiating with other CVP water contractors for renewal of long-term contracts, including contractors for the American River Division, Feather Water District, Shasta-Trinity Divisions, Sacramento Canals Unit, San Luis Unit, Contra Costa Unit, San Felipe Unit, Delta-Mendota Canal Unit, San Joaquin National Veterans' Cemetery, City of Lindsay, City of Fresno, Cross Valley, and Mercy Spring Water District.
Implementation of CVPIA –	Reclamation and the U.S. Fish and Wildlife Service (Service) are proceeding with implementation of other provisions of the CVPIA, including stream restoration, refuge water supplies, and further analysis of yield replacement.
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 completed an Environmental Impact Report (EIR) and EIS as part of this process. Renewal of long-term CVP contracts is assumed within the CALFED EIR/EIS and Record of Decision.
Trinity River Mainstem Fishery Restoration EIS/EIR – Reclamation, Service, Hoopa Valley Tribe and Trinity County	<p>The Service completed a Final EIS/EIR and Record of Decision. Because of subsequent litigation, the Service is preparing responses to the court's comments.</p> <p>The Service and Reclamation also are implementing a portion of the recommendations for restoration activities along the Trinity River.</p>

RELATED ACTIVITIES

Following are descriptions of long-term activities related to long-term contract renewal.

Central Valley Project Improvement Act Programmatic Environmental Impact Statement

The CVPIA Programmatic Environmental Impact Statement (PEIS) provided a functional evaluation of the impacts of implementing the CVPIA. Four alternatives, 17 supplemental analyses, a Preferred Alternative, and a No Action Alternative were evaluated in the PEIS. The impact analysis in the PEIS was completed at a subregional level but presented within the PEIS on a regional basis for the Sacramento Valley, San Joaquin Valley, and Tulare Lake regions. The PEIS No Action Alternative assumed that existing water service contracts, exchange contracts, and Settlement Contracts would be renewed under the same terms as expiring contracts. The Final PEIS included a Preferred Alternative that addressed the regional impacts and benefits of the general method that Reclamation anticipated for implementation of the CVPIA, including long-term contract renewal.

The PEIS evaluated the impacts and benefits of long-term contract renewals under the CVPIA, including the Settlement Contracts. Following completion of the PEIS, more specific information related to contract renewal proposals has been developed by Reclamation and the SRSCs. This EIS for the renewal of the Settlement Contracts includes the Preferred Alternative of the Final PEIS as the No Action Alternative and evaluates the impacts and benefits of differences among the contract assumptions in the No Action Alternative, the Preferred Alternative (Alternative 1) and additional project alternatives, as described in Chapter 2.

Operations Criteria and Plan Biological Assessment

Reclamation and the California Department of Water Resources (Department) propose operations of the CVP and State Water Project (SWP) to divert, store, and convey CVP and SWP water consistent with applicable law. These operations are summarized and evaluated in a Biological Assessment, and described in further detail in the CVP Operations Criteria and Plan (OCAP). The Biological Assessment addresses continued operation of the CVP and SWP in a coordinated manner. In addition to current-day operations, the following future actions are included in this consultation:

- Increased flows in the Trinity River
- Increased pumping at Banks Pumping Plant (referred to as 8,500 Banks)
- Permanent barriers operated in the South Delta
- An intertie between the California Aqueduct and the Delta-Mendota Canal
- A long-term Environmental Water Account
- Freeport Regional Water Project
- Various other operational changes described in detail in the Biological Assessment

The current and ongoing effects of diversions by the SRSCs as part of CVP operations are included in this Biological Assessment. The consultation addresses impacts to listed species that could be caused by hydrological and water quality conditions resulting from operation of the CVP and SWP facilities. With respect to long-term contract renewals with the SRSCs, the consultation evaluates the impact to listed species that could result from operating the CVP and SWP to deliver CVP water to the points of diversion of the SRSCs in combination with other operational and regulatory requirements. The analyses for the OCAP consultation assume the SRSCs divert their total contract quantity with deficiencies in critically dry years

in accordance with the existing and renewed contracts. Because maximum contract deliveries are assumed for the SRSCs, the OCAP opinion fully addresses any in-river effects to listed species that could result from long-term contract renewal. The consultation does not evaluate impacts that could result during diversion of water by the contractors or use of diverted water. It is anticipated that formal consultation on long-term OCAP will be completed by the end of 2004.

Sacramento River Basinwide Water Management Plan and Regional Criteria

In 1996, eight of the larger SRSCs commenced litigation against the United States and others to establish that Section 3404(c)(3) of the CVPIA did not apply to Settlement Contracts. Litigation reached settlement in January 1997 through a Stipulated Agreement, wherein the federal defendants agreed that Section 3404(c)(3) of the CVPIA did not apply to the Settlement Contracts.

As part of that settlement, the SRSCs and Reclamation entered into a “Memorandum of Understanding between Named Sacramento River Settlement Contractors and the United States of America for the Preparation of Data in Aid of the Renewal of Settlement Contracts” (Contract Renewal MOU).

SRSC participants that were signatories to the Contract Renewal MOU are as follows:

- Anderson-Cottonwood Irrigation District (ACID)
- Glenn-Colusa Irrigation District (GCID)
- Provident Irrigation District (PID)
- Princeton-Codora-Glenn Irrigation District (PCGID)
- Reclamation District No. 108 (RD 108)
- Reclamation District No. 1004 (RD 1004)
- Meridian Farms Water Company (MFWC)
- Sutter Mutual Water Company (SMWC)
- Pelger Mutual Water Company (PMWC)
- Natomas Central Mutual Water Company (NCMWC)

These SRSCs account for more than 80 percent of the total 2.2 MAF of Sacramento River water currently under Settlement Contracts with Reclamation. Reclamation was also a signatory to the Contract Renewal MOU. The Contract Renewal MOU identified the following four major types of data or documents that were to be prepared to aid in contract renewal negotiations:

- Update and extension of the 1956 Cooperative Study
- A Basinwide Water Management Plan (BWMP) for the Sacramento River
- Contracting principles
- Discussions of obligations, if any, of the SRSCs to meet water quality, endangered species, and other environmental needs, including the needs of the San Francisco Bay/Sacramento-San Joaquin Delta and alternative means, if any, by which these obligations can be met

The basic objective of the BWMP was to provide the participating SRSCs with a comprehensive basis upon which to manage water resources to meet their existing and future water needs. These needs would be met in a manner that could also serve other water needs in the Sacramento Valley, including, but not limited to, needs for the use of water for the environment. The basic objectives were more specifically defined as follows:

- Maintaining a permanent, reliable, adequate, and economical water supply to meet the existing and future needs of the SRSCs, including long-term soil salinity control and nonpoint discharge requirements
- Identifying the opportunities to enhance the water supplies for wildlife refuges and other uses of water for the environment
- Incorporating other water management considerations in the Sacramento River Basin, such as other water quality goals, agricultural economics, flood control, power operations, and recreation, to ensure a comprehensive and successful approach to meet the basic objectives of the BWMP
- Allowing for the potential use with the updated and extended 1956 Cooperative Study (subsequently mutually agreed would not be used) and other existing, past, or ongoing studies to provide a common set of data on which negotiations for renewal of water Settlement Contracts could be based

Sacramento Valley Water Management Program

Management of water quality in the Bay-Delta has been the topic of many programs and processes over the years. Water quality in the Bay-Delta is affected by freshwater inflows, which are influenced by upstream diversions. Possible changes to upstream diversion rights as part of water quality management in the Bay-Delta has been an extremely complicated and controversial issue. Certain water users and agencies throughout California, including Sacramento River water users (many of them SRSCs), the Department, Reclamation, and CVP and SWP water contractors signed the “Agreement Regarding Resolution of Phase 8 Issues, Development and Management of Water Supplies, and Binding Commitment to Proceed Pursuant of Specified Terms” (April 3, 2001, and known as the Stay Agreement). The Stay Agreement proposed goals and principles to resolve issues of the flow-related standards that would have been argued during the eighth phase (commonly referred to as “Phase 8”) of the impending State Board hearings. On April 26, 2001, the State Board issued Order WR 2001-05, which postponed Phase 8 and allowed for automatic dismissal of the Phase 8 hearing after 18 months in October 2002 (unless Reclamation or the Department had requested the State Board resume Phase 8 because of a breakdown in the settlement process). Under the State Board order and as agreed to in the Stay Agreement, Reclamation and the Department remained committed to meeting the flow-related objectives described in SWRCB D-1641 (the formal decision governing water quality in the Bay-Delta) during the term of the Stay Agreement.

One outcome of this process has been the Short-Term Program, which will develop projects that can provide water to the Bay-Delta. This water will be made available by conjunctively reducing surface diversions and using groundwater pumping or by re-operation of district or water agency reservoirs.

CHAPTER 2

DESCRIPTION OF ALTERNATIVES

INTRODUCTION

The Settlement Contracts have a unique history and nature. The SRSCs hold water rights to Sacramento River water that are senior to the CVP and, cumulatively, claim senior water rights that entitle them to use a significant portion of the water available for appropriation in the Sacramento River. If the SRSCs were to fully utilize their senior water rights, Reclamation's current ability to operate the CVP would be compromised. It was in recognition of this fact that members of Congress directed Reclamation to negotiate with the SRSCs and enter into the Settlement Contracts.

The CVPIA states that no contract renewals shall be authorized until appropriate environmental review, including the CVPIA Programmatic Environmental Impact Statement (PEIS), has been completed. The PEIS identifies the need for site-specific environmental documents for the long-term contract renewal process, including the Settlement Contract renewal process. This Chapter describes the methodology used to develop alternatives to be evaluated in this EIS for renewal of the Settlement Contracts, the selected alternatives, and alternatives considered for further evaluation but eliminated from this EIS.

DEVELOPMENT OF ALTERNATIVES

To develop the project Alternatives for this EIS, in 2001, Reclamation initiated public scoping activities and, with the SRSCs, initiated the process to negotiate the renewal of the SRSC contracts. Reclamation offered its initial proposed contract on May 15, 2002. Many of the larger SRSCs responded with their initial counter-proposal on May 31, 2002. A series of publicly noticed negotiation sessions between Reclamation and the larger SRSCs were held throughout 2002 and early 2003. The results of the negotiations are reflected in the March 11, 2003 draft form of the contract that has been tentatively approved by both Reclamation and many of the larger SRSCs. (Copies of the May 15, 2002, May 31, 2002, and March 11, 2003 draft contracts are included in Appendix C.)

Through contract negotiations and scoping activities, five reasonable and feasible alternatives have been identified for the renewal of the Settlement Contracts between Reclamation and the SRSCs. These five alternatives represent a range of agreement provisions that could be implemented for contract renewals. In addition to these five alternatives, the No Action Alternative was defined to consist of renewing long-term contracts as described by the adopted and implemented Preferred Alternative of the PEIS.

The negotiated contract is represented by Alternative 1 – the Preferred Alternative; Reclamation's initial proposal is represented by Alternative 2, and the SRSCs' initial counter proposal is represented by Alternative 3. This approach to developing alternatives based on various stages in the contract negotiation process is consistent with the approach taken for the environmental documentation of several other contract renewals, including long-term contract renewal documents for Westside Canals (i.e., Tehama-Colusa Canal), Shasta-Trinity,

San Felipe, San Luis Unit, Friant, Cross-Valley, Contra Costa Water District, and Delta-Mendota.

Two additional alternatives, 4 and 5, were developed in response to specific comments received during scoping and in extensive discussions between Reclamation and the SRSCs. Alternatives 4 and 5 evaluate different approaches to applying cutbacks of surface water diversions during years when total water supplies are below normal. These approaches were not considered in the contract negotiations.

Various contractual provisions define the differences among alternatives, as shown in Table 2-1. These provisions are addressed differently under the No Action Alternative and each of the project alternatives, and could result in changes in environmental impacts or benefits. These provisions include the following: total contract amount, contract period, Base Supply rescheduling provisions, water costs including Project Water costing mechanisms, conservation measurement, and shortage provisions.

The No Action, Preferred Alternative, and project alternatives are described below.

No Action Alternative

Selection of the No Action Alternative for Contract Renewals

The No Action Alternative is defined by NEPA as the most likely future that could be expected to occur in the absence of the project. It is intended to represent a projection of current conditions to the most reasonable future responses or conditions that could occur during the life of the project without any action alternatives being implemented.

The No Action Alternative for the SRSC contract renewals has been determined to be the Preferred Alternative for the CVPIA PEIS. The rationale for this decision is that with the passage of the CVPIA in 1992 and the completion of the environmental documentation for the CVPIA (PEIS), in 1999, the operations of the CVP, including the delivery of Sacramento River water to the SRSCs are guided by the adopted PEIS Preferred Alternative. The CVPIA Preferred Alternative is therefore the existing conditions for this EIS and the ongoing implementation of the CVPIA is the most likely future scenario. The Preferred Alternative for the CVPIA assumed renewal of the Settlement Contracts at existing full contract amounts. Additional details of the existing contract provisions are provided below.

The rationale for definition of the No Action Alternative also considered that the majority of the SRSCs and Reclamation have indicated their willingness to renew the contracts and Congress has approved interim contract extensions. Therefore, the possibility of a future without contract renewals was not anticipated. The concept of non-contract renewal, rather than being addressed as part of the no action, was considered as a Project Alternative, but eliminated from full analysis for several reasons, as discussed later in this Chapter.

The use of the PEIS Preferred Alternative as the No Action is consistent with the definition of the No Action for several other ongoing contract renewal environmental documents, including Westside Canals (i.e., Tehama-Colusa Canal), Shasta-Trinity, San Felipe, San Luis Unit, Friant, Cross-Valley, Contra Costa Water District, and Delta-Mendota.

TABLE 2-1

PROJECT ALTERNATIVES SUMMARY

Alternative	No Action	Alternative 1: Preferred Alternative– Negotiated Contract	Alternative 2: Reclamation’s Initial Contract Proposal	Alternative 3: SRSCs’ Initial Counter Proposal	Alternative 4: Cutback Provisions Based on Shasta Inflow	Alternative 5: Cutback Provisions Based on 40-30-30 Sacramento River Index
Total Annual Contract Amount (KAFY) ^a	2,316	2,227	2,316	2,316	2,227	2,227
Contract Period	40 years	40 years	40 years	40 years	40 years	25 years
Shortage Provision	Specifies reductions in critical years ^b only; reductions of 25%	Specifies reductions in critical years only; reductions of 25%	Specifies delivery reductions based on Shasta inflow deficiencies varying from 10 to 25% (sliding scale)	Same as Alternative 2, and SRSCs are compensated for water reductions	Sliding-scale cutback (10-20-25%) based on stepped decrease; cutback remains at lowest level until full contract amount reset at 4 MAF in Shasta Lake	Sliding-scale cutback (10-20-25%) based on Sacramento River Index ^c water years; no reset requirement at 4 MAF in Shasta Lake
Number of Years Shortage Provision Is Activated (based on historical period of record)	9 years	9 years	16 years	9 years	17 years	43 years
Total Amount Reduced over 4-year Drought Sequence Based on Shortage Provision (KAFY)	2,127	2,127	2,021	2,127	2,127	2,021
Base Supply Rescheduling Provisions	No fees for rescheduling	Requires rescheduling fee for water scheduled for diversion in April or May that is diverted in July, August, September, or October	Requires rescheduling fee to divert in excess of monthly quantities contained in Settlement Contract	No fees for rescheduling	Requires rescheduling fee to divert in excess of monthly quantities contained in Settlement Contract	Requires rescheduling fee to divert in excess of monthly quantities contained in Settlement Contract

TABLE 2-1

PROJECT ALTERNATIVES SUMMARY

Alternative	No Action	Alternative 1: Preferred Alternative– Negotiated Contract	Alternative 2: Reclamation’s Initial Contract Proposal	Alternative 3: SRSCs’ Initial Counter Proposal	Alternative 4: Cutback Provisions Based on Shasta Inflow	Alternative 5: Cutback Provisions Based on 40-30-30 Sacramento River Index
Costing Mechanism	Take or Pay: Requires SRSC to pay for Project Water at established rates with adjustments by Contracting Officer if water used other than for agricultural purposes; SRSC pays for 100% of Project Water	Take or Pay: Requires SRSC to pay for 75% of the amount of Project Water each year and to pay for Project Water actually diverted in excess of 75%; Contracting Officer can adjust rates to applicable rates and charges if the SRSC desires to use Project Water for other than agricultural use	Take or Pay: Requires SRSC to pay for Project Water at established rates with adjustments by Contracting Officer if water used other than for agricultural purposes; SRSC pays for 100% of Project Water	Take or Pay: Limits payment to Project Water actually diverted by the SRSC; does not specifically include adjustment for water used other than for agricultural purposes	Same as Alternative 1	Take or Pay: Requires SRSC to pay for 75% of the amount of Project Water each year and to pay for Project Water actually diverted in excess of 75%; Contracting Officer can adjust rates to applicable rates and charges if the SRSC desires to use Project Water for other than agricultural use
Conservation Measures		Prior to diversion of Project Water, requires SRSC to be implementing a water conservation and efficiency program based on the BWMP and/or the SRSC’s water conservation plan that has been determined by the Contracting Officer to meet requirements under federal law, which allows the SRSC to reduce the amount of Project Water for which payment is required under Article 8(a)	Prior to diversion of Project Water, requires SRSC to be implementing a water conservation and efficiency program based on the BWMP and/or the SRSC’s water conservation plan that has been determined by the Contracting Officer to meet requirements under federal law, which allows the SRSC to reduce the amount of Project Water for which payment is required under Article 8(a)	Prior to diversion of Project Water, requires SRSC to be implementing a water conservation and efficiency program based on the BWMP and/or the SRSC’s water conservation plan that has been determined by the Contracting Officer to meet requirements under federal law, which allows the SRSC to reduce the amount of Project Water for which payment is required under Article 8(a)	Same as Alternative 1	Reclamation’s standard criteria would apply, including measurement at each farm delivery, volumetric pricing of water, and implementation of Best Management Practices

TABLE 2-1

PROJECT ALTERNATIVES SUMMARY

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<p>^aIncludes contract amounts for 145 SRSCs and CDMWC. Total annual amounts vary according to shortage provisions.</p> <p>^bShasta critical years defined by the contract between Reclamation and the SRSCs (see Appendix C for complete contract). This shortage provision was the mechanism used in the original contracts and, thus, represents the No Action, in addition to Alternatives 1 and 3.</p> <p>^cThe 40-30-30 Sacramento River Index is computed as a weighted average of the current water year's April through July unimpaired runoff forecast (40 percent), the current water year's October through March unimpaired runoff forecast (30 percent), and the previous water year's index (30 percent). A cap of 10 MAF is put on the previous year's index to account for required flood control reservoir releases during wet years. Unimpaired runoff (calculated in the 40-30-30 Sacramento River Index as the sum of Sacramento River flow above Bend Bridge near Red Bluff, Feather River inflow to Oroville, Yuba River flow at Smartville, and American River inflow to Folsom) is the river production unaltered by water diversions, storage, exports, or imports. A water year with a 40-30-30 Sacramento River Index equal to or greater than 9.2 MAF is classified as "wet." A water year with an index equal to or less than 5.4 MAF is classified as "critical."</p> <p>Note:</p> <p>KAFY = thousand acre-feet per year</p>						

Similarities of the No Action to the Affected Environment/Existing Conditions

For Projects where the No Action future is different from the existing conditions, NEPA Guidelines instruct that the differences should be clearly defined. The No Action Alternative should not automatically be considered to be the same as the existing condition of the affected environment because reasonably foreseeable future actions may be taken regardless of whether any of the project action alternatives are chosen.

For the resources that may be affected by this Project, the existing conditions and the No Action are essentially identical. The existing condition consists of effects of the exercising of the SRSC contracts and the No Action assumes ongoing implementation of those contracts under identical contract provisions.

The analysis in Chapter 3 compares the reasonable action alternatives to the No Action Alternative to determine the net effect or impact of each of the action alternatives. This allows the analysis to focus upon the impacts that would be the result of the action under consideration, distinguishing the different impacts associated with each of the Alternatives. Because in this case, the No Action is the same as the existing conditions, this comparison of the project alternatives to the No Action is essentially the same as a comparison of the project alternatives to existing conditions.

Total Contract Amount

The total contract amount for each alternative includes both Base Supply and Project Water supply to be diverted by the SRSCs in years when shortage provisions are not in effect. The contract defines Base Supply as the quantity of water that the United States agrees may be diverted by the SRSCs from the Sacramento River each month from April through October without charge. This Base Supply reflects the negotiated quantity of surface water agreed to by both the SRSCs and Reclamation, derived from jointly conducted studies. The Base Supply represents the larger portion of the water quantities addressed in each contract and is diverted by the contractor free of any payment to Reclamation.

In addition, and in consideration of the SRSCs' willingness to settle on a Base Supply quantity during the term of the Settlement Contract, Reclamation agreed to provide the SRSCs with designated monthly quantities of CVP water, referred to as "Project Water." In the contracts, Project Water refers to all water diverted or scheduled for diversion by the SRSCs from the Sacramento River each month from April through October of each year that is in excess of the Base Supply. This CVP Project Water is provided to the SRSCs subject to all of the pricing and other requirements of federal Reclamation law.

As shown in Table 2-2, the total contract amount for the No Action Alternative is 2,316 KAFY. This alternative assumes renewal of all contracts at the existing contract amounts. This is the aggregated total amount provided for in all 145 contracts and the contract with CDMWC. Table 2-2 also shows the Base Supply and Project Water supply for each of the 20 largest SRSCs for each alternative. These are total contracted amounts, which may be reduced during years when shortage provisions are activated, as described below.

TABLE 2-2

CONTRACT AMOUNTS BY PROJECT ALTERNATIVE

Contractor	No Action (Renewal of Existing Contracts)			1 – Preferred Alternative (Negotiated Contract)			2 – Reclamation’s Initial Contract Proposal	3 – SRSCs’ Initial Counter Proposal	4 – Cutback Provisions Based on Shasta Inflow	5 – Cutback Provisions Based on 40-30-30 Sacramento River Index
	CVP Water	Base Supply	TOTAL	CVP Water	Base Supply	TOTAL				
ACID	10,000	165,000	175,000	6,000	122,000	128,000^a	Same as No Action		Contract amounts same as Preferred Alternative ^b	
GCID	105,000	720,000	825,000	105,000	720,000	825,000				
MID	6,000	11,980	17,980	6,000	11,980	17,980				
MFWC	12,000	23,000	35,000	12,000	23,000	35,000				
NCMWC	22,000	98,200	120,200	22,000	98,200	120,200				
PMWC	1,750	7,110	8,860	1,750	7,110	8,860				
Pleasant Grove-Verona	2,500	23,790	26,290	2,500	23,790	26,290				
PCGID	15,000	52,810	67,810	15,000	52,810	67,810				
PID	5,000	49,730	54,730	5,000	49,730	54,730				
RD 1004	15,000	56,400	71,400	15,000	56,400	71,400				
RD 108	33,000	199,000	232,000	33,000	199,000	232,000				
City of Redding ^c	3,150	17,850	21,000	3,150	17,850	21,000				
SMWC	95,000	172,900	267,900	56,500	169,500	226,000²				
Tisdale Irrigation Company	2,000	7,900	9,900	2,000	7,900	9,900				
Conaway Conservancy Group	672	50,190	50,862	672	50,190	50,862				
Davis Ranch	9,800	22,000	31,800	9,800	22,000	31,800				
Lomo Cold Storage	6410	700	7,110	6,410	700	7,110				
M & T Chico Ranch, Inc.	16980	976	17,956	16,980	976	17,956				
Reynen	2,000	8,070	10,070	2,000	8,070	10,070				
River Garden Farms	500	29,300	29,800	500	29,300	29,800				
Subtotal	363,762	1,716,906	2,080,668	363,762	1,716,906	2,080,668				
Other 125 Users	40,858	94,825	135,683	40,858	94,825	135,683				
CDMWC	100,000		100,000	100,000		100,000				
TOTAL	404,620	1,811,731	2,316,351	362,120	1,765,331	2,227,451				

^aNeeds analyses resulted in reduction from 175 to 128 KAFY for ACID and from 267,900 to 226 KAFY for SMWC.

^bTotal contract amounts under Alternatives 4 and 5 are the same; however, during dry years, shortage provisions may result in varying quantities of reductions in water delivered as detailed in Table 2-3.

^cAll CVP Project Water supply is denoted for agricultural use with the exception of the City of Redding supply, which is for M&I use.

Contract Period

The existing Settlement Contracts were originally executed in 1964, with a term not to exceed 40 years. Those contracts specified the following: “That under terms and conditions mutually agreeable to the parties hereto, renewals may be made for successive periods not to exceed forty (40) years each.” In addition, Section 3404(c) of the CVPIA, which limits the renewal of existing long-term repayment of water service contracts to a period of 25 years, does not apply to the Settlement Contracts. Under the No Action Alternative, the contract period for the renewed contracts would extend for 40 years.

Base Supply Rescheduling

The Base Supply and the Project Water supply for each contractor is allocated on a monthly basis as specified under Exhibit A of each contract. Base Supply is scheduled during the months of April through October for all SRSCs, with the exception of the City of Redding, whose water is scheduled year round for M&I use.

Critical months are defined in all of the contracts as July, August, and September, with the exception of GCID, ACID, and the City of Redding. Critical months for these three contractors, because of their claims to senior water rights, are July and August only.

Under the existing contracts (No Action), an SRSC cannot move Base Supply from non-critical months into critical months, but can move Base Supply within critical months or from critical months into non-critical months. However, after the Base Supply for critical months is exhausted, contractors can purchase Project Water up to their full contract amount. Rescheduling of Base Supply within critical months or into non-critical months is permitted without cost in the No Action Alternative.

Water Costs and Costing Mechanisms

As stated previously, SRSCs divert the Base Supply portion of their contract free of any payment to Reclamation. No payment is required if Base Supply is rescheduled as described in the previous section.

The cost for Project Water under the No Action Alternative is as set by the CVPIA and would apply to 100 percent of the Project Water, whether diverted or not.

Conservation Measures

The water conservation assumptions under the No Action Alternative include water conservation actions for municipal and on-farm uses assumed in Department 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.

Shortage Provisions

Under the No Action Alternative, the shortage provisions of the existing Settlement Contracts would apply. That contract specifies cutbacks of 25 percent in deliveries during critical years

only. Critical years are defined by the contract as any year during which either of the following eventualities exists:

- (1) The forecasted full natural inflow to Shasta Lake for the current Water Year, is equal to or less than three million two hundred thousand (3,200,000) AF; or
- (2) The total accumulated actual deficiencies below four million (4,000,000) AF in the immediately prior Water Year or series of successive prior Water Years each of which had inflows of less than four million (4,000,000) AF, together with the forecasted deficiency for the current Water Year, exceed eight hundred thousand (800,000) acre-feet.

Under these shortage provisions, as shown in Table 2-3, cutbacks would be projected to occur under the No Action Alternative in 9 years out of 80. This projection is based on the period of record from 1921 to 2001. Information from this period of record, such as frequency of various levels of dry years, periods of sequential dry years resulting in long-term droughts, and wet years, is typically used by Reclamation as a reliable predictor of the pattern of hydrology that can be expected in the future. During a 4-year drought sequence, such as that which occurred during the period 1930 through 1934, total cutbacks to SRSCs would allow for diversion of approximately 2,127 KAFY. Because the contract period is 40 years, and the period of record is 80 years, a reasonable assumption can be made that during the contract period, these shortage provisions would occur 4.5 years out of 40.

Alternative 1: Preferred Alternative – Negotiated Contract

Total Contract Amount

As shown in Table 2-2, the total contract amount for the Preferred Alternative is 2,227 KAFY. This total contract quantity of water is less than the No Action Alternative by 89 KAFY in response to the needs analyses prepared by Reclamation, which resulted in a proposed reduction in total supplies (Base and Project water) to two SRSCs (SMWC and ACID).

To determine contract amounts for the renewed contracts, and assist in demonstrating beneficial use, Reclamation developed a needs analysis methodology to evaluate the use of CVP water supplies. The water rights granted to the United States for the CVP require that the water be used in accordance with the law and in the interest of the public welfare to prevent waste and unreasonable use.

The needs analysis for the SRSCs used a multi-step approach to identify existing and projected water demands and support the assignment of contract amounts in the contract negotiations and the Preferred Alternative and alternatives. As discussed previously, the Settlement Contracts were negotiated to settle disputes over claims of water rights and resulted in agreement of the quantities of water that could be diverted free of charge (Base Supply) and that would be paid for by the SRSCs (Project Water). There was no requirement that the SRSCs had to use other sources of water supply, if available, in lieu of diverting Base Supply and Project Water, a fact that was taken into account in completing the water needs analysis. Beneficial and efficient future water demands were also identified for each district and then compared to each SRSC's Base Supply and Project Water.

TABLE 2-3

SAMPLE OF IMPLEMENTATION OF SHORTAGE PROVISIONS BASED ON HISTORICAL PERIOD OF RECORD

Water Year – Period of Record	Inflow to Shasta Reservoir in MAF	Percentage Cutback	Alternative 2 – Sliding-scale cutback (10-20-25%) based on stepped decrease; no cutback if previous water year greater than 4.0, and no reset requirement at 4 MAF	Alternative 4 – Using Shasta Inflow, Sliding-scale cutback (10-20-25%) based on stepped decrease; cutback remains at lowest level until full contract amount reset at 4 MAF	Alternative 5 – Using 40-30-30 Sacramento River Index, Sliding-scale cutback (10-20-25%) based on Sacramento River Index^b water years; no reset requirement at 4 MAF
		No Action, Alternative 1 (Preferred Alternative), and Alternative 3 – 25% cutback in Shasta critical years^a			
1921-1922	4.6	100%	100%	100%	100%
1922-1923	3.6	100%	90%	90%	90%
1923-1924	2.5	75%	75%	75%	75%
1924-1925	5.1	100%	100%	100%	80%
1925-1926	3.7	100%	90%	90%	80%
1926-1927	7.0	100%	100%	100%	100%
1927-1928	5.1	100%	100%	100%	100%
1928-1929	3.2	100%	75%	75%	75%
1929-1930	4.2	100%	100%	100%	80%
1930-1931	2.5	75%	75%	75%	75%
1931-1932	3.7	75%	80%	75%	80%
1932-1933	3.5	75%	75%	75%	75%
1933-1934	3.3	75%	75%	75%	75%
1934-1935	4.9	100%	100%	100%	90%
1935-1936	4.7	100%	100%	100%	90%

TABLE 2-3

SAMPLE OF IMPLEMENTATION OF SHORTAGE PROVISIONS BASED ON HISTORICAL PERIOD OF RECORD

Water Year – Period of Record	Inflow to Shasta Reservoir in MAF	Percentage Cutback	Alternative 2 – Sliding-scale cutback (10-20-25%) based on stepped decrease; no cutback if previous water year greater than 4.0, and no reset requirement at 4 MAF	Alternative 4 – Using Shasta Inflow, Sliding-scale cutback (10-20-25%) based on stepped decrease; cutback remains at lowest level until full contract amount reset at 4 MAF	Alternative 5 – Using 40-30-30 Sacramento River Index, Sliding-scale cutback (10-20-25%) based on Sacramento River Index^b water years; no reset requirement at 4 MAF
		No Action, Alternative 1 (Preferred Alternative), and Alternative 3 – 25% cutback in Shasta critical years^a			
1936-1937	4.1	100%	100%	100%	90%
1937-1938	9.5	100%	100%	100%	100%
1938-1939	3.5	100%	75%	80%	80%
1939-1940	7.0	100%	100%	100%	100%
1940-1941	8.7	100%	100%	100%	100%
1941-1942	7.6	100%	100%	100%	100%
1942-1943	5.9	100%	100%	100%	100%
1943-1944	3.7	100%	80%	90%	80%
1944-1945	4.9	100%	100%	100%	90%
1945-1946	5.9	100%	100%	100%	90%
1946-1947	3.9	100%	100%	90%	80%
1947-1948	5.4	100%	100%	100%	90%
1948-1949	4.3	100%	100%	100%	80%
1049-1950	4.1	100%	100%	100%	90%
1950-1951	6.3	100%	100%	100%	100%

TABLE 2-3

SAMPLE OF IMPLEMENTATION OF SHORTAGE PROVISIONS BASED ON HISTORICAL PERIOD OF RECORD

Water Year – Period of Record	Inflow to Shasta Reservoir in MAF	Percentage Cutback	Alternative 2 – Sliding-scale cutback (10-20-25%) based on stepped decrease; no cutback if previous water year greater than 4.0, and no reset requirement at 4 MAF	Alternative 4 – Using Shasta Inflow, Sliding-scale cutback (10-20-25%) based on stepped decrease; cutback remains at lowest level until full contract amount reset at 4 MAF	Alternative 5 – Using 40-30-30 Sacramento River Index, Sliding-scale cutback (10-20-25%) based on Sacramento River Index^b water years; no reset requirement at 4 MAF
		No Action, Alternative 1 (Preferred Alternative), and Alternative 3 – 25% cutback in Shasta critical years^a			
1951-1952	7.8	100%	100%	100%	100%
1952-1953	6.5	100%	100%	100%	100%
1953-1954	6.5	100%	100%	100%	100%
1954-1955	4.1	100%	100%	100%	80%
1955-1956	8.8	100%	100%	100%	100%
1956-1957	5.4	100%	100%	100%	100%
1957-1958	9.7	100%	100%	100%	100%
1958-1959	5.1	100%	100%	100%	90%
1959-1960	4.7	100%	100%	100%	80%
1960-1961	5.1	100%	100%	100%	80%
1961-1962	5.3	100%	100%	100%	90%
1962-1963	7.0	100%	100%	100%	100%
1963-1964	3.9	100%	100%	100%	80%
1964-1965	7.0	100%	100%	100%	100%
1965-1966	5.3	100%	100%	100%	90%

TABLE 2-3

SAMPLE OF IMPLEMENTATION OF SHORTAGE PROVISIONS BASED ON HISTORICAL PERIOD OF RECORD

Water Year – Period of Record	Inflow to Shasta Reservoir in MAF	Percentage Cutback	Alternative 2 – Sliding-scale cutback (10-20-25%) based on stepped decrease; no cutback if previous water year greater than 4.0, and no reset requirement at 4 MAF	Alternative 4 – Using Shasta Inflow, Sliding-scale cutback (10-20-25%) based on stepped decrease; cutback remains at lowest level until full contract amount reset at 4 MAF	Alternative 5 – Using 40-30-30 Sacramento River Index, Sliding-scale cutback (10-20-25%) based on Sacramento River Index^b water years; no reset requirement at 4 MAF
		No Action, Alternative 1 (Preferred Alternative), and Alternative 3 – 25% cutback in Shasta critical years^a			
1966-1967	7.4	100%	100%	100%	100%
1967-1968	4.8	100%	100%	100%	90%
1968-1969	7.7	100%	100%	100%	100%
1969-1970	7.9	100%	100%	100%	100%
1970-1971	7.3	100%	100%	100%	100%
1971-1972	5.1	100%	100%	100%	90%
1972-1973	6.2	100%	100%	100%	100%
1973-1974	10.8	100%	100%	100%	100%
1974-1975	6.4	100%	100%	100%	100%
1975-1976	3.6	100%	80%	80%	75%
1976-1977	2.6	75%	75%	75%	75%
1977-1978	7.8	100%	100%	100%	100%
1978-1979	4.0	100%	100%	100%	90%
1079-1980	6.4	100%	100%	100%	100%
1980-1981	4.1	100%	100%	100%	80%

TABLE 2-3

SAMPLE OF IMPLEMENTATION OF SHORTAGE PROVISIONS BASED ON HISTORICAL PERIOD OF RECORD

Water Year – Period of Record	Inflow to Shasta Reservoir in MAF	Percentage Cutback	Alternative 2 – Sliding-scale cutback (10-20-25%) based on stepped decrease; no cutback if previous water year greater than 4.0, and no reset requirement at 4 MAF	Alternative 4 – Using Shasta Inflow, Sliding-scale cutback (10-20-25%) based on stepped decrease; cutback remains at lowest level until full contract amount reset at 4 MAF	Alternative 5 – Using 40-30-30 Sacramento River Index, Sliding-scale cutback (10-20-25%) based on Sacramento River Index^b water years; no reset requirement at 4 MAF
		No Action, Alternative 1 (Preferred Alternative), and Alternative 3 – 25% cutback in Shasta critical years^a			
1981-1982	9.0	100%	100%	100%	100%
1982-1983	10.8	100%	100%	100%	100%
1983-1984	6.7	100%	100%	100%	100%
1984-1985	4.0	100%	100%	100%	80%
1985-1986	7.5	100%	100%	100%	100%
1986-1987	3.9	100%	100%	100%	80%
1987-1988	3.9	100%	100%	100%	75%
1988-1989	4.7	100%	100%	100%	80%
1989-1990	3.6	100%	80%	80%	75%
1990-1991	3.1	75%	75%	75%	75%
1991-1992	3.6	75%	90%	75%	75%
1992-1993	6.8	100%	100%	100%	100%
1993-1994	3.1	75%	75%	75%	75%
1994-1995	9.6	100%	100%	100%	100%
1995-1996	6.8	100%	100%	100%	100%

TABLE 2-3

SAMPLE OF IMPLEMENTATION OF SHORTAGE PROVISIONS BASED ON HISTORICAL PERIOD OF RECORD

Water Year – Period of Record	Inflow to Shasta Reservoir in MAF	Percentage Cutback	Alternative 2 – Sliding-scale cutback (10-20-25%) based on stepped decrease; no cutback if previous water year greater than 4.0, and no reset requirement at 4 MAF	Alternative 4 – Using Shasta Inflow, Sliding-scale cutback (10-20-25%) based on stepped decrease; cutback remains at lowest level until full contract amount reset at 4 MAF	Alternative 5 – Using 40-30-30 Sacramento River Index, Sliding-scale cutback (10-20-25%) based on Sacramento River Index^b water years; no reset requirement at 4 MAF
		No Action, Alternative 1 (Preferred Alternative), and Alternative 3 – 25% cutback in Shasta critical years only^a			
1996-1997	7.4	100%	100%	100%	100%
1997-1998	10.3	100%	100%	100%	100%
1998-1999	7.2	100%	100%	100%	100%
1999-2000	6.8	100%	100%	100%	100%
2000-2001	4.1	100%	100%	100%	80%
Number of years with cutbacks during period of record		9 years	16 years	17 years	43 years
Cumulative (4 years) cutback during 4-year drought of 1931- 1934		2,127,451	2,021,078	2,127,451	2,021,078

TABLE 2-3

SAMPLE OF IMPLEMENTATION OF SHORTAGE PROVISIONS BASED ON HISTORICAL PERIOD OF RECORD

Water Year – Period of Record	Inflow to Shasta Reservoir in MAF	Percentage Cutback	Alternative 2 – Sliding-scale cutback (10-20-25%) based on stepped decrease; no cutback if previous water year greater than 4.0, and no reset requirement at 4 MAF	Alternative 4 – Using Shasta Inflow, Sliding-scale cutback (10-20-25%) based on stepped decrease; cutback remains at lowest level until full contract amount reset at 4 MAF	Alternative 5 – Using 40-30-30 Sacramento River Index, Sliding-scale cutback (10-20-25%) based on Sacramento River Index ^b water years; no reset requirement at 4 MAF
		<p>No Action, Alternative 1 (Preferred Alternative), and Alternative 3 – 25% cutback in Shasta critical years only^a</p>			

Notes:

^aShasta critical years defined by the contract between Reclamation and the SRSCs (see Appendix C for complete contract). This shortage provision was the mechanism used in the original contracts and thus represents the No Action, in addition to Alternatives 1 and 3.

^bThe 40-30-30 Sacramento River Index is computed as a weighted average of the current water year's April through July unimpaired runoff forecast (40 percent), the current water year's October through March unimpaired runoff forecast (30 percent), and the previous water year's index (30 percent). A cap of 10 MAF is put on the previous year's index to account for required flood control reservoir releases during wet years. Unimpaired runoff (calculated in the 40-30-30 Sacramento River Index as the sum of Sacramento River flow above Bend Bridge near Red Bluff, Feather River inflow to Oroville, Yuba River flow at Smartville, and American River inflow to Folsom) is the river production unaltered by water diversions, storage, exports, or imports. A water year with a Sacramento Valley 40-30-30 Index equal to or greater than 9.2 MAF is classified as "wet." A water year with an index equal to or less than 5.4 MAF is classified as "critical."

In only two cases, the projected water needs were less than the contract amount, and the amount of Project Water was reduced. Because the renewed CVP contract amount is limited by the existing contract quantity, an increase in the total contract amount was not considered in the needs analysis.

Reclamation's threshold for conducting needs analysis for contractors is the irrigation of 2,000 or more acres. Twenty of the SRSCs meet this threshold and together these 20 SRSCs divert 94 percent of the total water diverted. Because of their small size, needs analyses were not conducted for 125 of the SRSCs.

The results of the completed needs analyses are summarized in Table 2-2 and are provided in more detail in Appendix D.

Under Alternative 1, the proposed contracts also provide for continued delivery of CVP water to the same lands and for the same purposes of irrigation and M&I use as the No Action, with the exception of NCMWC, which has requested a change in authorized use from agricultural to M&I for use in the Metro Air Park portion of its service area. This action is being processed along with the renewal of the Settlement Contracts. Water deliveries would be made through existing CVP facilities, with no new construction required. The water would be beneficially used within CVP-authorized places of use (within the SRSCs' service areas).

Contract Period

The existing Settlement Contracts were originally executed in 1964, with a term not to exceed 40 years. Those contracts specified the following: "That under terms and conditions mutually agreeable to the parties hereto, renewals may be made for successive periods not to exceed forty (40) years each." Consistent with the existing contract language, and the CVPIA PEIS, the Preferred Alternative includes a 40-year contract term.

Base Supply Rescheduling

Under the Preferred Alternative, the negotiated contract introduces a fee for the rescheduling of Base Supply during critical months or into non-critical months (except April and May), in excess of the monthly quantity shown in Exhibit A of each SRSC's contract. The fee is equal to 50 percent of the sum of the storage operations and maintenance rate and the storage capital rate components of the Project rate setting policy. Rescheduling water from non-critical months into critical months would not be permitted.

Water Costs and Costing Mechanisms

As stated previously, SRSCs divert the Base Supply portion of their contract free of charge. The only costs related to Base Supply are in the event that Base Supply is rescheduled as described in the previous section.

Payment for Project Water under the Preferred Alternative would include a costing mechanism that requires the contractor to pay for 75 percent of the amount of allocated Project Water each year, whether or not the contractor diverted the water, and to pay for Project Water actually diverted in excess of 75 percent. The Contracting Officer could adjust applicable rates and charges if the SRSC desires to use Project Water for other than agricultural use.

Conservation Measures

Prior to diversion of Project Water, Alternative 1 requires SRSCs to be implementing a water conservation and efficiency program based on the BWMP and/or the SRSC's water conservation plan that has been determined by the Contracting Officer to meet requirements under federal law. This alternative also allows any of the SRSCs to reduce the amount of Project Water for which payment is required under Article 8(a) Settlement Contract.

Shortage Provisions

In the existing Settlement Contract and No Action Alternative, cutbacks in deliveries of 25 percent are required during critical years only. Critical years are defined by the contract as any year in which either of the following eventualities exists:

- (1) The forecasted full natural inflow to Shasta Lake for the current Water Year, is equal to or less than three million two hundred thousand (3,200,000) AF; or
- (2) The total accumulated actual deficiencies below four million (4,000,000) AF in the immediately prior Water Year or series of successive prior Water Years each of which had inflows of less than four million (4,000,000) AF, together with the forecasted deficiency for the current Water Year, exceed eight hundred thousand (800,000) AF.

The Preferred Alternative includes these same shortage provisions. Under these shortage provisions, as shown in Table 2-3, and based on the period of record, cutbacks would occur in 9 years within the 80-year period of record or 4.5 years during the 40-year contract period. During a 4-year drought sequence, such as that which occurred during the period 1930 through 1934, total cutbacks to contractors would allow for diversions of approximately 2,127 KAFY, the same as No Action.

Alternative 2: Reclamation's Initial Contract Proposal

Alternative 2 represents the initial offer presented by Reclamation to the SRSCs during the initial phase of contract renewal negotiations.

Total Contract Amount

As shown in Table 2-2, the total contract amount for Alternative 2 is 2,316 KAFY. This is the aggregated total amount provided for in all 145 contracts and the contract with the CDMWC. Table 2-2 also shows the Base Supply and Project Water supply for each of the 20 largest SRSCs for each alternative. Note that these are total contracted amounts, which may be reduced during years when shortage provisions are activated, as described below.

This amount is the same as under the No Action Alternative because, at the time that contract negotiations were initiated, the needs analyses of a few SRSCs had not been completed by Reclamation, and no reductions in contract amounts had been identified.

Contract Period

Alternative 2 includes a 40-year contract term, which is the same as the No Action and Preferred Alternatives.

Base Supply Rescheduling

Alternative 2 includes the same Base Supply rescheduling fee provision as in the Preferred Alternative.

Water Cost and Costing Mechanism

Payment for Project Water under Alternative 2 is a costing mechanism that requires the contractor to pay for 100 percent of the amount of allocated Project Water each year, whether or not the contractor diverted the water. The Contracting Officer can adjust rates to applicable rates and charges if the SRSC desires to use Project Water for other than agricultural use.

Conservation Measures

Prior to diversion of Project Water, Alternative 2 requires that SRSCs already be implementing a water conservation and efficiency program based on the BWMP and/or the SRSC's water conservation plan that has been determined by the Contracting Officer to meet requirements under federal law, and allows the SRSC to reduce the amount of Project Water for which payment is required under Article 8(a) of the Settlement Contract. Each SRSC is responsible for preparing a individual conservation plan to comply with this contract term.

Shortage Provisions

Under Alternative 2, shortage provisions would be implemented on a 10-20-25 percent sliding scale that is tied to Shasta Lake inflow deficiencies. A 10 percent reduction is applied if inflows to Shasta Lake are between 3.6 and 3.8 MAF. A 20 percent reduction occurs if inflows are between 3.4 and 3.59 MAF, and 25 percent reduction occurs if inflows are below 3.4 MAF.

Under this shortage provision, as shown in Table 2-3, and based on the period of record, cutbacks would occur in 16 years during the 80-year period of record or 8 years during the 40-year contract period. During a 4-year drought sequence, such as that which occurred during the period 1930 through 1934, total cutbacks to SRSCs would allow for diversions of approximately 2,021 KAFY. This projection assumes cutbacks in 7 additional years (20 percent of years) over the 80-year period of record, versus 11 percent of years under the No Action Alternative.

Alternative 3: SRSCs' Initial Counter Proposal

Alternative 3 represents the contract provisions contained in the SRSCs' response to Reclamation's initial proposal for terms of the renewed contract.

Total Contract Amount

As shown in Table 2-2, the total contract amount for Alternative 3 is 2,316 KAFY. This is the aggregated total amount provided for in all 145 contracts and the contract with the CDMWC. Table 2-2 also shows the Base Supply and Project Water supply for each of the 20 largest SRSCs for each alternative. These are total contracted amounts that may be reduced during years when shortage provisions are activated, as described below.

This amount is the same as under the No Action Alternative and Alternative 2 because, at the time that contract negotiations were initiated, the needs analyses of a few SRSCs had not been completed by Reclamation, and no reductions in contract amounts had been identified.

Contract Period

Alternative 3 includes a 40-year contract term, which is the same as the No Action and Preferred Alternatives.

Base Supply Rescheduling

Alternative 3 includes the same Base Supply rescheduling provision as provided in the Preferred Alternative.

Water Cost and Costing Mechanism

Under Alternative 3, there is no provision to pay for CVP Project water not diverted. SRSC payments are limited to Project Water actually diverted by the SRSC. Additionally, there is no adjustment of cost for water used other than for agricultural purposes. These costs and mechanisms are the same as for the No Action Alternative.

Conservation Measures

Prior to diversion of Project Water, Alternative 3 requires that SRSCs be implementing a water conservation and efficiency program based on the BWMP and/or the SRSC's water conservation plan that has been determined by the Contracting Officer to meet requirements under federal law, and allows the SRSC to reduce the amount of Project Water for which payment is required under Article 8(a) of the Settlement Contracts.

Shortage Provisions

Under Alternative 3, the mechanism for the shortage provision is the same as Alternative 2. However, the SRSCs would receive payment in exchange for using quantities of water below their contracted amounts. Such payment would be based on mutually acceptable terms between Reclamation and the SRSCs.

Alternative 4: Cutback Provisions Based on Shasta Inflow Sliding Scale

Alternative 4 is similar to Alternative 1, except that it considers a variation in the shortage provision that was not considered in the contract negotiations between Reclamation and the SRSCs, and would result in more frequent reductions.

Total Contract Amount

As shown in Table 2-2, the total contract amount for Alternative 4 is 2,227 KAFY. This is the aggregated total amount provided for in all 145 contracts and the contract with the CDMWC. Table 2-2 also shows the Base Supply and Project Water supply for each of the 20 largest SRSCs for each alternative. These are total contracted amounts that may be reduced during years when shortage provisions are activated, as described below.

Total contract amount for Alternative 4 is the same as the Preferred Alternative because it includes adjustments made for ACID and SMWC total contracted amount on the basis of

Reclamation's needs analyses conducted for those contractors and subsequent negotiations. It also includes adjustments for NCMWC's requested change in authorized use from agricultural to M&I in the Metro Air Park portion of its service area. Water deliveries would be made through existing CVP facilities, with no new construction required. The water would be placed to beneficial use within CVP-authorized places of use (within the SRSCs' service areas).

Contract Period

Alternative 4 includes a 40-year contract term, which is the same as the No Action and Preferred Alternatives.

Base Supply Rescheduling

Alternative 4 includes the same Base Supply rescheduling provision as provided under the Preferred Alternative.

Water Cost and Costing Mechanism

Under Alternative 4, there is no provision to pay for CVP Project water not diverted. Contractor payments are limited to Project Water actually diverted by the SRSC. Additionally, there is no adjustment of cost for water used other than for agricultural purposes. These costs and mechanisms are the same as for the No Action Alternative.

Conservation Measures

Prior to diversion of Project Water, Alternative 4 requires that SRSCs be implementing a water conservation and efficiency program based on the BWMP and/or the SRSC's water conservation plan that has been determined by the Contracting Officer to meet requirements under federal law, and allows the SRSC to reduce the amount of Project Water for which payment is required under Article 8(a) of the Settlement Contract.

Shortage Provisions

Under Alternative 4, shortage provisions are similar to those under Alternative 2, and would be implemented on a 10-20-25 percent sliding-scale basis that is tied to Shasta inflow deficiencies. A 10 percent reduction is applied if inflows to Shasta Lake are between 3.6 and 3.8 MAF. A 20 percent reduction occurs if inflows are between 3.4 and 3.59 MAF, and a 25 percent reduction occurs if inflows are below 3.4 MAF. However, under Alternative 4, as reductions are applied, they are sustained at their greatest level until inflows to Shasta Lake return to 4.0 MAF.

Under this shortage provision, as shown in Table 2-3, and based upon the 80-year period of record, cutbacks would be projected to occur in 17 years or 8.5 years during the 40 year contract period. During a 4-year drought sequence, such as that which occurred during the period 1930 through 1934, total cutbacks to SRSCs would allow for diversions of approximately 2,127 KAFY. This projection assumes cutbacks in 8 additional years (21 percent of years) over the 80-year period of record versus 11 percent of years for the No Action Alternative.

Alternative 5: Cutback Provisions Based on 40-30-30 Sacramento River Index

Alternative 5 introduces a 25-year contract term and another variation of the shortage provision that is based on the 40-30-30 Sacramento River Index, as described below.

Total Contract Amount

As shown in Table 2-2, the total contract amount for Alternative 5 is 2,227 KAFY. This is the aggregated total amount provided for in all 145 contracts and the contract with the CDMWC. Table 2-2 also shows the Base Supply and Project Water supply for each of the 20 largest SRSCs for each alternative. Note that these are total contracted amounts that may be reduced during years when shortage provisions are activated, as described below.

This amount is the same as the Preferred Alternative because it includes adjustments made for ACID and SMWC total contracted amounts on the basis of Reclamation's needs analyses conducted for those contractors and subsequent negotiations. It also includes adjustments for NCMWC's requested change in authorized use from agricultural to M&I in the Metro Air Park portion of its service area. Water deliveries would be made through existing CVP facilities, with no new construction required. The water would be placed to beneficial use within CVP-authorized places of use (within the SRSCs' service areas).

Contract Period

The contract period for Alternative 5 is 25 years. The CVPIA authorizes renewal of long-term repayment or water service contracts for 25 years. Settlement Contracts are distinct from these types of contracts; however, a 25-year period is considered in this alternative to evaluate the potential for lessening any potential impacts with a shorter contract term, as suggested by comments received during scoping.

Base Supply Rescheduling

Alternative 5 includes the same Base Supply rescheduling provision as Alternative 1.

Water Cost and Costing Mechanism

Under Alternative 5, there is no provision to pay for CVP Project water not diverted. Contractor payments are limited to Project Water actually diverted by the SRSC. Additionally, there is no adjustment of cost for water used for other than for agricultural purposes.

Conservation Measures

Prior to diversion of Project Water, Alternative 5 requires that SRSCs be implementing a water conservation and efficiency program based on the BWMP and/or the SRSC's water conservation plan that has been determined by the Contracting Officer to meet requirements under federal law, and allows the SRSC to reduce the amount of Project Water for which payment is required under Article 8(a) of the Settlement Contract.

Shortage Provisions

Under Alternative 5, shortage provisions are similar to those under Alternative 2, and would be implemented on a 10-20-25 percent sliding-scale basis that is tied to the 40-30-30 Sacramento River Index rather than Shasta inflows.

The 40-30-30 Sacramento River Index is computed as a weighted average of the current water year's April through July unimpaired runoff forecast (40 percent), the current water year's October through March unimpaired runoff forecast (30 percent), and the previous water year's index (30 percent). A cap of 10 MAF is put on the previous year's index to account for required flood control reservoir releases during wet years. Unimpaired runoff calculated in the 40-30-30 Sacramento River Index is the sum of Sacramento River flow above Bend Bridge near Red Bluff, Feather River inflow to Oroville, Yuba River flow at Smartville, and American River inflow to Folsom. The result is the river production unaltered by water diversions, storage, exports, or imports. A water year with a 40-30-30 Sacramento River Index equal to or greater than 9.2 MAF is classified as "wet." Indexed water years are classified as follows:

- A water year with an index greater than 7.8 and less than 9.2 MAF is classified as "above normal."
- A water year with an index greater than 6.5 and equal to or less than 7.8 MAF is classified as "below normal."
- A water year with an index greater than 5.4 and equal to or less than 6.5 MAF is classified as "dry."
- A water year with an index equal to or less than 5.4 MAF is classified as "critical."

A 10 percent reduction is applied in years identified as below normal by the index. A 20 percent reduction occurs in dry years and a 25 percent reduction occurs in critical years.

Under this shortage provision, as shown in Table 2-3, and based on the period of record, cutbacks would occur in 43 years out of 80 or 10.5 years of the 25-year contract period. During a 4-year drought sequence, such as that which occurred during the period 1930 through 1934, total cutbacks to the SRSCs would allow for diversions of approximately 2,021 KAFY. This projection assumes cutbacks in 34 additional years (42 percent of years) during the 80-year period of record, versus 11 percent of years under the No Action Alternative.

ALTERNATIVES CONSIDERED AND ELIMINATED FROM DETAILED DISCUSSION

Several alternatives were identified by Reclamation and the SRSCs during preliminary planning efforts and scoping activities for this EIS. The following discussion identifies two alternatives that were considered, but eliminated from further discussion in this document. Each of these alternatives was eliminated from detailed discussion in this EIS for one or more of the following reasons: (1) it fails to meet the requirements of the purpose of and need for the action, or (2) the alternative is prohibitively greater in cost or in environmental impacts than the other alternatives, or (3) it cannot be reasonably implemented.

No Contract Renewal Alternative

This alternative was suggested by comments received during the scoping process for the EIS and would assume that the Settlement Contracts between the SRSCs and Reclamation were not renewed.

This alternative was eliminated from further consideration in this EIS because it would not meet the objectives of both Reclamation and the SRSCs to provide water supplies to the various M&I and agricultural water users within the contractors' service areas, and would not meet the purpose of the proposed action. It is difficult to speculate how both Reclamation and the SRSCs may respond in a scenario where the Settlement Contracts were not renewed. However, at least two possible scenarios are imagined. In the first, the status quo could prevail. Operations of the CVP would continue as they have in the recent past under existing contracts and the SRSCs would continue to divert Base and Project Water supplies in the quantities and during the months that they have historically. This scenario is not a feasible alternative as it does not meet the purpose for and need of the project to ensure the use of the Sacramento River to the SRSCs. Without a contract in place there would be no legally binding document to support both Reclamation and the SRSCs in the event of a dispute. Continuing water deliveries and diversions in the absence of a contract is not considered to be a reasonable alternative by either Reclamation or the SRSCs.

A second and possibly more probable scenario of a no contract renewal alternative would result in the inability of the SRSCs to divert water during the critical irrigation months. The existing contracts and the CVP provide the SRSCs with the ability to divert water during the hot summer, peak irrigation months. Without contracts in place and in the absence of current CVP operations, the SRSCs could possibly revert to their original water rights. Those rights would enable them to divert water in accordance with the natural hydrograph of the River; greater flows in the winter and spring months and lesser or none during the peak irrigation months. The existing diversion facilities are currently limited as to diversion capacity and the SRSCs do not have the capability to divert greater amounts of water during non-peak periods and store it onsite for use during periods of peak demand. This scenario would likely result in a greater reliance on local groundwater supplies to fulfill summer irrigation demands of the SRSCs. Consistent increased use of local groundwater supplies could lead to depletion of groundwater resources, and impacts to local streams and the biological resources reliant on those streams such as wildlife and vegetation of riparian habitats. In addition to environmental effects of groundwater use, the cost of pumping groundwater could become burdensome on the SRSCs, resulting in economic hardship, which could lead to fallowing and potentially the indirect effects associated with fallowing, such as air quality or soil erosion. These impacts would be greater than those projected under both the No Action Alternative and the Preferred Alternative. Therefore this alternative was eliminated from further consideration.

Additionally, Public Law 88-44 (77 Stat. 68) provides that the Secretary of the Interior shall, upon request of the other party to any long-term contract for municipal, domestic, or industrial water supply hereafter entered into under the Reclamation Project Act of 1939 (53 Stat. 1195, 43 U.S.C. 485h), include provision for contract renewal subject to renegotiation. Thus, nonrenewal of the contracts is also legally infeasible.

Reduction in Contract Amounts

Alternatives that included a significant reduction of contract amounts for all contractors were considered but eliminated from further consideration for two major reasons. First, water needs analyses have been completed for all contractors with more than 2,000 irrigable acres, accounting for over 95 percent of the contract water supply provided to the SRSCs. In all but two cases, the needs exceed or equal the current total contract amount. Reduced contract amounts would therefore not meet the purpose and need of the project to ensure the SRSCs the use of the Sacramento River. Additionally, reduced contract amounts could have a similar effect as the no contract renewal alternative described above by forcing the SRSCs to rely on local groundwater supplies. Ongoing, increased use of local groundwater supplies could lead to depletion of groundwater resources, and impacts to local streams and the biological resources reliant on those streams such as wildlife and vegetation of riparian habitats. In addition to environmental effects of groundwater use, the cost of pumping groundwater could become burdensome on the SRSCs, resulting in economic hardship, which could lead to fallowing and potentially the indirect effects associated with fallowing, such as air quality or soil erosion. For these reasons, an alternative that would include reduced contract amounts, beyond those included in the Preferred Alternative, was considered but eliminated from further analysis.

SELECTION OF THE PREFERRED ALTERNATIVE

The Preferred Alternative is Alternative 1, renewal of the SRSC contracts under the contract terms negotiated by Reclamation and the SRSCs. These terms were determined to be agreeable by both parties and such make this Alternative the most feasible to implement. Additionally, because this Alternative is essentially a continuation of existing conditions, there are no environmental effects of the Preferred Alternative and thus it can be considered to be environmentally superior.

SUMMARY OF IMPACT ASSESSMENT

The alternatives considered in this EIS were analyzed to determine the potential for adverse and beneficial impacts associated with their implementation as compared to continuation of existing conditions, which are reflected in the No Action Alternative. The results of this analysis are summarized in Table 3-1 and presented in Chapter 3 of this EIS.

CHAPTER 3

AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

INTRODUCTION

This chapter describes the affected environment and the environmental consequences associated with renewing the Settlement Contracts under all alternatives described in Chapter 2 as compared to renewing the contracts under the No Action Alternative. This chapter also describes potential mitigation measures that could be used to avoid, reduce, or otherwise minimize potential adverse impacts to the environment resulting from an alternative. Cumulative effects are presented in Chapter 4.

The resources and issues included in this chapter were identified through a review of NEPA guidance documents and through the scoping process. The resources and issues described in this chapter are as follows:

- Physical Environment
 - Air Quality
 - Geology and Soils
 - Surface Water
 - Groundwater
- Biological Environment
 - Terrestrial Biological Resources
 - Aquatic Biological Resources
- Economics
 - Land Use and Agricultural Production
 - M&I Land Use and Water Costs
 - Power Supply and Demands
 - Regional Economics
- Sociocultural Environment
 - Demographics Description
 - Cultural Resources
 - Indian Trust Assets
 - Environmental Justice
 - Recreation

The descriptions of the affected environment are first organized by issue and, then, further discussed by county, city, irrigation district, or province. The analyses for these areas include summaries of evaluations completed by cities, counties, irrigation districts, and federal and state agencies.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

NEPA Section 102(C)(v) requires federal agencies to consider to the fullest extent possible irreversible and irretrievable commitments of resources that would be involved if the Preferred Alternative were implemented. The Preferred Alternative is the renewal of existing contracts and does not involve construction or use of resources except water. There is no commitment of nonrenewable resources, and the Preferred Alternative would not commit future generations to permanent use of natural resources.

RELATIONSHIP BETWEEN SHORT-TERM USES OF THE ENVIRONMENT AND MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

NEPA Section 102(C)(iv) requires all federal agencies to disclose the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity. These water delivery contracts are temporary (40 years), yet result in long-term benefits to the sustainability and reliability of agricultural production and economic growth. Long-term productivity would be enhanced through the water supply that sustains agricultural economics, social benefits, and the long-term productivity of urban and rural populations by continuing to provide CVP water.

IMPACT ASSUMPTIONS

In conducting analyses of environmental impacts, it is necessary to make basic assumptions regarding secondary effects. For the analyses conducted in the following sections, basic assumptions were required regarding the use of water under the various alternatives. This was particularly relevant for Alternatives 4 and 5, which make water available for other uses through increased frequency of contract reductions. Following is a basic discussion of the assumptions guiding impact analysis.

Assumptions within Sacramento River Settlement Contractor Districts

In all but two cases (ACID and SMWD), contract amounts remain unchanged; therefore, typical water use among the districts would also remain unchanged. Contract reductions for ACID and SMWD were based on Reclamation's needs analyses, whereby water needs were evaluated according to irrigated acreage and crop patterns that represent typical district operations. Reclamation has determined that because these analyses are based on historical data of actual use, it is reasonable to assume that operations would be unchanged under reduced contract totals, given the contract reductions for ACID and SMWD result in matching water needs with actual use. Therefore, there is no assumed on-field change between current and revised contract totals. However, some SRSCs disagree with the assumptions used in the needs analysis, particularly with regard to irrigated acreage. Regardless, all parties have agreed upon the final contract amounts.

The second assumption necessary to assess impacts is how SRSCs would respond to drought conditions. Under the existing contracts (i.e., the No Action condition), SRSCs are subject to a 25 percent reduction in critical years. Reviewing input from the SRSC representatives, it was determined that in critical years, districts and member farmers turn to short-term supplies for water; typically increased use of groundwater and drainwater.

Using this information, there are no anticipated impacts under Alternatives 1 and 3 during drought conditions because the definition of critical years and the application of a shortage provision are the same as under No Action. Over the period of record (1922 through 2001), there were 9 critical years, and future responses are likely to be identical to past drought operations; thus, no change would occur. Under Alternatives 2, 4, and 5, the frequency of drought conditions is effectively increased because the definition of cutback years has been expanded. For Alternatives 2 and 4, there would be 16 years with drought shortage conditions (varying between 10 and 25 percent of full contract supply). Under Alternative 5, there would be 43 years with drought shortage conditions. It was expected that an increase in drought frequency would result in a change in cropping pattern; however, the agricultural impact analysis noted that cropping patterns would not change.

Potential increases in groundwater pumping under Alternatives 2, 4, and 5 are anticipated to have less than significant effects on groundwater supplies, even under very conservative modeling conditions. Although seasonal depth to groundwater may increase in some areas in the range of 20 to 40 feet, it is not anticipated to substantially change the economics of pumping groundwater during drought years, nor would new wells be required because drought-year supplies are currently being met. Also, the increased pumping would not lead to long-term declines in groundwater levels. Alternatives 3, 4, and 5 also include provisions stating that additional terms would be added to ensure that the additional drought years included compensation to offset additional costs, meaning that the additional cost of pumping would be offset by Reclamation. Therefore, drought operations, although occurring more frequently, would not result in substantial land use or cropping changes; thus, no significant secondary impacts would occur.

Assumptions outside Sacramento River Settlement Contractor Districts

Assessing impacts outside the SRSCs also requires basic assumptions about drought operations. As noted above, Alternatives 1 and 3 are identical to No Action in terms of drought-year frequency; therefore, operations would remain unchanged and no impacts would occur. The overall decrease in SRSC diversion associated with the reduction of ACID and SMWC contract amounts would provide Reclamation with additional flexibility in meeting other contract and environmental water needs. Under Alternatives 2, 4, and 5, frequencies of drought years would increase, meaning that deliveries to SRSCs would decrease, potentially allowing water to be re-allocated from SRSCs to other contract and environmental uses. However, it is speculative to predict specifically where the water would be allocated.

Many resources are potential recipients of the water not delivered to SRSCs. Water could be allocated for water quality in the Sacramento River or Bay Delta, for use by other agricultural or municipal water contractors, for habitat enhancement, as a benefit to recreational use, or

simply as carryover supply for the subsequent water year. In some cases, these uses may be complementary. To assess impacts, or benefits, in these areas, it is necessary that the additional water be potentially available for various uses. Actual use would be determined at a future date, and could change on the basis of administrative policy, hydrology, demographics, or other considerations.

Table 3-1 provides a basic overview of the general impact direction for all the resource categories under each of the alternatives.

TABLE 3-1

SUMMARY OF IMPACTS FOR ALL RESOURCE CATEGORIES

Alternative	Alternative 1: Preferred Alternative - Negotiated Contract	Alternative 2: Reclamation's Initial Contract Proposal	Alternative 3: SRSCs' Counter Proposal	Alternative 4: Cutback Provisions Based on Sliding Scale	Alternative 5: Cutback Provisions Based on Sacramento Index
Physical Environment					
Air Quality	No impact	No impact	No impact	Significant impact	Significant impact
Geology and Soils	No impact	No impact	No impact	No impact	No impact
Surface Water	No impact	Small potential benefit - increased flow in the Sacramento River/small potential impact – decreased flow in tributaries	No impact	Small potential benefit - increased flow in the Sacramento River/small potential impact – decreased flow in tributaries	Small potential benefit - increased flow in the Sacramento River/small potential impact – decreased flow in tributaries
Groundwater					
Sacramento Valley Groundwater Basin	No impact	No impact	No impact	Less than significant	Less than significant
Redding Groundwater Basin	No impact	No impact	No impact	Less than significant	Less than significant
Biological Environment					
Terrestrial Biological Resources	No impact	Less than significant	No impact	Less than significant	Less than significant
Aquatic Biological Resources	No impact	Potential benefit	No impact	Potential benefit	Potential benefit

TABLE 3-1

SUMMARY OF IMPACTS FOR ALL RESOURCE CATEGORIES

Alternative	Alternative 1: Preferred Alternative - Negotiated Contract	Alternative 2: Reclamation's Initial Contract Proposal	Alternative 3: SRSCs' Counter Proposal	Alternative 4: Cutback Provisions Based on Sliding Scale	Alternative 5: Cutback Provisions Based on Sacramento Index
Economics					
Agricultural Land Use and Production	No impact	Less than significant	No impact	Less than significant	Less than significant
M&I Land Use and Water Costs	No impact	Potential benefit	No impact	Potential benefit	Potential benefit
Power Supply and Demands	No impact	Potential benefit	No impact	Potential benefit	Potential benefit
Regional Economics	No impact	No impact	No impact	No impact	No impact
Socioculture Environment					
Demographic s Description	No impact	No impact	No impact	No impact	No impact
Cultural Resources	No impact	No impact	No impact	No impact	No impact
Indian Trust Assets	No impact	No impact	No impact	No impact	No impact
Environmenta l Justice	No impact	No impact	No impact	No impact	No impact
Recreation	No impact	Potential benefit	No impact	Potential benefit	Potential benefit

PHYSICAL ENVIRONMENT

Air Quality

Affected Environment

The Preferred Alternative is located entirely within the Sacramento Valley Air Basin (SVAB), which is composed of Shasta, Tehama, Butte, Glenn, Colusa, Sutter, Yolo, and Sacramento Counties and portions of Placer and Solano Counties.

Air Quality Standards. Air quality in the SRSCs service area is regulated at the federal, state, and local levels. At the federal level, the U.S. Environmental Protection Agency (EPA) is responsible for overseeing implementation of the federal Clean Air Act amendments. Pursuant to this act, EPA established National Ambient Air Quality Standards (NAAQS) for the following air pollutants (termed “criteria” pollutants): carbon monoxide

(CO), ozone (O₃), nitrogen dioxide (NO₂), sulfur dioxide (SO₂), particulate matter less than 10 (respirable) and 2.5 (fine) microns in diameter (PM₁₀ and PM_{2.5}, respectively), and lead. In 1977, the federal Clean Air Act was amended to require each state to maintain a State Implementation Plan for achieving compliance with NAAQS. In 1990, the federal Clean Air Act was again amended to strengthen regulation of both stationary and mobile emission sources.

The California Air Resources Board oversees California's air quality policies. California Ambient Air Quality Standards (CAAQS) were established starting in 1969, pursuant to the Mulford-Carrell Act. These standards are generally more stringent and include more pollutants than the NAAQS. The California Clean Air Act was approved in 1988, and requires each local air district in the state to prepare an Air Quality Plan to achieve compliance with CAAQS. Table 3-2 summarizes NAAQS and CAAQS and represents safe levels to avoid specific adverse health effects associated with each pollutant.

Several air districts are located within the SVAB. The local air districts with jurisdiction within the project study area include the following:

- Shasta County Air Quality Management District
- Glenn County Air Pollution Control District
- Tehama County Air Pollution Control District
- Colusa County Air Pollution Control District
- Butte County Air Quality Management District
- Feather River Air Quality Management District (mainly Sutter County)
- Placer County Air Pollution Control District
- Yolo/Solano Air Quality Management District

**TABLE 3-2
NATIONAL AND CALIFORNIA AMBIENT AIR QUALITY STANDARDS**

Pollutant	Averaging Period	California Standards ^a	National Standards ^b	
			Primary ^c	Secondary ^d
Ozone	8-hour	--	0.08 ppm	0.08 ppm
	1-hour	0.09 ppm	0.12 ppm	0.12 ppm
Carbon Monoxide	8-hour	9.0 ppm	9 ppm	--
	1-hour	20 ppm	35 ppm	--
Nitrogen Dioxide	Annual arithmetic mean	--	0.053 ppm	0.053 ppm
	1-hour	0.25 ppm	--	--
Sulfur Dioxide	Annual arithmetic mean	--	0.030 ppm	--
	24-hour	0.04 ppm	0.14 ppm	--
	3-hour	--	--	0.5 ppm
	1-hour	0.25 ppm	--	--
PM ₁₀	Annual arithmetic mean	20 µg/m ³	50 µg/m ³	50 µg/m ³
	24-hour	50 µg/m ³	150 µg/m ³	150 µg/m ³
PM _{2.5}	Annual arithmetic mean	12 µg/m ³	15 µg/m ³	15 µg/m ³
	24-hour	--	65 µg/m ³	65 µg/m ³
Sulfates	24-hour	25 µg/m ³	--	--
Lead	30-day average	1.5 µg/m ³	--	--
	Calendar quarter	--	1.5 µg/m ³	1.5 µg/m ³
Hydrogen Sulfide	1-hour	0.03 ppm	--	--
Vinyl Chloride	24-hour	0.01 ppm	--	--
Visibility-reducing Particles	8-hour	See note ^e	--	--

^aCalifornia standards for ozone, carbon monoxide, sulfur dioxide (1-hour and 24-hour), nitrogen dioxide, suspended particulate matter (PM₁₀, PM_{2.5}, and visibility-reducing particles) are values that are not to be exceeded. All others are not to be equaled or exceeded.

^bNational standards, other than ozone, particulate matter, and those based on annual averages or annual arithmetic means, are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest 8-hour concentration in a year, averaged over 3 years, is equal to or less than the standard. For PM₁₀, the 24-hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 µg/m³ is equal to or less than 1. For PM_{2.5}, the 24-hour standard is attained when 98 percent of the daily concentrations, averaged over 3 years, are equal to or less than the standard.

^cNational Primary Standards: The levels of air quality necessary, with an adequate margin of safety, to protect human health.

^dNational Secondary Standards: The levels of air quality necessary to protect human welfare from any known or anticipated adverse effects of a pollutant.

^eInsufficient amount to produce an extinction coefficient of 0.23 per kilometer due to particles when the relative humidity is less than 70 percent.

Notes:
µg/m³ = micrograms per cubic meter.
ppm = parts per million (by volume).
Source: California Air Resources Board, 2003.

Pursuant to the 1990 federal Clean Air Act amendments, EPA has classified air basins (or portions thereof) as either “attainment” or “nonattainment” for each criteria air pollutant, according to whether NAAQS have been achieved. Similar designations are assigned for attainment and nonattainment of CAAQS. The “nonattainment” designation means that the air quality standards for the criteria pollutants are not consistently met. Table 3-3 shows the attainment classification for each county represented in the SVAB.

Regional Climate and Weather. The climate in the SVAB is considered Mediterranean, with average maximum and minimum temperatures of 97 degrees Fahrenheit (°F) and 58°F, respectively. Annual sunshine is approximately 75 percent of daytime hours, and annual precipitation ranges from approximately 15 inches in the northwest to 60 inches in the northeast. Prevailing winds within the SVAB originate offshore of the San Francisco Bay Area and flow through the Carquinez Strait and then north through the Sacramento Valley. Elevations within the Sacramento Valley Floor range from 60 to 500 feet above mean sea level. The Sacramento Valley is bordered to the north by the Sierra Cascade Mountains, to the east by the Sierra Nevada Mountains, and to the west by the Coast Range.

The topography and climate in the SVAB create a high potential for air inversions. Air inversions occur when air of one temperature is contained beneath a layer of air of another temperature, and air circulation is impeded. Inversions occur frequently within the SVAB during all seasons. The most stable of these inversions occurs in the late summer and early fall, when cool coastal air is trapped beneath a warm air mass. During late fall and winter, air inversions occurring at ground level often result in low-lying fog when valley air becomes trapped and does not mix with coastal air. Under these conditions, the SVAB experiences the highest concentrations of carbon monoxide, nitrogen oxide (NO_x), and airborne particulate matter.

Factors contributing to the existing air quality within the SVAB, and especially within the SRSCs service area, are rural-type pollution and pollution transported from urban areas. Local emissions stem from the region’s predominantly agricultural economy, which necessitates land cultivation and produces agricultural byproducts. Overall, SVAB emissions are a result of industries, automobiles, and land disturbances from urban areas, such as metropolitan Sacramento and surrounding communities including Yuba City, Marysville, Woodland, Davis, Chico, and, to a lesser extent, the San Francisco Bay Area. In addition, local, regional, and interstate automobile and truck traffic is a continually increasing, predominant air pollutant emission source within the basin (Navigant Consulting, Inc., 2000).

Environmental Consequences. The effects of Alternatives 1 through 5 on air quality in the SRSCs service area are compared to conditions under the No Action Alternative.

No Action Alternative. The No Action Alternative does not include new facilities or construction. The No Action Alternative assumes that dry-year reductions would remain the same as existing conditions, and the renewed contract period would be 40 years.

TABLE 3-3

ATTAINMENT STATUS FOR COUNTIES WITHIN THE SACRAMENTO VALLEY AIR BASIN

Pollutant	Shasta	Tehama	Glenn	Colusa	Solano	Sutter	Butte	Yolo	Sacramento
State									
Ozone	Nonattainment	Nonattainment	Nonattainment – Transitional	Nonattainment	Nonattainment	Nonattainment	Nonattainment – Transitional	Nonattainment	Nonattainment
PM ₁₀	Nonattainment	Nonattainment	Nonattainment	Nonattainment	Nonattainment	Nonattainment	Nonattainment	Nonattainment	Nonattainment
Carbon Monoxide	Unclassified	Unclassified	Unclassified	Unclassified	Attainment	Attainment	Attainment	Attainment	Attainment
Federal									
Ozone (1-hour Standard)	Unclassified/Attainment	Unclassified/Attainment	Unclassified/Attainment	Unclassified/Attainment	Nonattainment (severe)	Nonattainment (southern portion – severe; northern portion – Section 185A)	Nonattainment	Nonattainment (severe)	Nonattainment (severe)
Ozone (8-hour Standard)	Unclassified/Attainment	Unclassified/Attainment	Unclassified/Attainment	Unclassified/Attainment	Nonattainment (portions – serious)	Nonattainment (southern portion – serious; northern portion – basic)		Nonattainment (serious)	Nonattainment (serious)
PM ₁₀	Unclassified/Attainment	Unclassified/Attainment	Unclassified/Attainment	Unclassified/Attainment	Unclassified/Attainment	Unclassified/Attainment	Unclassified/Attainment	Unclassified/Attainment	Nonattainment (moderate) (request for attainment redesignation has been filed)
Carbon Monoxide	Unclassified	Unclassified	Unclassified	Unclassified	Unclassified	Unclassified	Unclassified	Unclassified	Unclassified
Note: Attainment or Unclassified = sufficient data were not available to make a designation.									
Source: California Air Resources Board, 2002.									

Alternative 1. Air quality in the SRSCs service area under Alternative 1 would be similar to conditions under the No Action Alternative. Alternative 1 would not significantly alter current CVP operations, water storage or release patterns from CVP facilities, or the maximum volume of water delivered to the SRSCs, with the exception of reduced contract amounts to ACID and SMWC. However, these reductions would not result in increased pumping activities by these districts; therefore, the reductions would not result in impacts to air quality.

It is assumed that use of the assigned CVP water by the SRSCs would continue to be managed in the same manner under Alternative 1 as under the No Action Alternative.

No adverse impacts are associated with this alternative.

Alternative 2. Air quality in the SRSCs service area under Alternative 2 would be identical to conditions under the No Action Alternative. Alternative 2 would not alter current CVP operations, water storage or release patterns from CVP facilities, or the maximum volume of water delivered to the SRSCs.

It is assumed that use of the assigned CVP water by the SRSCs would continue to be managed in the same manner under Alternative 2 as under the No Action Alternative.

No adverse impacts are associated with this alternative.

Alternative 3. Air quality in the SRSCs service area under Alternative 3 would be identical to conditions under the No Action Alternative. Alternative 3 would not alter current CVP operations, water storage or release patterns from CVP facilities, or the maximum volume of water delivered to the SRSCs.

It is assumed that use of the assigned CVP water by the SRSCs would continue to be managed in the same manner under Alternative 3 as under the No Action Alternative.

No adverse impacts are associated with this alternative.

Alternative 4. It is assumed that use of the assigned CVMP water by SRSCs would continue to be managed in the same manner under Alternative 4 as under the No Action Alternative. Air quality in the SRSCs service area under Alternative 4 would be potentially decreased in comparison to the No Action Alternative. Alternative 4 would not significantly alter current CVP operations, water storage or release patterns from CVP facilities, or the maximum volume of water delivered to the SRSCs, with the exception of reduced contract amounts to ACID and SMWC, and sliding-scale reduced diversions to all contractors in dry years. Increased frequency of dry-year reductions would take place during years when the irrigation district would have otherwise maintained full contract amounts, but are still within the range of reductions for critical years as defined under No Action. Therefore, the amount of irrigated acreage would be within the normal range associated with the No Action condition, and no additional fallowing would be required, although some additional crop acreage reductions would occur in lands served by short-form contractors. Possible results of these reductions are discussed in the Agricultural Land Use and Production section.

Alternatively, farmers may supplement surface water with groundwater, which would cause increased diesel emissions from pumping activities, particularly PM₁₀ and NO_x. The quantity of pumping that would occur as a result of this alternative is outlined in the Groundwater section. However, all project-related emissions would be produced in nonattainment areas; thus, the project could potentially contribute to an existing air quality violation, which would be considered a significant impact.

It is assumed that use of the assigned CVP water by SRSCs would continue to be managed in the same manner under Alternative 4 as under the No Action Alternative.

Alternative 5. It is assumed that use of the assigned CVP water by the SRSCs would continue to be managed in the same manner under Alternative 5 as under the No Action Alternative. Air quality in the SRSCs service area under Alternative 5 would be potentially decreased in comparison to the No Action Alternative. Alternative 5 would not significantly alter current CVP operations, water storage or release patterns from CVP facilities, or the maximum volume of water delivered to the SRSCs, with the exception of reduced contract amounts to ACID and SMWC, and Shasta Inflow Index-reduced diversions to contractors in dry years. Increased frequency of dry-year reductions would take place during years when the irrigation district would have otherwise maintained full contract amounts, but are still within the range of reductions for critical years as defined under No Action. Therefore, the amount of irrigated acreage would be within the normal range associated with the No Action condition, and no additional fallowing would be required, although some additional crop acreage reductions would occur in lands served by short-form contractors. Possible results of these reductions are discussed in Agricultural Land Use and Production section.

Alternatively, farmers may supplement surface water with groundwater, which would cause increased diesel emissions from pumping activities, particularly PM₁₀ and NO_x. The quantity of pumping that would occur as a result of this alternative is outlined in the Groundwater section. However, all project-related emissions would be produced in nonattainment areas; thus, the project could potentially contribute to an existing air quality violation, which would be considered a significant impact.

It is assumed that use of the assigned CVP water by the SRSCs would continue to be managed in the same manner under Alternative 5 as under the No Action Alternative.

Geology and Soils

Geology Affected Environment. The SRSCs service area includes portions of two major physiographic provinces, the Sacramento Valley Province and the Klamath Mountains Province. The following sections provide a brief description of these provinces.

Sacramento Valley Province. The majority of the SRSCs service area, which includes Butte, Colusa, Glenn, Placer, Sutter, Tehama, Sacramento, and Yolo Counties, overlies the Sacramento Valley Province. The Sacramento Valley Province is a 400-mile-long by 60-mile-wide sedimentary basin positioned among the Sierra Nevada, Klamath Mountains, Cascade Range, and Coast Range Provinces. Rocks of the Sacramento Valley

Province include Upper Jurassic to Cretaceous marine sedimentary rocks, fluvial deposits, and recent alluvium (CALFED, 2000).

Klamath Mountains Province. The Klamath Mountains Province occurs at the northern end of the Sacramento Valley Province. Within the SRSCs service area, Shasta and Tehama Counties fall within the boundaries of this province. Klamath Mountains Province is approximately 70 miles wide and extends northward into Oregon. Rocks of this province range in age from Paleozoic to Jurassic. The province consists of several well-defined mountain ranges, including the Trinity, Marble, Scott, and Salmon Mountains (CALFED, 2000).

Soils

Affected Environment. The SRSCs service area includes the following five types of landforms that are associated with distinct characteristic soil compositions (CALFED, 1998):

- **Floodplain** – Composed of nearly level, recent alluvium with deposits of silt, sand, and gravel that were deposited by streams from the hills and mountains. These recent deposits consist mainly of reddish, sandy clay and black humus topsoil overlying unconsolidated sand, silt, clay, and gravel. The valley alluvium deposits increase in thickness toward the center of the valley, ranging from only a few inches near the foothills to over 200 feet near the Sacramento River (Butte County, 1977). Floodplain soils support highly productive agricultural land (CALFED, 1998).
- **Basin Rim/Basin Floor** – Consists of poorly drained soil, and saline and alkali soils in the valley trough and on the basin rim. This soil is typically used for pasture, rice, and cotton (CALFED, 1998).
- **Terraces** – Terraces consist of deposits of poorly consolidated, deeply red-stained gravel, sand, silt, and clay. These deposits typically are found near the eastern edge of the Sacramento Valley. The terraces were apparently formed as ancient floodplains during glacial periods (County of Sacramento, 1993). These soils are typically used for grazing and timberland (CALFED, 1998).
- **Delta** – Delta soils are primarily fertile peat composed of slow-to-decay organic material (County of Sacramento, 1993).
- **Foothills and Mountains** – This type of soil is formed in place through the decomposition and disintegration of underlying parent material. These soils are typically used for grazing and timberland (CALFED, 1998). A list of the most common soil groups in this category follows:
 - Soils with a deep depth (greater than 40 inches) to bedrock, which typically occur in high-rainfall zones at higher elevations
 - Soils with a shallow depth (less than 20 inches) to bedrock, which typically occur in the medium- to low-rainfall zones at lower elevations

- Soils with a very shallow depth (less than 12 inches) to bedrock, which typically occur on steep slopes at high elevations

Environmental Consequences. The effects of Alternatives 1 through 5 on geology and soils of the SRSCs service area are compared to conditions under the No Action Alternative.

No Action Alternative. The No Action Alternative does not include new facilities or construction. The No Action Alternative assumes that dry-year reductions would remain the same as existing conditions, and the renewed contract period would last 40 years.

Alternative 1. Geology and soils in the SRSCs service area under Alternative 1 would be similar to conditions under the No Action Alternative. Alternative 1 would not significantly alter current CVP operations, water storage or release patterns from CVP facilities, or the maximum volume of water delivered to the SRSC, with the exception of reduced contract amounts to ACID and SMWC. However, these reductions would not result in activities that would cause disturbance to soils; therefore, the reductions would result in no impacts.

It is assumed that use of the assigned CVP water by the SRSC would continue to be managed in the same manner under Alternative 1 as under the No Action Alternative.

No adverse impacts are associated with this alternative.

Alternative 2. Geology and soils in the SRSCs service area under Alternative 2 would be identical to conditions under the No Action Alternative. Alternative 2 would not alter current CVP operations, water storage or release patterns from CVP facilities, or the maximum volume of water delivered to the SRSCs.

It is assumed that use of the assigned CVP water by SRSCs would continue to be managed in the same manner under Alternative 2 as under the No Action Alternative.

No adverse impacts are associated with this alternative.

Alternative 3. Geology and soils in the SRSCs service area under Alternative 3 would be identical to conditions under the No Action Alternative. Alternative 3 would not alter current CVP operations, water storage or release patterns from CVP facilities, or the maximum volume of water delivered to the SRSC.

It is assumed that use of the assigned CVP water by the SRSCs would continue to be managed in the same manner under Alternative 3 as under the No Action Alternative.

No adverse impacts are associated with this alternative.

Alternative 4. Geology and soils in the SRSCs service area under Alternative 4 would be similar to conditions under the No Action Alternative. Alternative 4 would not significantly alter current CVP operations, water storage or release patterns from CVP facilities, or the maximum volume of water delivered to the SRSC, with the exception of reduced contract amounts to ACID and SMWC and sliding-scale reduced diversions to all contractors in dry years. Increased frequency of dry-year reductions would take place during

years when the irrigation district would have otherwise maintained full contract amounts, but are still within the range of reductions for critical years as defined under No Action. Therefore, the amount of irrigated acreage would be within the normal range associated with the No Action condition, and no additional erosion or loss of soil would occur.

It is assumed that use of the assigned CVP water by the SRSCs would continue to be managed in the same manner under Alternative 4 as under the No Action Alternative.

No significant adverse impacts are associated with this alternative.

Alternative 5. Geology and soils in the SRSCs service area under Alternative 5 would be similar to conditions under the No Action Alternative. Alternative 5 would not significantly alter current CVP operations, water storage or release patterns from CVP facilities, or the maximum volume of water delivered to the SRSCs, with the exception of reduced contract amounts to ACID and SMWC, and Shasta Inflow Index-reduced diversions in dry years. Increased frequency of dry-year reductions would take place during years when the irrigation district would have otherwise maintained full contract amounts, but are still within the range of reductions for critical years as defined under No Action. Therefore, the amount of irrigated acreage would be within the normal range associated with the No Action condition, and no additional erosion or loss of soil would occur.

No significant adverse impacts are associated with this alternative.

Surface Water

Affected Environment

The CVP is the largest surface water storage and delivery system in California, covering 35 of the state's 58 counties. The project includes 20 reservoirs, with a combined storage capacity of approximately 11 MAF, and 9 power plants and 2 pump-generating plants, with a combined generation capacity of approximately 2 million kilowatts. Operations of the CVP are quite complex given the multiple demands that must be met. Key Shasta Division operational issues include the following:

- Flood control
- Storage and release of water for agricultural, M&I, fish and wildlife, refuges, and other needs
- Navigation flows
- Temperature control as specified by the 1993 Biological Opinion for Sacramento Winter-run Chinook Salmon
- Bay-Delta water requirements
- Generation of hydroelectric energy

Historically, the vast majority of CVP water has been delivered to agricultural users. However, continued urban growth is resulting in greater demand from CVP M&I customers.

The CVP operations are guided by a series of documents, including the 1992 CVP-OCAP (currently undergoing revisions), various Biological Opinions for endangered species, the Coordinated Operating Agreement (COA) between the CVP and SWP, and Regional Water Resources Control Board water quality plans.

Flows in the upper Sacramento River are primarily regulated by Shasta Dam and are re-regulated 15 miles downstream at Keswick Dam. The watershed above Shasta Dam drains approximately 6,650 square miles with an average annual runoff of 5.7 MAF. With a capacity of 4.6 MAF, Shasta Dam has the largest capacity of any reservoir in the state. Annual releases range from 9 MAF in wet years to 3 MAF in dry years. From 1964-1996, Keswick releases averaged 7.3 MAF annually. In more recent years (1986 to 1996), Keswick annual releases averaged 5.9 MAF.

The 1993 Winter-run Biological Opinion is one of the most influential factors governing Shasta releases, both in terms of quantity and timing. The Biological Opinion sets temperature requirements below Keswick Dam for April through October, and established an end-of-September minimum carryover storage for Shasta Lake of 1.9 MAF. In years when CVP facilities cannot be operated to meet required temperature and storage objectives, Reclamation re-initiates consultation with National Oceanic and Atmospheric Administration-Fisheries (NOAA-Fisheries).

Aside from making water available for downstream uses, exports for the remainder of the water year are managed to maximize the following:

- Movement of water through Whiskeytown Reservoir to minimize warming
- Conservation of Shasta coldwater reserves
- Production of high-value summer and early fall power generation

The agricultural contractors account for the vast majority of consumptive uses of water along the Sacramento River. Of the total amount that is diverted for agricultural use, the portion of the water that is applied to fields but is not actually used by crops is assumed to return to the Sacramento River either through surface water or groundwater. This water is then available for other downstream uses, including CVP contractors within the Bay Area (e.g., Contra Costa Water District) or those served through Delta exports (e.g., the San Joaquin Exchange contractors, or agricultural and M&I water service contractors located south of the Delta).

The CVP annually supplies up to approximately 6.2 MAF to water contractors in the Central and Santa Clara Valleys and Contra Costa County. The CVP is required by contracts to make deliveries up to the contract amount, if requested, except in periods of water shortage. During periods of reduced supply, water deliveries are decreased according to terms in the contracts. Contractors are grouped into the following three general categories:

1. **Sacramento River Water Rights Settlement Contractors.** These contractors claimed water rights in the Sacramento River Basin prior to construction of Shasta Dam. Contract provisions allow for reductions of up to 25 percent of contracted amounts during dry conditions (as determined by the Shasta Inflow Index).
2. **San Joaquin River Exchange Contractors.** These contractors claimed water rights in the San Joaquin River and agreed to forgo these rights in exchange for CVP water

diverted from the Bay-Delta and delivered to the Mendota Pool. Contract provisions allow for reductions of up to 25 percent of contracted amounts under dry conditions (as determined by the Shasta Inflow Index).

- CVP Water Service Contractors.** These agricultural and M&I water service contractors entered into agreements with Reclamation for delivery of CVP water as a supplemental supply. Water deliveries to agricultural water service contractors can be reduced up to 100 percent in particularly dry years. Maximum curtailment levels are not specified for most M&I water service contractors. Historically, Reclamation has limited maximum curtailments to M&I contractors to 25 percent; future system demands are assumed to potentially require curtailments of up to 50 percent. Water availability for delivery to CVP water service contractors during periods of insufficient supply is determined using a combination of operational objectives, hydrologic conditions, and reservoir storage conditions.

Environmental Consequences. The effects of Alternatives 1 through 5 on surface water within the SRSCs service area are compared to conditions under the No Action Alternative.

No Action Alternative. The No Action Alternative does not include new facilities or construction. The No Action Alternative assumes that dry-year reductions would remain the same as existing conditions, and the renewed contract period would last 40 years.

Alternative 1. Surface water in the SRSCs service area under Alternative 1 would be similar to conditions under the No Action Alternative. Alternative 1 would not significantly alter current CVP operations, water storage or release patterns from CVP facilities, or the maximum volume of water delivered to the SRSCs, with the exception of reduced contract amounts to ACID and SMWC. However, these reductions are the result of needs analyses and are reflective of past water use by these SRSCs. Therefore, these reductions in contract amounts would not result in activities or conditions that would result in impacts to surface water. It is assumed that use of the assigned CVP water by the SRSCs would continue to be managed in the same manner under Alternative 1 as under the No Action Alternative.

No adverse impacts are associated with this alternative.

Alternative 2. Surface water in the SRSCs service area under Alternative 2 would be identical to conditions under the No Action Alternative. Alternative 2 would not alter current CVP operations, water storage or release patterns from CVP facilities, or the maximum volume of water delivered to the SRSCs.

It is assumed that use of the assigned CVP water by the SRSCs would continue to be managed in the same manner under Alternative 2 as under the No Action Alternative.

No adverse impacts are associated with this alternative.

Alternative 3. Surface water in the SRSCs service area under Alternative 3 would be identical to conditions under the No Action Alternative. Alternative 3 would not alter

current CVP operations, water storage or release patterns from CVP facilities, or the maximum volume of water delivered to the SRSCs.

It is assumed that use of the assigned CVP water by the SRSCs would continue to be managed in the same manner under Alternative 3 as under the No Action Alternative.

No adverse impacts are associated with this alternative.

Alternative 4. Surface water in the SRSCs service area under Alternative 4 would be similar to conditions under the No Action Alternative. Alternative 4 would not significantly alter current CVP operations, water storage or release patterns from CVP facilities, or the maximum volume of water delivered to the SRSCs, with the exception of reduced contract amounts to ACID and SMWC and sliding-scale reduced diversions to all contractors in dry years. This reduction could result in increased pumping activities in irrigation districts experiencing water cutbacks during dry years when the irrigation district would have otherwise maintained full contract amounts. Increased pumping activities associated with these cutbacks would result in temporary drawdown of groundwater levels in the aquifer system underlying the Sacramento Valley Groundwater Basin. Over time, increased pumping activities could result in a reduction in local streamflow by (1) increasing infiltration of surface water through the streambed, (2) intercepting groundwater that would have recharged surface waterbodies, or (3) a combination of 1 and 2.

It is assumed that use of the assigned CVP water by the SRSCs would continue to be managed in the same manner under Alternative 4 as under the No Action Alternative.

No significant adverse impacts are associated with this alternative.

Alternative 5. Surface water in the SRSCs service area under Alternative 5 would be similar to conditions under the No Action Alternative. Alternative 5 would not significantly alter current CVP operations, water storage or release patterns from CVP facilities, or the maximum volume of water delivered to the SRSCs, with the exception of reduced contract amounts to ACID and SMWC, and Shasta Inflow Index-reduced diversions in dry years. This reduction could result in increased pumping activities in irrigation districts experiencing water cutbacks during dry years when the irrigation district would have otherwise maintained full contract amounts. Increased pumping activities associated with these cutbacks would result in temporary drawdown of groundwater levels in the aquifer system underlying the Sacramento Valley Groundwater Basin. Over time, increased pumping activities could result in a reduction in local streamflow by (1) increasing infiltration of surface water through the streambed, (2) intercepting groundwater that would have recharged surface waterbodies, or (3) a combination of 1 and 2.

It is assumed that use of the assigned CVP water by the SRSCs would continue to be managed in the same manner under Alternative 5 as under the No Action Alternative.

No significant adverse impacts are associated with this alternative.

Groundwater

Affected Environment

Sacramento River Hydrologic Region. The project area is located within the Sacramento River Hydrologic Region. The Sacramento River Hydrologic Region covers approximately 17.4 million acres and extends south from the Modoc Plateau and Cascade Range at the Oregon border to the Sacramento-San Joaquin Delta. The hydrologic region contains both the Redding and Sacramento Valley Groundwater Basins. Collectively, the Redding and Sacramento Valley Groundwater Basins extend from Redding in the northern portion of the Sacramento Valley to the Sacramento metropolitan area in the southern portion of the Sacramento Valley. This discussion focuses on the land within the Sacramento Valley Groundwater Basin.

The Sacramento River Hydrologic Region is the main water supply source for much of California's urban and agricultural areas. Annual runoff in the hydrologic region averages approximately 22.4 MAF, which is nearly one-third of the state's total natural runoff. Major water supplies in the region are provided through surface storage reservoirs. The two largest surface reservoirs are Reclamation's Shasta Lake (CVP) on the upper Sacramento River and Lake Oroville (the Department's SWP) on the Feather River. M&I and agricultural demands in the region are approximately 8 MAF, with groundwater providing approximately 2.5 MAF of that total. This 2.5 MAF represents approximately 11 percent of the total annual runoff, as shown on Figure 3-1 (all figures are located at the end of this chapter). Much of the remainder of the runoff goes to dedicated natural flows, which support various environmental requirements, including in-stream fishery flows and flushing flows in the Delta. (Department, 2003a).

Climatic Influence on Groundwater Levels. Since 1980, California has experienced a variety of climate conditions, including a 5-year drought from approximately 1987 through 1992. During this drought, decreasing groundwater levels were experienced across much of the region; however, after the drought ceased, groundwater levels generally recovered. This suggests that the variability in the seasonal recovery of groundwater levels in the Sacramento Valley through time has been largely due to climate conditions (i.e., precipitation).

Sacramento Valley Groundwater Basin

The Sacramento Valley Groundwater Basin extends from the southern edge of the Redding Groundwater Basin to the San Joaquin Valley and includes portions of Tehama, Glenn, Butte, Yuba, Sutter, Colusa, Placer, Solano, Sacramento, and Yolo Counties. It is bordered by the Red Bluff Arch to the north, the Coast Range to the west, the Sierra Nevada to the east, and the San Joaquin Valley to the south. Department Bulletin 118 further divides the Sacramento Valley Groundwater Basin into sub-basins (Department, 2003a). Figure 3-2 shows the areal extent of the Sacramento Valley Groundwater Basin and defined sub-basins within the area of analysis.

Geology, Hydrogeology, and Hydrology

The Sacramento Valley Groundwater Basin is a north-northwestern-trending asymmetrical trough filled with as much as 10 miles of both marine and continental rocks and sediment (Page, 1986). On the eastern side, the basin overlies basement bedrock that rises relatively gently to form the Sierra Nevada, and on the western side, the underlying basement bedrock rises more steeply to form the Coast Ranges. Overlying the basement bedrock are marine sandstone, shale, and conglomerate rocks, which generally contain brackish or saline water (Department, 2001). The more recent continental deposits, overlying the marine sediments, contain freshwater. These continental deposits are generally 2,000 to 3,000 feet thick (Page, 1986). The depth (bgs) to the base of freshwater typically ranges from 1,000 to 3,000 feet (Bertoldi, 1991). Along the eastern and northeastern portion of the basin are the Tuscan and Mehrten Formations, derived from the Cascades and Sierra Nevada. The Tehama Formation in the western portion of the basin is derived from Coast Range sediments. In most of the Sacramento Valley Groundwater Basin, the Tuscan, Mehrten, and Tehama Formations are overlain with relatively thin alluvial deposits.

Groundwater is recharged by deep percolation of applied water and rainfall, infiltration from streambeds, and lateral inflow along the basin boundaries. Average annual precipitation in the Sacramento Valley Groundwater Basin ranges from 13 to 26 inches, with the higher precipitation quantities occurring along the eastern and northern edges of the basin. Typically, 80 to 90 percent of the basin's precipitation occurs from November to April. Farther east in the Sierra Nevada, precipitation ranges from 40 to 90 inches, much in the form of snow (Bertoldi, 1991).

The quantity and timing of snowpack melt are the predominant factors affecting the surface water and groundwater hydrology, and peak runoff in the basin typically lags peak precipitation by 1 to 2 months (Bertoldi, 1991). The main surface water feature in the Sacramento Valley Groundwater Basin is the Sacramento River, which has several major tributaries draining the Sierra Nevada, including the Feather, Yuba, and American Rivers. Stony, Cache, and Putah Creeks, draining the Coast Range, are the main western tributaries of the Sacramento River. Surface water and groundwater interact on a regional basis, and, thus, gains and losses to groundwater vary significantly geographically and temporally. In areas where groundwater levels have declined, such as in Sacramento County, streams that formerly gained flow by groundwater discharge now lose water to the groundwater system through seepage.

The exact quantity of groundwater that is pumped in the valley is not known. However, estimates by the Department and others, based on land use and crop requirements, suggest that approximately 2.5 MAF of water is pumped annually from M&I and agricultural production wells in the Sacramento River Hydrologic Region³. This magnitude of pumping represents approximately 11 percent of the average annual runoff into the Sacramento Valley Groundwater Basin. As described above, groundwater levels have historically recovered during the wet season within a given annual cycle.

³ <http://www.groundwater.water.ca.gov/bulletin118/update2003/index.cfm>

To further evaluate the nature of groundwater production from the Sacramento Valley Groundwater Basin, information contained in Department records is summarized in Table 3-4. These data suggest that the approximate 2.5 MAF of groundwater production from the Sacramento Valley Groundwater Basin occurs from a combination of about 5,800 irrigation and municipal wells along with 18,000 domestic wells. Municipal and irrigation wells appear to be screened slightly deeper within the aquifer (200 to 400 feet bgs) than the domestic wells in the basin (screened 100 to 250 feet bgs).

TABLE 3-4

TYPICAL WELL CONSTRUCTION IN THE SACRAMENTO VALLEY GROUNDWATER BASIN

Sub-basin	Number of Domestic Wells	Average Depth ^a (feet bgs)	Number of Irrigation Wells	Average Depth ^a (feet bgs)
Red Bluff	3,293 ^a	197 ^a	18 ^a	207 ^b
Bend	No Data	No Data	No Data	No Data
Antelope	702 ^a	104 ^a	92 ^a	176 ^b
Dye Creek	432 ^a	94 ^a	56 ^a	188 ^b
Los Molinos	311 ^a	92 ^a	42 ^a	327 ^a
Corning	1,667 ^a	135 ^a	822 ^a	246 ^b
Vina	2,215 ^a	139 ^a	715 ^a	330 ^b
Colusa	2,599 ^a	155 ^a	1,515 ^a	368 ^b
West Butte	1,469 ^a	136 ^a	1,038 ^a	321 ^a
East Butte	1,477 ^a	101 ^a	699 ^a	285 ^a
Sutter	510 ^c	127 ^c	106 ^c	195 ^c
North Yuba	262 ^c	131 ^c	61 ^c	251 ^c
South Yuba	275 ^c	186 ^c	92 ^c	343 ^c
Yolo	380 ^c	243 ^c	189 ^c	395 ^c
North American	665 ^c	190 ^c	105 ^c	396 ^c
South American	422 ^c	247 ^c	78 ^c	372 ^c
Solano	954 ^c	235 ^c	111 ^c	422 ^c
TOTALS	17,663		5,739	
^a Based on well completion reports (Department, 2003a).				
^b Includes both municipal and irrigation wells.				
^c Niblack (2004), Well Completion Reports received from 1979-2002.				

Groundwater Production, Levels, and Storage

Irrigated agriculture in the Sacramento Valley Groundwater Basin increased steadily from less than 500,000 acres in the 1940s to more than 1.5 million acres by 1980 (Reclamation, 1997). Correspondingly, groundwater production to support agriculture rose from less than 500,000 AF annually to more than 2.5 MAF annually by the mid-1990s (Department, 2003c).

In general, groundwater flows inward from the edges of the basin and south parallel to flow in the Sacramento River. Depth to groundwater throughout most of the valley averages about 30 feet, with shallower depths along the Sacramento River and greater depths along the basin

margins. Additionally, several local groundwater depressions are associated with areas of groundwater extraction.

The information presented in Table 3-4 suggests that, with the exception of the extreme northern end of the valley, most irrigation wells in the valley are at least 300 feet deep. Where construction data are not available, it is assumed that the “typical” irrigation well is screened over the bottom half of the total depth of the well. This fact, along with the depth-to-water measurements, implies that the top of a typical irrigation well screen lies at least 100 feet below the water table, and seasonal fluctuations on the order of tens of feet should not substantially impact well productivity.

Redding Groundwater Basin

The Redding Groundwater Basin is in the northernmost portion of the Sacramento Valley. Underlying Tehama and Shasta Counties, it is bordered by the Klamath Mountains to the north, the Coast Range to the west, and the Cascade Mountains to the east. The Red Bluff Arch, between Cottonwood and Red Bluff, separates the Redding Groundwater Basin from the Sacramento Valley Groundwater Basin to the south. Department Bulletin 118 subdivides the Redding Groundwater Basin into six sub-basins: Anderson, Enterprise, Millville, Rosewood, Bowman, and South Battle Creek (Department, 2003a). Figure 3-3 shows the areal extent of the Redding Groundwater Basin.

Geology, Hydrogeology, and Hydrology

The Redding Groundwater Basin consists of a sediment-filled, southward-plunging symmetrical trough (Department, 2001). Simultaneous deposition of material from the Coast Range and the Cascade Range resulted in two different formations, which are the principal freshwater-bearing formations in the basin. The Tuscan Formation in the east is derived from Cascade Range volcanic sediments, and the Tehama Formation in the western and northwest portion of the basin is derived from Coast Range sediments. These formations are up to 2,000 feet thick near the confluence of the Sacramento River and Cottonwood Creek, and the Tuscan Formation is generally more permeable and productive than the Tehama Formation (Department, 2001). Groundwater recharge occurs in the higher elevations by stream seepage and direct infiltration of precipitation. Rivers and streams transition to gaining streams at lower elevations and receive direct groundwater discharge. Areas of riparian vegetation occur along surface water features throughout the basin.

The water budget of the Redding Groundwater Basin is dominated by a large annual influx of water falling as precipitation on the surrounding mountains and on the valley floor. A large portion of recharge to the Redding Groundwater Basin is from precipitation and snowmelt from higher elevations. Average annual precipitation in the Redding Groundwater Basin ranges from 22 inches to as much as 40 inches in the higher elevations. As is typical throughout the Central Valley, 80 to 90 percent of the area’s precipitation occurs from November to April. In the surrounding mountain ranges, precipitation ranges from 40 to 75 inches, much of it in the form of snow. A portion of this water is consumed by evapotranspiration by native vegetation, and the remainder occurs as runoff and groundwater recharge.

It has been estimated that the Redding Groundwater Basin yields an average of 850,000 AF of annual runoff (CH2M HILL, 2003). Much of this water is potentially available to recharge the Redding Groundwater Basin and replenish water levels that have been depressed because of groundwater pumping. Applied water totals approximately 270,000 AF in the Redding Groundwater Basin (CH2M HILL, 1997). The exact quantity of groundwater that is pumped from the basin is not known; however, it has been estimated that approximately 55,000 AF of water is pumped annually from M&I and agricultural production wells (CH2M HILL, 2003). This magnitude of pumping represents approximately 6 percent of the average annual runoff into the basin.

To further evaluate the nature of groundwater production from the Redding Groundwater Basin, Table 3-5 summarizes information contained in Department records. These data suggest that the approximately 55,000 AF of groundwater production from the Redding Groundwater Basin occur from a combination of about 170 irrigation and municipal wells and approximately 6,000 domestic wells. Municipal and irrigation wells appear to be screened slightly deeper within the aquifer (200 to 300 feet bgs) than the domestic wells in the basin (screened 140 to 250 feet bgs).

Seasonal groundwater fluctuations range from 2 to 3 feet in shallow unconfined aquifers and 2 to 5 feet in semi-confined to confined aquifers in normal years. During drought years, unconfined aquifer levels could fluctuate by as much as 10 feet, and semi-confined and confined aquifer levels could fluctuate as much as 16 feet. The principal surface water features in the Redding Groundwater Basin are the Sacramento River and its tributaries Battle, Cow, Little Cow, Clear, Dry, and Cottonwood Creeks. Surface water and groundwater interact in many areas in the Redding Groundwater Basin.

In general, groundwater flows southeasterly on the west side of the basin and southwesterly on the east side, toward the Sacramento River. The Sacramento River is the main drain for the basin (Department, 2003a).

TABLE 3-5

TYPICAL WELL CONSTRUCTION IN THE REDDING GROUNDWATER BASIN

Sub-basin	Number of Domestic Wells	Average Depth (feet bgs) ^a	Number of Municipal and Irrigation Wells	Average Depth (feet bgs) ^a
Anderson	2,239	140	48	302
Bowman	804	257	27	312
Enterprise	1,970	139	65	180
Millville	487	156	8	265
Rosewood	447	181	15	311
South Battle Creek	18	189	5	227
Totals	5,965		168	

^aBased on well completion reports (Department, 2003c).

Groundwater Production, Levels, and Storage

Total annual groundwater pumping for the Redding Groundwater Basin is approximately 40,000 AF (CH2M HILL, 2003). This quantity represents less than 10 percent of the basin's average (during years of normal precipitation) groundwater discharge to surface water, estimated at approximately 670,000 AF (CH2M HILL, 2003). The majority of the groundwater discharge to surface water in the basin occurs to the Sacramento River in the lower portions of the basin.

Groundwater levels typically range from greater than 460 feet above mean sea level (msl) around the fringes of the basin, to less than 390 feet msl near the confluence of Cottonwood Creek and the Sacramento River. Historically, groundwater levels have remained stable, with no long-term trend of declining or increasing. However, groundwater levels are affected by changes in precipitation, falling during droughts but rising quickly when normal or above-normal precipitation occurs. For example, some short-term declines were noticeable during the droughts of 1976 through 1977 and in 1987 through 1992. These declines were followed by recovery to pre-drought levels after several successive normal or above-normal precipitation events occurred.

ASSESSMENT APPROACH

To evaluate the potential impacts associated with each of the proposed contract alternatives, some method of assessing the potential impacts that may occur to surface water flows and groundwater levels under various contract options was required. It was recognized early in the project planning process that sufficient time and resources were not available to develop a comprehensive water-budget based numerical model of the entire Sacramento Valley. This type of model would require simulation of spatial and temporally varying hydrologic processes including the recharge of precipitation, surface water/groundwater interactions, cropping patterns, and the recharge of applied irrigation water. As an alternative, a superposition approach was taken to estimating project impacts. A superposition model simulates the incremental impacts that would occur solely due to the changes in water contracting strategies, and these impacts would be superimposed on existing baseline groundwater conditions in the valley.

Impacts associated with changes to the current contracting strategy are simulated by the model, and model output provides estimates of impacts on surrounding groundwater levels and changes in streamflow due to changes in groundwater pumping in the basin. Model estimates represent the incremental impacts that would occur solely due to changes in groundwater pumping that would occur as a result of modifications to the current contracting approach. Simulations were performed to evaluate potential impacts projected during the April through October pumping period. In addition, potential impacts that would occur in the November through December time frame were also simulated because it was assumed that significant winter recharge would not yet occur. Finally, it was assumed that winter recharge would replenish groundwater levels over the winter months (January through March), eliminating any residual impacts; therefore, this period was not explicitly modeled.

The assumption of seasonal basin refilling is based on a comprehensive review of historical water-budget components and water-level trends in the Sacramento River Hydrologic

Region. Under current conditions, the Sacramento Valley and Redding Groundwater Basins are full and spill excess recharge to streams. In general, as pumping increases, the amount of discharge to streams decreases, but the groundwater basin would remain virtually full unless pumping rates exceed the water available for groundwater recharge. Existing data indicate that a large amount of water is available to replenish the groundwater basin after pumping. Furthermore, evaluation of water-level hydrographs from wells across the valley indicate that in almost all areas groundwater levels have been stable over the past 25 years, and water levels recover to pre-pumping conditions over the winter recharge period.

The impacts that may occur due to implementation of various contracting alternatives were evaluated by comparing the magnitude of cutbacks to surface water deliveries that would occur under current contracting practices, versus the magnitude of cutback that would occur under the proposed contracting alternatives. It was assumed that any decrease in surface water deliveries would immediately be replaced by groundwater pumping. In other words, during a period of reduced surface water deliveries, water districts would use the same quantity of irrigation water with the same timing simply by replacing surface water supplies with groundwater production. The estimated percentage of contract amounts that would be delivered under each alternative during the 1921-2001 hydrology period is shown in Table 3-6. Using this information, it was possible to compare the difference in surface water deliveries predicted under current contracting methodology, and under each of the proposed contracting alternatives. These data suggest that the greatest difference in surface water deliveries would occur during the early stages of drought periods, where the current contracting approach would result in full delivery of contracted amounts, whereas several alternative approaches would result in a 25 percent cutback in deliveries, and therefore a switch to groundwater pumping to meet irrigation needs. The impacts of this additional pumping on groundwater levels and streamflows were evaluated using the groundwater flow model as described below.

Several major assumptions were made in preparing the groundwater modeling simulations. These assumptions are summarized as follows:

- The quantity and timing of the contracted surface water deliveries for the contractors were used as a basis for assigning the additional groundwater pumping rates to the model. This was done on a monthly time step. If a contractor has a 25 percent cutback in deliveries for the year, it was assumed that the cutback occurs uniformly to the contracted delivery each month, and groundwater pumping would occur during that same time period to make up the difference in irrigation water supplies. A list of SRSCs included in the modeling effort, as well as monthly contract supplies can be found in Table 3-7.
- The timing of irrigation deliveries, and therefore groundwater pumping, for the districts where monthly contract delivery data were not available was estimated by calculating the percentage of contract delivery that occurs during each month of the irrigation season based on the all other districts, and applying those monthly percentages to the remaining contracts.
- Groundwater pumping was assumed to occur at a uniform rate over the entire water district service area.

TABLE 3-6

SAMPLE OF IMPLEMENTATION OF SHORTAGE PROVISIONS BASED ON HISTORICAL PERIOD OF RECORD

Water Year – Period of Record	Flow in Shasta in MAF	Percentage Cutback	Alternative 2 – Sliding-scale cutback (10-20-25%) based on stepped decrease; no cutback if previous water year greater than 4.0, and no reset requirement at 4 MAF	Alternative 4 – Sliding-scale cutback (10-20-25%) based on stepped decrease; cutback remains at lowest level until full contract amount reset at 4 MAF	Alternative 5 – Sliding-scale cutback (10-20-25%) based on Sacramento River Index ^b water years; no reset requirement at 4 MAF
		No Action, Alternative 1 (Preferred Alternative), and Alternative 3 – 25% cutback in Shasta critical years only ^a			
1921-1922	4.6	100%	100%	100%	100%
1922-1923	3.6	100%	90%	90%	90%
1923-1924	2.5	75%	75%	75%	75%
1924-1925	5.1	100%	100%	100%	80%
1925-1926	3.7	100%	90%	90%	80%
1926-1927	7.0	100%	100%	100%	100%
1927-1928	5.1	100%	100%	100%	100%
1928-1929	3.2	100%	75%	75%	75%
1929-1930	4.2	100%	100%	100%	80%
1930-1931	2.5	75%	75%	75%	75%
1931-1932	3.7	75%	80%	75%	80%
1932-1933	3.5	75%	75%	75%	75%
1933-1934	3.3	75%	75%	75%	75%
1934-1935	4.9	100%	100%	100%	90%
1935-1936	4.7	100%	100%	100%	90%
1936-1937	4.1	100%	100%	100%	90%
1937-1938	9.5	100%	100%	100%	100%
1938-1939	3.5	100%	75%	80%	80%

TABLE 3-6

SAMPLE OF IMPLEMENTATION OF SHORTAGE PROVISIONS BASED ON HISTORICAL PERIOD OF RECORD

Water Year – Period of Record	Flow in Shasta in MAF	Percentage Cutback	Alternative 2 – Sliding-scale cutback (10-20-25%) based on stepped decrease; no cutback if previous water year greater than 4.0, and no reset requirement at 4 MAF	Alternative 4 – Sliding-scale cutback (10-20-25%) based on stepped decrease; cutback remains at lowest level until full contract amount reset at 4 MAF	Alternative 5 – Sliding-scale cutback (10-20-25%) based on Sacramento River Index ^b water years; no reset requirement at 4 MAF
		No Action, Alternative 1 (Preferred Alternative), and Alternative 3 – 25% cutback in Shasta critical years only ^a			
1939-1940	7.0	100%	100%	100%	100%
1940-1941	8.7	100%	100%	100%	100%
1941-1942	7.6	100%	100%	100%	100%
1942-1943	5.9	100%	100%	100%	100%
1943-1944	3.7	100%	80%	90%	80%
1944-1945	4.9	100%	100%	100%	90%
1945-1946	5.9	100%	100%	100%	90%
1946-1947	3.9	100%	100%	90%	80%
1947-1948	5.4	100%	100%	100%	90%
1948-1949	4.3	100%	100%	100%	80%
1049-1950	4.1	100%	100%	100%	90%
1950-1951	6.3	100%	100%	100%	100%
1951-1952	7.8	100%	100%	100%	100%
1952-1953	6.5	100%	100%	100%	100%
1953-1954	6.5	100%	100%	100%	100%
1954-1955	4.1	100%	100%	100%	80%
1955-1956	8.8	100%	100%	100%	100%
1956-1957	5.4	100%	100%	100%	100%
1957-1958	9.7	100%	100%	100%	100%
1958-1959	5.1	100%	100%	100%	90%

TABLE 3-6

SAMPLE OF IMPLEMENTATION OF SHORTAGE PROVISIONS BASED ON HISTORICAL PERIOD OF RECORD

Water Year – Period of Record	Flow in Shasta in MAF	Percentage Cutback	Alternative 2 – Sliding-scale cutback (10-20-25%) based on stepped decrease; no cutback if previous water year greater than 4.0, and no reset requirement at 4 MAF	Alternative 4 – Sliding-scale cutback (10-20-25%) based on stepped decrease; cutback remains at lowest level until full contract amount reset at 4 MAF	Alternative 5 – Sliding-scale cutback (10-20-25%) based on Sacramento River Index ^b water years; no reset requirement at 4 MAF
		No Action, Alternative 1 (Preferred Alternative), and Alternative 3 – 25% cutback in Shasta critical years only ^a			
1959-1960	4.7	100%	100%	100%	80%
1960-1961	5.1	100%	100%	100%	80%
1961-1962	5.3	100%	100%	100%	90%
1962-1963	7.0	100%	100%	100%	100%
1963-1964	3.9	100%	100%	100%	80%
1964-1965	7.0	100%	100%	100%	100%
1965-1966	5.3	100%	100%	100%	90%
1966-1967	7.4	100%	100%	100%	100%
1967-1968	4.8	100%	100%	100%	90%
1968-1969	7.7	100%	100%	100%	100%
1969-1970	7.9	100%	100%	100%	100%
1970-1971	7.3	100%	100%	100%	100%
1971-1972	5.1	100%	100%	100%	90%
1972-1973	6.2	100%	100%	100%	100%
1973-1974	10.8	100%	100%	100%	100%
1974-1975	6.4	100%	100%	100%	100%
1975-1976	3.6	100%	80%	80%	75%
1976-1977	2.6	75%	75%	75%	75%
1977-1978	7.8	100%	100%	100%	100%
1978-1979	4.0	100%	100%	100%	90%

TABLE 3-6

SAMPLE OF IMPLEMENTATION OF SHORTAGE PROVISIONS BASED ON HISTORICAL PERIOD OF RECORD

Water Year – Period of Record	Flow in Shasta in MAF	Percentage Cutback	Alternative 2 – Sliding-scale cutback (10-20-25%) based on stepped decrease; no cutback if previous water year greater than 4.0, and no reset requirement at 4 MAF	Alternative 4 – Sliding-scale cutback (10-20-25%) based on stepped decrease; cutback remains at lowest level until full contract amount reset at 4 MAF	Alternative 5 – Sliding-scale cutback (10-20-25%) based on Sacramento River Index ^b water years; no reset requirement at 4 MAF
		No Action, Alternative 1 (Preferred Alternative), and Alternative 3 – 25% cutback in Shasta critical years only ^a			
1079-1980	6.4	100%	100%	100%	100%
1980-1981	4.1	100%	100%	100%	80%
1981-1982	9.0	100%	100%	100%	100%
1982-1983	10.8	100%	100%	100%	100%
1983-1984	6.7	100%	100%	100%	100%
1984-1985	4.0	100%	100%	100%	80%
1985-1986	7.5	100%	100%	100%	100%
1986-1987	3.9	100%	100%	100%	80%
1987-1988	3.9	100%	100%	100%	75%
1988-1989	4.7	100%	100%	100%	80%
1989-1990	3.6	100%	80%	80%	75%
1990-1991	3.1	75%	75%	75%	75%
1991-1992	3.6	75%	90%	75%	75%
1992-1993	6.8	100%	100%	100%	100%
1993-1994	3.1	75%	75%	75%	75%
1994-1995	9.6	100%	100%	100%	100%
1995-1996	6.8	100%	100%	100%	100%
1996-1997	7.4	100%	100%	100%	100%
1997-1998	10.3	100%	100%	100%	100%
1998-1999	7.2	100%	100%	100%	100%

TABLE 3-6

SAMPLE OF IMPLEMENTATION OF SHORTAGE PROVISIONS BASED ON HISTORICAL PERIOD OF RECORD

Water Year – Period of Record	Flow in Shasta in MAF	Percentage Cutback	Alternative 2 – Sliding-scale cutback (10-20-25%) based on stepped decrease; no cutback if previous water year greater than 4.0, and no reset requirement at 4 MAF	Alternative 4 – Sliding-scale cutback (10-20-25%) based on stepped decrease; cutback remains at lowest level until full contract amount reset at 4 MAF	Alternative 5 – Sliding-scale cutback (10-20-25%) based on Sacramento River Index ^b water years; no reset requirement at 4 MAF
		No Action, Alternative 1 (Preferred Alternative), and Alternative 3 – 25% cutback in Shasta critical years only ^a			
1999-2000	6.8	100%	100%	100%	100%
2000-2001	4.1	100%	100%	100%	80%
Number of years with cutbacks during period of record		9 years	16 years	17 years	43 years
Cumulative (4 years) cutback during 4-year drought of 1931- 1934		2,127,451	2,021,078	2,127,451	2,021,078

^aShasta critical years defined by the contract between Reclamation and the SRSCs (see Appendix C for complete contract). This shortage provision was the mechanism used in the original contracts and thus represents the No Action, in addition to Alternatives 1 and 3.

^bThe Sacramento Valley 40-30-30 Index is computed as a weighted average of the current water year's April through July unimpaired runoff forecast (40 percent), the current water year's October through March unimpaired runoff forecast (30 percent), and the previous water year's index (30 percent). A cap of 10 MAF is put on the previous year's index to account for required flood control reservoir releases during wet years. Unimpaired runoff (calculated in the Sacramento Valley 40-30-30 Index as the sum of Sacramento River flow above Bend Bridge near Red Bluff, Feather River inflow to Oroville, Yuba River flow at Smartville, and American River inflow to Folsom) is the river production unaltered by water diversions, storage, exports, or imports. A water year with a Sacramento Valley 40-30-30 Index equal to or greater than 9.2 MAF is classified as "wet." A water year with an index equal to or less than 5.4 MAF is classified as "critical."

TABLE 3-7

CONTRACT SUPPLY AND SCHEDULED MONTHLY DELIVERIES

Contractor Name	Contract Number	Total Contract Supply (AF)	January Delivery (AF)	February Delivery (AF)	March Delivery (AF)	April Delivery (AF)	May Delivery (AF)	June Delivery (AF)	July Delivery (AF)	August Delivery (AF)	September Delivery (AF)	October Delivery (AF)	November Delivery (AF)	December Delivery (AF)
City of West Sacramento	0-07-20-W0187	23,600	0	0	0	2,776	4,533	4,628	4,864	3,796	2,089	891	0	0
Howald Farms, Inc.	14-06-200-1042A	2,760	0	0	0	170	440	510	590	650	390	10	0	0
A & F Boeger Corp. and Boeger Land Company (Eastside MWC)	14-06-200-1053A	2,804	0	0	0	390	540	460	506	478	260	170	0	0
King, Barbara	14-06-200-1086Y	19	0	0	0	1	4	4	5	3	2	0	0	0
Dommer, Elizabeth (King)	14-06-200-1086Z	26	0	0	0	2	4	4	8	5	3	0	0	0
Reische, Laverne C., et ux	14-06-200-1150A	450	0	0	0	0	50	108	142	108	25	17	0	0
Reische, Eric	14-06-200-1150X	90	0	0	0	0	10	22	28	22	5	3	0	0
Furlan, Emile, et ux	14-06-200-1175A	920	0	0	0	50	180	165	180	200	140	5	0	0
Heidrick, Joe, Family Trust	14-06-200-1176A	560	0	0	0	20	120	120	120	120	60	0	0	0
Reynen, John; Bardis, Christo (Broomside Farms)	14-06-200-1286A	10,070	0	0	0	1,320	2,260	1,550	2,160	2,030	670	80	0	0
Lauppe, Burton	14-06-200-1289A	950	0	0	0	0	10	250	230	240	90	130	0	0
Driver, John A. and Clare M., Family Revocable Trust	14-06-200-1314A	230	0	0	0	10	40	50	50	40	30	10	0	0
ELH Sutter Properties (Natomas Basin Conservancy)	14-06-200-1364A	490	0	0	0	28	50	96	120	131	65	0	0	0
Lauppe, B & K	14-06-200-1364X	350	0	0	0	20	36	69	85	94	46	0	0	0
ELH Sutter Properties, Inc. & Lauppe, B.	14-06-200-1364Y	40	0	0	0	2	4	8	10	11	5	0	0	0
Wakida, Masaru, et ux	14-06-200-1415A	325	0	0	0	0	25	45	115	110	30	0	0	0
Ritchey, E.J (Jansen)	14-06-200-1426A	190	0	0	0	20	50	30	40	40	10	0	0	0
Furlan Joint Venture (Byrd/Osborne)	14-06-200-1595A	1,700	0	0	0	160	360	340	350	360	110	20	0	0
Baber, Jack, et al	14-06-200-1604A	6,260	0	0	0	0	1,160	1,703	1,188	1,520	649	40	0	0
Heidrick, Emmett & Mildred, Trust	14-06-200-1616A	120	0	0	0	6	19	24	27	24	15	5	0	0
Hale & Marks	14-06-200-1638A	75	0	0	0	6	21	17	17	13	1	0	0	0
Odysseus Farms	14-06-200-1664A	2,070	0	0	0								0	0

TABLE 3-7

CONTRACT SUPPLY AND SCHEDULED MONTHLY DELIVERIES

Contractor Name	Contract Number	Total Contract Supply (AF)	January Delivery (AF)	February Delivery (AF)	March Delivery (AF)	April Delivery (AF)	May Delivery (AF)	June Delivery (AF)	July Delivery (AF)	August Delivery (AF)	September Delivery (AF)	October Delivery (AF)	November Delivery (AF)	December Delivery (AF)
Anderson, Ray E., et ux (1) & (2)	14-06-200-1726A	190	0	0	0	15	25	35	50	40	15	10	0	0
Amen, Henry, Estate (RD 900&1000)	14-06-200-1779A	404	0	0	0	12	55	92	104	74	55	12	0	0
Zelmar Ranch	14-06-200-1827A	164	0	0	0	16	32	40	40	12	12	12	0	0
Martin, Andrew (Gomes)	14-06-200-1827X	246	0	0	0	24	48	60	60	18	18	18	0	0
Davis, Grover L., et ux	14-06-200-1851A	85	0	0	0	7	17	21	25	14	1	0	0	0
Andreotti, Arthur, et al	14-06-200-1898A	3,620	0	0	0	380	610	600	790	920	320	0	0	0
Locvich, Paul	14-06-200-1945A	150	0	0	0	0	30	50	40	10	10	10	0	0
Tarke, James	14-06-200-1949A	2,700	0	0	0	230	650	500	550	550	210	10	0	0
Nelson, Thomas L., et ux	14-06-200-1954A	136	0	0	0	0	18	36	38	40	4	0	0	0
Butte Creek Farms (Mayfair Farms)	14-06-200-1976A	204	0	0	0	18	47	55	51	0	0	33	0	0
Howard, Theodore & Linda	14-06-200-1976X	76	0	0	0	7	18	20	19	0	0	12	0	0
Colusa Properties, Inc.	14-06-200-2042A	940	0	0	0	40	230	200	220	180	30	40	0	0
Windswept Land & Livestock	14-06-200-2045A	4,040	0	0	0	220	690	720	730	740	880	60	0	0
Chilton, Barbara (Siddiqui)	14-06-200-2065A	130	0	0	0	0	20	30	40	30	10	0	0	0
Pelger Mutual Water Company	14-06-200-2073A	8,860	0	0	0	1,210	3,250	1,670	1,010	990	670	60	0	0
Swinford Tract Irrigation Company (Montgomery/Mehrhof/McPherson)	14-06-200-2145A	181	0	0	0	16	36	56	44	20	4	4	0	0
Davis, Olive P., et al	14-06-200-2146A	31,800	0	0	0	3,200	6,900	6,400	7,200	6,100	1,900	100	0	0
Knaggs Walnut Ranches Co., L.P.	14-06-200-2148A	630	0	0	0	40	110	180	110	70	120	0	0	0
Deseret Farms of California (Sacramento River Ranch)	14-06-200-2149A	4,000	0	0	0	500	1,000	1,100	600	200	500	100	0	0
Quad H Ranches	14-06-200-2153A	500	0	0	0	40	100	100	100	90	70	0	0	0
Freeman, Frank, et ux	14-06-200-2212A	30	0	0	0	2	4	6	6	6	4	2	0	0
Drew, Jerry	14-06-200-2250A	36	0	0	0	2	6	7	8	7	4	2	0	0

TABLE 3-7

CONTRACT SUPPLY AND SCHEDULED MONTHLY DELIVERIES

Contractor Name	Contract Number	Total Contract Supply (AF)	January Delivery (AF)	February Delivery (AF)	March Delivery (AF)	April Delivery (AF)	May Delivery (AF)	June Delivery (AF)	July Delivery (AF)	August Delivery (AF)	September Delivery (AF)	October Delivery (AF)	November Delivery (AF)	December Delivery (AF)
Butler, Leslie, et ux	14-06-200-2365A	460	0	0	0	30	70	110	110	80	40	20	0	0
Elliot, Marlene, and Hradecky, Denton, Co-Tenancy (Rubio)	14-06-200-2368A	16	0	0	0	1	2	2	3	3	3	2	0	0
Driver, John A., et ux	14-06-200-2398A	16	0	0	0	1	3	3	4	3	2	0	0	0
Sartain Mutual Water Company (Carter MWC)	14-06-200-2401A	7,122	0	0	0	560	1,950	1,610	1,154	818	810	210	0	0
Sacramento, County of	14-06-200-2404A	750	0	0	0	20	100	180	220	130	100	0	0	0
Oji, Mitsue, Family Partnership	14-06-200-2427A	4,740	0	0	0	590	920	910	910	730	680	0	0	0
Davis, Marilyn (Lamb/Wirth)	14-06-200-2486A	520	0	0	0	10	110	110	120	120	50	0	0	0
McLaughlin, Jack	14-06-200-2514A	650	0	0	0	70	110	110	140	160	60	0	0	0
J.B. Unlimited, Inc.	14-06-200-2519A	510	0	0	0	10	60	110	110	110	60	50	0	0
Kary, Carol	14-06-200-2520A	1,000	0	0	0	0	190	220	270	210	110	0	0	0
Young, Russell L., et al	14-06-200-2552A	10	0	0	0	0	1	2	3	3	1	0	0	0
Tisdale Irrigation and Drainage Company	14-06-200-2781A	9,900	0	0	0	1,200	2,000	1,900	1,800	1,700	1,100	200	0	0
Butte Creek Farms (Y)	14-06-200-2851A	36	0	0	0	3	13	8	10	2	0	0	0	0
Redding, City of	14-06-200-2871A	21,000	900	800	1,100	1,400	1,925	2,700	3,000	3,000	2,175	1,800	1,150	1,050
Griffin, Joseph, et al	14-06-200-2895A	2,760	0	0	0	20	400	668	652	548	462	10	0	0
Wells, Joyce M (Otterson/Azevedo)	14-06-200-2896A	1,815	0	0	0	120	580	360	160	465	120	10	0	0
Fedora, Sib, et al	14-06-200-2916A	210	0	0	0	10	30	40	50	40	30	10	0	0
Hollins, Mariette B.	14-06-200-2993A	1,560	0	0	0	30	620	340	150	280	130	10	0	0
Seaver, Charles	14-06-200-3296A	480	0	0	0	40	80	100	130	50	50	30	0	0
Anderson-Cottonwood Irrigation District	14-06-200-3346A	128,000	0	0	0	15,360	18,286	19,749	20,846	20,114	19,017	14,629	0	0
Willey, Edwin, et ux	14-06-200-3556A	95	0	0	0	5	15	20	25	20	10	0	0	0
Westfall, Ralph D.	14-06-200-3591A	490	0	0	0	20	80	100	110	100	60	20	0	0
Oji Brothers Farm, Inc.	14-06-200-3753A	3,200	0	0	0	240	550	600	760	710	340	0	0	0
Chicago Almond Products Co. and American Almond Products Co., Inc. (Exchange Bank/The	14-06-200-3774A	780	0	0	0	40	90	130	190	180	140	10	0	0

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Contractor Name	Contract Number	Total Contract Supply (AF)	January Delivery (AF)	February Delivery (AF)	March Delivery (AF)	April Delivery (AF)	May Delivery (AF)	June Delivery (AF)	July Delivery (AF)	August Delivery (AF)	September Delivery (AF)	October Delivery (AF)	November Delivery (AF)	December Delivery (AF)
Nature Conservancy)														
Gjermann, Hal	14-06-200-4010A	12	0	0	0	0	2	2	2	4	2	0	0	0
Giusti, Richard, et al	14-06-200-4076A	1,610	0	0	0	130	310	310	340	290	230	0	0	0
Lockett, William P. & Jean B. 1998 Family Revocable Trust	14-06-200-4105A	417	0	0	0	10	60	110	110	100	27	0	0	0
O'Brien, Janice	14-06-200-4105X	839	0	0	0	75	90	179	175	190	90	40	0	0
Leiser, Dorothy L.	14-06-200-4178A	60	0	0	0	1	13	13	13	13	7	0	0	0
Daniell, Harry	14-06-200-4348A	20	0	0	0	1	3	3	4	3	4	2	0	0
Richter Brothers, et al	14-06-200-4362A	2,780	0	0	0	155	550	490	530	600	435	20	0	0
McLane, Robert	14-06-200-4446A	40	0	0	0	3	6	7	9	6	5	4	0	0
Wilson Ranch Partnership	14-06-200-4520A	370	0	0	0	30	60	150	40	10	70	10	0	0
Wallace Construction (Tenhumfeld)	14-06-200-4604A	3,640	0	0	0	210	640	1,088	674	438	570	20	0	0
Carter, Jane Foster	14-06-200-4617A	1,470	0	0	0	140	620	440	140	100	20	10	0	0
Driscoll Strawberry Associates, Incorporated	14-06-200-4736A	820	0	0	0	80	130	130	170	150	110	50	0	0
Spence, Ruth Ann	14-06-200-4829A	730	0	0	0	120	100	180	210	10	0	110	0	0
Lake California Property Owners Association	14-06-200-4961A	780	0	0	0	60	100	150	170	140	110	50	0	0
M & L Farms	14-06-200-5200A	355	0	0	0	0	10	85	135	110	15	0	0	0
Wakida, Masaru, et ux	14-06-200-5200X	160	0	0	0	0	10	25	55	55	15	0	0	0
Butte Creek Farms (A)	14-06-200-5206A	95	0	0	0	0	25	30	30	10	0	0	0	0
Cannell, Fred (Green Valley Corp)	14-06-200-5210A	890	0	0	0	60	110	160	245	180	120	15	0	0
Stegeman Station Ranch (Green Valley Corp)	14-06-200-5211A	880	0	0	0	70	130	195	245	170	55	15	0	0
Cribari, Emile (Wisler)	14-06-200-5215A	35	0	0	0	1	2	11	18	3	0	0	0	0
Pleasant Grove-Verona Mutual Water Company	14-06-200-5520A	26,290	0	0	0	2,360	5,250	6,690	3,680	3,690	3,100	1,520	0	0
Morehead, Joseph A., et ux	14-06-200-5789A	255	0	0	0	20	45	50	50	50	30	10	0	0
Maxwell Irrigation	14-06-200-6078A	17,980	0	0	0	1,990	3,520	2,410	2,220	2,030	2,710	3,100	0	0

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District														
Munson, James T., et ux	14-06-200-7049A	155	0	0	0	0	10	45	60	40	0	0	0	0
Lee Farms	14-06-200-7206A	180	0	0	0	20	30	40	40	40	10	0	0	0
Churkin, Michael, et al	14-06-200-7227A	130	0	0	0	10	20	25	30	25	15	5	0	0
Tuttle, Charles	14-06-200-7296A	390	0	0	0	20	30	75	95	90	50	30	0	0
Leviathan, Inc.	14-06-200-7308A	700	0	0	0	55	65	135	155	120	110	60	0	0
Eggleston, Ronald H., et ux	14-06-200-7339A	65	0	0	0	6	18	15	14	11	1	0	0	0
Conaway Conservancy Group	14-06-200-7422A	50,862	0	0	0	6,890	13,970	14,690	5,374	1,268	6,810	1,860	0	0
Mirbach-Harff Antonius	14-06-200-7556A	170	0	0	0	0	10	60	60	40	0	0	0	0
Hale & Marks	14-06-200-7572A	130	0	0	0	11	36	29	29	22	3	0	0	0
Forry, Laurie	14-06-200-7691A	2,285	0	0	0	80	570	500	500	420	195	20	0	0
Pires, Lawrence J., et ux	14-06-200-7744A	280	0	0	0	10	75	85	55	45	5	5	0	0
Butte Creek Farms (P)	14-06-200-7744X	640	0	0	0	30	105	130	140	130	80	25	0	0
Alexander, Thomas, et ux	14-06-200-7754A	22	0	0	0	2	3	4	5	3	3	2	0	0
MCM Properties, Inc.	14-06-200-7827A	1,470	0	0	0	50	320	320	320	320	140	0	0	0
Siddiqui, Javed & Amna	14-06-200-7941A	1,060	0	0	0	90	120	190	220	220	170	50	0	0
Hershey Land Company	14-06-200-7972A	3,020	0	0	0	400	570	560	530	520	330	110	0	0
Micke, Daniel	14-06-200-7995A	100	0	0	0	11	13	20	32	13	10	1	0	0
Gillaspy, Fay	14-06-200-8117A	210	0	0	0	30	45	45	45	35	10	0	0	0
Beckley, Ralph, et ux	14-06-200-8118A	300	0	0	0	45	60	65	65	50	15	0	0	0
Sutter Mutual Water Company	14-06-200-815A	226,000	0	0	0	20,000	42,500	48,000	53,500	44,000	12,500	5,500	0	0
Riverview Golf & Country Club	14-06-200-8286A	280	0	0	0	30	35	45	55	55	35	25	0	0
Heidrick, Emmett & Mildred, Trust	14-06-200-8322A	430	0	0	0	5	30	120	145	80	35	15	0	0
Ehrke, Allen A., et ux	14-06-200-8330A	380	0	0	0	20	60	75	85	80	45	15	0	0
Meridian Farms Water Company	14-06-200-838A	35,000	0	0	0	4,400	6,200	5,900	7,000	6,100	5,400	0	0	0

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Princeton-Codora-Glenn Irrigation Company	14-06-200-849A	67,810	0	0	0	10,800	13,500	13,190	12,740	11,180	5,000	1,400	0	0
Glenn-Colusa Irrigation District	14-06-200-855A	825,000	0	0	0	100,000	140,000	150,000	185,000	140,000	65,000	45,000	0	0
Provident Irrigation District	14-06-200-856A	54,730	0	0	0	7,210	10,830	12,920	10,000	3,500	7,900	2,570	0	0
Odysseus Farms Partnership	14-06-200-8574A	630	0	0	0	0	70	140	135	170	100	15	0	0
Driver, Gary, et al	14-06-200-8585A	30	0	0	0	1	2	6	8	7	4	2	0	0
Lonon, Michael, et al	14-06-200-8658A	1,155	0	0	0	120	190	220	260	240	110	15	0	0
Steidlmayer, Francis J., et al	14-06-200-874A	1,310	0	0	0	230	210	160	360	140	130	80	0	0
Reclamation District #108	14-06-200-876A	232,000	0	0	0	34,000	50,500	49,000	47,500	31,500	18,000	1,500	0	0
River Garden Farms	14-06-200-878A	29,800	0	0	0	4,300	6,500	5,800	5,800	4,700	2,200	500	0	0
Hiatt, Glenwood J., et al	14-06-200-880A	1,486	0	0	0	75	258	244	420	377	115	0	0	0
Hiatt, Thomas et al	14-06-200-880X	584	0	0	0	28	102	96	165	148	45	0	0	0
Natomas Central Mutual Water Company	14-06-200-885A	120,200	0	0	0	14,000	27,700	23,000	18,700	18,700	16,100	2,000	0	0
Schreiner, Joe & Cleo	14-06-200-889A	200	0	0	0	0	10	40	100	30	20	0	0	0
Reclamation District #1004	14-06-200-890A	71,400	0	0	0	6,300	14,700	12,200	12,100	12,000	8,800	5,300	0	0
Wilson, Neil (Edson, W&M)	14-06-200-906A	104	0	0	0	8	16	24	16	16	16	8	0	0
Chesney, R & A, Bypass Trust et al	14-06-200-930A	700	0	0	0	60	170	140	170	140	20	0	0	0
Lomo Cold Storage	14-06-200-931A	7,110	0	0	0	1,400	2,900	1,670	450	360	330	0	0	0
Henle Family Limited Partnership	14-06-200-932A	935	0	0	0	120	300	210	120	100	55	30	0	0
Riverby Limited	14-06-200-934A	500	0	0	0	30	60	130	110	110	50	10	0	0
Robert's Ditch Irrigation Company, Inc.	14-06-200-935A	4,440	0	0	0	660	670	950	600	550	610	400	0	0
Driver, William, et al	14-06-200-939A-1	160	0	0	0	0	18	45	44	45	8	0	0	0
Driver, Gregory E.	14-06-200-939A-2	20	0	0	0	0	2	5	6	5	2	0	0	0
M & T Chico Ranch (Pacific Realty)	14-06-200-940A	17,956	0	0	0	1,200	1,640	3,002	4,330	4,564	2,460	760	0	0

TABLE 3-7

CONTRACT SUPPLY AND SCHEDULED MONTHLY DELIVERIES

Contractor Name	Contract Number	Total Contract Supply (AF)	January Delivery (AF)	February Delivery (AF)	March Delivery (AF)	April Delivery (AF)	May Delivery (AF)	June Delivery (AF)	July Delivery (AF)	August Delivery (AF)	September Delivery (AF)	October Delivery (AF)	November Delivery (AF)	December Delivery (AF)
Penner, H.H., et ux	14-06-200-960A	180	0	0	0	9	24	37	38	36	23	13	0	0
Giovannetti, B.E. & Mary	14-06-200-991A	520	0	0	0	60	80	90	120	120	50	0	0	0
Sekhon, Arjinderpal & Daljit	7-07-20-W0001	820	0	0	0	60	170	150	165	150	85	40	0	0
Jaeger, William, et al	7-07-20-W0002	870	0	0	0	90	145	185	205	190	55	0	0	0
High-Low Nursery, Inc.	7-07-20-W0006	205	0	0	0	10	30	45	50	45	20	5	0	0
Verona Farming Partnership	7-07-20-W0054	300	0	0	0	20	55	50	75	65	35	0	0	0
Forster, Rosemary Trust & Jerome	8-07-20-W0117	3,160	0	0	0	250	710	540	670	600	380	10	0	0

- Groundwater pumping was assumed to occur from the regional aquifer beneath each district. The regional aquifer is defined as the aquifer from which the majority of existing irrigation wells draw water in a given area.
- Groundwater production rates are assumed to be constant in a given month with groundwater production occurring 24 hours per day, 7 days a week.

The superposition approach was used to simulate two pumping scenarios. The first simulation represents a single year where all of the contract supplies are decreased by 25 percent. The second simulation represents a hypothetical 4-year drought. During this simulation, all contractor supplies are decreased by 25 percent for 4 consecutive years. It was assumed that there is a seasonal recovery of 40 to 50 percent (for the Sacramento Valley and Redding Groundwater Basins, respectively) during each winter. The recovery factor is based on the average seasonal recovery observed during the 1976-1977 drought in the Sacramento Valley and Redding Groundwater Basins (Department, 2003a).

Sacramento Valley Groundwater Basin Modeling Tool

The Sacramento Valley Groundwater Basin modeling tool covers the Sacramento Valley extending south from the Red Bluff Arch in Tehama County to the Sacramento-San Joaquin Delta. It includes specific information on the thickness and properties of the aquifers and the relationships between the streams and underlying aquifers. The extent of the groundwater modeling tool is presented on Figure 3-2. The total thickness and lateral extent of the model represent the freshwater aquifer defined by Berkstresser (1973). Thickness was divided into six model layers based on assumed construction of typical irrigation wells in the Sacramento Valley Groundwater Basin. A no-flow boundary was assumed along the margins of the model domain to simulate the lateral extent of freshwater-bearing sediments in the Sacramento Valley Groundwater Basin. A head-dependent boundary condition was used to simulate 40 individual streams throughout the model domain. The distribution of aquifer properties, such as transmissivity and specific yield, were derived from those reported by Bloyd (1978).

Redding Groundwater Basin Modeling Tool

To evaluate the impacts of the project on groundwater conditions and streamflows in the Redding Groundwater Basin, a superposition groundwater model was used similar to that constructed for the Sacramento Valley Groundwater Basin (referred to as the “Redding Basin Groundwater Model [RBGM]). Initial conditions for the modeling simulations assume a flat water table and with streams in direct hydraulic connection with the groundwater aquifer.

The boundary of the RBGM generally coincides with the boundary of the Redding Groundwater Basin and is shown on Figure 3-3. The RBGM boundary was extended slightly beyond the boundary in the following areas:

- North of the Redding Groundwater Basin boundary and south of Shasta Lake
- West of the Redding Groundwater Basin boundary and east of Clear Creek below Whiskeytown Lake

The RBGM boundaries were extended in these areas to fully encompass local water purveyor service areas for future simulations involving potential water transfers and impacts. The total aquifer thickness in the RBGM was estimated by subtracting the depth to bedrock (i.e., Chico

Formation) (Department, 1968) from average groundwater levels. The total aquifer thickness was subdivided into four model layers based on typical screened intervals of wells in the Redding Groundwater Basin. A no-flow boundary was used along the margins of the model domain to simulate the lateral extent of freshwater-bearing sediments in the basin. A head-dependent boundary condition was used to simulate 31 individual streams throughout the model domain. The distribution of aquifer properties that resulted from the calibration process, such as transmissivity, were originally derived from specific capacity data obtained from M&I and, where available, domestic water supply wells. An additional head-dependent boundary was applied to the surface of the RBGM to simulate the loss of shallow groundwater to evapotranspiration.

Due to the contracted surface water deliveries to the City of Redding water service area, pumping scenarios simulated with the RBGM were run using monthly time steps from April through March. Additionally, because well locations were known for the three largest contractors in the Redding Groundwater Basin, pumping was assigned to these discrete locations as opposed to being distributed over the district area.

Sacramento Valley Groundwater Basin Analysis

The following sections describe the modeling results for the Sacramento Valley Groundwater Basin.

Groundwater Levels

Under a 25 percent cutback scenario, annual SRSC pumping within the Sacramento Valley Groundwater Basin would total approximately 495,000 AF. A decrease in surface water supplies to SRSCs, and subsequent increase in groundwater pumping, would result in temporary additional drawdown of groundwater levels in the aquifer system underlying the Sacramento Valley Groundwater Basin. Model forecast drawdown was evaluated in both the shallow and regional aquifers. The shallow aquifer is defined as the unconfined aquifer that exists in the upper 50 feet of saturated sediments. The regional aquifer is defined as the deeper portions of the aquifer that are typically tapped by irrigation wells in the basin. Figures 3-4 and 3-5 are maps of maximum incremental drawdown due to increased SRSC pumping in both the shallow aquifer and the deeper regional aquifer at the end of an average pumping season. Drawdown in the shallow aquifer could influence streams and riparian vegetation. Drawdown in the deeper aquifer could affect pumping water levels in nearby wells and potentially induce subsidence. The degree of anticipated impact and relative potential for significance is discussed below.

Shallow aquifer drawdown, shown on Figure 3-4, refers to changes in water levels within the upper 50 feet of the unconfined aquifer. This figure is based on the maximum computed drawdown that would occur at the end of the April through October pumping season. The model indicates that shallow aquifer drawdown resulting from increased SRSC pumping generally ranges from 0 to 22 feet, with drawdown not exceeding 10 feet in most areas (Table 3-8). The maximum projected drawdown of 22 feet occurs in the GCID area.

Regional aquifer drawdown, shown Figure 3-5, is the maximum incremental drawdown, attributable to increased pumping, in groundwater levels in the aquifer where most irrigation pumping occurs. Model results suggest that drawdown of groundwater levels would range

from 0 to 22 feet (Table 3-8). This maximum drawdown is forecast to occur in the GCID area. However, predicted drawdown in all other areas of the Sacramento Valley Groundwater Basin would generally be less than 10 to 15 feet. The areal extent of regional aquifer drawdown is similar to that of shallow aquifer drawdown, but of slightly greater magnitude.

TABLE 3-8
SUMMARY OF DRAWDOWN IMPACTS AT THE END OF THE PUMPING SEASON

Sub-basin	Maximum Incremental Drawdown – Shallow Aquifer (feet)	Maximum Incremental Drawdown - Regional Aquifer (feet)
North Colusa	22	22
South Colusa	10	9
West Butte	6	6
East Butte	5	5
North Yuba	<1	<1
South Yuba	<1	<1
Sutter	15	15
Yolo	5	5
North American	10	9

Surface Water/Groundwater Interaction. Implementation of any cutback of SRSC surface water supply, and resultant increase in groundwater pumping, would result in a reduction in local streamflow by: (1) increasing infiltration of surface water through the streambed, (2) intercepting groundwater that would have recharged surface waterbodies, or (3) a combination of 1 and 2.

Impacts to Sacramento River flows are anticipated to result in a peak instantaneous streamflow reduction rate shortly before the end of the 214-day pumping period of 148 cfs, and an average streamflow reduction of 103 cfs between April and December. Peak impacts to flows in the Feather River are predicted to be 16 cfs, with an average reduction of 11 cfs. For comparison, the historical mean monthly flow in the Sacramento River ranges from 12,390 (October) to 41,060 (February) cfs at the Freeport gauge. The historical mean monthly flow in the Feather River, as measured at the Nicolaus gauge, ranges from 2,630 (August) to 15,520 (February) cfs. Table 3-9 summarizes the predicted streamflow depletion rates, along with average measured streamflows during the month of peak depletion, where available. Streamflow impacts on several outlying streams are predicted to continue to increase once pumping has stopped. However, the influence of winter recharge, assumed to begin January 1, would cause these impacts to decline over the winter, and cease altogether once groundwater levels return to pre-pumping conditions. Therefore, the impacts on these streams are assumed to peak on December 31. The spatial variation in streamflow depletion rates across the Sacramento Valley Groundwater Basin, at the end of the 214-day stress period, is shown on Figure 3-6.

Table 3-9 lists the average and peak stream impacts estimated for streams in the Sacramento Valley, along with the percentage of streamflow that each impact represents. The simulated peak stream depletion rate for each stream was compared to the corresponding measured historical streamflow for each stream (where data were available) to quantify the peak reduction in average streamflow. Results suggest that forecast changes in streamflow in the Sacramento Valley Groundwater Basin would be insignificant and likely unmeasurable.

TABLE 3-9

SUMMARY OF SIMULATED AVERAGE AND PEAK STREAM DEPLETION RATES IN THE SACRAMENTO VALLEY GROUNDWATER BASIN

Stream	Average April through December Stream Depletion Rate (cfs)	Peak Stream Depletion Rate (cfs)	Month of Peak Stream Depletion Rate	Historical Mean Measured Streamflow (cfs) for Month of Simulated Peak Impact – Gauge Location	Predicted Peak Reduction in Average Flows (%)
Sacramento River	102.8	147.8	September	14,850 – Freeport	1%
Feather River	10.5	16.1	October	3,375 – Nicolaus	0.5%
GCID Canal	9.5	13.8	October	N/A	N/A
Colusa Basin Drain	5.6	8.0	September	N/A	N/A
Stone Corral Creek ^a	4.3	6.3	October	0 – Sites	
Butte Creek	2.9	4.3	October	138 – Chico	3%
Funks Creek	2.5	3.6	October	N/A	N/A
Willow Creek	1.6	2.4	October	N/A	N/A
Stony Creek	1.0	1.5	September	136 – Orland	1%
Salt Creek	0.8	1.2	October	N/A	N/A
American River	0.6	0.9	October	1,160 – Fair Oaks	0.1%
Cache Creek	0.3	0.5	October	14 – Yolo	3%
Big Chico Creek	0.3	0.5	September	24 – Chico	2%
Angel Slough	0.2	0.3	December ^b	N/A	N/A
Walker Creek	0.1	0.3	December ^b	27 – Artois	1%
Little Chico Creek	0.1	0.2	September	N/A	N/A
Wilson Creek	0.1	0.2	December ^b	N/A	N/A
South Fork Willow Creek	0.1	0.2	December ^b	2 - Fruto	12%
TOTALS	<u>143.4</u>	<u>208.0</u>			

^aThe assumption that Stone Corral Creek flows year-round is conservative. Drawdown impacts are not underestimated as the total depletion from this stream (410 AF) represents only 0.30% of the total program supply (155,000 AF).

^bIt is assumed that the influence of winter recharge, beginning January 1, would cause stream impacts to decline over the winter, and cease altogether once groundwater levels return to pre-pumping conditions. Therefore, the impacts on these streams are assumed to peak on December 31.

Multi-year Drought Periods

The analysis of impacts presented above assumes that groundwater levels in the Sacramento Valley return to pre-pumping levels each spring due to recharge of precipitation and streamflow during the winter months. However, during periods of extreme drought conditions occurring over multiple years, it is likely that groundwater levels would not recover completely each spring, and some residual drawdown would persist into the subsequent irrigation season.

The groundwater flow model that was developed to estimate the SRSC groundwater and streamflow impact is a superposition model, which means that it does not explicitly simulate the recharge of applied water and precipitation that occurs over the course of the year. This modeling approach simply assumes that no groundwater recharge occurs during the pumping season (April through October) or the 2 months following, and that recharge during the winter months (January through March) is sufficient for full recovery of groundwater levels prior to the subsequent pumping season. Thus, it is not possible to use the existing model to simulate specific climatic trends such as the 1976-1977 drought or the 1928-1934 drought.

As an alternative, the approach taken to evaluate the impacts of decreases in SRSC surface water deliveries during multiple dry years is much more simplistic. This hypothetical 4-year drought scenario assumes that surface water deliveries are decreased by 25 percent each year, and that there is a seasonal recovery in groundwater levels of 40 percent (based on a review of historical hydrographs of water levels measured during the 1976-1977 drought). It was assumed that even in these extreme conditions, seepage from the Sacramento and Feather Rivers continued to occur, as these streams would continue to be fed by reservoir releases.

Groundwater Levels. The simulated maximum incremental drawdown in the shallow and regional aquifers after 4 consecutive dry years is presented as Figures 3-7 and 3-8, respectively. These results suggest that drawdown after 4 dry years would be greater than the single-year scenario (up to 15 to 20 feet of drawdown in most areas, but up to 37 feet in the GCID area, Table 3-10), but still supportable by the basin with current well construction (depth to screen). In other words, after a series of critically dry years, the basin would still be capable of producing the 495,000 AF of water associated with a cutback of 25 percent in SRSC supplies. It should be noted that the estimated drawdown is due to the SRSC pumping only, and does not include the influence of the other 2.5 MAF of pumping in the Sacramento Valley, which is assumed to occur under No Action. Figures 3-9 and 3-10 show the simulated drawdown over time by sub-basin in the model for the 4-year drought scenario in the shallow and regional aquifers, respectively. These figures demonstrate that under the multiple dry-year condition, a dynamic equilibrium is slowly established under which the groundwater removed from storage by pumping is replenished by seepage from surface water sources.

TABLE 3-10

**SUMMARY OF DRAWDOWN IMPACTS AT THE END OF THE
PUMPING SEASON – DROUGHT YEAR 4**

Sub-basin	Maximum Incremental Drawdown - Shallow Aquifer (feet)	Maximum Incremental Drawdown – Regional Aquifer (feet)
North Colusa	36	37
South Colusa	16	15
West Butte	10	10
East Butte	8	8
North Yuba	<1	<1
South Yuba	1	1
Sutter	24	24
Yolo	8	8
North American	15	14

Groundwater/Surface Water Interaction. From a streamflow perspective, the model predicts a peak streamflow impact of about 352 cfs from all streams in the model after 4 drought years, 241 cfs of that coming from the Sacramento River (Table 3-11). These figures are shown graphically on Figure 3-11. To put this number into perspective, the minimum mean monthly flow in the Sacramento River during the 1976-1977 drought, as measured at the Freeport gauge, was 4,494 cfs in October 1977. Streamflow at this gauge increased to over 45,000 cfs by January 1978.

Figure 3-12 is a time series plot of stream seepage rates over the drought for several major streams. This figure shows that near the end of the drought, the magnitude of increase in-stream seepage rates begin to level off, illustrating the equilibrium that is reached between groundwater pumping and stream leakage.

Table 3-11 lists the peak stream impacts estimated for streams in the Sacramento Valley, along with the percentage of streamflow that each impact represents. The simulated peak stream depletion rate for each stream was compared to the corresponding measured historical streamflow for each stream, during a drought period (where data were available) to quantify the peak reduction in average streamflow.

TABLE 3-11

**SUMMARY OF STREAM IMPACTS IN SACRAMENTO GROUNDWATER BASIN AFTER 4
CRITICALLY DRY YEARS**

Stream	Peak Instantaneous Stream Depletion Rate (cfs)	Month of Peak Stream Depletion Rate	Measured Streamflow during Month of Peak Stream Depletion (cfs)	Percent Instantaneous Depletion of Measured Streamflow
Sacramento River	240.7	August	8,718 ^a	3%
Feather River	29.7	October	1,120 ^b	3%
GCID Canal	25.2	September	N/A	N/A
Colusa Basin Drain	15.0	September	N/A	N/A
Stone Corral Creek	10.9	September	0	
Butte Creek	7.6	October	114 ^a	7%
Funks Creek	6.3	September	N/A	N/A
Willow Creek	4.6	October	N/A	N/A
Stony Creek	2.7	August	N/A	N/A
Salt Creek	2.4	October	N/A	N/A
American River	1.6	September	857 ^a	0.2%
Cache Creek	0.9	October	0 ^a	
Walker Creek	0.9	March	0 ^b	
South Fork Willow Creek	0.7	March	0 ^b	
Big Chico Creek	0.7	August	16 ^b	4%
Wilson Creek	0.6	March	N/A	N/A
Angel Slough	0.6	December	N/A	N/A
Little Chico Creek	0.3	September	N/A	N/A
Bear River	0.2	March	487 ^a	0.04%
Sand Creek	0.2	March	N/A	N/A
French Creek	0.2	March	N/A	N/A
Putah Creek	0.1	March	42.9 ^a	0.2%
Yuba River	0.1	March	804 ^a	0.01%
Totals:	<u>352.1</u>			
^a 1992				
^b 1977				

Redding Groundwater Basin

Groundwater Levels. Under a 25 percent cutback scenario, annual SRSC pumping within the Redding Groundwater Basin would total approximately 38,000 AF. A decrease in surface water supplies to SRSCs, and subsequent increase in groundwater pumping, would result in temporary additional drawdown of groundwater levels in the aquifer system underlying the Redding Groundwater Basin. Model forecast drawdown was evaluated in both the shallow and regional aquifers. The shallow aquifer is defined as the unconfined aquifer that exists in the upper 50 feet of saturated sediments. The regional aquifer is defined as the deeper portions of the aquifer that are typically tapped by irrigation wells in the basin. Figures 3-13 and 3-14 are maps of maximum incremental drawdown due to increased SRSC pumping in both the shallow aquifer and the deeper regional aquifer at the end of an average pumping season. Drawdown in the shallow aquifer could influence streams and riparian vegetation. Drawdown in the deeper aquifer could affect pumping water levels in nearby wells and potentially induce subsidence. The degree of anticipated impact and relative potential for significance is discussed below.

Shallow aquifer drawdown, shown on Figure 3-13, refers to changes in water levels within the upper 50 feet of the unconfined aquifer. This figure is based on the maximum computed drawdown that would occur at the end of the April through October pumping season. The model indicates that shallow aquifer drawdown resulting from increased SRSC pumping generally ranges from 0 to 15 feet, with drawdown not exceeding 5 to 10 feet in most areas (Table 3-12). The maximum projected drawdown of 15 feet occurs in the ACID area.

Regional aquifer drawdown, shown on Figure 3-14, is the maximum incremental drawdown, attributable to increased pumping, in groundwater levels in the aquifer where most irrigation pumping occurs. Model results suggest that drawdown of groundwater levels would range from 0 to 21 feet (Table 3-12). This maximum drawdown is forecast to occur in the ACID area. However, predicted drawdown in all other areas of the Redding Groundwater Basin would generally be less than 5 to 10 feet. The areal extent of regional aquifer drawdown is similar to that of shallow aquifer drawdown, but of slightly greater magnitude.

TABLE 3-12

SUMMARY OF DRAWDOWN IMPACTS AT THE END OF THE PUMPING SEASON

Sub-basin	Maximum Incremental Drawdown – Shallow Aquifer (feet)	Maximum Incremental Drawdown – Regional Aquifer (feet)
Anderson	15	21
Bowman	5	6
Enterprise	4	4
Millville	2	3
Rosewood	1	2
South Battle Creek	1	1

Surface Water/Groundwater Interaction. Implementation of any cutback of SRSC surface water supply, and resultant increase in groundwater pumping, would result in a reduction in local streamflow by: (1) increasing infiltration of surface water through the streambed, (2) intercepting groundwater that would have recharged surface waterbodies, or (3) a combination of 1 and 2.

Impacts to Sacramento River flows are anticipated to result in a peak instantaneous streamflow reduction rate at the end of the 214-day pumping period of 27 cfs, and an average streamflow reduction of 16 cfs between April and December. Peak impacts to flows in Cottonwood Creek are predicted to be 3 cfs, with an average reduction of 2 cfs. For comparison, the historical mean monthly flow in the Sacramento River ranges from 5,866 (October) to 13,200 (February) cfs at the Keswick gauge. The historical mean monthly flow in Cottonwood, as measured at the Olinda gauge, ranges from 20 (September) to 1,444 (March) cfs. Table 3-13 summarizes the predicted streamflow depletion rates, along with average measured streamflows during the month of peak depletion, where available. Streamflow impacts on several outlying streams are predicted to continue to increase once pumping has stopped. However, the influence of winter recharge, assumed to begin January 1, would cause these impacts to decline over the winter, and cease altogether once groundwater levels return to pre-pumping conditions. Therefore, the impacts on these streams are assumed to peak on December 31. The spatial variation in streamflow depletion rates across the Redding Groundwater Basin, at the end of the 214-day stress period, are shown on Figure 3-15.

Table 3-13 lists the average and peak stream impacts estimated for streams in the Redding Groundwater Basin, along with the percentage of streamflow that each impact represents. The simulated peak stream depletion rate for each stream was compared to the corresponding measured historical streamflow for each stream (where data were available) to quantify the peak reduction in average streamflow. Results suggest that forecast changes in streamflow in the Redding Groundwater Basin would be insignificant and likely unmeasurable.

Multi-year Drought Periods

The analysis of impacts presented above assumes that groundwater levels in the Redding Groundwater Basin return to pre-pumping levels each spring due to recharge of precipitation and streamflow during the winter months. However, during periods of extreme drought conditions occurring over multiple years, it is likely that groundwater levels would not recover completely each spring, and some residual drawdown would persist into the subsequent irrigation season.

The groundwater flow model that was developed to estimate the SRSC groundwater and streamflow impact is a superposition model, which means that it does not explicitly simulate the recharge of applied water and precipitation that occurs over the course of the year. This modeling approach simply assumes that no groundwater recharge occurs during the pumping season (April through October) or the 2 months following, and that recharge during the winter months (January through March) is sufficient for full recovery of groundwater levels prior to the subsequent pumping season. Thus, it is not possible to use the existing model to simulate specific climatic trends such as the 1976-1977 drought or the 1928-1934 drought.

TABLE 3-13

**SUMMARY OF SIMULATED AVERAGE AND PEAK STREAM DEPLETION RATES
IN THE REDDING GROUNDWATER BASIN**

Stream	Average April through December Stream Depletion Rate (cfs)	Peak Stream Depletion Rate (cfs)	Month of Peak Stream Depletion Rate	Historical Mean Measured Streamflow (cfs) for Month of Simulated Peak Impact – Gauge Location	Predicted Peak Reduction in Average Flows
Sacramento River	15.8	26.5	October	5,866 - Keswick	0.5%
Cottonwood Creek	1.9	3.0	October	42.2 - Olinda	7%
Anderson Creek	0.9	1.2	October	N/A	N/A
Stillwater Creek	0.9	1.4	October	N/A	N/A
Cow Creek	0.6	1.0	October	125	1%
Clover Creek	0.4	0.6	October	N/A	N/A
Battle Creek	0.3	0.5	October	298 - Coleman Hatchery	0.2%
Churn Creek	0.3	0.4	October	N/A	N/A
Bear Creek	0.2	0.4	October	21.2 - Millville	2%
Ash Creek	0.1	0.2	December	N/A	N/A
Dry Creek	0.1	0.1	December ^a	N/A	N/A
TOTALS	21.5	35.4			

^a It is assumed that the influence of winter recharge, beginning January 1, would cause stream impacts to decline over the winter, and cease altogether once groundwater levels return to pre-pumping conditions. Therefore, the impacts on these streams are assumed to peak on December 31.

As an alternative, the approach taken to evaluate the impacts of decreases in SRSC surface water deliveries during multiple dry years is much more simplistic. This hypothetical 4-year drought scenario assumes that surface water deliveries are decreased by 25 percent each year, and that there is a seasonal recovery in groundwater levels of 50 percent (based on a review of historical hydrographs of water levels measured during the 1976-77 drought). It was assumed that even in these extreme conditions, seepage from the Sacramento River continued to occur, as this stream would continue to be fed by reservoir releases.

Groundwater Levels. The simulated maximum incremental drawdown in the shallow and regional aquifers after 4 consecutive dry years is presented as Figures 3-16 and 3-17, respectively. These results suggest that drawdown after 4 dry years would be greater than the single-year scenario (up to 5 to 10 feet of drawdown in most areas, but up to 23 feet in the ACID area, Table 3-14), but still supportable by the basin with current well construction (depth to screen). In other words, after a series of critically dry years, the basin would still be capable of producing the 38,000 AF of water associated with a cutback of 25 percent in SRSC supplies. It should be noted that the estimated drawdown is due to the SRSC pumping

only, and does not include the influence of the other 55,000 AF of pumping in the Redding Groundwater Basin, which is assumed to occur under No Action.

TABLE 3-14

SUMMARY OF DRAWDOWN IMPACTS AT THE END OF THE PUMPING SEASON – DROUGHT YEAR 4

Sub-basin	Maximum Incremental Drawdown – Shallow Aquifer (feet)	Maximum Incremental Drawdown – Regional Aquifer (feet)
Anderson	18	23
Bowman	7	8
Enterprise	5	5
Millville	5	3
Rosewood	2	3
South Battle Creek	1	2

Groundwater/Surface Water Interaction. From a streamflow perspective, the model predicts a peak streamflow impact of about 41 cfs from all streams in the model after 4 drought years, 34 cfs of that coming from the Sacramento River (Table 3-15). These figures are shown graphically on Figure 3-18. To put this number into perspective, the minimum mean monthly flow in the Sacramento River during the 1976-1977 drought, as measured at the Keswick gauge, was 3,431cfs in October 1977 (USGS, 2004). Streamflow at this gauge increased to over 6,200 cfs by January 1978.

Figure 3-19 is a time series plot of stream seepage rates over the drought for several major streams. This figure shows that near the end of the drought, the magnitude of increase in stream seepage rates begin to level off, illustrating the equilibrium that is reached between groundwater pumping and stream leakage.

Table 3-15 lists the peak stream impacts estimated for streams in the Redding Groundwater Basin portion of the Sacramento Valley, along with the percentage of streamflow that each impact represents. The simulated peak stream depletion rate for each stream was compared to the corresponding measured historical streamflow for each stream, during a drought period (where data were available) to quantify the peak reduction in average streamflow.

TABLE 3-15

**SUMMARY OF STREAM IMPACTS IN THE REDDING GROUNDWATER BASIN
AFTER 4 CRITICALLY DRY YEARS**

Stream	Simulated Peak Stream Seepage Rate (cfs)	Month of Simulated Peak Stream Seepage Rate	Measured Streamflow during Month of Peak Stream Depletion (cfs)	Percent Instantaneous Depletion of Measured Streamflow
Sacramento River	34.2	October	3,741 ^b	1%
Cottonwood Creek	3.6	October	17.4 ^c	21%
Stillwater Creek	1.5	October	N/A ^d	N/A
Cow Creek	1.4	October	90.9 ^b	2%
Anderson Creek	1.3	October	N/A ^d	N/A
Battle Creek	0.8	October	139 ^b	1%
Clover Creek	0.7	October	N/A ^d	N/A
Churn Creek	0.4	November	N/A ^d	N/A
Bear Creek	0.4	November	N/A ^d	N/A
Ash Creek	0.2	December	N/A ^d	N/A
Hooker Creek	0.1	December ^a	N/A ^d	N/A
Dry Creek	0.1	December ^a	N/A ^d	N/A
Inks Creek	0.1	December ^a	N/A ^d	N/A
South Fork Cottonwood Creek	0.1	December ^a	521 ^c	0.01%
Clough Creek	0.1	December ^a	N/A ^d	N/A

^a It is assumed that the influence of winter recharge, beginning January 1, would cause stream impacts to decline over the winter, and cease altogether once groundwater levels return to pre-pumping conditions. Therefore, the impacts on these streams are assumed to peak on December 31.

^b1992

^c1977

^dNo data for either the 1976-1977 or 1989-1992 drought

No Action Alternative. The No Action Alternative does not include new facilities or construction. The No Action Alternative assumes that dry-year reductions would remain the same as existing conditions, and the renewed contract period would last 40 years.

Alternative 1. Groundwater recharge and groundwater use by the SRSCs under Alternative 1 would be similar, if not identical to conditions under the No Action Alternative. Alternative 1 would not significantly alter current CVP operations, water storage or release

patterns from CVP facilities, or the maximum volume of water delivered to the SRSCs with the exception of reduced contract amounts to ACID and SMWC. These reductions in contract amounts are based on needs analyses and historical use and are not expected to result in less water use by these contractors. Therefore, groundwater pumping is not expected to increase as a result of this alternative.

It is assumed that use of the assigned CVP water by the SRSCs would continue to be managed in the same manner under Alternative 1 as under the No Action Alternative.

Therefore, there are no environmental impacts of this alternative as compared to the No Action Alternative.

Alternative 2. Groundwater recharge and groundwater use by the SRSCs under Alternative 2 would be identical to conditions under the No Action Alternative. Alternative 2 would not alter CVP operations, water storage or release patterns from CVP facilities, or the maximum volume of water delivered to the SRSCs as compared to the No Action Alternative.

It is assumed that use of the assigned CVP water by the SRSCs would continue to be managed in the same manner under Alternative 2 as under the No Action Alternative.

Therefore, there are no environmental impacts of this alternative as compared to the No Action Alternative.

Alternative 3. Groundwater recharge and groundwater use by the SRSCs under Alternative 3 would be similar to conditions under the No Action Alternative. Alternative 3 would not alter CVP operations, water storage or release patterns from CVP facilities, or the maximum volume of water delivered to the SRSCs as compared to the No Action Alternative.

It is assumed that use of the assigned CVP water by the SRSCs would continue to be managed in the same manner under Alternative 3 as under the No Action Alternative.

Therefore, there are no environmental impacts of this alternative as compared to the No Action Alternative.

Alternative 4.

Groundwater Levels. Increased frequency of pumping within the Sacramento Valley Groundwater Basin could occur during dry years within the Sacramento Valley Groundwater Basin. This increased frequency would result from sliding-scale cutbacks in water deliveries during years where cutbacks would otherwise not have occurred. Assuming pumping were equal to reduced diversions, the increased pumping would total approximately 212,745 AF during Shasta inflow deficits of 200,000 to 400,000 AF, and 425,490 AF during inflow deficits of 400,000 to 600,000 AF. When deficits are greater than 600,000 AF, pumping would be the same as under No Action critical years.

Increased pumping activities associated with these cutbacks would result in temporary drawdown of groundwater levels in the aquifer system underlying the Sacramento Valley Groundwater Basin. Drawdown in the deeper aquifer could affect pumping water levels in nearby wells and potentially induce subsidence. However, as stated above, even under the

multi-year drought analysis, the overall impact to the Sacramento Valley and Redding Groundwater Basins is less than significant.

Land Subsidence. Groundwater extraction under this alternative may decrease groundwater levels, increasing the potential for localized land subsidence. Typically, permanent subsidence only occurs when groundwater levels are lowered for many years. Implementation of this alternative would not cause a permanent lowering of groundwater levels because it is expected that the basin would refill except during extreme drought conditions. Therefore, the potential for permanent subsidence of the land surface as a result of Alternative 4 is expected to be less than significant, even under the worst-case analysis considered here.

Groundwater Quality. *Migration of Reduced-quality Groundwater.* Although groundwater in this area is generally of good quality, elevated levels of TDS and nitrates have been detected in some localized areas of the basin. Areas of naturally occurring high TDS are west of the Sacramento River between Putah Creek and the confluence of the Sacramento and San Joaquin Rivers, and in the area south of the Sutter Buttes, in the vicinity of the confluence of the Sacramento and Yuba Rivers. Elevated nitrate levels occur in two areas within the Sacramento Valley Groundwater Basin: one in northern Yuba and southern Butte Counties, east of Sutter Buttes, and another in northern Butte and southern Tehama Counties (Reclamation, 1997). Any movement or migration of reduced-quality water under each of the contract alternatives would be similar to the No Action Alternative because the distribution of pumping across the valley would not change. However, the increase in the frequency of pumping may result in a slight increase in groundwater migration rates. This impact is considered less than significant.

Alternative 5.

Groundwater Levels. Increased pumping within the Sacramento Valley Groundwater Basin could occur during dry years within the Sacramento Valley Groundwater Basin. This increase would result from sliding-scale cutbacks in water deliveries during years where cutbacks would otherwise not have occurred under the No Action Alternative. The increased pumping would total approximately 212,745 AF during Sacramento Index below normal years, and 425,490 AF during Sacramento Index dry years. Pumping under Sacramento Index critically dry years would be equivalent to critical years under the No Action.

Increased pumping activities associated with these cutbacks would result in temporary drawdown of groundwater levels in the aquifer system underlying the Sacramento Valley Groundwater Basin. Drawdown in the deeper aquifer could affect pumping water levels in nearby wells and potentially induce subsidence. However, as stated above, even under the multi-year drought analysis, the overall impact to the Sacramento Valley and Redding Groundwater Basins is less than significant.

Land Subsidence. Groundwater extraction under this alternative could decrease groundwater levels, increasing the potential for localized land subsidence. Typically, permanent subsidence only occurs when groundwater levels are lowered for many years. Implementation of this alternative would not cause a permanent lowering of groundwater levels, because it is expected that the basin would refill except during extreme drought conditions. Therefore, the potential for permanent subsidence of the land surface as a result of Alternative 5 is expected to be less than significant, even under the worst-case analysis considered here.

Groundwater Quality. *Migration of Reduced-quality Groundwater.* Although groundwater in this area is generally of good quality, elevated levels of TDS and nitrate have been detected in some localized areas of the basin. Areas of naturally occurring high TDS are west of the Sacramento River between Putah Creek and the confluence of the Sacramento and San Joaquin Rivers, and in the area south of the Sutter Buttes, in the vicinity of the confluence of the Sacramento and Yuba Rivers. Elevated nitrate levels occur in two areas within the Sacramento Valley Groundwater Basin: one in northern Yuba and southern Butte Counties, east of Sutter Buttes, and another in northern Butte and southern Tehama Counties (Reclamation, 1997). Any movement or migration of reduced-quality water under each of the contract alternatives would be similar to the No Action Alternative because the distribution of pumping across the valley would not change. However, the increase in the frequency of pumping may result in a slight increase in groundwater migration rates. This impact is considered less than significant.

BIOLOGICAL ENVIRONMENT

Terrestrial Biological Resources

Affected Environment.

This section describes the wildlife habitats that occur in the SRSCs service area and the wildlife species typically found in each habitat. Special-status wildlife and plant species with the potential to occur in the SRSCs service area are identified, and their general habitat associations are summarized.

Wildlife and Wildlife Habitat. Historically, the Sacramento Valley contained a mosaic of riverine, wetlands, and riparian habitat along rivers and streams with surrounding terrestrial habitats consisting of perennial grassland and oak woodland. With settlement of the Sacramento Valley, agricultural and urban development converted land from native habitats to cultivated fields, pastures, residences, water impoundments, flood-control structures, and other developments. As a result, native habitats generally are restricted in their distribution and size and are highly fragmented. Agricultural land comprises most of the SRSCs service area and includes row and field crops, rice, pasture, and orchards. The following discussion describes the various terrestrial habitats that are present in or near the service areas of the SRSC and CDMWC.

The types, amounts, and distribution of habitats in the service areas were derived from the California GAP Analysis Project (California Department of Fish and Game [CDFG], 1998a).

In the California GAP Analysis, habitats were typed using the California Wildlife Habitats Relationship System (CWHR) (Mayer and Laudenslayer, 1988). This project focused on mapping habitats at a landscape scale and has a resolution of 274 acres (100 hectares) for upland habitats and 98.8 acres (40 hectares) for wetlands habitat. The database identifies general habitat types throughout the service area but does not distinguish small habitat patches, such as stringers of riparian habitat or small wetlands, which can have high wildlife value. Where available, additional information is provided on the occurrence of important habitat types not distinguished in the California GAP Analysis.

Wetlands Habitat. California supports a wide variety of wetland habitats. The plants and wildlife species supported in wetlands vary depending on the hydrologic regime, substrate, water source, and water quality of the site. Types of wetlands in the SRSCs service area are freshwater emergent wetlands and vernal pools.

Freshwater Emergent Wetlands. Freshwater emergent wetlands occur in areas that are seasonally or perennially inundated. They form a transitional habitat between open water and upland habitats and occur in backwater areas of rivers, streams, and lakes, and in the floodplains of rivers and streams. Emergent wetlands are characterized by erect, rooted, herbaceous vegetation that emerges above the water surface. Water depths are shallow, up to about 1 to 2 feet. Common plant species include cattails (*Typha* spp.), bulrushes (*Scirpus* spp.), and rushes (*Juncus* spp.).

Urban and agricultural development, as well as hydrologic changes from flood control and water supply development, have substantially reduced the amount of wetlands habitat in the Central Valley. In the 1940s, freshwater emergent wetlands occupied about 554,000 acres of the Central Valley (Frayer et al., 1989; Central Valley Habitat Joint Venture, 1990). By 1990, only 86,704 acres remained (CDFG, 1998a). Regional reductions in freshwater emergent wetlands have been estimated at 88.7 percent in the Sacramento Valley Groundwater Basin, 96.2 percent in the San Joaquin Basin, 99.2 percent in the Tulare Basin, 98.3 percent in the Delta, and 97.2 percent in the San Francisco Bay Area.

Freshwater wetlands are among the most important habitats for wildlife. In winter, waterfowl rely on wetlands in the Central Valley as a stopover during their migration or as habitat throughout the winter. Raptors such as golden eagles (*Aquila chrysaetos*) and northern harriers (*Circus cyaneus*) frequent wetlands while foraging. Birds such as marsh wrens (*Cistothorus palustris*), tricolored blackbirds (*Agelaius tricolor*), red-winged blackbirds (*Agelaius phoeniceus*), American bitterns (*Botaurus lentiginosus*), great egrets (*Ardea alba*), great blue herons (*Ardea herodias*), black-crowned night herons (*Nycticorax nycticorax*), and green herons (*Butorides virescens*) are common in wetland habitats in the SRSCs service area and depend on this habitat. Numerous amphibians and mammals also depend on wetlands or frequent this habitat because of its high productivity and diversity. Because much of the wetlands habitat in California has been lost, a number of species that require wetlands have been listed as threatened or endangered, or are species of concern to the U.S. Fish and Wildlife Service (Service) or CDFG. Special-status species associated with wetlands in the SRSCs service area include giant garter snake (*Thamnophis gigas*), tricolored blackbird, white-faced ibis (*Plegadis chihi*), and western pond turtle (*Clemmys marmorata*).

Vernal Pool. Vernal pools are typically found in association with annual grassland habitat, and constitute a unique habitat type. Vernal pools form in shallow depressions that are underlain by hardpan or volcanic rock. The hardpan or volcanic rock impedes drainage such that, in winter, the depressions fill with water and retain moist soil into late spring. The pools are then dry during the summer and fall until the rains commence the following winter. The soils and moist microhabitat of these pools provide a unique habitat within a general matrix of annual grassland habitat. Plant species of vernal pools differ from those of the surrounding annual grassland habitat, and many animals associated with annual grassland habitat depend on the occurrence of vernal pools to persist in the annual grassland landscape. Common plant species found in vernal pools include popcorn flower (*Plagiobothrys stipitata*), navarretia (*Navarretia leucocephala*), toad rush (*Juncus bufonius*), goldfields (*Lathenia chrysostoma*), yellow carpet (*Blennosperma nanum*), coyote thistle (*Eryngium vaseyi*), tidy tips (*Layia* spp.), water buttercup (*Ranunculus* spp.), and hairgrass (*Deschampsia danthonioides*).

The number and distribution of vernal pools in the Central Valley has been greatly reduced as a result of agricultural practices and conversion to urban land uses. Holland (1978) estimated that 5 to 30 percent of California's vernal pools are intact today, and 5 percent of the Central Valley's vernal pools remain. The reduction in vernal pool habitat has resulted in several plant and animal species being listed under the federal Endangered Species Act. Listed species associated with vernal pools in the SRSCs service area include Bogg's Lake hedge hyssop (*Gratiola heterosepala*), Hoover's spurge (*Chamaesyce hooveri*), hairy orcutt grass (*Orcuttia pilosa*), Greene's tuctoria (*Tuctoria greenei*), vernal pool fairy shrimp (*Branchinecta lynchi*), and vernal pool tadpole shrimp (*Lepidurus packardii*). In addition to the listed species, the California tiger salamander (*Ambystoma californiense*) breeds in vernal pools. The Central California Distinct Population Segment (DPS) of this species is currently proposed for federal threatened listing.

Valley Foothill Riparian Habitat. Valley foothill riparian habitat develops in the floodplains of low-gradient rivers and streams. Riparian habitats form a transitional community between the aquatic, riverine environment and dry upland habitats. Dominant tree species of valley foothill riparian habitat are cottonwood (*Populus fremontii*), California sycamore (*Plantanus racemosa*), and valley oaks (*Quercus lobata*). Typical shrub species include willows (*Salix* sp.), elderberry (*Sambucus* sp.), and wild grape (*Vitis californica*).

The composition of riparian plant communities is shaped by the timing, intensity, and duration of flooding. Willows predominate in areas subject to regular inundation and quickly colonize newly deposited gravel bars or recently scoured areas. Cottonwoods occur farther from the river channel in areas subject to less frequent and intense flooding. Still, the persistence of cottonwoods is linked to the natural seasonal pattern of flows. Cottonwoods evolved to release seeds at the same time that high spring flows deposit nutrient-rich sediment to enhance germination and seedling survival. Thus, the timing and intensity of flows is critical to the persistence of riparian vegetation. Flood-control and water supply projects have resulted in hydrologic alterations that have changed the species composition, structure, and extent of riparian habitats. In addition, most rivers have been channelized and confined by levees, which limits the area available to support riparian habitat. These changes have resulted in the reduction of widespread riparian habitat in the Central Valley.

The structural and compositional diversity, abundant food resources, and availability of water in valley foothill riparian habitat make this habitat particularly valuable to wildlife. Wildlife species diversity is often higher in riparian habitats than in adjacent habitats. Many resident birds, amphibians, reptiles, and mammals breed in riparian habitats, and other species frequent this habitat in winter or during migration (Sanders et al., 1985). Special-status species associated with riparian habitats in the SRSCs service area include the valley elderberry longhorn beetle (*Desmocercus californicus dimorphus*), Swainson's hawk (*Buteo swainsoni*), and western yellow-billed cuckoo (*Coccyzus americanus occidentalis*).

Annual Grassland. Annual grassland is a common habitat type in the SRSCs service area. Historically, grasslands in the Central Valley were dominated by native perennial grasses such as needlegrass. Currently, most grasslands in the area are dominated by introduced annual grasses of Mediterranean origin and a mixture of native and introduced forbs. Introduced annual grasses are the dominant plant species and include wild oats (*Avena* sp.), soft chess (*Bromus hordeaceus*), ripgut brome (*Bromus rigidus*), red brome (*Bromus rubens*), barley (*Hordeum* sp.), and foxtail (*Hordeum murinum*). Annual native forbs also occur in annual grassland habitat and include filaree (*Erodium* sp.), California poppy (*Eschscholtzia californica*), owl's clover (*Gilia* spp.), tarweed (*Holocarpha virgata*) and various lupines (*Lupinus* spp.). Yellow star-thistle (*Centaurea solstitialis*), a noxious weed, has invaded many annual grassland habitats and degraded their quality for wildlife and as livestock pasture. Annual grassland habitat merges with valley oak and blue oak woodlands, occurring where soil moisture is insufficient to support tree growth or is suppressed because of grazing.

Many species of birds, mammals, reptiles, and amphibians use annual grasslands. Raptors, such as ferruginous hawks (*Buteo regalis*), red-tailed hawks (*Buteo jamaicensis*), white-tailed kites (*Elanus leucurus*), American kestrels (*Falco sparverius*), and northern harriers (*Circus cyaneus*) commonly forage in annual grasslands. Short-eared owls (*Asio flammeus*) and burrowing owls (*Athene cunicularia*) forage and breed in this habitat. Horned larks (*Eremophila alpestris*), western meadowlarks (*Sturnella neglecta*), and savannah sparrows (*Passerculus sandwichensis*) are other common bird species. Characteristic reptiles and amphibians include western fence lizards (*Sceloporus occidentalis*), common garter snakes (*Thamnophis sirtalis*), and western rattlesnakes (*Rotalus viridis*). Common mammals include black-tailed jackrabbits (*Lepus californicus*), California ground squirrels (*Spermophilus beecheyi*), California voles (*Microtus californicus*), badgers (*Taxidea taxus*), coyotes (*Canis latrans*), and Botta's pocket gophers (*Thomomys bottae*). A number of special-status species use annual grassland habitat, including white-tailed kite, burrowing owl, and prairie falcon (*Falco mexicanus*).

Valley Oak Woodland. Valley oak woodland can occur throughout much of the Central Valley and into the Sierra Nevada foothills up to an elevation of about 2,000 feet. The overstory canopy of this habitat type is almost exclusively valley oak. California sycamore, black walnut (*Juglans californica*), interior live oak (*Quercus wislizenii*), boxelder (*Acer negundo*) and blue oak occur sporadically. Shrubs such as poison-oak (*Toxicodendron diversilobum*), toyon (*Heteromeles arbutifolia*), and coffeeberry (*Rhamnus californica*) can occur in the understory; although, typically, the understory is composed of annuals such as

wild oats, brome grass (*Bromus* sp.), barley (*Hordeum* sp.), and ryegrass (*Lolium* sp.) (Mayer and Laudenslayer, 1988). Valley oak woodland merges with annual grasslands and often borders agricultural fields. This habitat also occurs adjacent to valley foothill riparian habitats. As distance from the watercourse increases, tree density declines, thus transitioning from a forest-like structure, to savanna-like, to grassland.

Like other habitats containing oaks, valley oak woodland is used by a variety of wildlife species that exploit the acorn food resource. Cavities formed in oaks are also an important habitat feature for cavity-nesting birds and mammals. Common species inhabiting valley oak woodland include California quail (*Callipepla californica*), red-shouldered hawk (*Buteo lineatus*), acorn woodpecker (*Melanerpes formicivorus*), scrub jay (*Aphelocoma californica*), bushtit (*Psaltriparus minimus*), gray squirrel (*Sciurus griseus*), mule deer (*Odocoileus hemionus*), red-tailed hawk, and white-tailed kite. Special-status species associated with oak woodland habitats include oak titmouse (*Baeolophus inornatus*), Lawrence's goldfish (*Carduelis lawrenci*), and Nuttall's woodpecker (*Picoides nuttallii*).

Blue Oak Woodland. Blue oak woodland occurs in foothill regions of the SRSCs service area at elevations of 250 to 3,000 feet (Mayer and Laudenslayer, 1988). Blue oak (*Quercus douglasii*) is the dominant overstory species of this habitat, although at the higher elevations of this habitat's distribution, gray pine (*Pinus sabiniana*) becomes an important overstory species. Where gray pine or other conifers comprise 25 to 49 percent of the overstory and blue oak comprises at least 50 percent of the overstory canopy, the CWHR classifies this habitat as Blue Oak - Foothill Pine Woodland. Both CWHR habitat types (Blue Oak - Foothill Pine Woodland and Blue Oak Woodland) are considered collectively in this document as "blue oak woodland." Typical shrub species in blue oak woodland are poison-oak, coffeeberry, redbud (*Cercis occidentalis*), ceanothus (*Ceanothus* spp.), and manzanita (*Arctostaphylos* spp.) with groundcover consisting of annuals such as brome grass, wild oats, foxtail, and filaree (Mayer and Laudenslayer, 1988).

Blue oak woodlands provide habitat for a diversity of wildlife species, although no species appear to be completely dependent on this habitat type. Verner and Boss (1980) state that 29 species of amphibians and reptiles, 57 species of birds, and 10 species of mammals find optimal breeding habitat conditions in mature stages of blue oak woodlands. Acorns produced by blue oaks are an important food resource for a diversity of bird and mammal species. Typical species inhabiting blue oak woodlands in the SRSCs service area include scrub jays, yellow-billed magpies (*Pica nuttalli*), gray squirrels, and California ground squirrels (*Spermophilus beecheyi*). Special-status species associated with oak woodland habitats include oak titmouse, Lawrence's goldfish, and Nuttall's woodpecker.

Agricultural Habitat. Native habitats in the Sacramento Valley have been largely replaced by agricultural habitats. The following two primary agricultural types are used to characterize agricultural habitat in the SRSCs service area: (1) cropland and (2) orchard.

Cropland. Cropland in the SRSCs service area consists of row and field crops, and grain crops. Row crops in the SRSCs service area are predominantly tomatoes, sugar beets, and melons. Grain crops include rice, wheat, and corn. Rice is the predominant crop in the SRSCs service area.

Agricultural fields have replaced native habitats consisting of grasslands, wetlands, and oak woodlands. However, some wildlife species have adapted to using agricultural fields. Pheasants (*Phasianus colchicus*) and other game birds use tall crops for cover and grain crops for foraging. Waterfowl and sandhill cranes (*Grus canadensis*) also forage on waste grains after harvest. Small mammals such as black-tailed jackrabbit and several species of mice are often abundant in agricultural fields and attract foraging raptors such as red-tailed hawks, Swainson's hawks, northern harriers, and white-tailed kites. Special-status species that often use agricultural fields include Swainson's hawk, white-tailed kites, burrowing owl, and mountain plover (*Charadrius montanus*).

Riceland in the Central Valley provides some of the attributes found in seasonal wetlands and is used by some wetlands-associated species. However, the intensive management of rice reduces its value relative to natural wetlands. Irrigation ditches used to flood rice fields often contain dense cattail vegetation and provide habitat for some wetlands-associated species. Notably, rice fields and the associated water conveyance facilities are important habitat for the state- and federal-listed giant garter snake.

Orchard. Orchard habitat consists of cultivated fruit- or nut-bearing trees. Typically, they are open, tree-dominated habitats consisting of a single tree species. This habitat is planted in a uniform pattern and intensively managed. Understory vegetation is usually sparse; however, in some areas, grasses or forbs are grown between orchard rows to reduce erosion. Walnuts and olives are the primary orchard crops in the SRSCs service area. Wildlife use of orchards is typically limited. Ground squirrels and other small mammals can inhabit understory areas, and birds such as scrub jays may be seasonally attracted to fruit orchards. No special-status species rely on orchards or regularly use this habitat type.

Habitat in the Service Areas of the Sacramento River Settlement

Contractors. All of the habitats described above are found within the SRSCs service area. Blue oak woodland habitat is found primarily within the northern portion of the SRSCs service area, with large blocks located adjacent to urban and agricultural habitats (Figure 3-20). The central portion of the SRSCs service area is largely agricultural, dominated by cropland with a few areas of orchard and vineyard. This portion of the SRSCs service area also contains some large areas of freshwater emergent wetlands at the federal wildlife refuges and smaller areas of valley-foothill riparian and annual grassland habitats (Figure 3-21). The southern portion of the SRSCs service area is almost entirely agricultural, dominated by cropland with a few small areas of orchard and vineyard. A few small patches of annual grassland and valley-foothill riparian habitats also are found in the southern portion of the SRSCs service area (Figure 3-22). Acres of each habitat type within selected SRSC service areas are identified in Table 3-16.

TABLE 3-16

ACRES OF EACH HABITAT TYPE WITHIN SELECTED SRSC SERVICE AREAS

Contractor	Habitat Type								
	AGS	BAR	BOP/BOW	CRP/IRF	FEW	OVN	URB	VOW	VRI
ACID			19,493	3,630			9,539		24
GCID	1,909	198		147,307	19,085	4,347	335		39
MID				5,642	1,196				
MFWC				10,342		323			118
NCMWC				39,765	53		144		
PMWC				2,963					
Pleasant Grove-Verona				7,429					
PCGID				11,803		269			<1
PID				16,205	84				
RD 1004	942			21,805	1,097	47			344
RD 108	189			58,467		163			
City of Redding			21,294	538			16,162	770	
SMWC				51,118					
Tisdale Irrigation and Drainage Co.				2,409					
Notes:									
AGS = Annual Grassland									
BAR = Barren									
BOP/BOW = Blue Oak-Foothill Pine/Blue Oak Woodland									
CRP/IRF = Cropland/Irrigated Row and Field Crops									
FEW = Freshwater Emergent Wetland									
OVN = Orchard and Vineyard									
URB = Urban									
VOW = Valley Oak Woodland									
VRI = Valley-Foothill Riparian									

Special-status Wildlife Species. Many special-status wildlife species potentially use habitats in the SRSCs service area. The Service provided a list of species that are federally listed or are considered species of concern with the potential to occur in the SRSCs service area. This list was reviewed to identify species that use one or more habitats in the SRSCs service area. Species associated with habitats that do not occur in the service areas of the SRSC and CDMWC would not be affected by the Preferred Alternative and alternatives and were not further considered. In addition to the federal-listed species and species of concern, state-listed species and California Species of Special Concern with the potential to occur in the SRSCs service area were identified. Table 3-17 lists the special-status wildlife species with the potential to occur in the SRSCs service area, each species' state and federal status, and the general habitat types used by each species. The biological effects of project alternatives on federally designated critical habitat for wildlife and plants are very minor because there are no major changes anticipated in on-farm practices or cropping pattern. Simply put, the modest changes to system operations were not deemed to result in significant

changes to aquatic habitat; therefore, potential effects on endangered species were also deemed minimal.

TABLE 3-17

SPECIAL-STATUS WILDLIFE SPECIES WITH THE POTENTIAL TO OCCUR IN THE SRSC SERVICE AREAS

Species	Status	General Habitat Association
LISTED AND PROPOSED SPECIES		
BIRDS		
bald eagle <i>Haliaeetus leucocephalus</i>	Federal – T State – E; FP	Open-water habitats, lakes, rivers, and marshes
bank swallow <i>Riparia riparia</i>	Federal – none State – T	Riparian areas, nest in friable soils of vertical streambanks
greater sandhill crane <i>Grus canadensis tabida</i>	Federal – none State – T	Freshwater wetlands and irrigated fields
little willow flycatcher <i>Empidonax traillii brewsteri</i>	Federal – none State – E	Montane riparian areas and wet meadows, in dense willows
mountain plover <i>Charadrius montanus</i>	Federal – PT State – CSC	Agricultural fields
Peregrine falcon <i>Falco peregrinus anatum</i>	Federal – D State – E	Wetlands, lakes, rivers, grasslands, and agricultural fields
Swainson's hawk <i>Bufo swainsoni</i>	Federal – none State – T	Mature riparian forests, oak groves, agricultural fields, and grasslands
western yellow-billed cuckoo <i>Coccyzus americanus occidentalis</i>	Federal – C State – E	Riparian forests with abundant canopy cover of willow and cottonwood
REPTILES		
giant garter snake <i>Thamnophis gigas</i>	Federal – T State – T	Wetlands, sloughs, irrigation ditches, rice fields
AMPHIBIANS		
California red-legged frog <i>Rana aurora draytonii</i>	Federal – T State – CSC	Streams, ponds, marshes, and stock ponds
INVERTEBRATES		
conservancy fairy shrimp <i>Branchinecta conservatio</i>	Federal – E State – none	Vernal pools
valley elderberry longhorn beetle <i>Desmocercus californicus dimorphus</i>	Federal – T State – none	Elderberry shrubs in riparian areas, savannas, and woodlands
vernal pool fairy shrimp <i>Branchinecta lynchi</i>	Federal – T State – none	Vernal pools
vernal pool tadpole shrimp <i>Lepidurus packardii</i>	Federal – E State – none	Vernal pools
OTHER SPECIAL-STATUS SPECIES		
BIRDS		
Aleutian Canada goose <i>Branta canadensis leucopareia</i>	Federal – D State – none	Freshwater wetlands and agricultural fields
black swift	Federal – SC	Coastal bluffs and mountain canyons

TABLE 3-17

**SPECIAL-STATUS WILDLIFE SPECIES WITH THE POTENTIAL TO OCCUR IN THE
SRSC SERVICE AREAS**

Species	Status	General Habitat Association
<i>Cypseloides niger</i>	State – CSC	
California horned lark <i>Eremophila alpestris actia</i>	Federal – none State – CSC	Grasslands and open woodlands
California thrasher <i>Toxostoma redivivum</i>	Federal – SC State – none	Chaparral, riparian forest, and scrub
Cooper's hawk <i>Accipiter cooperii</i>	Federal – none State – CSC	Woodlands, riparian forests, and agricultural fields
ferruginous hawk <i>Buteo regalis</i>	Federal – SC State – CSC	Grasslands and agricultural fields
golden eagle <i>Aquila chrysaetos</i>	Federal – none State – CSC; FP	Grasslands, open woodlands, chaparral, wetlands, and agricultural areas
Lawrence's goldfinch <i>Carduelis lawrencei</i>	Federal – SC State – none	Oak woodlands
Lewis' woodpecker <i>Melanerpes lewis</i>	Federal – SC State – none	Open woodlands, savannas, and riparian areas
loggerhead shrike <i>Lanius ludovicianus</i>	Federal – SC State – CSC	Grasslands, savannas, and chaparral
long-billed curlew <i>Numenius americanus</i>	Federal – SC State – CSC	Wetlands and irrigated agricultural fields
northern harrier <i>Circus cyaneus</i>	Federal – none State – CSC	Marshes, grasslands, and agricultural fields
Nuttall's woodpecker <i>Picoides nuttallii</i>	Federal – SLC State – none	Riparian forest and oak woodland
oak titmouse <i>Baeolophus inornatus</i>	Federal – SLC State – none	Riparian forest and oak woodland
osprey <i>Pandion haliaetus</i>	Federal – none State – CSC	Open water habitats, lakes, and rivers
prairie falcon <i>Falco mexicanus</i>	Federal – none State – CSC	Grasslands, agricultural fields, river embankment, and open savannas
purple martin <i>Progne subis</i>	Federal – none State – CSC	Grasslands, wet meadows, wetlands, woodlands, and riparian areas
rufus hummingbird <i>Selasphorus rufus</i>	Federal – SC State – none	Riparian areas, open woodlands, chaparral, orchards, and gardens
sharp-shinned hawk <i>Accipiter striatus</i>	Federal – none State – CSC	Woodlands, riparian forests, and shrub thickets
short-eared owl <i>Asio flammeus</i>	Federal – none State – CSC	Annual grasslands and wetlands
tri-colored blackbird <i>Agelaius tricolor</i>	Federal – SC State – CSC	Wetlands in dense emergent vegetation
Vaux's swift <i>Chaetura vauxi</i>	Federal – SC State – CSC	Mixed oak and conifer woodlands, forage over grasslands, lakes, and streams
western burrowing owl <i>Athene cunicularia hypougea</i>	Federal – SC State – CSC	Grasslands, pastures, agricultural fields, road embankments, and near open urban areas

TABLE 3-17

**SPECIAL-STATUS WILDLIFE SPECIES WITH THE POTENTIAL TO OCCUR IN THE
SRSC SERVICE AREAS**

Species	Status	General Habitat Association
white-faced Ibis <i>Plegadis chihi</i>	Federal – SC State – CSC	Freshwater wetlands and irrigated fields
white-tailed kite <i>Elanus leucurus</i>	Federal – SC State – FP	Grasslands, oak savannas, and woodlands, and open riparian areas and agricultural fields
yellow-breasted chat <i>Icteria virens</i>	Federal – none State – CSC	Riparian areas
yellow warbler <i>Dendroica petechia</i>	Federal – none State – CSC	Riparian areas
REPTILES		
California horned lizard <i>Phrynosoma coronatum frontale</i>	Federal – SC State – CSC	Grasslands, chaparral, and riparian areas
San Joaquin coachwhip <i>Masticophis flagellum ruddocki</i>	Federal – SC State – CSC	Grasslands, chaparral habitat
western pond turtle <i>Emys (Clemmys) marmorata</i>	Federal – SC State – CSC	Wetlands, ponds, irrigation ditches, rivers, and streams
AMPHIBIANS		
California tiger salamander <i>Ambystoma californiense</i> Central California DPS ^a	Federal – PT State – CSC	Vernal pools and associated grasslands
foothill yellow-legged frog <i>Rana boylei</i>	Federal – SC State – CSC	Large streams with open gravel bars and rocks
western spadefoot toad <i>Spea (Scaphiopus) hammondi</i>	Federal – SC State – CSC	Quiet streams and pools in grasslands and woodlands
INVERTEBRATES		
Antioch Dunes anthicid beetle <i>Anthicus antiochensis</i>	Federal – SC State – none	Sandbars and sandy riparian areas
California linderiella fairy shrimp <i>Linderiella occidentalis</i>	Federal – SC State – none	Vernal pools
midvalley fairy shrimp <i>Branchinecta mesovallensis</i>	Federal – SC State – none	Vernal pools
Sacramento anthicid beetle <i>Anthicus sacramento</i>	Federal – SC State – none	Sandbars and sandy riparian areas
Sacramento Valley tiger beetle <i>Cicindela hirticollis abrupta</i>	Federal – SC State – none	Sandy soils along rivers, streams, and lakes
MAMMALS		
fringed myotis <i>Myotis thysanodes</i>	Federal – SC State – none	Foothill woodlands and mixed conifer-hardwood forests
greater western mastiff bat <i>Eumops perotis californicus</i>	Federal – SC State – CSC	Grasslands, chaparral, woodlands and conifer forests
long-eared myotis <i>Myotis evotis</i>	Federal – SC State – none	Chaparral, woodlands, and conifer forests
long-legged myotis <i>Myotis volans</i>	Federal – SC State – none	Chaparral, woodlands, and conifer forests

TABLE 3-17

SPECIAL-STATUS WILDLIFE SPECIES WITH THE POTENTIAL TO OCCUR IN THE SRSC SERVICE AREAS

Species	Status	General Habitat Association
Marysville Heerman's kangaroo rat <i>Dipodomys californicus eximus</i>	Federal – SC State – CSC	Grasslands
pale big-eared bat <i>Corynorhinus townsendii pallescens</i>	Federal – SC State – CSC	Grasslands, chaparral, woodlands, and conifer forests
San Joaquin pocket mouse <i>Perognathus inornatus inornatus</i>	Federal – SC State – none	Grasslands and oak savannas
small-footed myotis <i>Myotis ciliolabrum</i>	Federal – SC State – none	Open forests, woodlands, and chaparral
spotted bat <i>Euderma maculatum</i>	Federal – SC State – CSC	Grasslands and mixed conifer forests
Townsend's western big-eared bat <i>Corynorhinus townsendii townsendii</i>	Federal – SC State – CSC	Grasslands, chaparral, woodlands, and conifer forests
Yuma myotis <i>Myotis yumanensis</i>	Federal – SC State – none	Open forests and woodlands, and open waters
^a DPS = Distinct Population Segment Notes: Federal: E = Endangered T = Threatened PT = Proposed Threatened SC = Species of Concern SLC = Species of Concern D = Delisted C = Candidate for Federal Listing State: E = Endangered T = Threatened CSC = California Species of Concern FP = California Fully Protected		

Special-status Plant Species. Many special-status plant species have the potential to occur in the SRSCs service area. The Service provided a list of species that are federally listed or are considered species of concern with the potential to occur in the SRSCs service area. This list was reviewed to identify species that occur in one or more habitats in the SRSCs service area. Species associated with habitats or environmental conditions that do not occur in the service areas of the SRSC and CDMWC would not be affected by the Preferred Alternative and alternatives and were not further considered. In addition to the federal-listed species and species of concern, state-listed species with the potential to occur in the SRSCs service area were identified. Table 3-18 lists the special-status plant species with the potential to occur in the SRSCs service area, each species' state and federal status, and the general habitats and conditions each species prefers.

TABLE 3-18

**SPECIAL-STATUS PLANTS WITH THE POTENTIAL TO OCCUR IN THE SRSC
SERVICE AREAS**

Species	Status	General Habitat Associations
LISTED AND PROPOSED SPECIES		
Bogg's Lake hedge hyssop <i>Gratiola heterosepala</i>	Federal – none State – E CNPS – 1B	Vernal pools
Butte County meadowfoam <i>Limnathes floccosa</i> ssp. <i>californica</i>	Federal – E State – E CNPS – 1B	Vernal pools
Greene's tuctoria <i>Tuctoria greenei</i>	Federal – E State – R CNPS – 1B	Vernal pools
hairy Orcutt grass <i>Orcuttia pilosa</i>	Federal – E State – E CNPS – 1B	Vernal pools
Indian Valley brodiaea <i>Brodiaea coronaria</i> ssp. <i>rosea</i>	Federal – none State – E CNPS – 1B	Chaparral, woodlands, and conifer forests/serpentine
palmate bracted bird's-beak <i>Cordylanthus palmatus</i>	Federal – E State – E CNPS – 1B	Grassland and scrub habitats
slender Orcutt grass <i>Orcuttia tenuis</i>	Federal – T State – E CNPS – 1B	Vernal pools
OTHER SPECIAL-STATUS SPECIES		
Stony Creek spurge <i>Chamaesyce ocellata</i> ssp. <i>rattanii</i>	Federal – SLC State – none CNPS – 1B	Chaparral and grassland
silky cryptantha <i>Cryptantha crinita</i>	Federal – SC State – none CNPS – 1B	Riparian areas and gravelly streambeds
Henderson's bent grass <i>Agrostis hendersonii</i>	Federal – SC State – none CNPS – 3	Vernal pools and grasslands
woolly meadowfoam <i>Limnanthes floccosa</i> ssp. <i>floccosa</i>	Federal – none State – none CNPS – 4	Vernal pools and wet meadows
Red Bluff dwarf rush <i>Juncus leiospermus</i> var. <i>leiospermus</i>	Federal – SC State – none CNPS – 1B	Vernal pools and wet meadows, riparian areas, chaparral, and woodlands
Colusa layia <i>Layia septentrionalis</i>	Federal – SLC State – none CNPS – 1B	Serpentine soils in chaparral, woodlands, and grasslands
adobe lily <i>Fritillaria pluriflora</i>	Federal – SC State – none CNPS – 1B	Grasslands, chaparral, and woodlands
Hoover's spurge <i>Chamaesyce hooveri</i>	Federal – T State – none CNPS – 1B	Vernal pools

TABLE 3-18

SPECIAL-STATUS PLANTS WITH THE POTENTIAL TO OCCUR IN THE SRSC SERVICE AREAS

Species	Status	General Habitat Associations
legenere <i>Legenere limosa</i>	Federal – SC State – none CNPS – 1B	Vernal pools
red-flowered lotus <i>Lotus rubriflorus</i>	Federal – SC State – none CNPS – 1B	Woodlands and grasslands
Ahart's paronychia <i>Paronychia ahartii</i>	Federal – SC State – none CNPS – 1B	Woodlands, grasslands, and vernal pools
Heckard's pepper-grass <i>Lepidium latipes</i> var. <i>heckardii</i>	Federal – SLC State – none CNPS – 1B	Grasslands
San Joaquin spearscale <i>Atriplex joaquiniana</i>	Federal – SC State – none CNPS – 1B	Scrub habitat, grasslands, and meadows
brittlescale <i>Atriplex depressa</i>	Federal – SC State – none CNPS – 1B	Vernal pools, grasslands, and scrub habitat
lesser saltscale <i>Atriplex minuscula</i>	Federal – SC State – none CNPS – 1B	Alkaline sandy soils in scrub and grassland habitats
heartscale <i>Atriplex cordulata</i>	Federal – SC State – none CNPS – 1B	Alkaline sandy soils in scrub and grassland habitats
subtle orache <i>Atriplex subtilis</i>	Federal – SLC State – none CNPS – 1B	Grasslands
vernal pool saltbush <i>Atriplex persistens</i>	Federal – SC State – none CNPS – 1B	Vernal pools
alkali milk-vetch <i>Astragalus tener</i> var. <i>tener</i>	Federal – SC State – none CNPS – 1B	Vernal pools and grasslands
Ferris' milkvetch <i>Astragalus tener</i> var. <i>ferrisiae</i>	Federal – SC State – none CNPS – 1B	Grasslands
pink creamsacs <i>Castilleja rubicundula</i> ssp. <i>rubicundula</i>	Federal – SLC State – none CNPS – 1B	Serpentine soils in chaparral, grassland, and woodland habitats
little mousetail <i>Myosurus minimus</i> ssp. <i>apus</i>	Federal – SC State – none CNPS – 3	Grasslands and vernal pools
valley sagittaria <i>Sagittaria sanfordii</i>	Federal – SC State – none CNPS – 1B	Wetlands
Baker's navarretia <i>Navarretia leucocephala</i> ssp. <i>bakeri</i>	Federal – SC State – none	Woodlands, open conifer forests, grasslands, and vernal pools

TABLE 3-18

SPECIAL-STATUS PLANTS WITH THE POTENTIAL TO OCCUR IN THE SRSC SERVICE AREAS

Species	Status	General Habitat Associations
CNPS – 1B		
<p>Notes:</p> <p>CNPS = California Native Plant Society Federal: E = Endangered T = Threatened SC = Species of Concern (Former Category 2 Candidates) SLC = Species of Local Concern State: E = Endangered T = Threatened R = Rare CNPS: 1B = Rare or Endangered in California and elsewhere 2 = Rare or Endangered in California, more common elsewhere 3 = Additional information needed to determine status 4 = Plants of Limited distribution</p>		

Environmental Consequences. The effects of Alternatives 1 through 5 on terrestrial biological resources of the SRSCs service area are compared to conditions under the No Action Alternative.

No Action Alternative. The No Action Alternative involves renewal of delivery contracts to SRSCs and the CDMWC with no changes in contract provisions, including total contract amounts, relative to those included in the original Settlement Agreements.

Alternative 1. Alternative 1 would not significantly affect terrestrial biological resources of the SRSCs service area, when compared to the No Action Alternative.

The total volume of delivered water (Base Supply and Project Water) would decrease from 2,316 to 2,227 KAFY (4 percent reduction total). Such a reduction would be realized with reductions in contract totals to ACID and SMWC. It is assumed that use of the contracted CVP water by the SRSC would continue to be managed in the same manner under Alternative 1 as under the No Action Alternative.

Reductions in water use by ACID and SMWC could negatively impact terrestrial resources associated with drain and canal habitat, and with agricultural crops. Such impacts assume substantial changes in the nature and character of these habitats with less water delivered. Water needs analyses conducted by Reclamation, however, showed that both ACID and SMWC have not "...diverted the increments of water [they are entitled to] in recent years." (CH2M HILL, 2003). In fact, historical diverted volumes are similar to those volumes proposed after contract reductions (CH2M HILL, 2003, Appendix D). If implemented, reductions in contract volumes to these contractors would not pose adverse effects to terrestrial resources of the service area because in-district operations would be essentially the same as under current conditions.

Alternative 2. Terrestrial biological resources in the SRSCs service area under Alternative 2 would be identical to conditions under the No Action Alternative during years with full contract delivery. During drought conditions, when contract cutbacks would occur, less water would be diverted from the Sacramento River than under No Action, although total irrigated crop acreage would remain unchanged; therefore, on-farm habitat and in-drain habitat would be effectively the same as under No Action. Terrestrial habitat may be incrementally reduced between diversion points and on-farm application, but this reduction would be *de-minimis*, because canals would be operated with the same water surface elevations as No Action. Therefore, even if the volume of diversion were less, the amount of habitat in canals would be the same because the canals would still convey water to the fields throughout the normal irrigation season. Additional water available for re-allocation during the additional drought years could be available for habitat improvements, at refuges or other locations, thus providing a potential benefit. However, any re-allocation would be evaluated on a case-by-case basis during yearly operational planning activities.

There are no adverse impacts associated with this alternative, although benefits are feasible if water is re-allocated for terrestrial habitat.

Seasonal Groundwater Drawdown. As discussed in Groundwater section, increased pumping could occur during dry years within the Sacramento Valley Groundwater Basin. Increased pumping activities would occur in association with cutbacks and could result in temporary drawdown of groundwater levels, which could ultimately result in a reduction in local streamflow, affecting associated riparian vegetation.

The Sacramento River Riparian Vegetation GIS showed a total of 9,064 acres of vegetation along the Sacramento River in the project area. Of this acreage, 4,980 acres are Great Valley cottonwood riparian forest, Great Valley mixed riparian forest, and Great Valley riparian scrub. If pumping were to increase as a result of this alternative, it is likely that most of the riparian vegetation would experience minor reductions in groundwater elevations, but not enough to negatively affect acreage. An estimated 4,741 acres of riparian vegetation would experience a reduction in groundwater elevations at the end of the pumping season, again, not enough to affect acreage. The small change in extent of altered groundwater levels is not likely to cause an adverse impact to riparian vegetation.

Alternative 3. Terrestrial biological resources in the SRSCs service area under Alternative 3 would be identical to conditions under the No Action Alternative. Alternative 3 would not alter current CVP operations, water storage or release patterns from CVP facilities, or the maximum volume of water delivered to the SRSC.

It is assumed that use of the assigned CVP water by the SRSC would continue to be managed in the same manner under Alternative 3 as under the No Action Alternative.

There are no adverse impacts associated with this alternative.

Alternative 4. Terrestrial biological resources in the SRSCs service area under Alternative 4 would be identical to conditions under the No Action Alternative during years with full contract delivery. During drought conditions, when contract cutbacks would occur, less water would be diverted from the Sacramento River than under No Action, although total irrigated crop acreage would remain unchanged; therefore, on-farm habitat and in-drain

habitat would be effectively the same as under No Action. Terrestrial habitat might be incrementally reduced between diversion points and on-farm application, but this reduction would be *de-minimis*, because canals would be operated with the same water surface elevations as No Action. Therefore, even if the volume of diversion were less, the amount of habitat in canals would be the same because the canals would still convey water to the fields throughout the normal irrigation season. Additional water available for re-allocation during the additional drought years could be available for habitat improvements, at refuges or other locations, thus providing a potential benefit. However, any theoretical re-allocation would be evaluated on a case-by-case basis during yearly operational planning activities.

There are no adverse impacts associated with this alternative, although benefits are feasible if water is re-allocated for terrestrial habitat.

Seasonal Groundwater Drawdown. As discussed in the Groundwater section, increased pumping could occur during dry years within the Sacramento Valley Groundwater Basin. Increased pumping activities associated with these cutbacks would result in temporary drawdown of groundwater levels, which would ultimately result in a reduction in local streamflow, affecting associated riparian vegetation.

The Sacramento River Riparian Vegetation GIS showed a total of 9,064 acres of vegetation along the Sacramento River in the project area. Of this acreage, 4,980 acres are Great Valley cottonwood riparian forest, Great Valley mixed riparian forest, and Great Valley riparian scrub. If pumping were to increase as a result of this alternative, it is likely that most of the riparian vegetation would experience minor reductions in groundwater elevations. An estimated 4,741 acres of riparian vegetation would experience a reduction in groundwater elevations at the end of the pumping season. In neither case would the additional pumping affect habitat acreage. The small change in groundwater levels is not likely to cause an adverse impact to riparian vegetation.

Alternative 5. Terrestrial biological resources in the SRSCs service area under Alternative 5 would be identical to conditions under the No Action Alternative during years with full contract delivery. During drought conditions, when contract cutbacks would occur, less water would be diverted from the Sacramento River than under No Action, although total irrigated crop acreage would remain unchanged; therefore, on-farm habitat and in-drain habitat would be effectively the same as under No Action. Terrestrial habitat may be incrementally reduced between diversion points and on-farm application, but this reduction would be *de-minimis*, because canals would be operated with the same water surface elevations as No Action. Therefore, even if the volume of diversion were less, the amount of habitat in canals would be the same because the canals would still convey water to the fields throughout the normal irrigation season. Additional water available for re-allocation during the additional drought years could be available for habitat improvements, at refuges or other locations, thus providing a potential benefit. However, any theoretical re-allocation would be evaluated on a case-by-case basis during yearly operational planning activities.

There are no adverse impacts associated with this alternative, although benefits are feasible if water is re-allocated for terrestrial habitat.

Seasonal Groundwater Drawdown. As discussed in the Groundwater section, increased pumping within the Sacramento Valley Groundwater Basin could occur during dry

years within the Sacramento Valley Groundwater Basin. Increased pumping activities associated with these cutbacks would result in temporary drawdown of groundwater levels, which would ultimately result in a reduction in local streamflow, affecting associated riparian vegetation.

The Sacramento River Riparian Vegetation GIS showed a total of 9,064 acres of vegetation along the Sacramento River in the project area. Of this acreage, 4,980 acres are Great Valley cottonwood riparian forest, Great Valley mixed riparian forest, and Great Valley riparian scrub. If pumping were to increase as a result of this alternative, it is likely that most of the riparian vegetation would experience minor reductions in groundwater elevations. An estimated 4,741 acres of riparian vegetation would experience a reduction in groundwater elevations at the end of the pumping season. In neither case would pumping affect habitat. The small change in groundwater levels is not likely to cause an adverse impact to riparian vegetation.

Aquatic Biological Resources

Affected Environment.

This section describes the various types and characteristics of aquatic habitats in the SRSCs service area, the fish species inhabiting the SRSCs service area, and the distribution and habitat requirements of special-status fish species that occur in the SRSCs service area.

Aquatic Habitats. Aquatic habitats in the SRSCs service area fall into two broad types: riverine and lacustrine.

Riverine Habitat. Riverine habitat is aquatic habitat characterized by moving water. The nature and characteristics of riverine habitat can vary considerably. Depending on the size of the drainage basin and topography, riverine habitats can range from large, slow-moving water to small, fast-moving streams found in higher elevation drainages.

Historically, in the Central Valley, smaller creeks and rivers typically were dry in the late summer. Only the largest rivers were consistently perennial. With construction of reservoirs on most of the larger streams and rivers in the Central Valley, flows have been regulated, resulting in more consistent availability of aquatic habitat within and among years. Aquatic and emergent vegetation is typically sparse in riverine habitats and limited to the margins and backwaters of the river in areas of shallow, slow-moving water.

In the SRSCs service area, riverine habitat occurs as large, perennial rivers; small, perennial streams; and small, intermittent streams. The Sacramento River is the dominant riverine habitat in the SRSCs service area. Other perennial rivers and streams in or near the SRSCs service area include Clear, Cottonwood, Cow, Butte, Battle, and Bear Creeks, and the Feather River. Intermittent streams include Stony and Thomes, among others. These intermittent and perennial streams are tributaries to the Sacramento River.

In addition to the natural watercourses, the SRSCs service area contains an extensive network of canals and ditches. These canals and ditches were created and are maintained to convey water to agricultural users and to collect and carry drainwater from the agricultural fields after application. Canals and drains provide aquatic habitat of widely varying characteristics within and among years. Depending on the frequency and intensity of maintenance activities

and the consistency of water availability, some canals and drains can support emergent vegetation or bank vegetation. Water depth, velocity, and water quality also vary dramatically depending on the channel's size and use.

Lacustrine Habitat. Lacustrine habitats are inland depressions containing standing water. They vary in size and characteristics and include natural lakes, reservoirs, dammed river channels, and ponds. This aquatic habitat type can be associated with rivers and freshwater emergent wetlands. Shallow, temporary habitats may support rooted plants, whereas deep permanent waterbodies are primarily open water. Permanent open waters can support emergent and aquatic plants in shallow areas along the margins of the waterbody.

Lacustrine habitat is uncommon in the SRSCs service area. Lacustrine habitat has been created behind diversion dams on the Sacramento River and behind several dams on tributaries to the Sacramento River. The large CVP and State Water Project reservoirs also provide lacustrine habitat, but these features occur outside of the SRSCs service area.

Essential Fish Habitat. The Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) mandates federal action agencies that fund, permit, or carry out activities that may adversely impact the Essential Fish Habitat (EFH) of federally managed fish species to consult with National Oceanic and Atmospheric Association-Fisheries (NOAA-Fisheries) regarding the potential adverse effects of their actions on EFH (Section 305 (b)(2)). Section 600.920(a)(1) of the EFH regulations states that consultations are required of federal action agencies for renewals, reviews, or substantial revisions of actions if the renewal, review, or revision may adversely affect EFH. The EFH regulations require that federal action agencies obligated to consult on EFH provide NOAA-Fisheries with a written assessment of the effects of their action on EFH (50 CFR 600.920). The statute also requires federal action agencies receiving EFH Conservation Recommendations from NOAA-Fisheries to provide a detailed written response to NOAA-Fisheries within 30 days upon receipt detailing how they intend to avoid, mitigate, or offset the impact of the activity on EFH (Section 305(b)(4)(B)). NOAA-Fisheries may also include recommendations for other species.

EFH is the aquatic habitat (water and substrate) necessary to fish for spawning, breeding, feeding, or growth to maturity that would allow a level of production needed to support a long-term, sustainable commercial fishery and contribute to a healthy ecosystem. "Waters" include aquatic areas and their associated physical, chemical, and biological properties that are used by fish, and can include areas historically used by fish in addition to areas currently used. "Substrate" includes sediment, hard bottom, structures underlying the waters, and associated biological communities. "Necessary" means habitat required to support a sustainable fishery and a healthy ecosystem; and "spawning, breeding, feeding, or growth to maturity" covers a species' full life cycle.

Because of their commercial value, consultation is required with NOAA-Fisheries on all runs of Chinook salmon, including the following:

- Sacramento River winter-run Chinook salmon
- Central Valley spring-run Chinook salmon
- Central Valley fall-/late-fall-run Chinook salmon

Effects of the project on EFH are incorporated into the analysis for the listed and candidate species. A separate analysis to address potential effects on EFH was unnecessary.

Fish Resources. Fish resources of the SRSCs service area include native and non-native anadromous and resident species. Several native anadromous and resident species have been listed as threatened or endangered under the federal Endangered Species Act (ESA) or the California Endangered Species Act (CESA) or are candidates for listing.

Listed and Candidate Species. Five fish species or Evolutionarily Significant Units (ESU) listed under the ESA have the potential to occur in watercourses in the SRSCs service area (see Table 3-19). In addition to these listed species, two species that are candidates for federal listing have the potential to occur in the SRSCs service area (Table 3-19).

Central Valley Winter-run Chinook Salmon. Chinook salmon are anadromous, spawning in freshwater rivers and streams but spending most their life in the ocean. Adult winter-run Chinook salmon generally spend 1 to 3 years in the ocean before returning to their natal streams to spawn. Upstream migrants appear during December on the upper Sacramento River (Vogel and Marine, 1991). Because there are no fish passage facilities at Keswick Dam, the adults tend to migrate to and hold in deep pools between Red Bluff Diversion Dam (RBDD) and Keswick Dam before initiating spawning activities. The primary spawning grounds in the Sacramento River are above the RBDD.

TABLE 3-19

LISTED AND CANDIDATE FISH SPECIES POTENTIALLY OCCURRING IN THE SRSC SERVICE AREAS

Species	Status
Central Valley winter-run Chinook salmon <i>Onchorhynchus tshawytscha</i>	Federal – E State – E
Central Valley spring-run Chinook salmon <i>Onchorhynchus tshawytscha</i>	Federal – T State – T
Central Valley fall-/late-fall-run Chinook salmon <i>Onchorhynchus tshawytscha</i>	Federal – C State – CSC
Central Valley steelhead <i>Onchorhynchus mykiss</i>	Federal – T State – none
delta smelt <i>Hypomesus transpacificus</i>	Federal – T State – T
green sturgeon <i>Acipenser medirostris</i>	Federal – C State – CSC
Sacramento splittail <i>Pogonichthys macrolepidotus</i>	Federal – SC State – CSC
Notes: E – Listed as endangered under the federal or state Endangered Species Acts T – Listed as threatened under the federal or state Endangered Species Acts C – Candidate for listing as threatened or endangered under the federal or state Endangered Species Acts CSC – California Species of Special Concern	

Winter-run Chinook salmon lay their eggs in late summer in the gravel of the stream bottom where the eggs incubate for an extended time. Depending on water temperature, they generally hatch within 40 to 60 days of fertilization. After hatching, fry remain in the gravel for another 2 to 4 weeks before emerging. After emergence, Chinook salmon fry seek out shallow, nearshore areas with slow currents and good cover. Rearing Chinook salmon feed on a variety of aquatic and terrestrial insects and other small invertebrates, and newly emerged fry are sometimes prey to older steelhead. As they grow, juvenile Chinook salmon move to deeper, swifter water, but continue to use available cover to minimize the risk of being prey and to reduce energy expenditure. The emigration of juvenile winter-run Chinook salmon from the upper Sacramento River is highly dependent on streamflow conditions and water-year type. Storm events may cause pulses of mass emigration.

Prior to construction of Shasta and Keswick Dams, winter-run Chinook salmon spawned in the upper reaches of the Little Sacramento, McCloud, and lower Pit Rivers (Moyle et al., 1995). Shasta Dam, completed in the 1940s, blocked access to historical winter-run spawning grounds in the McCloud River and other areas upstream. However, cold-water releases from Shasta and Keswick Dams created more favorable spawning and rearing conditions in the mainstem Sacramento River than existed there prior to dam construction (Slater, 1963). Since the construction of Keswick Dam, all spawning of winter-run Chinook salmon has occurred downstream of Keswick Dam.

Critical habitat for Central Valley winter-run Chinook salmon was designated on March 22, 1999. Critical habitat includes the following:

- (1) Sacramento River from Keswick Dam in Shasta County (River Mile [RM] 302) to Chipps Island (RM 0) at the westward margin of the Sacramento-San Joaquin Delta
- (2) All waters from Chipps Island westward to Carquinez Bridge including Honker Bay, Suisun Bay, and Carquinez Strait
- (3) All waters of San Pablo Bay westward of the Carquinez Bridge
- (4) All waters of San Francisco Bay (north of the San Francisco/Oakland Bay Bridge) from San Pablo Bay to the Golden Gate Bridge

Central Valley Spring-run Chinook Salmon. Central Valley spring-run Chinook salmon include all naturally spawned spring-run populations from the Sacramento-San Joaquin River mainstem and its tributaries (50 CFR Part 17). Spring-run Chinook salmon are distinguished from the other runs of Central Valley Chinook salmon in the timing of life history events. Spring-run Chinook salmon adults leave the ocean and enter the Sacramento River from March to July (Myers et al., 1998). They move into tributaries where they over-summer in deep, cool pools. They prefer to hold in deep pools with moderate velocities and bedrock substrates.

Gravel beds at the tails of holding pools are used for spawning (Service, 1995). Chinook salmon lay their eggs in the gravel of the stream bottom where the eggs incubate for an extended time, depending on water temperature. The length of time required for eggs to develop and hatch is quite variable, but hatching generally occurs within 40 to 60 days of fertilization (Vogel and Marine, 1991). After hatching, fry remain in the gravel for another

2 to 4 weeks before emerging. Timing of emergence is variable among drainages and is strongly influenced by temperature.

After emergence, Chinook salmon fry seek out shallow, nearshore areas with slow currents and good cover. Rearing Chinook salmon feed on a variety of aquatic and terrestrial insects and other small invertebrates, and newly emerged fry are sometimes prey to older steelhead. As they grow to around 75 millimeters long, juvenile Chinook salmon move to deeper, swifter water, but continue to use available cover to minimize the risk of being preyed upon. Suitable rearing habitat for spring-run Chinook salmon includes areas with in-stream and overhead cover in the form of undercut banks, downed trees, and large, overhanging tree branches. In the Sacramento River, juveniles may begin migrating downstream almost immediately following emergence or may remain in riverine and/or estuarine habitats including their natal tributaries, the Sacramento River, non-natal tributaries, and the Delta for a year or more.

Historically, spring-run Chinook salmon were found throughout the Central Valley, with substantial populations in the upper and middle reaches of the San Joaquin, American, Yuba, Feather, Sacramento, McCloud, and Pit Rivers. Naturally spawning populations of spring-run Chinook salmon in the Central Valley are currently restricted to accessible reaches in the upper Sacramento, Feather, and Yuba Rivers, and Antelope, Battle, Butte, Clear, Deer, and Mill Creeks, and other creeks (CDFG, 1998b). Current surveys indicate that spring-run Chinook in Cottonwood, Battle, Antelope, and Big Chico Creeks are remnant, nonsustaining populations (DWR, 1997).

Critical habitat for spring-run Chinook salmon was designated on February 16, 2000. Critical habitat for Central Valley spring-run Chinook salmon is designated to include all river reaches accessible to listed Chinook salmon in the Sacramento River and its tributaries in California (e.g., Butte and Beegum Creeks). Also included are adjacent riparian zones, as well as river reaches and estuarine areas of the Sacramento-San Joaquin Delta; all waters from Chipps Island westward to Carquinez Bridge including Honker Bay, Grizzly Bay, Suisun Bay, and Carquinez Strait; all waters of San Pablo Bay westward of the Carquinez Bridge; and all waters of San Francisco Bay (north of the San Francisco/Oakland Bay Bridge) from San Pablo Bay to the Golden Gate Bridge.

Central Valley Steelhead. The life history of steelhead differs from that of Pacific salmon in several ways. First, steelhead do not necessarily die after spawning; a small portion survive to become repeat spawners. Secondly, juvenile steelhead have a longer freshwater rearing requirement (usually from 1 to 3 years). Thirdly, both adults and juveniles show more variability in the length of time they spend in fresh and salt water. Some individuals may remain in a stream, mature, and even spawn without ever going to sea; others migrate to the ocean at less than 1 year in age; and some may return to freshwater after spending less than 1 year in the ocean. Central Valley stocks generally return to spawn after 1 to 2 years (Barnhart, 1986; Busby et al., 1996).

Adult steelhead migrate through the mainstem Sacramento from July through March, with peaks in September and February (Bailey, 1954; Hallock et al., 1961), and spawn primarily from January through March, although spawning can begin as early as late December and can

extend through April (Hallock et al., 1961). Similar to other salmonids, steelhead lay their eggs in the gravel of the stream bottom where they incubate for about 3 to 12 weeks. The length of time required for eggs to develop and hatch is quite variable and depends on water temperature. After hatching, pre-emergent fry remain in the gravel for another 4 to 6 weeks, but factors such as redd depth, gravel size, siltation, and temperature can speed or retard this time (Shapovalov and Taft, 1954).

Steelhead fry usually emerge from the gravel 2 to 8 weeks after hatching (Barnhart, 1986; Reynolds et al., 1993). Upon emergence, steelhead fry seek out shallow areas along perennial streambanks. Streamside vegetation is essential for foraging, cover, and habitat diversity. Juvenile steelhead are generally associated with the bottom of the stream. The majority of steelhead inhabit riffles during their first year of life, although larger fish will occupy pools and deeper runs. In winter, juvenile steelhead become inactive and hide in available cover, which can include woody debris and the interstices between streambed cobbles. After rearing for 1 to 3 years in freshwater, juvenile steelhead migrate downstream to the ocean.

Sacramento River steelhead generally emigrate as 1-year olds (Barnhart, 1986; Reynolds et al., 1993). Although juveniles can emigrate downstream to the ocean from November through May, most Sacramento River steelhead emigrate in the spring and early summer (Reynolds et al., 1993). Additionally, there is a much smaller peak in the fall (Hallock et al., 1961).

Historically, steelhead were found throughout most of the tributaries and headwaters of the Sacramento and San Joaquin Basins. Compared to Chinook salmon, steelhead generally migrated farther into tributaries and headwater streams where suitable conditions were available year-round. Dam construction and water diversions during the nineteenth and twentieth centuries blocked steelhead migration to these preferred spawning and rearing habitats. Currently, wild steelhead stocks are mostly confined to upper Sacramento River tributaries such as Antelope, Deer, and Mill Creeks and the Yuba River (McEwan and Jackson, 1996). Butte Creek and the upper Sacramento, Feather, American, Mokelumne, and Stanislaus Rivers also contain naturally spawning populations of steelhead (CALFED, 1999).

Critical habitat for the Central Valley steelhead ESU is designated to include all river reaches accessible to listed steelhead in the Sacramento and San Joaquin Rivers and their tributaries in California. Also included are adjacent riparian zones, as well as river reaches and estuarine areas of the Sacramento-San Joaquin Delta; all waters from Chipps Island westward to Carquinez Bridge including Honker Bay, Grizzly Bay, Suisun Bay, and Carquinez Strait; all waters of San Pablo Bay westward of the Carquinez Bridge; and all waters of San Francisco Bay (north of the San Francisco/Oakland Bay Bridge) from San Pablo Bay to the Golden Gate Bridge. Excluded are areas of the San Joaquin River upstream of the Merced River confluence, tribal lands, and areas above specific dams or above longstanding, naturally impassable barriers (i.e., natural waterfalls in existence for at least several hundred years).

Delta Smelt. Delta smelt are small, slender-bodied fish that tolerate a wide salinity range. It spawns in freshwater but has been collected from estuarine waters up to 14 parts per thousand (ppt) salinity (Moyle et al., 1992). For most of its 1-year life span, this species is associated with the freshwater edge of the mixing zone (saltwater-freshwater interface), where the salinity is about 2 ppt.

Shortly before spawning, adult Delta smelt migrate upstream from the brackish-water habitat associated with the mixing zone to disperse widely into river channels and tidally influenced backwater sloughs. Delta smelt spawn in shallow, fresh, or slightly brackish water upstream of the mixing zone (Wang, 1991). Most spawning occurs in tidally influenced backwater sloughs and channel edgewater (Moyle, 1976; Wang, 1986 and 1991; Moyle et al., 1992). Although Delta smelt spawning behavior has not been observed in the wild (Moyle et al., 1992), the adhesive, demersal eggs are thought to attach to substrates such as cattails, tules, tree roots, and submerged branches. After hatching, larvae are carried downstream where they rear at the saltwater-freshwater interface.

Delta smelt are endemic to the Suisun Bay upstream through the Delta in Contra Costa, Sacramento, San Joaquin, Solano, and Yolo Counties. The Delta smelt is thought to have occurred historically from Suisun Bay upstream to at least the Cities of Sacramento on the Sacramento River and Mossdale on the San Joaquin River.

Designated critical habitat for Delta smelt consists of all water and all submerged lands below ordinary high water and the entire water column bounded by and contained in Suisun Bay (including the contiguous Grizzly and Honker Bays); the length of Goodyear, Suisun, Cutoff, First Mallard (Spring Branch), and Montezuma Sloughs; and the existing contiguous waters contained within the Delta, as defined in Section 12220 of the California Water Code (50 CFR Section 17.95).

Sacramento Splittail. Splittail are endemic to the lakes and rivers of the Central Valley (Moyle et al., 1995). Splittail are primarily freshwater fish, but are tolerant of moderate salinity and can live in water with salinities of 10 to 18 ppt. Adults migrate upstream from brackish areas to spawn in freshwater. The onset of spawning seems to be associated with increasing water temperature and day length between early March and May. Spawning begins by late January and early February and continues through July, with most spawning taking place from February through April.

Splittail typically spawn in dead-end sloughs and slow reaches of large rivers and river floodplains over submerged vegetation. Spawning occurs primarily in the lower river reaches and flood bypass of the Sacramento and San Joaquin Rivers. Shallow, weedy areas inundated during seasonal flooding provide habitat for adult spawning and foraging and subsequent egg development and larval and early juvenile rearing.

As flooded habitat disappears, larvae and juveniles use habitat along the margins of the main river and Delta channels. Although splittail use deeper, open water as they grow, much of the population continues to use shallow (less than 10 feet) edge habitat as adults (Meng and Moyle, 1995). Juvenile splittail are commonly found in Delta sloughs in late winter and spring and are particularly abundant in the vicinity of Montezuma Slough. As summer

progresses, juvenile splittail occupy the deeper, open-water habitats of Suisun and San Pablo Bays.

Sacramento splittail are found only in California's Central Valley where they were once widely distributed. Historically, splittail were found as far north as Redding on the Sacramento River and as far south as Friant Dam on the San Joaquin River. Splittail were common in San Pablo Bay and Carquinez Strait following high winter flows until about 1985. In recent times, dams and diversions have increasingly prevented upstream access in large rivers, and splittail are now restricted to a small portion of their former range. Splittail are currently confined largely to the Delta, Suisun Bay, Suisun Marsh, and Napa Marsh, but will use the Sutter, Sacramento, and Yolo bypasses when flooded (Moyle et al., 1995; Natural Heritage Institute, 1992; Jones and Stokes Associates, Inc., 1993). Splittail enter the lower reaches of the Feather and American Rivers on occasion and have been reported as far as Red Bluff on the Sacramento River.

Sacramento splittail is considered a federal and state Species of Concern.

Central Valley Fall-/Late-fall-run Chinook Salmon. Fall-run and late-fall-run Chinook salmon have similar habitat requirements and life history traits to spring-run and winter-run Chinook salmon. They differ from these runs mainly in the timing of life history events. They are anadromous, spending most of their lives in the ocean before returning to their natal streams to spawn. Fall-run Chinook salmon enter the Sacramento River as early as July and continue their upstream migration until about December. Late-fall-run Chinook salmon follow fall-run Chinook salmon, migrating to spawning areas during October through April. Fall-run Chinook salmon typically spawn between October and December, followed by late-fall-run Chinook salmon, which spawn from January to April.

Fall-run and late-fall-run Chinook salmon have similar habitat requirements for spawning and incubation as the other runs of Chinook salmon. As described for spring-run and winter-run Chinook salmon, the length of time required for eggs to hatch and the fry to develop sufficiently to leave the gravel is quite variable depending on environmental conditions. After emergence, fry seek out shallow, nearshore areas with slow currents and good cover. Late-fall-run Chinook salmon typically rear in their natal streams through the summer and emigrate in winter (December through February), and fall-run Chinook salmon typically have left natal streams by June or July depending on environmental conditions.

Fall-run salmon are well distributed in the Central Valley relative to the other runs of Chinook salmon. The Sacramento, Feather, Yuba, and American Rivers support sizable spawning populations of fall-run Chinook salmon. They also occur in smaller tributaries to the Sacramento River as well as in tributaries to the San Joaquin River. Late-fall-run Chinook salmon spawn in the mainstem Sacramento River as well as in Battle, Cottonwood, Clear, and Mill Creeks, and Yuba and Feather Rivers. Fall-run Chinook salmon are the most abundant of the Central Valley Chinook salmon runs, and late-fall-run Chinook salmon are the least abundant (Moyle et al., 1995).

Fall-run/late-fall-run Chinook salmon currently are candidates for listing under the ESA. Because this species is not formally listed, critical habitat has not been designated.

Green Sturgeon. Green sturgeon are anadromous fish migrating into freshwater to spawn, but spending most of their adult life in the ocean or estuaries. They are believed to migrate into the Sacramento River for spawning between late February and late July. Spawning occurs in deep, fast-moving water during March through July (Moyle et al., 1995). Habitat requirements for spawning are poorly understood, but sturgeon are believed to prefer large cobble for spawning, although they spawn over a range of substrates. Sturgeon are broadcast spawners and spawn in areas of deep water with high water velocity. Embryos are planktonic and develop as they drift downstream. Juveniles typically migrate to the ocean before 2 years of age (Moyle et al., 1995).

In California, green sturgeon spawn in the mainstem Sacramento River as far north as Red Bluff and in the Feather River. They are also known to spawn in the Klamath River, and historically used the Eel River on the north coast of California. Green sturgeon are a candidate for federally listing. No critical habitat has been designated because they are not formally listed under the ESA.

Other Anadromous Fish Species. Several other native and introduced species of anadromous fish occur in the Sacramento River and tributaries in the SRSCs service area. Native anadromous species include the following:

- river lamprey (*Lampetra ayresi*)
- Pacific lamprey (*Lampetra tridentata*)
- white sturgeon (*Acipenser transmontanus*)

Non-native anadromous species include striped bass (*Morone saxatilis*) and American shad (*Alosa sapidissima*). Both species were introduced into the Central Valley waterways for recreational fishing. The anadromous species share a common life history trait of spawning in freshwater rivers and streams and then migrating to the ocean where they spend most of their adult lives. All of these species use the Sacramento River; the adults use it for upstream migration, and the larvae or juveniles use it for downstream migration.

The ecological requirements and distribution of Pacific and river lampreys in California are poorly understood. They are known to occur in the Sacramento River and have been reported passing the RBDD during their upstream migrations, but where they spawn has not been determined. In other parts of their ranges, these species spawn in small tributaries and, therefore, could spawn in the numerous tributaries to the Sacramento River. Larvae grow and develop in natal streams for several years.

In California, white sturgeon are known to spawn only in the Feather River and the mainstem Sacramento River upstream of the confluence with the Feather River. Embryos are planktonic and carried downstream to rear in the upper reaches of the Sacramento-San Joaquin River and Suisun-San Pablo Bay estuary. Except during spawning runs, adults are primarily found in the lower reaches of the Delta and in Suisun, San Pablo, and San Francisco Bays.

American shad and striped bass are broadcast spawners. American shad spawn in the main channels of major rivers including the Sacramento, American, and Feather Rivers. Juveniles and adult shad have been documented as far upstream in the Sacramento River as the RBDD. The Sacramento River between Sacramento and Colusa is a major spawning area for striped

bass. After spawning, adults return to brackish water and saltwater areas. Larvae are carried downstream where they rear in the Sacramento-San Joaquin Delta.

Other Resident Fish Species. Most of the resident fish species in SRSCs service area waterways are non-native species that have been introduced for recreational fishing (see Table 3-20). Many of these species are well distributed in the Sacramento River and tributaries. Some species such as carp, catfish, and mosquitofish are able to tolerate a wide range of aquatic conditions and are found in water delivery canals and agricultural drains. Other species have more restricted habitat requirements and are only found in portions of the natural watercourses.

TABLE 3-20

RESIDENT FISH SPECIES IN THE SRSC SERVICE AREAS

Common Name	Scientific Name	Status
rainbow trout	<i>Oncorhynchus mykiss</i>	Native
hitch	<i>Lavinia exilicauda</i>	Native
Hardhead	<i>Mylopharodon conocephalus</i>	Native California Species of Special Concern
Sacramento pikeminnow	<i>Ptychocheilus grandis</i>	Native
speckled dace	<i>Rhinichthys osculus</i>	Native
California roach	<i>Hesperoleucus symmetricus</i>	Native
Sacramento sucker	<i>Catostomus occidentalis</i>	Native
tule perch	<i>Hysteroleucis traski</i>	Native
prickly sculpin	<i>Cottus asper</i>	Native
riffle sculpin	<i>Cottus gulosus</i>	Native
Sacramento blackfish	<i>Orthodon microlepidotus</i>	Native
threespine stickleback	<i>Gasterosteus aculeatus</i>	Native
brown trout	<i>Salmo trutta</i>	Non-native
threadfin shad	<i>Dorosoma petenense</i>	Non-native
largemouth bass	<i>Micropterus salmoides</i>	Non-native
spotted bass	<i>Micropterus punctulatus</i>	Non-native
smallmouth bass	<i>Micropterus dolomieu</i>	Non-native
green sunfish	<i>Lepomis cyanellus</i>	Non-native
Bluegill	<i>Lepomis macrochirus</i>	Non-native
reardear sunfish	<i>Lepomis microlophus</i>	Non-native
pumpkinseed	<i>Lepomis gibbosus</i>	Non-native

TABLE 3-20

RESIDENT FISH SPECIES IN THE SRSC SERVICE AREAS

Common Name	Scientific Name	Status
black crappie	<i>Pomoxis nigromaculatus</i>	Non-native
white crappie	<i>Pomoxis annularis</i>	Non-native
channel catfish	<i>Ictalurus punctatus</i>	Non-native
white catfish	<i>Ictalurus catus</i>	Non-native
black bullhead	<i>Ictalurus melas</i>	Non-native
yellow bullhead	<i>Ictalurus natalis</i>	Non-native
Goldfish	<i>Carassius auratus</i>	Non-native
Carp	<i>Cyprinus carpio</i>	Non-native
Mosquitofish	<i>Gambusia affinis</i>	Non-native

Environmental Consequences. The effects of Alternatives 1 through 5 on aquatic biological resources of the SRSCs service area are compared to conditions under the No Action Alternative.

No Action Alternative. The No Action Alternative is described previously in the Terrestrial Biological Resources section. A total volume of 2,316 KAFY would be contracted over a 40-year period, as has been done since 1964.

Alternative 1. Alternative 1 would not significantly affect aquatic resources of the SRSCs service area.

Aquatic biological resources in the SRSCs service area under Alternative 1 would be similar to conditions under the No Action Alternative. Alternative 1 would not alter current CVP operations, with the exception of reduced contract amounts to ACID and SMWC.

As discussed previously in the Terrestrial Biological Resources section, reductions in contracted water volumes to ACID and SMWC would not differ from volumes actually diverted by these water agencies in recent years. Therefore, no impacts due to water quantity reductions are anticipated in association with drain habitat, canal habitat, or agricultural areas.

It is assumed that use of the assigned CVP water by the SRSCs would continue to be managed in the same manner under Alternative 1 as under the No Action Alternative.

There are no adverse impacts associated with this alternative.

Alternative 2. Aquatic biological resources in the SRSCs service area under Alternative 2 would be identical to conditions under the No Action Alternative during years with full contract delivery. During drought conditions, when contract cutbacks would occur,

less water would be diverted from the Sacramento River than under No Action. Reduced diversions of water from the Sacramento River may provide a small benefit for in-stream habitat. The potential availability of re-allocation of water from drought cutbacks to fishery benefits is a potential benefit, although there is no assurance that the water would be allocated for fishery enhancement.

There are no adverse impacts associated with this alternative.

Seasonal Groundwater Drawdown. As discussed in the Groundwater section, increased pumping within the Sacramento Valley Groundwater Basin could occur during dry years within the Sacramento Valley Groundwater Basin. Increased pumping activities associated with these cutbacks would result in temporary drawdown of groundwater levels, which would ultimately result in a reduction in local streamflow as groundwater is intercepted before it can flow into the Sacramento River, affecting associated aquatic species. However, this effect is exceptionally small (e.g., no measurable at existing gauges) and is offset by reduced diversions of surface water; therefore, there are no adverse impact associated with this alternative.

Alternative 3. Aquatic biological resources in the SRSCs service area under Alternative 3 would be identical to conditions under the No Action Alternative. Alternative 3 would not alter current CVP operations, water storage or release patterns from CVP facilities, or the maximum volume of water delivered to the SRSC.

It is assumed that use of the assigned CVP water by the SRSCs would continue to be managed in the same manner under Alternative 3 as under the No Action Alternative.

There are no adverse impacts associated with this alternative.

Alternative 4. Aquatic biological resources in the SRSCs service area under Alternative 4 would be identical to conditions under the No Action Alternative during years with full contract delivery. During drought conditions, when contract cutbacks would occur, less water would be diverted from the Sacramento River than under No Action. Reduced diversions of water from the Sacramento River may provide a small benefit for in-stream habitat. The potential availability of re-allocation of water from drought cutbacks to fishery benefits is a potential benefit, although there is no assurance that the water would be allocated for fishery enhancement.

There are no adverse impacts associated with this alternative.

Seasonal Groundwater Drawdown. As discussed in the Groundwater section, increased pumping within the Sacramento Valley Groundwater Basin could occur during dry years within the Sacramento Valley Groundwater Basin. Increased pumping activities associated with these cutbacks would result in temporary drawdown of groundwater levels, which would ultimately result in a reduction in local streamflow as groundwater is intercepted before it can flow into the Sacramento River, affecting associated aquatic species. However, this effect is exceptionally small and is offset by reduced diversions of surface water; therefore, there are no adverse impacts associated with this alternative.

Alternative 5. Aquatic biological resources in the SRSCs service area under Alternative 5 would be identical to conditions under the No Action Alternative during years with full contract delivery. During drought conditions, when contract cutbacks would occur, less water would be diverted from the Sacramento River than under No Action. Additionally, cutbacks would occur with more frequency than in other alternatives. During years when the shortage provisions are activated, reduced diversions of water from the Sacramento River may provide a small benefit for in-stream habitat. The potential availability of re-allocation of water from drought cutbacks to fishery benefits is a potential benefit, although there is no assurance that the water would be allocated for fishery enhancement.

There are no adverse impacts associated with this alternative.

Seasonal Groundwater Drawdown. As discussed in the Groundwater section, increased pumping within the Sacramento Valley Groundwater Basin could occur during dry years within the Sacramento Valley Groundwater Basin. Increased pumping activities associated with these cutbacks would result in temporary drawdown of groundwater levels, which would ultimately result in a reduction in local streamflow as groundwater is intercepted before it can flow into the Sacramento River, affecting associated aquatic species. However, this effect is exceptionally small and is offset by reduced diversions of surface water; therefore, there are no adverse impacts associated with this alternative.

ECONOMICS

Land Use

Agricultural Land Use and Production.

Affected Environment.

Counties and Districts.

The Sacramento Valley is an important agricultural region for both the state of California and the United States. In 1997, the nine Sacramento River Valley counties contributed more than 8 percent, by value, of California's agricultural production. California producers account for about 10 percent of total United States agricultural exports. These exports represent almost 25 percent of the gross farm income of the state. Almost 80 percent of the irrigated land in California is located in the Central Valley. Water deliveries for agriculture average about 22.5 MAF per year, with the CVP providing about 25 percent, the State Water Project about 10 percent, local surface water rights about 30 percent, and groundwater about 35 percent. Most districts that receive CVP supplies also use other supplies such as groundwater. Use of non-CVP sources varies annually because of changes in weather and crop market conditions.

Agriculture accounts for the largest land use in each of the counties that are in the SRSCs service area (see Table 3-21). The region produces a wide variety of crops including rice, grains, tomatoes, field crops, fruits, and nuts. Sacramento Valley crop production reached \$1.9 billion in 1997, with rice, tomatoes, and orchard crops providing the highest revenues. Approximately 10 percent of the applied water within the Sacramento Valley is provided through CVP contracts.

The counties within the Sacramento Valley that are within the SRSCs service area include the following:

- Shasta
- Tehama
- Glenn
- Butte
- Colusa
- Sutter
- Yolo
- Sacramento
- Yuba

Shasta County. Shasta County's General Plan (updated 1998) identifies four major categories of land uses: urban, rural, agricultural, and timber. Urban land is primarily contained in the Cities of Redding, Shasta Lake, and Anderson, with small unincorporated communities throughout the county.

Shasta County has a total area of approximately 2,428,000 acres. Preservation of agricultural lands to support full-time and part-time agricultural operations, and to protect future agricultural operations is a stated objective in the Agricultural Element of the Shasta County General Plan. In 1997, the total land area in farm production was 316,743 acres. Although a large portion of the county's most valuable resources are in timberland, a significant portion of the county's land area is under agricultural production. Shasta County's highest reported crop type in 1997 was hay, accounting for approximately 13,000 acres.

Tehama County. With a total land area of 1,888,640 acres, Tehama County focuses largely on resource conservation and its relationship to urban development. Urban encroachment upon agricultural areas is regarded as a potentially adverse effect. Tehama County's General Plan has established planning strategies specifically for agricultural preservation, such as minimum parcel sizes and agricultural land preserves.

Agricultural preservation is a top priority in the Tehama County General Plan. Agriculture is the dominant land use in the county and comprises approximately 58 percent of the total land area in the county. In 1997, orchards accounted for the majority of the land in agricultural productivity. The second and third highest acreage in agricultural productivity was in hay crops and wheat.

TABLE 3-21

TOTAL ACRES OF FARMLAND AND LAND COMMITTED TO NONAGRICULTURAL USES IN COUNTIES IN THE SRSC SERVICE AREAS, 2000 DATA

County	Shasta		Tehama		Glenn		Butte		Colusa		Sutter		Yolo		Sacramento		Yuba	
	Total Acres	Percent of Total	Total Acres	Percent of Total	Total Acres	Percent of Total	Total Acres	Percent of Total	Total Acres	Percent of Total	Total Acres	Percent of Total	Total Acres	Percent of Total	Total Acres	Percent of Total	Total Acres	Percent of Total
Prime Farmland	19,815	2%	73,772	4%	166,549	20%	NA	NA	202,232	27%	169,782	44%	264,452	40%	116,116	18%	44,484	11%
Farmland of Statewide Importance	4,716	0%	19,760	1%	87,784	10%	NA	NA	1,811	0%	111,296	29%	18,072	3%	62,650	10%	10,991	3%
Unique Farmland	405	0%	18,486	1%	11,605	1%	NA	NA	125,497	17%	20,213	5%	54,390	8%	15,609	2%	34,698	8%
Farmland of Local Importance	10,416	1%	132,763	7%	141,965	17%	NA	NA	236,354	32%	0	0%	71,927	11%	39,745	6%	0	0%
Farmland Subtotal	35,352	3%	244,781	13%	407,903	48%	257,315^a	28%^a	565,894	76%	301,291	77%	408,841	63%	234,120	37%	90,173	22%
Grazing Land	409,477	40%	706,026	38%	176,071	21%	264,982	29%	7,526	1%	50,896	13%	144,695	22%	162,344	26%	144,519	35%
Agricultural Land Subtotal	444,829	44%	950,807	52%	583,974	69%	522,297	57%	573,420	77%	352,187	90%	553,536	85%	396,464	62%	234,692	57%
Urban and Built-up Land	32,657	3%	11,459	1%	5,609	1%	40,185	4%	4,257	1%	11,360	3%	25,939	4%	157,157	25%	11,544	3%
Other Land	537,852 ^b	53% ^a	871,007	47%	253,785	30%	333,784	36%	160,877	22%	24,044	6%	66,577	10%	64,209	10%	159,292	39%
Water Area	5,875	1%	6,221	0%	5,759	1%	21,643	2%	1,838	0%	1,848	0%	7,399	1%	18,253	3%	6,289	2%
Total Area Inventoried	1,021,213		1,839,494		849,127		917,909		740,392		389,439		653,451		636,083		411,817	

^aIncludes 249,414 acres of irrigated farmland (27%) and 7,901 acres of nonirrigated farmland (1%).

^b"Other Land" is defined as land not included in any other mapping category. Common examples include low-density rural developments; brush, timber, wetlands, and riparian areas not suitable for livestock grazing; confined livestock, poultry, or aquaculture facilities; strip mines; borrow pits; and waterbodies smaller than 40 acres. Vacant and nonagricultural land surrounded on all sides by urban development and greater than 40 acres is mapped as "Other Land."

Source: Department of Conservation, 2003.

Glenn County. Glenn County is situated at the northern end of the Colusa Basin and has the second lowest population of the counties in the study area. Of the county's 849,127 acres, approximately two-thirds (583,974 acres) are croplands and pasture, with approximately 48 percent of that land considered Important Farmland. Rice is the primary field crop in the county; rice grows well in the poorly drained alkali soils found in the Colusa Basin. The second and third highest crop types by acreage are orchards and hay, respectively.

Butte County. Butte County is the second most populous county in the study area; however, the majority of the county's 1,068,800 acres are rural. In 1997, 404,166 acres of land were in farm production. The Cities of Chico, Gridley, and Oroville (including East and South Oroville), the Town of Paradise, and the outlying area of Magalia comprise nearly half the population of the county.

Urban encroachment onto agricultural lands presents a challenge to agricultural uses within the county. As development pressures increase in the southern portion of the county, and in the existing urban centers, parcels are being subdivided and converted to nonagricultural land uses. Butte County's General Plan established goals and policies, such as minimum acreage densities, to help minimize the effects of urban development and encroachment into agricultural areas.

Colusa County. The majority of Colusa County's 740,392 acres are used for agricultural production. Approximately 77 percent of the county's land area is in orchards and vineyards, cropland, and undeveloped rangeland. Approximately 4,200 acres in Colusa County account for urban uses.

Similar to Glenn County, Colusa County's main crop is rice. The total land in farm production in 1997 was 430,958 acres, and rice accounted for 129,974 acres (30 percent).

Sutter County. Sutter County's 389,439 acres are composed of two major geographic units: the valley area and the Sutter Buttes. Approximately 98 percent of the land in the county is unincorporated, and approximately 98 percent of the unincorporated land is zoned for agricultural use. Agriculture is identified as a dominant industry in Sutter County (EDD, 2003).

Yolo County. Yolo County consists of approximately 647,936 acres, the majority of which is in agricultural production. The Yolo County General Plan identifies policies to prevent division and/or use of land for anything but agricultural uses. These policies prevent urban, residential, commercial, or industrial uses in the rural areas of the county. Nonagricultural land uses are discouraged by the Yolo County General Plan in areas that are presently farmed or contain prime agricultural soils. To preserve agricultural lands, the county participates in the Williamson Act Land Conservation Program and applies Agricultural Preserve Zoning designations where appropriate.

Yuba County. Of Yuba County's 408,960 acres, approximately 57 percent are in agriculture. The Yuba County General Plan states that agriculture is the most extensive land use in Yuba County and the most significant component of the county's economy. Agricultural lands within the county not only contribute to the county's economy and food source,

agricultural land preservation provides open space, which in turn contributes benefits for psychological and aesthetic qualities as well as biological resources.

Sacramento County. The unincorporated area of Sacramento County, excluding the Delta area, includes approximately 444,000 acres, 250,000 acres of which are in agriculture. The majority of the land outside of the urban developments within the county are devoted to agriculture.

Irrigation Districts. The 20 irrigation districts listed in Table 3-22 represent approximately 90 percent of the annual allocated water in the SRSCs service area. Rice is the predominant crop for most of the districts because of the prevalence of clay soils within many of the districts. Water needs for rice are greatest early in the growing season to flood rice fields. In response to increasingly stringent limitations on burning, many of the district's landowners also partially flood their fields in the fall to decompose leftover rice straw. Table 3-22 summarizes the number of acres flooded annually by each irrigation district. This trend is expected to continue or increase unless alternative options for disposing of rice straw (including the sale of stubble for ethanol production) become more economically feasible. This practice provides additional winter habitat for waterfowl.

Other key crops include processing tomatoes, vineseed (e.g., cucumber seeds), corn, orchards, pasture, and alfalfa. Water requirements are typically highest during the summer irrigation season (June, July, and August) because of the area's hot, dry climate.

In most of the irrigation districts, annual crop patterns have remained stable since the mid-1970s. For most of the districts, water needs have been a function of water-year type rather than changes in crop patterns.

Anderson-Cottonwood Irrigation District. ACID's service area encompasses approximately 32,000 acres and extends south from the City of Redding and encompasses the City of Anderson and the Town of Cottonwood. ACID's service area includes portions of Shasta and Tehama Counties. Although ACID overlaps the service area boundaries of a few municipalities, ACID does not currently provide water for municipal or industrial uses. Approximately 90 percent of ACID's customers irrigate pasture for hay or livestock; however, some orchard and other crops are also grown.

Land use within ACID's service area is primarily pasture (approximately 75 percent), in addition to alfalfa and some deciduous orchards (CH2M HILL, 2003). Groundwater pumping is limited in the district, and the small amount of water that is pumped is used for deciduous crops.

Table 3-23 shows 1995 normalized estimates of irrigated acres for the primary crops grown within the ACID service area, as well as projections for the year 2020. The variation around these estimates (+/- percentage) accounts for typical and predicted variation in crop acreage due to year type.

TABLE 3-22

ACRES FLOODED ANNUALLY BY DISTRICT TO DECOMPOSE RICE STRAW

District	Acres Flooded	Notes
ACID	0	Rice is not a significant crop in this district
GCID	30,000	Value from 1999; 50,000 acres flooded estimated for the future
PID		No data listed
PCGID		No data listed
MID	346	
RD 108	6,000	
RD 1004	12,000	
MFWC	0	Policy against flooding of rice fields to decompose rice straw for flood protection
SMWC	4,000	Total acres flooded capped at 5,000 under flood control agreement with Reclamation District 1500
PMWC	1,000	
NCMWC	5,780	
Pleasant Grove-Verona ID		
Tisdale Irrigation Company		
Conaway Conservancy Group		
Davis Ranch		
Lomo Cold Storage		
M&T Chico Ranch		
Reynen		
River Garden Farms		

TABLE 3-23

ACID TOTAL IRRIGATED ACRES BY CROP – 1995 AND 2020 ESTIMATES

Crop	1995 ^a	2020 ^b
Pasture	10,500 (+/- 5%) ^c	9,900 (+/- 5%) ^c
Other Deciduous	1,600 (+/- 5%) ^c	1,600 (+/- 5%) ^c
Alfalfa	400 (+/- 5%) ^c	200 (+/- 5%) ^c
Almonds and Pistachios	200 (+/- 5%) ^c	200 (+/- 5%) ^c
All Other Crops	1,200 (+/- 5%) ^c	1,200 (+/- 5%) ^c
Total Irrigated Acres	13,900 (+/- 5%)^c	13,100 (+/- 5%)^c

^aFigures are estimates derived from field data that have been normalized (data have been modified to simulate a condition where hydrology and climate are assumed to be normal, i.e., drought or wet condition assumed not to occur). Source: CH2M HILL, 2003.

^bFigures are future projections that incorporate current and historical trends, as well as anticipated local and regional development and economic trends in the year 2020. Source: CH2M HILL, 2003.

^cPercentages obtained from ACID.

Future irrigation-season cropping patterns and associated water requirements are anticipated to remain relatively constant in terms of crop mix; however, ACID anticipates an overall decrease in irrigated acres because of urban encroachment.

Glenn-Colusa Irrigation District. GCID is located in the central portion of the Sacramento Valley to the west of the Sacramento River and is the largest irrigation district in the Sacramento Valley, encompassing approximately 170,000 acres. GCID’s service area extends from northeastern Glenn County, near Hamilton City, to Colusa County, south of Williams. GCID boundaries also encompass the communities of Willows and Maxwell, but GCID does not supply water to municipal or industrial users. Rice is the predominant crop and accounts for approximately 85 percent of the GCID’s irrigated acreage. Other important crops include tomatoes, orchards, vineseed, cotton, alfalfa, and irrigated pasture.

GCID provides water to three National Wildlife Refuges (NWR) (Sacramento, Delevan, and Colusa) that encompass approximately 22,500 acres. Although surface water is the primary source of irrigation water, groundwater is used in drought years by individual growers.

Table 3-24 shows 1995 normalized estimates of irrigated acres and projections for the year 2020 for the primary crops grown within GCID’s service area. The variation around the estimates (+/- percentage) accounts for typical and anticipated variations in crop acreage due to year type.

TABLE 3-24

GCID TOTAL IRRIGATED ACRES – 1995 AND 2020 ESTIMATES

Crop	1995 ^a	2020 ^b
Rice	99,300 (+/- 10%) ^c	99,100 (+/- 10%) ^c
Grain	5,500 (+/- 10%) ^c	5,000 (+/- 10%) ^c
Alfalfa	4,300 (+/- 50%) ^c	4,500 (+/- 50%) ^c
Pasture	4,100 (+/- 20%) ^c	3,300 (+/- 20%) ^c
Tomatoes	3,800 (+/- 40%) ^c	6,400 (+/- 40%) ^c
All Other Crops	13,200 (+/- 10%) ^c	18,500 (+/- 10%) ^c
Total Irrigated Acres	130,200 (+/- 10%)^{c,d}	136,800 (+/- 10%)^{c,d}

^aFigures are estimates derived from field data that have been normalized (data have been modified to simulate a condition where hydrology and climate are assumed to be normal, i.e., drought or wet condition assumed not to occur). Source: CH2M HILL, 2003.

^bFigures are future projections that incorporate current and historical trends, as well as anticipated local and regional development and economic trends in the year 2020. Source: CH2M HILL, 2003.

^cPercentages obtained from GCID.

^dIncludes 200 double-cropped acres for 1995, and 3,700 double-cropped acres for 2020.

Provident Irrigation District. PID lies to the west of the Sacramento River in the Colusa Basin and includes portions of Glenn and Colusa Counties. PID encompasses approximately 15,965 acres (including 800 acres recently annexed) and serves 120 landowners. Rice is the predominant crop and accounts for approximately 98 percent of irrigated acres in PID. Other crops include pasture and grains. Many of PID's operations are coordinated with the PCGID, located directly adjacent and east of PID. PID operates a pumping plant, with a capacity of 300 cfs, on the Sacramento River located at Sidd's Landing north of the community of Glenn.

The majority of water needs are met through contracted surface water, although groundwater is used in drought years by individual growers.

Table 3-25 shows 1995 normalized estimates and projections for the year 2020 of irrigated acres for the primary crops grown within PID's service area. The variation around these estimates (+/- percentage) accounts for typical and anticipated variations in crop acreage due to year type.

TABLE 3-25

PID TOTAL IRRIGATED ACRES – 1995 AND 2020 ESTIMATES

Crop	1995 ^a	2020 ^b
Rice	14,600 (+/- 10%) ^c	14,600 (+/- 10%) ^c
All Other Crops	200 (+/- 10%) ^c	400 (+/- 10%) ^c
Total Irrigated Acres	14,800 (+/- 10%)^c	15,000 (+/- 10%)^c

^aFigures are estimates derived from field data that have been normalized (data have been modified to simulate a condition where hydrology and climate are assumed to be normal, i.e., drought or wet condition assumed not to occur). Source: CH2M HILL, 2003.

^bFigures are future projections that incorporate current and historical trends, as well as anticipated local and regional development and economic trends in the year 2020. Source: CH2M HILL, 2003.

^cPercentages obtained from PID.

Princeton-Codora-Glenn Irrigation District. PCGID is located in the western Sacramento Valley and is adjacent to the Sacramento River. PCGID covers portions of Glenn and Colusa Counties. The Colusa Basin Drain runs along most of PCGID's western boundary. The community of Princeton lies within PCGID's boundaries, but is not served by the district. PCGID encompasses approximately 11,700 acres and serves 125 landowners.

Rice is the major crop grown within PCGID's service area, in addition to orchard and row crops. Rice accounts for approximately 75 percent of PCGID's irrigated acreage

Although surface water is the primary source of irrigation water, groundwater is used in drought years by individual growers.

Table 3-26 shows 1995 normalized estimates and projections for the year 2020 of irrigated acres for the primary crops grown within PCGID’s service area. The variation around these estimates (+/- percentage) accounts for typical and anticipated variations in crop acreage due to year type.

Future irrigation-season cropping patterns and crops would likely shift, but overall water requirements are anticipated to remain relatively the same as current conditions.

TABLE 3-26

PCGID TOTAL IRRIGATED ACRES – 1995 AND 2020 ESTIMATES

Crop	1995 ^a	2020 ^b
Rice	7,700 (+/- 20%) ^c	7,700 (+/- 30%) ^c
Other Deciduous	700 (+/- 20%) ^c	700 (+/- 30%) ^c
Alfalfa	200 (+/- 10%) ^c	500 (+/- 10%) ^c
All Other Crops	1,400 (+/- 10%) ^c	1,400 (+/- 10%) ^c
Total Irrigated Acres	10,000 (+/- 10%)^{c,d}	10,300 (+/- 10%)^{c,d}

^aFigures are estimates derived from field data that have been normalized (data have been modified to simulate a condition where hydrology and climate are assumed to be normal, i.e., drought or wet condition assumed not to occur). Source: CH2M HILL, 2003.

^bFigures are future projections that incorporate current and historical trends, as well as anticipated local and regional development and economic trends in the year 2020. The source of water for additional acreage is undetermined. Source: CH2M HILL, 2003.

^cPercentages obtained from PCGID.

^dIncludes 100 double-cropped acres for 1995 and 2020.

Maxwell Irrigation District. MID is located on the west side of the Sacramento River approximately northwest of the Town of Colusa in Colusa County. MID is located directly east of the southern portion of GCID and south of the Delevan NWR. MID’s service area encompasses approximately 6,134 acres and includes 28 landowners.

The primary crop in MID’s service area is rice, due to the fine-textured and poorly drained soils found in the majority of the district. Rice accounts for over 95 percent of MID’s irrigated acres (CH2M HILL, 2003).

Table 3-27 shows 1995 normalized estimates and projections for the year 2020 of irrigated acres for the primary crops grown within MID’s service area. The variation around these estimates (+/- percentage) accounts for typical and anticipated variations in crop acreage due to year type.

TABLE 3-27

MID TOTAL IRRIGATED ACRES – 1995 AND 2020 ESTIMATES

Crop	1995 ^a	2020 ^b
Rice	4,900 (+/- 10%) ^c	4,900 (+/- 10%) ^c
All Other Crops	100 (+/- 10%) ^c	100 (+/- 10%) ^c
Total Irrigated Acres	5,000 (+/- 10%)^b	5,000 (+/- 10%)^c

^aFigures are estimates derived from field data that have been normalized (data have been modified to simulate a condition where hydrology and climate are assumed to be normal, i.e., drought or wet condition assumed not to occur). Source: CH2M HILL, 2003.

^bFigures are future projections that incorporate current and historical trends, as well as anticipated local and regional development and economic trends in the year 2020. Source: CH2M HILL, 2003.

^cPercentages obtained from MID.

Future irrigation-season cropping patterns and associated water requirements are anticipated to remain relatively the same as current conditions.

Reclamation District No. 108. RD 108's 48,000-acre service area is located within southern Colusa County and northern Yolo County along the west side of the Sacramento River, between the towns of Grimes and Knights Landing. The service area is surrounded on three sides by flood-control levees: on the east by the Westerly Levee of the Sacramento River, on the west and southwest by the Colusa Basin Drain (commonly referenced as the "Back Levee"), and on the southeast by the Northerly Levee of Reclamation District No. 787.

Rice is the predominant crop grown within RD 108's service area. Other key crops include tomatoes, safflower, wheat, alfalfa, corn, and vineseed. Rice accounts for approximately 40 to 50 percent of RD 108's irrigated acreage. Water needs are met through the contract surface water supply, although groundwater is used by a few individual growers to supplement the surface supply, particularly in dry years.

Table 3-28 shows 1995 normalized estimates and projections for the year 2020 of irrigated acres for the primary crops grown within RD 108's service area. The variation around these estimates (+/- percentage) accounts for typical and anticipated variations in crop acreage due to year type.

TABLE 3-28

RD 108 TOTAL IRRIGATED ACRES – 1995 AND 2020 ESTIMATES

Crop	1995 ^a	2020 ^b
Rice	21,500 (+/- 10%) ^c	21,600 (+/- 10%) ^c
Grain	8,200 (+/- 45%) ^c	8,100 (+/- 45%) ^c
Safflower	5,500 (+/- 35%) ^c	5,100 (+/- 35%) ^c
Tomatoes	5,400 (+/- 70%) ^c	6,600 (+/- 70%) ^c
All Other Crops	10,400 (+/- 30%) ^c	9,300 (+/- 30%) ^c
Total Irrigated Acres	51,000 (+/- 5%)^{c,d}	52,500 (+/- 5%)^{c,d}

^aFigures are estimates derived from field data that have been normalized (data have been modified to simulate a condition where hydrology and climate are assumed to be normal, i.e., drought or wet condition assumed not to occur). Source: DWR, Northern and Central Districts.

^bFigures are future projections that incorporate current and historical trends, as well as anticipated local and regional development and economic trends in the year 2020. Source: DWR, Northern and Central Districts.

^cPercentages obtained from RD 108.

^dIncludes 1,400 double-cropped acres for 1995, and 1,800 double-cropped acres for 2020.

Reclamation District No. 1004. RD 1004 is located on the east side of the Sacramento River east of the Town of Colusa and directly west of the Sutter Buttes. RD 1004 is primarily in Colusa County, with the southeasternmost portion extending into Sutter County. Butte Creek runs along a portion of the eastern edge of RD 1004. RD 1004's service area encompasses approximately 26,000 acres and serves 48 landowners.

The primary crop in RD 1004's service area is rice, due to the fine-textured and poorly drained soils found in the majority of the district. Rice accounts for over 80 percent of RD 1004's irrigated acres (CH2M HILL, 2003). Water needs are met through the contract surface water supply, although groundwater is used by a few individual growers to supplement the surface supply, particularly in dry years as per agreements with RD 1004.

Table 3-29 shows 1995 normalized estimates and projections for the year 2020 of irrigated acres for the primary crops grown within RD 1004's service area. The variation around these estimates (+/- percentage) accounts for typical and anticipated variations in crop acreage due to year type.

TABLE 3-29

RD 1004 TOTAL IRRIGATED ACRES – 1995 AND 2020 ESTIMATES

Crop	1995 ^a	2020 ^b
Rice	12,800 (+/- 10%) ^c	11,600 (+/- 10%) ^c
Dry Beans	1,400 (+/- 10%) ^c	1,200 (+/- 15%) ^c
Cotton	500 (+/-10%) ^c	1,500 (+/- 10%) ^c
Tomatoes	300 (+/-5%) ^c	300 (+/- 5%) ^c
Cucurbits	200 (+/-10%) ^c	600 (+/- 10%) ^c
All Other Crops	500 (+/-5%) ^c	500 (+/- 5%) ^c
Total Irrigated Acres	15,700 (+/-10%)^c	15,700 (+/- 10%)^c
^a Figures are estimates derived from field data that have been normalized (data have been modified to simulate a condition where hydrology and climate are assumed to be normal, i.e., drought or wet condition assumed not to occur). Source: CH2M HILL, 2003. ^b Figures are future projections that incorporate current and historical trends, as well as anticipated local and regional development and economic trends in the year 2020. Source: CH2M HILL, 2003. ^c Percentages obtained from RD 1004.		

Future irrigation-season cropping patterns and associated water requirements are anticipated to remain relatively the same as current conditions.

Meridian Farms Water Company. MFWC is located on the east side of the Sacramento River east of the community of Meridian and directly southwest of the Sutter Buttes. MFWC encompasses approximately 9,900 acres and serves 73 landowners. The main pumping facility is located at River Mile 134 on the Sacramento River.

Rice has typically accounted for less than half of MFWC's irrigated acreage; other key crops include tomatoes, safflower, alfalfa, and walnuts. MFWC uses recycled drainwater and stores water in canals and Long Lake to warm the water, which increases rice production. Several fields in MFWC's service area have recently been certified as organic rice farms. Organically grown rice is a higher value crop that requires additional water to offset herbicides commonly used for weed control. Irrigation water requirements are met through contract surface water supplies, drainwater recycling, and groundwater.

Rice production was increased in the MFWC service area, and tomato production has decreased because of changing market conditions. This increase in rice production has placed additional demands on MFWC's water delivery system, which has limited capacity in the middle of the company due to relatively flat slope and the need to maintain full canals to recirculate drainwater.

Table 3-30 shows 1995 normalized estimates and projections for the year 2020 of irrigated acres for the primary crops grown within MFWC's service area. The variation around these

estimates (+/- percentage) accounts for typical and anticipated variations in crop acreage due to year type.

TABLE 3-30

MFWC TOTAL IRRIGATED ACRES – 1995 AND 2020 ESTIMATES

Crop	1995 ^a	2020 ^b
Rice	3,500 (+/- 44%) ^c	3,500 (+/- 44%) ^c
Safflower	2,400 (+/- 11%) ^c	2,400 (+/- 11%) ^c
Tomatoes	1,300 (+/- 32%) ^c	1,300 (+/- 32%) ^c
Grain	1,000 (+/- 13%) ^c	1,000 (+/- 13%) ^c
Other Deciduous	600 (+/- 8%) ^c	600 (+/- 8%) ^c
All Other Crops	900 (+/- 5%) ^c	11,100 (+/- 5%) ^c
Total Irrigated Acres	9,700 (+/- 5%)^{c,d}	9,700 (+/- 5%)^{c,d}

^aFigures are estimates derived from field data which have been normalized (data have been modified to simulate a condition where hydrology and climate are assumed to be normal, i.e., drought or wet condition assumed not to occur).

^bFigures are future projections that incorporate current and historical trends, as well as anticipated local and regional development and economic trends in the year 2020.

^cPercentages obtained from MFWC.

^dIncludes 500 double-cropped acres for 1995 and 2020.

The MFWC Board of Directors issued a policy directive against the use of winter water for rice straw decomposition. During a flood event, the existing drain pumps would not be able to remove flood water and decomposition water. Removal of rice straw has not been an issue in the service area because rice straw is usually disked under after the growing season, and the field is planted with a different crop the following year.

Future irrigation-season cropping patterns and associated water requirements are anticipated to continue the current trend toward increased rice production and a reduction in tomato production, with rotations of beans, wheat, and safflower.

Sutter Mutual Water Company. SMWC is located northwest of Sacramento and is bordered by three levee systems. SMWC encompasses approximately 50,000 acres and serves 150 landowners. The service area encompasses the Town of Robbins.

The two major crops grown within the service area are tomatoes (grown in rotation with wheat, safflower, and beans) and rice (sometimes grown in rotation with wheat, safflower, beans, and melons, or grown 7 or 8 years consecutively without rotation).

Rice is the predominant crop grown within SMWC's service area, accounting for approximately 35 to 40 percent of the irrigated acreage. The majority of irrigation water needs are

met through the contract surface water supply, although drainwater is used depending on availability and quality.

Annual cropping patterns have changed over the last few decades as rice acreage has declined substantially. The prevalence of relatively rich, well-drained soils allows for a diversity of crops within the service area. Tomatoes have been the primary crop that has supplanted former rice-growing lands. However, the recent closure of two tomato canneries in the area may lead to a reduction in tomato production in the near future.

Table 3-31 shows 1995 normalized estimates and projections for the year 2020 of irrigated acres for the primary crops grown within SMWC's service area. The variation around these estimates (+/- percentage) accounts for typical and anticipated variations in crop acreage due to year type.

TABLE 3-31

SMWC TOTAL IRRIGATED ACRES – 1995 AND 2020 ESTIMATES

Crop	1995 ^a	2020 ^b
Rice	17,400 (+/- 10%) ^c	17,400(+/- 25%) ^c
Tomatoes	12,200 (+/- 10%) ^c	12,200 (+/- 20%) ^c
Grain	8,100 (+/- 15%) ^c	8,000 (+/- 15%) ^c
Dry Beans	5,500 (+/- 15%) ^c	4,900 (+/- 15%) ^c
All Other Crops	8,900 (+/- 15%) ^c	8,500 (+/- 25%) ^c
Total Irrigated Acres	52,100 (+/- 5%)^{c,d}	51,000 (+/- 5%)^{c,d}
^a Figures are estimates derived from field data that have been normalized (data have been modified to simulate a condition where hydrology and climate are assumed to be normal, i.e., drought or wet condition assumed not to occur). ^b Figures are future projections that incorporate current and historical trends, as well as anticipated local and regional development and economic trends in the year 2020. ^c Percentages obtained from SMWC. ^d Includes 5,500 double-cropped acres for 1995, and 4,900 double-cropped acres for 2020.		

Future irrigation-season cropping patterns and associated water requirements are anticipated to remain relatively the same as current conditions.

Pelger Mutual Water Company. PMWC is located approximately northwest of Sacramento and is bordered by SMWC on three sides. PMWC encompasses approximately 2,900 acres and serves 10 landowners.

PMWC has a relatively small service area, but operates similarly to larger districts in terms of cropping patterns and agricultural practices. Rice typically accounts for less than half of the irrigated acreage; other key crops include tomatoes and corn (CH2M HILL, 2003). Irrigation

water needs are met through contract surface water supplies, drainwater recycling, and groundwater. There is high variability in crop mix from year to year.

Table 3-32 shows 1995 normalized estimates and projections for the year 2020 of irrigated acres for the primary crops grown within PMWC’s service area. The variation around these estimates (+/- percentage) accounts for typical and anticipated variations in crop acreage due to year type.

TABLE 3-32

PMWC TOTAL IRRIGATED ACRES – 1995 AND 2020 ESTIMATES

Crop	1995 ^a	2020 ^b
Corn	700 (+/- 10-25%) ^c	700(+/- 10-25%) ^c
Rice	600 (+/- 10-25%) ^c	600 (+/- 10-25%) ^{bc}
Tomatoes	600 (+/- 10-25%) ^c	600 (+/- 10-25%) ^c
All Other Crops	1,000(+/- 10-25%) ^c	1,000 (+/- 10-25%) ^c
Total Irrigated Acres	2,900(+/- 10%)^{c,d}	2,900 (+/- 10%)^{c,d}

^aFigures are estimates derived from field data that have been normalized (data have been modified to simulate a condition where hydrology and climate are assumed to be normal, i.e., drought or wet condition assumed not to occur). Source: CH2M HILL, 2003.

^bFigures are future projections that incorporate current and historical trends, as well as anticipated local and regional development and economic trends in the year 2020. Source: CH2M HILL, 2003.

^cPercentages obtained from PMWC.

^dIncludes 100 double-cropped acres for 2020.

Future irrigation-season cropping patterns and associated water requirements are anticipated to remain relatively the same as current conditions.

Natomas Central Mutual Water Company. NCMWC is located on the east side of the Sacramento River between the Towns of Knight’s Landing and Sacramento. The service area includes portions of Sutter and Sacramento Counties and is within the western portion of the American Basin. NCMWC’s service area encompasses approximately 55,000 acres, which includes approximately 36,000 irrigated acres. NCMWC serves approximately 238 landowners, and the service area includes the Sacramento Municipal Airport and several proposed residential developments.

Rice is the predominant crop grown in the service area, accounting for approximately 60 percent of NCMWC’s irrigated acreage. Other crops include tomatoes and sugar beets, and rotation crops such as wheat and safflower, which are rotated with rice and tomatoes. The expanding Sacramento Metropolitan Area applies increasing urbanization pressure on agricultural properties in the service area along the urban fringe.

Water needs are met through the contract surface water supply, although groundwater is used by a few individual growers to supplement the surface supply, particularly in dry years as per agreements with NCMWC.

Table 3-33 shows 1995 normalized estimates and projections for the year 2020 of irrigated acres for the primary crops grown within NCMWC's service area. The variation around these estimates (+/- percentage) accounts for typical and anticipated variations in crop acreage due to year type.

TABLE 3-33

NCMWC TOTAL IRRIGATED ACRES – 1995 AND 2020 ESTIMATES

Crop	1995 ^{a, b}	2020 ^c
Rice	18,000	13,700
Sugar Beets	3,700	1,800
Corn	1,000	700
Tomatoes	600	500
All Other Crops	600	4,600
Total Irrigated Acres	23,900^b	21,300

^aFigures are estimates derived from field data that have been normalized (data have been modified to simulate a condition where hydrology and climate are assumed to be normal, i.e., drought or wet condition assumed not to occur).

^bAcres are based on NCMWC's actual deliveries. Potential acreage within Reclamation contract service area is approximately 35,000 acres.

^cFigures are future projections that incorporate current and historical trends, as well as anticipated local and regional development and economic trends in the year 2020.

Future irrigation-season cropping patterns and associated water requirements are anticipated to remain relatively the same as current conditions.

NCMWC has requested a change in authorized use from agricultural to M&I for use in a specified portion of its service area (i.e., Metro Air Park). Water deliveries would be made through existing CVP facilities, with no new construction required. The water would be placed to beneficial use within the CVP authorized places of use (within the SRSCs service area).

Agricultural Production. Regional economies include the producing, delivering, and trading of goods and services. Agriculture in the area of analysis is an important element of the local economy. Social and economic indicators addressed in this chapter include agricultural net returns, total output, value added, wages and salaries, and employment.

This section describes the social and economic conditions in the area of analysis and the social and economic effects of the No Action Alternative and Alternatives 1 through 5.

The Affected Environment/Existing Conditions section presents recent data related to the social and economic conditions of the subject areas, and provides background data related to

other social and economic issues, such as county tax revenue generated by the Williamson Act and agricultural groundwater extraction costs. This section presents most data at the county level because data regarding regional and agricultural economics area descriptions are generally available by county.

Area of Analysis. The area of analysis includes the following counties: Shasta, Tehama, Glenn, Colusa, Yolo, Butte, Sutter, Yuba, and Sacramento. Implementation of the Preferred Alternative would affect primarily the rural, agricultural portion of these counties, including small towns, located within the Sacramento Valley.

Agricultural Economics. The number and size of farms, together with ownership patterns, cropping patterns, production characteristics, and expense characteristics are used to describe the general structure of agriculture in the region. Table 3-34 summarizes data provided by the United States Department of Agriculture (USDA) Census of Agriculture for the number of farms, land in farm production, and area of cropland for counties in the Sacramento Valley.

In 1997, the average farm size in the Sacramento Valley was 349 acres⁴, and the region supported approximately 2 million acres of cropland, of which approximately 80 percent (1.6 million acres) were irrigated.

TABLE 3-34

FARMS, LAND IN FARMS, AND CROPLAND PROFILES OF SACRAMENTO VALLEY, 1997

County	Number of Farms	Land in Farms (acres) ^a	Average Size of Farms ^b (acres)	Total Cropland ^c		Harvested Cropland ^d		Irrigated Land ^e	
				Farms ^f	Acres	Farms	Acres	Farms	Acres
Shasta	850	316,743	373	612	59,487	401	22,659	605	38,863
Tehama	1,362	885,426	650	1,063	127,019	831	62,038	1,001	85,571
Glenn	1,189	482,583	406	1,070	255,968	916	212,848	1,025	220,235
Colusa	810	430,958	532	759	316,756	722	287,630	723	276,562
Yolo	923	536,595	581	832	380,700	747	324,291	709	294,021
Butte	1,942	404,166	208	1,750	247,368	1,646	222,209	1,686	223,690
Sutter	1,314	348,349	265	1,259	297,109	1,203	266,399	1,199	242,183
Yuba	706	208,462	295	548	96,989	426	79,586	556	85,241
Sacramento	1,288	308,035	239	986	159,059	688	120,220	886	122,550
Total	11,793	4,123,686	349	9,763	2,017,833	8,150	1,627,931	9,371	1,630,571

⁴ USDA data provided assumes the Census Bureau's most recent definition of a farm, being any place from which \$1,000 or more of agricultural products were produced or sold, or normally would have been sold during the census year.

TABLE 3-34

FARMS, LAND IN FARMS, AND CROPLAND PROFILES OF SACRAMENTO VALLEY, 1997

County	Number of Farms	Land in Farms (acres) ^a	Average Size of Farms ^b (acres)	Total Cropland ^c		Harvested Cropland ^d		Irrigated Land ^e	
				Farms ^f	Acres	Farms	Acres	Farms	Acres
<p>^aThe acreage designated as "land in farms" consists primarily of agricultural land used for crops, pasture, or grazing. All grazing land, except land used under government permits on a per-head basis, was included as "land in farms," provided it was part of a farm or ranch.</p> <p>^bAll farms were classified into selected size groups according to the total land area in the farm. The land area of a farm is an operating unit concept and includes land owned and operated as well as land rented from others.</p> <p>^cThis category includes land from which crops were harvested or hay was cut; land in orchards, citrus groves, vineyards, nurseries, and greenhouses; cropland used only for pasture or grazing; land in cover crops, legumes, and soil-improvement grasses; land on which all crops failed; land in cultivated summer fallow; and idle cropland.</p> <p>^dThis category includes land from which crops were harvested or hay was cut, and land in orchards, citrus groves, Christmas trees, vineyards, nurseries, and greenhouses.</p> <p>^eThis category includes all land watered by any artificial or controlled means, such as sprinklers, flooding, furrows or ditches, and spreader dikes. Included are supplemental, partial, and pre-plant irrigation.</p> <p>^fNumber of farms with some cropland.</p> <p>Source: 1997 Census of Agriculture, Volume 1 Geographic Area Series, "Table 1. County Summary Highlights: 1997."</p>									

The U.S. Department of Commerce, Bureau of Economic Analysis definition of agricultural net returns is gross crop revenues plus other income less total farming costs. Although higher costs reduce farm profits, some costs represent farm expenditures in the regional economy. In 1999, total cash receipts for the Sacramento Valley were approximately \$1.9 billion, other income was \$0.5 billion, and realized agricultural net income for the valley was estimated to be approximately \$323 million. Table 3-35 shows agriculture revenue and production costs by county.

TABLE 3-35

AGRICULTURAL REVENUE AND PRODUCTION COSTS (\$1,000)

County	Gross Farm Income ^a					Production Expenses ^b	Realized Net Income ^c	Total Farm Labor and Proprietors Income ^d
	Total Cash Receipts			Other Income				
	Livestock Production	Crops	Total	Govt. Payments	Total Other Income			
Shasta	15,417	19,738	35,155	429	4,088	42,374	-3,131	9,669
Tehama	53,611	46,931	100,542	4,775	19,244	123,403	-3,617	20,022
Glenn	50,356	149,606	199,962	48,148	71,885	252,270	19,577	32,451
Colusa	7,412	280,828	288,240	74,895	97,987	307,194	79,033	98,887
Yolo	15,537	330,515	346,052	26,678	57,213	368,957	34,308	99,454
Butte	9,103	234,335	243,438	48,682	75,601	283,349	35,690	58,363
Sutter	6,044	315,158	321,202	54,220	89,966	323,420	87,748	97,658
Yuba	15,434	84,078	99,512	17,639	33,159	115,212	17,459	34,784
Sacramento	78,570	171,819	250,389	43,165	56,828	250,083	57,134	83,510
Total	271,021	1,660,266	1,931,287	325,930	520,264	2,128,372	323,179	541,230

^aGross farm income consists of estimates for the following items: cash receipts from marketing of crops and livestock; income from other farm-related activities, including recreational services and the sale of forest products; government payments to farmers; value of food and fuel produced and consumed on farms; gross rental value of farm dwellings; and the value of the net change in the physical volume of farm inventories of crops and livestock.

^bProduction expenses consist of purchases of feed, livestock, seed, fertilizer and lime, and petroleum products; hired farm labor expenses (including contract labor); and all other production expenses (e.g., depreciation, interest, rent and taxes, and repair and operation of machinery).

^cProduction expenses and gross farm income excluding inventory change are used to calculate realized net income of all farms (gross farm income, excluding inventory change, minus production expenses equals realized net income).

^dU.S. Department of Commerce, Bureau of Economic Analysis estimate of farm proprietors' income is estimated from modifying realized net income to exclude the income of corporate farms and salaries paid to corporate officers.

Farm production expenses represent income for farm labor, farm supply companies, custom operators, and related businesses. A decrease in farm production expenses results in a decrease in revenues received by farm labor and businesses. In 1999, total production expenses for the region were about \$2.1 billion (Table 3-36). Hired farm labor costs were one of the largest components of total expenses at 29.5 percent.

TABLE 3-36

PRODUCTION EXPENSES

County	Feed Purchased	Livestock Purchased	Seed Purchased	Fertilizer and Lime	Petroleum Products Purchased	Hired Farm Labor Expenses ^a	Other Production Expenses ^b
Shasta	2,824	1,309	600	801	1,475	8,806	26,559
Tehama	8,701	8,129	1,248	7,635	3,814	26,550	67,326
Glenn	16,556	6,690	7,276	29,233	8,800	64,369	119,346
Colusa	1,308	1,737	17,989	38,468	12,133	93,877	141,682
Yolo	2,103	3,501	20,370	45,069	14,093	118,942	164,879
Butte	2,634	1,308	8,519	3,379	8,698	96,487	132,324
Sutter	1,702	887	11,412	40,657	12,585	99,412	156,765
Yuba	4,194	1,100	2,335	12,241	3,748	37,814	53,780
Sacramento	43,362	9,805	8,098	17,458	7,268	61,251	102,841
Total	88,232	36,957	80,038	198,838	74,545	619,918	999,803

^aHired Farm Labor" includes contract labor.
^bOther production expenses includes depreciation, interest, rent, water, taxes, and repair and operation of machinery.

Environmental Consequences. The No Action Alternative represents future conditions if the Preferred Alternative were not implemented. In general, agricultural production within the Sacramento Valley is not anticipated to substantially change within the 40-year term of the Preferred Alternative. Rice, grains, tomatoes, oilseeds, forage, and orchard crops would dominate agricultural production. Trends reported in the most recent California Water Plan Update (Department, 1998) indicate little change in total irrigated acreage through 2020, but with some shift in acreage toward permanent crops. These trends are expected to continue. Farmers would continue to temporarily idle some land and would continue to rotate other previously idled land back into production. Fallowing fields is a common land management practice and is done for agronomic purposes as well as in response to market conditions and water supply shortages. These farming practices cause normal variations in total value of output, value added, wages and salaries, and employment. It is anticipated that some lands, primarily those near the urban areas of the Sacramento Metropolitan Area and to a lesser degree Redding, would be converted to nonagricultural use in accordance with local general plans and zoning constraints. The conditions under the No Action Alternative generally reflect the conditions described in the Affected Environment section.

Alternative 1.

Water Delivery: Contract Quantities and Shortage Provisions

This alternative would not result in any operational changes compared to the No Action condition.

Other Contract Provisions

Some savings in cost to SRSCs may occur in years during which they purchase between 75 and 100 percent of their Project Water. The average annual savings are anticipated to be small and would not affect agricultural production.

No other proposed contract provisions are expected to affect agricultural production.

Alternative 2.**Water Delivery: Contract Quantities and Shortage Provisions**

This alternative could result in a small increase in groundwater pumping due to increased frequency of shortages under the sliding-scale provision. However, such cutbacks would be infrequent and involve relatively modest amounts of pumping.

Economic analyses prepared for other recent studies indicate that grains, oilseeds, rice, and forage crops are those likely to be reduced in acreage during years of water shortage (Reclamation, 1998). These SRSCs lacking groundwater represent a very small portion of the total Settlement Contract water delivery. No significant impacts to the regional economy are expected. The incremental changes in frequency of shortage would apply to a very limited area.

Some increase in water delivery could occur for agricultural water service contractors outside the SRSCs service area, depending on how the additional years of SRSC shortages affect CVP water management.

Other Contract Provisions

No other proposed contract provisions are expected to affect agricultural production.

Alternative 3.**Water Delivery: Contract Quantities and Shortage Provisions**

Water shortages and frequencies are identical to the No Action Alternative, so there would be no impacts to agricultural production or land use.

Other Contract Provisions

Some savings in cost to SRSCs may occur in years during which they purchase less than 100 percent of their project water. The average annual savings is anticipated to be small and would not be expected to affect agricultural production.

No other proposed contract provisions are expected to affect agricultural production.

Alternative 4.**Water Delivery: Contract Quantities and Shortage Provisions**

Under this alternative, any increase in groundwater pumping costs would be compensated by Reclamation; therefore, there would be no net change in agricultural production and net revenues for lands with access to groundwater.

SRSCs with no ability to pump groundwater in shortage years would be compensated for any losses in net revenue from agricultural production. Economic analysis prepared for other recent studies indicates that grains, oilseeds, rice, and forage crops are those likely to be reduced in acreage during years of water shortage (Reclamation, 1998). These SRSCs represent a very small portion of the total Settlement Contract water delivery. No significant

impacts to the regional economy are expected. SRSC growers would be compensated, and the incremental changes in frequency of shortage would apply to a very limited area.

Some increase in water delivery could occur for agricultural water service contractors outside the SRSCs service area, depending on how the additional years of SRSC shortages affect CVP water management.

Other Contract Provisions

Some savings in cost to SRSCs may occur in years during which they purchase between 75 and 100 percent of their Project Water. The average annual savings are anticipated to be small and would not be expected to affect agricultural production.

No other proposed contract provisions are expected to affect agricultural production.

Alternative 5.

Water Delivery: Contract Quantities and Shortage Provisions

Under this alternative, any increase in groundwater pumping costs would be compensated by Reclamation; therefore, there would be no net change in agricultural production and net revenues for lands with access to groundwater.

SRSCs with no ability to pump groundwater in shortage years would be compensated for any losses in net revenue from agricultural production. Economic analysis prepared for other recent studies indicates that grains, oilseeds, rice, and forage crops are those likely to be reduced in acreage during years of water shortage (Reclamation, 1998). These SRSCs represent a very small portion of the total Settlement Contract water delivery. No significant impacts to the regional economy are expected. SRSC growers would be compensated, and the incremental changes in frequency of shortage would apply to a very limited area.

Some increase in water delivery could occur for agricultural water service contractors outside the SRSCs service area, depending on how the additional years of SRSC shortages affect CVP water management.

Other Contract Provisions

Some savings in cost to SRSCs may occur in years during which they purchase between 75 and 100 percent of their Project Water. The average annual savings are anticipated to be small and would not affect agricultural production.

The requirement to install measuring devices on all farm gate deliveries would impose substantial cost obligations on SRSCs. According to estimates prepared for the Independent Panel on Appropriate Measurement of Agricultural Water Use (California Bay-Delta Authority, 2003), most agricultural fields in the SRSCs service area do not have measuring devices that meet Reclamation's Water Conservation Guidelines for precision. Installation, operation, and data collection for such measuring devices were estimated to cost \$1,500 per year per device, or \$33 per year per affected acre.

The combination of farm gate measuring devices and volumetric pricing of water to growers would likely result in some reductions in average applied water. The reduction in applied water could be significant if water is priced high enough to induce major changes in irrigation techniques. In turn, this would result in decreases in diversions during all years, both full

delivery and shortage years. A portion of the reduced water application would reduce groundwater recharge, and potentially could impair the groundwater basin’s ability to recover after drought years when surface water deliveries are cut.

Municipal and Industrial Land Use and Water Costs.

Affected Environment. M&I land uses in the Sacramento Valley are small when compared to agricultural land use. Continued population growth in the Sacramento Valley identified in County General Plans and projected by the Department of Finance would likely cause the conversion of agricultural land uses to M&I uses, particularly near population centers like Sacramento and Yuba City-Marysville (growing commuter populations). The new M&I land uses could increase economic activity in population centers and reach throughout the region by diversifying commercial, industrial, and service industries. The following describes M&I areas that potentially could be affected by the Preferred Alternative. These areas either currently receive, or are anticipated to receive water from irrigation districts for municipal and/or industrial use. Some of these customers would potentially benefit from additional water available, particularly through Alternatives 4 and 5.

City of Redding. The total population of the City of Redding is 80,865, with an anticipated annual growth rate of 2.2 percent. Population is projected to reach 126,548 by the year 2020.

Table 3-37 shows the build-out projections for the City of Redding.

TABLE 3-37

GENERAL PLAN LAND USE PROJECTIONS

Land Use	Acres	Dwelling Units	Population	Commercial/Industrial Square Feet (x 1,000) ²
Residential	36,817	85,354	201,433	
Commercial	2,658			35,019
Heavy Commercial/Industry	6,556			94,751
Other ^a	25,452			N/A
^a Other land use designation includes: airports, public facilities/institutional, greenways, parks, and recreation areas.				

The City of Redding has two surface water supply contracts with Reclamation, the Sacramento River Contract and the Buckeye Contract. The Sacramento River Contract provides up to 21,000 AFY from the Sacramento River (17,850 AF of Base Supply and 3,150 AF of Project Water), and 6,140 AF from Whiskeytown Reservoir. The City of Redding Water Master Plan indicates that by the year 2005, the city water system would have an annual demand of approximately 26,100 AF, and by the year 2010, the annual demand would reach approximately 44,200 AF. Table 3-38 shows the City of Redding’s demand projections through 2040.

TABLE 3-38

CITY OF REDDING WATER SERVICE AREA – GROWTH AND WATER DEMAND PROJECTIONS

Year	Service Area Population	Average Connections	Annual Demand (AF)	Average-day Demand (mgd)	Maximum-day Demand (mgd)
2000	77,782	24,460	23,900	21.34	46.9
2005	84,956	26,716	26,100	23.30	51.3
2010	92,609	29,122	28,400	25.35	55.8
2015	100,357	31,559	30,800	27.49	60.5
2020	108,326	34,065	33,200	29.64	65.2
2025	117,274	36,879	36,00	32.14	70.7
2030	126,961	39,925	39,00	34.81	76.6
2035	137,448	43,223	42,200	37.67	82.9
2040	144,000	45,283	44,200	39.46	86.8

Source: City of Redding Water Master Plan, 2000.

Natomas Central Mutual Water Company. NCMWC has requested a change in authorized use from agricultural to M&I for use in a specified portion of its service area (i.e., Metro Air Park). Water deliveries would be made through existing CVP facilities, with no new construction required. The water would be placed to beneficial use within the CVP authorized places of use (within the SRSCs service area).

City of West Sacramento. Land use in the City of West Sacramento is primarily M&I. The total population of the city is 31,615.

Table 3-39 shows the projected water demand at build-out.

TABLE 3-39

**CITY OF WEST SACRAMENTO PROJECTED
WATER DEMAND AT BUILD-OUT**

Land Use Type	Projected Units	Water Use Factors	Projected Average Day (mgd)
Single-family Residential	14,992 du	560 gpd/du	8.4
Multi-family Residential	14,143 du	290 gpd/du	4.1
Commercial	2,268 acres	2,950 gpd/acre	6.7
Industrial	1,444 acres	2,950 gpd/acre	4.3
Schools	12,027 students	25 gpd/student	0.3
Parks/Other	528 acres	1,800 gpd/acre	0.9
Total			24.7
Notes:			
gpd = gallons per day du = dwelling unit			

City of Sacramento. Sacramento is bordered on the west by the Sacramento River, and the American River and the Sacramento River converge at the city's west-central border.

The City of Sacramento contains approximately 63,120 acres, and land uses include the following:

- 23,510 acres of residential uses
- 22,360 acres of vacant and agricultural uses
- 7,540 acres of public and quasi-public land uses
- 3,300 acres of industrial
- 3,200 acres of recreation
- 3,210 acres of commercial and office parks

Existing agricultural land in the City of Sacramento is located primarily along the northern and southern perimeters, the western corner of the South Natomas area, and the eastern portion of East Broadway. The City of Sacramento General Plan indicates the following mix of planned land uses (Water Forum, 1999):

- 34,470 acres of residential
- 8,770 acres of industrial
- 5,520 acres of recreation
- 8,570 acres of public and quasi-public land uses
- 5,310 acres of commercial and office park
- 490 acres of vacant land

Water Costs. During periods of cutbacks, the SRSCs would have to turn to other sources of water to make up the difference in CVP deliveries. Agricultural water deliveries are cut back sooner than M&I diversions with the amount of the shortage dependent on the severity of the drought conditions. In the future, as water contracts are converted from agricultural purposes to M&I, more M&I water users would benefit from these drought delivery prioritizations. This would somewhat reduce the risk to M&I land uses and economic activity. Reclamation is currently working on a new M&I Shortage Policy that would provide a cutback protocol applicable to long-term contract renewals.

Currently only the City of Redding has an M&I contract among the SRSCs. Water withheld from agricultural deliveries could go to M&I contractors outside the SRSCs service area, including those described earlier, and those contractors would realize some benefit in delayed shortages as well. However, those impacts are beyond the scope of this analysis.

Once the M&I users are shorted CVP water deliveries, they would need to turn to more expensive alternative sources of water through purchases, transfers, storage, or groundwater pumping. Spot market purchases are expensive by the nature of needing to acquire water when supplies are low. They may also create local or regional impacts. For instance, an agricultural producer could decide not to plant a crop because of existing water shortages and sells his or her remaining water to an M&I users on the spot market. The crop is not planted and money is not spent on the process of developing crops (e.g., fertilizer and labor) and is therefore lost to the local and regional economy. Transfer agreements can be costly in time and resources to negotiate. Inter-regional support and approvals are also required to successfully negotiate some transfers. Similarly, storage facilities can require regulatory and local approval and be expensive to build. Groundwater pumping requires infrastructure in the form of wells, pumps, and conveyance if they do not already exist. However, the costs of pumping groundwater under Alternatives 4 and 5 would be compensated by Reclamation under the assumptions of these alternatives.

Environmental Consequences. The effects of Alternatives 1 through 5 on M&I water costs and land use in the SRSCs service area are compared to conditions under the No Action Alternative.

No Action Alternative. The No Action Alternative does not include new facilities or construction. The No Action Alternative assumes that dry-year reductions would remain the same as existing conditions and the renewal contract period would last 40 years. M&I land uses and economic growth are anticipated to follow trends already identified in county master plans and by the California Department of Finance. The impacts of the No Action Alternative are consistent with existing land use conditions. With the current level of population growth, additional water costs would be incurred to develop new water supplies, but increased water demands due to population growth have been accounted for in county general plans and are integrated into existing conditions.

Alternative 1. Land use and economic growth under Alternative 1 would be identical to conditions under the No Action Alternative. There are no significant changes in project infrastructure or operations. The reduction in contract amounts for ACID and SMWC would have no impact on land use or economic growth because the contract reductions are

based on current agricultural development levels. No adverse land use and water cost impacts are associated with this alternative.

Alternative 2. Land use and economic growth under Alternative 2 would be identical to conditions under the No Action Alternative. There are no significant changes in project infrastructure or operations. No adverse land use and water cost impacts are associated with this alternative. Some increase in water delivery could occur for M&I water service contractors outside the SRSCs service area, depending on how the additional years of SRSC shortages affect CVP water management.

Alternative 3. Land use and economic growth under Alternative 3 would be identical to conditions under the No Action Alternative. There are no significant changes in project infrastructure or operations. No adverse land use and water cost impacts are associated with this alternative.

Alternative 4. Land use and economic growth under Alternative 4 would be identical to conditions under the No Action Alternative. There are no significant changes in project infrastructure or operations. The reduction in contract amounts for ACID and SMWC would have no impact on land use or economic growth because contract reductions are based on current agricultural development levels. No adverse land use and water cost impacts are associated with this alternative. Some increase in water delivery could occur for M&I water service contractors outside the SRSCs service area, depending on how the additional years of SRSC shortages affect CVP water management.

Alternative 5. Land use and economic growth under Alternative 5 would be identical to conditions under the No Action Alternative. There are no significant changes in project infrastructure or operations. The reduction in contract amounts for ACID and SMWC would have no impact on land use or economic growth because contract reductions are based on current agricultural development levels. No adverse land use and water cost impacts are associated with this alternative. Some increase in water delivery could occur for M&I water service contractors outside the SRSCs service area, depending on how the additional years of SRSC shortages affect CVP water management.

Power Supply and Demands

Central Valley Project Hydroelectric Operations and Generation Facilities.

Western Area Power Authority (Western) operates, maintains, and upgrades the transmission grid that was constructed by the CVP. Hydroelectric generation facilities were constructed as part of 11 CVP water supply facilities (Figure 3-23). Hydroelectric generation facilities include the turbines, generators, and powerplant substations and switchyards used to generate electricity and deliver it to a transmission system. CVP hydroelectric facilities have an installed generation capability of approximately 2,000 megawatts (MW) (Table 3-40).

Western dispatches and markets CVP power to preference power customers. Preference power customers are entities such as municipalities and irrigation districts that are specifically entitled to preference under Reclamation law. Western is also responsible for meeting all project use load, which is the power required to operate CVP facilities. Although developed primarily for irrigation, this multiple-purpose project also provides flood control,

improves Sacramento River navigation, supplies domestic and industrial water, generates electric power, conserves fish and wildlife, creates opportunities for recreation, and enhances water supply. Although the generation of power is not the primary operational objective, it is nonetheless a major economic benefit of CVP operations and, accordingly, affects project operations.

TABLE 3-40

HYDROELECTRIC GENERATION FACILITIES

CVP Division	Powerplant	Location	Generating Units	Capability (kW)
Trinity River	Trinity	Trinity Dam/Trinity River	2	139,650
	Lewiston	Lewiston Dam/Trinity River	1	350
	J.F. Carr	Whiskeytown Dam	2	157,000
	Spring Creek	Spring Creek Power Conduit	2	200,000
Shasta	Shasta	Shasta Dam/Sacramento River	7 ^a	625,000 ^b
	Keswick	Keswick Dam/Sacramento River	3	105,000
American River	Folsom	Folsom Dam/American River	3	215,000
	Nimbus	Nimbus Dam/American River	2	14,900
Delta	San Luis	San Luis Reservoir	8 (total)	202,000 (CVP share) (424,000 total)
	O'Neill	San Luis Canal	6	29,000
East Side	New Melones	New Melones Dam/Stanislaus River	2	383,000
Total Capability				2,070,900
^a Includes two station service units. ^b Installed capacity after all rewinds were completed in year 2000. Note: kW = kilowatt				

Power Generation and Purchase. Power generation from CVP facilities fluctuates with reservoir releases and storage levels. Climatic conditions such as drought or wet conditions are the primary factors affecting releases and storage, and the associated ability to generate power. For example, dry periods reduced the water level in the New Melones Reservoir to below the minimum power-pool levels, resulting in no power being generated at the facility from August through January in 1991 and August through January in 1992. Reservoir releases are also affected by mandated minimum streamflow requirements, flow-fluctuation restrictions, water delivery contracts, and water quality requirements. For example, prior to construction of the Shasta Dam Temperature Control Device (TCD), the Biological Opinion (BO) on Sacramento River Winter-run Chinook Salmon required Reclamation to release cold water from Shasta Dam outlets that bypass the powerplants. The BO has also increased the winter and spring water releases into the Sacramento River, thereby resulting in less water being available for release in the summer, when power needs are highest (the installation of the Shasta TCD in 1997 essentially eliminated the need to bypass the powerplants at Shasta Dam). These factors have resulted in actual generation typically being less than full capability.

Peak power loads typically occur in summer months when water conveyance, groundwater pumping, industrial loads, and air conditioning loads are greatest. In the past, CVP generation has been integrated with other power generation resources operated by Pacific Gas and Electric Company (PG&E) to meet project use load and CVP preference power customer loads. The integration of CVP and PG&E generation is subject to a contract signed by the Department of the Interior (DOI) and PG&E, referred to as Contract 2948-A. In recent years, this integration has also been affected by changes in the power supply industry. Contract 2948-A will expire after 2004 and will not be renewed. Future project power operations will be based on project use loads and CVP preference power customer loads. Currently, project use loads account for about 30 percent of the energy generated by CVP. In Fiscal Year (FY) 2001, CVP net generation was 4,175 gigawatt hours (GWh), and project use was 1,158 GWh (28 percent of net generation). In FY 2002, CVP net generation was 4,280 GWh, and project use was 1,375 GWh (32 percent of net generation). During droughts and other times of low CVP generation, Western has exchanged or banked power with PG&E and purchased power from other entities (particularly those in the Pacific Northwest) to meet demands.

Reclamation, Western, and PG&E work together on a daily basis, comparing hydropower availability, total loads (including PG&E loads), and availability of PG&E resources and transmission capabilities. Daily operations are scheduled 1 day prior to actual use when the Reclamation dispatch center determines the necessary releases from Keswick, Lewiston, Tulloch, and Nimbus Reservoirs to meet hourly streamflows, water demands, water quality requirements, and power generation needs. Reclamation communicates the dam releases to Western's Folsom dispatch office, which coordinates with the PG&E dispatch center. The three entities confirm and, if necessary, adjust the schedule.

Current Power Marketing. Western sets prices for CVP hydropower according to its costs for delivering power to customers. However, the value of the electricity that Western sells to customers is set by the external markets and can fluctuate according to supply and demand. Although the value and annual project output can fluctuate, Western's costs remain essentially unchanged. This causes Western's per-unit cost of electricity to vary. When long-term average generation decreases, Western's customers receive less electricity and are required to pay a higher per-unit cost. If Western rates are relatively low, Western customers are likely to continue to purchase power from Western as part of their long-term resource mix. For planning purposes, power customers evaluate capacity resources according to dry conditions to ensure reliability.

Western has wide discretion within its statutory guidelines regarding with whom and on what terms it will contract for the sale of federal power. The sale of excess power is conducted so as not to impair the efficiency of CVP irrigation deliveries. Contract 2948-A allows for the sale, interchange, and transmission of electrical power and energy between the federal government and PG&E. The agreement allows PG&E to provide energy and capacity as required to meet project use and preference power customer loads; in return, the CVP generating units provide energy and capacity for integration with other PG&E resources. The agreement also recognizes the federal government's 400-MW entitlement on the Pacific Northwest/Pacific Southwest Intertie.

Under the terms of Contract 2948-A, Western delivers the generation of CVP powerplants to PG&E, along with its wholesale purchases; and PG&E supports firm power deliveries to the preference power customers up to a maximum simultaneous demand of 1,152 MW. Western also purchases additional power to support the CVP marketing program and primarily imports it through use of Western's share of the Pacific Northwest/Pacific Southwest Intertie and the California-Oregon Transmission Project.

Market Trends in Electricity Demand. The California Energy Commission has forecast that electricity usage in California will grow an average of 1.8 percent per year between now and 2010; the growth rate in the PG&E service area is forecast to grow a similar 1.7 percent per year (California Energy Commission, 2000). Peak capacity requirements are forecast to grow at similar rates. Table 3-41 shows the forecast energy use and peak demand for the PG&E service area and the state.

TABLE 3-41

FORECAST ELECTRICITY DEMAND

Year	Energy Use (GWh)		Peak Capacity Demand (MW)	
	PG&E	California	PG&E	California
2000 (estimated)	101,172	262,441	20,320	53,439
2003 (forecast)	103,335	273,063	20,881	57,643
2010 (forecast)	119,968	313,674	24,335	66,095
Change, 2003-2010	16,633	40,611	3,454	8,452
% Change 2003-2010	16.1%	14.9%	16.5%	14.7%
Source: California Energy Commission, 2000. The Commission is in process of preparing the "2003 Integrated Energy Policy Report" that will include updated forecasts.				

Value of Electricity Production. Hydroelectric power generated from existing facilities is one of the lowest-cost sources available and represents about 10 to 20 percent of California's electricity generation, depending on weather. It is often generated during peak demand periods with the ability to rapidly vary output levels, making it more valuable than average. New sources of electricity generation are being developed in California and other western states that will include gas-fired combustion and combined-cycle plants, co-generation plants, and renewable sources such as windmills. The cost of these new sources is expected to be substantially greater than the cost of producing power with existing hydroelectric facilities.

The California Energy Commission has made estimates of what it calls the market-clearing price for new power. This is defined as the price that would be paid for additional power in a day-ahead auction such as California's former energy-trading market, the Power Exchange. The Commission examined a rapid supply development scenario and a cautious development

scenario. In the cautious scenario, estimated average costs for increments of purchased power rise from about \$25 per megawatt-hour (MWh) in 2003 to over \$40 per MWh in 2010. Purchase costs for on-peak power are higher, rising from an estimated \$29 per MWh in 2003 to \$48 per MWh in 2010 (see Figure 3-24). These estimates were made prior to the very large price spikes observed in 2001. As a comparison, the Energy Commission recently estimated the cost of replacing peak generation on the Klamath Project at \$50 per MWh (CEC, 2003).

Power Requirements for Groundwater Pumping. One of the main alternative sources of water when CVP cutbacks are in effect is groundwater. Electric or diesel-driven pumps are used by SRSCs to pump groundwater to supplement CVP water during years of delivery cutbacks. Table 3-42 summarizes the amount of electricity needed to pump groundwater under different cutback scenarios. These estimates assume that the pumps are driven by electric motors – energy required by diesel-driven pumps would be roughly equivalent. For purposes of illustrating potential impacts, total average pumping lift is assumed to be 60 feet and well pumping efficiency is assumed to be 70 percent. Actual lifts and efficiency will vary by location.

TABLE 3-42

POWER REQUIRED TO PUMP GROUNDWATER

Shasta Inflow Deficiency	Water Pumped (AF)	Energy Used (MWh) ^a
200,000 to 400,000 AF	212,745	18,600
400,000 to 600,000 AF	425,490	37,200
Greater than 600,000 AF	531,863	46,500

^aAssumes 60-foot average total lift and 70 percent pumping efficiency.

Environmental Consequences. The effects of Alternatives 1 through 5 on hydroelectric power generation and power consumption through changes to groundwater pumping of the SRSCs service area are compared to conditions under the No Action Alternative.

No Action Alternative. The No Action Alternative does not include new facilities or construction. The No Action Alternative assumes that dry-year reductions would remain the same as existing conditions, and the renewed contract period would last 40 years.

Alternative 1. Alternative 1 would not change water operations compared to No Action; therefore, hydroelectric power generation would also remain unchanged.

The demand for electricity to pump groundwater would be exactly the same as under No Action. Implementation of this alternative would not result in any impact compared to No Action.

Alternative 2. Alternative 2 would potentially result in changed water operations compared to No Action, particularly during drought operations when the SRSCs would be subject to more frequent water cutbacks than in the No Action. Any additional water available for hydropower generation would be beneficial for hydropower resources. Notably,

if the additional water were allocated for hydropower, it could be reserved to generate power during nonirrigation and peak electrical demand periods, when the value of hydropower generation is highest.

The demand for electricity to pump groundwater during cutbacks would increase in frequency relative to No Action. Expressed as an average over the 80-year hydrologic record, about 32,000 AF of Sacramento River delivery per year would need to be replaced by groundwater pumping. Using the assumptions described above, up to 2,800 MWh of electricity would be consumed by that increased level of pumping. At a price of 9.3 cents per kWh (PG&E, 2004), the annual cost would average up to about \$0.3 million. Under assumptions of the alternative, any additional costs to SRSCs and their growers would be compensated by Reclamation, resulting in no net change in cost of agricultural production. The increased demand for electricity to pump groundwater during cutbacks would be less than significant.

Alternative 3. Alternative 3 would not change water operations compared to No Action; therefore, hydroelectric power generation would also remain unchanged. The demand for electricity to pump groundwater would not change relative to No Action.

Alternative 4. Alternative 4 would potentially result in changed water operations compared to No Action, particularly during drought operations when the SRSCs would be subject to more frequent water cutbacks. Any additional water available for hydropower generation would be beneficial for hydropower resources. Notably, if the additional water were allocated for hydropower, it could be reserved to generate power during nonirrigation and peak electrical demand periods, when the value of hydropower generation is highest.

The demand for electricity to pump groundwater during cutbacks would increase in frequency relative to No Action. Expressed as an average over the 80-year hydrologic record, about 121,000 AF of Sacramento River delivery per year would need to be replaced by groundwater pumping. Using the assumptions described above, up to 10,500 MWh of electricity would be consumed by that increased level of pumping. At a price of 9.3 cents per kWh (PG&E, 2004), the annual cost would average up to almost \$1 million. Under assumptions of the alternative, any additional costs to SRSCs and their growers would be compensated by Reclamation, resulting in no net change in cost of agricultural production. The increased demand for electricity to pump groundwater during cutbacks would be less than significant.

Alternative 5. Alternative 5 would potentially result in changed water operations compared to No Action, particularly during drought operations when the SRSCs would be subject to more frequent water cutbacks. Any additional water available for hydropower generation would be beneficial for hydropower resources. Notably, if the additional water were allocated for hydropower, it could be reserved to generate power during nonirrigation and peak electrical demand periods, when the value of hydropower generation is highest. The demand for electricity to pump groundwater during cutbacks would increase in frequency relative to No Action. Expressed as an average over the 80-year hydrologic record, about 241,000 AF of Sacramento River delivery per year would need to be replaced by groundwater pumping. Using the assumptions described above, up to 21,000 MWh of electricity would be consumed by that increased level of pumping. At a price of 9.3 cents per kWh (PG&E, 2004), the annual cost would average up to almost \$2 million. Under assumptions of the alternative,

any additional costs to SRSCs and their growers would be compensated by Reclamation, resulting in no net change in cost of agricultural production. The increased demand for electricity to pump groundwater during cutbacks would be less than significant.

Regional Economics

The total population for the counties in the Sacramento Valley was approximately 2,824,000 in the year 2001. In 2001, the total employment for the area was 1,482,000 jobs, with the most jobs (approximately 22 percent) existing in the government and government enterprises industry. It should be noted that a substantial majority of the Sacramento Valley population is located in the Sacramento metropolitan area and in other urban centers (e.g., Redding and Yuba City/Marysville).

Regional Employment and Income

Table 3-43 shows the total non-farm earnings. The sectors with the largest earnings are Government and Government Enterprises (29 percent), Health Care and Social Assistance (9 percent), Construction (9 percent), Retail Trade (8 percent), and Transportation and Warehousing (8 percent). Table 3-44 shows estimated non-farm industry employment for potentially affected counties in the Sacramento Valley area. As mentioned above, Government and Government Enterprise provide approximately 22 percent of the jobs in the Sacramento Valley, followed by Retail Trade (12 percent), Health Care and Social Assistance (9 percent), Construction (7 percent), and Accommodation and Food Services (7 percent).

Table 3-45 summarizes personal income measures, industry earnings, employment and population. The range of per capita income in 2001 was Sacramento County with the highest at \$29,548 and Glenn County with the lowest at \$18,031. Non-farm personal income is highest in Sacramento County and lowest in Colusa County. Farm income is highest in Yolo County and lowest in Butte County. Non-farm income represents the majority of the income for the region.

TABLE 3-43

TOTAL NON-FARM INDUSTRY EARNINGS, SACRAMENTO VALLEY (\$1,000), 2001

Industry	Shasta	Tehama	Glenn	Colusa	Yolo	Butte	Sutter	Yuba	Sacramento	Total
Forestry, Fishing, Related Activities, and Other	N/A	N/A	12,375	14,082	43,346	36,599	32,415	12,932	28,958	215,407
Mining	N/A	N/A	1,924	86	19,275	1,965	2,091	5,633	28,226	96,351
Utilities	51,422	4,571	3,174	846	N/A	26,069	1,480	N/A	68,594	197,041
Construction	264,243	32,009	17,338	8,505	322,247	184,238	111,706	53,272	2,105,739	4,780,420
Manufacturing	140,344	95,856	28,907	56,839	330,415	162,622	84,678	36,178	1,930,604	4,308,211
Wholesale Trade	59,804	6,072	13,114	13,454	N/A	64,833	45,894	N/A	930,622	1,510,067
Retail Trade	270,358	58,162	19,584	17,110	271,715	282,655	119,042	41,554	2,008,555	4,392,565
Transportation and Warehousing	114,320	65,473	16,207	11,047	292,589	72,311	32,129	14,617	498,602	1,285,617
Information	48,388	3,802	2,137	1,456	55,642	57,031	7,363	7,886	1,166,838	1,550,484
Finance and Insurance	82,070	17,044	4,462	4,889	98,410	108,220	25,894	9,368	1,973,899	2,871,024
Real Estate and Rental and Leasing	39,847	5,327	3,286	1,714	58,087	61,534	23,704	5,191	451,690	827,394
Professional and Technical Services	143,094	15,717	10,371	3,408	207,366	155,364	N/A	33,770	2,518,095	3,758,969
Management of Companies and Enterprises	31,737	4,228	0	105	152,356	18,478	N/A	1,094	479,725	957,511
Administrative and Waste Services	76,399	17,920	2,858	1,980	104,090	119,402	30,144	23,053	1,159,264	2,036,543
Educational Services	23,606	2,388	N/A	N/A	12,664	7,088	6,383	872	216,408	356,794
Health Care and Social Assistance	401,893	53,609	N/A	N/A	181,637	411,592	120,854	74,383	2,353,777	4,796,231
Arts, Entertainment, and Recreation	22,985	2,936	604	633	19,894	20,924	4,877	3,437	233,440	436,451
Accommodation and Food Services	103,916	20,098	11,200	8,645	83,055	101,585	36,130	14,243	793,628	1,713,293
Other Services, Except Public Administration	105,739	22,930	10,477	6,447	97,710	141,942	47,210	19,502	955,096	1,873,109
Government and Government Enterprise	545,123	136,787	86,009	64,914	1,287,629	606,759	171,893	456,058	9,810,490	15,676,856
Total	2,525,288	564,929	244,027	216,160	3,638,127	2,641,211	903,887	813,043	29,712,250	

Note: N/A = Not shown to avoid disclosure of confidential information, but the estimates for this item are included in the totals.

TABLE 3-44

TOTAL NON-FARM INDUSTRY EMPLOYMENT, SACRAMENTO VALLEY 2001

Industry	Shasta	Tehama	Glenn	Colusa	Yolo	Butte	Sutter	Yuba	Sacramento	Total
Forestry, Fishing, Related Activities, and Other	N/A	N/A	686	553	1,832	1,516	1,510	566	1,588	10,030
Mining	N/A	N/A	53	26	374	117	74	109	577	2,162
Utilities	577	84	67	27	N/A	418	50	N/A	780	2,610
Construction	6,140	1,006	543	212	6,201	5,261	2,552	1,334	46,799	108,243
Manufacturing	3,658	2,576	718	871	6,353	4,585	2,428	1,204	34,365	81,068
Wholesale Trade	1,869	236	383	352	N/A	1,978	1,190	N/A	20,640	35,750
Retail Trade	11,706	2,696	1,136	755	10,035	12,836	5,699	2,000	76,820	173,228
Transportation and Warehousing	3,257	1,941	480	324	7,905	2,407	1,156	489	14,680	36,967
Information	1,297	142	87	41	1,207	1,706	293	244	19,432	28,240
Finance and Insurance	3,140	744	227	199	2,671	3,980	1,370	459	44,643	72,714
Real Estate and Rental and Leasing	3,629	704	275	203	3,020	4,118	1,957	501	24,175	49,914
Professional and Technical Services	4,168	624	327	186	6,272	4,702	N/A	925	48,376	84,581
Management of Companies and Enterprises	709	113	0	27	3,161	446	N/A	52	8,401	18,050
Administrative and Waste Services	4,419	848	221	113	4,489	5,687	1,615	1,075	49,459	89,465
Educational Services	1,231	123	N/A	N/A	985	623	436	77	9,665	17,806
Health Care and Social Assistance	10,944	2,174	N/A	N/A	6,435	13,235	3,571	2,084	59,821	130,900
Arts, Entertainment, and Recreation	1,495	260	83	60	1,770	1,994	643	343	12,049	28,094
Accommodation and Food Services	6,118	1,296	618	613	5,527	6,927	2,247	1,161	44,258	96,748
Other Services, Except Public Administration	5,395	1,230	575	385	4,224	8,011	2,621	1,055	38,173	81,985
Government and Government Enterprise	13,949	3,710	2,173	1,878	28,618	15,662	4,397	10,147	184,119	319,374
Total	83,701	20,507	8,652	6,825	101,079	96,209	33,809	23,825	738,820	
Note: N/A = Not shown to avoid disclosure of confidential information, but the estimates for this item are included in the totals.										

TABLE 3-45

2001 ECONOMIC ACTIVITY SACRAMENTO VALLEY REGION

County	Personal Income (\$1,000) ^a						Total Industry Earnings (\$1,000) ^c	Total Employment (jobs) ^d	Total Population (persons)
	Total	Non-farm	% of Total	Farm	% of Total	Per Capita (Dollars) ^b			
Shasta	4,210,746	4,202,674	99.81	8,072	0.0019	25,175	2,577,432	86,655	167,257
Tehama	1,128,994	1,106,902	98.04	22,092	0.0196	19,868	602,520	23,722	56,824
Glenn	475,866	470,418	98.86	5,448	0.0114	18,031	261,165	11,723	26,392
Colusa	413,767	369,297	89.25	44,470	0.1075	21,668	272,062	9,992	19,096
Yolo	4,792,716	4,734,413	98.78	58,303	0.0122	27,332	3,943,138	110,249	175,351
Butte	4,700,738	4,696,386	99.91	4,352	0.0009	22,818	2,645,563	100,379	206,007
Sutter	1,935,941	1,923,530	99.36	12,411	0.0064	24,075	969,872	40,075	80,413
Yuba	1,177,888	1,164,491	98.66	13,397	0.0114	19,236	848,621	26,271	61,232
Sacramento	37,466,330	37,408,287	99.85	58,043	0.0015	29,548	29,770,293	742,414	1,267,969
Total	79,599,209	79,367,614	99.71	231,595	0.0029	301,669	54,595,887	1,482,175	2,824,498

^aPersonal income is the income that is received by persons from participation in production, from both government and business transfer payments, and from government interest.

^bPer capita personal income is measure of income calculated as the total personal income of the residents of an area divided by the population of the area. Per capita personal income is often used as an indicator of the economic well being of the residents of an area.

^cTotal industry earnings include all farm and non-farm earnings.

^dTotal employment includes all industry sector employment estimates of both full and part-time jobs.

Regional Economic Multipliers

Regional employment and income impacts are often divided into direct, indirect, and induced components. Direct impacts are the initial changes in the economy, such as an increase in expenditure of \$1,000 by an agricultural producer for seed. The indirect effect of that increase in expenditure is the new business expenditure on inputs for products or services that it causes. For example, the seed purchase prompts an increased demand for fertilizer by the seed producer to grow more seed stock. The induced effects are the additional spending of wages on goods and services caused by the initial expenditure. For example, the seed grower realizes an increase in income due to the sale and purchases the services of a mechanic with

the additional income. The combined economic effect from the \$1,000 expenditure rippling through the economy is the total economic effect and it is larger than the initial expenditure. This is known as the multiplier effect.

Taking the nine-county Sacramento Valley study area as one economic region, multipliers were generated using the IMPLAN® regional economic model and 2001 data and are reported in Table 3-46. The economic sectors were aggregated into agricultural and nonagricultural related. The agricultural multipliers are interpreted as for every dollar of agriculture related income generated, the total effect in the economy will be an additional \$1.60 of income; for every agricultural job created, an additional 0.78 job is created; and for every \$1.00 of output produced, an additional \$0.98 of output will result. The nonagricultural multipliers may be interpreted similarly.

TABLE 3-46

INCOME, EMPLOYMENT, AND OUTPUT MULTIPLIERS FOR THE SACRAMENTO VALLEY

Multiplier	Agricultural Sector	Nonagricultural Sector
Income	2.60	1.93
Employment	1.78	1.94
Output	1.98	1.93
Source: IMPLAN, 2001		

County Settings.

The following sections describe the existing social and economic setting in counties in the project area. Trends from the nine counties in the SRSCs service area are identified in Table 3-47.

TABLE 3-47

SUMMARY OF AGRICULTURAL ECONOMIC ACTIVITY BY COUNTY

County	Total Land Area of County ^a	Acres in Farm Production ^a	Percent of Total Acres in Farm Production ^a	Agricultural Gross Value (million)	Percent Farm Personal Income of Total from All Sectors	Percent of Labor Force Employed by Agriculture ^b	County Unemployment Rate ^b
Shasta	2,422,400	316,743	13%	52.2	0.2%	1.4%	6.7%
Tehama	1,904,640	885,000	46%	126	1.9%	8.1%	6.4%
Glenn	846,636	482,583	57%	303.9	6.5%	18.6%	12%
Colusa	736,450	430,958	59%	290.2	22.4%	29.5%	17.6%
Yolo	646,500	536,595	83%	299.8	2.1%	4.6%	4.2%
Butte	1,035,897	404,000	39%	288	1.3%	3.8%	7%
Sutter	385,600	248,349	64%	291	5.0%	14.8%	12.3%
Yuba	208,461	108,400	52%	133	3.1%	9%	11.7%
Sacramento	618,240	308,035	50%	276	0.2%	>1%	4.2%
Total	8,804,824	3,720,663	42%	2,063.1	1.0%		

^a Source: USDA, 1997.
^b Source: EDD, 2002.

In six out of the nine counties in the SRSCs service area, agriculture is the largest land use; however, the amount of personal income derived from agriculture as a percentage of personal income from all sectors in each county is significantly less. Agriculture employed a significant percentage of the total labor force in Glenn, Colusa, and Sutter Counties.

Shasta County. Shasta County is the northernmost county in the SRSCs service area. The City of Redding, located in the southwestern portion of the county on I-5, is the primary trade and commerce center for the far north-central and northeastern portion of California. Historically, Shasta County's economic base relied heavily on the timber industry; however, in recent years, education employment, construction, services, retail trade, and manufacturing industries have all shown an increase (Employment Development Department [EDD], 2002).

Table 3-48 summarizes the value of production of Shasta County's leading commodities.

The EDD labor statistics indicate that the services, retail trade, and government industries were the predominant employers in the county during 2001. These three industries accounted for approximately 73.4 percent of total county employment, and EDD projections estimate that the majority of the non-farm job growth will be in these industries. Agriculture comprised approximately 1.4 percent of total county employment in 2001⁵ (EDD, 2002).

⁵ Agricultural employment includes agricultural workers who are employed by farm labor contractors; employment data do not include unpaid family workers

TABLE 3-48

SHASTA COUNTY LEADING COMMODITIES

Commodity	Value of Production (\$1,000)
Cattle, Stockers and Feeders	8,700
Nursery, Strawberry Plants	6,193
Hay, Other	4,955
Hay, Alfalfa	3,856
Pasture, Range	3,475
Pasture, Irrigated	3,300
Rice, Wild	2,629
Livestock	2,432
Nursery Products	2,383
Cattle, Beef Cows, Breeding	2,381
Source: Summary of County Agricultural Commissioners' Reports, 2001-02. California Agricultural Statistics Service.	

Tehama County. Because Tehama County has an abundant supply of water, the economic base has been composed primarily of timber, agriculture, and sport and commercial fishing industries. According to the Tehama County 1993 General Plan, agriculture has been and will continue to represent the major focus of the county's economic base. About 10 percent of employed individuals in the county are directly employed by the agricultural industry. Many more provide indirect or secondary service to the agricultural sector. Although government, services, and retail trade are growing industries, agriculture still comprises a significant portion of the county's economic production.

Table 3-49 summarizes the value of production of Tehama County's leading commodities.

TABLE 3-49

TEHAMA COUNTY LEADING COMMODITIES

Commodity	Value of Production (\$1,000)
Walnuts, English	25,109
Plums, Dried	22,281
Milk, Market	11,172
Olives	11,138
Almonds	9,460

TABLE 3-49

TEHAMA COUNTY LEADING COMMODITIES

Commodity	Value of Production (\$1,000)
Cattle, Stockers and Feeders	7,410
Pasture, Range	6,510
Fruit and Nut Crops	3,390
Cattle, Fed Heifers and Steers	3,150
Cattle, Dairy Replacement Heifers	3,000
Source: Summary of County Agricultural Commissioners' Reports, 2001-02. California Agricultural Statistics Service.	

The EDD labor statistics indicates that the retail trade, government, and services industries comprised the majority of employment in the county during 2001. These three industries account for approximately 67.4 percent of total county employment, and EDD projections estimate that the majority of the non-farm job growth will be in these industries. Agriculture comprised approximately 8.1 percent of the total county employment in 2001 (EDD, 2002).

Glenn County. Glenn County is located about 100 miles northwest of Sacramento, along the I-5 corridor. Agriculture, agriculturally dependent industries, and government employment comprise a disproportionately high percentage of employment in the county. Local government was the dominant employer in 2001, and is expected to continue to provide the majority of jobs (EDD, 2002).

Glenn County was the fourth largest producer of rice in California, contributing over 18 percent of the total for the state. The total production value for rice was nearly \$100 million. Table 3-50 summarizes the value of production and acreage of Glenn County's leading commodities.

TABLE 3-50

GLENN COUNTY LEADING COMMODITIES

Commodity	Value of Production (\$1,000)
Rice, Paddy	97,829
Almonds	46,728
Dairy Products	38,477
Cattle and Calves	15,099
Hay, Alfalfa	13,309
Walnuts	12,607
Corn	11,517
Olives	11,339
Plums, Dried	10,040
Grapes	5,488
Source: Summary of County Agricultural Commissioners' Reports, 2001-02. California Agricultural Statistics Service.	

Government was the primary job-producing sector in Glenn County in 2001, employing 29.9 percent of the county's labor force compared to 18.6 percent for agriculture (EDD 2002). Non-farm industry projections indicate that the majority of the job growth in the county will be in services, manufacturing, and retail trade (EDD, 2002).

Colusa County. Colusa County is located about 35 miles northwest of Sacramento along the I-5 corridor. The county's economy depends highly on agriculture. The county has a high labor surplus for much of the year because of the seasonal nature of agriculture.

Colusa County ranks as the leading rice-producing county in the United States and is the leading producer of field crops in the region, with a total field crop production of about \$170 million in 2002. Colusa County is currently in a transition from row crops to perennial crops (almonds, grapes, and walnuts) and from low-value agronomic crops to higher value vegetables or other row crops". Table 3-51 summarizes the value of production of Colusa County's leading commodities.

TABLE 3-51

COLUSA COUNTY LEADING COMMODITIES

Commodity	Value of Production (\$1,000)
Rice	136,832
Tomatoes, Processing	39,481
Almond Meats	27,197
Rice Seed	9,092
Cotton Lint	8,539
Cattle and Calves	7,685
Walnuts, English	6,530
Beans, Dry	4,717
Wheat	4,676
Cucumber Seed	4,056
Source: Summary of County Agricultural Commissioners' Reports, 2001-02. California Agricultural Statistics Service.	

Colusa County is primarily a rural agricultural county, with a total population of about 18,800 in 2000. Agricultural employment in Colusa County during 2001 was 29.5 percent of total employment, which was the highest percentage of the counties in the Sacramento Valley (EDD, 2002). In comparison, 25.1 percent of the workforce was employed in the government sector and 14.5 percent in retail trade (EDD, 2002). Other major employers in the county include trucking and courier services, amusement and recreation services, oil and gas field services, and groceries and related products.

Yolo County. Yolo County is located immediately west of the Sacramento Metropolitan Area near the southern end of the Sacramento Valley. Although the majority of the county's land area is in agriculture, a large portion of the economy is tied to education facilities and the Sacramento urban economy.

Processing tomatoes were the most valuable crop in Yolo County and were planted on 48,575 acres. Processing tomatoes from Yolo County generated about 13 percent (\$76.5 million) of California's tomato processing income in 2000. Gross agricultural production was \$299.8 million in 2002. Table 3-52 summarizes the value of production of Yolo County's leading commodities.

TABLE 3-52

YOLO COUNTY LEADING COMMODITIES

Commodity	Value of Production (\$1,000)
Tomatoes, Processing	74,135
Grapes, Wine	44,675
Hay, Alfalfa	32,804
Rice, Milling	27,688
Vegetable Crops	13,704
Walnuts, English	11,465
Wheat, All	8,537
Cattle and Calves	7,695
Safflower	6,697
Almonds	6,694
Source: Summary of County Agricultural Commissioners' Reports, 2001-02. California Agricultural Statistics Service.	

In 2000, agriculture employed 4.6 percent of the civilian workforce, and other major employers in the county included state-local government (32.9 percent), retail trade (16.9 percent), and services (17 percent) (EDD, 2002).

Butte County. Butte County is located about 60 miles north of Sacramento along the Highway 99 corridor. Historically, Butte County has been agriculturally based, and commercial agriculture continues to be the county's principal economic base, which is supplemented by nonagricultural industry located in Chico.

The most valuable crop in Butte County is rice, which is 18.7 percent (\$101.2 million) of California's gross production of rice in 2002. Table 3-53 summarizes the value of production of Butte County's leading commodities.

TABLE 3-53

BUTTE COUNTY LEADING COMMODITIES

Commodity	Value of Production (\$1,000)
Rice	101,192
Almonds	65,762
Walnuts, English	45,055
Plums, Dried	18,286
Nursery Stock	7,178
Peaches, Clingstone	7,123
Cattle and Calves	5,227
Field Crops	4,801
Rice Seed	4,740
Kiwifruit	3,206
Source: Summary of County Agricultural Commissioners' Reports, 2001-02. California Agricultural Statistics Service.	

According to EDD labor statistics, the services sector was the largest employer in the county, employing 30 percent of the labor force in 2001. Recent growth within the service industry has been in health services and the social services components. Aircraft and parts, colleges and universities, and amusement and recreation services are some of the other major employers in the county. Government comprised 22.6 percent of the workforce in 2001 compared to 3.8 percent for agriculture.

Sutter County. Sutter County is located about 40 miles north of Sacramento, along the State Highway 99 corridor. Sutter County's main economic base is in agriculture, food processing, lumber and wood products, and government.

In 2000, Sutter County accounted for 19.1 percent of total rice produced in the state. Table 3-54 summarizes the value of production of Sutter County's leading commodities.

TABLE 3-54

SUTTER COUNTY LEADING COMMODITIES

Commodity	Value of Production (\$1,000)
Rice	109,923
Peaches	37,437
Walnuts	29,669
Plums, Dried	19,262
Tomatoes	16,960
Nursery Products	8,929
Melons	8,579
Cattle and Calves	6,963
Almonds	5,375
Hay, Alfalfa	4,789
Source: Summary of County Agricultural Commissioners' Reports, 2001-02. California Agricultural Statistics Service.	

According to the 1996 Sutter County General Plan, agriculture and agriculturally related services and industries have dominated employment in the county. In 2001, 14.8 percent of Sutter County's workforce was employed in agriculture compared with retail trade (21.1 percent) and service industries (21.5 percent) (EDD, 2002).

Yuba County. Yuba County is located east of Sutter County, with the Sacramento River creating the westernmost boundary. Beale Air Force Base, located in Yuba County, provides a large number of federal jobs for the county. The majority of job growth in the county is predicted to be in local government, specifically in local education, city and county government, and Indian tribal government.

Yuba County ranked fifth in the state in overall rice production. Table 3-55 summarizes the value of production of Yuba County's leading commodities.

TABLE 3-55

YUBA COUNTY LEADING COMMODITIES

Commodity	Value of Production (\$1,000)
Rice	35,284
Peaches	20,765
Plums, Dried	19,983
Cattle and Calves	17,129
Walnuts	14,805
Milk	7,652
Pasture, All	3,356
Kiwifruit	3,118
Almonds	1,024
Source: Summary of County Agricultural Commissioners' Reports, 2001-02. California Agricultural Statistics Service.	

Local government has had the highest growth rate in the county, and comprises the majority of the workforce at 39.3 percent (EDD, 2002). Industry projections for non-farm employment indicate that government, services, and retail trade will account for the highest percentage of job growth in the county.

Sacramento County. Sacramento County is situated at the southern portion of the SRSCs service area and is the most developed of the counties in the SRSCs service area. The City of Sacramento is the state's capital, and the majority of the workforce is in the government sector.

Grapes were the county's highest crop, in terms of gross value, providing nearly 27 percent of the total gross value of agriculture production. Table 3-56 summarizes the value of production of Sacramento County's leading commodities.

EDD labor statistics indicate that the government and services sectors accounted for over half the total employment in the county at 55.8 percent (EDD, 2002). EDD projections estimate that the majority of the non-farm job growth will be in the government, retail trade, and services industries. Agriculture accounted for less than 1 percent of total county employment in 2001.

TABLE 3-56

SACRAMENTO COUNTY LEADING COMMODITIES

Commodity	Value of Production (\$1,000)
Grapes, Wine	73,876
Milk, Market	38,029
Pears, Bartlett	27,352
Nursery Stock	26,378
Cattle and Calves	11,771
Poultry	11,116
Corn, Field	11,022
Hay, Alfalfa	10,544
Rice	9,870
Tomatoes, Processing	9,497

Source: Summary of County Agricultural Commissioners' Reports, 2001-02.
California Agricultural Statistics Service.

Environmental Consequences. The effects of Alternatives 1 through 5 on of the SRSCs service areas are compared to conditions under the No Action Alternative.

No Action Alternative. The No Action Alternative represents future conditions if the Preferred Alternative were not implemented. In general, agricultural economies within the Sacramento Valley are not anticipated to change substantially within the term of the Preferred Alternative. Rice, grains, tomatoes, oilseeds, forage, and orchard crops will dominate agricultural production. Trends reported in the most recent California Water Plan Update (Department, 1998) indicate little change in total irrigated acreage through 2020, but with some shift in acreage toward permanent crops. These trends are expected to continue. It is anticipated that some lands, primarily those near the urban areas of the Sacramento Metropolitan Area and to a lesser degree Redding, will be converted to nonagricultural use in accordance with local general plans and zoning constraints. The conditions under the No Action Alternative generally reflect the conditions described in the Affected Environment section.

Alternative 1. A substantial increase in agricultural production costs would result from the required installation of water measurement devices at farm gates. The installation and operation of these devices would generate additional economic activity in the region, but these gains would be offset by reduced spending by growers on other production items or personal consumption. No significant impacts to agricultural production or other economic activities were identified. Therefore, net changes to the regional economy are judged to be not significant.

Alternative 2. No significant impacts to agricultural production or other economic activities were identified. Therefore, net changes to the regional economy are judged to be not significant.

Alternative 3. No significant impacts to agricultural production or other economic activities were identified. Therefore, net changes to the regional economy are judged to be not significant.

Alternative 4. No significant impacts to agricultural production or other economic activities were identified. Therefore, net changes to the regional economy are judged to be not significant.

Alternative 5. No significant impacts to agricultural production or other economic activities were identified. Therefore, net changes to the regional economy are judged to be not significant.

SOCIOCULTURAL ENVIRONMENT

The following subsections describe settings and potential impacts to sociocultural resources. Sociocultural resources generally refer to resources associated with human communities.

Demographic Descriptions

Affected Environment.

Table 3-57 shows the population projections for counties within the SRSCs service area. In 2000, the nine counties that comprise the service area accounted for approximately six percent of the total population in the state.

TABLE 3-57

POPULATION PROJECTIONS FOR COUNTIES WITHIN THE CENTRAL VALLEY SRSC SERVICE AREAS^a

Years	2000 ^a	2010	2020	2030	2040
Shasta County	163,000	213,000	241,000	268,000	294,000
City of Redding ^b	81,000	105,000	127,000	--	--
Tehama County	56,000	71,000	94,000	98,000	114,000
Glenn County	26,000	39,000	49,000	61,000	75,000
Butte County	203,000	259,000	307,000	363,000	420,000
Colusa County	19,000	31,000	41,000	54,000	68,000
Sutter County	79,000	100,000	116,000	134,000	152,000
Yolo County	167,000	195,000	225,000	260,000	298,000
Sacramento County	1,223,000	1,436,000	1,652,000	1,884,000	2,123,000
Yuba County	60,219	73,935	94,610	96,563	109,934
Total	\$2,077,219	\$2,522,935	\$2,946,610	\$3,218,563	\$3,653,934

^aU.S. Census Bureau: State and County Quick Facts, 2002.
^bCity of Redding, General Plan, March 2000.

Shasta County. The population of Shasta County has increased from 147,036 in 1990 to 163,256 in 2000. The majority of the county's population (approximately 61 percent) is located in the urban areas of the Cities of Redding, Anderson, and Shasta Lake, all of which are situated along the I-5 corridor.

According to the general plan, the annual growth rate of the county is estimated to be approximately 1.75 percent. The projected population in the year 2020, is 241,000, and 294,000 by the year 2040.

Tehama County. The population of Tehama County in the year 2000 was 56,039, with approximately 23 percent (13,147 people) of the population residing in the City of Red Bluff. The county population increased by approximately 12 percent from 1990 to 2000. The two main urban centers in the county are the Cities of Red Bluff, which contains approximately 23 percent of the county's population (13,147), and Corning, population 6,741.

Tehama County's General Plan zones urban development along the I-5 corridor on lands with relatively low agricultural capability. Thus, the county encourages future growth while maintaining agricultural resources.

Glenn County. The population in Glenn County in the year 2000 was 26,453. The largest urban areas in the county include the City of Orland (population 6,281) and the City of Willows (population 6,220). Both cities are situated near the I-5 corridor. Population increases countywide are estimated at 0.7 percent per year.

Butte County. Butte County's General Plan states an anticipated growth rate of approximately 3 percent. From 1990 to 2000, total county population increased approximately 12 percent from 182,120 to 203,171. The largest urban areas in the county include the City of Chico (population 59,954), City of Oroville (population 13,004), Paradise (population 26,408) and the City of Magalia (population 10,569).

Colusa County. The population of Colusa County in 2000 was 18,804, an approximate 14 percent increase in population since 1990. Communities including the Cities of Williams, Colusa, and Arbuckle contain over 60 percent of the county's population. Growth and urban development is targeted to take place near the existing urban centers of Arbuckle, College City, Colusa, Grimes, Maxwell, Princeton, Stonyford, and Williams. The Colusa County General Plan includes strict policies to preserve agricultural lands.

Sutter County. The two main urban areas within the county include the Cities of Yuba (population 36,758) and Live Oak (population 6,229).

Sutter County's population increased approximately 23 percent from 1990 to 2000. The population in 2000 was 78,930. Nearly half the county's population resides in Yuba City.

Yolo County. From 1990 to 2000, population in the county increased approximately 20 percent, from 141,092 in 1990 to 168,660 in 2000. Residential/urban land uses are primarily located in major urban centers including the Cities of Davis (population 60,308), Winters (population 6,125), Woodland (population 49,151), and the unincorporated area of West Sacramento (population 31,615).

Sacramento County. Urban uses are distributed within a 650-square-mile area of Sacramento County surrounding and including the City of Sacramento. The population of Sacramento County in 2000 was 1,223,499, an approximate increase of 182,000 from 1990. Agricultural and rural residential land uses are primarily located south and east of Elk Grove-Florin Road, south of the Cosumnes River, near Folsom and Rio Linda, and in the northernmost portion of the county along the county line (Water Forum, 1999).

Yuba County From 1990 to 2000, Yuba County's population increased approximately 3 percent from 58,228 to 60,219. The majority of the population in the county resides in the Cities of Linda (13,474), Marysville (12,268), Olivehurst (11,061), and South Yuba City (12,651).

Environmental Consequences. The effects of Alternatives 1 through 5 on land uses of the SRSCs service area are compared to conditions under the No Action Alternative.

No Action Alternative. The No Action Alternative does not include new facilities or construction. The No Action Alternative assumes that dry-year reductions would remain the same as existing conditions, and the renewed contract period would last 40 years. It is anticipated that growth would continue to occur as described in the county general plans and as projected by the Department of Finance.

It should be noted that the use of CVP water through the Settlement Contracts is not a primary factor driving growth and land use change, and in most areas of urban growth ample groundwater is available to support the predicted growth. Demographic, economic, political, and other factors, independent of the contract renewal process, are causing changes with direct and indirect effects to land use that are beyond the range of Reclamation's responsibilities. Virtually all of the renewal actions are within the range of existing conditions. This includes the area of use, type of use, range of river flows, and reservoir fluctuations. No additional infrastructure would be constructed, deliveries would not increase, and no existing natural habitat would be converted into farmland or other uses.

In some instances, the responsibility to address effects to land uses would be with the local government as part of their California Environmental Quality Act (CEQA) compliance for their actions. For example, Reclamation is not responsible for the development of housing tracts or industrial development in a community. Such actions are approved locally and at the state level. Furthermore, if a farmer changes from one irrigated crop to another because of economic reasons, Reclamation does not control the farmer's decision. On the other hand, Reclamation would need to consider the effects to land uses when Reclamation approves new lands being brought into an irrigation district and when Reclamation approves a change in use.

Alternative 1. Land use in the SRSCs service area under Alternative 1 would be identical to conditions under the No Action Alternative. Alternative 1 would not significantly alter current CVP operations, water storage or release patterns from CVP facilities, or the maximum volume of water delivered to the SRSCs, with the exception of reduced contract amounts to ACID and SMWC. However, these reductions would not result in activities that would cause any changes to existing land uses in these districts; therefore, there would be no impacts.

It is assumed that use of the assigned CVP water by the SRSC would continue to be managed in the same manner under Alternative 1 as under the No Action Alternative.

No adverse impacts to land use are associated with this alternative.

Alternative 2. Land use in the SRSCs service area under Alternative 2 would be identical to conditions under the No Action Alternative. Alternative 2 would not alter current CVP operations, water storage or release patterns from CVP facilities, or the maximum volume of water delivered to the SRSCs.

It is assumed that use of the assigned CVP water by the SRSCs would continue to be managed in the same manner under Alternative 2 as under the No Action Alternative.

No adverse impacts are associated with this alternative.

Alternative 3. Land use in the SRSCs service area under Alternative 3 would be identical to conditions under the No Action Alternative. Alternative 3 would not alter current CVP operations, water storage or release patterns from CVP facilities, or the maximum volume of water delivered to the SRSCs.

It is assumed that use of the assigned CVP water by the SRSCs would continue to be managed in the same manner under Alternative 3 as under the No Action Alternative.

No adverse impacts are associated with this alternative.

Alternative 4. Land use in the SRSCs service area under Alternative 4 would be similar to conditions under the No Action Alternative. Alternative 4 would not significantly alter current CVP operations, water storage or release patterns from CVP facilities, or the maximum volume of water delivered to the SRSCs, with the exception of reduced contract amounts to ACID and SMWC, and sliding-scale reduced diversions to all contractors in dry years. This reduction could result in increased pumping activities in irrigation districts experiencing water delivery cutbacks during dry years when the irrigation district would have otherwise maintained full contract amounts.

Alternatively, reduced diversions to the SRSC could result in increased diversions in dry years to districts that would have otherwise experienced water cutbacks. This would create beneficial impacts to new recipients.

It is assumed that use of the assigned CVP water by the SRSCs would continue to be managed in the same manner under Alternative 4 as under the No Action Alternative.

No adverse impacts are associated with this alternative.

Alternative 5. Land use in the SRSCs service area under Alternative 5 would be similar to conditions under the No Action Alternative. Alternative 5 would not significantly alter current CVP operations, water storage or release patterns from CVP facilities, or the maximum volume of water delivered to the SRSCs, with the exception of reduced contract amounts to ACID and SMWC, and Shasta-Index reduced diversions to all SRSCs in dry years. This reduction could result in increased pumping activities in irrigation districts

experiencing water deliveries cutbacks during dry years when the irrigation district would have otherwise maintained full contract amounts.

Alternatively, reduced diversions to the SRSCs could result in increased diversions in dry years to districts that would have otherwise experienced water cutbacks. This would create beneficial impacts to new recipients.

It is assumed that use of the assigned CVP water by the SRSCs would continue to be managed in the same manner under Alternative 5 as under the No Action Alternative.

No adverse impacts are associated with this alternative.

Cultural Resources

Affected Environment

The cultural resources analysis focuses on the project study area. Discussion of the project area generally proceeds from north to south from Shasta County to Solano, Yolo, and Sacramento Counties, including the Counties of Butte, Tehama, Glenn, Colusa, Yuba, and Sutter.

Regulatory Setting. Preserving the culture and history of the nation's past are the goals of regulations that include the National Historic Preservation Act, Antiquities Act of 1906, Archaeological Resource Protection Act of 1979, and Historic Sites Act of 1935. The National Historic Preservation Act, Section 106 regulations (36 CFR 800), require that federal agencies seek information, as appropriate, from the State Historic Preservation Officer (SHPO), the Advisory Council on Historic Preservation, Indian tribes (e.g., Tribal Historic Preservation Officer [THPO]), and other individuals and organizations likely to have knowledge of, or concerns with, historic properties in the area of potential effect.

Similar state regulations protect archaeological, paleontological, and historical sites and specifically provide for identification and protection of traditional Native American gathering and ceremonial sites on state land. These regulations include CEQA (Public Resources Code [PRC] Section 21000) and various provisions within PRC Division 5 (Parks and Monuments).

Prehistory/Archaeology. Archaeological evidence of human occupation in the Sacramento Valley and nearby areas extends back several thousand years B.C. Tribal oral histories would place Native American occupation back to "time immemorial."

In the span between about 10,000 B.C. and A.D. 1850, prehistoric societies occupying the greater Sacramento Valley and surrounding areas underwent a series of slow but important changes in subsistence and economic orientation, population densities and distribution, and social organization. The evidence for these changes is found within the known archaeological record. Several models of prehistoric culture history are available for the region and are summarized by Moratto (1984:167-216), Jensen and Reed (1979:90-108), Basgall and Hildebrandt (1989:66-72); and Johnson and Theodoratus (1984a:7-12, 1984b:7-12).

Ethnology/Ethnohistory. The Sacramento Valley includes a broad geographic area that encompassed a great deal of environmental and cultural diversity in prehistoric

times and during the contact period when Native Americans encountered Spanish and Euro-American explorers and settlers. The Sacramento Valley was home to several California Native American groups, including the Wintu, Yana, River Nomlaki, Hill Nomlaki, Konkow, Nisenan, Patwin, Bay Miwok, and Plains Miwok.

The Wintu territory covered parts of what are now Trinity, Shasta, Siskiyou, and Tehama counties, including the area north of Cottonwood Creek and west of Little Cow Creek and the Sacramento River. Detailed ethnographic information on the Wintu is available in Du Bois (1935), Lapena (1978:324-340), and Kroeber (1925).

The Yana traditionally occupied the upper Sacramento River valley and foothills east of Little Cow Creek and the Sacramento River (generally east of Redding, Bloody Island, Red Bluff, and Tehama). Detailed ethnographic information on the Yana is available in J.J. Johnson (1978) and Kroeber (1925).

The Nomlaki consisted of two groups; the River Nomlaki lived in the Sacramento River Valley in present Tehama County south of Cottonwood Creek; and the Hill Nomlaki lived in the foothills to the west, extending to the summit of the Coast Range in what is now Tehama and Glenn Counties (Goldschmidt, 1978). Detailed ethnographic information on the Nomlaki is available in Du Bois (1939), Goldschmidt (1951, 1978), and Kroeber (1925).

The Konkow, also known as Northwestern Maidu, occupied territory below the high Sierra in the foothills where the south, middle, north, and west branches of the Feather River converge. Konkow territory included the upper Butte and Chico Creeks and part in the Sacramento Valley along the lower courses of the same streams. Detailed ethnographic information on the Konkow is available in Kroeber (1925, 1932), Hill (1970), and Riddell (1960-1974, 1978).

The Nisenan territory was the drainages of the Yuba, Bear, and American Rivers and the lower drainages of the Feather River southward to a few miles below the confluence of the American River. Their territory in the project area includes Marysville, Sacramento, and the territory between and along the Feather River and Sacramento River.

The Patwin occupied the southern portion of the Sacramento River Valley to the west of the river, from the town of Princeton south to San Pablo and Suisun Bays. Detailed ethnographic information on the Patwin can be found in McKern (1922, 1923), Kroeber (1932), and P.J. Johnson (1978).

The Bay Miwok and Plains Miwok, which lived just south of the Colusa Sub-basin, are part of the Eastern Miwok. The Bay Miwok were located in the inner Coast Ranges in the vicinity of Mount Diablo and extended northeasterly from there into the Sacramento-San Joaquin river delta. Most of the delta and plains along the Cosumnes and Mokelumne rivers were the territory of the Plains Miwok. Detailed ethnographic information on the Eastern Miwok is also available in Kroeber (1925).

Euro-American History. Many areas in the northern Sacramento Valley saw the first major wave of white settlement following the Gold Rush. By the time the local Indians had been forcibly taken to reservations, many small towns and settlements had already been

established. White settlement was further stimulated by the 1862 Homestead Act and the arrival of the railroad. White settlement included establishment of farms, ranches, gold mines, and lumber and other extractive industries.

In 1897, copper replaced gold as the main mineral produced in Shasta County. Smoke and fumes from Shasta County smelters killed vegetation, fish, and fruit trees as far south as Anderson and Cottonwood. By 1919, all the smelters were closed by court order.

Through the late nineteenth and twentieth centuries, the spread of riverboat and ferry transportation, and, later railroad and highway transportation, infrastructure increased access to more distant markets. The northern end of the Sacramento Valley developed a growing population sustained by a mix of mineral and timber extraction industries and farm and ranch operations. Large-scale irrigation of farms and ranches was made possible in the mid-twentieth century by completion of Shasta Dam and other large water reservoirs and aqueduct projects. Today, the area enjoys a more diversified economy that is fully integrated with the rest of California and nearby states. In recent decades, recreation and tourism have emerged as important components of the local economy.

The central region of the Sacramento Valley includes Sutter County – named after John Sutter (of Sutter’s Fort fame). John Sutter received a grant of 50,000 acres in 1841 from the Mexican government; he named his settlement New Helvetia. He established a farm, the first large-scale agricultural settlement in Northern California, near what is now Yuba City. By 1844, he had nearly completed Sutter’s Fort. The United States seized control of California from Mexico in 1846, at the start of the Mexican War. John Marshall, an employee of Sutter, discovered gold on the American River in 1848. In 1856, Yuba City became the permanent County Seat.

Following the Gold Rush, white settlers developed the rich farmland in the region and made use of its abundant water. Several agricultural developments were introduced, including Edward Proper’s development in 1868 of a strain of wheat known for its suitability for shipment over long distances; William and George Thompson’s development in 1873 of the Thompson seedless grape; and A.F. Abbott and Joseph Phillips’ development in the 1880s of a strain of cling peach. Today, this portion of the Sacramento Valley enjoys a diverse population and industry, and vast stretches of rich farmland.

The more southern region of the Sacramento Valley includes portions of Yolo, Glenn, Solano, and Colusa Counties. After the Gold Rush, many disappointed miners became permanent settlers who raised cattle, sheep, wheat, and barley. One of the first pioneering irrigation projects in the region was started on Cache Creek as early as 1865. Initially, the location of towns and settlements was influenced by access to water and water transportation routes. In the late nineteenth century, emphasis shifted from livestock grazing to grain growing and orchard crops.

In the 1870s, the railroad progressed northward, which enabled such towns as Arbuckle, Williams, Maxwell, Willows, and Orland to be established and carried new settlers to the area. Certain areas became known for specific orchard crops: almonds in Arbuckle, oranges in Orland, prunes in Colusa, or olives in Corning. With the advent of large-scale flood control and irrigation projects, the Colusa Sub-basin has become noted for growing rice and

tomatoes. Large-scale, diversified farming was introduced as new lands were irrigated and brought into production, and as shipment of local products to domestic and international markets increased by the improved railroad and highway transportation system.

Environmental Consequences. The effects of Alternatives 1 through 5 on cultural resources of the SRSCs service area are compared to conditions under the No Action Alternative.

No Action Alternative The No Action Alternative does not include new facilities or construction. The No Action Alternative assumes that dry-year reductions would remain the same as existing conditions, and the renewed contract period would be 40 years.

It should be noted that use of CVP water through the Settlement Contracts is not a primary force driving growth and land use change. Demographic, economic, political, and other factors, independent of the contract renewal process, are causing changes with direct and indirect effects to cultural resources that are beyond the range of Reclamation's Section 106 of the National Historic Preservation Act (NHPA) responsibilities. With little exception, virtually all of the contract renewal actions are within the range of existing conditions. This includes the area of use, types of use, range of river flows, and reservoir fluctuations. No additional infrastructure would be constructed, and there would be no increase in deliveries and no conversion of existing natural habitat into farmland or other uses.

Alternative 1. Implementation of the contract renewals would not require the construction of new facilities and thus would not impact cultural resources in the study area. However, this alternative would result in the availability of water for development of the Metro Air Park as a result of the re-assignment of agricultural water for M&I use for NCMWC. However, the Final EIS for the Metro Air Park Project (Service, 2001) stated that "The likelihood of the disturbance of any prehistoric or historic archaeological resource from development of the Metro Air Park project is low as cultural resource surveys of the site found no such resources present ..."

Alternative 2. Implementation of the contract renewals would not require the construction of new facilities and thus would not impact cultural resources in the study area.

Alternative 3. Implementation of the contract renewals would not require the construction of new facilities and thus would not impact cultural resources in the study area.

Alternative 4. Implementation of the contract renewals would not require the construction of new facilities and thus would not impact cultural resources in the study area.

Alternative 5. Implementation of the contract renewals would not require the construction of new facilities and thus would not impact cultural resources in the study area.

Indian Trust Assets

Affected Environment. Potential effects on Indian Trust Assets (ITA) stem from actions or activities that would affect federally reserved Indian lands and hunting, fishing, gathering, water rights, or other rights. This section addresses potential ITAs that could be affected by the project. The area of analysis is the Sacramento Valley.

Regulatory Setting

ITAs are legal interests in property held in trust by the United States for federally recognized Indian tribes or individual Indians. Land assets held in trust for individual Indians are more specifically referred to as “public-domain allotments” (PDA). An Indian trust has the following three components: (1) the trustee, (2) the beneficiary, and (3) the trust asset. ITAs can include lands; minerals; federally reserved hunting and fishing rights; federally reserved water rights; and in-stream flows associated with a reservation, rancheria, or PDA. Beneficiaries of the Indian trust relationship are federally recognized Indian tribes and individual Indians with trust land; the United States is the trustee.

By definition, ITAs cannot be sold, leased, or otherwise encumbered without approval from the United States government, or one of its executive agencies. The definition and application of the U.S. trust relationship has been defined by case law that supports congressional acts, executive orders, and historical treaty provisions.

Consistent with President Clinton’s April 29, 1994, Memorandum, agencies assess the effect of programs on tribal trust resources and federally reserved tribal governmental rights and concerns. Agencies must actively engage federally recognized tribal governments and consult with such tribes on a government-to-government level. The DOI’s Department Manual Part 512, Chapter 2 (Departmental Responsibilities for Indian Trust Resources) ascribes the responsibility for ensuring protection and preservation of ITAs from loss, damage, and unlawful alienation, waste, and depletion to the heads of bureaus and offices.

The DOI’s policy is to carry out activities in a manner that protects ITAs and avoids adverse effects whenever possible (Reclamation Indian Trust Asset Policy, July 2, 1993).

Project Area Setting

All projects discussed in this section occur in the Sacramento Valley region along the Sacramento River. ITAs are described from north to south along this river system.

Sacramento River

The northernmost indigenous California people in the project area were the Achowami, Atsugewi, Ajumawi, Wintun, Pit River, and the Yana. Descendants of these tribes live on the Big Bend, Burney Tract, Montgomery Creek, Redding, and Roaring Creek Rancherias in Shasta County. Shasta County also has 15 PDAs.

Maidu and Wintun people inhabited the downstream Colusa Basin section of the Sacramento River. The Wintun Tribe is composed of three divisions: Patwin, Nomlaki, and Wintu. Present-day descendants of the Wintun live on the Colusa (Cachil Dehe) and Cortina Rancherias in Colusa County and Rumsey Rancheria in Yolo County. Wintun-Wailaki descendants in Glenn County live on the Grindstone Creek Rancheria. The Paskenta Band of

Nomlaki Indians has a large tract of trust land in Glenn County, just northwest of Orland, near I-5. Colusa County has one PDA; there are no PDAs in Glenn and Yolo Counties.

Environmental Consequences. The effects of Alternatives 1 through 5 on ITAs of the SRSCs service area are compared to conditions under the No Action Alternative.

No Action Alternative. The No Action Alternative does not include new facilities or construction. The No Action Alternative assumes that dry-year reductions would remain the same as existing conditions, and the renewed contract period would last 40 years.

Alternative 1. There would be no impacts to ITAs in the Sacramento Valley region as a result of this alternative.

Alternative 2. There would be no impacts to ITAs in the Sacramento Valley region as a result of this alternative.

Alternative 3. There would be no impacts to ITAs in the Sacramento Valley region as a result of this alternative.

Alternative 4. There would be no impacts to ITAs in the Sacramento Valley region as a result of this alternative.

Alternative 5. There would be no impacts to ITAs in the Sacramento Valley region as a result of this alternative.

Environmental Justice

The concept of environmental justice embraces two principles: (1) fair treatment of all people regardless of race, color, nation of origin, or income; and (2) meaningful involvement of people in communities potentially affected by program actions. Executive Order 12898, Section 2-2, signed by President Clinton in 1994, requires all federal agencies to conduct “programs, policies, and activities that substantially affect human health or the environment, in a manner that ensures that such programs, policies, and activities do not have the effect of excluding persons (including populations) from participation in, denying persons the benefits of, or subjecting persons to discrimination because of their race, color or national origin.” Section 1-101 requires federal agencies to identify and address, as appropriate, “disproportionately high and adverse human health or environmental effects” of programs on minority and low-income populations.

A total of 81 percent of all farm workers in 1997-98 were foreign-born, 95 percent of which were born in Mexico. In the 1990s, approximately 52 percent of all farm workers were married; however, the majority of these families had incomes below the poverty level. The individual median annual personal income is less than \$7,500, with real income having declined over 11 percent in the last decade. Average wages for farm workers are almost 50 percent less than average hourly wages for non-farm private-sector workers. The median level of educational achievement for these farm workers is the sixth grade (U.S. Department of Labor, 2000).

These identifying factors place these workers into a low income, minority group that is considered to represent the environmental justice community – a community that can potentially bear the greatest burden (or share in the benefits) of a given project's effects.

Affected Environment/Existing Conditions.

Area of Analysis. The following discussion provides a general description of the ethnic composition, unemployment, and poverty rates for counties affected by the Preferred Alternative. The counties included in the discussion includes the following:

- Shasta
- Tehama
- Glenn
- Colusa
- Yolo
- Butte
- Sutter
- Yuba
- Sacramento

Regional Setting. Table 3-58 lists the ethnic compositions of each county in the SRSCs service area.

TABLE 3-58

ETHNICITIES OF COUNTIES IN THE SRSC SERVICE AREAS

County	White Persons	Black or African American Persons	American Indian and Alaska Native Persons	Asian Persons	Native Hawaiian and Other Pacific Islander	Persons of Hispanic or Latino Origin
Shasta	89.3	0.8	2.8	1.9	0.1	5.5
Tehama	84.8	0.6	2.1	0.8	0.1	15.8
Glenn	71.8	0.6	2.1	3.4	0.1	29.6
Colusa	64.3	0.5	2.3	1.2	0.4	46.5
Yolo	67.7	2.0	1.2	9.9	0.3	25.9
Butte	84.5	1.4	1.9	3.3	0.1	10.5
Sutter	67.5	1.9	1.6	11.3	0.2	22.2
Yuba	70.6	3.2	2.6	7.5	0.2	17.4
Sacramento	64.0	10.0	1.1	11.0	0.6	16.0

Note: Values do not equal 100 percent because of multi-race reporting.

Source: Source U.S. Census Bureau: State and County QuickFacts. Data derived from Population Estimates, 2000 Census of Population and Housing, 1990 Census of Population and Housing, Small Area Income and Poverty Estimates, County Business Patterns, 1997 Economic Census, Minority- and Women-Owned Business, Building Permits, Consolidated Federal Funds Report, 1997 Census of Governments.

The data in Table 3-59 underestimates the number of people who live in urbanized areas, because many people live in urban, unincorporated communities surrounding cities. The

counties with established metropolitan areas (Yolo and Sacramento) tend to have higher median incomes, and Sacramento County also has a lower percentage of residents living in poverty.

Environmental Consequences. The effects of Alternatives 1 through 5 on environmental justice within the SRSCs service area are compared to conditions under the No Action Alternative.

No Action Alternative. The No Action Alternative does not include new facilities or construction. The No Action Alternative assumes that dry-year reductions would remain the same as existing conditions, and the renewed contract period would last 40 years. There would be no impacts to environmental justice under the No Action Alternative.

TABLE 3-59

SUMMARY OF PERCENT OF COUNTY POPULATIONS LIVING IN CITIES, MEDIAN INCOME, AND POVERTY

County	Percentage of County Population Living in Cities	Major Cities in the County (Percent of County Population)	Household Median Income	Percentage of County Population Living in Poverty
Shasta	58%	Redding, Shasta Lake, and Anderson	\$34,000	15%
Tehama	35%	Red Bluff (23%) and Corning (12%)	\$28,000	20%
Glenn	47%	Willows (23%) and Orland (24%)	\$32,000	18%
Colusa	49%	Williams (20%) and Colusa (29%)	\$35,000	16%
Yolo	84%	Davis, West Sacramento, and Woodland	\$41,000	18%
Butte	50%	Chico, Oroville, Town of and Paradise	\$32,000	20%
Sutter	45%	Yuba City	\$38,000	16%
Yuba	20%	Communities of Linda, Marysville, and Olivehurst	\$30,000	21%
Sacramento	54%	Sacramento (33%), Elf Grove (8%), Citrus Heights (7%), Folsom (4%), Galt (2%), and Isleton (0.1%)	\$44,000	14%

Alternative 1. Impacts to environmental justice issues in the SRSCs area under Alternative 1 would be identical to conditions under the No Action Alternative. Alternative 1 would not alter current CVP operations, water storage or release patterns from CVP facilities,

or the maximum volume of water delivered to the SRSCs, with the exception of reduced contract amounts to ACID and SMWC. These reductions would not change actual diversions and thus would not result in changes to job availability within these districts.

It is assumed that use of the assigned CVP water by SRSCs would continue to be managed in the same manner under Alternative 1 as under the No Action Alternative.

Therefore, there are no impacts to environmental justice under this alternative.

Alternative 2. Impacts to environmental justice issues in the SRSC area under Alternative 2 would be similar to conditions under the No Action Alternative. Alternative 2 would not alter current CVP operations, water storage or release patterns from CVP facilities, or the maximum volume of water delivered to the SRSCs, with the exception of reduced contract amounts to ACID and SMWC, and sliding-scale reduced diversions to all contractors in dry years. These dry-year reductions would take place during years when the irrigation district would have otherwise maintained full contract amounts. It is assumed that these reductions would not result in land fallowing or other reductions in agricultural production. Therefore, no impact to seasonal migrant farmworkers is anticipated due to the loss of jobs. Additionally, water that would have been diverted to the SRSCs may be diverted to other irrigation districts that would have otherwise had water cutbacks in dry years. This could increase the number of jobs available to migrant farmworkers outside of the SRSCs service area. Therefore, impacts to environmental justice would be considered less than significant.

It is assumed that use of the assigned CVP water by SRSCs would continue to be managed in the same manner under Alternative 2 as under the No Action Alternative.

Therefore, there are no impacts to environmental justice under this alternative.

Alternative 3. Impacts to environmental justice issues in the SRSC area under Alternative 3 would be identical to conditions under the No Action Alternative. Alternative 3 would not alter CVP operations, water storage or release patterns from CVP facilities, or the maximum volume of water to be delivered to the SRSCs.

It is assumed that use of the assigned CVP water by SRSCs would continue to be managed in the same manner under Alternative 3 as under the No Action Alternative.

Therefore, there are no impacts to environmental justice under this alternative.

Alternative 4. Impacts to environmental justice issues in the SRSC area under Alternative 4 would be similar to conditions under the No Action Alternative. Alternative 4 would not significantly alter current CVP operations, water storage or release patterns from CVP facilities, or the maximum volume of water delivered to the SRSCs, with the exception of reduced contract amounts to ACID and SMWC, and sliding-scale reduced diversions to all contractors in dry years. These dry-year reductions would take place during years when the irrigation district would have otherwise maintained full contract amounts. It is assumed that these reductions would not result in land fallowing or other reductions in agricultural production due to increased groundwater use. Therefore, no impact to seasonal migrant farmworkers is anticipated due to the loss of jobs. Additionally, water that would have been

diverted to the SRSCs may be diverted to other irrigation districts that would have otherwise had water cutbacks in dry years. This would increase the number of jobs available to migrant farmworkers outside of the SRSCs service area. Therefore, impacts to environmental justice would be considered less than significant.

It is assumed that use of the assigned CVP water by SRSCs would continue to be managed in the same manner under Alternative 4 as under the No Action Alternative.

Therefore, there are no impacts to environmental justice under this alternative.

Alternative 5. Impacts to environmental justice issues in the SRSC area under Alternative 5 would be similar to conditions under the No Action Alternative. Alternative 5 would not significantly alter current CVP operations, water storage or release patterns from CVP facilities, or the maximum volume of water delivered to the SRSCs, with the exception of reduced contract amounts to ACID and SMWC, and Shasta-Index reduced diversions to all contractors in dry years. These dry-year reductions would take place during years when the irrigation district would have otherwise maintained full contract amounts. It is assumed that these reductions would not result in land fallowing or other reductions in agricultural production. Therefore, no impact to seasonal migrant farmworkers is anticipated due to the loss of jobs. Additionally, water that would have been diverted to the SRSCs may be diverted to other irrigation districts that would have otherwise had water cutbacks in dry years. This would increase the number of jobs available to migrant farmworkers outside of the SRSCs service area. Therefore, impacts to environmental justice would be considered less than significant.

It is assumed that use of the assigned CVP water by SRSCs would continue to be managed in the same manner under Alternative 5 as under the No Action Alternative.

Therefore, there are no impacts to environmental justice under this alternative.

Recreation

Affected Environment.

The following description includes recreational areas that could be affected by the renewal of the Settlement Contracts. The CVPIA PEIS provides a detailed description of recreation resources within the SRSCs service area (Reclamation, 1997).

The SRSCs service area includes several key lakes, reservoirs, rivers, NWRs, Wildlife Management Areas (WMA), and private hunting clubs. Table 3-60 lists key recreation areas in the SRSCs service area and summarizes recreation characteristics.

Reservoirs. Construction of reservoirs has provided extensive flatwater recreation opportunities. The following sections describe the major reservoirs located within the SRSCs service area.

Shasta Lake. Shasta Lake is located approximately 10 miles north of Redding. The surface area of the lake is approximately 30,000 acres, which provides 370 miles of shoreline when the reservoir is full. The Sacramento River, McCloud River, Pit River, and Squaw Creek are tributaries to Shasta Lake and form the main branches of the reservoir.

TABLE 3-60

RECREATION CHARACTERISTICS OF AFFECTED RECREATION AREAS IN THE SRSC SERVICE AREAS

Recreation Area	Owner/Recreation Manager	Year Constructed or Established	Use (1,000 visitor days ^a) ^b	Number of Key Facilities					Activity Restrictions
				Marinas	Boat Launches	Picnic Areas	Campgrounds	Swimming Areas	
Reservoirs and Lakes									
Shasta	Reclamation/USFS	1945	2,422	13	6	1	22	0	Swimming/boat speed restrictions
Whiskeytown	Reclamation/NPS	1963	279	1	3	0	3	2	Boat speed restrictions in coves
Keswick	Reclamation/Shasta County	1945	0.5	0	1	0	0	0	None
Lake Red Bluff	Reclamation/Reclamation	1964	86	0	1	1	1	0	Reservoir drained in winter
Lake Oroville Complex	DWR/DPR	1968	418	2	3	3	9	1	None
Folsom	Reclamation/DPR	1955	362	1	8	5	4	1	None
Englebright	COE/COE	1941	92	2	4	1	17	0	No skiing in upper portion of lake
New Bullards Bar	YCWA/USFS	1970	52	1	2	1	4	0	No skiing along shore
Camp Far West	SSWD/ Private concessionaire	1963	72	1	2	2	2	2	None
Rivers									
Sacramento	NA/BLM, Reclamation, DPR, counties, private	NA	54	49	40	26	26	1	None
American	NA/DPR, Sacramento County	NA	27	1	16	12	0	0	None
Feather	NA/Private	NA	69	0	3	0	0	0	None
Yuba	NA/Private	NA	2	0	0	0	0	0	Activity restricted on private lands
Clear Creek	NA/NPS, Private	NA	1	0	0	0	0	0	Activity restricted on private lands
Bear	NA/Private	NA	NA	0	0	0	0	0	Dewatered in summer
Wildlife Refuges									
Sacramento NWR	Service/Service	1937	NA	0	3	0	0	0	Limited access during waterfowl season
Delevan NWR	Service/Service	1962	NA	0	0	0	0	0	Limited access during waterfowl season
Sutter NWR	Service/Service	1944	NA	0	3	0	0	0	Limited access during waterfowl season
Colusa NWR	Service/Service	1944	NA	0	0	0	0	0	Limited access during waterfowl season
Gray Lodge NWR	CDFG/CDFG	1931	NA	0	0	0	0	0	Limited access during waterfowl season

^aReservoir use reported in 12-hour visitor days, river use reported in 6-hour visitor days, and wildlife refuge use reported in 5-hour visitor days.

^bReservoir and river use based on 1992 data.

Source: Reclamation, 1997.

Approximately 75 percent of the recreational use at Shasta Lake occurs between May and September. Shasta Lake provides a variety of water-dependent recreation activities including the following:

- Power boating
- House boating
- Water skiing
- Fishing
- Camping

Sightseeing, boating, and visiting resorts are most popular recreation activities at Shasta Lake. Fishing is also popular, and rainbow trout, smallmouth bass, and crappie are the most frequently caught species.

Whiskeytown Lake. Whiskeytown Lake is located approximately 8 miles west of Redding. The surface area of the reservoir is approximately 3,250 acres, and the shoreline is 36 miles long when the reservoir is full. The most recreational use occurs between June and August, accounting for approximately 50 percent of the total annual use. The most popular water-dependent activities include swimming/beach use, boating, and fishing. The most popular water-enhanced activities are camping and sightseeing.

Lake Oroville Complex. The Lake Oroville recreational complex consists of Lake Oroville and the Thermalito Forebay and Afterbay. The California Department of Parks and Recreation administers recreation facilities. Peak travel to the area occurs between April and September. Day use and overnight camping account for most of the recreational use. Table 3-60 summarizes the recreation facilities at Lake Oroville.

The Oroville recreation area provides recreation facilities to support the following activities:

- Boating
- Water skiing
- Sailing
- Fishing
- Swimming
- Boat-in camping
- Overnight camping

The reservoir is stocked with game fish, and rainbow trout and smallmouth bass are the most frequently caught species in the reservoir. The surface area of Oroville Lake is approximately 15,800 acres, which provides 167 miles of shoreline when the reservoir is full.

Recreation facilities in the 600-acre Thermalito Forebay include a picnic area, swimming beach, and boat ramp for nonmotorized boats. Recreation activities at the Thermalito Afterbay include fishing and motorized boating. Rainbow trout, catfish, and largemouth and smallmouth bass are the most frequently caught species in the Forebay and Afterbay.

Folsom Lake State Recreation Area. Folsom Lake State Recreation Area (SRA), located east of Sacramento on the America River, includes both Folsom Lake and Lake Natoma. The surface area of the Folsom Lake is approximately 11,450 acres, which provides 75 miles of shoreline when the reservoir is full. Lake Natoma, located 6 miles

downstream of Folsom Lake, has a surface area of approximately 500 acres and provides approximately 10 miles of shoreline when full.

Most recreational use occurs between April and September. Water-oriented recreational activities at the Folsom SRA includes the following:

- Boating
- Fishing
- Swimming
- Jet skiing
- Windsurfing
- Sailing

More than 80 percent of the annual recreation use of Folsom Lake includes water-oriented activities. Additionally, water-enhanced activities include camping, picnicking, and hiking.

New Bullards Bar Reservoir. New Bullards Bar Reservoir is located on the Yuba River in Yuba County. The surface area of the reservoir is approximately 4,800 acres, and recreational facilities at the reservoir are administered by the Service. Water-orientated activities include boating, water skiing, fishing, and swimming. Boating activities account for the majority of water-orientated use. The CDFG stocks the reservoir with approximately 220,000 to 250,000 kokanee salmon (landlocked sockeye salmon) annually. The reservoir also provides water-enhanced activities such as picnicking, camping, and hiking.

Englebright Lake. Englebright Lake is located on the Yuba River downstream of New Bullards Bar Reservoir. The surface area of Englebright Lake is approximately 760 acres when the reservoir is full. Most recreational use occurs between April and September. Water-dependent recreation activities include boating, water skiing, fishing, and boat-in camping. Species typically caught on the lake include stocked rainbow trout, kokanee salmon, and warmwater species. The CDFG stocks the lake with approximately 22,000 catchable-sized trout per year.

Lake Red Bluff. Lake Red Bluff is located on the Sacramento River in the City of Red Bluff. The lake consists of backwater from a diversion dam for the Tehama-Colusa Canal, which began operation in 1967. When the diversion structure gates are closed, the lake has a surface area of approximately 530 acres. The diversion structure gates are opened from September 15 to May 15 to provide unimpeded upstream and downstream passage for winter-run Chinook salmon.

Most use of this river segment occurs between May and September when the diversion gates are closed. Annual boat drag races held during the Memorial Day weekend attract approximately 7,500 visitors. Lake Red Bluff provides both water-related and water-enhanced recreation activities when the diversion gates are closed, including fishing, boating, water skiing, camping, and picnicking. When the lake gates are open, flatwater recreation activities are eliminated. Because most recreation activities occur during the summer, opening of the diversion gates does not cause substantial impacts to recreation. Fishing is the primary recreation activity impacted by opening of the diversion gates because of the decrease in water surface area.

Lake Red Bluff is maintained at a constant pool elevation for water diversions when the diversion gates are closed.

Keswick Reservoir. Keswick Reservoir is located on the Sacramento River in a steep canyon approximately one-half mile downstream of Shasta Dam. The reservoir's surface area is approximately 640 acres, which provides about 19 miles of shoreline. The primary recreation activities at the reservoir include fishing, boating, sightseeing, and hunting. Fishing is the most popular activity at the reservoir, and rainbow trout, bass, and crappie are the most frequently caught species. Water-contact recreational activities are limited on the lake because of the cold water released from Shasta Dam.

Camp Far West Reservoir. Camp Far West Reservoir, constructed in 1963, is located on the Bear River at the junction of the Nevada, Placer, and Yuba County lines. The reservoir's surface area is approximately 2,680 acres when full and provides about 32 miles of shoreline. Most use is recorded between April and September. Water-dependent activities include fishing, water skiing, and swimming. Water-enhanced activities include picnicking and camping.

Rivers. Key rivers and streams in the SRSCs service area include the Sacramento, American, Feather, Bear, and Yuba Rivers and Clear Creek. The Draft PEIS for the CVPIA states that recreational use of these waterways likely has increased with increases in regional population. However, no comprehensive data are available on recreational uses of these rivers and streams.

Sacramento River, Upper Reach. The upper reach of the Sacramento River is defined as the 60-mile portion of the river between Keswick Reservoir and Lake Red Bluff. The reach flows through the foothills of the northern Sacramento Valley, which are largely unpopulated besides the Cities of Redding and Anderson. This reach of the river is characterized by rapid flow and scenic views. The upper reach of the Sacramento River provides more public access opportunities than the lower reaches of the river. Popular public access areas include a 3-mile segment between Keswick Reservoir and Lake Redding, Lake Redding Park, Turtle Bay Recreation Area, Anderson River Park, and a 7-mile segment below Jelly's Ferry.

Fishing is one of the primary water-dependent activities on the reach, with salmon, steelhead, and trout being the most frequently caught species. Although fishing is popular year-round, most fishing occurs in September and October during the fall salmon run. Water-enhanced activities in the upper reach include camping, picnicking, and sightseeing.

Sacramento River, Middle Reach. The middle reach of the Sacramento River is defined as the 160-mile segment of the river between Lake Red Bluff and the confluence with the Feather River. The meandering river channel is characterized by relatively slow-moving water, and the channel is lined with riparian forest and orchards. California DPR and Tehama, Glenn, Colusa, and Sutter Counties provide public access points along the river. Additionally, private facilities, such as fishing access points, marinas, and resorts, also provide access to the river.

Water-dependent activities include fishing, boating, swimming, and beach use. The middle portion of the Sacramento River provides the widest variety of game fish, including salmon, trout, steelhead, American shad, striped bass, sturgeon, and catfish. The relatively warm water present in this reach makes it a popular location for water-contact activities. Water-enhanced activities include camping, picnicking, and sightseeing.

Sacramento River, Lower Reach. The lower reach of the Sacramento River is defined as the 80-mile segment between the confluence with the Feather River and Courtland. The channel in the upstream portion of the reach meanders across the floodplain. Closer to Sacramento, the channel is confined by levees and commercial development. The downstream portion of this reach flows through agricultural areas.

The City and County of Sacramento provide public access points along the river, such as Discovery Park. In addition, private access points, such as marinas, exist throughout the reach. Water-dependent activities along the lower reach of the Sacramento River include fishing, boating, swimming, and beach use. Game fish present within the lower reach include salmon, steelhead, American shad, striped bass, sturgeon, and catfish. Water-enhanced activities include camping, picnicking, and sightseeing.

Feather River. The lower Feather River is defined as the 40-mile segment of the river between Oroville Dam and the confluence with the Sacramento River. Major recreation areas within this reach include the Oroville Wildlife Areas south of Lake Oroville, Riverfront Park in Marysville, and Lake of the Woods Wildlife Area near the confluence with Bear River. Several other undeveloped public access points also exist within the reach.

The lower Feather River provides both water-enhanced activities (camping, picnicking, and sightseeing) and water-dependent recreation activities (boating, fishing, and swimming). The frequently caught fish within this reach include American shad, salmon, striped bass, and steelhead.

American River. The American River Parkway consists of a 23-mile corridor between Nimbus Dam and the confluence with the Sacramento River. Sacramento County Parks and Recreation Department manages the parkway, which traverses the Sacramento Metropolitan Area and includes a series of 14 parks distributed on publicly owned lands. The parkway provides approximately 6,000 acres of open space, which include 28 automobile access points and 68 access points for pedestrians, equestrians, and bicyclists.

Water-enhanced activities include the following:

- Picnicking
- Hiking
- Jogging
- Nature study
- Bicycling
- Equestrian recreation

Water-dependent recreation activities include the following:

- Rafting

- Boating
- Fishing
- Swimming
- Beach use

The most frequently caught fish within this reach include salmon, trout, striped bass, and steelhead.

Yuba River. The lower Yuba River is defined as the 20-mile reach between Englebright Lake and the confluence with the Feather River at Marysville. No public recreation facilities are located in this reach, and limited public access is available along this reach. Boating is constrained by flows and the presence of a barrier at Daguerre Point Dam, located approximately 10 miles upstream of the confluence with the Feather River. The river provides water-related recreation activities, such as fishing for salmon, steelhead, striped bass, and American shad.

Clear Creek. The Clear Creek reach flows approximately 17 miles from Whiskeytown Lake to the confluence with the Sacramento River, south of Redding. The upstream portion of the creek is characterized by steep terrain with falls and cascades, which transitions to a flatter gradient in the downstream portion of the creek.

The upper 4 miles of the reach flows through the Whiskeytown-Shasta-Trinity National Recreation Area (NRA). Although several miles of stream frontage are now owned by BLM, no formal recreation areas exist along the remaining portion of the creek, which flows through private lands. Public access is provided at the Whiskeytown-Shasta-Trinity NRA and the National Environmental Education Camp, which is primarily used by nearby schools.

Water-dependent recreation activities include fishing, tubing, swimming, and beach use. Water-enhanced recreation activities include relaxing, hiking, and camping.

Bear River. The Bear River reach is defined as the 20-mile segment between Camp Far West Reservoir and the confluence with the Feather River. There are no public recreation facilities or public access points along this reach. However, several informal access sites exist along the reach. Water-dependent recreation activities include fishing for bass, catfish, and other warmwater species. Water-enhanced recreation activities include sightseeing and informal picnicking.

Recreation opportunities provided by Bear River typically are poor because the reach is usually dry during the peak summer recreation season.

Wildlife Refuges. Five key wildlife refuges are located within the SRSCs service area: the Sacramento, Delevan, Sutter, and Colusa NWRs and Gray Lodge WMA. The Sacramento, Delevan, Sutter, and Colusa NWRs are managed as the Sacramento NWR Complex, and Gray Lodge WMA is managed by CDFG. Most recreation use at the Sacramento NWR Complex and the Gray Lodge WMA occurs between October and January when migratory birds are present.

Recreation facilities on the refuges include a visitor center, interpretive trails, viewing platforms, and self-guided driving tours, which are designed to enhance wildlife observation

opportunities. Nonconsumptive recreation opportunities consist of wildlife viewing, which accounts for most of the recreation use at the refuges. Consumptive recreation opportunities include fishing and hunting. Hunting of ducks, geese, coots, snipes, and pheasants is permitted on all refuges in the Sacramento NWR Complex between October and January. Hunting recreation opportunities are also provided on the Gray Lodge WMA. Fishing opportunities are provided on the Delevan NWR, which permits fishing for catfish and largemouth bass from February to October, and the Gray Lodge WMA. The primary goal of the refuges is to provide habitat for waterfowl and other wildlife, and visitor access is restricted in certain areas during specified periods to limit disturbances to wildlife.

Private Hunting Clubs. The SRSCs service area includes 516 private hunting clubs covering 227,000 acres, and approximately 96,700 acres are flooded annually. Consumptive recreation opportunities include hunting for ducks, geese, snipes, coots, and pheasants.

Economic Value of Recreation The economic value of recreation is commonly measured in dollars per user day. The recreation associated with the CVP in the Sacramento Valley is predominantly reservoir and river based. An estimate of the user day value of reservoir recreation is \$12 (Bay-Delta Authority, 2004). This value was updated to 2002 dollars from the CVPIA PEIS. The existing value of recreation at a particular reservoir would be the number of visitors to the reservoir times the number of days in total they spent recreating times \$12.

Environmental Consequences. The effects of Alternatives 1 through 5 on recreational activities in the SRSCs service area are compared to conditions under the No Action Alternative.

No Action Alternative. The No Action Alternative does not include new facilities or construction. The No Action Alternative assumes that dry-year reductions would remain the same as existing conditions, and the renewed contract period would last 40 years.

Alternative 1. Recreation activities and benefits in the SRSC area under Alternative 1 would be identical to conditions under the No Action Alternative. Alternative 1 would not significantly alter current CVP operations, water storage or release patterns from CVP facilities, or the maximum volume of water delivered to the SRSCs.

It is assumed that use of the assigned CVP water by SRSCs would continue to be managed in the same manner under Alternative 1 as under the No Action Alternative.

Therefore, there are no impacts to recreation under this alternative.

Alternative 2. Recreation activities and benefits in the SRSC area under Alternative 2 would be similar to conditions under the No Action Alternative. Alternative 2 would not alter CVP operations, water storage or release patterns from CVP facilities, or the maximum volume of water to be delivered to the SRSCs, with the exception of reductions in water deliveries due to sliding-scale cutbacks in dry water years. The cutbacks associated with this alternative could result in additional water in the storage reservoirs, as well as additional surface water flows through the Sacramento River, into the Delta. This could

create beneficial impacts to recreational resources in the SRSCs service area. Impacts could include small increases in visitor-days to CVP reservoirs and streams in the affected area.

It is assumed that use of the assigned CVP water by SRSCs would continue to be managed in the same manner under Alternative 4 as under the No Action Alternative.

Therefore, there are no impacts to recreation under this alternative.

Alternative 3. Recreation activities and benefits in the SRSC area under Alternative 3 would be identical to conditions under the No Action Alternative. Alternative 3 would not alter CVP operations, water storage or release patterns from CVP facilities, or the maximum volume of water to be delivered to the SRSCs.

It is assumed that use of the assigned CVP water by SRSCs would continue to be managed in the same manner under Alternative 3 as under the No Action Alternative.

Therefore, there are no impacts to recreation under this alternative.

Alternative 4. Recreation activities and benefits in the SRSC area under Alternative 4 would be similar to conditions under the No Action Alternative. Alternative 4 would not alter CVP operations, water storage or release patterns from CVP facilities, or the maximum volume of water to be delivered to the SRSCs, with the exception of reductions in water deliveries due to sliding-scale cutbacks in dry water years. The cutbacks associated with this alternative could result in additional water in the storage reservoirs, as well as additional surface water flows through the Sacramento River, into the Delta. This could create beneficial impacts to recreational resources in the SRSCs service area. Impacts could include small increases in visitor-days to CVP reservoirs and streams in the affected area.

It is assumed that use of the assigned CVP water by SRSCs would continue to be managed in the same manner under Alternative 4 as under the No Action Alternative.

Therefore, there are no impacts to recreation under this alternative.

Alternative 5. Recreation activities and benefits in the SRSC area under Alternative 5 would be similar to conditions under the No Action Alternative. Alternative 5 would not alter CVP operations, water storage or release patterns from CVP facilities, or the maximum volume of water to be delivered to the SRSCs, with the exception of reductions in water deliveries due to Sacramento-Index cutbacks in dry water years. The cutbacks associated with this alternative could result in additional water in the storage reservoirs, as well as additional surface water flows through the Sacramento River, into the Delta. This could create beneficial impacts to recreational resources in the SRSCs service area. Impacts could include small increases in visitor-days to CVP reservoirs and streams in the affected area.

It is assumed that use of the assigned CVP water by SRSCs would continue to be managed in the same manner under Alternative 5 as under the No Action Alternative.

Therefore, there are no impacts to recreation under this alternative.

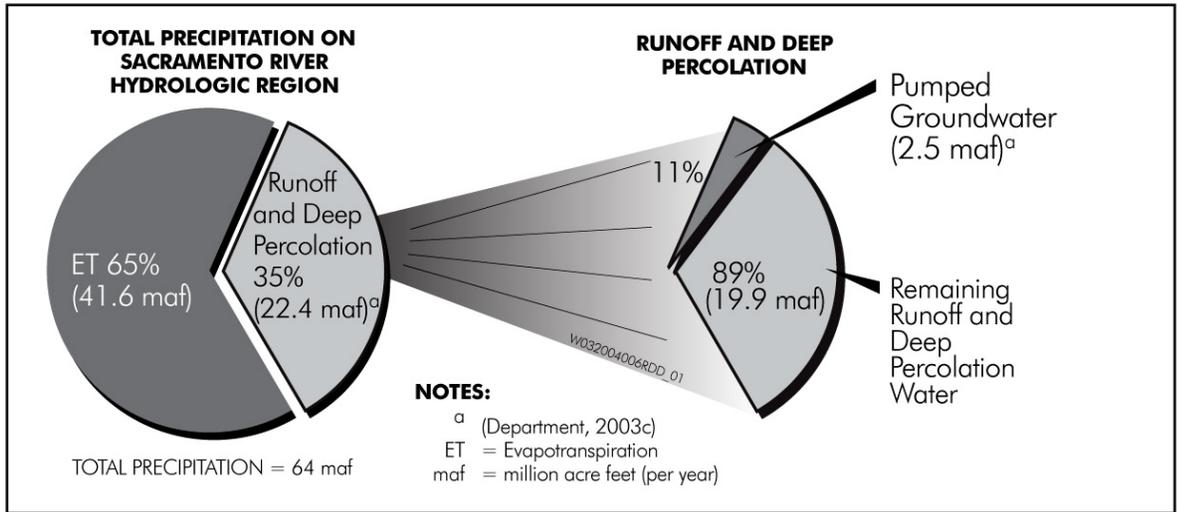
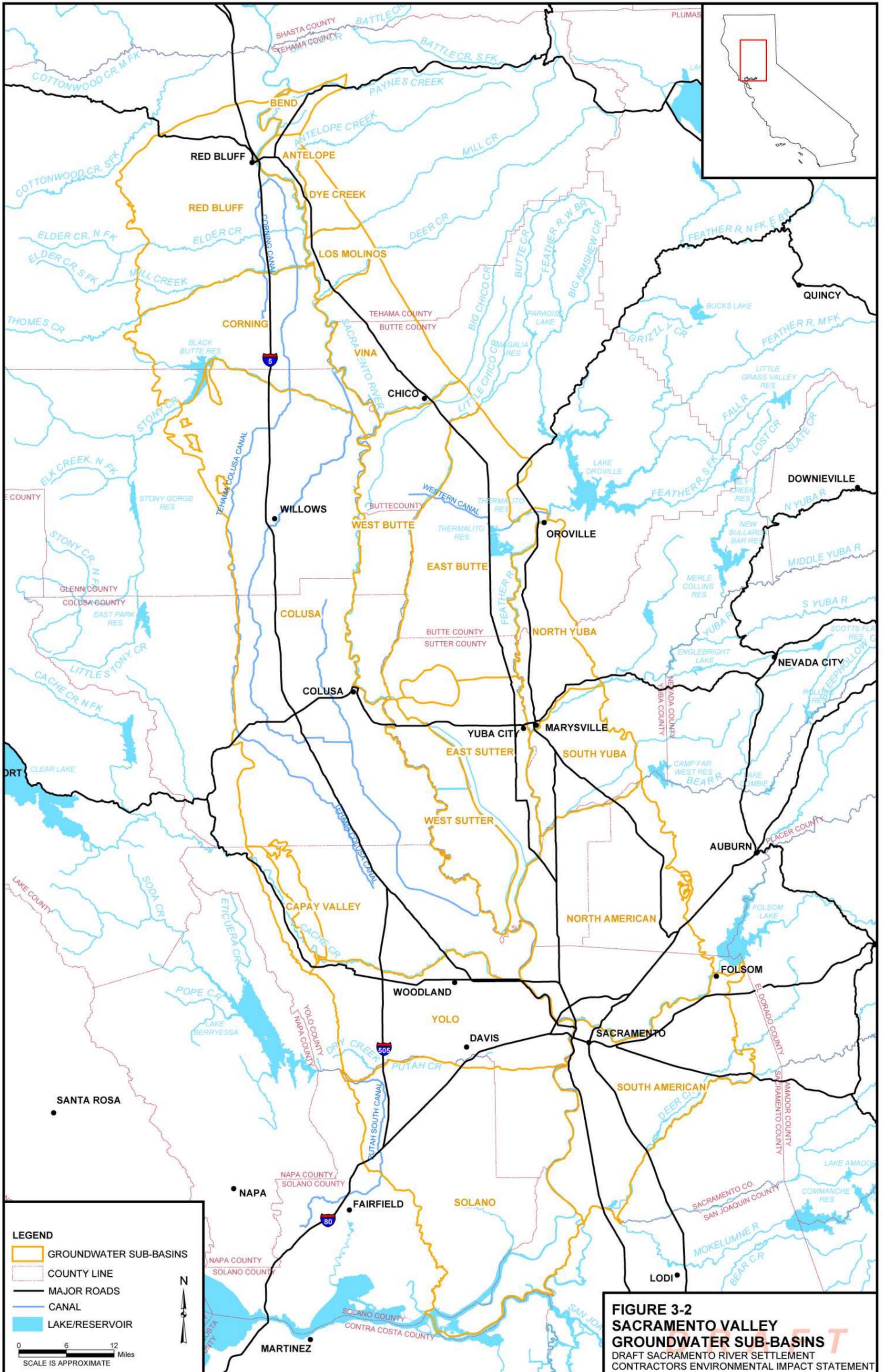
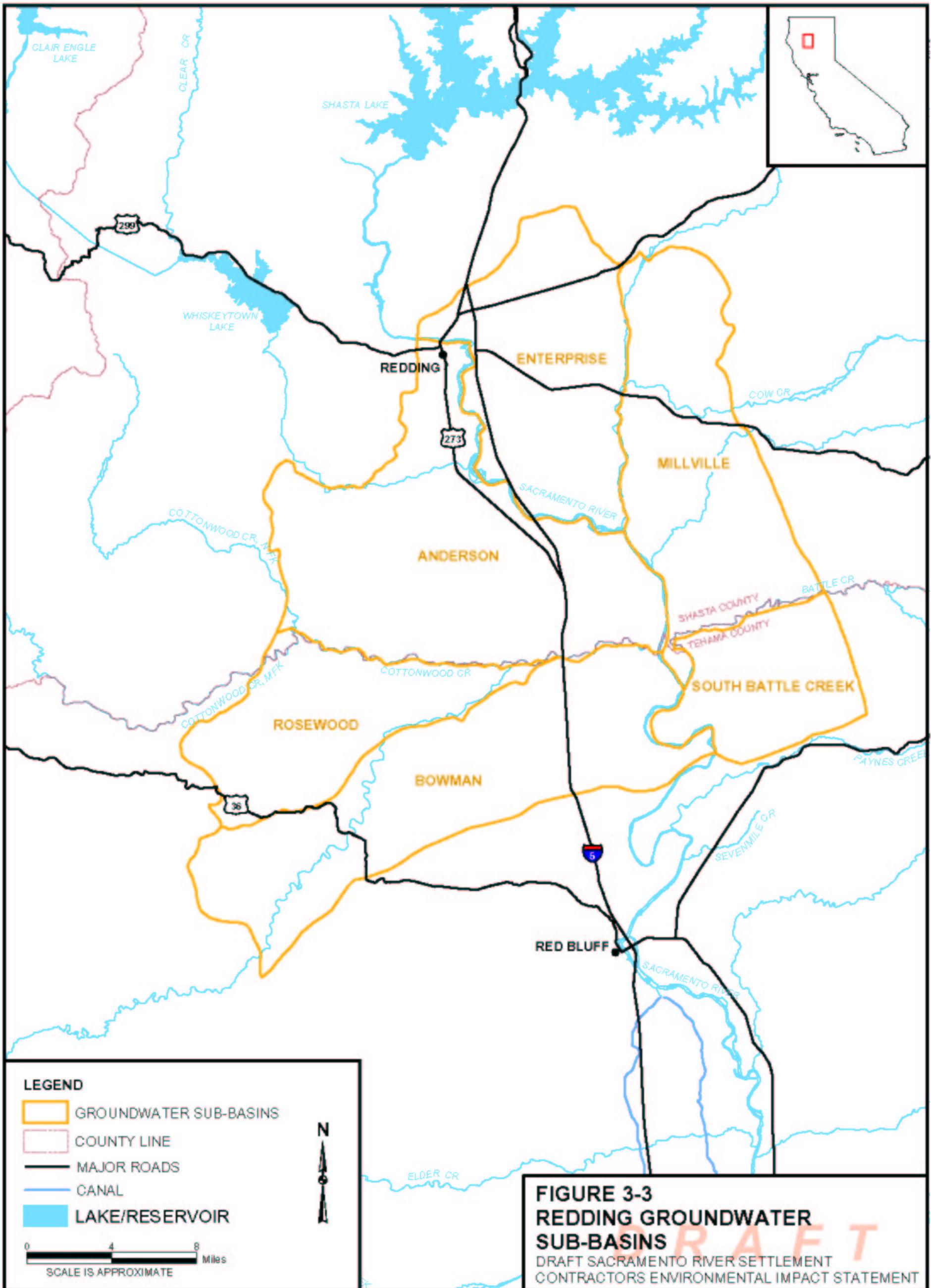
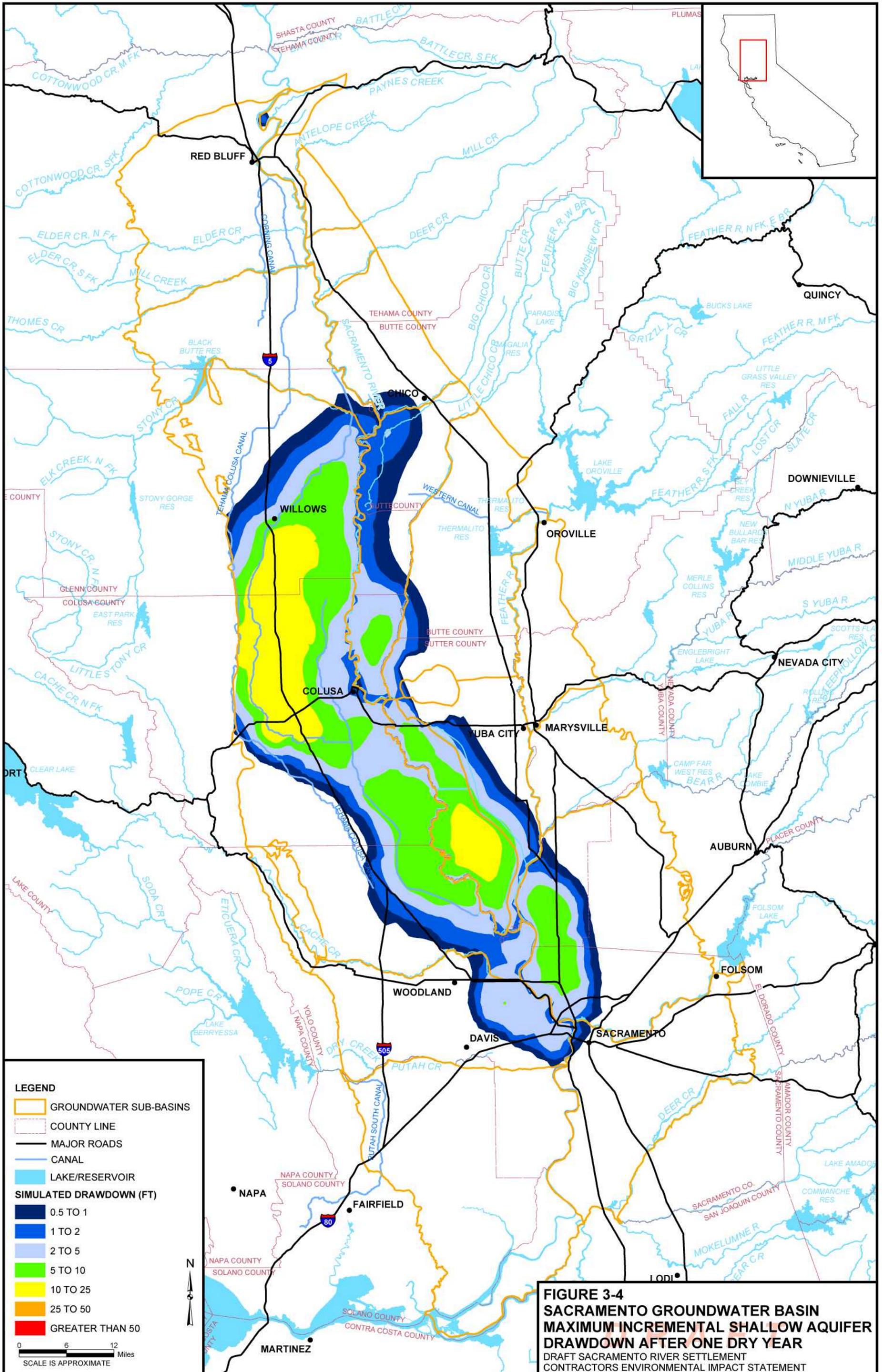


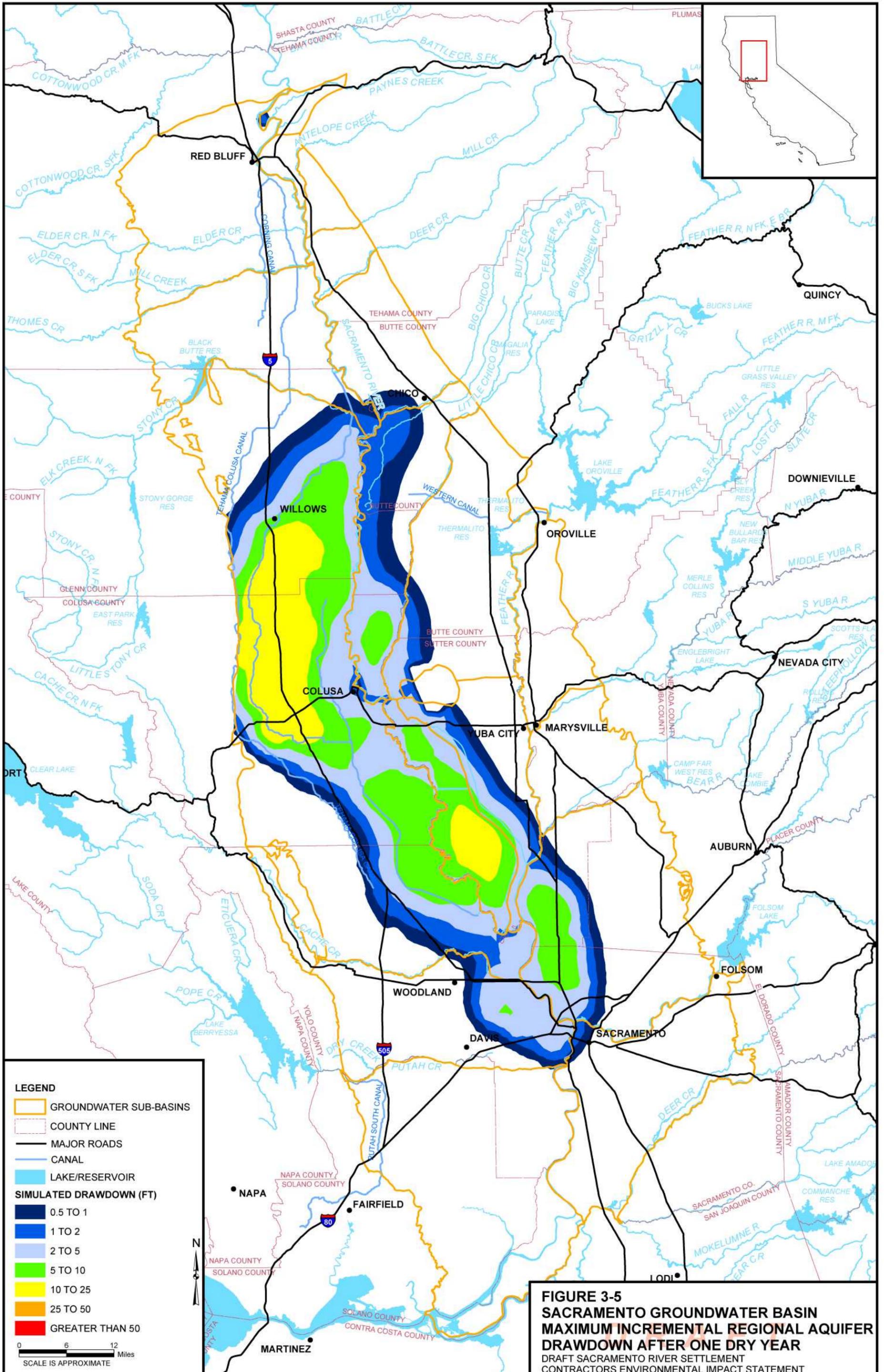
FIGURE 3-1
 SACRAMENTO RIVER HYDROLOGIC REGION TOTAL PRECIPITATION BREAKDOWN

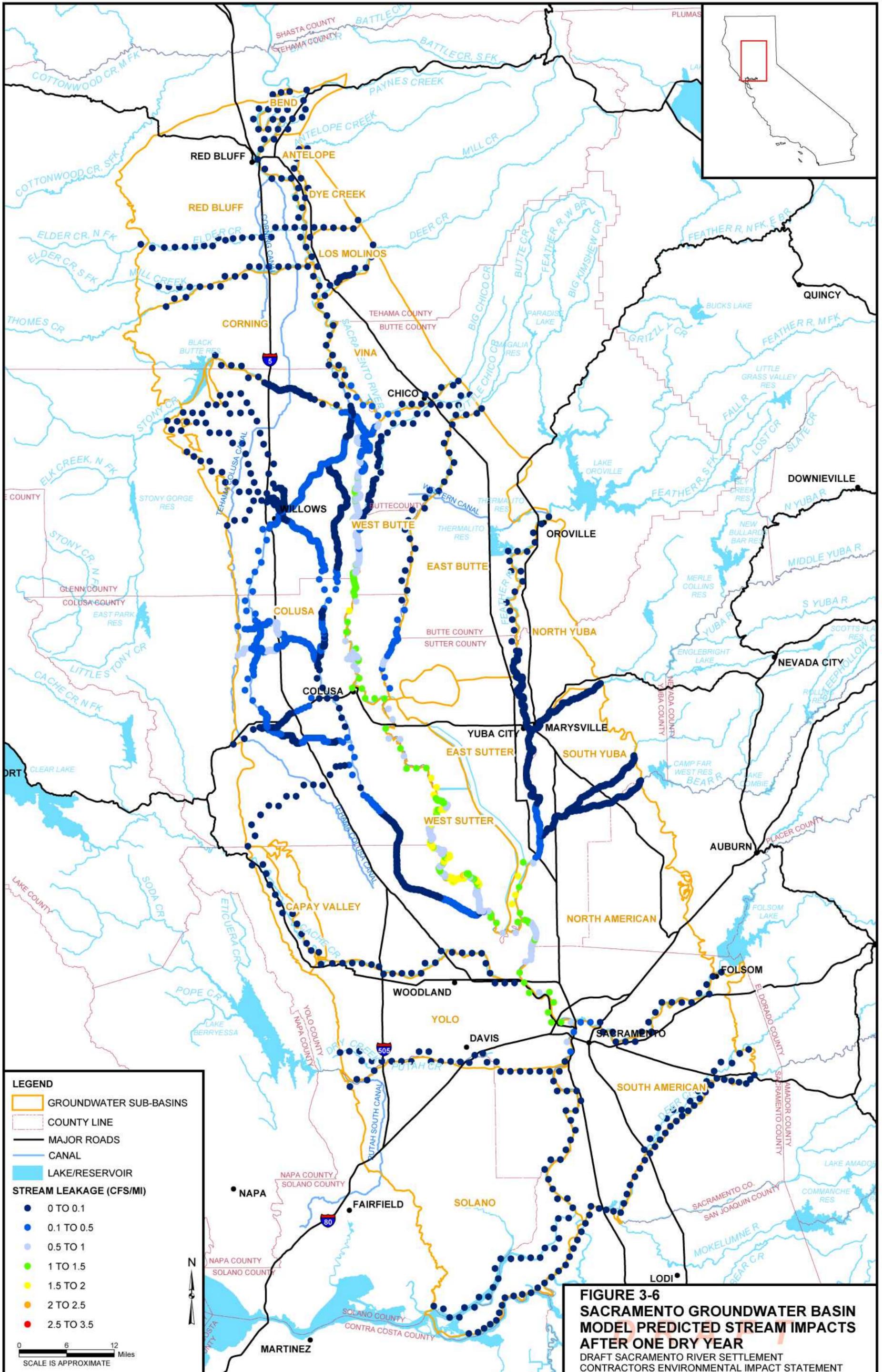


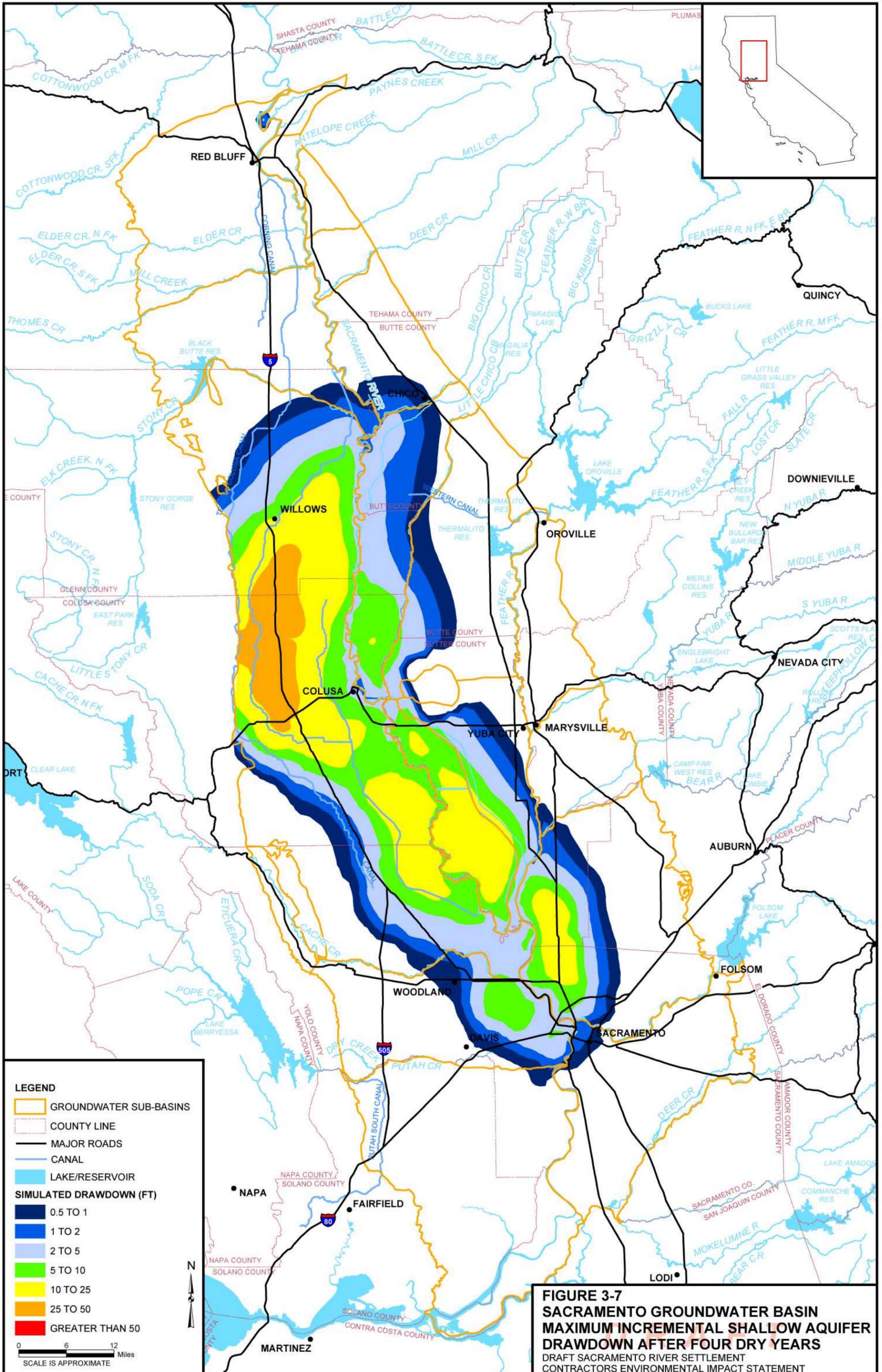


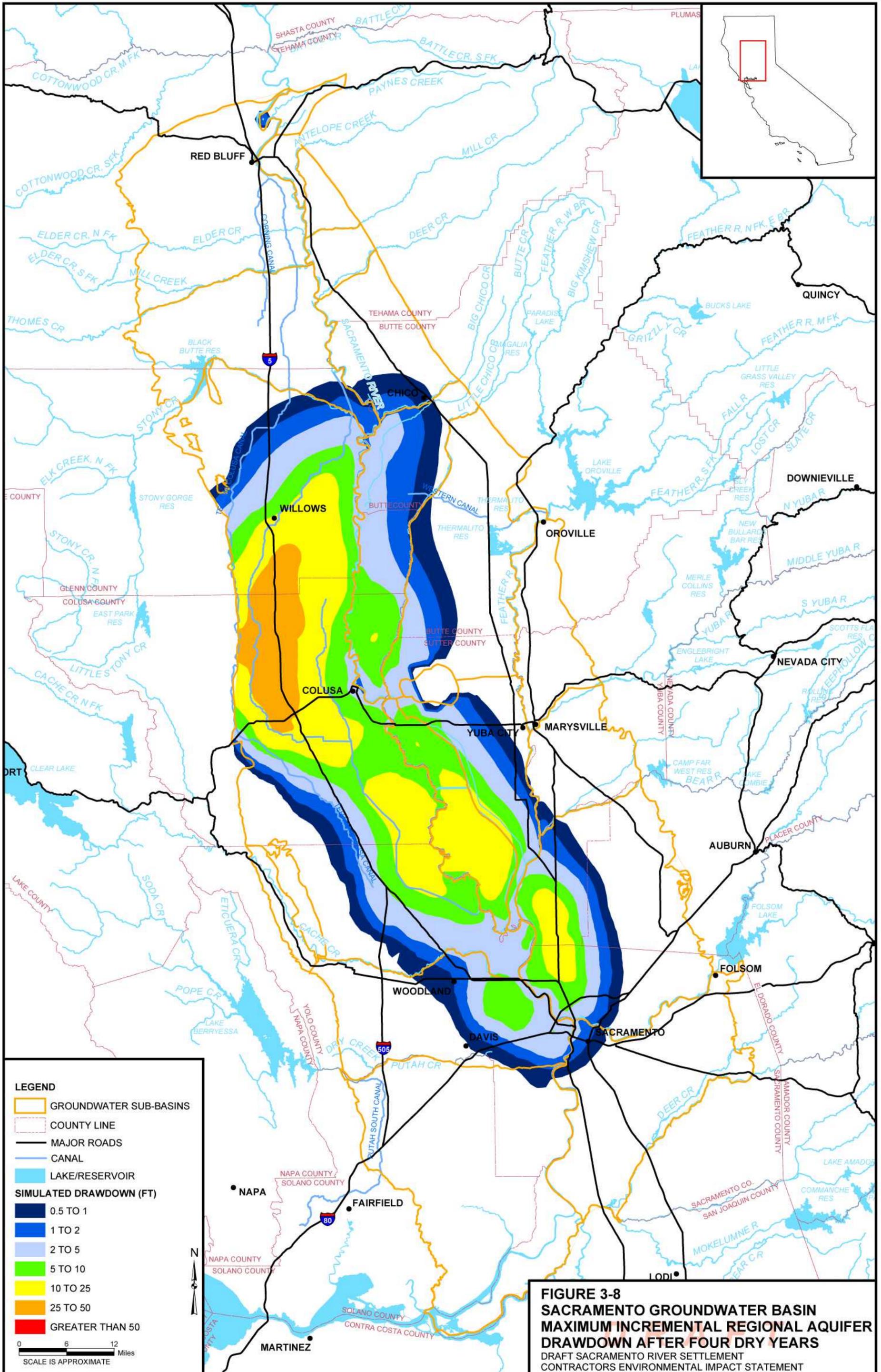
**FIGURE 3-3
REDDING GROUNDWATER
SUB-BASINS**
DRAFT SACRAMENTO RIVER SETTLEMENT
CONTRACTORS ENVIRONMENTAL IMPACT STATEMENT











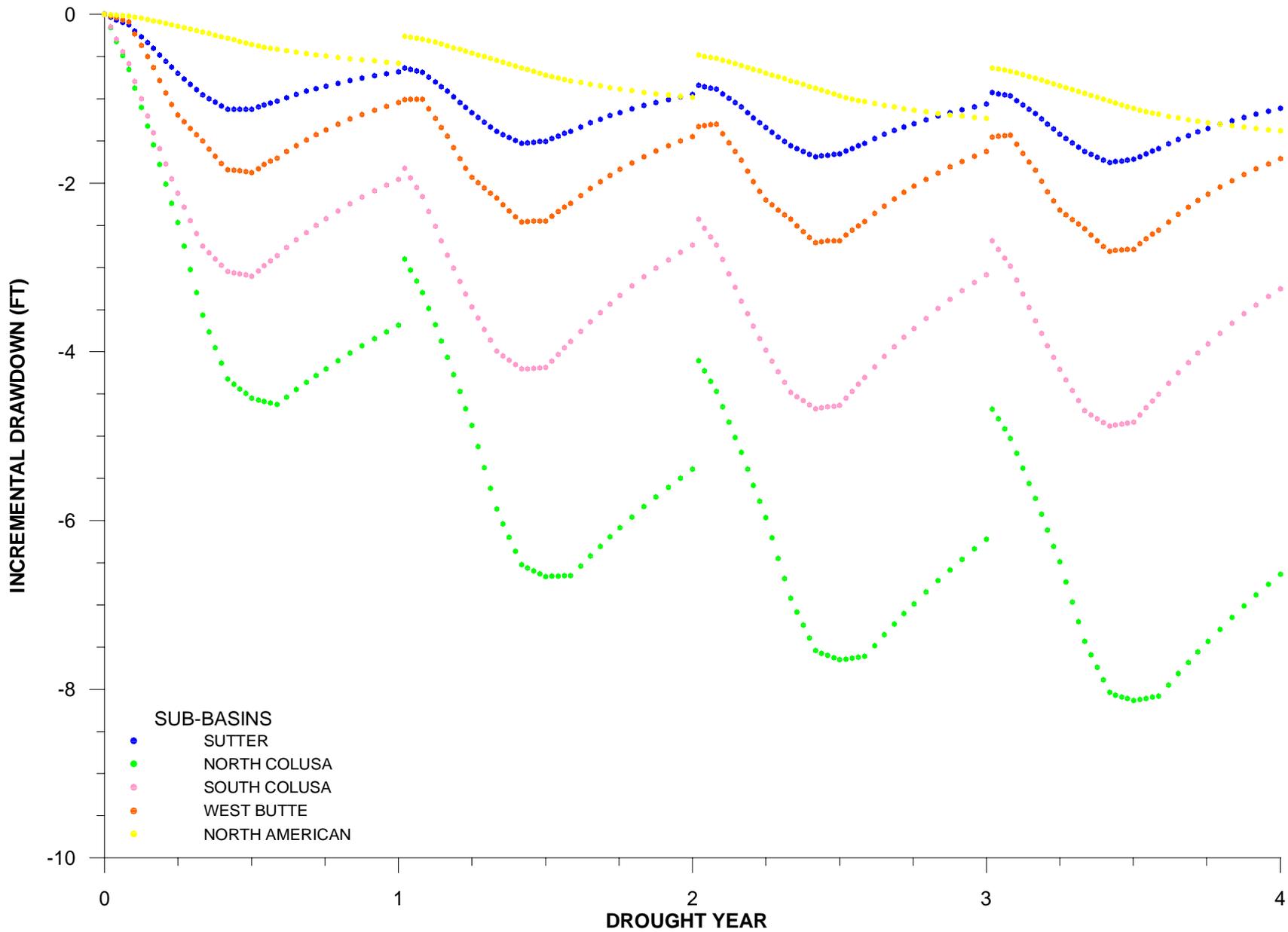
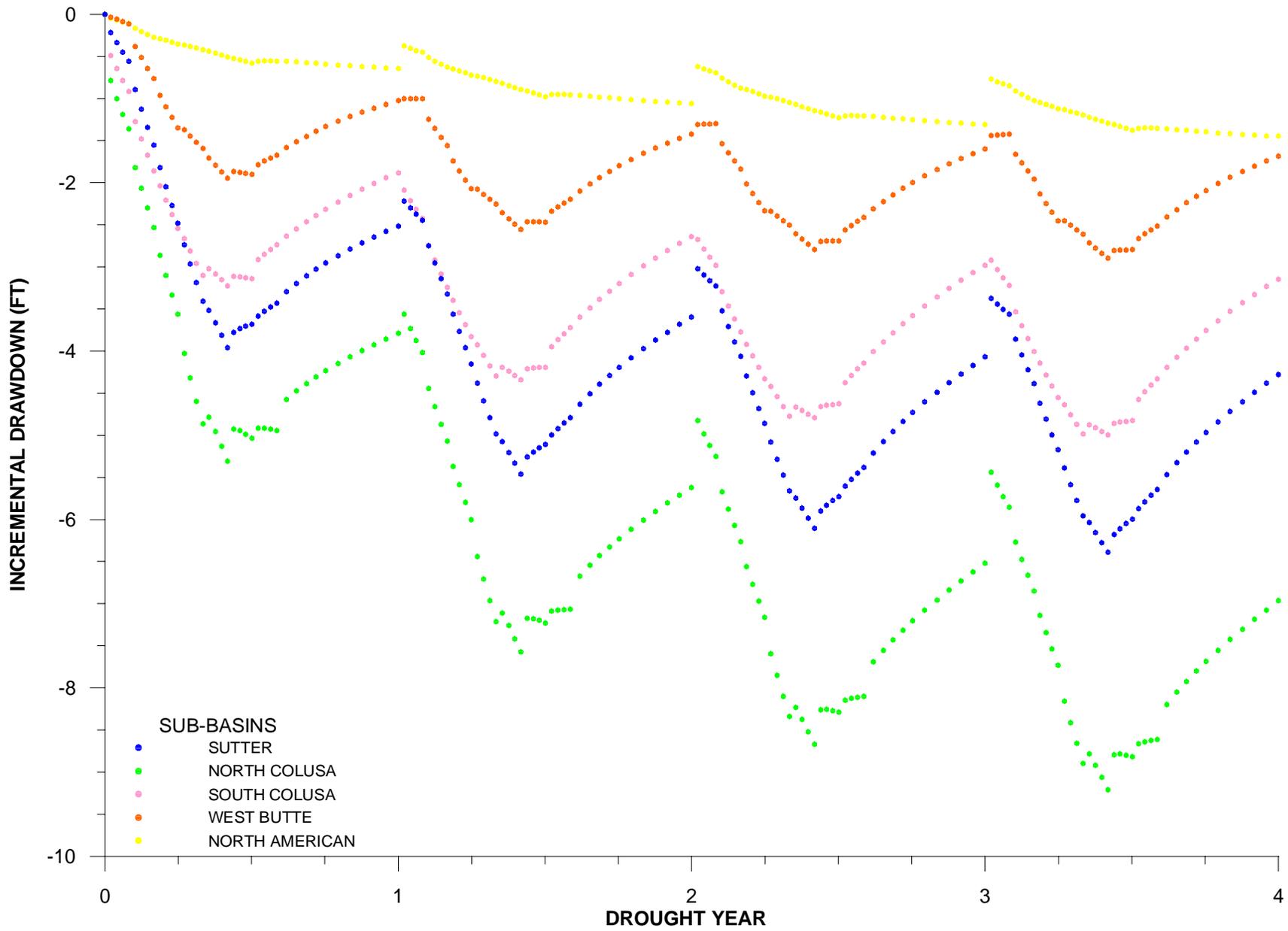
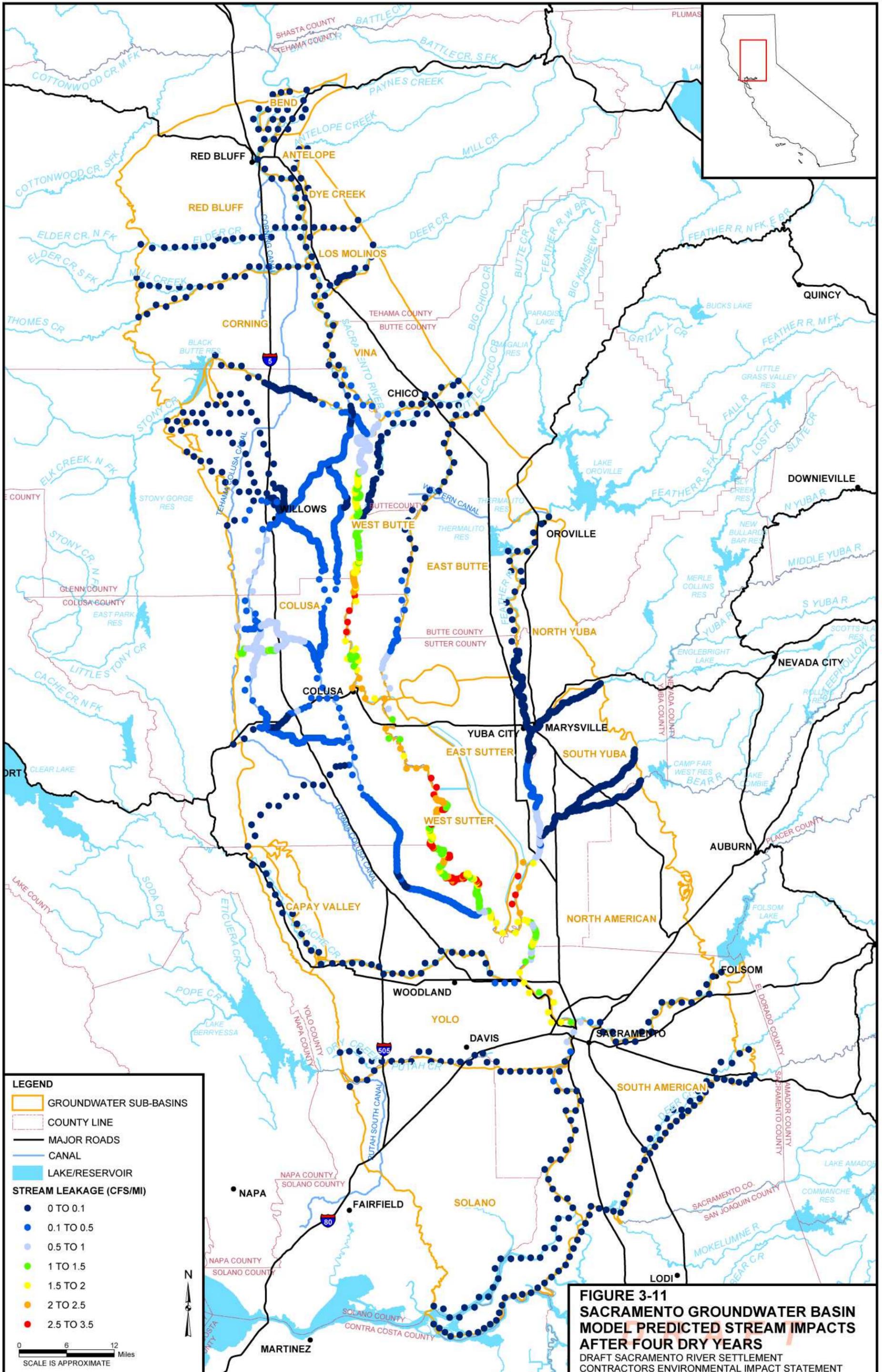


FIGURE 3-9
SACRAMENTO GROUNDWATER BASIN
SIMULATED SHALLOW AQUIFER HYDROGRAPHS
 DRAFT SACRAMENTO SETTLEMENT CONTRACTORS
 ENVIRONMENTAL IMPACT STATEMENT



- SUB-BASINS
- SUTTER
 - NORTH COLUSA
 - SOUTH COLUSA
 - WEST BUTTE
 - NORTH AMERICAN

FIGURE 3-10
SACRAMENTO GROUNDWATER BASIN
SIMULATED REGIONAL AQUIFER HYDROGRAPHS
 DRAFT SACRAMENTO SETTLEMENT CONTRACTORS
 ENVIRONMENTAL IMPACT STATEMENT



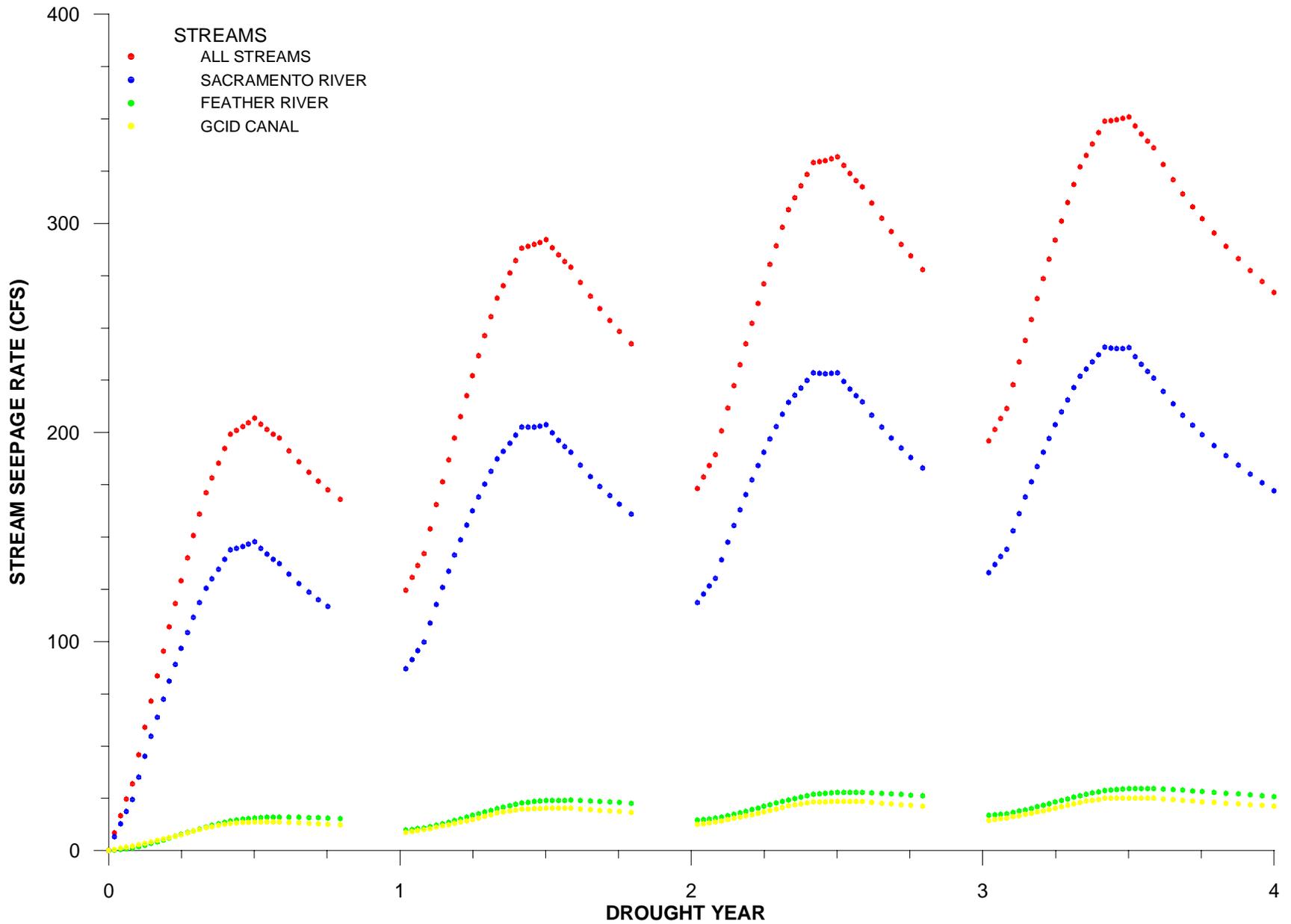
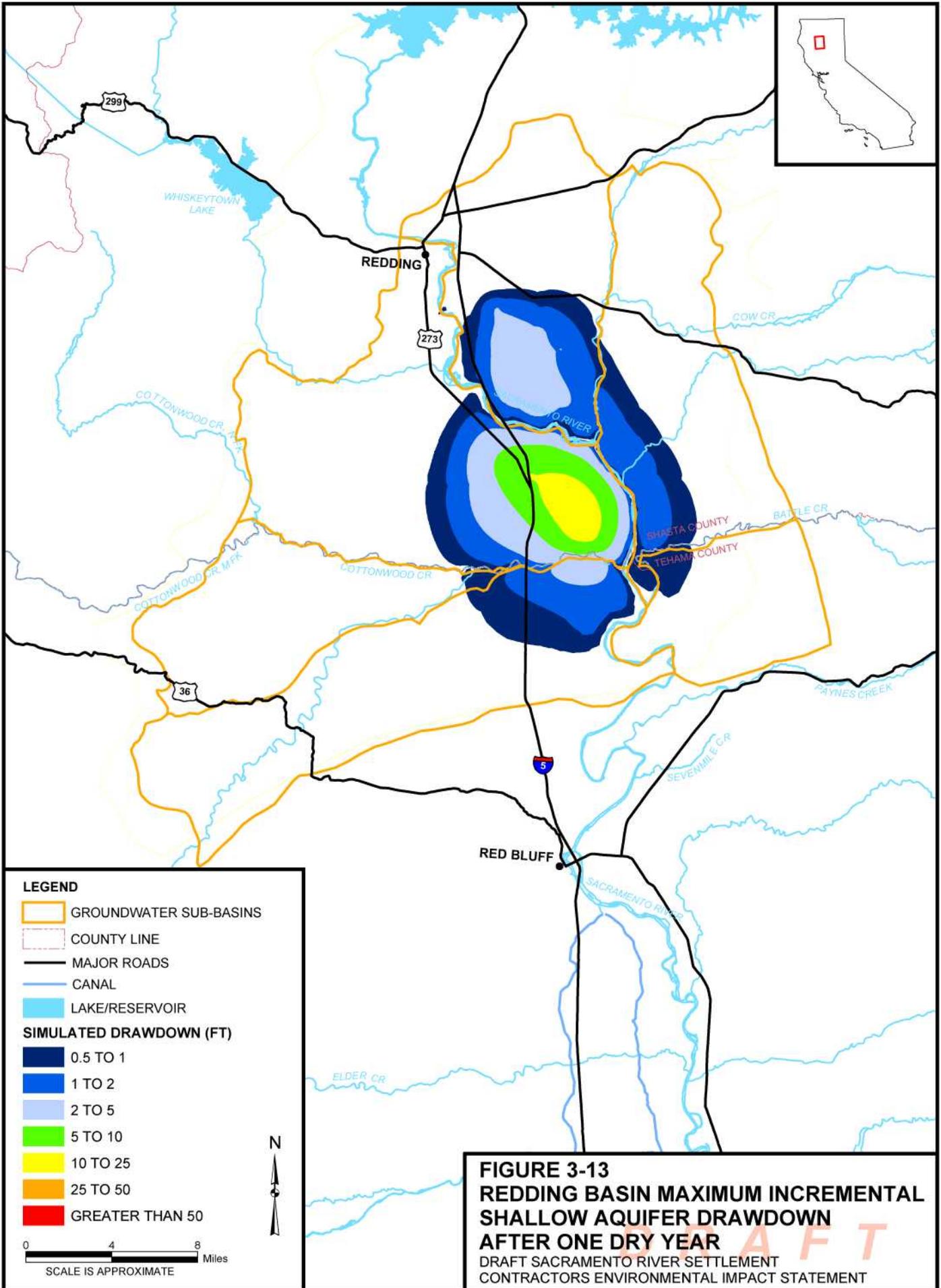
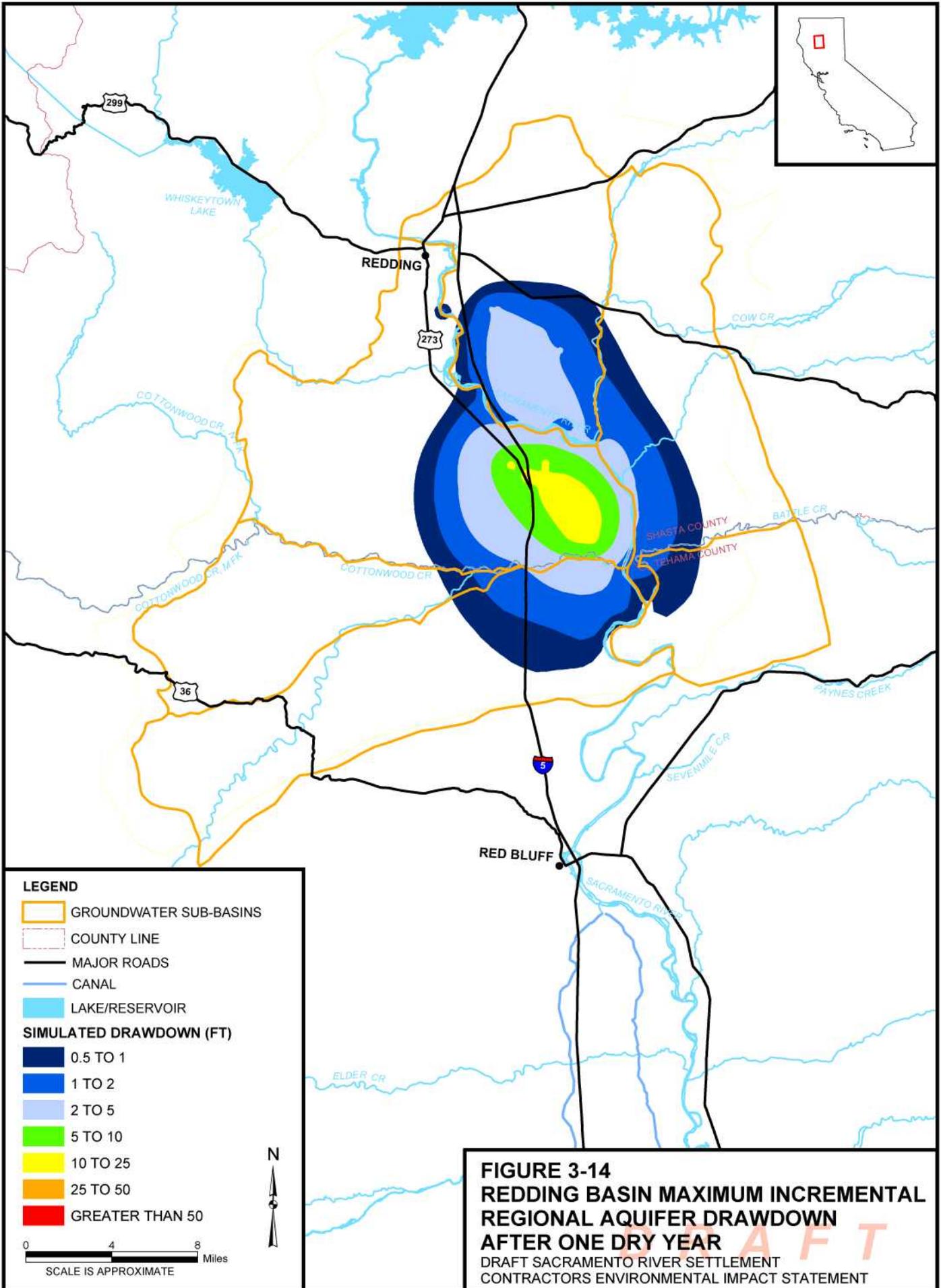
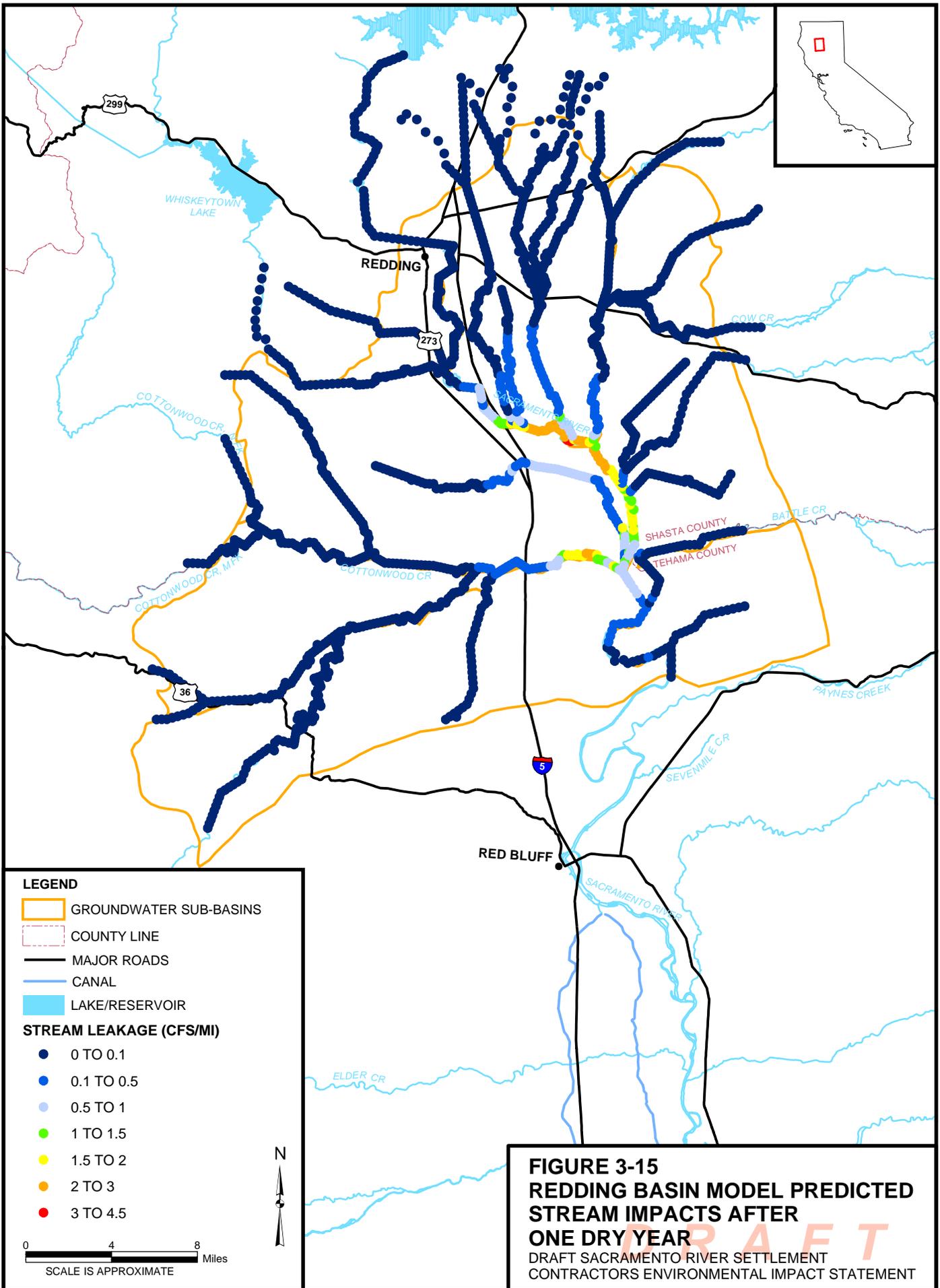


FIGURE 3-12
SACRAMENTO GROUNDWATER BASIN
SIMULATED STREAM LEAKAGE
OVER 4 DRY YEARS
 DRAFT SACRAMENTO SETTLEMENT CONTRACTORS
 ENVIRONMENTAL IMPACT STATEMENT







LEGEND

- GROUNDWATER SUB-BASINS
- COUNTY LINE
- MAJOR ROADS
- CANAL
- LAKE/RESERVOIR

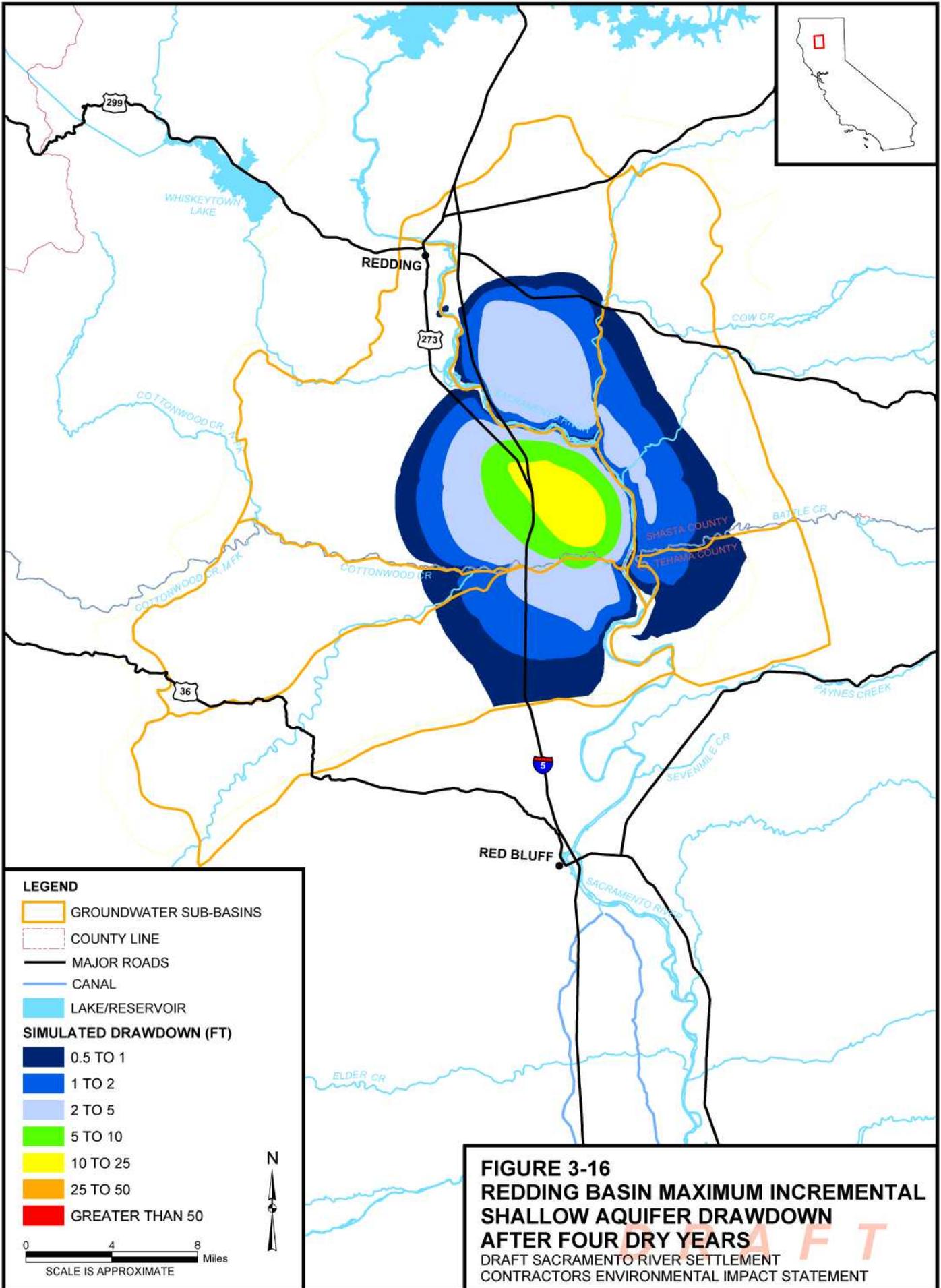
STREAM LEAKAGE (CFS/MI)

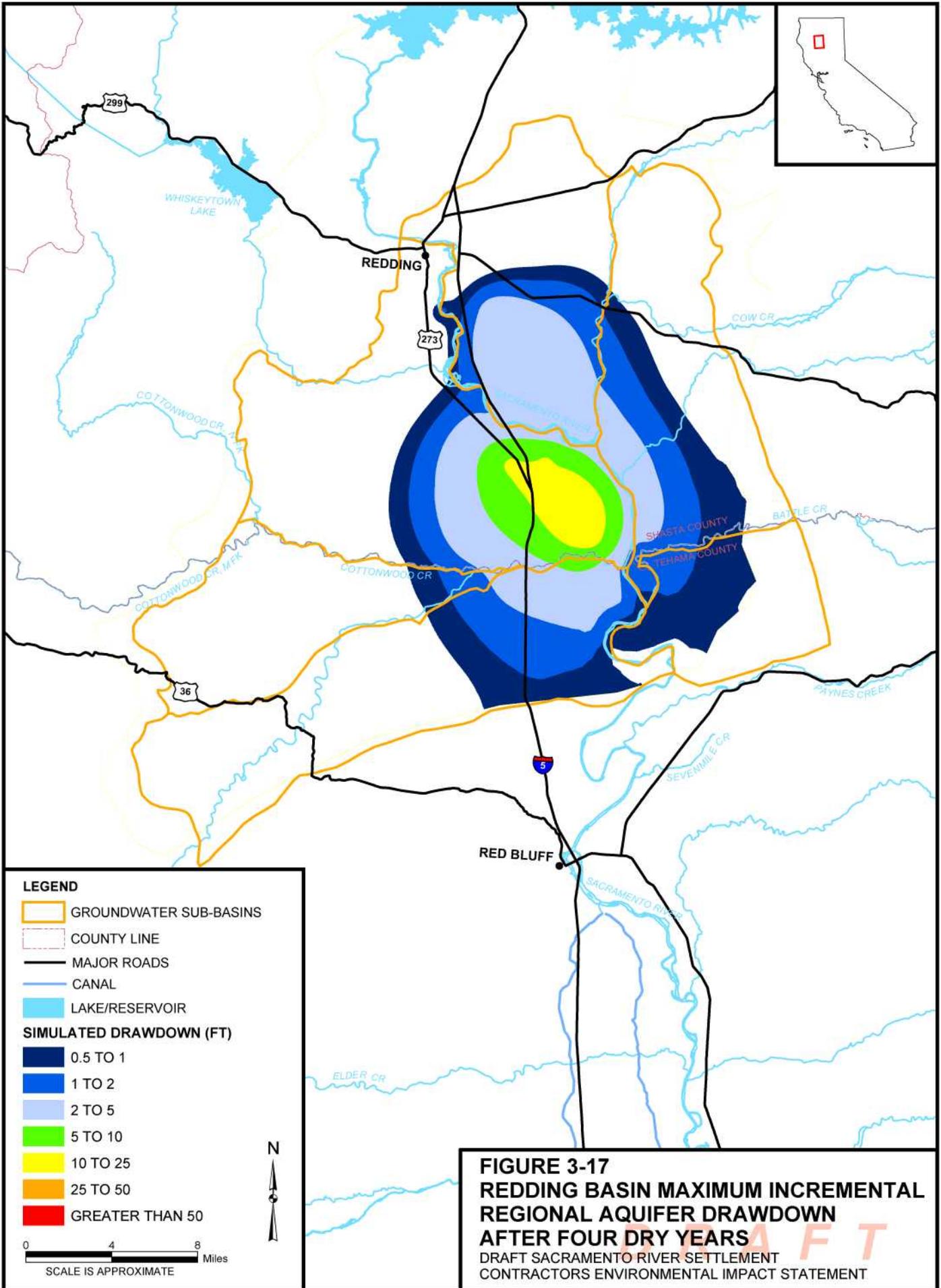
- 0 TO 0.1
- 0.1 TO 0.5
- 0.5 TO 1
- 1 TO 1.5
- 1.5 TO 2
- 2 TO 3
- 3 TO 4.5

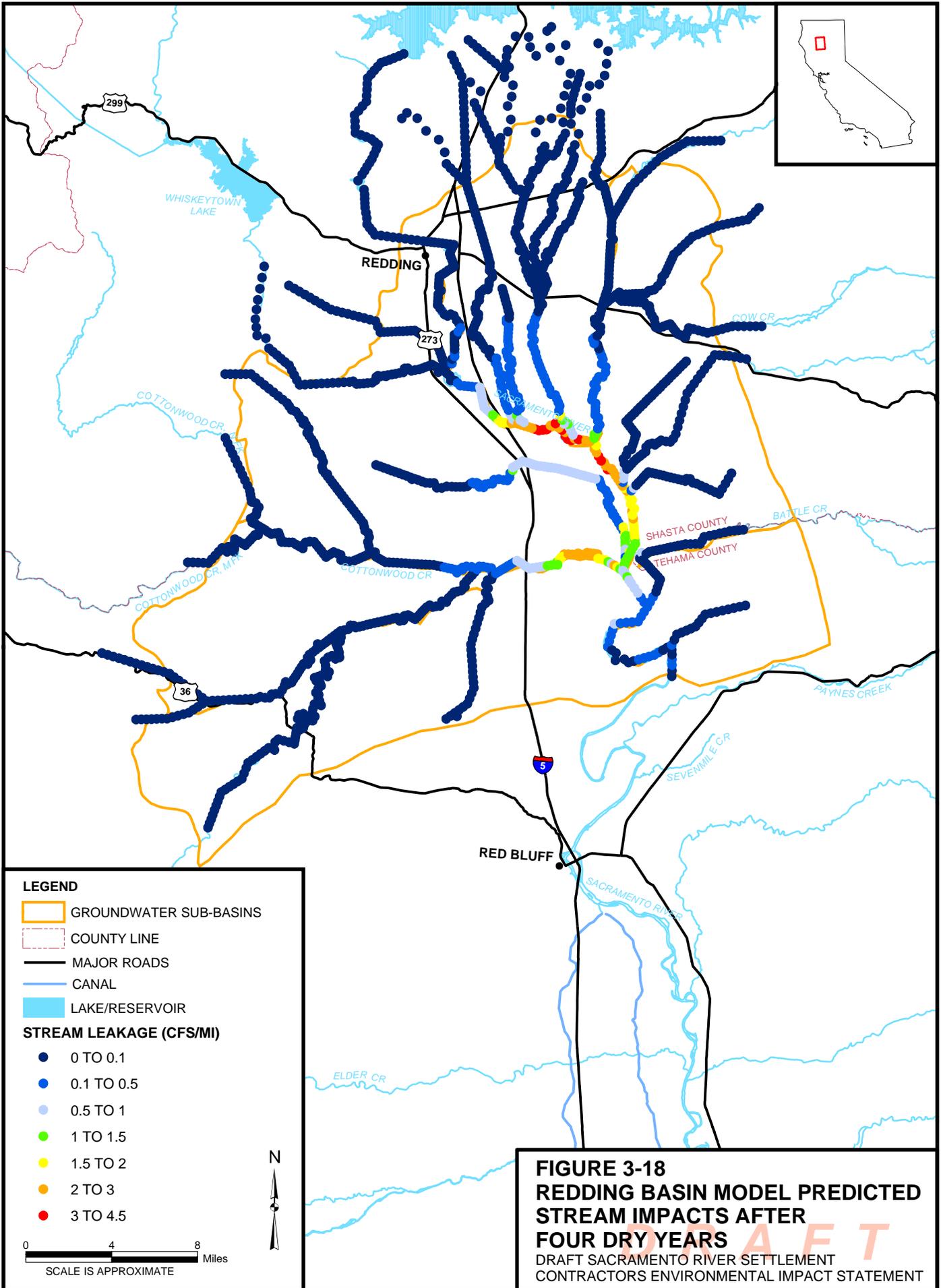
0 4 8 Miles
SCALE IS APPROXIMATE

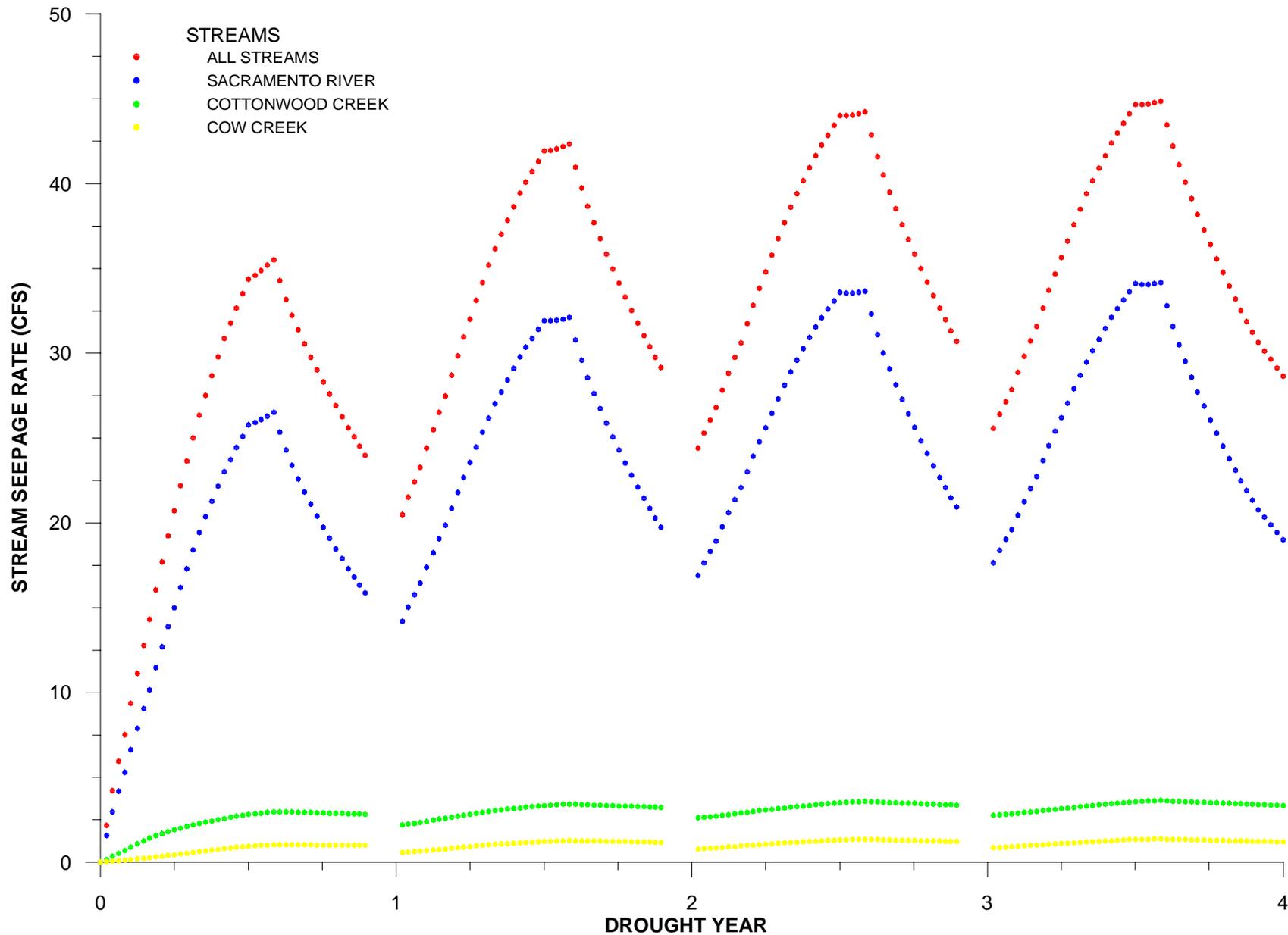


**FIGURE 3-15
REDDING BASIN MODEL PREDICTED
STREAM IMPACTS AFTER
ONE DRY YEAR**
DRAFT
DRAFT SACRAMENTO RIVER SETTLEMENT
CONTRACTORS ENVIRONMENTAL IMPACT STATEMENT



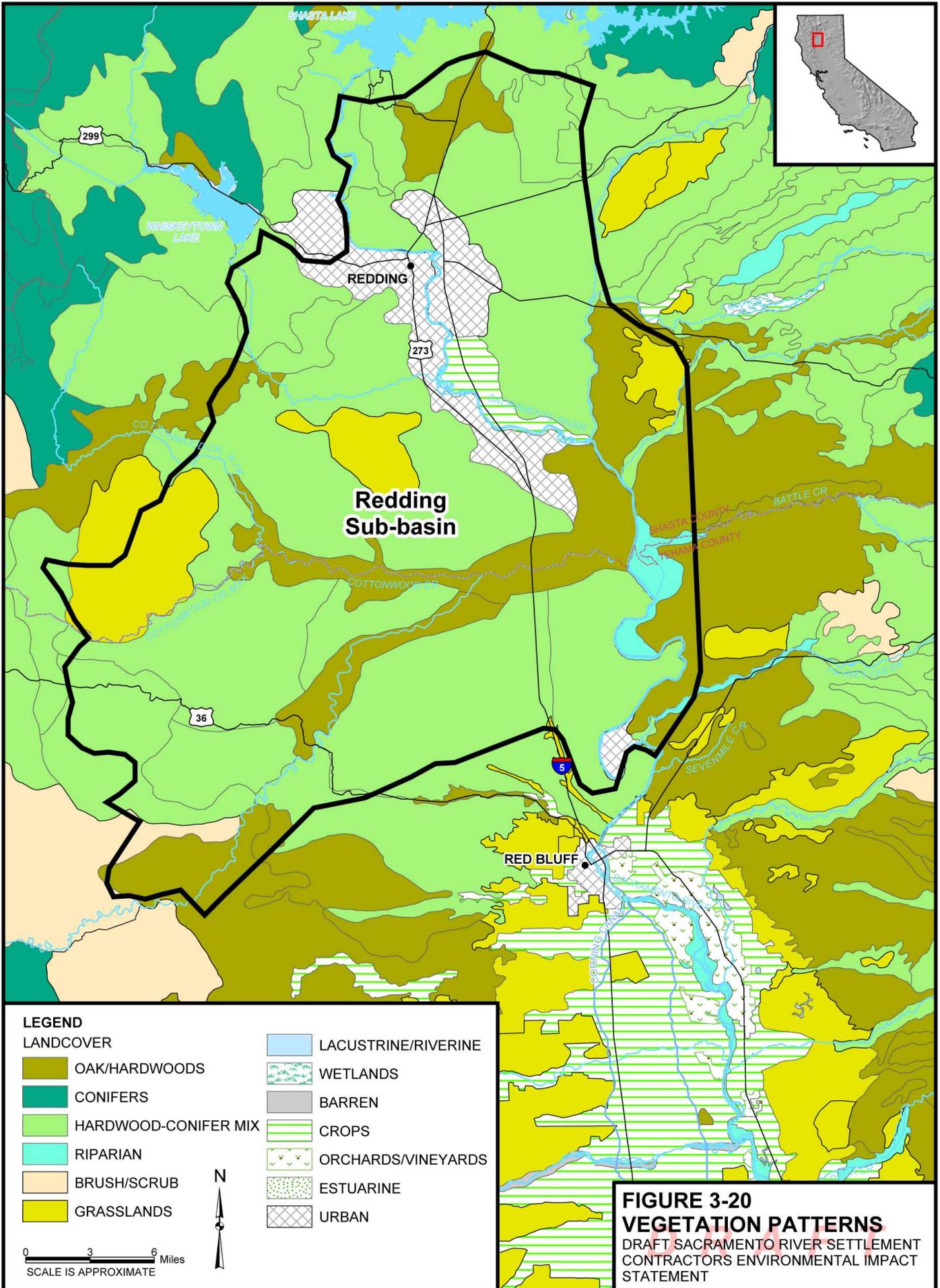


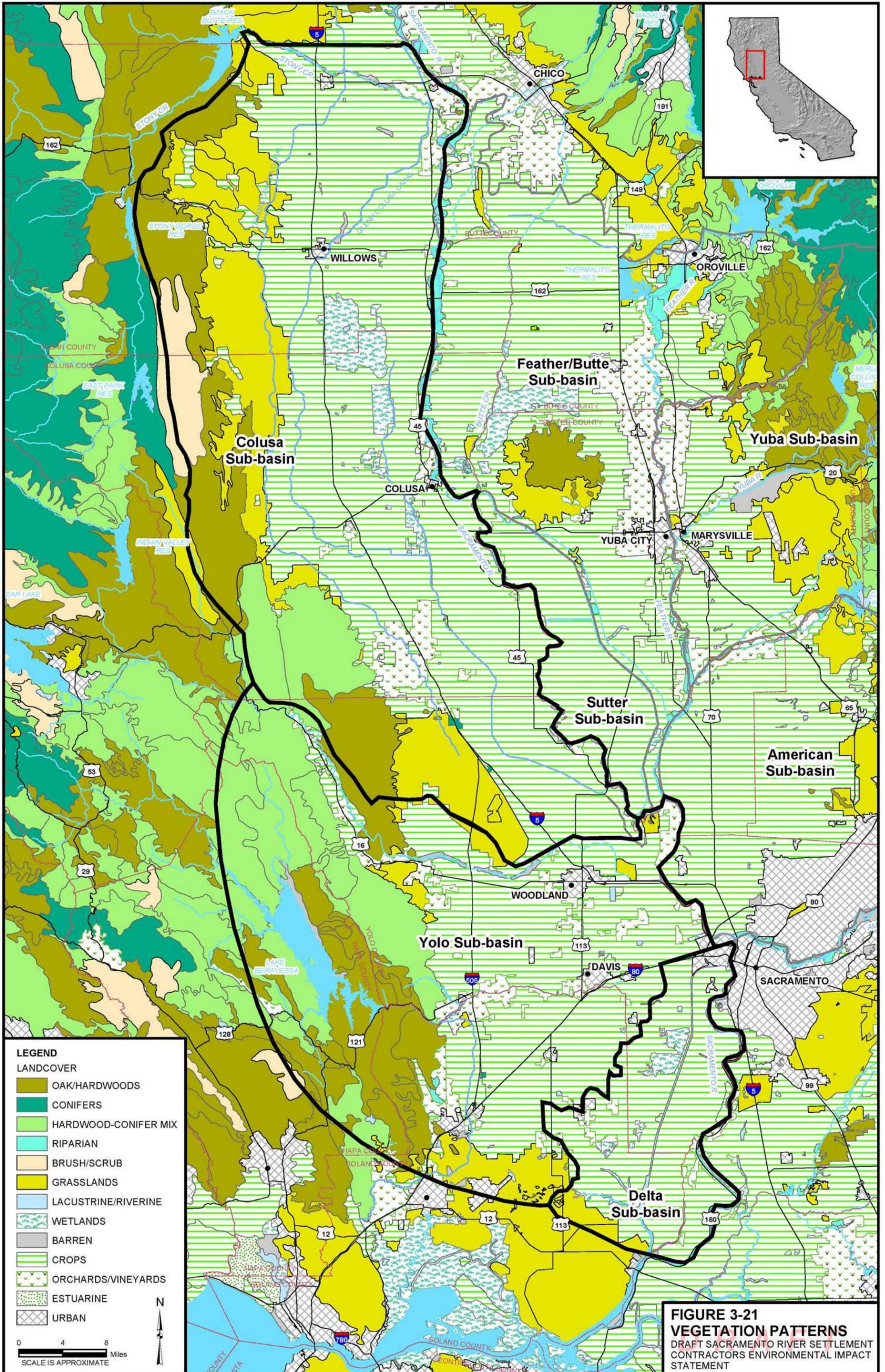


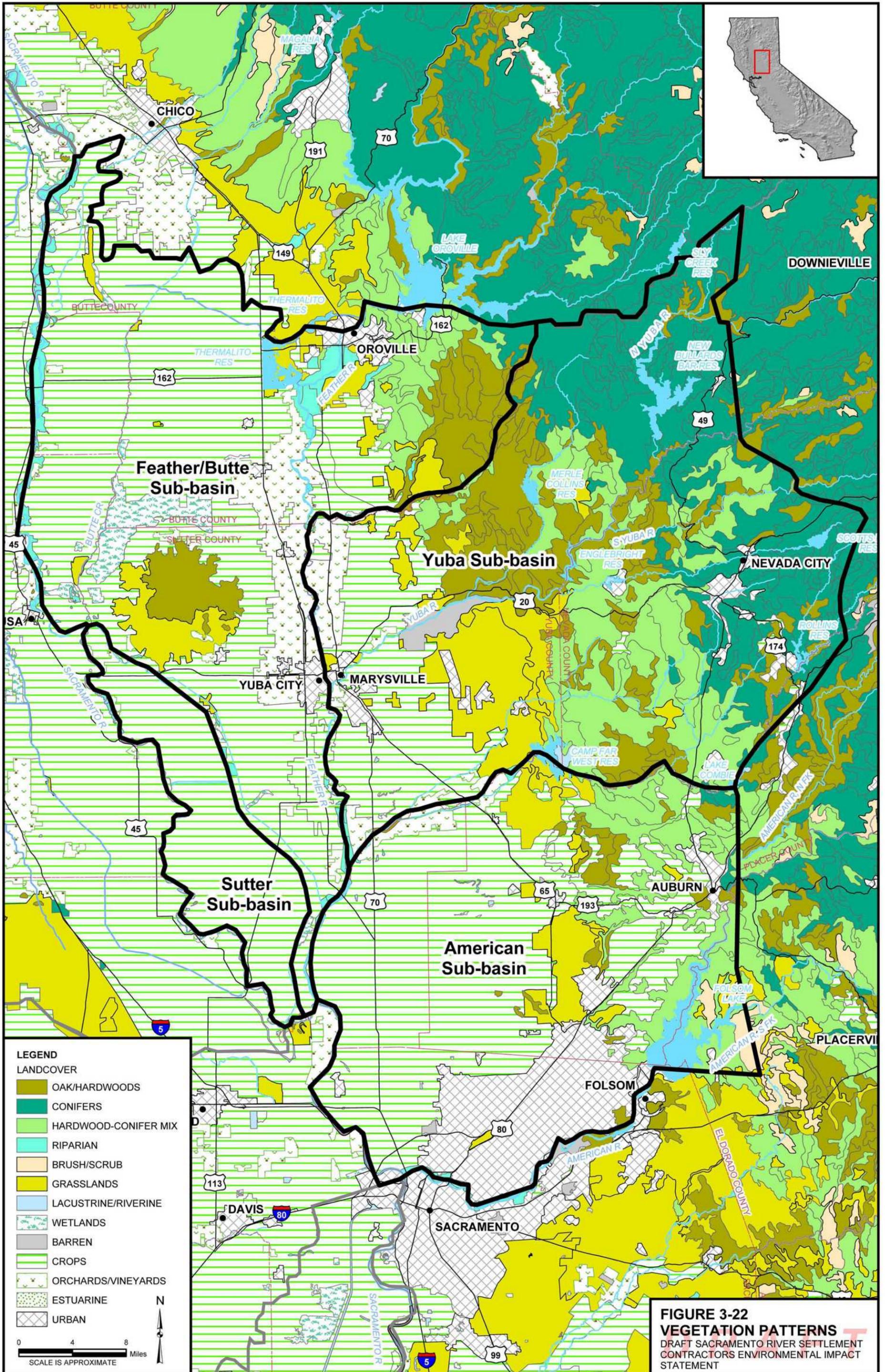


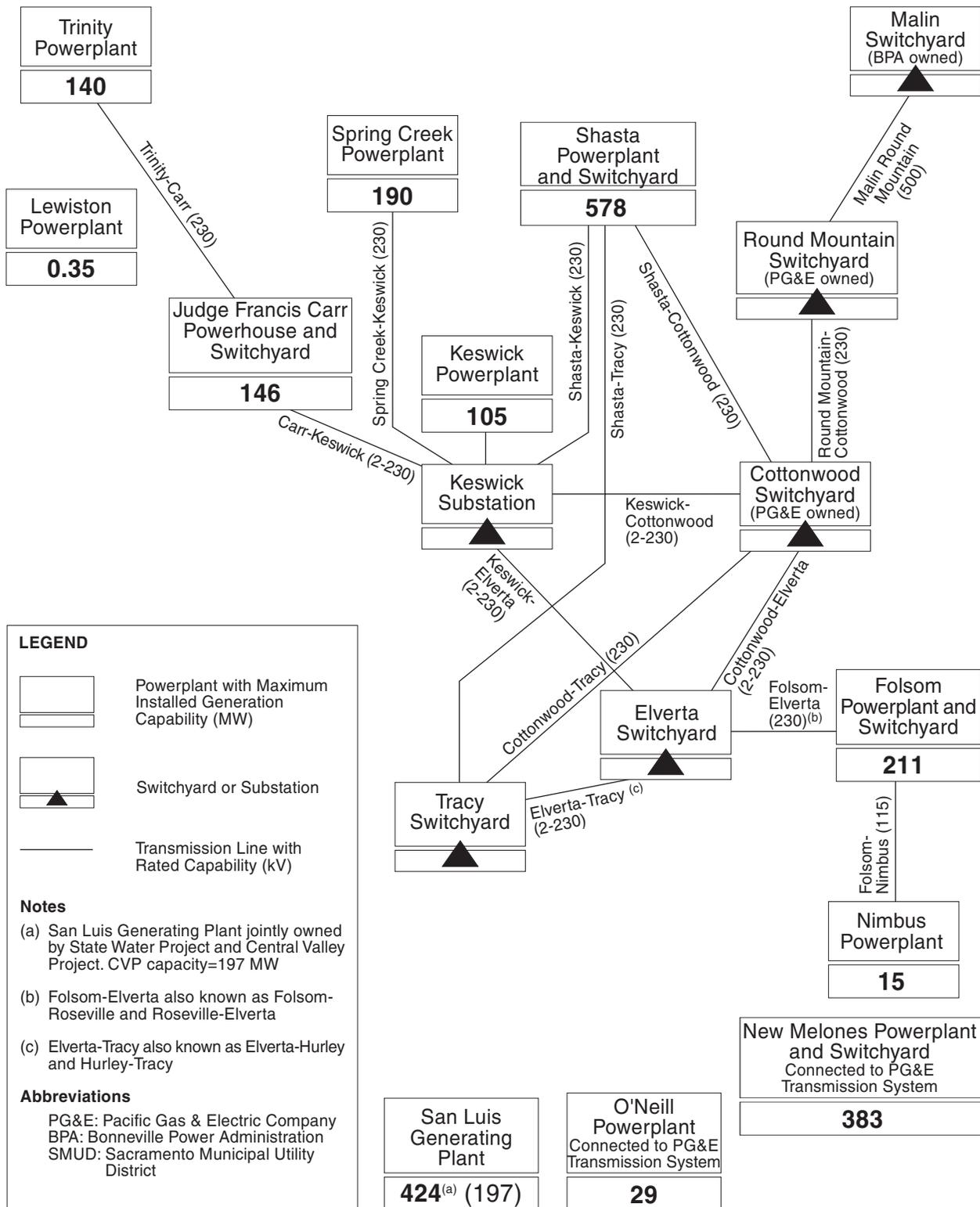
**FIGURE 3-19
REDDING GROUNDWATER BASIN
SIMULATED STREAM LEAKAGE
OVER 4 DRY YEARS**

DRAFT SACRAMENTO SETTLEMENT CONTRACTORS
ENVIRONMENTAL IMPACT STATEMENT









July 1996

FIGURE 3-23
CVP POWER GENERATION FACILITIES AND
ASSOCIATED TRANSMISSION FACILITIES
 DRAFT SACRAMENTO RIVER SETTLEMENT CONTRACTORS
 ENVIRONMENTAL IMPACT STATEMENT

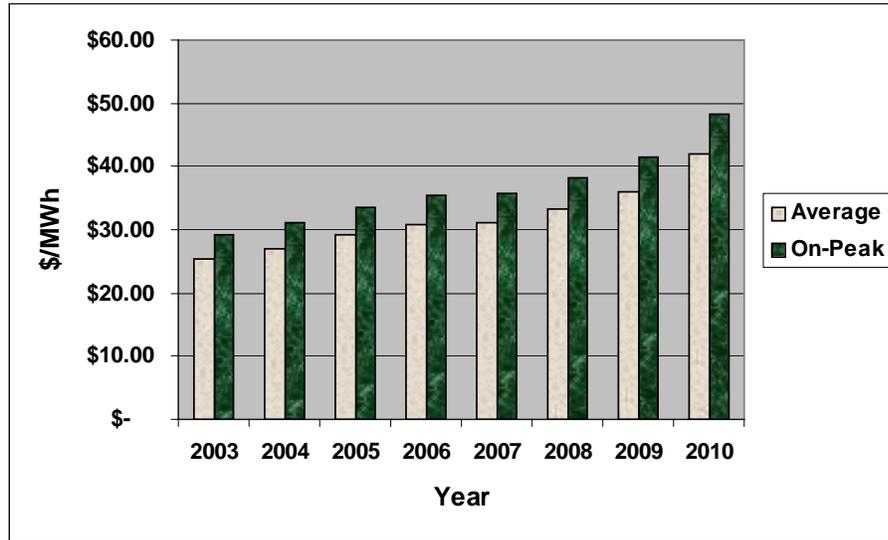


FIGURE 3-24
FORECAST MARKET POWER COSTS (CEC, 2000)

CHAPTER 4

CUMULATIVE IMPACTS

INTRODUCTION

As required by NEPA, this section assesses the cumulative impacts of implementing the Preferred Alternative when combined with other projects that could result in impacts to the same environmental resources as the Preferred Alternative. NEPA provides the following guidelines for assessing cumulative impacts.

The CEQ regulations implementing NEPA (40 CFR Section 1508.7) define a “cumulative impact” for purposes of NEPA as follows:

Cumulative impact is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

CUMULATIVE IMPACTS ANALYSIS

The No Action Alternative for this EIS is also the Preferred Alternative for the CVPIA PEIS, which assumed that the Settlement Contracts would be renewed at full contract amounts. The CVPIA PEIS considered the cumulative effect of future programs including the entirety of the CVPIA with contract renewal of the Settlement Contracts. The cumulative impacts analysis of the CVPIA PEIS is hereby incorporated into this EIS by reference.

The cumulative impact analysis for the CVPIA PEIS is found in Chapter V of that document.

The CVPIA PEIS alternatives (including the PEIS No-Action Alternative) are limited to those actions clearly addressed by the CVPIA and the environmental consequences of closely related actions. However, it is recognized that the provisions of the CVPIA may be implemented in an interactive manner with other concurrent and subsequent projects. The non-CVPIA actions implemented concurrently with CVPIA might affect the overall conditions in the study area and the results of implementation of the CVPIA, and might have impacts different from those associated with implementation of CVPIA in isolation.

Other actions that might contribute to cumulative effects of the CVPIA (including renewal of the Settlement Contracts) include, but are not limited to, the following:

- Implementation of the Bay-Delta Plan Accord
- Conformed Place-of-use EIR for CVP Water Supplies
- Recommendations for increased in-stream flows in the Trinity River
- Implementation of the Sacramento and San Joaquin River Basins Comprehensive Study

- Implementation of the CALFED EIS/EIR
- Implementation of the Sacramento Area Water Forum Proposal (American River)
- Implementation of the Environmental Water Account (EWA) (long term)
- Implementation of the Dry-year Water Purchase Program
- Implementation of the Drought Risk Reduction Program
- Implementation of the Environmental Water Program
- Changes in non-CVPIA water transfer actions
- Changes in federal farm programs
- Changes in demand for agricultural products
- Changes to the commercial and recreational harvest actions for commercial fishing
- Implementation of Yield Increase Plan
- Implementation of the Water Acquisition Program
- Creation of additional wetlands
- Additional listings of special-status species

The CVPIA PEIS includes an in-depth cumulative impact analysis of the effect of the CVPIA Preferred Alternative in combination with the projects listed above and other related projects. That analysis indicated that future projects could potentially improve CVP water supply reliability. These types of programs would modify water supply reliability but not change long-term CVP contract amounts or deliveries from within the historical ranges.

In addition, the PEIS cumulative analysis addressed potential impacts from CVPIA projects that might have occurred during preparation of or following the completion of the PEIS. These actions include early implementation of CVPIA provisions, the Least-cost Yield Increase Plan, development of additional wetlands, and contract renewals. The potential effects of these actions and how they might influence the effects of implementing the alternatives are considered in Chapter V of the PEIS. In addition to these projects, additional recent programs that are being coordinated between Reclamation and the Department or are being wholly managed by the Department are summarized below.

Environmental Water Account (Long Term)

The EWA is a CALFED implementation action, the primary focus of which is to provide environmental benefits while ensuring CVP/SWP operations are not adversely affected. The EWA program makes environmentally beneficial changes in the operations of SWP and CVP, at no uncompensated water loss to the CVP and SWP water users. Protective actions for at-risk native fish species would range from reducing Delta export pumping to augmenting in-stream flows and Delta outflows. Beneficial changes in SWP and CVP operations could include changing the timing of some flow releases from storage and the timing of water exports from the Delta pumping plants to coincide with periods of greater or lesser vulnerability of various fish species to environmental conditions in the Delta. The

CALFED Record of Decision states that an EWA program would replace any regular water supply interrupted by the environmentally beneficial changes to SWP and CVP operations. The timing of the protective actions and operational changes would vary from year to year, depending on many factors such as hydrology and real-time monitoring that indicates fish presence at the pumps.

Dry-year Water Purchase Program and Drought Risk Reduction Investment Program

The Dry-year and Drought Programs would assist water users in dry conditions and compensate willing sellers in coordination with Reclamation and the Department. In mid-January 2001, several SWP and CVP contractors requested that Reclamation and the Department initiate planning for a dry-year water acquisition program, based on the dry-year hydrology to date. The Department announced the 2001 Dry-year Water Purchase Program (Dry-year Program) in March 2001. This program represented the first dry-year acquisition program by the Department since the 1991, 1992, and 1994 Drought Bank programs. The Dry-year Program was implemented again in 2002 and 2003, and may be activated in the future to help public agencies throughout California supplement their water supplies in dry years. During dry years, the Department and Reclamation would likely initiate water acquisitions first from reservoirs upstream from the Delta, followed sequentially by groundwater substitution, crop substitution, and crop idling in areas upstream from the Delta. In addition, as part of the implementation of the CALFED Plan, Governor Gray Davis convened a panel to develop plans for California to respond to a future drought. In December 2000, the panel published its report, titled the Critical Water Shortage Contingency Plan, which is now referred to as the Drought Risk Reduction Investment Program (DRRIP). The plan recommended a multi-pronged set of preparations and responses to future water shortages. The water acquisition element of the plan is the Critical Water Shortage Reduction Marketing Program (CWSRMP). CWSRMP is an as-needed water purchasing and allocation program and is activated whenever parts of the state are suffering from critical water shortages.

Environmental Water Program

CALFED agencies created the Environmental Water Program (EWP) to carry out flow-related goals of the Ecological Restoration Program Plan. The EWP will acquire water from sources throughout the Bay-Delta watershed and provide flows to facilitate the following:

- Improvement in habitat conditions for fishery protection and recovery
- Restoration of critical in-stream and channel-forming flows in Bay-Delta tributaries
- Improvement in Delta outflow during critical periods
- Improvement of salmon spawning and juvenile survival in upstream tributaries by purchasing up to 100,000 AF of water per year by the end of Stage 1

The EWP focuses on enhancing in-stream conditions, but program managers would also consider potential benefits to offstream resources. The EWP intends to purchase water from willing sellers in its effort to meet program objectives. CALFED agencies intend to first try the program with pilot water acquisitions. CALFED agencies will then evaluate the results to

determine the program effectiveness and to refine the EWP framework (CALFED, 2002). Once the CALFED agencies gather sufficient information, they will prepare an environmental document that covers full implementation of the EWP.

South Delta Improvements Program

The Department and Reclamation are currently evaluating the potential benefits and impacts associated with implementing CALFED’s South Delta Improvements Program (SDIP). Actions contemplated as part of the SDIP include providing for more reliable long-term export capability by the state and federal water projects, protection of local diversions, and reducing impacts on San Joaquin River salmon. Specifically, the CALFED actions in the South Delta Improvements Program include considering placement of a fish barrier at the head of Old River, up to three hydraulic barriers in south Delta channels, dredging and extending some agricultural diversions, and increasing diversion capability of Clifton Court Forebay to 8,500 cfs.

POTENTIAL FOR SIGNIFICANT CUMULATIVE IMPACTS

The Preferred Alternative for the SRSC Contract Renewals EIS includes slightly reduced contract amounts compared to the Preferred Alternative of the CVPIA PEIS and, therefore, increased CVP flexibility to assist in meeting other contract needs. As discussed above, the CVPIA PEIS Cumulative Impact Analysis is incorporated into this EIS by reference. The potential cumulative effects of future and proposed projects are summarized in Table V-1 of the cumulative effects chapter of the PEIS and is duplicated below for convenience. None of the additional four projects described above would adversely affect the cumulative condition described and evaluated in the PEIS or change the conclusions in that document regarding cumulative impacts of the Preferred Alternative.

TABLE V-1

SUMMARY OF CUMULATIVE EFFECTS

Action	Potential Results	Effects of Cumulative Actions on Results of Impacts of PEIS Alternatives
Implementation of the Bay-Delta Plan Acord	<p>Changes in Delta inflow and associated instream releases.</p> <p>Restoration of habitat in streams and actions to improve water quality.</p> <p>Development of new storage and/or Delta conveyance facilities.</p> <p>Unknown cumulative effects on CPVIA water requirements.</p>	<p>Changes in instream and Delta flows may influence methodology for reoperation, (b)(2) water, or water acquisition for instream or Delta flows. Programs that could lead to partnerships with CVPIA actions or eliminate need for specific AFRP actions to be implemented under CVPIA.</p> <p>Water delivery shortages may not be as severe as identified in PEIS. May lead to partnerships with CVPIA actions or eliminate the need for specific AFRP actions to be implemented under CVPIA.</p>

TABLE V-1
SUMMARY OF CUMULATIVE EFFECTS

Action	Potential Results	Effects of Cumulative Actions on Results of Impacts of PEIS Alternatives
Place of Use EIR for CVP Water Supplies	Permitting or cessation of CVP water service areas currently served with CVP water but outside of authorized Place of Use.	No anticipated change.
Trinity River Studies	Changes in instream flow requirements for Trinity River.	Could change (b)(2) water management and CVP water reliability.
Sacramento and San Joaquin River Basins Comprehensive Study	Develop a program to provide offstream storage, channel modifications, and other actions to reduce flood potential and improve habitat.	Could change channel cross-sections; instream flows; and offstream storage. Habitat improvements could be integrated with CVPIA actions.
Sacramento Water Forum Proposal	Changes in water demands and flow requirements on American River.	Could change (b)(2) and (b)(3) water management and CVP water reliability.
Changes in Water Transfer Actions	More extensive non-CVPIA water transfers than assumed in Base Transfer Scenario for alternatives with CVPIA transfers.	Competition for water from water rights holders would reduce available water supplies for transfers under CVPIA water acquisition programs or increase cost of water beyond assumptions for PEIS. Both of these impacts could reduce the amount of water acquired by Interior or increase the price of water purchased by Interior.
Changes in Federal Farm Programs	If lands fallowed or retired due to CVPIA actions continue to accumulate support payments, the net revenue to farmers may increase and the revenue to the Federal Treasury may not increase.	Farmers may decide to increase participation in water transfer programs, including water acquisition programs by Interior. The price of water also may be reduced, which could lead to an opportunity for higher purchases by Interior.
Changes in Demand for Agricultural Products	If changes in demand increase crop value, the price of water would increase and/or farmers would be less willing to sell water. If changes in demand decrease crop value, the price of water could decrease and/or farmers would be more willing to sell water. Changes in demand may cause farmers to change cropping patterns.	Increases in price or reduction in willing sellers would improve the ability of Interior to acquire water. Decreases in price or an increase in willing sellers would improve the ability of Interior to acquire water. Changes in cropping patterns could change the impacts of water shortages, especially if the ratio of permanent to annual crops changes.
Changes in Future Use of Hatcheries	Changes in use of hatcheries could occur based upon future studies. Changes in harvest limitations could occur in the future.	Whether changes in hatchery operations increase fish populations may depend. Changes in harvest limitations may increase fish population. However, the upon habitat, hatchery practices, and other factors such as predation. Use of hatcheries also could reduce natural stock and the overall population through competition or reduction in genetic diversity. impact of

TABLE V-1
SUMMARY OF CUMULATIVE EFFECTS

Action	Potential Results	Effects of Cumulative Actions on Results of Impacts of PEIS Alternatives
		domestic harvest may not be noticeable if larger numbers of fish are lost to international harvest, ocean conditions, or predation.
Yield Increase Plan	Development of facilities and programs to increase CVP water supplies could reduce impact of shortages from CVPIA actions.	Associated programs may increase the amount of water available for use by Interior for fish and wildlife purposes or may result in adverse impacts to fish and wildlife habitat due to new storage or conveyance facilities. The programs also may compete for the same sources of water that the PEIS identified as sources for the water acquisition program.
Additional Wetlands	Improve reliability of water supplies to private wetlands and develop new wetlands. A portion of the new wetlands proposal is considered in the PEIS alternatives.	For the new wetlands, water supplies would probably be obtained with the land. Water obtained from other sources could be acquired for multiple purposes or water available for transfers may be reduced.
Future Listings under ESA of Special-Status Species	Initiation of consultation with the Service and NMFS.	Possible additional measures (flow and non-flow) to avoid a jeopardy determination. However, measures being taken under the AFRP, (b)(1) "other" program, and the Conservation Program may suffice to avoid substantial additional requirements.

The potential for cumulative impacts addressed in the PEIS would be slightly reduced given the Preferred Alternative would include a slightly reduced contract quantity from the contract renewals evaluated in the PEIS. Accordingly, implementation of the Preferred Alternative would not result in additional significant cumulative impacts beyond those described in the PEIS.

CHAPTER 5

CONSULTATION AND COORDINATION

INTRODUCTION

Prior to preparation of this EIS, input was solicited and incorporated from a broad range of cooperating and consulting agencies and the public. This chapter summarizes the public involvement program and key issues raised by the public and interest groups.

PUBLIC INVOLVEMENT

Reclamation started the preparation of this EIS with scoping meetings. Public input continued during long-term contract negotiations to define the contract language. Discussions also were held with the SRSCs and their representatives during the preparation of this document. Comments received during this period are summarized below.

Scoping Process

Scoping served as a fact-finding process to identify public concerns and recommendations about the Settlement Contract that would be addressed in this EIS, and the scope and level of detail for analyses. Scoping activities began in July 2001, after a Notice of Intent to prepare environmental documentation for long-term contract renewals was filed in the Federal Register. The scoping period formally ended in August 2001. The Scoping Report was released in December 2001.

At public scoping meetings, Reclamation provided information about the contract renewal process and solicited public comments, questions, and concerns. At these meetings, participants had comments and questions about how important issues would be considered in the EIS. The majority of the comments received during the scoping process addressed the contract terms and negotiations process, the environmental document, and the public involvement process.

CONSULTATION WITH OTHER AGENCIES

This EIS was prepared in accordance with the policies and regulations for the following issues:

- National Environmental Policy Act
- Endangered Species Act
- Fish and Wildlife Coordination Act
- National Historic Preservation Act
- Indian Trust Assets
- Indian Sacred Sites on Federal Land
- Environmental Justice
- State, Areawide, and Local Plan and Program Consistency

National Environmental Policy Act

This EIS was prepared pursuant to regulations implementing NEPA (42 USC 4321 *et seq.*). NEPA provides a commitment that federal agencies will consider the environmental effects of their actions. This EIS provides information regarding the No Action Alternative and alternatives, environmental impacts of the alternatives, potential mitigation measures, and adverse environmental impacts that cannot be avoided.

Endangered Species Act

Reclamation has prepared a Biological Assessment to determine if the Preferred Alternative will affect listed, threatened, and endangered species. The Biological Assessment addresses all species affected by the renewal of the Settlement Contracts. Reclamation is consulting with both the Service and NOAA-Fisheries pursuant to the Endangered Species Act. The terms and conditions, reasonable and prudent measures, and all environmental commitments identified in the Service and NOAA-Fisheries Biological Opinions are hereby incorporated by reference.

Additionally, as described in Chapter 1, Reclamation and the Department have proposed to operate the CVP and SWP to divert, store, and convey CVP and SWP (Project) water consistent with applicable law. These operations are summarized and evaluated in a draft Biological Assessment, and described in further detail in the CVP Operations Criteria and Plan (OCAP). The Biological Assessment addresses continued operation of the CVP and SWP in a coordinated manner. In addition to current-day operations, the following future actions are included in this consultation:

- Increased flows in the Trinity River
- Increased pumping at Banks Pumping Plant (referred to as 8500 Banks)
- Permanent barriers operated in the South Delta
- An intertie between the California Aqueduct and the Delta-Mendota Canal
- A long-term EWA
- Freeport Regional Water Project
- Various other operational changes described in detail in the Biological Assessment

The current and ongoing effects of diversions to the SRSCs as part of CVP operations are included in this Biological Assessment. The consultation addresses impacts to listed species that could be caused by hydrological and water quality conditions resulting from operation of the CVP and SWP facilities. With respect to long-term contract renewals with the SRSCs, the consultation evaluates the impact to listed species that could result from operating the CVP and SWP to deliver CVP water to the points of diversion of the SRSCs in combination with other operational and regulatory requirements. The analyses for the OCAP consultation assume the SRSCs divert their total contract quantity with deficiencies in critically dry years in accordance with the existing and renewal contracts. Because maximum contract deliveries are assumed for the SRSCs, the OCAP opinion fully addresses any in-river effects to listed species that could result from long-term contract renewal. The consultation does not evaluate impacts that could result during diversion of water by the SRSCs or use of diverted water. It is anticipated that formal consultation on long-term OCAP will be completed by the end of 2004.

Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act 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 Fish and Wildlife Coordination Act.

National Historic Preservation Act

Section 106 of the National Historic Preservation Act requires that federal agencies evaluate the effects of federal 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 on (or eligible for inclusion on) the National Register of Historic Places that are located in or near the project area. The second step is to identify the possible effects of preferred Alternatives. The lead agency must examine whether feasible alternatives exist that would avoid such effects. If an effect cannot reasonably be avoided, measures must be taken to minimize or mitigate potential adverse effects.

During preparation of this EIS, it was determined that renewal of the Settlement Contracts would result in no impacts to cultural resources. The counties within the project study area are required to initiate separate consultations with respect to land use planning activities that would result in effects to cultural resources.

Indian Trust Assets

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

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 within the area of potential effect. To date, no comments or formal response have been received from the tribes.

During preparation of this EIS, it was determined, using the information provided by Reclamation, that no Indian Trust Assets exist within the study area for this EIS.

Indian Sacred Sites on Federal Land

Executive Order 13007 provides that in managing federal lands, each federal agency with statutory or administrative responsibility for management of federal lands shall, to the extent

practicable and as permitted by law, accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners, and avoid adversely affecting the physical integrity of such sacred sites. No sacred sites were identified during the scoping or planning process and, therefore, were not included in the impact assessment of this EIS.

Environmental Justice

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

State, Areawide, and Local Plan and Program Consistency

Agencies must consider the consistency of a preferred alternative with approved state and local plans and laws. This EIS was prepared with extensive information from local planning agencies.

CHAPTER 6

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Appendix A
Sacramento River Settlement Contractors

Sacramento River Settlement Contractors

Standard-form Contract – Districts, Water Companies, and Municipalities

- 1) Anderson-Cottonwood Irrigation District
- 2) Glenn-Colusa Irrigation District
- 3) Maxwell Irrigation District
- 4) Meridian Farms Water Company
- 5) Natomas Central Mutual Water Company
- 6) Pelger Mutual Water Company
- 7) Pleasant Grove-Verona Mutual Water Company
- 8) Princeton-Codora-Glenn Irrigation Company
- 9) Provident Irrigation District
- 10) Reclamation District No. 1004
- 11) Reclamation District No. 108
- 12) Redding, City of
- 13) Robert's Ditch Irrigation Company, Inc.
- 14) Sartain Mutual Water Company
- 15) Sutter Mutual Water Company
- 16) Swinford Tract Irrigation Company
- 17) Tisdale Irrigation and Drainage Company

Standard Form – Individuals

- 1) A& F Boeger Corp. and Boeger Land Company
- 2) Andreotti, Arthur, et al.
- 3) Baber, Jack, et al.
- 4) Cannell, Fred, et al.
- 5) Carter, Jane Foster
- 6) Colusa Properties, Inc.
- 7) Conaway Conservancy Group
- 8) Davis, Olive P., et al.
- 9) Deseret Farms of California
- 10) Dommer, Elizabeth
- 11) Forry, Laurie
- 12) Forster, Rosemary Trust and Jerome
- 13) Furlan Joint Venture
- 14) Griffin, Joseph, et al.
- 15) Henle Family Limited Partnership
- 16) Hershey Land Company
- 17) Hiatt, Glenwood J., et al.
- 18) Hollins, Mariette B.
- 19) Howald Farms, Inc.
- 20) King, Barbara

- 21) Knaggs Walnut Ranches Co., L.P.
- 22) Lockett, William P. and Jean B., 1998 Family Revocable Trust
- 23) Lomo Cold Storage
- 24) M & T, Inc.
- 25) MCM Properties, Inc.
- 26) O'Brien, Janice
- 27) Odysseus Farms
- 28) Oji Brothers Farm, Inc.
- 29) Oji, Mitsue, Family Partnership
- 30) Reynen, John, et al.
- 31) River Garden Farms
- 32) Siddiqui, Javed and Amna
- 33) Spence, Ruth Ann
- 34) Tarke, James
- 35) Wallace Construction, Incorporated
- 36) Wells, Joyce M.
- 37) Whitney Construction
- 38) Wilson Ranch Partnership
- 39) Windswept Land & Livestock

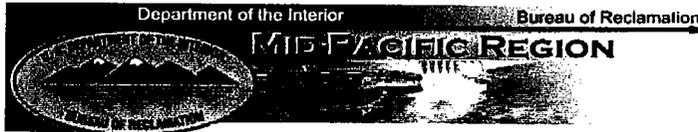
Short-form Contracts

- 1) Alexander, Thomas,
- 2) Amen, Henry, Estate
- 3) Anderson, Ray E., et ux. (1) & (2)
- 4) Beckley, Ralph, et ux.
- 5) Butler, Leslie, et ux.
- 6) Butte Creek Farms (A)
- 7) Butte Creek Farms (P)
- 8) Butte Creek Farms (Y)
- 9) Chesney, R and A, Bypass Trust et al.
- 10) Chicago Almond Products Co. and American Almond Products Co., Inc.
- 11) Chilton, Barbara
- 12) Churkin, Michael, et al.
- 13) Cribari, Emile, et ux.
- 14) Daniell, Harry
- 15) Davis, Grover L., et ux.
- 16) Davis, Marilyn, et al.
- 17) Diamond Holdings, Inc., A
- 18) Drew, Jerry
- 19) Driscoll Strawberry Associates, Incorporated
- 20) Driver, Gary, et al.
- 21) Driver, Gregory E.
- 22) Driver, John A. and Clare M., Family Revocable Trust
- 23) Driver, John A., et ux.
- 24) Driver, William, et al.
- 25) Eggleston, Ronald H., et ux.

- 26) Ehrke, Allen A., et ux.
- 27) ELH Sutter Properties, Inc.
- 28) Sutter Properties, Inc. and Lauppe, B.
- 29) Elliot, Marlene, and Hradecky, Denton, CoTenancy
- 30) Fedora, Sib, et al.
- 31) Freeman, Frank, et ux.
- 32) Furlan, Emile, et ux.
- 33) Gillaspy, Fay
- 34) Giovannetti, B. E. and Mary
- 35) Giusti, Richard, et al.
- 36) Gjermann, Hal
- 37) Hale & Marks
- 38) Hale & Marks
- 39) Heidrick, Emmett and Mildred, Trust
- 40) Heidrick, Emmett and Mildred, Trust
- 41) Heidrick, Joe, Family Trust
- 42) HighLow Nursery, Inc.
- 43) J.B. Unlimited, Inc.
- 44) Jaeger, William, et al.
- 45) Kaiser Development Co.
- 46) Kary, Carol (1) & (2)
- 47) Lake California Property Owners Association
- 48) Lauppe, B. and K.
- 49) Lauppe, Burton
- 50) Lee Farms
- 51) Leiser, Dorothy L.
- 52) Leviathan, Inc.
- 53) Locvich, Paul
- 54) Lonon, Michael, et al.
- 55) M & L Farms
- 56) Martin, Andrew
- 57) Mayfair Farms
- 58) McLane, Robert
- 59) McLaughlin, Jack
- 60) Micke, Daniel
- 61) MirbachHarff Antonius
- 62) Morehead, Joseph A., et ux.
- 63) Morey, Richard T.
- 64) Munson, James T., et ux.
- 65) Nelson, Thomas L., et ux.
- 66) Odysseus Farms Partnership
- 67) Penner, H. H., et ux.
- 68) Pires, Lawrence J., et ux.
- 69) Quad H Ranches
- 70) Reische, Laverne C., et ux.
- 71) Richter Brothers, et al.
- 72) Ritchey, E. J., et ux.

- 73) Riverby Limited
- 74) Riverview Golf & Country Club
- 75) Sacramento, County of
- 76) Schreiner, Joe and Cleo
- 77) Seaver, Charles
- 78) Sekhon, Arjinderpal and Daljit
- 79) Stegeman Station Ranch
- 80) Steidlmayer, Francis J., et al.
- 81) Tuttle, Charles
- 82) Verona Farming Partnership
- 83) Wakida, Masaru, et ux.
- 84) Wakida, Masaru, et ux.
- 85) Westfall, Ralph D.
- 86) Willey, Edwin, et ux.
- 87) Williams Co., G.W.
- 88) Wilson, Neil
- 89) Young, Russell L., et al.

Appendix B
Sacramento River Settlement Contractors
Environmental Impact Statement
Scoping Report



Long-Term Contract Renewal Sacramento River Settlement Contractors Scoping Report



Prepared for: US Department of Interior Bureau of Reclamation
Northern California Area Office
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Section 1 - Introduction

SECTION 1 - INTRODUCTION

1.1 Settlement Contract Overview

The Central Valley Project (CVP or Project) was first authorized as a Federal project in 1935 and includes facilities on the Trinity River, Sacramento River, American River, Sacramento-San Joaquin Delta, San Joaquin River, Stanislaus River and offstream storage and conveyance facilities associated with the San Luis Reservoir and Delta Mendota Canal. Construction of dams on the Sacramento River and the Trinity River substantially modified the flows of the Sacramento River. Prior to construction of the CVP, individuals and entities along the Sacramento River were diverting water for irrigation, municipal and industrial uses under various claims of right.

In order to settle the controversy over assertions of water rights, the United States, acting through the Bureau of Reclamation (Reclamation), negotiated contracts that provided for agreement on diversion of water and CVP water service. The settlement contracts provided for diversion of base water supply, a negotiated amount of water which is delivered without charge and a Project water supply for which the users must pay a fee per unit volume (acre-feet). The term of these Sacramento River settlement contracts was not to exceed 40 years and the contracts expire on March 31, 2004. The settlement contracts provide for renewal which must be accomplished prior to March 31, 2004.

In 1996, eight Sacramento River settlement contractors commenced litigation against the United States of America and others for the purpose of establishing that Section 3404(c)(3) of the Central Valley Project Improvement Act (*CVPIA*) does not apply to Sacramento River settlement contracts. Section 3404(c)(3) stipulates that ". . . the Secretary shall impose on existing contractors an additional mitigation and restoration payment of one

1 INTRODUCTION

and one-half times the annual mitigation and restoration payment calculated under subsection 3407(d)." Settlement was reached in that litigation in January 1997. As part of that settlement, the eight contractors and Reclamation entered into a "Memorandum of Understanding between named Sacramento River Settlement Contractors and the United States of America for the Preparation of Data in Aid of the Renewal of Settlement Contract". Terms of the Memorandum of Understanding (MOU) will be completed prior to contract renewal.

1.2 Proposed Action

Pursuant to section 102(2)(C) of the National Environmental Policy Act of 1969 (NEPA) and section 3404(c) of the CVPIA(Public Law 102-575), Reclamation proposes to prepare an environmental document to evaluate alternatives for renewal of long-term contracts with the entities and individuals asserting rights to divert water from the natural flow of the Sacramento River. These entities and individuals, known as the Sacramento River settlement contractors, typically receive both non-Central Valley Project water, referred to as base supply, and supplemental water from the Central Valley Project, referred to as Project water. The current contracts expire in 2004, and the proposed renewals would extend for at least 25 years.

1.3 Scoping Process

Public involvement is a vital component of NEPA for including the public in the decision-making process and for allowing for full environmental disclosure. This report summarizes the public scoping process used to obtain public input for long-term renewal of the settlement contracts.

Scoping is a public process designed to determine the scope of issues and alternatives to be addressed in a NEPA document. The main objectives of the scoping process are to help ensure that real problems are identified early and are properly studied, that issues that are of no concern do not consume time and effort, that the proposed action and alternatives are balanced and thorough, and that the delays occasioned by redoing an inadequate NEPA document are avoided. To achieve these objectives, the public is notified of

1 INTRODUCTION

the proposed action and input is solicited during a comment period at which time the public may comment, in writing or in verbal testimony, on the proposed action. Public meetings are held during this time to facilitate public input.

On July 19, 2001, Reclamation published a notice of intent (NOI) in the Federal Register that notified the public of the proposal, announced the dates and locations of public meetings, and solicited public comments. Public notification also was made through direct mailing. The scoping process for renewing long-term contracts began with publication of the NOI on July 19, 2001, and ended on August 27, 2001. During this scoping period, three public meetings were held and 5 letters of comment were received.

Public involvement will continue beyond the scoping process. Once the environmental document has been prepared and Reclamation has approved the document for public review, the document will be available to all interested parties. The availability of these documents will be announced and a public comment period will follow to allow the public opportunity to comment on the findings of the documents. At the conclusion of this public comment period, Reclamation will weigh appropriate information and will decide which action to implement. This decision will be presented in a Record of Decision.

1.4 Scoping Meetings

Interested parties were encouraged to attend scoping meetings to provide verbal comments. Meetings were held in three geographic areas convenient for affected public, interested parties and stakeholders. These locations were:

- ❖ Tracy, California; August 6, 2001
- ❖ Concord, California; August 7, 2001
- ❖ Red Bluff, California; August 8, 2001

The facilitator opened each meeting with a welcome, followed by a brief introduction of Reclamation staff present at each meeting and a review of the agenda. The facilitator then described these objectives for the meeting:

1 INTRODUCTION

- a. To provide information on the renewal process for the Sacramento River Settlement contracts,
- b. To provide the contractors, public and interested parties an opportunity to ask questions,
- c. To allow the contractors, public and interested parties an opportunity to identify major issues to be addressed in contract negotiations and the environmental document.

Reclamation staff presented information on the types of settlement contracts and what types of water rights are included in these contracts. Staff carefully explained that contracts include supply of two types of water: base supply and Central Valley Project water supply. In addition, staff explained how the total amount of water under consideration was distributed among the contractors and also provided current price information for various water uses.

Components of the Memorandum of Understanding resulting from litigation by eight of the settlement contractors (SCORE) were identified by Reclamation staff. Staff explained that SCORE contractors were partnering with Reclamation to complete some of the components. Staff emphasized that Reclamation would review all work completed with SCORE's assistance and all Reclamation contract renewals will be based on Reclamation's conclusions.

The presentation was concluded with the process Reclamation will follow for contract renewal and the environmental document. Staff identified significant milestones for the process, including the current schedule for these milestones. Staff also explained that the contract renewal process runs concurrent with the environmental document. The public involvement process was presented emphasizing that contractors, public and interested parties provide input for contract renewal issues as well as the environmental document issues. The facilitator closed the presentation by providing a date and address for submitting written comments for public scoping of the environmental document.

Section 2 – Summary of Comments on Major Issues

S ECTION 2 - SUMMARY OF COMMENTS ON MAJOR ISSUES

2.1 Comment Tracking System

A comment tracking system was employed to uniquely identify each comment, to assist with the analysis of all comments and to track responses to each comment. All verbal and written comments were first evaluated for content. The comments were recorded on a spreadsheet and assigned a unique tracking number. The tracking number represented the lead agency, the project name and the sequence the comment was entered into the tracking system.

Using USBR-LTCR SRSC-103c as an example of the tracking system numbers, the unique portion of the number was assigned for the following reasons:

- ▶ Reclamation is the lead agency (USBR),
- ▶ The project name is the Long-Term Contract Renewal for Sacramento River Settlement Contracts (LTCR SRSC),
- ▶ This is the 103rd comment entered in the system,
- ▶ And this is the third specific issue in the 103rd comment(c).

Three major issue categories emerged from all of the comments: public involvement process, contract terms and negotiation process, environmental document. Although some comments could address more than one issue category, each comment was assigned to only one category to permit accurate accounting of comments received. Comments were designated as “other” if the contents were too general to categorize or too inclusive to place in a specific category.

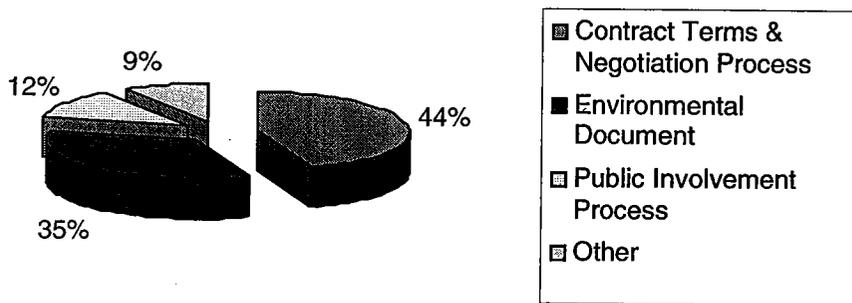
2.2 Comment Totals

A total of 109 verbal and written comments received during the scoping period were entered into the tracking system. More than 75 percent of the comments

2 SUMMARY OF COMMENTS ON MAJOR ISSUES

were related to the contract terms and renewal process (46 comments) or the environmental document (39 comments). An additional 13 percent commented on the public involvement process (14 comments).

Figure 1. Major Issues in All Comments



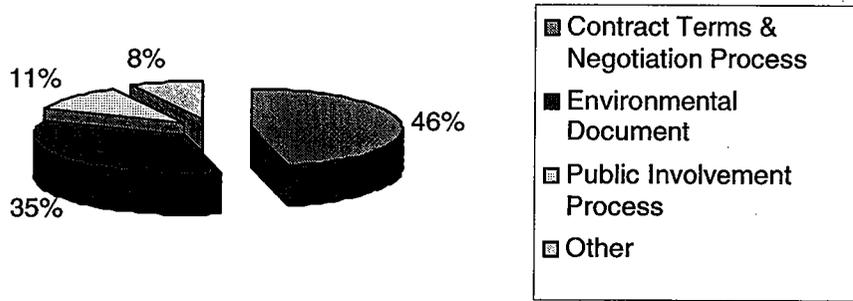
2.3 Verbal Comments

Verbal comments were recorded by hand at each meeting and then transcribed into the tracking system after the meeting. A total of 100 verbal comments were recorded for the three meetings. Therefore, 92 percent of the total comments were verbal comments.

For all verbal comments, 43 percent of the comments were related to the contract terms and negotiation process (43 comments), 38 percent were related to the environmental document (38 comments) and 11 percent were related to the public involvement process (11 comments).

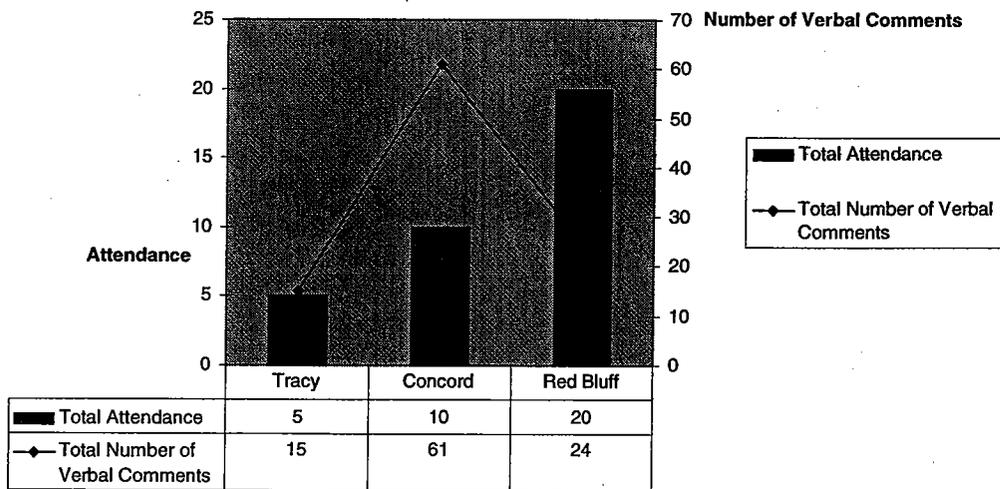
2 SUMMARY OF COMMENTS ON MAJOR ISSUES

Figure 2. Major Issues in Verbal Comments



Trends in attendance and location were also examined. Attendance was highest in Red Bluff (20 of the 35 total attendees) but the largest number of verbal comments was heard in Concord (60 of the 100 total comments).

Figure 3. Comparison of Attendance to Number of Verbal Comments by Location



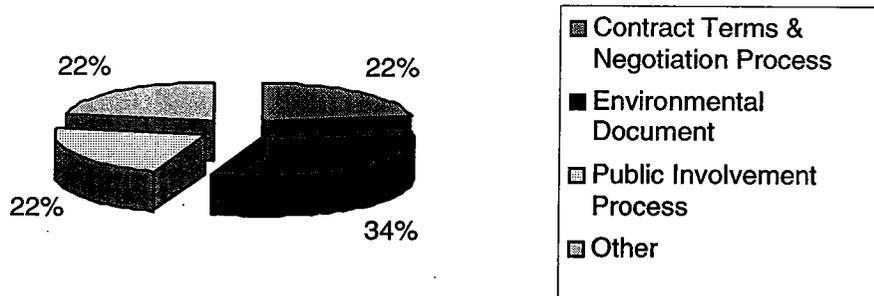
2 SUMMARY OF COMMENTS ON MAJOR ISSUES

Attendees in both Red Bluff and Concord commented most about the contract terms and negotiation process and the environmental document. However, attendees in Tracy commented most about the environmental document and public involvement process.

2.4 Written Comments

A total of five letters were received during the comment period. These letters contained a total of 9 comments, representing 8 percent of the total number of comments. Two of the comments addressed the contract terms and negotiations process (22 percent), 3 comments addressed the environmental document (34 percent) and 2 comments addressed the public involvement process (22 percent). Two other comments were general in nature. However, one of these general comments included by reference all of the commentor's previous written comments regarding CVP long-term contract renewals.

Figure 4. Major Issues in Written Comments



Section 3 – Comment Analysis and Responses:
Environmental Document

S

SECTION 3 - COMMENT ANALYSIS AND RESPONSES:

ENVIRONMENTAL DOCUMENT

This section provides a summary and analysis of comments received concerning environmental review issues. Public concerns regarding environmental review issues expressed during the scoping process will be considered in the preparation of the environmental documents. Comments are grouped by specific issue category and the manner in which these issues will be addressed in the environmental documents is discussed.

A total of 35 verbal comments and 3 written comments were received on environmental review issues; 35 percent of all comments received. Verbal comments on environmental review issues mostly addressed alternatives, impact issues and the purpose and need of the project. However, if all the comments received are considered, a significant number of comments also addressed issues such as impacts to biological resources, social and economic resources, water quality as well as cumulative effects. Table 1 summarizes the number, type and location of the verbal comments. Written comments on environmental review issues mostly addressed impact issues, biological resources, alternatives, and water resources. The comments, by issue, are discussed below.

3.1 - Alternatives

Comments: Commentors provide two specific elements for alternatives to evaluate in the environmental document. Commentors indicated a desire to evaluate one alternative that separates “base” supply from “project water” supply in the environmental document. Commentors also indicated a desire to evaluate pricing schemes in the alternatives that differ from current contract terms.

In addition, commentors inquired what water quantities would be included in the No Action Alternative. One commentor suggested that the baseline should be existing contract water quantities while another recommended against using existing quantities for the baseline.

A commentor noted that the environmental analysis process does not have to find impacts; there can be alternatives/actions developed that do not have impacts.

Responses: The comments provided during the scoping process will be considered in developing the alternatives for the environmental document. The alternatives will include actions identified in the Record of Decision for the Programmatic Environmental Impact Statement (PEIS). Analysis of separate effects for "base" and "project" water is difficult because of a lack of historical data and baseline conditions. The No Action alternative will evaluate the effects of conditions that are likely to exist when the contracts expire in 2004. These conditions will include actions that have occurred, or are likely to occur, as a result of CVPIA, Bay Delta Water Plan of 1995 and other operating requirements of the CVP.

3.2 - Biological Resources

Comments: Commentors stated opinions for the scope of analysis for biological resources. One commentor expressed a desire that the analysis include terrestrial impacts in the Sacramento River meander belt. Another suggested that restoration actions undertaken as part of the CVPIA should be included in the endangered species analysis in the environmental document.

Responses: Effects to biological resources, including the effects of hydrology and the identification of endangered species, will be characterized and analyzed in the environmental document. The US Fish and Wildlife Service (USFWS) will be invited to review and comment on the analysis. Biological opinions already in place will be considered. Therefore, further consultation with the National Marine Fisheries Service is not expected for the environmental document.

3.3 - Cumulative Effects

Comments: Water transfers outside the Sacramento River basin and the needs of the Environmental Water Account in the CVPIA were effects raised by commentors. Specifically, commentors suggested including the effect of transfers of large blocks of water from the Sacramento Valley to San Joaquin Valley. A commentor also suggested that the requirements of Environmental Water Account (EWA) in the CVPIA must be understood and addressed for this environmental document.

Responses: The effects of water transfers were analyzed in the PEIS. In addition, Reclamation is preparing an environmental document for the EWA. Cumulative impact analyses will include a summary of appropriate analysis from the PEIS and EWA environmental documents.

3.4 - Coordination with Other Agencies or Parties

Comments: Settlement contractors present at the public meetings asked to participate with Reclamation during consultations with agencies for endangered species. These contractors also inquired how to become co-applicants for permits resulting from consultations with agencies.

Responses: Reclamation will comply with the requirements of ESA. Pre-consultation with other agencies will occur while the environmental document is prepared. Settlement contractors are invited to participate in ESA as land owners by contacting Reclamation in writing.

3.5 - Impact Issues

Comments: Several commentors suggested impacts that should be analyzed in this document, suggested impacts in other environmental documents they felt should be updated for this environmental document and suggested the timing for completing the analysis of impacts for this document. One commentor also asked how the CVPIA will factor into the environmental analysis. In addition, small individual contractors questioned how their activities would be evaluated in the document.

Specific impacts identified for analysis included reducing water quantities under contract, using fish screens for pump stations, and the effects of pesticide use in the watershed. Analysis of reasonable and beneficial uses of "base" supply was suggested for compliance with state and federal laws. Updating or supplementing analysis in the PEIS to address water transfer to areas with drainage problems and updating analysis in the 1956 study to address new water demands was suggested. Waiting for CEQA analysis to be completed before starting the NEPA analysis was also suggested.

Responses: Analysis will include direct, indirect and cumulative effects of water uses within the watershed. Changes to water deliveries will be evaluated to determine if there are any disproportional environmental impacts to the minority communities involved in agriculture and to the social services infrastructures that support and assist minority and low-income populations. Operating facilities and agricultural practices will be evaluated to determine the benefits and impacts, if any, to fisheries and water supplies. The method of analysis is likely to evaluate groups of contracts with similar water-use practices rather than individuals.

Benefits and impacts of using "base" water will be examined in this document. However, reasonable and beneficial uses will be identified during the contract renewal and negotiation process. Reasonable and beneficial uses will be consistent with Reclamation goals and Federal and State laws.

Due to the need to complete the environmental document prior to the expiration of current water contracts, it is necessary to begin the environmental document. The document will tier off of the PEIS and recent environmental studies completed for the contract renewal process.

3.6 - Impacts of Contract Terms

Comments: Several commentors expressed concern that the contract renewal/contract negotiation process and environmental analysis would result in less water for contractors. One commentor stated that it was premature to begin the public scoping of the contract renewals before the Settlement Contractors

had a chance to discuss the nature and extent of contracts to be renewed and contracting principles are developed.

Responses: Impacts of any contract terms negotiated will be evaluated in the appropriate resource sections of the document. The document will assess the economics of the study area and the potential impacts from water allocation.

It is necessary to begin the environmental document before the expiration of current water contracts. Public scoping is the first step in the environmental analysis. There will be extensive coordination between the environmental document and contract negotiation/renewal process to insure that environmental issues are adequately addressed in the environmental document.

3.7 - Purpose and Need of the Environmental Document

Comments: Many of the commentors wanted Reclamation to clarify the purpose and need for the environmental document. These questions can be summarized as: who made the decision that renewal contracts required environmental analysis, what is the purpose of the document, why is a document required when water rights do not change and how will the contractor's needs and the environmental requirements will be met.

Response: Any Federal discretionary action must comply with Section 102(2)(c) of NEPA. In addition, Section 3404(c)1 of CVPIA prohibits renewal of existing contracts to supply water from CVP until completion of appropriate environmental review. This document will satisfy the requirements of these laws.

3.8 - Socioeconomic Issues

Comments: Commentors emphasized that economic impacts must be examined for local effects. A written comment strongly urged the most comprehensive study possible to fully evaluate the economic impacts related to contract renewals. Other comments emphasized analysis of the benefits of applied water as well as analysis of the effects water pricing has on the economy in the Sacramento Valley.

Responses: Broad scale economic issues are analyzed in the PEIS. The environmental document will analyze demographics for the study area and potential impacts to minority and low-income populations from water allocation, per Executive Order 12898. Changes to water prices would be evaluated to determine if there are any non-economic impacts to populations involved in agriculture and to social services infrastructure in the study area.

3.9 - Type of Document

Comments: Commentors inquired if Reclamation has decided on the type of environmental document appropriate for the proposed action. Commentor's recommended an environmental impact study.

Responses: Reclamation believes that insufficient information is provided at this time to warrant preparation of an EIS and Reclamation will be proceeding with the preparation of an Environmental Assessment. Reclamation will prepare an EA to determine if an EIS is required.

3.10 - Water Quality

Comments: Water quality was an issue for commentors. A specific concern was expressed for the affects of herbicides on downstream water quality.

Responses: Reclamation intends to evaluate the effects contract terms have on water quality in the study area. Changes, if any, in water allocation and water conservation are likely to affect water temperature. Water conservation may also change the concentration of pollutants such as sediment and pesticides in downstream water. The document will tier off recent studies of water quality within the watershed.

Reclamation will continue cooperating with other agencies regarding water quality. The Reclamation will consult with US Environmental Protection Agency consult under Section 401 of the CWA, as appropriate. The Reclamation will also consult US Army Corps of Engineers regarding physical changes to the streambed that may affect water quality under Section 404 of the CWA, as appropriate.

Section 4 - Comment Analysis and Responses:
Contract Terms and Negotiation Process

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SECTION 4 - COMMENT ANALYSIS AND RESPONSES:

CONTRACT TERMS AND NEGOTIATION PROCESS

A significant number of comments received during the public scoping period addressed the contract renewal negotiation process, including contract terms and conditions. Such comments are not directly related to the environmental review issues that are the main concern of this scoping report. Nevertheless, issues that are brought up in discussion of contract renewals may affect the environmental review process. For example, contract issues may form a basis for developing alternatives or may result in contract terms that would have environmental effects. Analysis of comments received on contract renewal negotiation issues, and responses to the main issues of concern are provided below.

A total of 46 verbal comments and 1 written comment were received during the scoping period concerning the contract renewal negotiation issues; 44 percent of all comments received. Table 2 summarizes the issues raised in verbal comments organized by meeting location. The written comment addressed the legal authority, policy, and rules guiding the contract renewal.

4.1 - Beneficial and Reasonable Use

Comments: Several comments addressed the requirements for reasonable water use. Some simply questioned whether current uses are reasonable while others stated emphatically that Reclamation has an “overriding obligation” to insure current and future uses are beneficial and reasonable.

Responses: Reclamation is subject to the standards for beneficial use of water that are established by the State Water Resources Control Board (SWRCB). The California Water Code, Section 1257 states that, in acting upon

4 SUMMARY OF COMMENTS ON MAJOR ISSUES

applications to appropriate water, the SWRCB shall consider, "all beneficial uses of the water concerned including, but not limited to, use for domestic, irrigation, municipal, industrial, preservation and enhancement of fish and wildlife, recreational, mining and power purpose, and any uses specified to be protected in any relevant water control plan".

4.2- Contract Form

Comments: Concern was raised that small contractors may have existing short form contracts renewed as standard form contracts.

Responses: At this time, Reclamation intends to keep short form contracts for qualifying contracts. Terms and conditions of the short-form contract are likely to change. These changes will result from changes in Federal Laws, changes in water allocation and changes needed to keep the short-form contract terms and conditions consistent with changes to standard form contracts.

4.3 - Duration

Comments: Commentors asked Reclamation to clarify the term of the renewed contracts. Some commentors stated a preference for 25-year terms while others preferred 40-year terms.

Responses: Section 3402 of CVPIA limits certain types of contracts to 25 years for the delivery of water from the Central Valley Project. Reclamation intends to renew contracts for at least a 25- year term.

4.4 - Legal Authority, Policy, and Rules for Contract Renewal

Comments: More than a third of the comments regarding the contract renewal and negotiation process addressed the policy and procedures Reclamation will apply for contract renewal. Some of these comments also asked Reclamation to clarify laws and regulations that may apply to the contract renewal process.

Several commentors asked Reclamation to clarify the process for contract renewals. Commentors noted that some contractors are working with Reclamation in groups, such as the SCORE contractors, to evaluate water

needs and develop policies and procedures. Commentors asked if Reclamation will evaluate the water need for each contract. Commentors also stated that small individual contractors have concerns that differ from groups such as SCORE and wanted policies and procedures to consider small contractor concerns. One commentor asked if existing contracts will continue under the same terms and conditions if the contracts expire before the contracts are renewed.

Several commentors addressed the basis for the original contracts. One comment questioned what was intended when the original Sacramento River contracts were negotiated and what was the "settlement". A concern was also expressed that the renewal processes comply with the Reclamation Act of 1902 to provide for zero cost, and, that water supply quantities and water use practices for all water supplies comply with acreage limits specified in law.

Commentors noted that settlement contracts cover riparian and appropriative water rights. It was also noted that some diverters "claim" rights and divert water without contract. Riparian water rights holders asked if they can sign a contract for an amount of water equal to the amount in the existing contract. Diverters claiming water rights without a contract asked if Reclamation will negotiate contracts with them and asked if they will be required to sign a contract to continue claiming their water right. A concern was expressed regarding sections of the CVPIA that limit the term of contracts to 25 years. If the CVPIA applied to the Sacramento River settlement contracts, would the Act apply only to the "project" water supply.

One commentor expressed a feeling that the capital cost of Reclamation facilities on the Sacramento River should be repaid entirely by the general population, thereby eliminating the agricultural water diverters share of the capital costs.

Responses: Reclamation will follow Federal Law and California water law for the water needs assessments. The SCORE MOU specifies studies that will support development of contract principles potentially useful for all contractors. Goals for water allocation in the study area are specified in the PEIS and existing contracts.

Reclamation intends to renew all contracts before the expiration date. If contracts expire, Reclamation will renew contracts on an interim basis as allowed in Section 3404(c)1 of CVPIA. Reclamation intends to negotiate contracts with all existing diverters for a term of at least 25 years. CVPIA requires payment to include capital and operation and maintenance costs.

4.5 - Relationship to Other Delta Actions

Comments: A commentor asked how the "Phase 8" settlement process impacts Sacramento River contract renewals.

Responses: Phase 8 settlement process is an action resulting from SWRCB Decision 1641. Because resolution of Phase 8 is a separate process, Phase 8 is not part of the contract renewal and negotiation process. The impacts of actions resulting from resolution of Phase 8 will be also be evaluated separately. Resolution of Phase 8 may incorporate water allocations resulting from long-term contract renewals for all CVP water, as well as, actions by the State, local districts and Settlement Contractors such as off-line storage, revised operation plans and conjunctive use.

4.6 - Water Efficiency

Comments: Commentors stated that the Reclamation Reform Act of 1982 requires increased water efficiencies including the use of water pricing to encourage efficiency. Contract terms were suggested to encourage water efficiency such as increasing mandatory uses, incentive pricing alternatives and surcharges on base and project water supplies. Changing the definition of water use in contract wording was also suggested to increase water efficiency.

Responses: The PEIS Record of Decision specifies methods for implementing water efficiency throughout the CVP. The methods include price incentives such as surcharges on water above 80 percent of contract amount. Flexibility in water uses is maintained to insure a reliable water supply. The definition of water use is specified in Federal and State law.

4.7 - Water Pricing

Comments: Like the issues regarding the quantity of water, issues regarding the price of water were a significant discussion. Participants in the discussion focused primarily on the terms for negotiating future water prices. Some participants believed the water prices should be based on operation and maintenance costs for delivering the water to irrigated land. Another opinion expressed a belief that water price should reflect the benefit to the user, in a manner similar to pricing proposed in the CALFED program.

Participants also asked Reclamation to clarify operation and maintenance costs. One question asked if some contractors are accruing an operation and maintenance cost deficit. Another asked what the surcharges are and what the benefits of the surcharges are. A third question asked if the restoration charge will be charged only if water is diverted to the contractor.

Responses: Water pricing is following a separate process that includes public participation. Reclamation has considered the issues raised by commentors, including the basis of cost. Reclamation has also considered other issues such as the demand response to price changes, the impact of tiered pricing on other objectives such as conjunctive use and conservation, and economic impacts. Any water pricing policy modifications will be accomplished separate from contract negotiations and will not be subject to negotiation during the contract renewal. Pricing policies for contract water, as may be modified, will, by reference, be built into the contracts.

4.8 - Water Quantity

Comments: Two specific issues regarding the quantity of water were a request for thorough analysis of water needs and concern that future quantities of water may change from current quantities. Participants further recommended that the water needs analysis should be detailed and look at the available supply of water, and should look at the allocation of base and project water supplies among the contractors.

Responses: Water allocation is likely to decrease for renewed contracts. Available water supply and water needs, and allocation of water will be evaluated in

4 SUMMARY OF COMMENTS ON MAJOR ISSUES

a process separate from the contract renewal and negotiation process. Public participation is essential for Reclamation to refine the supply and needs methodology and to gather the necessary data for the methods. Public participation is also essential to identify practices in the study area for equitable allocation of water.

4.9 - Water Transfers

Comments: A commentor questioned the benefits of water transfers and the effect on the quantity of water under contract. The commentor was concerned that water transfers were “paper transfers” of water to justify a beneficial use. The commentor was also concerned that current transfers of water and transfers of water under CVPIA increase the amount of water under contract.

Responses: Section 3405 of CVPIA and Section 475 of the California Water Code identify water transfers as a beneficial use. Reclamation follows Federal and California water law to assess water needs for each contract.

Section 5 – Comment Analysis and Responses:
Public Involvement Process

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SECTION 5 - COMMENT ANALYSIS AND RESPONSES: PUBLIC INVOLVEMENT

A number of comments received during the public scoping period addressed the public involvement process for NEPA and the contract renewal processes. Such comments are not directly related to the environmental review issues that are the main concern of this scoping report. Nevertheless, issues that are brought up in discussion of contract renewals may affect the environmental review process. Analysis of comments received on public involvement issues of concern are provided below.

A total of 11 verbal comments and 2 written comment were received during the scoping period concerning public involvement; 10 percent of all comments received. Table 2 summarizes the issues raised in verbal comments organized by meeting location. The written comments addressed the NEPA and contract renewal processes.

5.1 - Access to Information

Comments: Several comments requested additional access to environmental studies being completed for the environmental document and SCORE MOU. Commentors requested a public presentation of the results of the water supply and water use analysis (1956 Update Study) and Basin Wide Management Plan. A commentor also suggested making information available on an internet website.

Response: Reclamation plans public participation for the environmental studies completed for the environmental document and SCORE MOU. Reclamation welcomes the publics comments, ideas and historical data

5 SUMMARY OF COMMENTS ON PUBLIC INVOLVEMENT

needed to identify significant issues and complete technical evaluations. Reclamation will notify the public of meetings, public workshops and public comment periods for the studies completed during the contract renewal process, SCORE MOU process and other related actions. When practical, Reclamation will post documents, policies and news releases on Reclamation's existing website.

5.2- Legal Authority, Policy and Rules for Contract Renewal

Comments: Concern was raised that the public is allowed access to contract negotiations. Commentors questioned why the public is involved in private property contract negotiations and what statute provided this involvement.

Responses: Federal disclosure laws provide public access to existing and future contracts through the Freedom of Information Act. Terms resulting from contract renewal and negotiation processes will receive public comment during environmental review. Revisions to contract terms may result from the environmental review. Therefore, Reclamation encourages public comment during the contract renewal process so that contracts are renewed before the contracts expire.

5.3 - NEPA and Contract Renewal Process

Comments: Commentors asked Reclamation to report the comments received during the scoping process and the resulting list of issues to be addressed in the environmental document. A workshop was suggested to review the environmental requirements for contract renewal, including requirements of the California Environmental Quality Act.

A written comment requested an additional opportunity to provide further comments after environmental studies are completed for the environmental document and contract renewal processes. Another written comment suggested that CVP contracts go through a rigorous public review process.

Responses: Reclamation follows NEPA for environmental review of all CVP contracts and contract renewals. Public scoping is the initial step for NEPA. The issues resulting from the public scoping meetings are reported in this

5 SUMMARY OF COMMENTS ON PUBLIC INVOLVEMENT

document. Subsequent public meetings are planned to discuss the draft environmental document. Reclamation encourages public comment for CVP long-term contract renewals separately from the environmental review.

The State, districts and some individuals may complete environmental review under CEQA. Reclamation encourages interested parties to contact these entities directly.

Section 6 – Comment Analysis and Responses:

Other

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SECTION 6 - COMMENT ANALYSIS AND RESPONSES: OTHER

A number of comments received during the public scoping period were too general to accurately categorize or were too inclusive to place in a specific category. However, analyses of comments received and designated as “other” are provided below. A total of 7 verbal comments and 2 written comments received during the scoping period were designated as “other”; 9 percent of all comments received.

6.1 - Negotiation Process Clarifications

Comments: Several comments asked if the terms and conditions negotiated between contractors with large water quantities would apply to the remaining individuals and smaller contractors. Some contractors asked Reclamation to help coordinate the individuals and smaller contractors with one representative.

Responses: Reclamation intends to renew short form and standard form contracts. Terms and conditions for both forms will be consistent with, and meet the goals, of Federal and California water laws. Federal and state laws prohibit Reclamation from advising both sides in any contract negotiations. Reclamation will negotiate with individuals or a duly authorized agent representing groups of contractors.

6.2- Pricing Statements

Comments: One commentor clarified that the “base water” supply isn’t free for a grower, stating that the supply includes costs for power and repayment of infrastructure required to deliver the water to each growers land. One comment asked a hypothetical question asking if contractors were

6 SUMMARY OF COMMENTS ON OTHER ISSUES

required to pay a water cost reflecting the beneficial use, would some contractors be willing to pay \$400.00 per acre-foot while CVP water contractors were paying \$0.00 to \$14.00 per acre-foot.

Responses: Reclamation acknowledges these comments.

6.3 - Clarification of Relationship to Other Delta Actions

Comments: East Bay Municipal Utility District (EBMUD) asked Reclamation to clarify that EBMUD is not a Sacramento River Settlement Contractor. EBMUD recommended that Reclamation provide an explanation in the environmental document that EBMUD may possibly divert water from a location along the Sacramento River resulting from water rights along the American River.

A written comment asked that all previous comments by the entity regarding long-term contract renewals for other Delta Actions and CVPIA actions be incorporated into the scope of the environmental document.

Another written comment requested that the investigation accompanying the renewal process should include adequate provision for current and future area of origin rights, compliance with the Delta Protection Statutes, and meet interior Delta water quality objectives.

Responses: Reclamation will provide an explanation for EBMUD diversion in the environmental document. Reclamation will consider all comments received during the scoping process. Significant issues resulting from the scoping process will be addressed in the environmental document. The public is invited to provide additional comments on the draft environmental document.

Contract terms must comply with Federal and State laws, including statutes governing area of origin, beneficial uses of upstream and downstream users, and public trust resources.

6.4 - SCORE MOU ISSUE

Comments: One comment requested the names of consultants that are revising the technical memorandums in the SCORE MOU.

6 SUMMARY OF COMMENTS ON OTHER ISSUES

Responses: The consulting firm CH2MHill is preparing a basin-wide management plan on behalf of the SCORE contractors. Reclamation is completing an independent review and evaluation of the plan.

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TABLES

Table 1
Summary of Verbal Comments on Environmental Document Issues

Issue	Tracy	Concord	Red Bluff	Total Number of Comments by Issue	Percent of Verbal Comments by Issue
Alternatives	2	6	1	9	26%
Biological Resources	--	1	1	2	6%
Cumulative Effects	--	3	--	3	8%
Coordination with other Agencies and Parties	--	--	2	2	6%
Impact Issues	--	6	3	9	26%
Impacts of Contract Terms	1	--	--	1	3%
Purpose and Need of Environmental Document	3	--	1	4	11%
Socioeconomic Issues	--	2	--	2	6%
Type of Document	--	2	--	2	6%
Water Quality	--	1	--	1	3%
Number of Comments by Location	6	21	8	35	
Percentage of Comments by Location	17%	60%	23%		

TABLES

Table 2
Summary of Verbal Comments on Contract Renewal and Negotiation Issues

Issue	Tracy	Concord	Red Bluff	Total Number of Comments by Issue	Percent of Verbal Comments by Issue
Beneficial and Reasonable Use	--	4	--	4	8%
Contract Form	--	--	1	1	4%
Duration	--	4	0	4	8%
Legal Authority, Policy, and Rules for Contract Renewal	1	9	5	15	33%
Relationship to Other Delta Actions	--	1	--	1	2%
Water Efficiency	--	3	--	3	7%
Water Pricing	--	5	3	8	17%
Water Quantity	1	3	4	8	17%
Water Transfers	--	2	--	2	4%
Number of Comments by Location	2	31	13	46	
Percentage of Comments by Location	4%	68%	28%		

TABLES

**Table 3
Summary of Verbal Comments on Public Involvement Issues**

Issue	Tracy	Concord	Red Bluff	Total Number of Comments by Issue	Percent of Verbal Comments by Issue
Access To Information	1	2	--	3	28%
Legal Authority, Policy, and Rules for Contract Renewal	3	1	--	4	36%
NEPA and Contract Renewal Process	2	1	1	4	36%
Number of Comments by Location	6	4	1	11	
Percentage of Comments by Location	55%	36%	9%		

Appendix C
Contracts between U.S. Bureau of Reclamation and
Sacramento River Settlement Contractors

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
Central Valley Project, California

CONTRACT BETWEEN THE UNITED STATES AND

DIVERTER OF WATER FROM SACRAMENTO RIVER SOURCES,
SETTLING WATER RIGHTS DISPUTES AND
PROVIDING FOR PROJECT WATER

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5 UNITED STATES
6 DEPARTMENT OF THE INTERIOR
7 BUREAU OF RECLAMATION
8 Central Valley Project, California
9

10 CONTRACT BETWEEN THE UNITED STATES AND
11 _____
12 DIVERTER OF WATER FROM SACRAMENTO RIVER SOURCES
13 SETTLING WATER RIGHTS DISPUTES AND
14 PROVIDING FOR PROJECT WATER
15
16

17 THIS CONTRACT, hereinafter referred to as "Settlement Contract," is
18 entered into by THE UNITED STATES OF AMERICA, hereinafter referred to as the
19 United States, made this ____ day of _____, 2004, pursuant to the
20 applicable authority granted to it generally in the Act of June 17, 1902 (32 Stat. 388), and
21 acts amendatory or supplementary thereto, including, but not limited to, the Acts of
22 August 26, 1937 (50 Stat. 844), as amended and supplemented, August 4, 1939 (53 Stat.
23 1187), as amended and supplemented, including, but not limited to, Sections 9 and 14
24 thereto, July 2, 1956 (70 Stat. 483), June 21, 1963 (77 Stat. 68), October 12, 1982 (96
25 Stat. 1262), October 27, 1986 (100 Stat. 3050), as amended, and Title XXXIV of the Act
26 of October 30, 1992 (106 Stat. 4706), all collectively hereinafter referred to as Federal
27 Reclamation law, and _____, hereinafter referred to as the
28 Contractor, a public agency of the State of California, duly organized, existing, and
29 acting pursuant to the laws thereof, with its principal place of business in California;
30 *[may change depending on contracting entity]*

31 WITNESSETH, that:

EXPLANATORY RECITALS

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[1st] WHEREAS, the United States has constructed and is operating the Central Valley Project, California, for multiple purposes pursuant to its statutory authority; and

[2nd] WHEREAS, the Contractor has rights to divert, is diverting, and will continue to divert for reasonable beneficial use, water from the natural flow of the Sacramento River and tributaries thereto, that would have been flowing therein if the Central Valley Project were not in existence; and [*Contractor Specific – “Other” Rights*’]

[3rd] WHEREAS, the construction and operation of the integrated and coordinated Central Valley Project has changed and will further change the regimen of the Sacramento, American, San Joaquin, and Trinity Rivers and the Sacramento-San Joaquin Delta from unregulated flow to regulated flow; and

[4th] WHEREAS, the United States has rights to divert, is diverting, and will continue to divert waters from said Rivers and said Delta in connection with the operation of said Central Valley Project, and

[5th] WHEREAS, the Contractor and the United States had a dispute over the respective rights of the parties to divert and use water from the regulated flow of the Sacramento River which threatened to result in litigation, and as a means to settle that dispute entered into Contract No. _____, as amended, hereinafter referred to as the Existing Contract, which established terms for the delivery to the Contractor of Central Valley Project Water, and the quantities of Base Supply the United States and the Contractor agreed may be diverted by the Contractor from the Sacramento River pursuant to such contract; and

1 Sacramento River each month during the period April through October of each Year
2 without payment to the United States for such quantities diverted;

3 (b) "Basin-Wide Water Management Plan" shall mean the mutually
4 agreeable Sacramento River Basinwide Water Management Plan, dated _____,
5 developed by Glenn-Colusa Irrigation District, Maxwell Irrigation District, Natomas
6 Central Mutual Water Company, Pelger Mutual Water Company, Princeton-Codora-
7 Glenn Irrigation District, Provident Irrigation District, Reclamation District 108, Sutter
8 Mutual Water Company, Anderson-Cottonwood Irrigation District, M&T, Inc., Meridian
9 Farms Water Company, Reclamation District 1004 and the U.S. Bureau of Reclamation.

10 (c) "Charges" shall mean the payments for Project Water that the
11 Contractor is required to pay to the United States in addition to the "Rates" specified in
12 this Settlement Contract. The Contracting Officer will, on an annual basis, determine the
13 extent of these Charges. The type and amount of each Charge shall be specified in
14 Exhibit D;

15 (d) "Contract Total" shall mean the sum of the Base Supply and
16 Project Water available for diversion by the Contractor for the period April 1 through
17 October 31;

18 (e) "Critical Year" shall mean any Year in which either of the
19 following eventualities exists:

20 (1) The forecasted full natural inflow to Shasta Lake for the
21 current Water Year, as such forecast is made by the United States on or before February
22 15 and reviewed as frequently thereafter as conditions and information warrant, is equal
23 to or less than 3.2 million acre-feet; or

1 (2) The total accumulated actual deficiencies below 4 million
2 acre-feet in the immediately prior Water Year or series of successive prior Water Years
3 each of which had inflows of less than 4 million acre-feet, together with the forecasted
4 deficiency for the current Water Year, exceed 800,000 acre-feet.

5 For the purpose of determining a Critical Year, the computation of inflow
6 to Shasta Lake shall be performed in a manner that considers the extent of upstream
7 development above Shasta Lake during the year in question, and shall be used as the full
8 natural flow to Shasta Lake. In the event that major construction has occurred or occurs
9 above Shasta Lake after September 1, 1963 and which has materially altered or alters the
10 regimen of the stream systems contributing to Shasta Lake, the computed inflow to
11 Shasta Lake used to define a Critical Year will be adjusted to eliminate the effect of such
12 material alterations. After consultation with the State of California, the National Weather
13 Service, and other recognized forecasting agencies, the Contracting Officer will select the
14 forecast to be used and will make the details of it available to the Contractor. The same
15 forecasts used by the United States for the operation of the Project shall be used to make
16 the forecasts hereunder;

17 (f) “CVPIA” shall mean the Central Valley Project Improvement Act,
18 Title XXXIV of the Act of October 30, 1992 (106 Stat. 4706);

19 (g) “Eligible Lands” shall mean all lands to which Project Water may
20 be delivered in accordance with Section 204 of the Reclamation Reform Act of October
21 12, 1982 (96 Stat. 1263), as amended, hereinafter referred to as RRA;

1 (h) “Excess Lands” shall mean all lands in excess of the limitations
2 contained in Section 204 of the RRA, other than those lands exempt from acreage
3 limitation under Federal Reclamation law;

4 (i) “Full Cost Rate” shall mean that water rate described in Sections
5 205(a)(3) or 202(3) of the RRA, whichever is applicable;

6 (j) “Ineligible Lands” shall mean all lands to which Project Water
7 may not be delivered in accordance with Section 204 of the RRA;

8 (k) “Landholder” shall mean a party that directly or indirectly owns or
9 leases nonexempt land, as provided in 43 CFR 426.2;

10 (l) “Project” shall mean the Central Valley Project owned by the
11 United States and managed by the Department of the Interior, Bureau of Reclamation;

12 (m) “Project Water” shall mean all Surface Water diverted or
13 scheduled to be diverted each month during the period April through October of each
14 Year by the Contractor from the Sacramento River which is in excess of the Base Supply.
15 The United States recognizes the right of the Contractor to make arrangements for
16 acquisition of water from projects of others than the United States for delivery through
17 the Sacramento River and tributaries subject to written agreement between Contractor
18 and the United States as to identification of such water which water when so identified
19 shall not be deemed Project Water under this Settlement Contract;

20 (n) “Rates” shall mean the payments for Project Water determined
21 annually by the Contracting Officer in accordance with the then current applicable water
22 ratesetting policies for the Project, as described in subdivision (a) of Article 8 of this
23 Settlement Contract;

1 1939 Reclamation Project Act (53 Stat. 1187), the relevant portions of this Settlement
2 Contract may be converted to a contract under said subsection 9(d) upon terms and
3 conditions mutually agreeable to the United States and the Contractor. The Secretary
4 shall make a determination 10 years after the date of execution of this Settlement
5 Contract, and every five years thereafter, of whether a conversion to a contract under said
6 subsection 9(d) can be accomplished pursuant to Public Law 643. Notwithstanding any
7 provision of this Settlement Contract, the Contractor reserves and shall have all rights and
8 benefits under Public Law 643.

9 WATER TO BE FURNISHED TO CONTRACTOR

10 3. (a) Subject to the conditions, limitations, and provisions hereinafter
11 expressed, the Contractor is hereby entitled and authorized to divert from the Sacramento
12 River at the locations shown in Exhibit A, for beneficial use within the area delineated on
13 Exhibit B, (both Exhibits are attached hereto and made a part hereof), the Contract Total
14 designated in Exhibit A, or any revision thereof, in accordance with the monthly
15 operating schedule required by Article 3(c) of this Settlement Contract. The quantity of
16 any water diverted under this Settlement Contract from the Sacramento River, during the
17 period April through October, for use on any lands delineated on Exhibit B, by the owner
18 of such lands or otherwise shall constitute a part of the Contract Total as shown on
19 Exhibit A and shall be subject to all the provisions of this Settlement Contract relating to
20 such Contract Total as if such diversion were made by the Contractor.

21 ***[NOTE: contractor-specific language dealing with individual water rights may be***
22 ***needed.]***

1 (b) The Contractor may have acquired rights to divert water from the
2 Sacramento River during the period April through October, that were obtained after the
3 date of execution of the Existing Contract, or the Contractor may acquire such rights in
4 the future. All diversions made from the Sacramento River, pursuant to such rights,
5 during the period April through October, shall not be considered a part of the quantity of
6 Base Supply and Project Water specified in Exhibit A; Provided, that the quantities
7 diverted pursuant to the above rights shall be identified on the schedule submitted
8 pursuant to Article 3(c) below, and shall not be substituted for any Base Supply or Project
9 Water; Provided, further, that any such identified quantities of other acquired rights may
10 be diverted by the Contractor before incurring any fee pursuant to Article 3(c)(1), below.

11 (c) Before April 1 and before the first day of each month thereafter
12 when a revision is needed, the Contractor shall submit a written schedule to the
13 Contracting Officer indicating the Contract Total to be diverted by the Contractor during
14 each month under this Settlement Contract. The United States shall furnish water to the
15 Contractor in accordance with the monthly operating schedule or any revisions thereof.
16 However, the United States recognizes the need of the Contractor to change from time to
17 time its monthly diversions of water from the quantities shown in Exhibit A; the
18 Contractor may make such changes, provided:

19 (1) that for the quantity of Base Supply diverted in excess of
20 the monthly quantity shown in Exhibit A, and as may be reduced in accordance with
21 Article 5(a), during June, July, August, September, or October of any Water Year, the
22 Contractor shall be charged a rescheduling fee equal to 50% of the sum of the storage

1 operations and maintenance rate and the storage capital rate components of the Project
2 ratesetting policy.

3 (2) that in no event shall the total quantity scheduled for
4 diversion by the Contractor from the Sacramento River:

5 (i) During the period April through October exceed the
6 aggregate of the Contract Total for that period shown in Exhibit A or any revision
7 thereof;

8 (ii) During the period July through September exceed
9 the aggregate of the Contract Total for that period shown in Exhibit A or any revision
10 thereof.

11 (d) In the event conditions warrant, the Contracting Officer reserves
12 the right to require the Contractor to submit, at least 72 hours prior to the beginning of
13 each weekly period, its estimate of daily diversion requirements for each such period
14 from the Sacramento River: Provided, however, that changes during any such period
15 may be made upon the giving of 72 hours' notice thereof to the Contracting Officer.

16 (e) No sale, transfer, exchange, or other disposal of any of the
17 Contract Total designated in Exhibit A or the right to the use thereof for use on land other
18 than that shown on Exhibit B shall be made by the Contractor without first obtaining the
19 written consent of the Contracting Officer. Such consent will not be unreasonably
20 withheld and a decision will be rendered in a timely manner. For short-term actions that
21 will occur within one year or less, the decision will be rendered within 30 days after
22 receipt of a complete written proposal. For long-term actions that will occur in a period
23 longer than one year, the decision will be rendered within 90 days after receipt of a

1 complete written proposal. For a proposal to be deemed complete by the Contracting
2 Officer, it must comply with all provisions required by State and Federal law, including
3 information sufficient to enable the Contracting Officer to comply with the National
4 Environmental Policy Act, the Endangered Species Act, and applicable rules or
5 regulations then in effect; Provided that, such consent does not authorize the use of
6 Federal facilities to facilitate or effectuate the sale, transfer, exchange or other disposal of
7 Base Supply. Such use of Federal facilities will be the subject of a separate agreement to
8 be entered into between the Contractor and Reclamation.

9 (f) For the purpose of determining whether section 3405(a)(1)(M) of
10 the CVPIA applies to the Contractor as a transferor or transferee of Project Water, the
11 Contracting Officer acknowledges that the Contractor is within a county, watershed or
12 other area of origin, as those terms are utilized under California law.

13 (g) Nothing herein contained shall prevent the Contractor from
14 diverting water during the months of November through March for beneficial use on the
15 land shown on Exhibit B or elsewhere to the extent authorized under the laws of the State
16 of California.

17 (h) The United States assumes no responsibility for and neither it nor
18 its officers, agents, or employees shall have any liability for or on account of:

19 (1) The quality of water to be diverted by the Contractor;

20 (2) The control, carriage, handling, use, disposal, or

21 distribution of water diverted by the Contractor outside the facilities constructed and then
22 being operated and maintained by or on behalf of the United States;

1 (b) The amount of any overpayment by the Contractor shall, at its
2 option, be refunded or credited upon amounts to become due to the United States from
3 the Contractor under the provisions hereof in the ensuing Year. To the extent of such
4 deficiency such adjustment of overpayment shall constitute the sole remedy of the
5 Contractor.

6 INTEGRATED WATER MANAGEMENT AND PARTNERSHIPS

7 6. The Contractor and United States desire to work together to maximize the
8 reasonable beneficial use of water for their mutual benefit. As a consequence, the United
9 States and the Contractor will work in partnership and with others within the Sacramento
10 Valley, including other Contractors, to facilitate the better integration within the
11 Sacramento Valley of all water supplies including, but not limited to, the better
12 management and integration of surface water and groundwater, the development and
13 better utilization of surface water storage, the effective utilization of waste, seepage and
14 return flow water, and other operational and management options that may be identified
15 in the future. *[Language cross-referencing other related agreement will be added as*
16 *appropriate to the individual Settlement Contracts.]*

17 USE OF WATER FURNISHED TO CONTRACTOR

18 7. (a) Project Water furnished to the Contractor pursuant to this
19 Settlement Contract shall not be delivered or furnished by the Contractor for any
20 purposes other than agricultural purposes without the written consent of the Contracting
21 Officer. For purposes of this Settlement Contract, “agricultural purposes” includes, but is
22 not restricted to, the watering of livestock, incidental domestic use including related
23 landscape irrigation, or underground water replenishment.

1 Reclamation law and associated rules and regulations, or policies: Provided, that if the
2 Contractor desires to use Project Water for other than agricultural use the Rates and
3 Charges set forth above will be adjusted by the Contracting Officer to the applicable
4 Rates and Charges for such use. The Rates and Charges applicable to the Contractor
5 upon execution of this Settlement Contract are set forth in Exhibit D, as may be revised
6 annually. The Secretary's ratesetting policies for the Project shall be amended, modified,
7 or superseded only through a public notice and comment procedure. The Contracting
8 Officer shall adjust the amount of Project Water for which payment is required to the
9 extent of any reduction in diversions of Project Water made in accordance with the water
10 conservation provisions of Article 29(e).

11 (b) The Contracting Officer shall notify the Contractor of the Rates
12 and Charges as follows:

13 (1) Prior to July 1 of each Year, the Contracting Officer shall
14 provide the Contractor an estimate of the Charges for Project Water that will be applied
15 to the period October 1, of the current Year, through September 30, of the following
16 Year, and the basis for such estimate. The Contractor shall be allowed not less than two
17 months to review and comment on such estimates. On or before September 15 of each
18 Year, the Contracting Officer shall notify the Contractor in writing of the Charges to be
19 in effect during the period October 1 of the current Year, through September 30, of the
20 following Year, and such notification shall revise Exhibit D.

21 (2) Prior to October 1 of each Year, the Contracting Officer
22 shall make available to the Contractor an estimate of the Rates for Project Water for the
23 following Year and the computations and cost allocations upon which those Rates are

1 based. The Contractor shall be allowed not less than two months to review and comment
2 on such computations and cost allocations. By December 31 of each Year, the
3 Contracting Officer shall provide the Contractor with the final Rates to be in effect for
4 the upcoming Year, and such notification shall revise Exhibit D.

5 (c) The Contractor shall pay the United States for Project Water in the
6 following manner:

7 (1) With respect to Rates, prior to May 1 of each Year, the
8 Contractor shall pay the United States one-half the total amount payable pursuant to
9 subdivision (a) of this Article and the remainder shall be paid prior to July 1 or such later
10 date or dates as may be specified by the United States in a written notice to the
11 Contractor: Provided, however, that if at any time during the Year the amount of Project
12 Water diverted by the Contractor shall equal the amount for which payment has been
13 made, the Contractor shall pay for the remaining amount of such water as shown in
14 Exhibit A in advance of any further diversion of Project Water.

15 (2) With respect to Charges, the Contractor shall also make a
16 payment to the United States, in addition to the Rate(s) in subdivision (c)(1) of this
17 Article, at the Charges then in effect, before the end of the month following the month of
18 delivery or transfer. The payments shall be consistent with the quantities of Project
19 Water delivered or transferred. Adjustment for overpayment or underpayment of
20 Charges shall be made through the adjustment of payments due to the United States for
21 Charges for the next month. Any amount to be paid for past due payment of Charges
22 shall be computed pursuant to Article 13 of this Settlement Contract.

1 (d) Payments to be made by the Contractor to the United States under
2 this Settlement Contract may be paid from any revenues available to the Contractor.

3 (1) All revenues received by the United States from the
4 Contractor relating to the delivery of Project Water or the delivery of non-Project water
5 through Project facilities shall be allocated and applied in accordance with Federal
6 Reclamation law and the associated rules or regulations, and the then current Project
7 ratesetting policies for Irrigation Water.

8 (e) The Contracting Officer shall keep its accounts pertaining to the
9 administration of the financial terms and conditions of its long-term water service and
10 Settlement Contracts, in accordance with applicable Federal standards, so as to reflect the
11 application of Project costs and revenues. The Contracting Officer shall, each Year upon
12 request of the Contractor, provide to the Contractor a detailed accounting of all Project
13 and Contractor expense allocations, the disposition of all Project and Contractor
14 revenues, and a summary of all water delivery information. The Contracting Officer and
15 the Contractor shall enter into good faith negotiations to resolve any discrepancies or
16 disputes relating to accountings, reports, or information.

17 (f) The parties acknowledge and agree that the efficient administration
18 of this Settlement Contract is their mutual goal. Recognizing that experience has
19 demonstrated that mechanisms, policies, and procedures used for establishing Rates and
20 Charges and/or for making and allocating payments, other than those set forth in this
21 Article may be in the mutual best interest of the parties, it is expressly agreed that the
22 parties may enter into agreements to modify the mechanisms, policies, and procedures for

1 any of those purposes while this Settlement Contract is in effect without amendment of
2 this Settlement Contract.

3 (g) For the term of this Settlement Contract, Rates under the respective
4 ratesetting policies for the Project will be established to recover only reimbursable
5 operation and maintenance (including any deficits) and capital costs of the Project, as
6 those terms are used in the then current Project ratesetting policies, and interest, where
7 appropriate, except in instances where a minimum Rate is applicable in accordance with
8 the relevant Project ratesetting policy. Proposed changes of significance in practices
9 which implement the ratesetting policies for the Project will not be implemented until the
10 Contracting Officer has provided the Contractor an opportunity to discuss the nature,
11 need, and impact of the proposed change. The Contractor retains all rights to challenge
12 the validity of Rates and Charges imposed pursuant to this Settlement Contract, including
13 but not limited to operation and maintenance expenses and operation and maintenance
14 deficits, in an appropriate administrative or judicial proceeding.

15 (h) Except as provided in subsection 3405(a)(1)(B) of the CVPIA, the
16 Rates for Project Water transferred, exchanged, or otherwise disposed of, by the
17 Contractor shall be the Contractor's Rates adjusted upward or downward to reflect the
18 changed costs of delivery (if any) of the transferred, exchanged, or otherwise disposed of
19 Project Water to the transferee's point of delivery in accordance with the then-current
20 ratesetting policies for the Project. Except as provided in subsection 3407(d)(2)(A) of the
21 CVPIA, the Charges for Project Water transferred, exchanged, or otherwise disposed of,
22 by the Contractor shall be the Contractor's Charges specified in Exhibit D. If the
23 Contractor is receiving lower Rates and Charges because of inability to pay and is

1 transferring, exchanging, or otherwise disposing of Project Water to another entity whose
2 Rates and Charges are not adjusted due to inability to pay, the Rates and Charges for
3 transferred, exchanged, or otherwise disposed of Project Water shall be the Contractor's
4 Rates and Charges unadjusted for ability to pay.

5 (i) Pursuant to the Act of October 27, 1986 (100 Stat. 3050), the
6 Contracting Officer is authorized to adjust determinations of ability to pay every five
7 years.

8 (j) Each payment to be made pursuant to subdivisions (a) and (b) of
9 this Article shall be made at the office of the Bureau of Reclamation, Mid-Pacific Region,
10 File No. 11546, P.O. Box 6000, San Francisco, California, 94160-1546, or at such other
11 place as the United States may designate in a written notice to the said Contractor.
12 Payments shall be made by cash transaction, wire, or any other mechanism as may be
13 agreed to in writing by the Contractor and the Contracting Officer. In the event there
14 should be a default in the payment of the amount due, the delinquent payment provisions
15 of Article 13 shall apply. The Contractor shall not be relieved of the whole or any part of
16 its said obligation by, on account of, or notwithstanding, as the case may be:

17 (1) Its failure, refusal, or neglect to divert seventy-five percent
18 of the quantity of Project Water shown on Exhibit A;

19 (2) The default in payment to it by any water user of
20 assessments, tolls, or other charges levied by or owing to said Contractor;

21 (3) Any judicial determination that any assessment, toll, or
22 other charge referred to in subsection 8(c)(2) of this Settlement Contract is irregular,
23 void, or ineffectual; or

1 (4) Any injunctive process enjoining or restraining the
2 Contractor from making or collecting any such assessment, toll, or other charge referred
3 to in subsection 8(c)(2) of this Settlement Contract.

4 AGREEMENT ON WATER QUANTITIES

5 9. (a) During the term of this Settlement Contract and any renewals
6 thereof:

7 (1) It shall constitute full agreement as between the United
8 States and the Contractor as to the quantities of water and the allocation thereof between
9 Base Supply and Project Water which may be diverted by the Contractor from the
10 Sacramento River for beneficial use on the land shown on Exhibit B which said
11 diversion, use, and allocation shall not be disturbed so long as the Contractor shall fulfill
12 all of its obligations hereunder;

13 (2) Neither party shall claim any right against the other in
14 conflict with the provisions of Article 9(a)(1) hereof.

15 (b) Nothing herein contained is intended to or does limit rights of the
16 Contractor against others than the United States or of the United States against any
17 person other than the Contractor: Provided, however, that in the event the Contractor, the
18 United States, or any other person shall become a party to a general adjudication of rights
19 to the use of water of the Sacramento River system, this Settlement Contract shall not
20 jeopardize the rights or position of either party hereto or of any other person and the
21 rights of all such persons in respect to the use of such water shall be determined in such
22 proceedings the same as if this Settlement Contract had not been entered into, and if final
23 judgment in any such general adjudication shall determine that the rights of the parties

1 hereto are different from the rights as assumed herein, the parties shall negotiate an
2 amendment to give effect to such judgment. In the event the parties are unable to agree
3 on an appropriate amendment they shall, within 60 days of determining that there is an
4 impasse, employ the services of a neutral mediator, experienced in resolving water rights
5 disputes, to assist in resolving the impasse. The cost of the mediation will be shared
6 equally. A failure to reach agreement on an amendment within 60 days of the end of
7 mediation will cause the immediate termination of this Settlement Contract.

8 (c) In the event that the California State Water Resources Control
9 Board or a court of competent jurisdiction issues a final decision or order modifying the
10 terms and conditions of the water rights of either party to this Settlement Contract in
11 order to impose Bay-Delta water quality obligations, the Contractor and the United States
12 shall promptly meet to determine whether or not to modify any of the terms of this
13 Settlement Contract to comply with the final decision or order, including, but not limited
14 to, the applicability of the rescheduling charge in Article 3(c)(1) of this Settlement
15 Contract. If within 60 days of the date of the issuance of the final decision or order the
16 parties are not able to reach agreement regarding either the need to modify this
17 Settlement Contract or the manner in which this Settlement Contract is to be modified,
18 the parties shall promptly retain a neutral mediator, experienced in resolving water right
19 disputes, to assist the parties in resolving their dispute. The cost of the mediator shall be
20 shared equally. In the event that either of the parties to this Settlement Contract
21 determines that the parties will not be able to develop mutually-agreeable modification(s)
22 to this Settlement Contract even with the assistance of a mediator, either of the parties to
23 this Settlement Contract may attempt to resolve the impasse by seeking appropriate

1 judicial relief including, but not limited to, filing a general adjudication of the rights to
2 the use of water in the Sacramento River system. The foregoing provisions of this sub-
3 article shall only apply to the incremental obligations contained within a final decision or
4 order of the State Water Resources Control Board that reflects a modification to the
5 obligations imposed in State Water Resources Control Board Revised Water Rights
6 Decision 1641 dated March 15, 2000, and its associated 1995 Water Quality Control Plan
7 which, taken together, will be considered the baseline for the application of the
8 provisions of this sub-article.

9 (d) In the event this Settlement Contract terminates, the rights
10 of the parties to thereafter divert and use water shall exist as if this Settlement Contract
11 had not been entered into; and the fact that as a compromise settlement of a controversy
12 as to the respective rights of the parties to divert and use water and the yield of such
13 rights during the term hereof, this Settlement Contract places a limit on the Contract
14 Total to be diverted annually by the Contractor during the Settlement Contract term and
15 segregates it into Base Supply and Project Water shall not jeopardize the rights or
16 position of either party with respect to its water rights or the yield thereof at all times
17 after the Settlement Contract terminates. It is further agreed that the Contractor at all
18 times will first use water to the use of which it is entitled by virtue of its own water
19 rights, and neither the provisions of this Settlement Contract, action taken thereunder, nor
20 payments made thereunder to the United States by the Contractor shall be construed as an
21 admission that any part of the water used by the Contractor during the term of this
22 Settlement Contract was in fact water to which it would not have been entitled under
23 water rights owned by it nor shall receipt of payments thereunder by the United States

1 from the Contractor be construed as an admission that any part of the water used by the
2 Contractor during the term of this Settlement Contract was in fact water to which it
3 would have been entitled under water rights owned by it.

4 MEASUREMENT OF WATER

5 10. (a) All water diverted by the Contractor from the Sacramento River
6 will be diverted at the existing point or points of diversion shown on Exhibit A or at such
7 other points as may be mutually agreed upon in writing by the Contracting Officer and
8 the Contractor.

9 (b) All water diverted from the Sacramento River pursuant to this
10 Settlement Contract will be measured or caused to be measured by the United States at
11 each point of diversion with existing equipment or equipment to be installed, operated,
12 and maintained by the United States, and/or others, under contract with and at the option
13 of the United States. The equipment and methods used to make such measurement shall
14 be in accordance with sound engineering practices. Upon request of the Contractor, the
15 accuracy of such measurements will be investigated by the Contracting Officer and any
16 errors appearing therein will be corrected.

17 (c) The right of ingress to and egress from all points of diversion is
18 hereby granted to all authorized employees of the United States. The Contractor also
19 hereby grants to the United States the right to install, operate, maintain and replace such
20 equipment on diversion or carriage facilities at each point of diversion as the Contracting
21 Officer deems necessary.

22 (d) The Contractor shall not modify, alter, remove, or replace
23 diversion facilities or do any other act which would alter the effectiveness or accuracy of

1 the measuring equipment installed by the United States or its representatives unless and
2 until the Contracting Officer has been notified with due diligence and has been given an
3 opportunity to modify such measuring equipment in such manner as may be necessary or
4 appropriate. In the event of an emergency the Contractor shall notify the United States
5 within a reasonable time thereafter as to the existence of the emergency and the nature
6 and extent of such modification, alteration, removal, or replacement of diversion
7 facilities.

8 (e) The Contractor shall pay the United States for the costs to repair,
9 relocate, or replace measurement equipment when the Contractor modifies, alters,
10 removes, or replaces diversion or carriage facilities.

11 (f) Contractor and Contracting Officer shall develop a mutually
12 agreeable surface water delivery water measurement program which shall be
13 implemented by the Contractor, and such measurement program shall be consistent with
14 the conservation and efficiency criteria for evaluating water conservation plans as
15 provided in Article 29(a).

16 (g) All new surface water delivery systems installed within the lands
17 delineated on Exhibit B after the effective date of this Settlement Contract shall also
18 comply with the measurement provisions described in this Article.

19 RULES AND REGULATIONS

20 11. The parties agree that the delivery of Project Water for irrigation use or
21 use of Federal facilities pursuant to this Settlement Contract is subject to Federal
22 Reclamation law, including but not limited to, the Reclamation Reform Act of 1982 (43

1 U.S.C. 390aa et seq.), as amended and supplemented, and the rules and regulations
2 promulgated by the Secretary of the Interior under Federal Reclamation law.

3 GENERAL OBLIGATION--BENEFITS CONDITIONED UPON PAYMENT
4

5 12. (a) The obligation of the Contractor to pay the United States as
6 provided in this Settlement Contract is a general obligation of the Contractor
7 notwithstanding the manner in which the obligation may be distributed among the
8 Contractor's water users and notwithstanding the default of individual water users in their
9 obligations to the Contractor.

10
11 (b) The payment of Charges becoming due hereunder is a condition
12 precedent to receiving benefits under this Settlement Contract. The United States shall
13 not make water available to the Contractor through Project facilities during any period in
14 which the Contractor may be in arrears in the advance payment of water Rates due the
15 United States. The Contractor shall not furnish water made available pursuant to this
16 Settlement Contract for lands or parties which are in arrears in the advance payment of
17 water rates levied or established by the Contractor.

18
19 (c) With respect to subdivision (b) of this Article, the Contractor shall
20 have no obligation to require advance payment for water Rates which it levies.

21
22 CHARGES FOR DELINQUENT PAYMENTS
23

24 13. (a) The Contractor shall be subject to interest, administrative and
25 penalty charges on delinquent installments or payments. When a payment is not received
26 by the due date, the Contractor shall pay an interest charge for each day the payment is
27 delinquent beyond the due date. When a payment becomes 60 days delinquent, the
28 Contractor shall pay an administrative charge to cover additional costs of billing and
29 processing the delinquent payment. When a payment is delinquent 90 days or more, the
30 Contractor shall pay an additional penalty charge of six percent per year for each day the
31 payment is delinquent beyond the due date. Further, the Contractor shall pay any fees
32 incurred for debt collection services associated with a delinquent payment.

33
34 (b) The interest charge rate shall be the greater of the rate prescribed
35 quarterly in the Federal Register by the Department of the Treasury for application to
36 overdue payments, or the interest rate of one-half of one percent per month prescribed by
37 Section 6 of the Reclamation Project Act of 1939 (Public Law 76-260). The interest
38 charge rate shall be determined as of the due date and remain fixed for the duration of the
39 delinquent period.

40
41 (c) When a partial payment on a delinquent account is received, the
42 amount received shall be applied, first to the penalty, second to the administrative
43 charges, third to the accrued interest, and finally to the overdue payment.
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QUALITY OF WATER

14. The operation and maintenance of Project facilities shall be performed in such manner as is practicable to maintain the quality of raw water made available through such facilities at the highest level reasonably attainable as determined by the Contracting Officer. The United States does not warrant the quality of water and is under no obligation to construct or furnish water treatment facilities to maintain or better the quality of water.

WATER AND AIR POLLUTION CONTROL

15. The Contractor, in carrying out this Settlement Contract, shall comply with all applicable water and air pollution laws and regulations of the United States and the State of California, and shall obtain all required permits or licenses from the appropriate Federal, State, or local authorities.

EQUAL OPPORTUNITY

16. During the performance of this Settlement Contract, the Contractor agrees as follows:

(a) The Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. The Contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, sex, or national origin. Such action shall include, but not be limited to, the following: Employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination, rates of payment or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the Contracting Officer setting forth the provisions of this nondiscrimination clause.

(b) The Contractor will, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without discrimination because of race, color, religion, sex, or national origin.

1 (c) The Contractor will send to each labor union or representative of
2 workers with which it has a collective bargaining agreement or other contract or
3 understanding, a notice, to be provided by the Contracting Officer, advising the said labor
4 union or workers' representative of the Contractor's commitments under Section 202 of
5 Executive Order No. 11246 of September 24, 1965, as amended, and shall post copies of
6 the notice in conspicuous places available to employees and applicants for employment.
7

8 (d) The Contractor will comply with all provisions of Executive Order
9 No. 11246 of September 24, 1965, as amended, and of the rules, regulations, and relevant
10 orders of the Secretary of Labor.
11

12 (e) The Contractor will furnish all information and reports required by
13 said amended Executive Order and by the rules, regulations, and orders of the Secretary
14 of Labor, or pursuant thereto, and will permit access to its books, records, and accounts
15 by the Contracting Officer and the Secretary of Labor for purposes of investigation to
16 ascertain compliance with such rules, regulations, and orders.
17

18 (f) In the event of the Contractor's noncompliance with the
19 nondiscrimination clauses of this Settlement Contract or with any of the said rules,
20 regulations, or orders, this Settlement Contract may be canceled, terminated, or
21 suspended, in whole or in part, and the Contractor may be declared ineligible for further
22 Government contracts in accordance with procedures authorized in said amended
23 Executive Order, and such other sanctions may be imposed and remedies invoked as
24 provided in said Executive Order, or by rule, regulation, or order of the Secretary of
25 Labor, or as otherwise provided by law.
26

27 (g) The Contractor will include the provisions of paragraphs (a)
28 through (g) in every subcontract or purchase order unless exempted by the rules,
29 regulations, or orders of the Secretary of Labor issued pursuant to Section 204 of said
30 amended Executive Order, so that such provisions will be binding upon each
31 subcontractor or vendor. The Contractor will take such action with respect to any
32 subcontract or purchase order as may be directed by the Secretary of Labor as a means of
33 enforcing such provisions, including sanctions for noncompliance: Provided, however,
34 that in the event the Contractor becomes involved in, or is threatened with, litigation with
35 a subcontractor or vendor as a result of such direction, the Contractor may request the
36 United States to enter into such litigation to protect the interests of the United States.
37

38 COMPLIANCE WITH CIVIL RIGHTS LAWS AND REGULATIONS
39 *(For Districts Only)*
40

41 17. (a) The Contractor shall comply with Title VI of the Civil Rights Act
42 of 1964 (42 U.S.C. 2000d), Section 504 of the Rehabilitation Act of 1975 (P.L. 93-112,
43 as amended), the Age Discrimination Act of 1975 (42 U.S.C. 6101, et seq.) and any other
44 applicable civil rights laws, as well as with their respective implementing regulations and
45 guidelines imposed by the U.S. Department of the Interior and/or Bureau of Reclamation.
46

1 (b) These statutes require that no person in the United States shall, on
2 the grounds of race, color, national origin, handicap, or age, be excluded from
3 participation in, be denied the benefits of, or be otherwise subjected to discrimination
4 under any program or activity receiving financial assistance from the Bureau of
5 Reclamation. By executing this Settlement Contract, the Contractor agrees to
6 immediately take any measures necessary to implement this obligation, including
7 permitting officials of the United States to inspect premises, programs, and documents.
8

9 (c) The Contractor makes this agreement in consideration of and for
10 the purpose of obtaining any and all Federal grants, loans, contracts, property discounts,
11 or other Federal financial assistance extended after the date hereof to the Contractor by
12 the Bureau of Reclamation, including installment payments after such date on account of
13 arrangements for Federal financial assistance which were approved before such date.
14 The Contractor recognizes and agrees that such Federal assistance will be extended in
15 reliance on the representations and agreements made in this Article, and that the United
16 States reserves the right to seek judicial enforcement thereof.
17

18 MINGLING OF CONTRACTOR'S PROJECT AND NON-PROJECT WATER

19 18. (a) Project Water must of necessity be transported by the Contractor to
20 its water users by means of the same works and channels used for the transport of its non-
21 Project Water including Base Supply. Notwithstanding such mingling of water, the
22 provisions of Article 11 hereof shall be applicable only to Project Water, and such
23 mingling of water shall not in any manner subject to the provisions of Article 11 hereof
24 the Contractor's non-Project water including Base Supply.

25 (b) If required in accordance with subdivision (c) of this Article, the
26 Contractor shall install and maintain such measuring equipment and distribution facilities
27 and maintain such records as may be necessary to determine the amounts of water
28 delivered to Excess Lands served by the Contractor. The Contractor shall not within any
29 month deliver to Ineligible Lands water in excess of the non-Project Water, including
30 Base Supply, for that month. The Contracting Officer or authorized representative shall
31 have the right at all reasonable times to inspect such records and measuring equipment.

1 ownership, land-leasing and water use data; and other matters that the Contracting
2 Officer may require. Reports thereon shall be furnished to the Contracting Officer in
3 such form and on such date or dates as the Contracting Officer may require. Subject to
4 applicable Federal laws and regulations, each party to this Settlement Contract shall have
5 the right during office hours to examine and make copies of each other's books and
6 official records relating to matters covered by this Settlement Contract.

7
8 CHANGE OF PLACE OF USE OR ORGANIZATION

9 20. (a) Unless the written consent of the United States is first obtained no
10 change shall be made in the place of water use shown on Exhibit B.

11 (b) While this Settlement Contract is in effect, no change shall be
12 made in the area of the Contractor as shown on its Exhibit B, by inclusion, exclusion,
13 annexation or detachment of lands, by dissolution, consolidation, or merger or otherwise,
14 except upon the Contracting Officer's written consent thereto. Such consent will not be
15 unreasonably withheld and a decision will be provided in a timely manner. [*There may*
16 *need to be Contractor specific language added.*]

17 (c) In the event lands are annexed to or detached from the area of the
18 Contractor, as provided herein, the quantity of Project Water to be diverted may be
19 increased or decreased, as may be appropriate, pursuant to a supplemental agreement to
20 be executed in respect thereto.

21 CONSOLIDATION OF CONTRACTING ENTITIES

22
23 21. Consolidation of Contractors may be approved by the Contracting Officer
24 provided: (i) the Contracting Officer approves the form and organization of the resulting
25 entity and the utilization by it of the Contract Total; and (ii) the obligations of the
26 Contractors are assumed by such entity.

27 No such consolidation shall be valid unless and until approved by the Contracting
28 Officer.

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NOTICES

22. Any notice, demand, or request authorized or required by this Settlement Contract shall be deemed to have been given, on behalf of the Contractor, when mailed, postage prepaid, or delivered to the Area Manager, Northern California Area Office, Bureau of Reclamation, 16349 Shasta Dam Blvd., Shasta Lake, California, 96019, and on behalf of the United States, when mailed, postage prepaid, or delivered to the Board of Directors /City Council of the _____. The designation of the addressee or the address may be changed by notice given in the same manner as provided in this Article for other notices.

ASSIGNMENT LIMITED--SUCCESSORS AND ASSIGNS OBLIGATED

23. (a) The provisions of this Settlement Contract shall apply to and bind the successors and assigns of the parties hereto, but no assignment or transfer of this Settlement Contract or any right or interest therein shall be valid until approved in writing by the Contracting Officer.

(b) The assignment of any right or interest in this Settlement Contract by either party shall not interfere with the rights or obligations of the other party to this Settlement Contract absent the written concurrence of said other party.

(c) The Contracting Officer shall not unreasonably condition or withhold his approval of any proposed assignment.

OFFICIALS NOT TO BENEFIT

24. (a) No Member of or Delegate to Congress, Resident Commissioner, or official of the Contractor shall benefit from this Settlement Contract other than as a water user or landowner in the same manner as other water users or landowners.

(b) No officer or member of the governing board of the Contractor shall receive any benefit that may arise by reason of this Settlement Contract other than as a landowner within the Contractor's service area and in the same manner as other landowners within the said service area.

CONTINGENT UPON APPROPRIATION OR ALLOTMENT OF FUNDS

25. The expenditure or advance of any money or the performance of any obligation of the United States under this Settlement Contract shall be contingent upon appropriation or allotment of funds. Absence of appropriation or allotment of funds shall not relieve the Contractor from any obligations under this Settlement Contract. No liability shall accrue to the United States in case funds are not appropriated or allotted.

1 43 CFR 2.72. The Contractor is authorized to grant requests by individuals for access to
2 their own records.

3
4 (e) The Contractor shall forward promptly to the System Manager
5 each proposed denial of access under 43 CFR 2.64; and each request for amendment of
6 records filed under 43 CFR 2.71; notify the requester accordingly of such referral; and
7 provide the System Manager with information and records necessary to prepare an
8 appropriate response to the requester. These requirements do not apply to individuals
9 seeking access to their own certification and reporting forms filed with the Contractor
10 pursuant to 43 CFR 426.18, unless the requester elects to cite the Privacy Act as a basis
11 for the request.

12
13 WATER CONSERVATION

14 29. (a) Prior to the diversion of Project Water, the Contractor shall be
15 implementing an effective water conservation and efficiency program based on the
16 Basin-Wide Water Management Plan and/or Contractor's water conservation plan that
17 has been determined by the Contracting Officer to meet the conservation and efficiency
18 criteria for evaluating water conservation plans established under Federal law. The water
19 conservation and efficiency program shall contain definite water conservation objectives,
20 appropriate economically feasible water conservation measures, and time schedules for
21 meeting those objectives. Continued diversion of Project Water pursuant to this
22 Settlement Contract shall be contingent upon the Contractor's continued implementation
23 of such water conservation program. In the event the Contractor's water conservation
24 plan or any revised water conservation plan completed pursuant to subdivision (c) of
25 Article 29 of this Settlement Contract have not yet been determined by the Contracting
26 Officer to meet such criteria, due to circumstances which the Contracting Officer
27 determines are beyond the control of the Contractor, Project Water deliveries shall be
28 made under this Settlement Contract so long as the Contractor diligently works with the
29 Contracting Officer to obtain such determination at the earliest practicable date, and

1 thereafter the Contractor immediately begins implementing its water conservation and
2 efficiency program in accordance with the time schedules therein.

3 (b) The Contractor shall submit to the Contracting Officer a report on
4 the status of its implementation of the water conservation plan on the reporting dates
5 specified in the then existing conservation and efficiency criteria established under
6 Federal law.

7 (c) At five year intervals, the Contractor shall revise its water
8 conservation plan to reflect the then current conservation and efficiency criteria for
9 evaluating water conservation plans established under Federal law and submit such
10 revised water management plan to the Contracting Officer for review and evaluation.
11 The Contracting Officer will then determine if the water conservation plan meets
12 Reclamation's then current conservation and efficiency criteria for evaluating water
13 conservation plans established under Federal law.

14 (d) If the Contractor is engaged in direct ground-water recharge, such
15 activity shall be described in the Contractor's water conservation plan.

16 (e) In order to provide incentives for water conservation, the
17 Contractor may reduce the amount of Project Water for which payment is required under
18 Article 8(a) in accordance with the provisions of this Article 29(e).

19 (1) On or before February 15 of any Water Year, the
20 Contractor may file with Reclamation an offer to reduce Project Water use, hereinafter
21 referred to as Offer. The Offer shall specify the maximum quantity of Project Water to
22 be diverted by the Contractor for each month that Project Water is available for that
23 Water Year under this Settlement Contract. The Contracting Officer shall provide the

1 Contractor with a decision, in writing, to the Offer on or before March 15 of that Water
2 Year. The dates specified in this Article 29(e)(1) can be changed if mutually agreed to, in
3 writing, by the Contractor and Contracting Officer.

4 (2) If Reclamation accepts the Offer, the Contractor's payment
5 obligation under Article 8(a)(1) shall be reduced to the maximum quantity of Project
6 Water to be diverted by the Contractor as specified in the Offer. The Contractor shall not
7 divert Project Water in excess of the quantities set forth in the Offer: Provided, however,
8 if the Contractor's diversions of Project Water exceed the quantities set forth in the Offer,
9 the Contractor shall pay to Reclamation the applicable Rates and Charges plus an amount
10 equal to the applicable Rates and Charges, unadjusted for ability to pay, for each acre-
11 foot of Project Water diverted in excess of the quantities set forth in the Offer.

12 (3) If Reclamation decides not to accept the Offer, the
13 Contractor's payment obligation will remain as specified in Article 8(a)(1).

14 (4) The provisions of this Article 29(e) shall be in addition to
15 and shall not affect the provisions of Article 3(e) pertaining to the sale, transfer, exchange
16 or other disposal of the Contract Total designated in Exhibit A.

17 OPINIONS AND DETERMINATIONS

18 30. (a) Where the terms of this Settlement Contract provide for actions to
19 be based upon the opinion or determination of either party to this Settlement Contract,
20 said terms shall not be construed as permitting such action to be predicated upon
21 arbitrary, capricious, or unreasonable opinions or determinations. Both parties,
22 notwithstanding any other provisions of this Settlement Contract, expressly reserve the
23 right to seek relief from and appropriate adjustment for any such arbitrary, capricious, or
24

1 unreasonable opinion or determination. Each opinion or determination by either party
2 shall be provided in a timely manner. Nothing in subdivision (a) of Article 30 of this
3 Settlement Contract is intended to or shall affect or alter the standard of judicial review
4 applicable under Federal law to any opinion or determination implementing a specific
5 provision of Federal law embodied in statute or regulation.

6 (b) The Contracting Officer shall have the right to make
7 determinations necessary to administer this Settlement Contract that are consistent with
8 the provisions of this Settlement Contract, the laws of the United States and of the State
9 of California, and the rules and regulations promulgated by the Secretary of the Interior.
10 Such determinations shall be made in consultation with the Contractor to the extent
11 reasonably practicable.

12 CONTRACTOR TO PAY CERTAIN MISCELLANEOUS COSTS

13 31. (a) In addition to all other payments to be made by the Contractor
14 pursuant to this Settlement Contract, the Contractor shall pay to the United States, within
15 60 days after receipt of a bill and detailed statement submitted by the Contracting Officer
16 to the Contractor for such specific items of direct cost incurred by the United States for
17 work requested by the Contractor associated with this Settlement Contract plus indirect
18 costs in accordance with applicable Bureau of Reclamation policies and procedures. All
19 such amounts referred to in this Article shall not exceed the amount agreed to in writing
20 in advance by the Contractor. This Article shall not apply to costs for routine contract
21 administration.

22 (b) All advances for miscellaneous costs incurred for work requested
23 by the Contractor pursuant to Article 31 of this Settlement Contract shall be adjusted to

1 reflect the actual costs when the work has been completed. If the advances exceed the
2 actual costs incurred, the difference will be refunded to the Contractor. If the actual costs
3 exceed the Contractor's advances, the Contractor will be billed for the additional costs
4 pursuant to Article 31 of this Settlement Contract.

5 WAIVER OF DEFAULT

6 32. The waiver by either party to this Settlement Contract as to any default
7 shall not be construed as a waiver of any other default or as authority of the other party to
8 continue such default or to make, do, or perform, or not to make, do, or perform, as the
9 case may be, any act or thing which would constitute a default.

**2003 Water Rates and Charges for Contract No. ##-##-###-#####
Contractor Name - Sacramento River**

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Per Acre-Foot

COST OF SERVICE RATES:

Capital Rates	\$4.24
O&M Rates:	
Water Marketing	\$5.66
Storage	\$4.87
Deficit Rates:	
Interest Bearing	\$3.34
TOTAL	\$18.11

FULL-COST RATES:

Section 202(3) Rate is applicable to a Qualified Recipient or to a Limited Recipient receiving irrigation water on or before October 1, 1981.	\$22.12
Section 205(a)(3) Rate is applicable to a Limited Recipient that did not receive irrigation water on or before October 1, 1981.	\$24.47

CHARGES UNDER P.L. 102-575 TO THE RESTORATION FUND 1/

Restoration Payments (3407(d)(2)(A))	\$7.54
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1/ Restoration fund charges are payments in addition to the water rates and were determined pursuant to Title XXXIV of Public Law 102-575. Restoration fund charges are on a fiscal year basis (10/1 - 9/30).

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
Central Valley Project, California

CONTRACT BETWEEN THE UNITED STATES AND

DIVERTER OF WATER FROM SACRAMENTO RIVER SOURCES PROVIDING
FOR PROJECT WATER SERVICE AND AGREEMENT ON DIVERSION OF
WATER

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6 UNITED STATES
7 DEPARTMENT OF THE INTERIOR
8 BUREAU OF RECLAMATION
9 Central Valley Project, California

10
11 CONTRACT BETWEEN THE UNITED STATES AND
12 _____
13 DIVERTER OF WATER FROM SACRAMENTO RIVER SOURCES PROVIDING
14 FOR PROJECT WATER SERVICE AND AGREEMENT ON DIVERSION OF
15 WATER
16

17 THIS CONTRACT, made this _____ day of _____, 2002,
18 in pursuance generally of the Act of June 17, 1902 (32 Stat. 388), and acts amendatory or
19 supplementary thereto, including, but not limited to, the Acts of August 26, 1937 (50
20 Stat. 844), as amended and supplemented, August 4, 1939 (53 Stat. 1187), as amended
21 and supplemented, July 2, 1956 (70 Stat. 483), June 21, 1963 (77 Stat. 68), October 12,
22 1982 (96 Stat. 1262), October 27, 1986 (100 Stat. 3050), as amended, and Title XXXIV
23 of the Act of October 30, 1992 (106 Stat. 4706), all collectively hereinafter referred to as
24 Federal Reclamation law, between THE UNITED STATES OF AMERICA, hereinafter
25 referred to as the United States, and _____, hereinafter referred to
26 as the Contractor, a public agency of the State of California, duly organized, existing, and
27 acting pursuant to the laws thereof, with its principal place of business in California;
28 *(may change depending on contracting entity)*

29 WITNESSETH, That:

1 EXPLANATORY RECITALS

2 WHEREAS, the United States has constructed and is operating the Central Valley
3 Project, California, for diversion, storage, carriage, distribution and beneficial use, for
4 flood control, irrigation, municipal, domestic, industrial, fish and wildlife mitigation,
5 protection and restoration, generation and distribution of electric energy, salinity control,
6 navigation and other beneficial uses, of waters of the Sacramento River, the American
7 River, the Trinity River, and the San Joaquin River and their tributaries; and

8 WHEREAS, the Contractor asserts that it has rights to divert, is diverting, and
9 will continue to divert for reasonable beneficial use, water from the natural flow of the
10 Sacramento River and tributaries thereto, that would have been flowing therein if the
11 Central Valley Project were not in existence; and

12 WHEREAS, the construction and operation of the integrated and coordinated
13 Central Valley Project has changed and will further change the regimen of the
14 Sacramento, American, San Joaquin, and Trinity Rivers and the Sacramento-San Joaquin
15 Delta from unregulated flow to regulated flow; and

16 WHEREAS, the United States asserts that it has rights to divert, is diverting, and
17 will continue to divert waters from said Rivers and said Delta in connection with the
18 operation of said Central Valley Project, and

19 WHEREAS, the Contractor and the United States entered into Contract No.
20 _____, as amended, hereinafter referred to as the Existing Contract, which
21 established terms for the delivery to the Contractor of Central Valley Project Water and
22 the quantities of Base Supply the Contractor may divert from the Sacramento River from
23 _____ through _____; and

1 (d) "Critical Year" shall mean any Year in which either of the following
2 eventualities exists:

3 (1) The forecasted full natural inflow to Shasta Lake for the current Water
4 Year, as such forecast is made by the United States on or before February 15 and
5 reviewed as frequently thereafter as conditions and information warrant, is equal to or
6 less than three million two hundred thousand (3,200,000) acre-feet; or

7 (2) The total accumulated actual deficiencies below four million
8 (4,000,000) acre-feet in the immediately prior Water Year or series of successive prior
9 Water Years each of which had inflows of less than four million (4,000,000) acre-feet,
10 together with the forecasted deficiency for the current Water Year, exceed eight hundred
11 thousand (800,000) acre-feet. For the purpose of determining a Critical Year the
12 computed inflow to Shasta Lake under present upstream development above Shasta Lake
13 shall be used as the full natural inflow to Shasta Lake. In the event that major
14 construction occurs above Shasta Lake after April 1, 2004, which materially alters the
15 present regimen of the stream systems contributing to Shasta Lake, the computed inflow
16 to Shasta Lake used to define a Critical Year will, be adjusted to eliminate the effect of
17 such material alterations. After consultation with the State of California, the National
18 Weather Service, and other recognized forecasting agencies, the Contracting Officer will
19 select the forecast to be used and will make the details of it available to the Contractor.
20 The same forecasts used by the United States for the operation of the Project shall be
21 used to make the forecasts hereunder;

22 (e) "CVPIA" shall mean the Central Valley Project Improvement Act, Title
23 XXXIV of the Act of October 30, 1992 (106 Stat. 4706);

1 (f) "Eligible Lands" shall mean all lands to which Project Water may be
2 delivered in accordance with Section 204 of the Reclamation Reform Act of October 12,
3 1982 (96 Stat. 1263), as amended, hereinafter referred to as RRA;

4 (g) "Excess Lands" shall mean all lands in excess of the limitations contained
5 in Section 204 of the RRA, other than those lands exempt from acreage limitation under
6 Federal Reclamation law;

7 (h) "Full Cost Rate" shall mean that water rate described in Sections
8 205(a)(3) or 202(3) of the RRA, whichever is applicable;

9 (i) "Ineligible Lands" shall mean all lands to which Project Water may not be
10 delivered in accordance with Section 204 of the RRA;

11 (j) "Landholder" shall mean a party that directly or indirectly owns or leases
12 nonexempt land, as provided in 43 CFR 426.2;

13 (k) "Project" shall mean the Central Valley Project owned by the United
14 States and managed by the Department of the Interior, Bureau of Reclamation;

15 (l) "Project Water" shall mean all water diverted or scheduled to be diverted
16 each month during the period April through October of each Year by the Contractor from
17 the Sacramento River which is in excess of the Base Supply. The United States
18 recognizes the right of the Contractor to make arrangements for acquisition of water from
19 projects of others than the United States for delivery through the Sacramento River and
20 tributaries subject to written agreement between Contractor and the United States as to
21 identification of such water which water when so identified shall not be deemed Project
22 Water under this contract;

1 (m) "Rates" shall mean the payments for Project Water determined annually
2 by the Contracting Officer in accordance with the then current applicable water
3 ratesetting policies for the Project, as described in subdivision (a) of Article 8 of this
4 Contract;

5 (n) "Secretary" or "Contracting Officer" shall mean the Secretary of the
6 Interior, a duly appointed successor, or an authorized representative acting pursuant to
7 any authority of the Secretary and through any agency of the Department of the Interior;

8 (o) "Water Year" shall mean the period commencing with October 1 of one
9 year and extending through September 30 of the next; and

10 (p) "Year" shall mean a calendar year.

11 TERM OF CONTRACT

12 2. This contract shall become effective April 1, 2004, and shall remain in effect
13 until and including March 31, 2044: Provided, That under terms and conditions mutually
14 agreeable to the parties hereto, renewals may be made for successive periods not to
15 exceed forty (40) years each. The terms and conditions of each renewal shall be agreed
16 upon not later than one (1) year prior to the expiration of the then existing contract:
17 Provided further, That upon written request by the Contractor of the Secretary made not
18 later than one (1) year prior to the expiration of this contract, whenever, account being
19 taken of the amount then credited to the costs of construction of water supply works, the
20 remaining amount of construction costs of water supply work which is properly
21 assignable for ultimate return by the Contractor as established by the Secretary of the
22 Interior pursuant to (3) of Section 1 of Public Law 643 (70 Stat. 483), probably can be
23 repaid to the United States within the term of a contract under subsection (d), Section 9 of

1 the 1939 Reclamation Project Act (53 Stat. 1187), this contract may be converted to a
2 contract under said subsection (d) upon terms and conditions mutually agreeable to the
3 United States and the Contractor. Notwithstanding any provision of this contract, the
4 Contractor reserves and shall have all rights and benefits under Public Law 643.

5 WATER TO BE FURNISHED TO CONTRACTOR

6 3. (a) Subject to the conditions, limitations, and provisions hereinafter expressed,
7 the Contractor is hereby entitled and authorized to divert from the Sacramento River at
8 the locations shown in Exhibit A, for beneficial use within the area delineated on Exhibit
9 B, (both Exhibits are attached hereto and made a part hereof), the Contract Total
10 designated in Exhibit A, or any revision thereof, in accordance with the monthly
11 operating schedule required by Article 3(b) of this contract. The quantity of any water
12 diverted from the Sacramento River for use on any lands delineated on Exhibit B, by the
13 owner of such lands or otherwise shall constitute a part of the Contract Total as shown on
14 Exhibit A and shall be subject to all the provisions of this contract relating to such
15 Contract Total as if such diversion were made by the Contractor.

16 (b) The United States recognizes the need of the Contractor to vary from time
17 to time its monthly diversions of water from the quantities shown in Exhibit A, or any
18 revision thereof. Before April 1 of each Year the Contractor shall submit a written
19 schedule to the Contracting Officer indicating the Contract Total to be diverted by the
20 Contractor during each month. The United States shall furnish water to the Contractor in
21 accordance with the monthly operating schedule or any revisions thereof: Provided, That
22 in no event shall the total quantity scheduled for diversion by the Contractor from the
23 Sacramento River:

1 (1) During the period April through October exceed the aggregate of the
2 Contract Total for those months shown in Exhibit A or any revision thereof;

3 (2) During the period July through September exceed the aggregate of the
4 Contract Total for those months shown in Exhibit A or any revision thereof; and

5 Provided, further, That with the prior written approval of the Contracting Officer, water
6 to be diverted in April, May, or June may be diverted in September or October, or vice
7 versa. The Contractor shall be charged a fee based upon the appropriate components of
8 the water ratesetting policy for the Project for the Base Supply scheduled for diversion in
9 April, May, or June that is diverted in September or October, or vice versa.

10 (c) In the event conditions warrant, the Contracting Officer reserves the right
11 to require the Contractor to submit, at least seventy-two (72) hours prior to the beginning
12 of each weekly period, its estimate of daily diversion requirements for each such period
13 from the Sacramento River: Provided, however, That changes during any such period
14 may be made upon the giving of seventy-two (72) hours' notice thereof to the
15 Contracting Officer.

16 (d) No sale, transfer, exchange, or other disposal of any water or the right to
17 the use thereof for use on land other than that shown on Exhibit B shall be made by the
18 Contractor without:

19 (1) First obtaining the written consent of the Contracting Officer; and

20 (2) Compliance with all applicable State and Federal laws, including but
21 not limited to the National Environmental Policy Act and the Endangered Species Act,
22 and applicable guidelines or regulations then in effect.

1 (e) Nothing herein contained shall prevent the Contractor from diverting
2 water during the months of November through March for beneficial use on the land
3 shown on Exhibit B to the extent authorized under the laws of the State of California.

4 (f) The United States assumes no responsibility for and neither it nor its
5 officers, agents, or employees shall have any liability for or on account of:

6 (1) The quality of water to be diverted by the Contractor;

7 (2) The control, carriage, handling, use, disposal, or distribution of water
8 diverted by the Contractor outside the facilities constructed and then being operated and
9 maintained by or on behalf of the United States;

10 (3) Claims of damage of any nature whatsoever, including but not limited
11 to, property loss or damage, personal injury, or death arising out of or connected with the
12 control, carriage, handling, use, disposal, or distribution of said water outside of the
13 hereinabove referred to facilities; and

14 (4) Any damage whether direct or indirect arising out of or in any manner
15 caused by a shortage of water whether such shortage be on account of errors in operation,
16 drought, or unavoidable causes.

17 RETURN FLOW

18 4. The United States reserves the right to the use of all waste, seepage, and return
19 flow water derived from water diverted by the Contractor hereunder and which escapes
20 or is discharged beyond the boundaries of the lands shown on Exhibit B. Nothing herein
21 shall be construed as an abandonment or a relinquishment by the United States of the
22 right to the use of any such water; Provided, That this shall not be construed as claiming
23 for the United States any right to such water which is recovered by the Contractor

1 pursuant to California law from within the boundaries of the lands shown on Exhibit B,
2 and which is being used pursuant to this contract for surface irrigation or underground
3 storage on the lands shown on Exhibit B by the Contractor. (*Colusa Basin Drain*
4 *language may be required*)

5 CONSTRAINTS ON THE AVAILABILITY OF WATER

6 5. (a) In any Water Year that (1) the forecasted full natural inflow to Shasta Lake
7 for the current Water Year, as such forecast is made by the United States on or before
8 February 15 and reviewed as frequently thereafter as conditions and information warrant,
9 is equal to or less than three million eight hundred thousand (3,800,000) acre-feet; or

10 (2) If the total accumulated actual deficiencies in the full natural inflow to Shasta
11 Lake in the immediately prior Water Year or series of successive prior Water Years, each
12 of which had inflows of less than four million (4,000,000) acre-feet, together with the
13 forecasted deficiency for the current Water Year, are between 200,000 acre-feet and
14 800,000 acre-feet, then the following reductions in the Contractor's monthly Contract
15 Total shall be imposed:

<u>Deficiency (acre-feet)</u>	<u>Reduction</u>
200,000 – 400,000	10 percent
400,001 – 600,000	15 percent
600,001 – 800,000	20 percent

21 (b) In a Critical Year, the Contractor's Base Supply and Project Water agreed
22 to be diverted during the period April through October of the Year in which the principal
23 portion of the Critical Year occurs and, each monthly quantity of said period shall be
24 reduced by twenty-five percent (25%).

25 (c) The amount of any overpayment by the Contractor shall, at its option, be
26 refunded or credited upon amounts to become due to the United States from the

1 Contractor under the provisions hereof in the ensuing Year. To the extent of such
2 deficiency such adjustment of overpayment shall constitute the sole remedy of the
3 Contractor.

4 USE OF WATER FURNISHED TO CONTRACTOR

5 6. (a) Project Water furnished to the Contractor pursuant to this contract shall not
6 be delivered or furnished by the Contractor for any purposes other than agricultural
7 purposes, including, but not restricted to, the watering of livestock, incidental domestic
8 use, or underground water replenishment without written consent of the Contracting
9 Officer.

10 (b) The Contractor shall comply with requirements applicable to the
11 Contractor in biological opinion(s) prepared as a result of a consultation regarding the
12 execution of this Contract undertaken pursuant to Section 7 of the Endangered Species
13 Act of 1973, as amended, that are within the Contractor's legal authority to implement.
14 The Contractor shall comply with the limitations or requirements imposed by
15 environmental documentation applicable to the Contractor and within its legal authority
16 to implement regarding specific activities, including conversion of Irrigation Water to
17 M&I Water. Nothing herein shall be construed to prevent the Contractor from
18 challenging or seeking judicial relief in a court of competent jurisdiction with respect to
19 any biological opinion or other environmental documentation referred to in this Article.

20 RATE AND METHOD OF PAYMENT FOR WATER

21 7. (a) The Contractor shall make payments to the United States as provided in
22 this Article for all Project Water shown in Exhibit A of this contract at Rates and Charges
23 established in accordance with: (i) the Secretary's then-current ratesetting policies for the

1 Project; and (ii) applicable Reclamation law and associated rules and regulations, or
2 policies: Provided, That if the Contractor desires to use Project Water for other than
3 agricultural use the Rates and Charges set forth above will be adjusted by the Contracting
4 Officer to the applicable Rates and Charges for such use. The Rates and Charges
5 applicable to the Contractor upon execution of this Contract are set forth in Exhibit “D”,
6 as may be revised annually. The Secretary’s ratesetting policies for the Project shall be
7 amended, modified, or superseded only through a public notice and comment procedure.

8 (b) The Contracting Officer shall notify the Contractor of the Rates and
9 Charges as follows:

10 (1) Prior to July 1 of each Year, the Contracting Officer shall provide the
11 Contractor an estimate of the Charges for Project Water that will be applied to the period
12 October 1, of the current Year, through September 30, of the following Year, and the
13 basis for such estimate. The Contractor shall be allowed not less than two (2) months to
14 review and comment on such estimates. On or before September 15 of each Year, the
15 Contracting Officer shall notify the Contractor in writing of the Charges to be in effect
16 during the period October 1 of the current Year, through September 30, of the following
17 Year, and such notification shall revise Exhibit “D.”

18 (2) Prior to October 1 of each Year, the Contracting Officer shall make
19 available to the Contractor an estimate of the Rates for Project Water for the following
20 Year and the computations and cost allocations upon which those Rates are based. The
21 Contractor shall be allowed not less than two (2) months to review and comment on such
22 computations and cost allocations. By December 31 of each Year, the Contracting

1 Officer shall provide the Contractor with the final Rates to be in effect for the upcoming
2 Year, and such notification shall revise Exhibit “D”.

3 (c) The Contractor shall pay the United States for Project Water in the
4 following manner:

5 (1) With respect to Rates, prior to May 1 of each Year, the Contractor
6 shall pay the United States one-half (1/2) the total amount payable pursuant to
7 subdivision (a) of this Article and the remainder shall be paid prior to July 1 or such later
8 date or dates as may be specified by the United States in a written notice to the
9 Contractor: Provided, however, That if at any time during the Year the amount of Project
10 Water diverted by the Contractor shall equal the amount for which payment has been
11 made, the Contractor shall pay for the remaining amount of such water as shown in
12 Exhibit A in advance of any further diversion of Project Water.

13 (2) With respect to Charges, the Contractor shall also make a payment to
14 the United States, in addition to the Rate(s) in subdivision (c)(1) of this Article, at the
15 Charges then in effect, before the end of the month following the month of delivery or
16 transfer. The payments shall be consistent with the quantities of Project Water delivered
17 or transferred. Adjustment for overpayment or underpayment of Charges shall be made
18 through the adjustment of payments due to the United States for Charges for the next
19 month. Any amount to be paid for past due payment of Charges shall be computed
20 pursuant to Article 12 of this Contract.

21 (d) Payments to be made by the Contractor to the United States under this
22 Contract may be paid from any revenues available to the Contractor.

1 (d1) (*Contractor Specific*) All revenues received by the United States from
2 the Contractor relating to the delivery of Project Water or the delivery of non-Project
3 water through Project facilities shall be allocated and applied in accordance with Federal
4 Reclamation law and the associated rules or regulations, and the then current Project
5 ratesetting policies for Irrigation Water.

6 (e) The Contracting Officer shall keep its accounts pertaining to the
7 administration of the financial terms and conditions of its long-term water service and
8 settlement contracts, in accordance with applicable Federal standards, so as to reflect the
9 application of Project costs and revenues. The Contracting Officer shall, each Year upon
10 request of the Contractor, provide to the Contractor a detailed accounting of all Project
11 and Contractor expense allocations, the disposition of all Project and Contractor
12 revenues, and a summary of all water delivery information. The Contracting Officer and
13 the Contractor shall enter into good faith negotiations to resolve any discrepancies or
14 disputes relating to accountings, reports, or information.

15 (f) The parties acknowledge and agree that the efficient administration of this
16 Contract is their mutual goal. Recognizing that experience has demonstrated that
17 mechanisms, policies, and procedures used for establishing Rates and Charges and/or for
18 making and allocating payments, other than those set forth in this Article may be in the
19 mutual best interest of the parties, it is expressly agreed that the parties may enter into
20 agreements to modify the mechanisms, policies, and procedures for any of those purposes
21 while this Contract is in effect without amendment of this Contract.

22 (g) For the term of this contract, Rates under the respective ratesetting
23 policies for the Project will be established to recover only reimbursable operation and

1 maintenance (including any deficits) and capital costs of the Project, as those terms are
2 used in the then-current Project ratesetting policies, and interest, where appropriate,
3 except in instances where a minimum Rate is applicable in accordance with the relevant
4 Project ratesetting policy. Proposed changes of significance in practices which
5 implement the ratesetting policies for the Project will not be implemented until the
6 Contracting Officer has provided the Contractor an opportunity to discuss the nature,
7 need, and impact of the proposed change.

8 (h) Except as provided in subsections 3405(a)(1)(B) and 3405(f) of the
9 CVPIA, the Rates for Project Water transferred, exchanged, or otherwise disposed of , by
10 the Contractor shall be the Contractor's Rates adjusted upward or downward to reflect the
11 changed costs of delivery (if any) of the transferred, exchanged, or otherwise disposed of
12 Project Water to the transferee's point of delivery in accordance with the then-current
13 ratesetting policies for the Project. If the Contractor is receiving lower Rates and
14 Charges because of inability to pay and is transferring, exchanging, or otherwise
15 disposing of Project Water to another entity whose Rates and Charges are not adjusted
16 due to inability to pay, the Rates and Charges for transferred, exchanged, or otherwise
17 disposed of Project Water shall be the Contractor's Rates and Charges unadjusted for
18 ability to pay.

19 (i) Pursuant to the Act of October 27, 1986 (100 Stat. 3050), the Contracting
20 Officer is authorized to adjust determinations of ability to pay every five (5) years.

21 (j) Each payment to be made pursuant to subdivisions (a) and (b) of this
22 Article shall be made at the office of the Bureau of Reclamation, Mid-Pacific Region,
23 File No. 11546, P.O Box 6000, San Francisco, California, 94160-1546, or at such other

1 place as the United States may designate in a written notice to the said Contractor.
2 Payments shall be made by cash transaction, wire, or any other mechanism as may be
3 agreed to in writing by the Contractor and the Contracting Officer. In event there should
4 be a default in the payment of the amount due, the delinquent payment provisions of
5 Article 12 shall apply. The Contractor shall not be relieved of the whole or any part of its
6 said obligation by, on account of, or notwithstanding, as the case may be:

7 (1) Its failure, refusal, or neglect to divert the quantity of Project Water as
8 hereinabove provided;

9 (2) The default in payment to it by any water user of assessments, tolls, or
10 other charges levied by or owing to said Contractor;

11 (3) Any judicial determination that any assessment, toll, or other charge
12 referred to in subsection 8(c)(2) of this Contract is irregular, void, or ineffectual; or

13 (4) Any injunctive process enjoining or restraining the Contractor from
14 making or collecting any such assessment, toll, or other charge referred to in subsection
15 8(c)(2) of this Contract.

16 AGREEMENT ON WATER QUANTITIES

17 8. (a) During the term of this contract and any renewals thereof:

18 (1) It shall constitute full agreement as between the United States and the
19 Contractor as to the quantities of water and the allocation thereof between Base Supply
20 and Project Water which may be diverted by the Contractor from the Sacramento River
21 for beneficial use on the land shown on Exhibit B which said diversion, use, and
22 allocation shall not be disturbed so long as the Contractor shall fulfill all of its obligations
23 hereunder;

1 (2) The Contractor shall not claim any right against the United States in
2 conflict with the provisions hereof.

3 (b) Nothing herein contained is intended to or does limit rights of the
4 Contractor against others than the United States or of the United States against any
5 person other than the Contractor: Provided, however, That in the event the Contractor,
6 the United States, or any other person shall become a party to a general adjudication of
7 rights to the use of water of the Sacramento River system, this contract shall not
8 jeopardize the rights or position of either party hereto or of any other person and the
9 rights of all such persons in respect to the use of such water shall be determined in such
10 proceedings the same as if this contract had not been entered into, and if final judgment
11 in any such general adjudication shall determine that the rights of the parties hereto are
12 different from the rights as assumed herein, the United States shall submit it to the
13 Contractor an amendment to give effect to such judgment and the contract shall be
14 deemed to have been amended accordingly unless within sixty (60) days after submission
15 of such amendment to the Contractor, the Contractor elects to terminate the contract or
16 within the same period of time the parties agree upon mutually satisfactory amendments
17 to give effect to such judgment: Provided, further, That if, during the term of this
18 Contract, the Contractor's or the United States' water rights are adjusted or affected, or
19 the responsibility to meet flow, water quality and/or environmental requirements under
20 those water rights is modified (e.g., changes to the Delta Water Quality Control Plan and
21 associated water right actions), by or through any final administrative or judicial
22 proceeding, the Contractor and the United States shall negotiate appropriate adjustments
23 to this contract.

1 (c) In the event this contract terminates, the rights of the parties to thereafter
2 divert and use water shall exist as if this contract had not been entered into; and the fact
3 that as a compromise settlement of a controversy as to the respective rights of the parties
4 to divert and use water and the yield of such rights during the term hereof, this contract
5 places a limit on the Contract Total to be diverted annually by the Contractor during the
6 contract term and segregates it into Base Supply and Project Water shall not jeopardize
7 the rights or position of either party with respect to its water rights or the yield thereof at
8 all times after the contract terminates. It is further agreed that the Contractor at all times
9 will first use water to the use of which it is entitled by virtue of its own water rights, and
10 neither the provisions of this contract, action taken thereunder, nor payments made
11 thereunder to the United States by the Contractor shall be construed as an admission that
12 any part of the water used by the Contractor during the term of this contract was in fact
13 water to which it would not have been entitled under water rights owned by it nor shall
14 receipt of payments thereunder by the United States from the Contractor be construed as
15 an admission that any part of the water used by the Contractor during the term of this
16 contract was in fact water to which it would have been entitled under water rights owned
17 by it.

18 MEASUREMENT OF WATER

19 9. (a) All water diverted by the Contractor from Sacramento River will be
20 diverted at the existing point or points of diversion shown on Exhibit A or at such other
21 points as may be mutually agreed upon in writing by the Contracting Officer and the
22 Contractor.

1 (b) All water diverted from the Sacramento River pursuant to this contract
2 will be measured or caused to be measured by the United States at each point of diversion
3 with existing equipment or equipment to be installed, operated, and maintained by the
4 United States, and/or others, under contract with and at the option of the United States.
5 The equipment and methods used to make such measurement shall be in accordance with
6 sound engineering practices. Upon request of the Contractor, the accuracy of such
7 measurements will be investigated by the Contracting Officer and any errors appearing
8 therein will be corrected.

9 (c) The right of ingress to and egress from all points of diversion is hereby
10 granted to all authorized employees of the United States. The Contractor also hereby
11 grants to the United States the right to install, operate, maintain and replace such
12 equipment on diversion or carriage facilities at each point of diversion as the Contracting
13 Officer deems necessary.

14 (d) The Contractor shall not modify, alter, remove, or replace diversion
15 facilities or do any other act which would alter the effectiveness or accuracy of the
16 measuring equipment installed by the United States or its representatives unless and until
17 the Contracting Officer has been notified with due diligence and has been given an
18 opportunity to modify such measuring equipment in such manner as may be necessary or
19 appropriate. In the event of an emergency the Contractor shall notify the United States
20 within a reasonable time thereafter as to the existence of the emergency and the nature
21 and extent of such modification, alteration, removal, or replacement of diversion
22 facilities.

1 (e) The Contractor shall pay the United States for the costs to repair, relocate,
2 or replace measurement equipment when the Contractor modifies, alters, removes, or
3 replaces diversion or carriage facilities.

4 (f) (*Contractor Specific*) By _____[DATE] _____, the
5 Contractor shall ensure that, unless the Contractor establishes an alternative measurement
6 program satisfactory to the Contracting Officer, all surface water delivered for irrigation
7 purposes on the lands delineated on Exhibit B is measured at each agricultural turnout.
8 The water measuring devices or water measuring methods of comparable effectiveness
9 must be acceptable to the Contracting Officer. The Contractor shall be responsible for
10 installing, operating, and maintaining and repairing all such measuring devices and
11 implementing all such water measuring methods at no cost to the United States. The
12 Contractor shall inform the Contracting Officer in writing by April 30 of each Year of the
13 monthly volume of surface water delivered to the lands delineated on Exhibit B during
14 the previous Year. This information will be used by Reclamation to satisfy the water
15 measurement requirements of the Contractor's water conservation plan, as set forth in
16 Article 28 of this Contract.

17 (g) All new surface water delivery systems installed within the lands
18 delineated on Exhibit B after the effective date of this Contract shall also comply with the
19 measurement provisions described in this Article.

20 RULES AND REGULATIONS

21 10. The parties agree that the delivery of Project Water for irrigation use or use of
22 Federal facilities pursuant to this Contract is subject to Federal Reclamation law,
23 including but not limited to, the Reclamation Reform Act of 1982 (43 U.S.C.390aa et

1 seq.), as amended and supplemented, and the rules and regulations promulgated by the
2 Secretary of the Interior under Federal Reclamation law.

3 GENERAL OBLIGATION--BENEFITS CONDITIONED UPON PAYMENT
4

5 11. (a) The obligation of the Contractor to pay the United States as provided in
6 this Contract is a general obligation of the Contractor notwithstanding the manner in
7 which the obligation may be distributed among the Contractor's water users and
8 notwithstanding the default of individual water users in their obligations to the
9 Contractor.

10
11 (b) The payment of charges becoming due hereunder is a condition precedent
12 to receiving benefits under this Contract. The United States shall not make water
13 available to the Contractor through Project facilities during any period in which the
14 Contractor may be in arrears in the advance payment of water rates due the United States.
15 The Contractor shall not furnish water made available pursuant to this Contract for lands
16 or parties which are in arrears in the advance payment of water rates levied or established
17 by the Contractor.

18
19 (c) With respect to subdivision (b) of this Article, the Contractor shall have
20 no obligation to require advance payment for water rates which it levies.
21

22 CHARGES FOR DELINQUENT PAYMENTS
23

24 12. (a) The Contractor shall be subject to interest, administrative and penalty
25 charges on delinquent installments or payments. When a payment is not received by the
26 due date, the Contractor shall pay an interest charge for each day the payment is
27 delinquent beyond the due date. When a payment becomes sixty (60) days delinquent,
28 the Contractor shall pay an administrative charge to cover additional costs of billing and
29 processing the delinquent payment. When a payment is delinquent ninety (90) days or
30 more, the Contractor shall pay an additional penalty charge of six (6%) percent per year
31 for each day the payment is delinquent beyond the due date. Further, the Contractor shall
32 pay any fees incurred for debt collection services associated with a delinquent payment.
33

34 (b) The interest charge rate shall be the greater of the rate prescribed quarterly
35 in the Federal Register by the Department of the Treasury for application to overdue
36 payments, or the interest rate of one-half of one (0.5%) percent per month prescribed by
37 Section 6 of the Reclamation Project Act of 1939 (Public Law 76-260). The interest
38 charge rate shall be determined as of the due date and remain fixed for the duration of the
39 delinquent period.
40

41 (c) When a partial payment on a delinquent account is received, the amount
42 received shall be applied, first to the penalty, second to the administrative charges, third
43 to the accrued interest, and finally to the overdue payment.
44

1 QUALITY OF WATER

2 13. The operation and maintenance of Project facilities shall be performed in
3 such manner as is practicable to maintain the quality of raw water made available through
4 such facilities at the highest level reasonably attainable as determined by the Contracting
5 Officer. The United States does not warrant the quality of water and is under no
6 obligation to construct or furnish water treatment facilities to maintain or better the
7 quality of water.

8 WATER AND AIR POLLUTION CONTROL

9 14. The Contractor, in carrying out this Contract, shall comply with all applicable
10 water and air pollution laws and regulations of the United States and the State of
11 California, and shall obtain all required permits or licenses from the appropriate Federal,
12 State, or local authorities.

13 EQUAL OPPORTUNITY

14
15 15. During the performance of this Contract, the Contractor agrees as follows:
16

17 (a) The Contractor will not discriminate against any employee or applicant
18 for employment because of race, color, religion, sex, or national origin. The Contractor
19 will take affirmative action to ensure that applicants are employed, and that employees
20 are treated during employment, without regard to their race, color, religion, sex, or
21 national origin. Such action shall include, but not be limited to, the following:
22 Employment, upgrading, demotion, or transfer; recruitment or recruitment advertising;
23 layoff or termination, rates of payment or other forms of compensation; and selection for
24 training, including apprenticeship. The Contractor agrees to post in conspicuous places,
25 available to employees and applicants for employment, notices to be provided by the
26 Contracting Officer setting forth the provisions of this nondiscrimination clause.
27

28 (b) The Contractor will, in all solicitations or advertisements for employees
29 placed by or on behalf of the Contractor, state that all qualified applicants will receive
30 consideration for employment without discrimination because of race, color, religion,
31 sex, or national origin.
32

33 (c) The Contractor will send to each labor union or representative of workers
34 with which it has a collective bargaining agreement or other contract or understanding, a

1 notice, to be provided by the Contracting Officer, advising the said labor union or
2 workers' representative of the Contractor's commitments under Section 202 of Executive
3 Order 11246 of September 24, 1965, and shall post copies of the notice in conspicuous
4 places available to employees and applicants for employment.

5
6 (d) The Contractor will comply with all provisions of Executive Order No.
7 11246 of September 24, 1965, as amended, and of the rules, regulations, and relevant
8 orders of the Secretary of Labor.

9
10 (e) The Contractor will furnish all information and reports required by said
11 amended Executive Order and by the rules, regulations, and orders of the Secretary of
12 Labor, or pursuant thereto, and will permit access to its books, records, and accounts by
13 the Contracting Officer and the Secretary of Labor for purposes of investigation to
14 ascertain compliance with such rules, regulations, and orders.

15
16 (f) In the event of the Contractor's noncompliance with the nondiscrimination
17 clauses of this Contract or with any of the said rules, regulations, or orders, this Contract
18 may be canceled, terminated, or suspended, in whole or in part, and the Contractor may
19 be declared ineligible for further Government contracts in accordance with procedures
20 authorized in said amended Executive Order, and such other sanctions may be imposed
21 and remedies invoked as provided in said Executive Order, or by rule, regulation, or
22 order of the Secretary of Labor, or as otherwise provided by law.

23
24 (g) The Contractor will include the provisions of paragraphs (a) through (g)
25 in every subcontract or purchase order unless exempted by the rules, regulations, or
26 orders of the Secretary of Labor issued pursuant to Section 204 of said amended
27 Executive Order, so that such provisions will be binding upon each subcontractor or
28 vendor. The Contractor will take such action with respect to any subcontract or purchase
29 order as may be directed by the Secretary of Labor as a means of enforcing such
30 provisions, including sanctions for noncompliance: Provided, however, That in the event
31 the Contractor becomes involved in, or is threatened with, litigation with a subcontractor
32 or vendor as a result of such direction, the Contractor may request the United States to
33 enter into such litigation to protect the interests of the United States.

34
35 COMPLIANCE WITH CIVIL RIGHTS LAWS AND REGULATIONS
36 *(For Districts Only)*

37
38 16. (a) The Contractor shall comply with Title VI of the Civil Rights Act of 1964
39 (42 U.S.C. 2000d), Section 504 of the Rehabilitation Act of 1975 (P.L. 93-112, as
40 amended), the Age Discrimination Act of 1975 (42 U.S.C. 6101, et seq.) and any other
41 applicable civil rights laws, as well as with their respective implementing regulations and
42 guidelines imposed by the U.S. Department of the Interior and/or Bureau of Reclamation.

43
44 (b) These statutes require that no person in the United States shall, on the
45 grounds of race, color, national origin, handicap, or age, be excluded from participation
46 in, be denied the benefits of, or be otherwise subjected to discrimination under any

1 program or activity receiving financial assistance from the Bureau of Reclamation. By
2 executing this Contract, the Contractor agrees to immediately take any measures
3 necessary to implement this obligation, including permitting officials of the United States
4 to inspect premises, programs, and documents.

5
6 (c) The Contractor makes this agreement in consideration of and for the
7 purpose of obtaining any and all Federal grants, loans, contracts, property discounts, or
8 other Federal financial assistance extended after the date hereof to the Contractor by the
9 Bureau of Reclamation, including installment payments after such date on account of
10 arrangements for Federal financial assistance which were approved before such date.
11 The Contractor recognizes and agrees that such Federal assistance will be extended in
12 reliance on the representations and agreements made in this Article, and that the United
13 States reserves the right to seek judicial enforcement thereof.

14
15 MINGLING OF CONTRACTOR'S PROJECT AND NON-PROJECT WATER

16 17. (a) Project Water must of necessity be transported by the Contractor to its
17 water users by means of the same works and channels used for the transport of its non-
18 Project Water. Notwithstanding such mingling of water, the provisions of Article 11
19 hereof shall be applicable only to Project Water, and such mingling of water shall not in
20 any manner subject to the provisions of Article 11 hereof the Contractor's non-Project
21 water.

22 (b) If required in accordance with subdivision (c) of this Article, the
23 Contractor shall install and maintain such measuring equipment and distribution facilities
24 and maintain such records as may be necessary to determine the amounts of water
25 delivered to Excess Lands served by the Contractor. The Contractor shall not within any
26 month deliver to Ineligible Lands water in excess of the non-Project Water for that
27 month. The Contracting Officer or authorized representative shall have the right at all
28 reasonable times to inspect such records and measuring equipment.

29 (c) The Contractor will not be considered in violation of the requirement that
30 Project Water be delivered only to Eligible Lands during any month of the irrigation

1 season that the water requirement for beneficial use on Eligible Lands for that month is
2 equal to or in excess of the Project Water for that month as shown on Exhibit A or any
3 revision thereof pursuant to subdivision (b) of Article 3. The water requirement for
4 beneficial use on Eligible Lands will be determined by multiplying:

5 (1) the number of irrigable acres of the particular types of crops grown in
6 that year on the acreage designated as eligible by

7 (2) the Unit Duties as set forth in Exhibit C attached hereto and made a
8 part hereof, or by such other Unit Duties mutually agreed upon by the Contractor and the
9 Contracting Officer. In order to make the computation of the water requirement for
10 Eligible Lands, on April 1 of each Year and concurrently with its order for water for the
11 irrigation season, the Contractor shall designate the acreage of and type of crops to be
12 grown on its Eligible Lands that irrigation season. During any month the water
13 requirement as above determined for crops growing on Eligible Lands during such month
14 is equal to or in excess of the Project Water for that month as provided herein the
15 Contractor shall not be required to measure the water delivered to Excess Lands. Any
16 month the said water requirement is less than the amount of Project Water as provided
17 herein, the Contractor will be required to measure water delivered to excess land in
18 accordance with subdivision (b) hereof.

19 **BOOKS, RECORDS, AND REPORTS**

20 18. The Contractor shall establish and maintain accounts and other books and
21 records pertaining to administration of the terms and conditions of this Contract,
22 including: the Contractor's financial transactions, water supply data, and Project land and
23 right-of-way agreements; the water users' land-use (crop census), land ownership, land-
24 leasing and water use data; and other matters that the Contracting Officer may require.
25 Reports thereon shall be furnished to the Contracting Officer in such form and on such
26 date or dates as the Contracting Officer may require. Subject to applicable Federal laws
27 and regulations, each party to this Contract shall have the right during office hours to

1 examine and make copies of each other's books and official records relating to matters
2 covered by this Contract.

3
4 CHANGE OF PLACE OF USE OR ORGANIZATION

5 19. (a) Unless the written consent of the United States is first obtained no change
6 shall be made in the place of water use shown on Exhibit B.

7 (b) While this contract is in effect, no change shall be made in the area of the
8 Contractor as shown on its Exhibit B, by inclusion or exclusion of lands, by dissolution,
9 consolidation, or merger or otherwise, except upon the Contracting Officer's written
10 assent thereto.

11 (c) In the event lands are excluded from the area of the Contractor, as
12 provided herein, the quantity of Project Water to be diverted may be decreased pursuant
13 to a supplemental agreement to be executed in respect thereto.

14 CONSOLIDATION OF CONTRACTING ENTITIES

15
16 20. Consolidation of Contractors may be approved by the Contracting Officer
17 provided: (i) the Contracting Officer approves the form and organization of the resulting
18 entity and the utilization by it of the Contract Total; and (ii) the obligations of the
19 Contractor are assumed by such entity.

20 No such consolidation shall be valid unless and until approved by the Contracting
21 Officer.

22 NOTICES

23 21. Any notice, demand, or request authorized or required by this Contract shall
24 be deemed to have been given, on behalf of the Contractor, when mailed, postage
25 prepaid, or delivered to the Area Manager, Northern California Area Office, Bureau of
26 Reclamation, 16349 Shasta Dam Blvd., Shasta Lake, California, 96019, and on behalf of
27 the United States, when mailed, postage prepaid, or delivered to the Board of Directors
28 /City Council of the _____. The designation of the addressee or

1 the address may be changed by notice given in the same manner as provided in this
2 Article for other notices.

3
4 ASSIGNMENT LIMITED--SUCCESSORS AND ASSIGNS OBLIGATED

5
6 22. (a) The provisions of this Contract shall apply to and bind the successors
7 and assigns of the parties hereto, but no assignment or transfer of this Contract or any
8 right or interest therein shall be valid until approved in writing by the Contracting
9 Officer.

10
11 (b) The assignment of any right or interest in this Contract by either party
12 shall not interfere with the rights or obligations of the other party to this Contract absent
13 the written concurrence of said other party.

14
15 (c) The Contracting Officer shall not unreasonably condition or withhold his
16 approval of any proposed assignment.

17
18 OFFICIALS NOT TO BENEFIT

19
20 23. (a) No Member of or Delegate to Congress, Resident Commissioner, or
21 official of the Contractor shall benefit from this Contract other than as a water user or
22 landowner in the same manner as other water users or landowners.

23
24 (b) No officer or member of the governing board of the Contractor shall
25 receive any benefit that may arise by reason of this contract other than as a landowner
26 within the Contractor's service area and in the same manner as other landowners within
27 the said service area.

28
29 CONTINGENT UPON APPROPRIATION OR ALLOTMENT OF FUNDS

30
31 24. The expenditure or advance of any money or the performance of any
32 obligation of the United States under this Contract shall be contingent upon appropriation
33 or allotment of funds. Absence of appropriation or allotment of funds shall not relieve
34 the Contractor from any obligations under this Contract. No liability shall accrue to the
35 United States in case funds are not appropriated or allotted.

36
37 CONFIRMATION OF CONTRACT

38 25. The Contractor, after the execution of this Contract, shall promptly seek to
39 secure a decree of a court of competent jurisdiction of the State of California, if
40 appropriate, confirming the execution of this contract. The Contractor shall furnish the
41 United States a certified copy of the final decree, the validation proceedings, and all
42 pertinent supporting records of the court approving and confirming this Contract, and
43 decreeing and adjudging it to be lawful, valid, and binding on the Contractor. This
44 Contract shall not be binding on the United States until such final decree has been
45 secured.

1 UNAVOIDABLE GROUNDWATER PERCOLATION

2 26. To the extent applicable, the Contractor shall not be deemed to have delivered
3 Project Water to Excess Lands or Ineligible Lands if such lands are irrigated with
4 groundwater that reaches the underground strata as an unavoidable result of the delivery
5 of Project Water by the Contractor to Eligible Lands.

6 PRIVACY ACT COMPLIANCE

7
8 27. (a) The Contractor shall comply with the Privacy Act of 1974 (5 U.S.C.
9 552a) (the Act) and the Department of the Interior rules and regulations under the Act (43
10 CFR 2.45 et seq.) in maintaining Landholder acreage certification and reporting records,
11 required to be submitted to the Contractor for compliance with Sections 206 and 228 of
12 the Reclamation Reform Act of 1982 (96 Stat. 1266), and pursuant to 43 CFR 426.18.

13
14 (b) With respect to the application and administration of the criminal penalty
15 provisions of the Act (5 U.S.C. 552a(i)), the Contractor and the Contractor's employees
16 responsible for maintaining the certification and reporting records referenced in (a) above
17 are considered to be employees of the Department of the Interior. See 5 U.S.C. 552a(m).

18
19 (c) The Contracting Officer or a designated representative shall provide the
20 Contractor with current copies of the Interior Department Privacy Act regulations and the
21 Bureau of Reclamation Federal Register Privacy Act System of Records Notice (Acreage
22 Limitation--Interior, Reclamation-31) which govern the maintenance, safeguarding, and
23 disclosure of information contained in the Landholder's certification and reporting
24 records.

25
26 (d) The Contracting Officer shall designate a full-time employee of the
27 Bureau of Reclamation to be the System Manager who shall be responsible for making
28 decisions on denials pursuant to 43 CFR 2.61 and 2.64 amendment requests pursuant to
29 43 CFR 2.72. The Contractor is authorized to grant requests by individuals for access to
30 their own records.

31
32 (e) The Contractor shall forward promptly to the System Manager each
33 proposed denial of access under 43 CFR 2.64; and each request for amendment of records
34 filed under 43 CFR 2.71; notify the requester accordingly of such referral; and provide
35 the System Manager with information and records necessary to prepare an appropriate
36 response to the requester. These requirements do not apply to individuals seeking access
37 to their own certification and reporting forms filed with the Contractor pursuant to 43
38 CFR 426.18, unless the requester elects to cite the Privacy Act as a basis for the request.
39

WATER CONSERVATION

1
2 28. (a) Prior to the diversion of Project Water, the Contractor shall be
3 implementing an effective water conservation and efficiency program based on the
4 Contractor's water conservation plan that has been determined by the Contracting Officer
5 to meet the conservation and efficiency criteria for evaluating water conservation plans
6 established under Federal law. The water conservation and efficiency program shall
7 contain definite water conservation objectives, appropriate economically feasible water
8 conservation measures, and time schedules for meeting those objectives. Continued
9 diversion of Project Water pursuant to this Contract shall be contingent upon the
10 Contractor's continued implementation of such water conservation program. In the event
11 the Contractor's water conservation plan or any revised water conservation plan
12 completed pursuant to subdivision (c) of Article 28 of this Contract have not yet been
13 determined by the Contracting Officer to meet such criteria, due to circumstances which
14 the Contracting Officer determines are beyond the control of the Contractor, Project
15 Water deliveries shall be made under this Contract so long as the Contractor diligently
16 works with the Contracting Officer to obtain such determination at the earliest practicable
17 date, and thereafter the Contractor immediately begins implementing its water
18 conservation and efficiency program in accordance with the time schedules therein.

19 (b) The Contractor shall submit to the Contracting Officer a report on the
20 status of its implementation of the water conservation plan on the reporting dates
21 specified in the then existing conservation and efficiency criteria established under
22 Federal law.

1 (c) At five (5)-year intervals, the Contractor shall revise its water
2 conservation plan to reflect the then current conservation and efficiency criteria for
3 evaluating water conservation plans established under Federal law and submit such
4 revised water management plan to the Contracting Officer for review and evaluation.
5 The Contracting Officer will then determine if the water conservation plan meets
6 Reclamation's then current conservation and efficiency criteria for evaluating water
7 conservation plans established under Federal law.

8 (d) If the Contractor is engaged in direct ground-water recharge, such activity
9 shall be described in the Contractor's water conservation plan.

10 OPINIONS AND DETERMINATIONS

11
12 29. (a) Where the terms of this Contract provide for actions to be based upon the
13 opinion or determination of either party to this Contract, said terms shall not be construed
14 as permitting such action to be predicated upon arbitrary, capricious, or unreasonable
15 opinions or determinations. Both parties, notwithstanding any other provisions of this
16 Contract, expressly reserve the right to seek relief from and appropriate adjustment for
17 any such arbitrary, capricious, or unreasonable opinion or determination. Each opinion
18 or determination by either party shall be provided in a timely manner. Nothing in
19 subdivision (a) of Article 29 of this Contract is intended to or shall affect or alter the
20 standard of judicial review applicable under federal law to any opinion or determination
21 implementing a specific provision of federal law embodied in statute or regulation.

22 (b) The Contracting Officer shall have the right to make determinations
23 necessary to administer this Contract that are consistent with the provisions of this
24 Contract, the laws of the United States and of the State of California, and the rules and

1 regulations promulgated by the Secretary of the Interior. Such determinations shall be
2 made in consultation with the Contractor to the extent reasonably practicable.

3 CONTRACTOR TO PAY CERTAIN MISCELLANEOUS COSTS

4 30. (a) In addition to all other payments to be made by the Contractor pursuant to
5 this Contract, the Contractor shall pay to the United States, within sixty (60) days after
6 receipt of a bill and detailed statement submitted by the Contracting Officer to the
7 Contractor for such specific items of direct cost incurred by the United States for work
8 requested by the Contractor associated with this Contract plus indirect costs in
9 accordance with applicable Bureau of Reclamation policies and procedures. All such
10 amounts referred to in this Article shall not exceed the amount agreed to in writing in
11 advance by the Contractor. This Article shall not apply to costs for routine contract
12 administration.

13 (b) All advances for miscellaneous costs incurred for work requested by the
14 Contractor pursuant to Article 30 of this Contract shall be adjusted to reflect the actual
15 costs when the work has been completed. If the advances exceed the actual costs
16 incurred, the difference will be refunded to the Contractor. If the actual costs exceed the
17 Contractor's advances, the Contractor will be billed for the additional costs pursuant to
18 Article 30 of this Contract.

19 WAIVER OF DEFAULT

20 31. The waiver by either party to this contract as to any default shall not be
21 construed as a waiver of any other default or as authority of the other party to continue
22 such default or to make, do, or perform, or not to make, do, or perform, as the case may
23 be, any act or thing which would constitute a default.

1 IN WITNESS WHEREOF, the parties hereto have executed this contract as of
2 the day and year first hereinabove written.

3
4 THE UNITED STATES OF AMERICA

5
6
7
8 By: _____
9 Regional Director, Mid-Pacific Region
10 Bureau of Reclamation

11
12
13 (SEAL)

14
15
16 (Contractor)

17
18
19 By: _____
20 President

21
22
23 ATTEST:

24
25
26 _____
27 Secretary

28
29
30 (I:\sac river renewal\Sac R Long Form Draft.doc)

31

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
Central Valley Project, California

CONTRACT BETWEEN THE UNITED STATES AND

DIVERTER OF WATER FROM SACRAMENTO RIVER SOURCES PROVIDING
FOR PROJECT WATER SERVICE AND AGREEMENT ON DIVERSION OF
WATER

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UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
Central Valley Project, California

CONTRACT BETWEEN THE UNITED STATES AND

DIVERTER OF WATER FROM SACRAMENTO RIVER SOURCES PROVIDING
FOR PROJECT WATER SERVICE AND AGREEMENT ON DIVERSION OF
WATER

THIS CONTRACT, made this ____ day of _____, 2002,
in pursuance generally of the Act of June 17, 1902 (32 Stat. 388), and acts amendatory or
supplementary thereto, including, but not limited to, the Acts of August 26, 1937 (50
Stat. 844), as amended and supplemented, August 4, 1939 (53 Stat. 1187), as amended
and supplemented, July 2, 1956 (70 Stat. 483), June 21, 1963 (77 Stat. 68), October 12,
1982 (96 Stat. 1262), October 27, 1986 (100 Stat. 3050), as amended, and Title XXXIV
of the Act of October 30, 1992 (106 Stat. 4706), all collectively hereinafter referred to as
Federal Reclamation law, between THE UNITED STATES OF AMERICA, hereinafter
referred to as the United States, and _____, hereinafter referred to
as the Contractor, a public agency of the State of California, duly organized, existing, and
acting pursuant to the laws thereof, with its principal place of business in California;
(may change depending on contracting entity)

WITNESSETH, That:

1 EXPLANATORY RECITALS

2 [1st] WHEREAS, the United States has constructed and is operating the Central
3 Valley Project, California, for diversion, storage, carriage, distribution and beneficial use,
4 for flood control, irrigation, municipal, domestic, industrial, fish and wildlife mitigation,
5 protection and restoration, generation and distribution of electric energy, salinity control,
6 navigation and other beneficial uses, of waters of the Sacramento River, the American
7 River, the Trinity River, and the San Joaquin River and their tributaries; and

8 [2nd] WHEREAS, the Contractor ~~asserts that it~~ has rights to divert, is diverting,
9 and will continue to divert for reasonable beneficial use, water from the natural flow of
10 the Sacramento River and tributaries thereto, that would have been flowing therein if the
11 Central Valley Project were not in existence; and [Contractor Specific – “Other” Rights]

12 [3rd] WHEREAS, the construction and operation of the integrated and
13 coordinated Central Valley Project has changed and will further change the regimen of
14 the Sacramento, American, San Joaquin, and Trinity Rivers and the Sacramento-San
15 Joaquin Delta from unregulated flow to regulated flow; and

16 [4th] WHEREAS, the United States ~~asserts that it~~ has rights to divert, is diverting,
17 and will continue to divert waters from said Rivers and said Delta in connection with the
18 operation of said Central Valley Project, and

19 [5th] WHEREAS, the Contractor and the United States had a dispute over the
20 respective rights of the parties to divert and use water from the regulated flow of the
21 Sacramento River which threatened to result in litigation, and as a means to settle that
22 dispute, entered into Contract No. _____, as amended, hereinafter referred to
23 as the Existing Contract, which established terms for the delivery to the Contractor of

1 Central Valley Project Water, and the quantities of Base Supply the United States and the
2 Contractor agreed may be diverted by the Contractor from the Sacramento River pursuant
3 to such contract from _____ through March 31, 2004; and

4 [6th] WHEREAS, although the Contractor and the United States ~~has requested the~~
5 ~~long term renewal of the Existing Contract,~~ disagree with respect to the authority of the
6 United States to change the quantities of Base Supply and/or Project water specified in
7 this Contract from the quantities specified in the Existing Contract and that dispute is
8 being litigated in a lawsuit entitled GCID v. United States of America, Civ. No. S-01-
9 1816 GEB/JFM (E.D. CA), both the Contractor and the United States are willing to agree
10 to the dismissal of that lawsuit without waiving or otherwise prejudicing their respective
11 right to assert whatever arguments and defenses either of them believe is appropriate if
12 that issue is subsequently litigated and enter into this Contract pursuant to the terms of
13 the Existing Contract, Federal Reclamation law, and the laws of the State of California;
14 ~~and the United States has determined that the Contractor has fulfilled all of its obligations~~
15 ~~under~~; and

16 [7th] WHEREAS, to assure the Contractor of the enjoyment and use of the
17 regulated flow of the said Rivers and the Delta, and to provide for the economical
18 operation of the Central Valley Project by, and the reimbursement to, the United States
19 for expenditures made for said Project;

20 NOW, THEREFORE, in consideration of the performance of the herein
21 contained provisions, conditions, and covenants, it is agreed as follows:

1 DEFINITIONS

2 1. When used herein, unless otherwise expressed or incompatible with the intent
3 hereof, the term:

4 (a) "Base Supply" shall mean the quantity of water established in Articles 3
5 and 5 which ~~the United States agrees~~ may be diverted by the Contractor from the
6 Sacramento River each month during the period April through October of each Year
7 without payment to the United States for such quantities diverted;

8 (b) "Charges" shall mean the payments for Project Water which the
9 Contractor is required by Federal Reclamation law to pay to the United States in addition
10 to the Rates specified in this Contract as determined annually by the Contracting Officer
11 pursuant to this Contract. The type and amount of each Charge shall be specified in
12 Exhibit D;

13 (c) "Contract Total" shall mean the sum of the Base Supply and Project
14 Water available for diversion by the Contractor for the period April 1 through October
15 31;

16 (d) "Critical Year" shall mean any Year in which either of the following
17 eventualities exists:

18 (1) The forecasted full natural inflow to Shasta Lake for the current Water
19 Year, as such forecast is made by the United States on or before February 15 and
20 reviewed as frequently thereafter as conditions and information warrant, is equal to or
21 less than ~~three~~ 3.2 million ~~two hundred thousand (3,200,000)~~ acre-feet; or

22 (2) The total accumulated actual deficiencies below ~~four~~ 4 million
23 ~~(4,000,000)~~ acre-feet in the immediately prior Water Year or series of successive prior

1 Water Years each of which had inflows of less than ~~four~~ 4 million (4,000,000) acre-feet,
2 together with the forecasted deficiency for the current Water Year, exceed ~~eight hundred~~
3 ~~thousand~~ (800,000) acre-feet. For the purpose of determining a Critical Year the
4 computed inflow to Shasta Lake under present upstream development above Shasta Lake
5 shall be used as the full natural inflow to Shasta Lake. In the event that major
6 construction occurs above Shasta Lake after ~~April 1, 2004~~ September 1, 1963, which
7 materially alters the present regimen of the stream systems contributing to Shasta Lake,
8 the computed inflow to Shasta Lake used to define a Critical Year will, be adjusted to
9 eliminate the effect of such material alterations. After consultation with the State of
10 California, the National Weather Service, and other recognized forecasting agencies, the
11 Contracting Officer will select the forecast to be used and will make the details of it
12 available to the Contractor. The same forecasts used by the United States for the
13 operation of the Project shall be used to make the forecasts hereunder;

14 (e) "CVPIA" shall mean the Central Valley Project Improvement Act, Title
15 XXXIV of the Act of October 30, 1992 (106 Stat. 4706);

16 (f) "Eligible Lands" shall mean all lands to which Project Water may be
17 delivered in accordance with Section 204 of the Reclamation Reform Act of October 12,
18 1982 (96 Stat. 1263), as amended, hereinafter referred to as RRA;

19 (g) "Excess Lands" shall mean all lands in excess of the limitations contained
20 in Section 204 of the RRA, other than those lands exempt from acreage limitation under
21 Federal Reclamation law;

22 (h) "Full Cost Rate" shall mean that water rate described in Sections
23 205(a)(3) or 202(3) of the RRA, whichever is applicable;

1 (i) "Ineligible Lands" shall mean all lands to which Project Water may not be
2 delivered in accordance with Section 204 of the RRA;

3 (j) "Landholder" shall mean a party that directly or indirectly owns or leases
4 nonexempt land, as provided in 43 CFR 426.2;

5 (k) "Project" shall mean the Central Valley Project owned by the United
6 States and managed by the Department of the Interior, Bureau of Reclamation;

7 (l) "Project Water" shall mean all water diverted or scheduled to be diverted
8 each month during the period April through October of each Year by the Contractor from
9 the Sacramento River which is in excess of the Base Supply. The United States
10 recognizes the right of the Contractor to make arrangements for acquisition of water from
11 projects of others than the United States for delivery through the Sacramento River and
12 tributaries subject to written agreement between Contractor and the United States as to
13 identification of such water which water when so identified shall not be deemed Project
14 Water under this eContract;

15 (m) "Rates" shall mean the payments for Project Water determined annually
16 by the Contracting Officer in accordance with the then current applicable water
17 ratesetting policies for the Project, as described in subdivision (a) of Article 8 of this
18 Contract;

19 (n) "Secretary" or "Contracting Officer" shall mean the Secretary of the
20 Interior, a duly appointed successor, or an authorized representative acting pursuant to
21 any authority of the Secretary and through any agency of the Department of the Interior;

22 (o) "Water Year" shall mean the period commencing with October 1 of one
23 year and extending through September 30 of the next; and

1 (p) "Year" shall mean a calendar year.

2 TERM OF CONTRACT

3 2. (a) This contract shall become effective April 1, 2004, and shall remain in
4 effect until and including March 31, 2044: Provided, ~~F~~that under terms and conditions
5 mutually agreeable to the parties hereto, renewals may be made for successive periods
6 not to exceed ~~forty (40)~~ years each. The terms and conditions of each renewal shall be
7 agreed upon not later than one ~~(1)~~ year prior to the expiration of the then existing
8 contract.

9 (b) ~~Provided further, That u~~Upon written request by the Contractor of the
10 Secretary made not later than one ~~(1)~~ year prior to the expiration of this contract,
11 whenever, account being taken of the amount then credited to the costs of construction of
12 water supply works, the remaining amount of construction costs of water supply work
13 which is properly assignable for ultimate return by the Contractor as established by the
14 Secretary of the Interior pursuant to (3) of Section 1 of Public Law 643 (70 Stat. 483),
15 probably can be repaid to the United States within the term of a contract under subsection
16 (d), Section 9 of the 1939 Reclamation Project Act (53 Stat. 1187), then this contract may
17 be converted to a contract under said subsection (d) upon terms and conditions mutually
18 agreeable to the United States and the Contractor. The Secretary shall make a
19 determination 10 years after the date of execution of this Contract, and every five years
20 thereafter, of whether a conversion to a contract under said subsection (d) can be
21 accomplished pursuant to Public Law 643.

22 Notwithstanding any provision of this contract, the Contractor reserves and
23 shall have all rights and benefits under Public Law 643.

1 WATER TO BE FURNISHED TO CONTRACTOR

2 3. (a) Subject to the conditions, limitations, and provisions hereinafter expressed,
3 the Contractor is hereby entitled and authorized to divert from the Sacramento River at
4 the locations shown in Exhibit A, for beneficial use within the area delineated on Exhibit
5 B, (both Exhibits are attached hereto and made a part hereof), the Contract Total
6 designated in Exhibit A, or any revision thereof, in accordance with the monthly
7 operating schedule required by Article 3(b) of this eContract. The quantity of any water
8 diverted from the Sacramento River for use on any lands delineated on Exhibit B, by the
9 owner of such lands or otherwise shall constitute a part of the Contract Total as shown on
10 Exhibit A and shall be subject to all the provisions of this eContract relating to such
11 Contract Total as if such diversion were made by the Contractor.

12 (b) The Contractor may have acquired rights to divert water from the
13 Sacramento River during the period April to October, which were obtained after the date
14 of execution of the Existing Contract. However, all diversions made from the
15 Sacramento River during the period April to October are subject to the terms and
16 conditions of this Contract, and the quantity of Base Supply and Project Water in the
17 Existing Contract shall not be increased in this Contract.

18 (b c) The United States recognizes the need of the Contractor to vary from
19 time to time its monthly diversions of water from the quantities shown in Exhibit A, or
20 any revision thereof. Before April 1 of each Year the Contractor shall submit a written
21 schedule to the Contracting Officer indicating the Contract Total to be diverted by the
22 Contractor during each month. The United States shall furnish water to the Contractor in
23 accordance with the monthly operating schedule or any revisions thereof: Provided,

1 That in no event shall the total quantity scheduled for diversion or diverted by the
2 Contractor from the Sacramento River:

3 (1) During the period April through October exceed the aggregate of the
4 Contract Total for those months shown in Exhibit A or any revision thereof;

5 (2) During the period July through September exceed the aggregate of the
6 Contract Total for those months shown in Exhibit A or any revision thereof; and

7 Provided, further, That with the prior written approval of the Contracting Officer, water
8 to be diverted in April, May, or June may be diverted in September or October, or vice
9 versa. The Contractor shall be charged a fee, based upon the appropriate components of
10 the water ratesetting policy for the Project, for the Base Supply scheduled for diversion in
11 April, May, or June that is diverted in September or October, or vice versa.

12 (e d) In the event conditions warrant, the Contracting Officer reserves the
13 right to require the Contractor to submit, at least ~~seventy-two (72)~~ hours prior to the
14 beginning of each weekly period, its estimate of daily diversion requirements for each
15 such period from the Sacramento River: Provided, however, That changes during any
16 such period may be made upon the giving of ~~seventy-two (72)~~ hours' notice thereof to the
17 Contracting Officer.

18 (d e) No sale, transfer, exchange, or other disposal of any water (such as
19 forbearance of diversions) or the right to the use thereof for use on land other than that
20 shown on Exhibit B shall be made by the Contractor without:

21 (1) First obtaining the written consent of the Contracting Officer; and

1 (2) Compliance with all applicable State and Federal laws, including but
2 not limited to the National Environmental Policy Act and the Endangered Species Act,
3 and applicable guidelines or regulations then in effect.

4 (e f) Nothing herein contained shall prevent the Contractor from diverting
5 water during the months of November through March for beneficial use on the land
6 shown on Exhibit B to the extent authorized under the laws of the State of California.

7 (f g) The United States assumes no responsibility for and neither it nor its
8 officers, agents, or employees shall have any liability for or on account of:

9 (1) The quality of water to be diverted by the Contractor;

10 (2) The control, carriage, handling, use, disposal, or distribution of water
11 diverted by the Contractor outside the facilities constructed and then being operated and
12 maintained by or on behalf of the United States;

13 (3) Claims of damage of any nature whatsoever, including but not limited
14 to, property loss or damage, personal injury, or death arising out of or connected with the
15 control, carriage, handling, use, disposal, or distribution of said water outside of the
16 hereinabove referred to facilities; and

17 (4) Any damage whether direct or indirect arising out of or in any manner
18 caused by a shortage of water whether such shortage be on account of errors in operation,
19 drought, or unavoidable causes.

20 RETURN FLOW

21 4. The United States reserves the right to the use of all waste, seepage, and return
22 flow water derived from water diverted by the Contractor hereunder and which escapes
23 or is discharged beyond the boundaries of the lands shown on Exhibit B. Nothing herein

1 shall be construed as an abandonment or a relinquishment by the United States of the
2 right to the use of any such water; Provided, ~~T~~hat this shall not be construed as claiming
3 for the United States any right to such water which is recovered by the Contractor
4 pursuant to California law from within the boundaries of the lands shown on Exhibit B,
5 and which is being used pursuant to this ~~e~~Contract for surface irrigation or underground
6 storage on the lands shown on Exhibit B by the Contractor. (*Colusa Basin Drain*
7 *language may be required*)

8 CONSTRAINTS ON THE AVAILABILITY OF WATER

9 5. (a) In any Water Year that (1) the forecasted full natural inflow to Shasta Lake
10 for the current Water Year, as such forecast is made by the United States on or before
11 February 15 and reviewed as frequently thereafter as conditions and information warrant,
12 is equal to or less than ~~three~~ 3.8 million ~~eight hundred thousand~~ (3,800,000) acre-feet; or

13 (2) If the total accumulated actual deficiencies in the full natural inflow to Shasta
14 Lake in the immediately prior Water Year or series of successive prior Water Years, each
15 of which had inflows of less than ~~four~~ 4 million (4,000,000) acre-feet, together with the
16 forecasted deficiency for the current Water Year, are between 200,000 acre-feet and
17 800,000 acre-feet, then the following reductions in the Contractor's monthly Contract

18 Total shall be imposed:

<u>Deficiency (acre-feet)</u>	<u>Reduction</u>
200,000 – 400,000	10 percent
400,001 – 600,000	15 percent
600,001 – 800,000	20 percent

24 (b) In a Critical Year, the Contractor's Base Supply and Project Water agreed
25 to be diverted during the period April through October of the Year in which the principal

1 portion of the Critical Year occurs and, each monthly quantity of said period shall be
2 reduced by twenty-five percent (25%).

3 (c) The amount of any overpayment by the Contractor shall, at its option, be
4 refunded or credited upon amounts to become due to the United States from the
5 Contractor under the provisions hereof in the ensuing Year. To the extent of such
6 deficiency such adjustment of overpayment shall constitute the sole remedy of the
7 Contractor.

8 INTEGRATED WATER MANAGEMENT AND PARTNERSHIPS

9 6. The Contractor and United States desire to work together to maximize the
10 reasonable beneficial use of water to their mutual benefit. As a consequence, the United
11 States will work in partnership with the Contractor and others within the Sacramento
12 Valley to facilitate the better integration within the Sacramento Valley of all water
13 supplies including, but not limited to, the better management and integration of surface
14 water and groundwater, the development and better utilization of surface water storage,
15 the effective utilization of waste, seepage and return flow water, and other operational
16 and management options that may be identified in the future.

17 USE OF WATER FURNISHED TO CONTRACTOR

18 ~~67.~~ (a) Project Water furnished to the Contractor pursuant to this eContract shall
19 not be delivered or furnished by the Contractor for any purposes other than agricultural
20 purposes without the written consent of the Contracting Officer. ~~, including~~ For
21 purposes of this Contract, “agricultural purposes” includes, but is not restricted to, the
22 watering of livestock, incidental domestic use including related landscape irrigation, or
23 underground water replenishment ~~without written consent of the Contracting Officer.~~

1 (b) The Contractor shall comply with requirements applicable to the
2 Contractor in biological opinion(s) prepared as a result of a consultation regarding the
3 execution of this Contract undertaken pursuant to Section 7 of the Endangered Species
4 Act of 1973, as amended, that are within the Contractor's legal authority to implement.
5 The Contractor shall comply with the limitations or requirements imposed by
6 environmental documentation applicable to the Contractor and within its legal authority
7 to implement ~~regarding specific activities, including conversion of Irrigation Water to~~
8 ~~M&I Water~~. Nothing herein shall be construed to prevent the Contractor from
9 challenging or seeking judicial relief in a court of competent jurisdiction with respect to
10 any biological opinion or other environmental documentation referred to in this Article.

11 RATE AND METHOD OF PAYMENT FOR WATER

12 78. (a) The Contractor shall make payments to the United States as provided in
13 this Article for all Project Water shown in Exhibit A of this eContract at Rates and
14 Charges established in accordance with: (i) the Secretary's then-current ratesetting
15 policies for the Project; and (ii) applicable Reclamation law and associated rules and
16 regulations, or policies: Provided, ~~F~~that if the Contractor desires to use Project Water for
17 other than agricultural use the Rates and Charges set forth above will be adjusted by the
18 Contracting Officer to the applicable Rates and Charges for such use. The Rates and
19 Charges applicable to the Contractor upon execution of this Contract are set forth in
20 Exhibit "D", as may be revised annually. The Secretary's ratesetting policies for the
21 Project shall be amended, modified, or superseded only through a public notice and
22 comment procedure.

1 (b) The Contracting Officer shall notify the Contractor of the Rates and
2 Charges as follows:

3 (1) Prior to July 1 of each Year, the Contracting Officer shall provide the
4 Contractor an estimate of the Charges for Project Water that will be applied to the period
5 October 1, of the current Year, through September 30, of the following Year, and the
6 basis for such estimate. The Contractor shall be allowed not less than two (~~2~~) months to
7 review and comment on such estimates. On or before September 15 of each Year, the
8 Contracting Officer shall notify the Contractor in writing of the Charges to be in effect
9 during the period October 1 of the current Year, through September 30, of the following
10 Year, and such notification shall revise Exhibit "D."

11 (2) Prior to October 1 of each Year, the Contracting Officer shall make
12 available to the Contractor an estimate of the Rates for Project Water for the following
13 Year and the computations and cost allocations upon which those Rates are based. The
14 Contractor shall be allowed not less than two (~~2~~) months to review and comment on such
15 computations and cost allocations. By December 31 of each Year, the Contracting
16 Officer shall provide the Contractor with the final Rates to be in effect for the upcoming
17 Year, and such notification shall revise Exhibit "D".

18 (c) The Contractor shall pay the United States for Project Water in the
19 following manner:

20 (1) With respect to Rates, prior to May 1 of each Year, the Contractor
21 shall pay the United States one-half (~~1/2~~) the total amount payable pursuant to
22 subdivision (a) of this Article and the remainder shall be paid prior to July 1 or such later
23 date or dates as may be specified by the United States in a written notice to the

1 Contractor: Provided, however, That if at any time during the Year the amount of Project
2 Water diverted by the Contractor shall equal the amount for which payment has been
3 made, the Contractor shall pay for the remaining amount of such water as shown in
4 Exhibit A in advance of any further diversion of Project Water.

5 (2) With respect to Charges, the Contractor shall also make a payment to
6 the United States, in addition to the Rate(s) in subdivision (c)(1) of this Article, at the
7 Charges then in effect, before the end of the month following the month of delivery or
8 transfer. The payments shall be consistent with the quantities of Project Water delivered
9 or transferred. Adjustment for overpayment or underpayment of Charges shall be made
10 through the adjustment of payments due to the United States for Charges for the next
11 month. Any amount to be paid for past due payment of Charges shall be computed
12 pursuant to Article ~~12~~ 13 of this Contract.

13 (d) Payments to be made by the Contractor to the United States under this
14 Contract may be paid from any revenues available to the Contractor.

15 (d1) (*Contractor Specific*) All revenues received by the United States from
16 the Contractor relating to the delivery of Project Water or the delivery of non-Project
17 water through Project facilities shall be allocated and applied in accordance with Federal
18 Reclamation law and the associated rules or regulations, and the then current Project
19 ratesetting policies for Irrigation Water.

20 (e) The Contracting Officer shall keep its accounts pertaining to the
21 administration of the financial terms and conditions of its long-term water service and
22 settlement contracts, in accordance with applicable Federal standards, so as to reflect the
23 application of Project costs and revenues. The Contracting Officer shall, each Year upon

1 request of the Contractor, provide to the Contractor a detailed accounting of all Project
2 and Contractor expense allocations, the disposition of all Project and Contractor
3 revenues, and a summary of all water delivery information. The Contracting Officer and
4 the Contractor shall enter into good faith negotiations to resolve any discrepancies or
5 disputes relating to accountings, reports, or information.

6 (f) The parties acknowledge and agree that the efficient administration of this
7 Contract is their mutual goal. Recognizing that experience has demonstrated that
8 mechanisms, policies, and procedures used for establishing Rates and Charges and/or for
9 making and allocating payments, other than those set forth in this Article may be in the
10 mutual best interest of the parties, it is expressly agreed that the parties may enter into
11 agreements to modify the mechanisms, policies, and procedures for any of those purposes
12 while this Contract is in effect without amendment of this Contract.

13 (g) For the term of this eContract, Rates under the respective ratesetting
14 policies for the Project will be established to recover only reimbursable operation and
15 maintenance (including any deficits) and capital costs of the Project, as those terms are
16 used in the then-current Project ratesetting policies, and interest, where appropriate,
17 except in instances where a minimum Rate is applicable in accordance with the relevant
18 Project ratesetting policy. Proposed changes of significance in practices which
19 implement the ratesetting policies for the Project will not be implemented until the
20 Contracting Officer has provided the Contractor an opportunity to discuss the nature,
21 need, and impact of the proposed change.

22 (h) Except as provided in subsections 3405(a)(1)(B) and 3405(f)
23 3407(d)(2)(a) of the CVPIA, the Rates for Project Water transferred, exchanged, or

1 otherwise disposed of, by the Contractor shall be the Contractor's Rates adjusted upward
2 or downward to reflect the changed costs of delivery (if any) of the transferred,
3 exchanged, or otherwise disposed of Project Water to the transferee's point of delivery in
4 accordance with the then-current ratesetting policies for the Project. If the Contractor is
5 receiving lower Rates and Charges because of inability to pay and is transferring,
6 exchanging, or otherwise disposing of Project Water to another entity whose Rates and
7 Charges are not adjusted due to inability to pay, the Rates and Charges for transferred,
8 exchanged, or otherwise disposed of Project Water shall be the Contractor's Rates and
9 Charges unadjusted for ability to pay.

10 (i) Pursuant to the Act of October 27, 1986 (100 Stat. 3050), the Contracting
11 Officer is authorized to adjust determinations of ability to pay every five ~~(5)~~ years.

12 (j) Each payment to be made pursuant to subdivisions (a) and (b) of this
13 Article shall be made at the office of the Bureau of Reclamation, Mid-Pacific Region,
14 File No. 11546, P.O Box 6000, San Francisco, California, 94160-1546, or at such other
15 place as the United States may designate in a written notice to the said Contractor.

16 Payments shall be made by cash transaction, wire, or any other mechanism as may be
17 agreed to in writing by the Contractor and the Contracting Officer. In event there should
18 be a default in the payment of the amount due, the delinquent payment provisions of
19 Article ~~12~~ 13 shall apply. The Contractor shall not be relieved of the whole or any part of
20 its said obligation by, on account of, or notwithstanding, as the case may be:

21 (1) Its failure, refusal, or neglect to divert the quantity of Project Water as
22 hereinabove provided;

1 (2) The default in payment to it by any water user of assessments, tolls, or
2 other charges levied by or owing to said Contractor;

3 (3) Any judicial determination that any assessment, toll, or other charge
4 referred to in subsection 8(c)(2) of this Contract is irregular, void, or ineffectual; or

5 (4) Any injunctive process enjoining or restraining the Contractor from
6 making or collecting any such assessment, toll, or other charge referred to in subsection
7 8(c)(2) of this Contract.

8 AGREEMENT ON WATER QUANTITIES

9 ~~89.~~ (a) During the term of this eContract and any renewals thereof:

10 (1) It shall constitute full agreement as between the United States and the
11 Contractor as to the quantities of water and the allocation thereof between Base Supply
12 and Project Water which may be diverted by the Contractor from the Sacramento River
13 for beneficial use on the land shown on Exhibit B which said diversion, use, and
14 allocation shall not be disturbed so long as the Contractor shall fulfill all of its obligations
15 hereunder;

16 (2) Neither party shall ~~not~~ claim any right against the ~~United States~~ other
17 party in conflict with the provisions ~~hereof~~ of this Article 9(a).

18 (b) Nothing herein contained is intended to or does limit rights of the
19 Contractor against others than the United States or of the United States against any
20 person other than the Contractor: Provided, however, That in the event the Contractor,
21 the United States, or any other person shall become a party to a general adjudication of
22 rights to the use of water of the Sacramento River system, this eContract shall not
23 jeopardize the rights or position of either party hereto or of any other person and the

1 rights of all such persons in respect to the use of such water shall be determined in such
2 proceedings the same as if this eContract had not been entered into, and if final judgment
3 in any such general adjudication shall determine that the rights of the parties hereto are
4 different from the rights as assumed herein, the United States shall submit it to the
5 Contractor an amendment to give effect to such judgment and the eContract shall be
6 deemed to have been amended accordingly unless within ~~sixty (60)~~ days after submission
7 of such amendment to the Contractor, the Contractor elects to terminate the eContract or
8 within the same period of time the parties agree upon mutually satisfactory amendments
9 to give effect to such judgment: Provided, further, ~~That~~ if, during the term of this
10 Contract, the Contractor's or the United States' water rights are adjusted or affected, or
11 the responsibility to meet flow, water quality and/or environmental requirements under
12 those water rights is modified (e.g., changes to the Delta Water Quality Control Plan and
13 associated water right actions), by or through any final administrative or judicial
14 proceeding, the Contractor and the United States shall negotiate appropriate adjustments
15 to this eContract.

16 (c) In the event this eContract terminates, the rights of the parties to thereafter
17 divert and use water shall exist as if this eContract had not been entered into; and the fact
18 that as a compromise settlement of a controversy as to the respective rights of the parties
19 to divert and use water and the yield of such rights during the term hereof, this eContract
20 places a limit on the Contract Total to be diverted annually by the Contractor during the
21 eContract term and segregates it into Base Supply and Project Water shall not jeopardize
22 the rights or position of either party with respect to its water rights or the yield thereof at
23 all times after the eContract terminates. It is further agreed that the Contractor at all

1 times will first use water to the use of which it is entitled by virtue of its own water
2 rights, and neither the provisions of this eContract, action taken thereunder, nor payments
3 made thereunder to the United States by the Contractor shall be construed as an
4 admission that any part of the water used by the Contractor during the term of this
5 eContract was in fact water to which it would not have been entitled under water rights
6 owned by it nor shall receipt of payments thereunder by the United States from the
7 Contractor be construed as an admission that any part of the water used by the Contractor
8 during the term of this eContract was in fact water to which it would have been entitled
9 under water rights owned by it.

10 MEASUREMENT OF WATER

11 910. (a) All water diverted by the Contractor from Sacramento River will be
12 diverted at the existing point or points of diversion shown on Exhibit A or at such other
13 points as may be mutually agreed upon in writing by the Contracting Officer and the
14 Contractor.

15 (b) All water diverted from the Sacramento River pursuant to this eContract
16 will be measured or caused to be measured by the United States at each point of diversion
17 with existing equipment or equipment to be installed, operated, and maintained by the
18 United States, and/or others, under contract with and at the option of the United States.
19 The equipment and methods used to make such measurement shall be in accordance with
20 sound engineering practices. Upon request of the Contractor, the accuracy of such
21 measurements will be investigated by the Contracting Officer and any errors appearing
22 therein will be corrected.

1 (c) The right of ingress to and egress from all points of diversion is hereby
2 granted to all authorized employees of the United States. The Contractor also hereby
3 grants to the United States the right to install, operate, maintain and replace such
4 equipment on diversion or carriage facilities at each point of diversion as the Contracting
5 Officer deems necessary.

6 (d) The Contractor shall not modify, alter, remove, or replace diversion
7 facilities or do any other act which would alter the effectiveness or accuracy of the
8 measuring equipment installed by the United States or its representatives unless and until
9 the Contracting Officer has been notified with due diligence and has been given an
10 opportunity to modify such measuring equipment in such manner as may be necessary or
11 appropriate. In the event of an emergency the Contractor shall notify the United States
12 within a reasonable time thereafter as to the existence of the emergency and the nature
13 and extent of such modification, alteration, removal, or replacement of diversion
14 facilities.

15 (e) The Contractor shall pay the United States for the costs to repair, relocate,
16 or replace measurement equipment when the Contractor modifies, alters, removes, or
17 replaces diversion or carriage facilities.

18 (f) (*Contractor Specific*) By _____[DATE] _____, the
19 Contractor shall ensure that, unless the Contractor establishes an alternative measurement
20 program satisfactory to the Contracting Officer, all surface water delivered for irrigation
21 purposes on the lands delineated on Exhibit B is measured at each agricultural turnout.
22 The water measuring devices or water measuring methods of comparable effectiveness
23 must be acceptable to the Contracting Officer. The Contractor shall be responsible for

1 installing, operating, and maintaining and repairing all such measuring devices and
2 implementing all such water measuring methods at no cost to the United States. The
3 Contractor shall inform the Contracting Officer in writing by April 30 of each Year of the
4 monthly volume of surface water delivered to the lands delineated on Exhibit B during
5 the previous Year. This information will be used by Reclamation to satisfy the water
6 measurement requirements of the Contractor's water conservation plan, as set forth in
7 Article ~~28~~ 29 of this Contract.

8 (g) All new surface water delivery systems installed within the lands
9 delineated on Exhibit B after the effective date of this Contract shall also comply with the
10 measurement provisions described in this Article.

11 RULES AND REGULATIONS

12 ~~11~~ 11. The parties agree that the delivery of Project Water for irrigation use or use
13 of Federal facilities pursuant to this Contract is subject to Federal Reclamation law,
14 including but not limited to, the Reclamation Reform Act of 1982 (43 U.S.C.390aa et
15 seq.), as amended and supplemented, and the rules and regulations promulgated by the
16 Secretary of the Interior under Federal Reclamation law.

17 GENERAL OBLIGATION--BENEFITS CONDITIONED UPON PAYMENT

18
19 ~~11~~ 12. (a) The obligation of the Contractor to pay the United States as provided
20 in this Contract is a general obligation of the Contractor notwithstanding the manner in
21 which the obligation may be distributed among the Contractor's water users and
22 notwithstanding the default of individual water users in their obligations to the
23 Contractor.

24
25 (b) The payment of charges becoming due hereunder is a condition precedent
26 to receiving benefits under this Contract. The United States shall not make water
27 available to the Contractor through Project facilities during any period in which the
28 Contractor may be in arrears in the advance payment of water rates due the United States.
29 The Contractor shall not furnish water made available pursuant to this Contract for lands

1 or parties which are in arrears in the advance payment of water rates levied or established
2 by the Contractor.

3
4 (c) With respect to subdivision (b) of this Article, the Contractor shall have
5 no obligation to require advance payment for water rates which it levies.

6
7 CHARGES FOR DELINQUENT PAYMENTS

8
9 ~~12~~¹³. (a) The Contractor shall be subject to interest, administrative and penalty
10 charges on delinquent installments or payments. When a payment is not received by the
11 due date, the Contractor shall pay an interest charge for each day the payment is
12 delinquent beyond the due date. When a payment becomes ~~sixty (60)~~ days delinquent,
13 the Contractor shall pay an administrative charge to cover additional costs of billing and
14 processing the delinquent payment. When a payment is delinquent ~~ninety (90)~~ days or
15 more, the Contractor shall pay an additional penalty charge of six ~~(6%)~~ percent per year
16 for each day the payment is delinquent beyond the due date. Further, the Contractor shall
17 pay any fees incurred for debt collection services associated with a delinquent payment.

18
19 (b) The interest charge rate shall be the greater of the rate prescribed quarterly
20 in the Federal Register by the Department of the Treasury for application to overdue
21 payments, or the interest rate of one-half of one ~~(0.5%)~~ percent per month prescribed by
22 Section 6 of the Reclamation Project Act of 1939 (Public Law 76-260). The interest
23 charge rate shall be determined as of the due date and remain fixed for the duration of the
24 delinquent period.

25
26 (c) When a partial payment on a delinquent account is received, the amount
27 received shall be applied, first to the penalty, second to the administrative charges, third
28 to the accrued interest, and finally to the overdue payment.

29
30 QUALITY OF WATER

31 ~~13~~¹⁴. The operation and maintenance of Project facilities shall be performed in
32 such manner as is practicable to maintain the quality of raw water made available through
33 such facilities at the highest level reasonably attainable as determined by the Contracting
34 Officer. The United States does not warrant the quality of water and is under no
35 obligation to construct or furnish water treatment facilities to maintain or better the
36 quality of water.

1 WATER AND AIR POLLUTION CONTROL

2 ~~44~~15. The Contractor, in carrying out this Contract, shall comply with all
3 applicable water and air pollution laws and regulations of the United States and the State
4 of California, and shall obtain all required permits or licenses from the appropriate
5 Federal, State, or local authorities.

6 EQUAL OPPORTUNITY

7
8 ~~45~~16. During the performance of this Contract, the Contractor agrees as follows:
9

10 (a) The Contractor will not discriminate against any employee or applicant
11 for employment because of race, color, religion, sex, or national origin. The Contractor
12 will take affirmative action to ensure that applicants are employed, and that employees
13 are treated during employment, without regard to their race, color, religion, sex, or
14 national origin. Such action shall include, but not be limited to, the following:
15 Employment, upgrading, demotion, or transfer; recruitment or recruitment advertising;
16 layoff or termination, rates of payment or other forms of compensation; and selection for
17 training, including apprenticeship. The Contractor agrees to post in conspicuous places,
18 available to employees and applicants for employment, notices to be provided by the
19 Contracting Officer setting forth the provisions of this nondiscrimination clause.
20

21 (b) The Contractor will, in all solicitations or advertisements for employees
22 placed by or on behalf of the Contractor, state that all qualified applicants will receive
23 consideration for employment without discrimination because of race, color, religion,
24 sex, or national origin.
25

26 (c) The Contractor will send to each labor union or representative of workers
27 with which it has a collective bargaining agreement or other contract or understanding, a
28 notice, to be provided by the Contracting Officer, advising the said labor union or
29 workers' representative of the Contractor's commitments under Section 202 of Executive
30 Order 11246 of September 24, 1965, and shall post copies of the notice in conspicuous
31 places available to employees and applicants for employment.
32

33 (d) The Contractor will comply with all provisions of Executive Order No.
34 11246 of September 24, 1965, as amended, and of the rules, regulations, and relevant
35 orders of the Secretary of Labor.
36

37 (e) The Contractor will furnish all information and reports required by said
38 amended Executive Order and by the rules, regulations, and orders of the Secretary of
39 Labor, or pursuant thereto, and will permit access to its books, records, and accounts by
40 the Contracting Officer and the Secretary of Labor for purposes of investigation to
41 ascertain compliance with such rules, regulations, and orders.

1
2 (f) In the event of the Contractor's noncompliance with the nondiscrimination
3 clauses of this Contract or with any of the said rules, regulations, or orders, this Contract
4 may be canceled, terminated, or suspended, in whole or in part, and the Contractor may
5 be declared ineligible for further Government contracts in accordance with procedures
6 authorized in said amended Executive Order, and such other sanctions may be imposed
7 and remedies invoked as provided in said Executive Order, or by rule, regulation, or
8 order of the Secretary of Labor, or as otherwise provided by law.

9
10 (g) The Contractor will include the provisions of paragraphs (a) through (g)
11 in every subcontract or purchase order unless exempted by the rules, regulations, or
12 orders of the Secretary of Labor issued pursuant to Section 204 of said amended
13 Executive Order, so that such provisions will be binding upon each subcontractor or
14 vendor. The Contractor will take such action with respect to any subcontract or purchase
15 order as may be directed by the Secretary of Labor as a means of enforcing such
16 provisions, including sanctions for noncompliance: Provided, however, ~~That~~ in the
17 event the Contractor becomes involved in, or is threatened with, litigation with a
18 subcontractor or vendor as a result of such direction, the Contractor may request the
19 United States to enter into such litigation to protect the interests of the United States.

20
21 COMPLIANCE WITH CIVIL RIGHTS LAWS AND REGULATIONS
22 *(For Districts Only)*
23

24 ~~16~~17. (a) The Contractor shall comply with Title VI of the Civil Rights Act of
25 1964 (42 U.S.C. 2000d), Section 504 of the Rehabilitation Act of 1975 (P.L. 93-112, as
26 amended), the Age Discrimination Act of 1975 (42 U.S.C. 6101, et seq.) and any other
27 applicable civil rights laws, as well as with their respective implementing regulations and
28 guidelines imposed by the U.S. Department of the Interior and/or Bureau of Reclamation.

29
30 (b) These statutes require that no person in the United States shall, on the
31 grounds of race, color, national origin, handicap, or age, be excluded from participation
32 in, be denied the benefits of, or be otherwise subjected to discrimination under any
33 program or activity receiving financial assistance from the Bureau of Reclamation. By
34 executing this Contract, the Contractor agrees to immediately take any measures
35 necessary to implement this obligation, including permitting officials of the United States
36 to inspect premises, programs, and documents.

37
38 (c) The Contractor makes this agreement in consideration of and for the
39 purpose of obtaining any and all Federal grants, loans, contracts, property discounts, or
40 other Federal financial assistance extended after the date hereof to the Contractor by the
41 Bureau of Reclamation, including installment payments after such date on account of
42 arrangements for Federal financial assistance which were approved before such date.
43 The Contractor recognizes and agrees that such Federal assistance will be extended in
44 reliance on the representations and agreements made in this Article, and that the United
45 States reserves the right to seek judicial enforcement thereof.

1
2 MINGLING OF CONTRACTOR'S PROJECT AND NON-PROJECT WATER

3 ~~17~~18. (a) Project Water must of necessity be transported by the Contractor to its
4 water users by means of the same works and channels used for the transport of its non-
5 Project Water including Base Supply. Notwithstanding such mingling of water, the
6 provisions of Article 11 hereof shall be applicable only to Project Water, and such
7 mingling of water shall not in any manner subject to the provisions of Article 11 hereof
8 the Contractor's non-Project ~~w~~Water including Base Supply.

9 (b) If required in accordance with subdivision (c) of this Article, the
10 Contractor shall install and maintain such measuring equipment and distribution facilities
11 and maintain such records as may be necessary to determine the amounts of water
12 delivered to Excess Lands served by the Contractor. The Contractor shall not within any
13 month deliver to Ineligible Lands water in excess of the non-Project Water, including
14 Base Supply, for that month. The Contracting Officer or authorized representative shall
15 have the right at all reasonable times to inspect such records and measuring equipment.

16 (c) The Contractor will not be considered in violation of the requirement that
17 Project Water be delivered only to Eligible Lands during any month of the irrigation
18 season that the water requirement for beneficial use on Eligible Lands for that month is
19 equal to or in excess of the Project Water for that month as shown on Exhibit A or any
20 revision thereof pursuant to subdivision (b) of Article 3. The water requirement for
21 beneficial use on Eligible Lands will be determined by multiplying:

22 (1) the number of irrigable acres of the particular types of crops grown in
23 that year on the acreage designated as eligible by

1 (2) the Unit Duties as set forth in Exhibit C attached hereto and made a
2 part hereof, or by such other Unit Duties mutually agreed upon by the Contractor and the
3 Contracting Officer. In order to make the computation of the water requirement for
4 Eligible Lands, on April 1 of each Year and concurrently with its order for water for the
5 irrigation season, the Contractor shall designate the acreage of and type of crops to be
6 grown on its Eligible Lands that irrigation season. During any month the water
7 requirement as above determined for crops growing on Eligible Lands during such month
8 is equal to or in excess of the Project Water for that month as provided herein the
9 Contractor shall not be required to measure the water delivered to Excess Lands. Any
10 month the said water requirement is less than the amount of Project Water as provided
11 herein, the Contractor will be required to measure water delivered to excess land in
12 accordance with subdivision (b) hereof.

13 BOOKS, RECORDS, AND REPORTS

14 ~~18~~¹⁹. The Contractor shall establish and maintain accounts and other books and
15 records pertaining to administration of the terms and conditions of this Contract,
16 including: the Contractor's financial transactions, water supply data, and Project land and
17 right-of-way agreements; the water users' land-use (crop census), land ownership, land-
18 leasing and water use data; and other matters that the Contracting Officer may require.
19 Reports thereon shall be furnished to the Contracting Officer in such form and on such
20 date or dates as the Contracting Officer may require. Subject to applicable Federal laws
21 and regulations, each party to this Contract shall have the right during office hours to
22 examine and make copies of each other's books and official records relating to matters
23 covered by this Contract.

24 CHANGE OF PLACE OF USE OR ORGANIZATION

25
26 ~~19~~²⁰. (a) Unless the written consent of the United States is first obtained no
27 change shall be made in the place of water use shown on Exhibit B.

28 (b) While this ~~e~~^cContract is in effect, no change shall be made in the area of
29 the Contractor as shown on its Exhibit B, by inclusion or exclusion of lands, by

1 dissolution, consolidation, or merger or otherwise, except upon the Contracting Officer's
2 written assent thereto.

3 (c) In the event lands are excluded from the area of the Contractor, as
4 provided herein, the quantity of Project Water to be diverted may be decreased pursuant
5 to a supplemental agreement to be executed in respect thereto.

6 CONSOLIDATION OF CONTRACTING ENTITIES

7 ~~20~~21. Consolidation of Contractors may be approved by the Contracting Officer
8 provided: (i) the Contracting Officer approves the form and organization of the resulting
9 entity and the utilization by it of the Contract Total; and (ii) the obligations of the
10 Contractor are assumed by such entity.

11 No such consolidation shall be valid unless and until approved by the Contracting
12 Officer.

13 NOTICES

14 ~~21~~22. Any notice, demand, or request authorized or required by this Contract
15 shall be deemed to have been given, on behalf of the Contractor, when mailed, postage
16 prepaid, or delivered to the Area Manager, Northern California Area Office, Bureau of
17 Reclamation, 16349 Shasta Dam Blvd., Shasta Lake, California, 96019, and on behalf of
18 the United States, when mailed, postage prepaid, or delivered to the Board of Directors
19 /City Council of the _____. The designation of the addressee or
20 the address may be changed by notice given in the same manner as provided in this
21 Article for other notices.

22
23 ASSIGNMENT LIMITED--SUCCESSORS AND ASSIGNS OBLIGATED

24
25 ~~22~~23. (a) The provisions of this Contract shall apply to and bind the
26 successors and assigns of the parties hereto, but no assignment or transfer of this Contract
27 or any right or interest therein shall be valid until approved in writing by the Contracting
28 Officer.

29
30 (b) The assignment of any right or interest in this Contract by either party
31 shall not interfere with the rights or obligations of the other party to this Contract absent
32 the written concurrence of said other party.

33

1 (c) The Contracting Officer shall not unreasonably condition or withhold his
2 approval of any proposed assignment.

3
4 OFFICIALS NOT TO BENEFIT

5
6 ~~23~~²⁴. (a) No Member of or Delegate to Congress, Resident Commissioner, or
7 official of the Contractor shall benefit from this Contract other than as a water user or
8 landowner in the same manner as other water users or landowners.

9
10 (b) No officer or member of the governing board of the Contractor shall
11 receive any benefit that may arise by reason of this eContract other than as a landowner
12 within the Contractor's service area and in the same manner as other landowners within
13 the said service area.

14
15 CONTINGENT UPON APPROPRIATION OR ALLOTMENT OF FUNDS

16
17 ~~24~~²⁵. The expenditure or advance of any money or the performance of any
18 obligation of the United States under this Contract shall be contingent upon appropriation
19 or allotment of funds. Absence of appropriation or allotment of funds shall not relieve
20 the Contractor from any obligations under this Contract. No liability shall accrue to the
21 United States in case funds are not appropriated or allotted.

22
23 CONFIRMATION OF CONTRACT

24 ~~25~~²⁶. The Contractor, after the execution of this Contract, shall promptly seek to
25 secure a decree of a court of competent jurisdiction of the State of California, if
26 appropriate, confirming the execution of this eContract. The Contractor shall furnish the
27 United States a certified copy of the final decree, the validation proceedings, and all
28 pertinent supporting records of the court approving and confirming this Contract, and
29 decreeing and adjudging it to be lawful, valid, and binding on the Contractor. This
30 Contract shall not be binding on the United States until such final decree has been
31 secured.

32 UNAVOIDABLE GROUNDWATER PERCOLATION

33 ~~26~~²⁷. To the extent applicable, the Contractor shall not be deemed to have
34 delivered Project Water to Excess Lands or Ineligible Lands if such lands are irrigated
35 with groundwater that reaches the underground strata as an unavoidable result of the
36 delivery of Project Water by the Contractor to Eligible Lands.

37 PRIVACY ACT COMPLIANCE

38
39 ~~27~~²⁸. (a) The Contractor shall comply with the Privacy Act of 1974 (5 U.S.C.
40 552a) (the Act) and the Department of the Interior rules and regulations under the Act (43

1 CFR 2.45 et seq.) in maintaining Landholder acreage certification and reporting records,
2 required to be submitted to the Contractor for compliance with Sections 206 and 228 of
3 the Reclamation Reform Act of 1982 (96 Stat. 1266), and pursuant to 43 CFR 426.18.
4

5 (b) With respect to the application and administration of the criminal penalty
6 provisions of the Act (5 U.S.C. 552a(i)), the Contractor and the Contractor's employees
7 responsible for maintaining the certification and reporting records referenced in (a) above
8 are considered to be employees of the Department of the Interior. See 5 U.S.C. 552a(m).
9

10 (c) The Contracting Officer or a designated representative shall provide the
11 Contractor with current copies of the Interior Department Privacy Act regulations and the
12 Bureau of Reclamation Federal Register Privacy Act System of Records Notice (Acreage
13 Limitation--Interior, Reclamation-31) which govern the maintenance, safeguarding, and
14 disclosure of information contained in the Landholder's certification and reporting
15 records.
16

17 (d) The Contracting Officer shall designate a full-time employee of the
18 Bureau of Reclamation to be the System Manager who shall be responsible for making
19 decisions on denials pursuant to 43 CFR 2.61 and 2.64 amendment requests pursuant to
20 43 CFR 2.72. The Contractor is authorized to grant requests by individuals for access to
21 their own records.
22

23 (e) The Contractor shall forward promptly to the System Manager each
24 proposed denial of access under 43 CFR 2.64; and each request for amendment of records
25 filed under 43 CFR 2.71; notify the requester accordingly of such referral; and provide
26 the System Manager with information and records necessary to prepare an appropriate
27 response to the requester. These requirements do not apply to individuals seeking access
28 to their own certification and reporting forms filed with the Contractor pursuant to 43
29 CFR 426.18, unless the requester elects to cite the Privacy Act as a basis for the request.
30

31 WATER CONSERVATION

32 ~~28~~²⁹. (a) Prior to the diversion of Project Water, the Contractor shall be
33 implementing an effective water conservation and efficiency program based on the
34 Contractor's water conservation plan that has been determined by the Contracting Officer
35 to meet the conservation and efficiency criteria for evaluating water conservation plans
36 established under Federal law. The water conservation and efficiency program shall
37 contain definite water conservation objectives, appropriate economically feasible water
38 conservation measures, and time schedules for meeting those objectives. Continued

1 diversion of Project Water pursuant to this Contract shall be contingent upon the
2 Contractor's continued implementation of such water conservation program. In the event
3 the Contractor's water conservation plan or any revised water conservation plan
4 completed pursuant to subdivision (c) of Article ~~28~~ 29 of this Contract have not yet been
5 determined by the Contracting Officer to meet such criteria, due to circumstances which
6 the Contracting Officer determines are beyond the control of the Contractor, Project
7 Water deliveries shall be made under this Contract so long as the Contractor diligently
8 works with the Contracting Officer to obtain such determination at the earliest practicable
9 date, and thereafter the Contractor immediately begins implementing its water
10 conservation and efficiency program in accordance with the time schedules therein.

11 (b) The Contractor shall submit to the Contracting Officer a report on the
12 status of its implementation of the water conservation plan on the reporting dates
13 specified in the then existing conservation and efficiency criteria established under
14 Federal law.

15 (c) At five (5)-year intervals, the Contractor shall revise its water
16 conservation plan to reflect the then current conservation and efficiency criteria for
17 evaluating water conservation plans established under Federal law and submit such
18 revised water management plan to the Contracting Officer for review and evaluation.
19 The Contracting Officer will then determine if the water conservation plan meets
20 Reclamation's then current conservation and efficiency criteria for evaluating water
21 conservation plans established under Federal law.

22 (d) If the Contractor is engaged in direct ground-water recharge, such activity
23 shall be described in the Contractor's water conservation plan.

1 OPINIONS AND DETERMINATIONS

2
3 2930. (a) Where the terms of this Contract provide for actions to be based upon
4 the opinion or determination of either party to this Contract, said terms shall not be
5 construed as permitting such action to be predicated upon arbitrary, capricious, or
6 unreasonable opinions or determinations. Both parties, notwithstanding any other
7 provisions of this Contract, expressly reserve the right to seek relief from and appropriate
8 adjustment for any such arbitrary, capricious, or unreasonable opinion or determination.
9 Each opinion or determination by either party shall be provided in a timely manner.
10 Nothing in subdivision (a) of Article 29 30 of this Contract is intended to or shall affect
11 or alter the standard of judicial review applicable under federal law to any opinion or
12 determination implementing a specific provision of federal law embodied in statute or
13 regulation.

14 (b) The Contracting Officer shall have the right to make determinations
15 necessary to administer this Contract that are consistent with the provisions of this
16 Contract, the laws of the United States and of the State of California, and the rules and
17 regulations promulgated by the Secretary of the Interior. Such determinations shall be
18 made in consultation with the Contractor to the extent reasonably practicable.

19 CONTRACTOR TO PAY CERTAIN MISCELLANEOUS COSTS

20 3031. (a) In addition to all other payments to be made by the Contractor pursuant
21 to this Contract, the Contractor shall pay to the United States, within ~~sixty~~ (60) days after
22 receipt of a bill and detailed statement submitted by the Contracting Officer to the
23 Contractor for such specific items of direct cost incurred by the United States for work
24 requested by the Contractor associated with this Contract plus indirect costs in

1 accordance with applicable Bureau of Reclamation policies and procedures. All such
2 amounts referred to in this Article shall not exceed the amount agreed to in writing in
3 advance by the Contractor. This Article shall not apply to costs for routine contract
4 administration.

5 (b) All advances for miscellaneous costs incurred for work requested by the
6 Contractor pursuant to Article ~~30~~ 31 of this Contract shall be adjusted to reflect the actual
7 costs when the work has been completed. If the advances exceed the actual costs
8 incurred, the difference will be refunded to the Contractor. If the actual costs exceed the
9 Contractor's advances, the Contractor will be billed for the additional costs pursuant to
10 Article 30 of this Contract.

11 WAIVER OF DEFAULT

12 ~~31~~32. The waiver by either party to this eContract as to any default shall not be
13 construed as a waiver of any other default or as authority of the other party to continue
14 such default or to make, do, or perform, or not to make, do, or perform, as the case may
15 be, any act or thing which would constitute a default.

16 IN WITNESS WHEREOF, the parties hereto have executed this eContract as
17 of the day and year first hereinabove written.

18
19 THE UNITED STATES OF AMERICA

20
21
22
23 By: _____
24 Regional Director, Mid-Pacific Region
25 Bureau of Reclamation
26

27
28 (SEAL)
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16

(Contractor)

By: _____
President

ATTEST:

Secretary

(I:\Sac River Renewal\Contract Draft and Support Docs\Sac R Std Form Draft 6-21.doc)

1 EXHIBIT D

2
3 2002 Water Rates and Charges for Contract No. ##-##-###-#####
4 Contractor Name - Sacramento River

5
6
7
8 Per Acre-Foot

9
10 COST OF SERVICE RATES:

11 Capital Rates	\$ 4.24
12 O&M Rates:	
13	
14 Water Marketing	5.66
15 Storage	4.87
16 Deficit Rates:	
17	
18 Interest Bearing	<u>3.34</u>
19	
20	
21	
22	
23 TOTAL	<u>\$18.11</u>

24
25 FULL-COST RATES:

26	
27 <u>Section 202(3)</u> Rate is applicable to a	
28 Qualified Recipient or to a Limited	
29 Recipient receiving irrigation water	
30 on or before October 1, 1981.	<u>\$22.12</u>
31	
32 <u>Section 205(a)(3)</u> Rate is applicable to a Limited	
33 Recipient that did <u>not</u> receive irrigation water on or	
34 before October 1, 1981.	<u>\$24.47</u>
35	

36
37 CHARGES UNDER P.L. 102-575 TO THE
38 RESTORATION FUND 1/

39	
40 Restoration Payments (3407(d)(2)(A))	<u>\$ 7.54</u>

41
42
43 1/ Restoration fund charges are payments in addition to the water rates and were
44 determined pursuant to Title XXXIV of Public Law 102-575. Restoration fund charges
45 are on a fiscal year basis (10/1 - 9/30).

Appendix D
Needs Analyses

ANDERSON-COTTONWOOD ID

Water Needs Assessment

Contractor ID: 202870

Settlement

Contractor's Water Supply Sources and Quantities

Date: 5/13/2003 8:16:54

Safe Timeframe 1	Reference 2	Total Deliv/Max 3	Surface Water Supply						Groundwater Supply			
			SWP 4	Local 5	Local Source 6	Rtrn / Recycle In 8	Out 8	District 9	Private 10	Yield 11	Recharge 12	Supply 13
1995	BWMP	103,270	0	0	0	5,000	10,000	3,400	0	3,400	32,705	105,496
2020	BWMP	175,000 *	0	0	0	5,000	10,000	3,400	0	3,400	23,868	149,532
2021		175,000 *	0	0	0	5,000	10,000	3,400	0	3,400	5,856	167,544
2022		175,000 *	0	0	0	0	0	0	0	3,400	0	175,000

Contractor's Agricultural Water Demands

Maximum Productive Acres: 20,017

Timeframe 1	Crop Water Requirement (acre-feet) 15	District Irrig. Efficiency (%) 16	Effective Precip (acre-feet) 17	Reference Effective Precip (acre-ft) 18	Calculated Net Crop Water Req (acre-feet) 19	USBR Net Crop Water Req (acre-feet) 20	Average Irrigated Acres (acres) 21	Reference Irrigated Acres (acres) 22	Calculate d FDR (AF/acre) 23	USBR FDR (AF/acr e) 24	Conveyanc e Loss (acre-feet) 25	Total Ag Demand (acre-fe et) 26
1995	56,100	66	13,900	7,750	64,200	34,100	13,900	7,750	4.62	4.40	24,227	88,427
2020	51,876	85	11,790	11,790	47,160	47,160	13,100	13,100	3.60	3.60	17,680	64,840
2021	51,876	85	11,790	11,790	47,160	47,160	13,100	13,100	3.60	3.60	5,856	53,016
2022	51,876	85	11,790	11,790	47,160	47,160	13,100	13,100	3.60	3.60	11,712	58,872

Contractor's M&&I Water

Timeframe 1	Residential Water Demand			Nonresidential Water Demand				Unacc. / Distr.	Ref Urban Per Demand (acre-feet) 28	Calc Urban Per (acre-feet) 29	Total M&&I (acre-feet) 30
	Per Total Ag + Capita M&&I Dmd (gpcd) 27	Total Unmet Demand (acre-feet) 31	Industrial (acre-feet) 32	Instit. (acre-feet) 33	Loss Total Demand (acre-feet) 34	Capita Dmd (gpcd) 35					
1995						0	0		0	88,427	-17,069
2020						0	0		0	64,840	-84,692
2021						0	0		0	53,016	-114,528
2022						0	0		0	58,872	-116,128

* Represents Maximum Contract

Notes: Conveyance loss = 20% operational spills [col. 25] and 27% seepage loss [col. 12] (TM 2) of the crop water requirement [col. 19]. 10,000 ac-ft transfer to Pool during critical months/normal year from (TM 6, pg 3-1). 3,400 ac-ft groundwater (from Groundwater Hydrology Tech. Memo, pg. 4). Column 3, 1995 deliveries represent Normalized delivery data to correspond with 1995 Normalized crop data. 139,801 ac-ft = ave. deliveries through 1997 excluding 1975-1980, 1983, 1991, 1992, and 1994. Trsfr/Rtrn/Recycle In and GW Recharge quantities are from TM-3. 2021 Conveyance and Seepage losses are limited to no more than 10% of crop water requirement [col. 19].

2022 represents 2021 conditions excepting that all supplies are limited to contract quantities. Seepage and spills identified in BWMP are considered conveyance losses but are limited to no more than 10% of crop water requirement [col. 19]. Future efficiencies are set to 85% because there are no drainwater supplies or water quality concerns.

Water Needs Assessment

Contractor ID: 206019

Settlement

Contractor's Water Supply Sources and Quantities

Date: 5/13/2003 8:16:54

Safe Timeframe 1	Reference Delivery 2	Surface Water Supply						Groundwater Supply				
		Total Deliv/Max 3	SWP 4	Local 5	Local Source 6	Rtrn / Recycle In 8	Out 8	District 9	Private 10	Yield 11	Recharge 12	Supply 13
1995	0	21,748	0	0	0	0	8	0	0	0	0	21,756
2020	0	24,939	0	0	0	0	179	0	0	0	0	25,118
2021	0	31,800	0	0	0	0	0	0	0	0	0	31,800

Contractor's Agricultural Water Demands

Maximum Productive Acres: 9,110

Timeframe 1	Crop Water Requirement (acre-feet) 16	District Irrig. Efficiency (%) 16	Effective Precip (acre-feet) 18	Reference		Calculated		USBRR Net		Average		Reference	Calculate d FDR (AF/acre) 22	USBRR FDR (AF/acre) 24	Conveyanc e Loss (acre-feet) ()	Total Ag Demand (acre-feet) ()
				Effective Precip (acre-ft) 18	Net Crop Water Req (acre-feet) ()	Water Req (acre-feet) 20	Crop Water Req (acre-feet) ()	Irrigated Acres (acres) ()	Irrigated Acres (acres) ()	Calculate d FDR (AF/acre) ()	Irrigated Acres (acres) ()					
1995	23,876	75	1,910	1,910	29,288	29,288	6,367	6,367	4.60	4.60	2,175	31,463				
2020	29,040	85	1,357	1,357	32,568	32,568	6,785	6,785	4.80	4.80	2,494	35,062				
2021	29,040	85	1,357	1,357	32,568	32,568	6,785	6,785	4.80	4.80	3,180	35,748				

Contractor's M&I Water

Timeframe	Residential Water Demand			Nonresidential Water Demand				Loss Total ()	Unacc. / Distr.	Ref Urban Per (acre-feet)	Calc Urban Per (acre-feet)	Total M&I (acre-feet)
	Per Total Ag + Capita M&I Dmd (gpcd)	Total Unmet Demand ()	Total Demand ()	Industrial ()	Comm / ()	Instit. ()	Loss Demand ()					
1995	28	29	30	31	32	33	34	0	0	0	38	9,707
2020								0	0	0	38	9,944
2021								0	0	0	38	9,944

* Represents Maximum Contract

Notes:

GLENN-COLUSA ID

Water Needs Assessment

Contractor ID: 202900

Settlement

Contractor's Water Supply Sources and Quantities

Date: 5/13/2003 8:16:54

Safe Timeframe 1	Reference Delivery 2	Total Deliv/Max 3	Surface Water Supply						Groundwater Supply			
			SWP 4	Local 5	Local Source 6	Rtrn / Recycle In 8	Out 8	District 9	Private 10	Yield 11	Recharge 12	Supply 13
1995	BWMP	514,390	0	44,990	Water Rights	155,000	20,000	17,000	0	100,000	97,296	832,402
2020	BWMP	825,000 *	0	44,990	Water Rights	155,000	20,000	17,000	0	100,000	108,441	913,549
2021		825,000 *	0	44,990	Water Rights	155,000	20,000	17,000	0	100,000	85,500	936,490
2022		825,000 *	0	0		0	0	0	0	100,000	0	825,000

Contractor's Agricultural Water Demands

Maximum Productive Acres: 127,136

Timeframe 1	Crop Water Requirement (acre-feet) 16	District Irrig. Efficiency (%) 16	Effective Precip (acre-feet) 18	Reference Effective Precip (acre-ft) 18	Calculated Net Crop Water Req (acre-feet) 20	USB Net Crop Water Req (acre-feet) 20	Average Irrigated Acres (acres) 22	Reference Irrigated Acres (acres) 22	Calculate d FDR (AF/acre) 24	USB FDR (AF/acr e) 24	Conveyanc e Loss (acre-feet) 24	Total Ag Demand (acre-feet) 24
1995	433,660	64	39,060	34,284	613,695	639,968	130,200	114,280	4.71	5.60	37,423	651,118
2020	588,240	80	41,040	41,040	684,000	684,000	136,800	136,800	5.00	5.00	41,710	725,710
2021	588,240	80	41,040	41,040	684,000	684,000	136,800	136,800	5.00	5.00	41,710	725,710
2022	588,240	80	41,040	41,040	684,000	684,000	136,800	136,800	5.00	5.00	127,210	811,210

Contractor's M&I Water

Timeframe 1	Residential Water Demand			Nonresidential Water Demand				Unacc. / Distr.	Ref Urban Per Demand (acre-feet)	Calc Urban Per (acre-feet)	Total M&I (acre-feet)
	Per Total Ag + Capita M&I Dmd (gpcd) 28	Total Unmet Demand (acre-feet) 29	Total Demand (acre-feet) 30	Industrial (acre-feet) 31	Instit. (acre-feet) 32	Loss Total Demand (acre-feet) 33	Capita Dmd (gpcd) 34				
1995						0	0	0	651,118	-181,284	
2020						0	0	0	725,710	-187,839	
2021						0	0	0	725,710	-210,780	
2022						0	0	0	811,210	-13,790	

* Represents Maximum Contract

Notes: Conveyance loss = 5% operational spills [col. 25] and 13% seepage loss [col. 12] (TM 2) of the crop water requirement (col. 19). 17,000 ac-ft groundwater from Groundwater Hydrology Tech. Memo, pg. 13. GW Safe Yield from (TM 3). Column 3, 1995 deliveries represent Normalized delivery data to correspond with 1995 Normalized crop data. 732,708 ac-ft = ave. deliveries through 1997 excluding 1977, 1983, 1991, 1992, 1994. Trsftr/Rtrn/Recycle In quantities are from TM-3. 2021 Conveyance and Seepage losses are limited to no more than 10% of crop water requirement [col. 19].

2022 represents 2021 conditions excepting that all supplies are limited to contract quantities. Seepage and spills identified in BWMP are considered conveyance losses but are limited to no more than 10% of crop water requirement [col. 19].

M. AND T. CHICO RANCH INC.

Water Needs Assessment

Contractor ID: 206071

Settlement

Contractor's Water Supply Sources and Quantities

Date: 5/13/2003 8:16:55

Safe Timeframe 1	Reference Delivery 2	Total Deliv/Max 3	Surface Water Supply						Groundwater Supply			
			Total		USBRR				Trsfrr /		Trsfrr /	
			SWP 4	Local 5	Local Source 6	Rtrn / Recycle In 8	Out 8	District 9	Private 10	Yield 11	Recharge 12	Supply 13
1997	0	16,496	0	3,865	Butte Creek	0	0	1,540	0	0	0	21,901
2020	0	16,500	0	4,000	Butte Creek	0	0	2,000	0	0	0	22,500
2021	0	17,956	0	4,000	Butte Creek	0	0	0	0	0	0	21,956

Contractor's Agricultural Water Demands

Maximum Productive Acres: 6,364

Timeframe 1	Crop Water Requirement (acre-feet)	District Irrig. Efficiency (%)	Effective Precip (acre-feet)	Reference Effective Precip (acre-ft)	Calculated Net Crop Water Req (acre-feet)	USBRR Net Crop Water Req (acre-feet)	Average Irrigated Acres (acres)	Reference Irrigated Acres (acres)	Calculated FDR (AF/acre)	USBRR FDR (AF/acre)	Conveyance Loss (acre-feet)	Total Ag Demand (acre-feet)
1997	20,365	75	3,182	3,182	22,910	22,910	6,364	6,364	3.60	3.60	1,650	24,560
2020	21,574	85	3,182	3,182	21,638	21,638	6,364	6,364	3.40	3.40	1,650	23,288
2021	21,574	85	3,182	3,182	21,638	21,638	6,364	6,364	3.40	3.40	1,796	23,433

Contractor's M&&I Water

Timeframe	Residential Water Demand			Nonresidential Water Demand				Loss Total	Unacc. / Distr.	Ref Urban Per	Calc Urban Per	Total M&&I
	Population	Per Total Ag + Capita M&&I Dmd	Total Unmet Demand	Industrial	Comm / Instlt.	Loss Demand	Capita Dmd					
	(gpcd)	(gpcd)	(acre-feet)	(acre-feet)	(acre-feet)	(acre-feet)	(acre-feet)	(gpcd)	(gpcd)	(acre-feet)	(acre-feet)	(acre-feet)
1997	28	29	30	31	32	33	34	0	0	0	38	39
2020								0	0	0	24,560	2,659
2021								0	0	0	23,288	788
								0	0	0	23,433	1,477

* Represents Maximum Contract

Notes:

MAXWELL ID

Water Needs Assessment

Contractor ID: 202910

Settlement

Contractor's Water Supply Sources and Quantities

Date: 5/13/2003 8:16:55

Safe Timeframe 1	Reference 2	Total Deliv/Max 3	Surface Water Supply						Groundwater Supply			
			SWP 4	Local 5	Local Source 6	Rtrn / Recycle In 8	Out 8	District 9	Private 10	Yield 11	Recharge 12	Supply 13
1995	BWMP	11,480	0	41,670	Water Rights	0	5,500	0	0	0	4,781	35,417
2020	BWMP	17,980 *	0	41,670	Water Rights	0	5,500	0	0	0	5,250	48,900
2021		17,980 *	0	41,670	Water Rights	0	5,500	0	0	0	3,500	50,650
2022		17,980 *	0	0		0	0	0	0	0	0	17,980

Contractor's Agricultural Water Demands

Maximum Productive Acres: 3,367

Timeframe 1	Crop Water Requirement (acre-feet) 15	District Irrig. Efficiency (%) 16	Effective Precip (acre-feet) 17	Reference Effective Precip (acre-ft) 18	Calculated Net Crop Water Req (acre-feet) 19	USB Net Crop Water Req (acre-feet) 20	Average Irrigated Acres (acres) 21	Reference Irrigated Acres (acres) 22	Calculate d FDR (AF/acre) 23	USB FDR (AF/acr e) 24	Conveyanc e Loss (acre-feet) 25	Total Ag Demand (acre-fe et) 26
2020	23,400	80	1,000	1,000	28,000	28,000	5,000	5,000	5.60	5.60	1,750	29,750
2021	23,400	80	1,000	1,000	28,000	28,000	5,000	5,000	5.60	5.60	1,750	29,750
2022	23,400	80	1,000	1,000	28,000	28,000	5,000	5,000	5.60	5.60	5,250	33,250

Contractor's M&I Water

Timeframe 1	Residential Water Demand			Nonresidential Water Demand				Unacc. / Distr.	Ref Urban Per Demand (acre-feet) 27	Calc Urban Per (acre-feet) 28	Total M&I (acre-feet) 29	
	Per Total Ag + Capita M&I Dmd (gpcd) 25	Total Unmet Demand (acre-feet) 26	Industrial (acre-feet) 30	Instit. (acre-feet) 31	Loss Total Demand (acre-feet) 32	Capita Dmd (gpcd) 33						
1995	28	29	30	31	32	33	34	0	0	0	27,094	-8,323
2020								0	0	0	29,750	-19,150
2021								0	0	0	29,750	-20,900
2022								0	0	0	33,250	15,270

* Represents Maximum Contract

Notes: Conveyance loss = 5% operational spills [col. 25] and 15% seepage loss [col. 12] (TM 2) of the crop water requirement [col. 19]. 5,500 ac-ft transferred to Colusa Drain MWC in 1995 (USB R records). Column 3, 1995 deliveries represent Normalized delivery data to correspond with 1995 Normalized crop data. 4,028 ac-ft = ave. deliveries through 1997 excluding 1977, 1983, 1991, 1992, 1994. Trsftr/Rtrn/Recycle In quantities are from TM-3. 2021 Conveyance and Seepage Losses are limited to no more than 10% of crop water requirement [col. 19].

2022 represents 2021 conditions excepting that all supplies are limited to contract quantities. Seepage and spills identified in BWMP are considered conveyance losses but are limited to no more than 10% of crop water requirement [col. 19].

MERIDIAN FARMS WATER CO.

Water Needs Assessment

Contractor ID: 202920

Settlement

Contractor's Water Supply Sources and Quantities

Date: 5/13/2003 8:16:55

Safe Timeframe 1	Reference 2	Total Deliv/Max 3	Surface Water Supply					Groundwater Supply				
			SWP 4	Local 5	Local Source 6	Rtrn / Recycle In 8	Out 8	District 9	Private 10	Yield 11	Recharge 12	Supply 13
1995	BWMP	19,235	0	12,688		28,720	26	1,000	0		6,860	60,263
2020	BWMP	35,000 *	0	12,688		26,950	26	1,000	0		6,984	68,628
2021		35,000 *	0	12,688		26,950	26	1,000	0		4,365	71,247
2022		35,000 *	0	0		0	0	0	0		0	35,000

Contractor's Agricultural Water Demands

Maximum Productive Acres: 9,130

Timeframe 1	Crop Water Requirement (acre-feet) 15	District Irrig. Efficiency (%) 16	Effective Precip (acre-feet) 17	Reference Effective Precip (acre-ft) 18	Calculated Net Crop Water Req (acre-feet) 19	USBR Net Crop Water Req (acre-feet) 20	Average Irrigated Acres (acres) 21	Reference Irrigated Acres (acres) 22	Calculate d FDR (AF/acre) 23	USBR FDR (AF/acr e) 24	Conveyanc e Loss (acre-feet) 25	Total Ag Demand (acre-feet) 26
2020	29,876	80	1,940	1,940	34,920	34,920	9,700	9,700	3.60	3.60	4,656	39,576
2021	29,568	80	1,920	1,920	34,560	34,560	9,600	9,600	3.60	3.60	4,365	38,925
2022	6,984	80	1,920	1,920	34,560	34,560	9,600	9,600	3.60	3.60	8,730	43,290

Contractor's M&&I Water

Timeframe 1	Residential Water Demand			Nonresidential Water Demand				Unacc. / Distr.	Ref Urban Per Demand (acre-feet) 28	Calc Urban Per (acre-feet) 29	Total M&&I (acre-feet) 30
	Per Total Ag + Capita M&&I Dmd (gpcd) 27	Total Unmet Demand (acre-feet) 31	Industrial (acre-feet) 32	Instit. (acre-feet) 33	Loss Total Demand (acre-feet) 34	Capita Dmd (gpcd) 35					
1995						0	0		0	38,873	-21,390
2020						0	0		0	39,576	-29,052
2021						0	0		0	38,925	-32,322
2022						0	0		0	43,290	8,290

* Represents Maximum Contract

Notes: Conveyance loss = 10% operational spills [col. 25] and 15% seepage loss [col. 12] (TM 2) of the crop water requirement [col. 19]. 26 ac-ft transferred to SRWCA Pool in 1995 (USB R records). 1,000 ac-ft groundwater pumping during critical months/normal year (TM 6, pg. 10-1). Column 3, 1995 deliveries represent Normalized delivery data to correspond with 1995 Normalized crop data. 24,741 ac-ft = ave. deliveries through 1997 excluding 1977, 1991, 1992, 1994. Trsf r/Rtrn/Recycle In quantities are from TM-3 and represents 40% of crop water requirement plus 15,000 ac-ft from outside sources. 2021 Conveyance and Seepage Losses are limited to no more than 10% of crop water requirement [col. 19].

2022 represents 2021 conditions excepting that all supplies are limited to contract quantities. Seepage and spills identified in BWMP are considered conveyance losses but are limited to no more than 10% of crop water requirement [col. 19].

NATOMAS CENTRAL MWC

Water Needs Assessment

Contractor ID: 202940

Settlement

Contractor's Water Supply Sources and Quantities

Date: 5/13/2003 8:16:55

Safe Timeframe 1	Reference 2	Total Deliv/Max 3	Surface Water Supply						Groundwater Supply			
			SWP 4	Local 5	Local Source 6	Rtrn / Recycle In 8	Out 8	District 9	Private 10	Yield 11	Recharge 12	Supply 13
1995	BWMP	70,911	0	2,500	Water Rights	36,000	0	15,000	0	0	20,763	129,276
2020	BWMP	120,200 *	0	2,500	Water Rights	36,000	0	15,000	0	0	11,527	162,173
2021		120,200 *	0	2,500	Water Rights	36,000	0	15,000	0	0	11,527	162,173
2022		120,200 *	0	0			0	0	0	0	0	120,200

Contractor's Agricultural Water Demands

Maximum Productive Acres: 32,876

Timeframe 1	Crop Water Requirement (acre-feet) 15	District Irrig. Efficiency (%) 16	Effective Precip (acre-feet) 17	Reference Effective Precip (acre-ft) 18	Calculated Net Crop Water Req (acre-feet) 19	USB Net Crop Water Req (acre-feet) 20	Average Irrigated Acres (acres) 21	Reference Irrigated Acres (acres) 22	Calculate d FDR (AF/acre) 23	USB FDR (AF/acr e) 24	Conveyanc e Loss (acre-feet) 25	Total Ag Demand (acre-fe et) 26
2020	82,112	85	4,260	4,260	91,590	91,590	21,300	21,300	4.30	4.30	11,527	103,117
2021	82,112	85	4,260	4,260	91,590	91,590	21,300	21,300	4.30	4.30	11,527	103,117
2022	82,112	85	4,260	4,260	91,590	91,590	21,300	21,300	4.30	4.30	23,054	114,644

Contractor's M&I Water

Timeframe 1	Residential Water Demand			Nonresidential Water Demand				Unacc. / Distr.	Ref Urban Per Demand (acre-feet) 27	Calc Urban Per (acre-feet) 28	Total M&I (acre-feet) 29
	Per Total Ag + Capita M&I Dmd (gpcd) 28	Total Unmet Demand (acre-feet) 30	Industrial (acre-feet) 31	Instit. (acre-feet) 32	Comm / (acre-feet) 33	Loss Total Demand (acre-feet) 34	Capita Dmd (gpcd) 35				
1995							0	0	0	186,863	57,587
2020							0	0	0	103,117	-59,056
2021							0	0	0	103,117	-59,056
2022							0	0	0	114,644	-5,556

* Represents Maximum Contract

Notes: Conveyance loss = 10% operational spills [col. 25] and 10% seepage loss [col. 12] (TM 2) of the crop water requirement [col. 19]. 15,000 ac-ft groundwater from Groundwater Hydrology Tech. Memo, pg. 70. Column 3, 1995 deliveries represent Normalized delivery data to correspond with 1995 Normalized crop data. 96,539 ac-ft = ave. deliveries through 1997 excluding 1977, 1983, 1991, 1992, 1994. Trsfr/Rtrn/Recycle In quantities are from TM-3. 2021 Conveyance and Seepage Losses are limited to no more than 10% of crop water requirement [col. 19].

2022 represents 2021 conditions excepting that all supplies are limited to contract quantities. Seepage and spills identified in BWMP are considered conveyance losses but are limited to no more than 10% of crop water requirement [col. 19]. Future efficiencies are set to 85% because there are no drainwater supplies or water quality concerns.

PELGER MWC

Water Needs Assessment

Contractor ID: 202950

Settlement

Contractor's Water Supply Sources and Quantities

Date: 5/13/2003 8:16:56

Safe Timeframe 1	Reference 2	Total Deliv/Max 3	Surface Water Supply					Groundwater Supply					
			SWP 4	Local 5	Local Source 6	Rtrn / Recycle In 8	Out 8	District 9	Private 10	Yield 11	Recharge 12	Supply 13	
1995	BWMP	6,230	0	0	0	5,060	0	0	0	0	0	1,082	8,117
2020	BWMP	8,860 *	0	0	0	4,147	0	0	0	0	0	1,024	11,983
2021		8,860 *	0	0	0	4,147	0	0	0	0	0	1,024	11,983
2022		8,860 *	0	0	0	0	0	0	0	0	0	0	8,860

Contractor's Agricultural Water Demands

Maximum Productive Acres: 2,485

Timeframe 1	Crop Water Requirement (acre-feet) 16	District Irrig. Efficiency (%) 16	Effective Precip (acre-feet) 18	Reference Effective Precip (acre-ft) 18	Calculated Net Crop Water Req (acre-feet) 20	USB Net Crop Water Req (acre-feet) 20	Average Irrigated Acres (acres) 22	Reference Irrigated Acres (acres) 22	Calculate d FDR (AF/acre) 24	USB FDR (AF/acre) 24	Conveyanc e Loss (acre-feet)) 24	Total Ag Demand (acre-feet) 24
2020	7,540	80	580	580	8,700	8,700	2,900	2,900	3.00	3.00	512	9,212
2021	7,540	80	580	580	8,700	8,700	2,900	2,900	3.00	3.00	512	9,212
2022	7,540	80	580	580	8,700	8,700	2,900	2,900	3.00	3.00	1,536	10,236

Contractor's M&I Water

Timeframe 1	Residential Water Demand			Nonresidential Water Demand				Loss Total	Unacc. / Distr.	Ref Urban Per	Calc Urban Per	Total M&I	
	Per Total Ag + Capita M&I Dmd (gpcd) 28	Total Unmet Demand (acre-feet)) 29	Total Demand (acre-feet)) 30	Industrial (acre-feet)) 31	Instit. (acre-feet)) 32	Comm / (acre-feet)) 33	Loss Demand (acre-feet)) 34						Capita Dmd (gpcd)) 38
1995							0	0			0	9,741	1,624
2020							0	0			0	9,212	-2,771
2021							0	0			0	9,212	-2,771
2022							0	0			0	10,236	1,376

* Represents Maximum Contract

Notes: Conveyance loss = 5% operational spills [col.25] and 10% seepage loss [col. 12] (TM 2) of the crop water requirement [col. 19]. Column 3, 1995 deliveries represent Normalized delivery data to correspond with 1995 Normalized crop data. 4,139 ac-ft = ave. deliveries through 1997 excluding 1977, 1983, 1991, 1992, 1994. Trsftr/Rtrn/Recycle In quantities are from TM-3 and represents 55% of Crop Water Requirement. 2021 Conveyance and Seepage Losses are limited to no more than 10% of crop water requirement [col. 19].

2022 represents 2021 conditions excepting that all supplies are limited to contract quantities. Seepage and spills identified in BWMP are considered conveyance losses but are limited to no more than 10% of crop water requirement [col. 19].

PLEASANT GROVE-VERONA

Water Needs Assessment

Contractor ID: 202960

Settlement

Contractor's Water Supply Sources and Quantities

Date: 5/13/2003 8:16:56

Safe Timeframe 1	Reference		Surface Water Supply						Groundwater Supply			
	Delivery 2	Total Deliv/Max 3	Total SWP 4	Local Loca 5	Local Source 6	Rtrn / Recycle In 7	Out 8	District 9	Private 10	Yield 11	Recharge 12	Supply 13
1997	26,290 *	18,105	0	0		13,000	0	0	0		0	31,105
1999	26,290 *	18,837	0	0		13,000	0	0	0		0	31,837
2000	26,290 *	19,370	0	0		13,000	0	0	0		0	32,370
2022	26,290 *	26,290	0	0		0	0	0	0		0	26,290

Contractor's Agricultural Water Demands

Maximum Productive Acres: 6,514

Timeframe 1	Crop Water Requirement (acre-feet)	District Irrig. Efficiency (%) 16	Effective Precip (acre-feet) 17	Reference	Calculated	USBR Net Crop Water Req (acre-feet) 20	Average Irrigated Acres (acres) 21	Reference	Calculate d FDR (AF/acre) 23	USBR FDR (AF/acr e) 24	Conveyanc e Loss (acre-feet) 25	Total Ag Demand (acre-feet) 26
				Effective Precip (acre-ft) 18	Net Crop Water Req (acre-feet) 19	Water Req (acre-feet) 20	Irrigated Acres (acres) 21	Irrigated Acres (acres) 22	FDR (AF/acre) 23	FDR (AF/acr e) 24	Conveyanc e Loss (acre-feet) 25	Total Ag Demand (acre-feet) 26
1997	23,803	75	1,205	1,205	30,130	30,130	6,026	6,026	5.00	5.00	1,810	31,940
1999	24,755	75	1,253	1,253	31,335	31,335	6,267	6,267	5.00	5.00	1,884	33,219
2000	25,434	75	1,264	1,264	32,227	32,227	6,319	6,319	5.10	5.10	1,937	34,164
2022	25,669	85	1,303	1,303	28,666	28,666	6,515	6,515	4.40	4.40	2,629	31,295

Contractor's M&I Water

Timeframe 1	Residential Water Demand			Nonresidential Water Demand				Unacc. / Distr.	Ref Urban Per Demand (acre-feet) 37	Calc Urban Per (acre-feet) 38	Total M&I (acre-feet) 39
	Population 28	Per Capita M&I Dmd Demand (gpcd) 29	Total Unmet Demand (acre-feet) 30	Industrial (acre-feet) 31	Comm / Instit. (acre-feet) 32	Loss Total Demand (acre-feet) 33	Capita Dmd (gpcd) 34				
1997						0	0		0	31,940	835
1999						0	0		0	33,219	1,382
2000						0	0		0	34,164	1,794
2022						0	0		0	31,295	5,005

* Represents Maximum Contract

Notes:

PRINCETON-CODORA-GLENN ID

Water Needs Assessment

Contractor ID: 202970

Settlement

Contractor's Water Supply Sources and Quantities

Date: 5/13/2003 8:16:56

Safe Timeframe 1	Reference 2	Delivery	Total Deliv/Max 3	Surface Water Supply					Groundwater Supply			
				SWP 4	Local 5	Local Source 6	Rtrn / Recycle In 8	Out 8	District 9	Trsf / Trsf /		Supply 13
										Private 10	Yield 11	
1995	BWMP	43,377	56,240	0	8,930	Water Rights	20,000	26	3,800	0	13,371	75,573
2020	BWMP	67,810 *	67,810	0	8,930	Water Rights	25,000	26	3,800	0	15,008	90,506
2021		67,810 *	67,810	0	8,930	Water Rights	25,000	26	3,800	0	6,566	98,948
2022		67,810 *	67,810	0	0		0	0	0	0	0	67,810

Contractor's Agricultural Water Demands

Maximum Productive Acres: 10,187

Timeframe 1	Crop Water Requirement (acre-feet)	District Irrig. Efficiency (%) 16	Effective Precip (acre-feet) 18	Reference Effective Precip (acre-ft) 18	Calculated Net Crop Water Req (acre-feet) 20	USB Net Crop Water Req (acre-feet) 20	Average Irrigated Acres (acres) 22	Reference Irrigated Acres (acres) 22	Calculate d FDR (AF/acre) 24	USB FDR (AF/acr e) 24	Conveyanc e Loss (acre-feet) 24	Total Ag Demand (acre-feet) 24
1995	32,680	64	1,980	1,751	47,600	49,904	9,900	8,755	4.81	5.70	6,686	54,286
2020	45,114	80	3,090	3,090	52,530	52,530	10,300	10,300	5.10	5.10	7,504	60,034
2021	45,492	80	3,060	3,060	53,040	53,040	10,200	10,200	5.20	5.20	6,566	59,606
2022	45,492	80	3,060	3,060	53,040	53,040	10,200	10,200	5.20	5.20	13,132	66,172

Contractor's M&I Water

Timeframe 1	Residential Water Demand			Nonresidential Water Demand				Unacc. / Distr.	Ref Urban Per Demand (acre-feet)	Calc Urban Per (acre-feet)	Total M&I (acre-feet)
	Per Total Ag + Capita M&I Dmd (gpcd) 28	Total Unmet Demand (acre-feet) 30	Total Demand (acre-feet) 31	Industrial (acre-feet) 32	Instit. (acre-feet) 33	Loss Total Demand (acre-feet) 34	Capita Dmd (gpcd) 34				
1995						0	0		0	54,286	-21,287
2020						0	0		0	60,034	-30,472
2021						0	0		0	59,606	-39,342
2022						0	0		0	66,172	-1,638

* Represents Maximum Contract

Notes: Conveyance loss = 10% operational [col. 25] spills and 20% seepage loss [col. 12] (TM 2) of the crop water requirement [col. 19]. 26 ac-ft transferred to SRWCA Pool in 1995 (USB records). 3,800 ac-ft groundwater from Groundwater Hydrology Tech. Memo, pg. 30. Column 3, 1995 deliveries represent Normalized delivery data to correspond with 1995 Normalized crop data. 56,240 ac-ft = ave. deliveries through 1997 excluding 1977, 1983, 1991, 1992, 1994. Trsf/Rtrn/Recycle In quantities are from TM-3. 2021 Conveyance and Seepage Losses are limited to no more than 10% of crop water requirement [col. 19].

2022 represents 2021 conditions excepting that all supplies are limited to contract quantities. Seepage and spills identified in BWMP are considered conveyance losses but are limited to no more than 10% of crop water requirement [col. 19].

PROVIDENT ID

Water Needs Assessment

Contractor ID: 202980

Settlement

Contractor's Water Supply Sources and Quantities

Date: 5/13/2003 8:16:56

Safe Timeframe 1	Reference 2	Total Deliv/Max 3	Surface Water Supply					Groundwater Supply				
			SWP 4	Local 5	Local Source 6	Rtrn / Recycle In 8	Out 8	District 9	Private 10	Yield 11	Recharge 12	Supply 13
1995	BWMP	41,028	0	7,880	Water Rights	90,000	0	3,000	0	0	11,770	132,269
2020	BWMP	54,730 *	0	7,880	Water Rights	110,000	0	4,000	0	0	13,385	163,225
2021		54,730 *	0	7,880	Water Rights	105,000	0	4,000	0	0	10,875	160,735
2022		54,730 *	0	0		0	0	0	0	0	0	54,730

Contractor's Agricultural Water Demands

Maximum Productive Acres: 14,556

Timeframe 1	Crop Water Requirement (acre-feet) 15	District Irrig. Efficiency (%) 16	Effective Precip (acre-feet) 17	Reference Effective Precip (acre-ft) 18	Calculated Net Crop Water Req (acre-feet) 19	USB Net Crop Water Req (acre-feet) 20	Average Irrigated Acres (acres) 21	Reference Irrigated Acres (acres) 22	Calculate d FDR (AF/acre) 23	USB FDR (AF/acre) 24	Conveyanc e Loss (acre-feet) 25	Total Ag Demand (acre-feet) 26
2020	72,600	80	3,000	3,000	87,000	87,000	15,000	15,000	5.80	5.80	11,154	98,154
2021	72,600	80	3,000	3,000	87,000	87,000	15,000	15,000	5.80	5.80	10,875	97,875
2022	72,600	80	3,000	3,000	87,000	87,000	15,000	15,000	5.80	5.80	21,750	108,750

Contractor's M&I Water

Timeframe 1	Residential Water Demand			Nonresidential Water Demand				Unacc. / Distr.	Ref Urban Per Demand (acre-feet) 37	Calc Urban Per (acre-feet) 38	Total M&I (acre-feet) 39
	Per Total Ag + Capita M&I Dmd (gpcd) 28	Total Unmet Demand (acre-feet) 29	Total Demand (acre-feet) 30	Industrial (acre-feet) 31	Instit. (acre-feet) 32	Comm / (acre-feet) 33	Loss Total Demand (acre-feet) 34				
1995							0	0	0	86,308	-45,961
2020							0	0	0	98,154	-65,071
2021							0	0	0	97,875	-62,860
2022							0	0	0	108,750	54,020

* Represents Maximum Contract

Notes: Conveyance loss = 10% operational spills [col. 25] and 12% seepage loss [col. 12] (TM 2) of the crop water requirement [col. 19]. Column 3, 1995 deliveries represent Normalized delivery data to correspond with 1995 Normalized crop data. 43,159 ac-ft = ave. deliveries through 1997 excluding 1977, 1983, 1991, 1992, 1994. Trsfr/Rtrn/Recycle In quantities are from TM-3. GW is from TM-3. 2021 Conveyance Losses are limited to no more than 10% of crop water requirement [col. 19].

2022 represents 2021 conditions excepting that all supplies are limited to contract quantities. Seepage and spills identified in BWMP are considered conveyance losses but are limited to no more than 10% of crop water requirement [col. 19].

RECL. DISTRICT 1004

Water Needs Assessment

Contractor ID: 203000

Settlement

Contractor's Water Supply Sources and Quantities

Date: 5/13/2003 8:16:57

Safe Timeframe 1	Reference Delivery 2	Total Deliv/Max 3	Surface Water Supply						Groundwater Supply			
			SWP 4	Local 5	Local Source 6	Rtrn / Recycle In 8	Out 8	District 9	Private 10	Yield 11	Recharge 12	Supply 13
1995	BWMP	48,641	0	20,830	Water Rights	20,000	0	500	0	0	14,025	83,431
2020	BWMP	71,400 *	0	20,830	Water Rights	20,000	0	500	0	0	15,469	97,261
2021		71,400 *	0	20,830	Water Rights	20,000	0	500	0	0	10,313	102,417
2022		71,400 *	0	0			0	0	0	0	0	71,400

Contractor's Agricultural Water Demands

Maximum Productive Acres: 18,799

Timeframe 1	Crop Water Requirement (acre-feet) 15	District Irrig. Efficiency (%) 16	Effective Precip (acre-feet) 17	Reference Effective Precip (acre-ft) 18	Calculated Net Crop Water Req (acre-feet) 19	USBR Net Crop Water Req (acre-feet) 20	Average Irrigated Acres (acres) 21	Reference Irrigated Acres (acres) 22	Calculate d FDR (AF/acre) 23	USBR FDR (AF/acr e) 24	Conveyanc e Loss (acre-feet) 25	Total Ag Demand (acre-fe et) 26
1995	48,970	64	1,570	1,403	74,330	85,571	15,700	14,028	4.73	6.10	4,675	79,005
2020	67,650	80	1,650	1,650	82,500	82,500	16,500	16,500	5.00	5.00	5,156	87,656
2021	67,650	80	1,650	1,650	82,500	82,500	16,500	16,500	5.00	5.00	5,156	87,656
2022	67,650	80	1,650	1,650	82,500	82,500	16,500	16,500	5.00	5.00	15,469	97,969

Contractor's M&I Water

Timeframe 1	Residential Water Demand			Nonresidential Water Demand				Unacc. / Distr.	Ref Urban Per Demand (acre-feet) 28	Calc Urban Per (acre-feet) 38	Total M&I (acre-feet) 39
	Per Total Ag + Capita M&I Dmd (gpcd) 27	Total Unmet Demand (acre-feet) 30	Industrial (acre-feet) 31	Instit. (acre-feet) 32	Loss Total Demand (acre-feet) 33	Capita Dmd (gpcd) 34					
1995						0	0		0	79,005	-4,426
2020						0	0		0	87,656	-9,605
2021						0	0		0	87,656	-14,761
2022						0	0		0	97,969	26,569

* Represents Maximum Contract

Notes: Conveyance loss = 5% operational spills [col. 25] and 15% seepage loss [col. 12] (TM 2) of the crop water requirement [col. 19]. 500 ac-ft groundwater from Groundwater Hydrology Tech. Memo, pg. 49. Column 3, 1995 deliveries represent Normalized delivery data to correspond with 1995 Normalized crop data. 56,126 ac-ft = ave. deliveries through 1997 excluding 1977, 1983, 1991, 1992, 1994. Trsfr/Rtrn/Recycle In quantities are from TM-3. 2021 Conveyance Losses are limited to no more than 10% of crop water requirement [col. 19].

2022 represents 2021 conditions excepting that all supplies are limited to contract quantities. Seepage and spills identified in BWMP are considered conveyance losses but are limited to no more than 10% of crop water requirement [col. 19].

RECL. DISTRICT 108

Water Needs Assessment

Contractor ID: 202990

Settlement

Contractor's Water Supply Sources and Quantities

Date: 5/13/2003 8:16:57

Safe Timeframe 1	Reference Delivery 2	Total Deliv/Max 3	Surface Water Supply						Groundwater Supply			
			SWP 4	Local 5	Local Source 6	Rtrn / Recycle In 8	Out 8	District 9	Private 10	Yield 11	Recharge 12	Supply 13
1995	BWMP	126,435	0	27,200	Water Rights	0	66	0	0	0	21,342	168,662
2020	BWMP	232,000 *	0	27,200	Water Rights	0	66	0	0	0	21,618	237,516
2021		232,000 *	0	27,200	Water Rights	0	66	0	0	0	21,618	237,516
2022		232,000 *	0	0		0	0	0	0	0	0	232,000

Contractor's Agricultural Water Demands

Maximum Productive Acres: 48,707

Timeframe 1	Crop Water Requirement (acre-feet) 15	District Irrig. Efficiency (%) 16	Effective Precip (acre-feet) 17	Reference Effective Precip (acre-ft) 18	Calculated Net Crop Water Req (acre-feet) 19	USBR Net Crop Water Req (acre-feet) 20	Average Irrigated Acres (acres) 21	Reference Irrigated Acres (acres) 22	Calculate d FDR (AF/acre) 23	USBR FDR (AF/acr e) 24	Conveyanc e Loss (acre-feet) 25	Total Ag Demand (acre-fe et) 26
1995	122,820	62	9,920	8,170	181,400	191,995	49,600	40,850	3.66	4.70	10,670	192,070
2020	168,000	80	21,000	21,000	183,750	183,750	52,500	52,500	3.50	3.50	10,808	194,558
2021	168,000	80	21,000	21,000	183,750	183,750	52,500	52,500	3.50	3.50	10,808	194,558
2022	168,000	80	21,000	21,000	183,750	183,750	52,500	52,500	3.50	3.50	32,426	216,176

Contractor's M&I Water

Timeframe 1	Residential Water Demand			Nonresidential Water Demand				Unacc. / Distr.	Ref Urban Per Demand (acre-feet) 28	Calc Urban Per (acre-feet) 29	Total M&I (acre-feet) 30
	Per Total Ag + Capita M&I Dmd (gpcd) 27	Total Unmet Demand (acre-feet) 31	Industrial (acre-feet) 32	Instit. (acre-feet) 33	Loss Total Demand (acre-feet) 34	Capita Dmd (gpcd) 35					
1995						0	0	0	192,070	38	23,408
2020						0	0	0	194,558	38	-42,958
2021						0	0	0	194,558	38	-42,958
2022						0	0	0	216,176	38	-15,824

* Represents Maximum Contract

Notes: Conveyance loss = 5% operational spills [col. 25] and 10% seepage loss [col. 12] (TM 2) of the crop water requirement [col. 19]. 66 ac-ft transferred to SRWCA Pool in 1995. Column 3, 1995 deliveries represent Normalized delivery data to correspond with 1995 Normalized crop data. 162,870 ac-ft = ave. deliveries through 1997 excluding 1977, 1983, 1991, 1992, 1994. Trsftr/Rtrn/Recycle In quantities are from TM-3. GW is not quantified. 2021 Conveyance Losses are limited to no more than 10% of crop water requirement [col.19].

2022 represents 2021 conditions excepting that all supplies are limited to contract quantities. Seepage and spills identified in BWMP are considered conveyance losses but are limited to no more than 10% of crop water requirement [col. 19].

RIVER GARDEN FARMS CO.

Water Needs Assessment

Contractor ID: 206097

Settlement

Contractor's Water Supply Sources and Quantities

Date: 5/13/2003 8:16:57

Safe Timeframe 1	Reference Delivery 2	Total Deliv/Max 3	Surface Water Supply					Groundwater Supply				
			Total SWP 4	Local Loca 5	Local Source 6	Rtrn / Recycle In 7	Out 8	District 9	Private 10	Yield 11	Recharge 12	Supply 13
2000	0	22,691	0	0	0	0	0	1,222	0	0	0	23,913
2001	0	22,691	0	0	0	0	0	1,122	0	0	0	23,813
2020	0	22,700	0	0	0	0	0	1,140	0	0	0	23,840
2025	0	29,800	0	0	0	0	0	0	0	0	0	29,800

Contractor's Agricultural Water Demands

Maximum Productive Acres: 6,739

Timeframe 1	Crop Water Requirement (acre-feet)	District Irrig. Efficiency (%) 16	Effective Precip (acre-feet) 17	Reference Effective Precip (acre-ft) 18	Calculated Net Crop Water Req (acre-feet) 19	USB Net Crop Water Req (acre-feet) 20	Average Irrigated Acres (acres) 21	Reference Irrigated Acres (acres) 22	Calculate d FDR (AF/acre) 23	USB FDR (AF/acr e) 24	Conveyanc e Loss (acre-feet) 25	Total Ag Demand (acre-feet) 26
2001	30,700	75	1,616	1,616	38,779	38,779	8,079	8,079	4.80	4.80	2,381	41,161
2020	30,583	85	2,424	2,424	33,128	33,128	8,080	8,080	4.10	4.10	2,384	35,512
2025	23,688	85	1,348	1,348	26,282	26,282	6,739	6,739	3.90	3.90	2,980	29,262

Contractor's M&I Water

Timeframe e	Residential Water Demand			Nonresidential Water Demand				Unacc. / Distr.	Ref Urban Per Demand (acre-feet)	Calc Urban Per (acre-feet) 38	Total M&I (acre-feet) 39
	Population 28	Per Total Ag + Capita M&I Dmd Demand (gpcd) 29	Total Unmet Demand (acre-feet) 30	Industrial (acre-feet) 31	Instit. (acre-feet) 32	Comm / (acre-feet) 33	Loss Total Demand (acre-feet) 34				
2000							0	0	0	28,190	4,277
2001							0	0	0	41,161	17,348
2020							0	0	0	35,512	11,672
2025							0	0	0	29,262	-538

* Represents Maximum Contract

Notes:

Technical Analysis of Sutter Mutual Water Company's Water Needs

by
Chuck Jachens
Regional Agricultural Engineer
Mid-Pacific Office, MP-450

Summary

The total water demand for SMWC has been calculated several ways as follows:

Summary of Calculated Water Needs (in acre-feet)	
BWMP 2020 Cropping Pattern	208,600
BWMP 2020 Drought Year Demand	210,600
BWMP 2020 Normal Year Demand	197,200
Peak Diversion in Recent years	224,784
SMWC High Water Use Cropping Pattern	220,600
WNA Based On Highest Historic Need	220,100

A contract quantity of 220,000 acre-feet will meet the needs of SMWC. SMWC has not had any reported salinity problems at lower diversions therefore the risk associated with salinity problems in the future is minimal.

WNA Methodology

For contractors who supply water to meet agricultural demands, Reclamation estimated the district irrigation efficiency associated with the crop water information provided for the snapshot year. Both the district irrigation efficiency and the amount of intra-district conveyance losses are evaluated for reasonableness. Past beneficial use of CVP supplies is confirmed if the district irrigation efficiency is close to the current statewide average of 75 percent, or if a trend towards increasing district irrigation efficiencies over time is apparent; and if intra-district conveyance losses total 10 percent, or less, of the district's total water supply. In situations where some, or all, of these conveyance losses contribute to groundwater recharge for later use by the contractor, these "conveyance losses" are shown as groundwater recharge rather than conveyance losses. (Central Valley Project (CVP) Water Needs Assessments: Purpose and Methodology)

85% Documentation

The CALFED Agricultural Water Use Efficiency has a "Farm Quantifiable Objective Component" which ~~uses a~~ states a high farm efficiency is equal to an overall 75% efficiency. The resulting district efficiency was to achieve an overall maximum of 85% from the high farm efficiency of 75%.

Agricultural water demand is defined as the sum of the district's irrigation water demand and the intra-district conveyance losses, where irrigation water demand is the product of the irrigated acreage in a district and the average farm delivery requirement. The farm delivery requirement is defined as the unit amount of water necessary to supply crop water needs in excess of effective precipitation and varies based on crop type, climate, irrigation water quality, soil salinity and irrigation method. The district's irrigation water demand is not necessarily the sum of all the on-farm irrigation water demands because such measures as recycling of intra-district return flows are effective in reducing the overall district irrigation water demand. The assumption for this analysis is that the continued implementation of water use efficiency measures between now and the year 2025 will further reduce the unit amount of water needed to grow crops in the future. Often, it is also assumed that district conveyance losses will decrease in the future. Specifically, district irrigation efficiencies are assumed to increase from an average of 75 percent currently to 85 percent by the year 2025. (Central Valley Project (CVP) Water Needs Assessments: Purpose and Methodology)

85% efficiency was used consistently for the previous contract renewals such as the American River, Shasta and Friant Divisions, the Delta Mendota Canal and Tehama-Colusa Canal Contractors, etc.

Reduction to 80%

Certain districts, such as those with large elevation differences within their boundaries, have target district irrigation efficiencies of 80 percent based on the unavailability of certain water management options to increase overall district irrigation efficiency. (Central Valley Project (CVP) Water Needs Assessments: Purpose and Methodology)

This was expanded to include areas in the Sacramento Valley with water quality concerns. District efficiencies in areas of water quality concerns were reduced to 80%. This is to compensate for the added management issues associated with additional drainage requirements and reduced ability to recycle drainage water.

The Sacramento River Basinwide Water Management Plan (BWMP), discusses the efficiency at which overall water needs are met is typically quantified by a seasonal application efficiency (SAE), defined as the sum of ETAW and cultural water requirement divided by total applied water.

The BWMP further indicates that on a farm scale, SAE may be diminished by evaporation during conveyance, irrigation system leaks, leaching losses from the soil, etc. However, irrigation water that seeps to groundwater or becomes tailwater from surface drainage can be recovered on other farms. Unless water drains to an unusable pool (commonly termed an "unrecoverable loss"), such as contaminated or saline groundwater or water that is hydrologically at the end of

the irrigation network (e.g., drainage water flows to the ocean), it can be reused. Improvements in irrigation practices, planning, technology, and policies are expected to increase the average SAE from 73 percent to 80 percent for California over the next 2 decades.

Crop Water Use and Effective Precipitation

Reclamation estimated crop water requirements for the year 2025 level of development are based on the CVP water contractors' estimates of future crops and acreage planted multiplied by estimates of the farm delivery requirements for each crop. Reclamation staff initially estimated crop water requirements for all regions using evapotranspiration (ET) and effective precipitation (EP) data from several sources: 1) California Department of Water Resources (DWR) Bulletin 160-98, 2) DWR Bulletin 113-3, and 3) Reclamation knowledge and experience. The ET and EP information was tabulated on a Detailed Analysis Unit (DAU) basis and then proportioned to each district based on the district's area in a DAU. The data was then used in combination with other traditional methodologies for determining crop water requirements to estimate each district's total irrigation water demand in the year 2025. (Central Valley Project (CVP) Water Needs Assessments: Purpose and Methodology)

Sacramento River Settlement Contractors WNA

The BWMP used a methodology where current crop acreage estimates and associated applied on-field water requirements are presented for each district in the context of a range around a projected *normalized* (condition developed by DWR, which assumed a 1995 cropping pattern that would have occurred absent the effects of 1987 to 1992 drought) year. These data were obtained from DWR in a tabular form, and included the following: Future crop acreage predictions are based on land survey trends, crop market outlook studies, land retirement (elimination of agricultural land with drainage problems), urban expansion projections, production models, and other variables.

Reclamation agreed to use the BWMP as the WNA basis for the participating Sacramento River Settlement Contractors. The data found in the BWMP was used to determine past reasonable and beneficial use with the 1995 Normal year data.

Due to the nature of the settlement contracts, Reclamation used the full contract quantities for the year 2020 analysis as the Settlement Contractors only water supply. The settlement contracts were negotiated in lieu of the Settlement Contractors exercising their water rights on the Sacramento River and its tributaries. This is a notable difference because the CVP WNA included Non-Contract water supplies such as groundwater including the conjunctive use of surface and groundwater, State Water Project (SWP) supplies, local surface water supplies, recycled water, inter-district return flows and water transfers

Sutter Mutual Water Company WNA

The results from the WNA for SMWC has a maximum of 80,156 acre-feet of their 267,900 acre-feet contract quantity that is in excess of their full water need of 187,744 acre-feet in the year 2020. This was calculated using a 15% combined seepage and spill loss based on the diversion requirement. SMWC has 30% of total water under their Settlement Contract in excess of their water needs and thus does not meet the Reclamation’s needs analysis criteria for the full contract supply. SMWC appears to have implemented practices that increase the district efficiency and reduce diversions to compensate for the mound of artesian connate (saline) ground water found within boundaries of SMWC.

The normal year 1995 WNA resulted in showing SMWC has reasonably and beneficially used the normalize diversions stated in the BWMP.

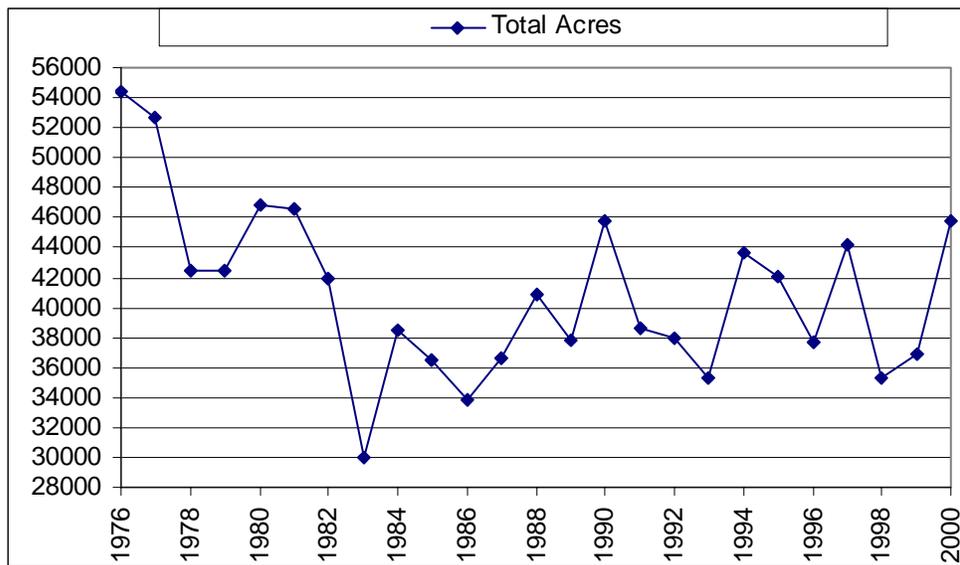
Irrigated Acreage Comparisons

Comparison of Land Classification Acreage To BWMP Acreage						
District	Gross Acreage	Arable Acreage	Irrigable Acreage	Class 6 Lands	BWMP	
					Total District	Net Irrigated
ACID	33,240	22,179	21,070	10,001	32,000	13,900
GCID	173,394	140,871	133,827	15,578	170,000	130,200
MID	6,841	3,731	3,544	3,110	5,000	5,000
MFWC	10,793	10,116	9,610	677	15,600	9,700
NCMWC	39,982	36,428	34,607	2,927	36,000	34,100
PMWC	2,969	2,754	2,616	215	2,900	2,900
PCGID	12,113	11,287	10,723	826	11,700	10,000
PID	17,019	16,128	15,322	891	15,165	14,800
RD 1004	23,113	20,829	19,788	1,639	15,700	15,700
RD 108	58,863	53,969	51,271	4,637	47,600	51,000
SMWC	51,136	48,218	45,807	1,136	52,300	52,100

The “Comparison of Land Classification Acreage To BWMP Acreage” table

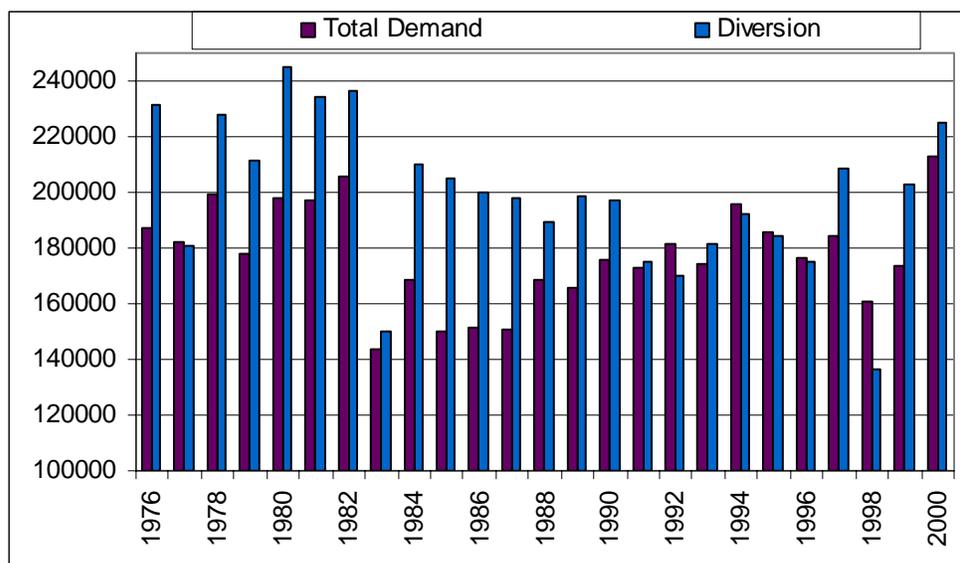
compares Reclamation records to the acreages used in the BWMP. A closer comparison of the Irrigable Acreage with the BWMP Net Irrigated Acreage shows that Glenn-Colusa Irrigation District (GCID), Natomas Central Mutual Water Company (NCMWC), Princeton Cordora-Glenn Irrigation District (PCGID), Provident Irrigation District (PID), Reclamation District 104 (RD-1004), and Reclamation District 108 (RD-108) have net irrigated land that is less than irrigable acreage. Anderson-Cottonwood Irrigation District (ACID) also meets these criteria, however over one-third of the irrigable acreage is idled. Maxwell Irrigation District (MID), Meridian Farms Water Company (MFWC), Pelger Mutual Water Company (PMWC), and Sutter Mutual Water Company (SMWC) have higher net irrigated acreages than the irrigable acreage. Possible reasons for this include double crop acreage, or irrigation of Class 6 lands. However, PMWC, and SMWC also exceed the sum of the irrigable acreage and the Class 6 acreage. (Transmittal of the Final Water Needs Assessments for the Sacramento River Settlement Contracts).

The cropping acreage for SMWC has been in the range of 34,000 acres to 46,000 acres since 1982 as shown below. The total acres include double cropped acreage thus exceeding the sum of the irrigable acreage and the Class 6 acreage that is not supported by SMWC's past cropping patterns.



Historic Water Needs and Use

The results of the “ADD NAME HERE” (1996 NRCS Report) indicates that, while there is room for slight improvements, SMWC is efficiently utilizing the water resources available. Any dramatic modifications to the way water is managed in this basin requires further research and understanding of the ground water fluctuations and the movement of the connate water. Drastic cutbacks in water availability would most likely lead to an increase in soil salinity and impact crop productivity and have an adverse impact on wildlife habitats and populations.



SMWC has repeated that cutbacks in the contract supply may result in salinity problems. Based on historic diversions or the exercised use of the contract supplies, SMWC has diverted less than 220,000 acre-feet from 1983 through 2002 except for the year 2000 where diversions were measured at 224,784 acre-feet. Since 1983, water quality concerns over chemicals applied to rice have increased the time water must be held on rice fields before being discharged. This has greatly reduced the diversion requirements of SMWC as shown in the above graph showing Total Demands and Diversions.

Salinity Concerns

The 1975 Tanji et al report, “Water and Salt Transfers in Sutter Basin, California” (Tanji) reported that analysis of soil samples taken during 1971-73 indicate Chloride (Cl) was not accumulating to any substantial degree in the soil profiles above the water table.

The 1996 NRCS report said present irrigation and drainage practices have kept salt levels in the soil down to a manageable level. Due to the low Electrical Conductivity (EC) of the irrigation supply water, it was estimated that less than one percent of the applied irrigation water is needed for leaching purposes. The leaching requirement for connate water suppression was not estimated. Continual productivity indicates the leaching requirement is being maintained.

In the 1996 NRCS report, there had not been a substantiated amount of salt buildup in soils in this area of high TDS. To address the concern of salt buildup in soils, the University of California, Davis tested for saturation extract conductivities and chloride concentration at representative sites from 1971 to 1978. Eleven of the 32 regular sample sites were located in the delineated areas of high TDS in drain waters. Based on these analyses, Henderson (1978) recommended discontinuance of sampling. Henderson states that there was no

increasing trend in the salinity or chloride of sampled soils over the period 1971 to 1978.

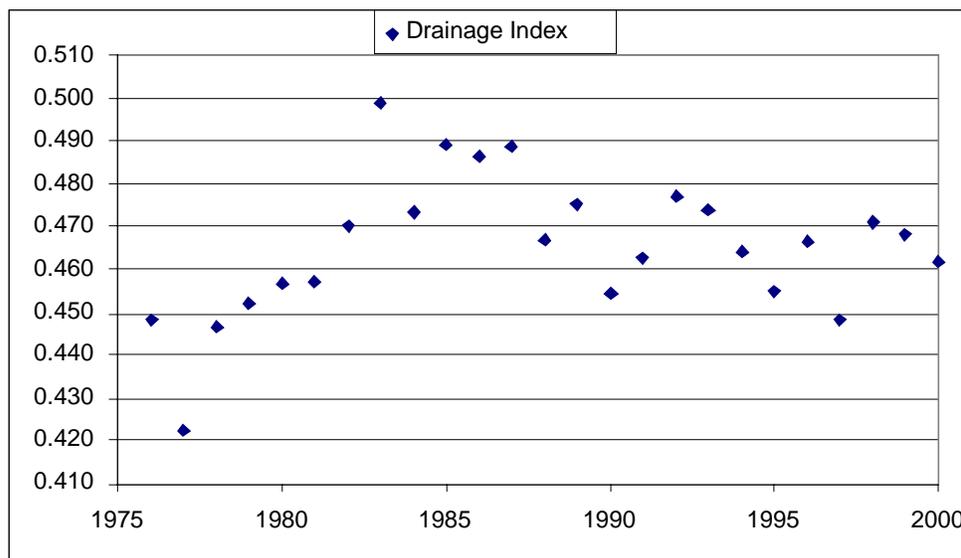
A number of factors stated by Tanji and the 1996 NRCS report contribute to the lack of buildup of salts in the soils overlying the connate water. These factors include but are not necessarily limited to: 1) a siltstone at a depth of approximately 40 inches occurring in patches over the area, 2) leaching and drainage, and 3) clay soils overlying a sandstone. (NRSC 1996)

The implied reduction of saline soils from 1965 to 1988 suggests that a salt buildup can be managed by leaching and drainage. Evapotranspiration over time, without downward leaching, causes salts to build up. The amount of irrigation required to provide the desired leaching can be established. Land owners and operators appear to be applying ample irrigation at present to prevent salt buildup in the soils and apparently have leached (reclaimed) formerly saline soils. (1996 NRCS Report)

Historic Drainage Fraction

Tanji said the major outputs from the basin were surface drainage outflow and evapotranspiration losses to the atmosphere. There were no net deep percolation water losses into the substrata.

Tanji described a drainage index calculated as the ratio of the surface drainage output divided by the surface inputs. The surface drainage output is not readily available and the basin is assumed to be in balanced water conditions, therefore, surface drainage output was calculated as expected diversions minus consumptive use. Rainfall and net influx of subsurface water were ignored since both factors increase the required discharge requirements and raise the drainage index.



Tanji reported the drainage index ranged from 0.34 to 0.50 with a 9-year average of 0.42. Reclamation's calculations based on the historic cropping patterns and the expected diversion requirement using an 80% district wide efficiency yielded a drainage index from 0.42 to 0.50 with an average of 0.47. Note that 1977 was significantly below 0.45 because 1997 was a severe, wide-spread drought year in California.

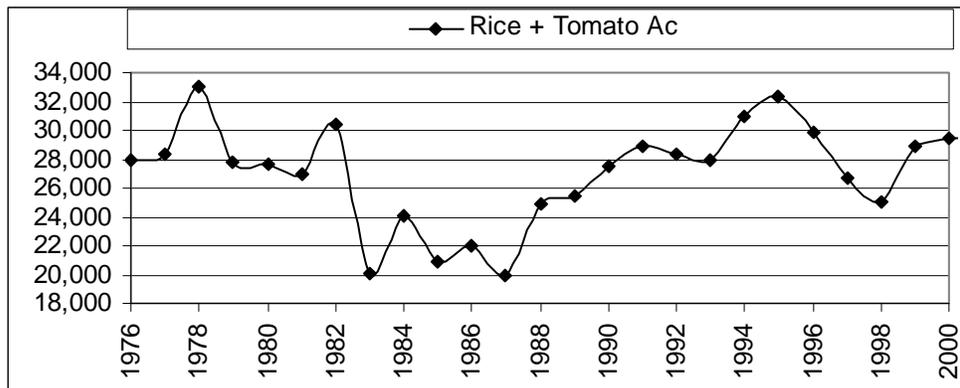
Reclamation's use of the 80% efficiency in the water needs assessment should not result in any significant risk of salinity problems for SMWC.

Revised WNA Based on Future Projections

Using SMWC's own estimates for their future cropping patterns as shown in the Sacramento River Basinwide Water Management Plan (BWMP), Reclamation determined SMWC's need in the year 2020 to be 187,744 acre-feet. The WNA Methodology allows for a 10% error in the diversion quantities, which yields a total demand at 208,600 acre-feet. The SMWC calculations within the BWMP for the future year 2020 yields a total demand of 210,600 acre-feet under drought conditions and only 197,200 acre-feet in normal conditions.

Since the last published draft of the BWMP in September, 2000, SMWC has revised the future cropping patterns. Rice acreage was increased from 17,400 acres of rice to 26,000 acres, however, only in 1968 was this amount surpassed at 26,078 acres of rice. Also, tomato acreages were estimated to remain the same or decrease. Based on verbal information from SMWC, sugar beets should disappear from the area due to the lack of processing facilities nearby.

Information on the other crops grown, within SMWC, were not given. A trend analysis was done on the historical record to make that determination. Rice acreage was set to 26,000 acres and tomatoes were estimated to be 5,000 acres. The rice plus tomato acreage was plotted and 31,000 acre total was determined to be approximately 2,000 acres over the reasonable estimate for the long term record.



The total irrigated acreage in the district including double cropping was set to 45,810 acres which is equal to the year of 2000 peak water demand acreage. The total demand is 220,600 acre-feet using this theoretical cropping pattern. Reclamation would be technical hard pressed to claim this was reasonable estimate of the SMWC's future water needs based on the historic records.

Revised WNA Based on Highest Past Need

Reclamation calculated the water needs (total demand) SMWC would have required using an 80% district efficiency based on SMWC's historic cropping patterns from 1976 through the year 2000 as shown in the table below. The second to highest demand occurred in 1982 at 205,964 acre-feet. The highest year was 2000 at 212,872 acre-feet. Using the 2000 data, correcting for known errors of -1.7%, and allowing a 5% for unknown errors, yields a total demand of 220,100 acre-feet. This amount allows for 10,000 acre-feet of cushion for low rainfall years, operational problems, etc.

Year	FDR	Total Acres	Demand Col.19	Losses	Total Demand
1976	2.9	54419	157815	29644	187459
1977	2.9	52695	152816	29644	182460
1978	4.0	42456	169824	29644	199468
1979	3.5	42434	148519	29644	178163
1980	3.6	46818	168545	29644	198189
1981	3.6	46625	167850	29644	197494
1982	4.2	41981	176320	29644	205964
1983	3.8	29931	113738	29644	143382
1984	3.6	38523	138683	29644	168327
1985	3.3	36516	120503	29644	150147
1986	3.6	33828	121781	29644	151425
1987	3.3	36656	120965	29644	150609
1988	3.4	40864	138938	29644	168582
1989	3.6	37785	136026	29644	165670
1990	3.2	45731	146339	29644	175983
1991	3.7	38646	142990	29644	172634
1992	4.0	37960	151840	29644	181484
1993	4.1	35293	144701	29644	174345
1994	3.8	43709	166094	29644	195738
1995	3.7	42094	155748	29644	185392
1996	3.9	37677	146940	29644	176584
1997	3.5	44184	154644	29644	184288
1998	3.7	35330	130721	29644	160365
1999	3.9	36929	144023	29644	173667
2000	4.0	45807	183228	29644	212872

The total demand of 220,000 ac-ft will meet the needs of SMWC based on the last 20 years of historic diversions and should not result in any significant risk of salinity problems for SMWC. The Contract in Article 9, Part 2C states in paraphrase that the contractors' water use during the contract period in no way reflects the water use of the contractors if they exercising their water rights.

City of Redding: Determination of Monthly Quantities of Base Supply and Project Water for renewal of Sac. River Settlement Contract

Month	2002 Diversions	Monthly % of Total Diversions 2002	2001 Diversions	Monthly % of Total Diversions 2001	2000 Diversions	Monthly % of Total Diversions 2000	Average Monthly % Using 2000-2002 Diversions	Average Monthly % x Contract Total of 21,000 AF	Average Monthly Yield of Water Right	Calculated Base Supply Using Avg. % x Contract Total x Avg. Yield of Water Right	Calculated Project Water Using Avg. % x Contract Total less Base Supply	Base Supply - Proposed Exhibit A	Project Water - Proposed Exhibit A	Potential Rescheduled Base Supply Using Avg. Monthly Diversions and Proposed Ex. A Qtys.
Jan	552	3.76%	651	4.53%	609	4.63%	4.30%	904	100%	904	0	900	0	
Feb	627	4.27%	508	3.54%	482	3.66%	3.82%	803	100%	803	0	800	0	
Mar	837	5.69%	684	4.76%	706	5.37%	5.27%	1,107	100%	1,107	0	1100	0	
Apr	1136	7.73%	841	5.85%	808	6.14%	6.57%	1,381	100%	1,381	0	1400	0	
May	1038	7.06%	1708	11.89%	1120	8.51%	9.15%	1,922	100%	1,922	0	1925	0	
Jun	1774	12.07%	1921	13.37%	1737	13.20%	12.88%	2,705	99%	2,678	27	2675	25	5
Jul	2114	14.38%	1894	13.18%	1959	14.89%	14.15%	2,972	72%	2,140	832	2150	850	0
Aug	2042	13.89%	1965	13.68%	2014	15.31%	14.29%	3,001	30%	900	2,101	750	2250	1
Sep	1758	11.96%	1498	10.43%	1157	8.79%	10.39%	2,183	99%	2,161	22	2150	25	8
Oct	1370	9.32%	1288	8.96%	978	7.43%	8.57%	1,800	100%	1,800	0	1800	0	0
Nov	727	4.95%	782	5.44%	808	6.14%	5.51%	1,157	100%	1,157	0	1150	0	
Dec	723	4.92%	627	4.36%	781	5.94%	5.07%	1,065	100%	1,065	0	1050	0	
Total	14698	100.00%	14367	100.00%	13159	100.00%	100.00%	21,000		18,018	2,982	17850	3,150	14

Month	Minimum Monthly Diversions 2000-2002	Maximum Monthly Diversions 2000-2002	Average Monthly % x Contract Total of 21,000 AF	Project Water Needed Using Minimum #s	Project Water Needed Using Maximum #s	Project Water Needed Using Average #s
Jan	552	651	904	0	0	0
Feb	482	627	803	0	0	0
Mar	684	837	1,107	0	0	0
Apr	808	1136	1,381	0	0	0
May	1038	1708	1,922	0	0	0
Jun	1737	1921	2,705	0	0	30
Jul	1894	2114	2,972	0	0	822
Aug	1965	2042	3,001	1215	1292	2,251
Sep	1157	1758	2,183	0	0	33
Oct	978	1370	1,800	0	0	0
Nov	727	808	1,157	0	0	0
Dec	627	781	1,065	0	0	0
Total	12,649	15,753	21,000	1,215	1,292	3,135

% of Total Project Water Used 38.57% 41.02% 99.54%
 % of Contract Total Used 7.71% 10.21% 14.93%