

RECLAMATION

Managing Water in the West

San Luis Reservoir Low Point Improvement Project Final Appraisal Report



U.S. Department of the Interior
Bureau of Reclamation

May 2006

Mission Statements

The mission of the Department of the Interior is to protect and provide access to our Nation's natural and cultural heritage and honor our trust responsibilities to Indian Tribes and our commitments to island communities.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

San Luis Reservoir Low Point Improvement Project Final Appraisal Report

Prepared by

**Bureau of Reclamation
Mid-Pacific Region**

with

MWH



**U.S. Department of the Interior
Bureau of Reclamation
Mid-Pacific Region
Sacramento, California**

May 2006

EXECUTIVE SUMMARY

The purpose of the San Luis Reservoir Low Point Improvement Project Appraisal Study is to identify problems and potential solutions related to low water levels and other water resources issues associated with San Luis Reservoir and its operation, and to determine if Federal interest exists in participating in a feasibility study to resolve the identified problems.

The study area includes San Luis Reservoir and the service area of the San Luis & Delta-Mendota Authority, which represents most Central Valley Project (CVP) contractors within the San Felipe, West San Joaquin, and Delta divisions of the CVP. San Luis Reservoir and its appurtenant facilities are jointly owned and operated by the United States Department of the Interior, Bureau of Reclamation (Reclamation), and the State of California Department of Water Resources for the CVP and State Water Project, respectively.

The CVP and SWP have authority to operate San Luis Reservoir to its minimum operating level of 79,000 acre-feet to meet contractual obligations. Annual allocations and operations are determined such that deliveries may be made accordingly without disruption. It is expected that under real-time operations, attempts will continue to be made to avoid water supply reductions. However, given likely growth in future water demands, and additional regulatory requirements, it is anticipated that storage in San Luis Reservoir will be more fully exercised and result in more frequent and lower late-summer storage levels in the reservoir. While other factors may influence reservoir operations, it is believed that the system will have less flexibility to accommodate operational requests outside contractual uses and requirements, such as maintaining higher reservoir levels.

On the basis of the water resources problems identified to date, the following preliminary study objectives were developed:

- Increase the certainty of meeting the requested delivery schedule of annual allocations to CVP contractors dependent on San Luis Reservoir.
- While meeting the first objective, increase the reliability and quantity of annual allocations to CVP contractors.
- To the extent possible, while meeting the first objective, forecast earlier in the season the final allocation to CVP contractors dependent on San Luis Reservoir.

Several additional opportunities also may be available as a result of addressing the above objectives. These include improving water quality conditions for San Felipe Division contractors and providing ecosystem restoration opportunities.

Water resource management measures identified to date include both structural and non-structural actions. Structural measures could include developing additional out-of-basin storage. Non-structural actions could include source-shifting water to maintain the reservoir at higher levels.

It is believed that a Federal interest exists in a feasibility study authorized under Public Law 108-361 (October 25, 2004) that primarily focuses on improving the certainty of the requested delivery schedule and annual allocation to CVP contractors dependent on San Luis Reservoir through measures identified to date. The scope of a Federal feasibility study would include clear

identification of Reclamation and non-Federal sponsor roles for the study, as well as further evaluation of structural and non-structural measures. A recommendation is made in this Appraisal Report that a feasibility-level study be conducted.

TABLE OF CONTENTS

CHAPTER 1. INTRODUCTION	1-1
PURPOSE AND SCOPE	1-1
STUDY AUTHORIZATION	1-2
STUDY AREA	1-2
ORGANIZATION OF THIS REPORT	1-2
CHAPTER 2. EXISTING PROJECTS, PRIOR REPORTS, AND AGREEMENTS	2-1
EXISTING PROJECTS	2-1
Central Valley Project Facilities	2-1
State Water Project Facilities	2-3
Water Purveyors in Study Area	2-4
PRIOR REPORTS	2-5
California Water Plan	2-5
CALFED Bay-Delta Program	2-6
Central Valley Project Improvement Act Yield Replacement Plan	2-6
Non-Federal Feasibility Report for San Luis Reservoir Low Point Improvement Project	2-6
Anderson Reservoir Study	2-7
Water Transfer Program for the San Joaquin River Exchange Contractors Water Authority	2-7
SCVWD Urban Water Management Plan	2-7
Integrated Water Resources Planning Study	2-7
San Benito County Water District Annual Groundwater Report	2-8
Westside Integrated Water Resources Management Plan	2-8
INFLUENCING CONTRACTS, AGREEMENTS, AND CONDITIONS	2-8
CVP Contracts	2-8
CVP Water Service Contracts	2-8
San Joaquin River Exchange Contractors	2-10
CVP Operations Criteria and Plan	2-10
Joint Point of Diversion	2-10
CALFED Conveyance Program - South Delta Improvement Program	2-10
Delta-Mendota Canal-California Aqueduct Intertie	2-11
Monterey Agreement: State Water Project Extended Carryover Program	2-11
Central Valley Project Carryover Program	2-11
Safety of Dam Project Management Guidelines	2-12
1972 Supplemental Agreement Between the State of California and the United States Bureau of Reclamation	2-12
CHAPTER 3. PROBLEM IDENTIFICATION	3-1
GROWTH IN WATER DEMAND	3-1
Statewide	3-1
San Felipe Division	3-2
San Luis & Delta-Mendota Water Authority	3-3
PROJECT OPERATIONS	3-3
REGULATORY REQUIREMENTS	3-5
WITHOUT-PROJECT CONDITIONS	3-6
IDENTIFIED PROBLEMS	3-6

Delivery Schedule Reliability 3-6
 Water Supply Reliability 3-7

CHAPTER 4. PLAN FORMULATION..... 4-1

STUDY PROCESS..... 4-1
 FEASIBILITY STUDY OBJECTIVES..... 4-1
 POTENTIAL WATER RESOURCES MANAGEMENT MEASURES 4-2
 Structural Measures 4-2
 Non-Structural Measures 4-3
 Potential Alternatives..... 4-3

CHAPTER 5. FEASIBILITY STUDY 5-1

FEDERAL INTEREST 5-1
 ELEMENTS OF FEASIBILITY STUDY 5-1
 Initial Alternatives Phase 5-2
 Public Scoping..... 5-3
 Plan Formulation Phase 5-3
 Feasibility Report and EIS/EIR Phase..... 5-4

CHAPTER 6. SUMMARY OF FINDINGS AND RECOMMENDATION..... 6-1

SUMMARY OF FINDINGS 6-1
 RECOMMENDTION 6-2

CHAPTER 7. REFERENCES 7-1

LIST OF TABLES

TABLE 2-1. LOCAL RESERVOIRS IN THE SAN FELIPE DIVISION..... 2-4
 TABLE 2-2. SANTA CLARA VALLEY WATER DISTRICT:
 ANNUAL WATER SUPPLIES 2-5
 TABLE 2-3. CURRENT CVP SHORTAGE POLICY FOR
 WATER SERVICE CONTRACTS 2-9
 TABLE 2-4. SUMMARY OF CVP SAN FELIPE DIVISION
 ANNUAL CONTRACT AMOUNT 2-9
 TABLE 3-1. CALIFORNIA WATER BUDGET WITH EXISTING
 FACILITIES AND PROGRAMS..... 3-2
 TABLE 3-2. SCVWD ANNUAL WATER DEMAND AND SURPLUS/SHORTFALL 3-3

LIST OF FIGURES

FIGURE 1-1. STUDY AREA 1-3
 FIGURE 2-1. PRIMARY FEATURES OF SAN LUIS RESERVOIR 2-2
 FIGURE 2-2. SCHEMATIC OF SAN LUIS RESERVOIR OPERATIONS 2-3
 FIGURE 3-1. HISTORICAL SAN LUIS RESERVOIR BEGIN-OF-MONTH STORAGE FOR
 OCTOBER 1968 THROUGH MARCH 2006 3-5

FIGURE 3-2. EXCEEDENCE PROBABILITY OF SIMULATED SAN LUIS RESERVOIR END-
OF-MONTH STORAGE: EXISTING AND FUTURE WITHOUT-PROJECT
CONDITIONS3-7

FIGURE 5-1. PLAN FORMULATION PROCESS5-2

THIS PAGE LEFT BLANK INTENTIONALLY

ABBREVIATIONS AND ACRONYMS

Appraisal Report	San Luis Reservoir Low Point Improvement Project Appraisal Report
Appraisal Study	San Luis Low Point Improvement Project Appraisal Study
Authority	San Luis & Delta-Mendota Water Authority
Bay-Delta	Sacramento-San Joaquin Delta
BO	biological opinion
CA	California Aqueduct
CAR	Coordination Act Report
CEQA	California Environmental Quality Act
cfs	cubic feet per second
COA	Coordinated Operation Agreement
CVOO	Central Valley Operations Office
CVP	Central Valley Project
CVPIA	Central Valley Project Improvement Act
Delta	Sacramento-San Joaquin Delta
DIPIP	Delta Improvements Package Implementation Plan
DMC	Delta-Mendota Canal
DWR	State of California Department of Water Resources
EIS/EIR	Environmental Impact Statement/Environmental Impact Report
ESA	Endangered Species Act
EWA	Environmental Water Account
IWRP	Integrated Water Resources Plan
JPOD	Joint Point of Diversion
M&I	municipal and industrial
MAF	million acre-feet
msl	mean sea level
Napa Proposal	Draft Proposition Concerning CVP/SWP Integrated Operations
NEPA	National Environmental Policy Act
OCAP	Operations Criteria and Plan
OCO	Operations Control Office
PL	Public Law
PPA	Preferred Program Alternative
PVWMA	Pajaro Valley Water Management Agency
Reclamation	United States Department of the Interior, Bureau of Reclamation, Mid-Pacific Region
ROD	Record of Decision
SBCWD	San Benito County Water District
SCVWD	Santa Clara Valley Water District

SWP	State Water Project
SWRCB	State Water Resource Control Board
UWMP	Urban Water Management Plan

CHAPTER 1. INTRODUCTION

The CALFED Bay-Delta Program identified California statewide problems associated with growing water demands, degrading water quality, ecosystem protection, and degrading Sacramento-San Joaquin Delta (Delta) levee stability as the basis for comprehensive and long-term action. The Preferred Program Alternative (PPA), described in the CALFED Record of Decision (ROD), dated in August 2000, comprises several programs that, in combination, address four broad goals:

- Increase water supply reliability
- Improve water quality for all beneficial uses
- Improve ecosystem conditions in the San Francisco Bay/Sacramento-San Joaquin Delta (Bay-Delta) and tributary watersheds
- Increase Delta levee stability

Many of these goals are interdependent and could be addressed jointly through implementation of projects described in the ROD. One of the potential actions in the ROD is to address the water quality problem associated with “low point” water levels in San Luis Reservoir through the construction of a bypass facility that would convey water around San Luis Reservoir to the San Felipe Division. To address this action, since 2002, the California Department of Water Resources (DWR) has sponsored the Santa Clara Valley Water District (SCVWD), a member of the San Luis & Delta-Mendota Water Authority (Authority), to perform a non-Federal feasibility study through a DWR Proposition 13 grant. The United States Department of the Interior, Bureau of Reclamation (Reclamation), participated in this effort as the lead Federal agency for compliance with the National Environmental Policy Act (NEPA).

All of the water users in the West San Joaquin and San Felipe divisions of the Central Valley Project (CVP), and some of the water users in the Delta Division, are represented by the Authority. During preparation of the non-Federal feasibility study for the San Luis Reservoir Low Point Improvement Project, several Authority members identified problems associated with the delivery of allocated CVP water supplies from San Luis Reservoir. The problems are not only related to low water levels in San Luis Reservoir, but also to other constraints in CVP and State Water Project (SWP) operations. Authority members have requested that this San Luis Reservoir Low Point Improvement Project Appraisal Study (Appraisal Study) consider those problems.

PURPOSE AND SCOPE

The purpose of this San Luis Reservoir Low Point Improvement Project Appraisal Report (Appraisal Report) is to present the results of an appraisal-level assessment of problems and potential solutions related to low water levels and other water resources issues in association with San Luis Reservoir and its operation for the CVP, and to determine Federal interest exists in participating in feasibility-level studies.

The next step in the Appraisal Study will be to develop a study plan to more clearly direct and frame the Feasibility Study, and develop the roles of Reclamation and non-Federal participants.

STUDY AUTHORIZATION

This Appraisal Study was initiated under the general authority contained in the Reclamation Act of June 17, 1902. During preparation of this report, feasibility study authority was provided by Public Law (PL) 108-361, Section 103(f)(1)(A). The authorization states that “Funds may be expended for feasibility studies, evaluation, and implementation for the San Luis Reservoir Low Point improvement project, except that Federal participation in any construction of an expanded Pacheco Reservoir shall be subjected to future congressional authorization.”

STUDY AREA

The study area (**Figure 1-1**) includes San Luis Reservoir and the service area of the Authority. Authority members are CVP contractors within the San Felipe, West San Joaquin, and Delta divisions of the CVP. San Luis Reservoir was completed in 1967 and has a total storage of 2.03 million acre-feet (MAF). It is located in Merced County about 80 miles southeast of San Francisco. The reservoir is jointly owned and operated by Reclamation and DWR for the CVP and State Water Project (SWP), respectively.

ORGANIZATION OF THIS REPORT

The Appraisal Report is divided into seven chapters. **Chapter 1** discusses the purpose and scope of the Appraisal Report and describes the study authorization and study area. **Chapter 2** describes existing projects, prior reports, and agreements. **Chapter 3** summarizes water resources problems. **Chapter 4** discusses plan formulation and potential water resources management measures and potential alternatives. **Chapter 5** describes the scope for a potential feasibility study. **Chapter 6** summarizes the findings and recommendations of this Appraisal Study. **Chapter 7** provides a list of pertinent reference resources used in preparing this Appraisal Study.

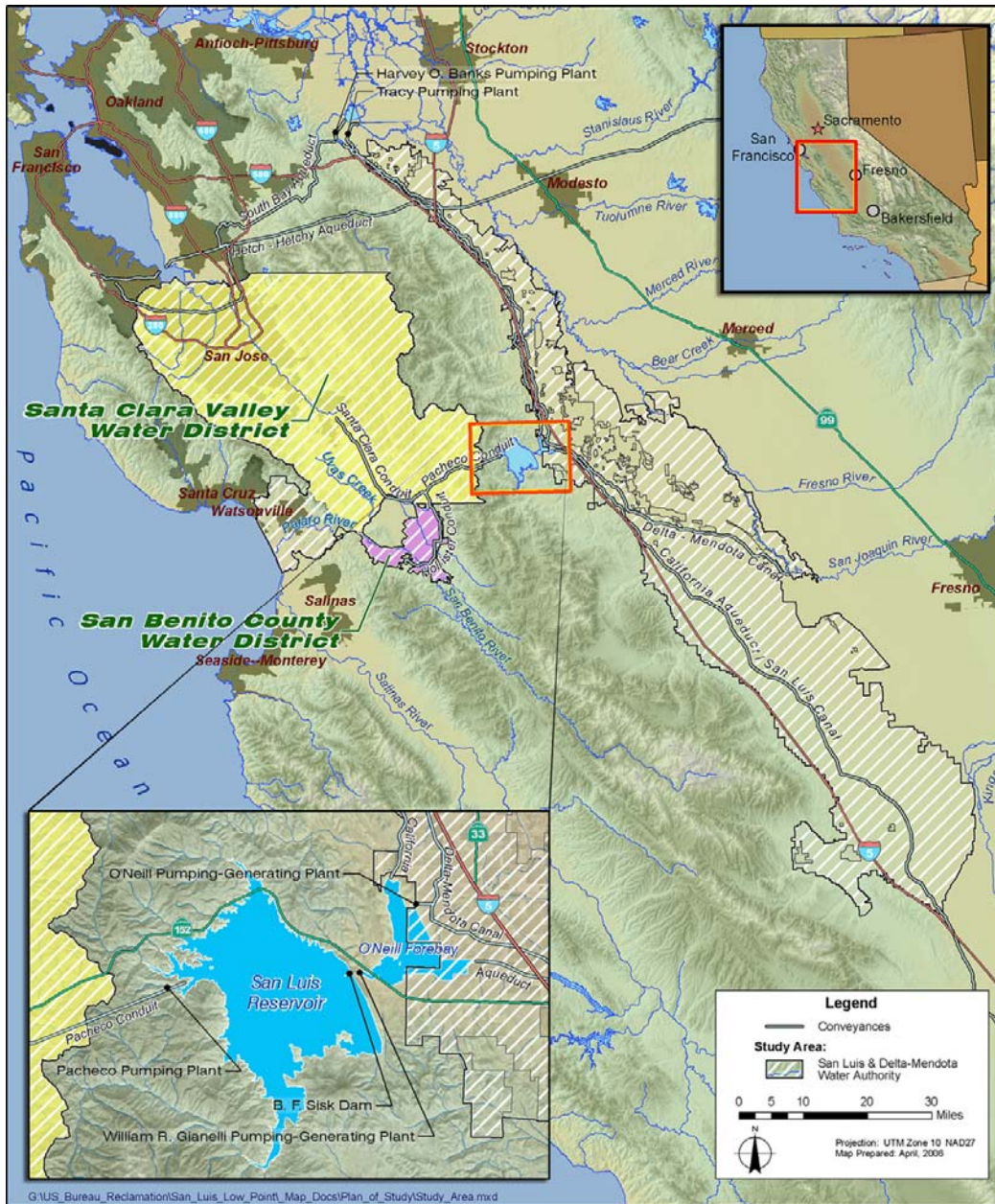


FIGURE 1-1. STUDY AREA

THIS PAGE LEFT BLANK INTENTIONALLY

CHAPTER 2. EXISTING PROJECTS, PRIOR REPORTS, AND AGREEMENTS

This chapter provides an overview of existing water projects, prior studies and reports, and agreements and contracts that are relevant to this Appraisal Study. Many of the studies, reports, agreements, and conditions are noted in this chapter in response to changing environmental and other regulatory requirements for CVP operations.

EXISTING PROJECTS

San Luis Reservoir is an offstream, pumped-storage reservoir jointly owned and operated by Reclamation and DWR as part of the CVP and SWP, respectively. The following section briefly summarizes the facilities and operations of the CVP and SWP in the study area.

Central Valley Project Facilities

Federal authorization for construction of the CVP was initially provided in the Rivers and Harbors Act of 1935 and reauthorized in the River and Harbors Act of 1937. Several subsequent authorizations added divisions and project purposes. Today, the CVP is authorized for navigation, flood control, agricultural, municipal and industrial (M&I) water supply, power generation, and environmental purposes. Nine divisions are included in the CVP – the Delta Division, four divisions located north of the Delta, and four divisions located south of the Delta. This Appraisal Study focuses on the West San Joaquin, San Felipe, and Delta divisions.

San Luis Unit, West San Joaquin Division

PL 86-488, 74 Stat. 156, authorized the San Luis Unit on June 3, 1960. The unit includes joint Federal and State facilities for the storage and conveyance of water to CVP contractors in the West San Joaquin and San Felipe divisions and SWP contractors in the San Joaquin Valley and southern California.

San Luis Reservoir is located near Los Banos on the west side of the San Joaquin Valley. The reservoir, with a capacity of 2.03 MAF, is the world's largest offstream pumped-storage reservoir that stores both CVP and SWP water exported from the Delta. Reclamation owns 45 percent of San Luis Reservoir and its appurtenant facilities while DWR owns the remaining 55 percent. **Figure 2-1** shows the primary features of the San Luis Reservoir area.

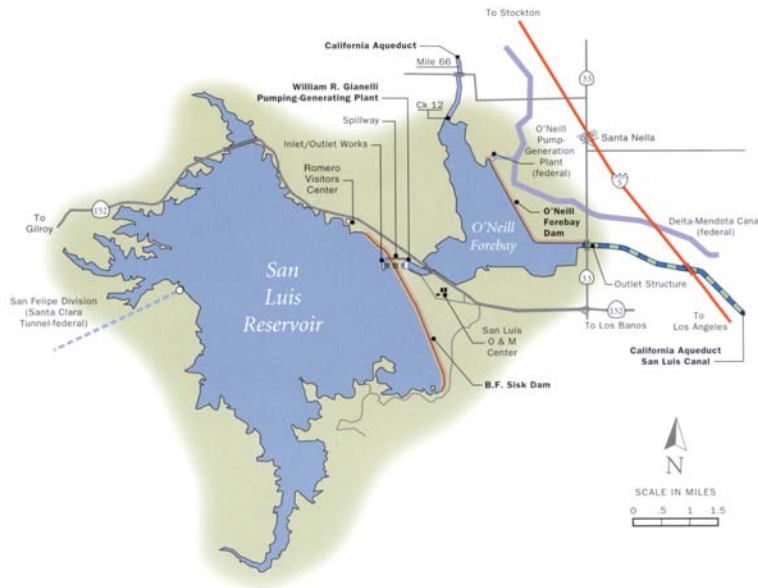


FIGURE 2-1. PRIMARY FEATURES OF SAN LUIS RESERVOIR

The main dam at San Luis Reservoir is the B.F. Sisk Dam, a zoned earthfill structure 382 feet high, with a crest length of 18,600 feet. The 2.03 MAF gross pool in San Luis Reservoir is at elevation 543 feet above mean sea level (msl). The minimum operating pool of 79 thousand acre-feet (TAF) is at an elevation of 326 feet above msl. Minimum (dead) pool storage is 8 TAF at elevation 281 feet above msl.

Water is delivered to San Luis Reservoir and withdrawn for delivery to CVP and SWP contractors in the San Joaquin Valley and further south through the William R. Gianelli Pumping-Generating Plant and inlet/outlet works (see **Figure 2-2**). The bottom elevation of the Gianelli outlet works is at 296 feet above msl. Water is withdrawn from San Luis Reservoir for delivery to the San Felipe Division through the upper and lower Pacheco intakes. The upper intake is at 376 feet above msl and the top of the lower intake is at 334 feet above msl.

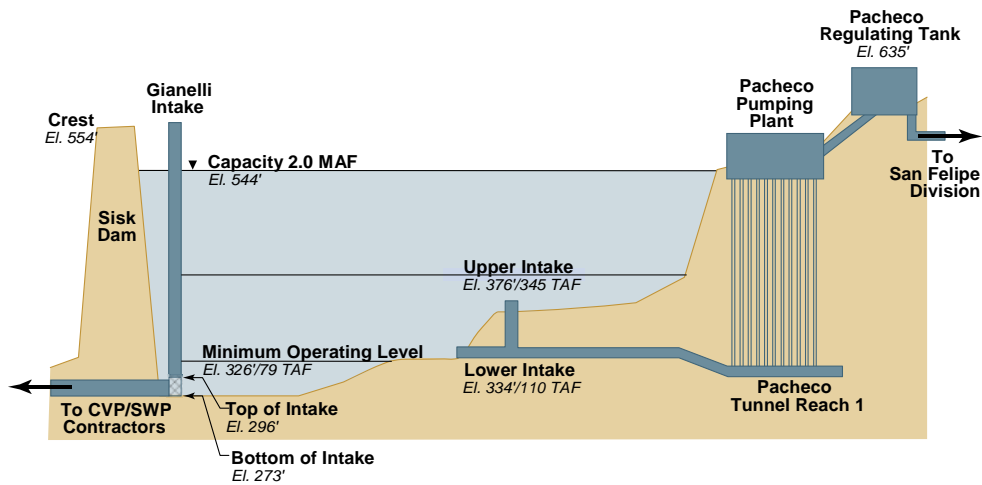


FIGURE 2-2.
SCHEMATIC OF SAN LUIS RESERVOIR OPERATIONS

San Felipe Division

The San Felipe Division of the CVP was authorized on August 30, 1967, by PL 90-72. Current CVP contractors in the San Felipe Division are SCVWD and San Benito County Water District (SBCWD). Water delivery contracts with SCVWD and SBCWD were signed in 1977, and water deliveries began in 1987. Key facilities of the San Felipe Division include San Justo Dam and Reservoir, Pacheco Conduit, Hollister Conduit, and Santa Clara Conduit.

Deliveries to the San Felipe Division from San Luis Reservoir began in 1987. Water is conveyed from the San Luis Reservoir via the Pacheco Tunnel and Pumping Plant. The intake consists of a 1.8-mile-long underwater channel on the bottom of San Luis Reservoir that conveys water from the center of the reservoir to the Pacheco Pumping Plant. The Pacheco Pumping Plant (**Figure 2-2**) has a total rated capacity of approximately 490 cubic feet per second (cfs). From the Pacheco Pumping Plant, water is lifted to the 5.3-mile-long Pacheco Tunnel Reach 2. Water flows through the Pacheco Tunnel, the Pacheco Conduit, and then through the bifurcation of the Santa Clara and Hollister conduits to SCVWD and SBCWD.

Delta Division

The Delta Division of the CVP was originally identified as the Contra Costa Division in the initial CVP authorization in 1935. The division included the Contra Costa Canal and San Joaquin Valley pumping system. The primary Delta Division facility of interest in this Appraisal Study is the Delta-Mendota Canal (DMC).

State Water Project Facilities

The SWP was approved by California voters in 1960 (Water Code, Section 12930, et seq.). The project extends from Plumas County in the north to Riverside County in the south. SWP facilities include 23 dams and reservoirs, 6 powerplants, 17 pumping plants, and 533 miles of

aqueduct. In the southern portion of the Delta, the Harvey O. Banks Delta Pumping Plant lifts water into the California Aqueduct (CA) from the Clifton Court Forebay. With a total length of 444 miles, CA is the State's largest and longest water conveyance system, beginning at the Banks Pumping Plant and extending to Lake Perris, south of Riverside in Southern California.

The SWP "Table A" lists the maximum contract amount for each contractor in a given year. The total annual maximum deliveries of up to 4.2 MAF are allocated to the north-of-Delta area (38.9 TAF), San Francisco Bay area (290 TAF), central coast (70.5 TAF), San Joaquin Valley area (1,183 TAF), and Southern California area (2,572 TAF).

Water Purveyors in Study Area

The two major water interests related to this Appraisal Study in the study area are the San Felipe Division and the Authority. Following is a brief description of each.

San Felipe Division

Current CVP contractors in the San Felipe Division include SCVWD and SBCWD. Several locally owned and operated reservoirs in SCVWD and SBCWD are used in the management of local and imported water supplies, including CVP deliveries (**Table 2-1**).

TABLE 2-1. LOCAL RESERVOIRS IN THE SAN FELIPE DIVISION

Reservoir	Year Constructed	Capacity (TAF)
Santa Clara Valley Water District		
Stevens Creek Reservoir	1935	3.1
Almaden Reservoir	1935	1.6
Calero Reservoir	1935	9.9
Guadalupe Reservoir	1935	3.4
Lexington Reservoir	1952	19.0
Vasona Reservoir	1935	0.4
Coyote Reservoir	1936	23.2
Anderson Reservoir	1950	90.4
Chesbro Reservoir	1955	7.9
Uvas Reservoir	1957	9.8
Total		168.9
San Benito County Water District		
San Justo Reservoir		7.4
Hernandez Rese		13.8
Paicines Reservoir		0.9
Total		22.1

TAF = thousand acre-feet

SCVWD is responsible for water supply, flood protection, and watershed management in Santa Clara County, west of San Luis Reservoir. The district encompasses all of the county's 1,300 square miles and serves the area's 15 cities, 1.7 million residents, and more than 200,000 commuters. The water supply portfolio of SCVWD includes local supplies, contracted imports, banking, and transfers (**Table 2-2**). SCVWD manages 10 reservoirs and one local groundwater basin. Imported supplies include deliveries from the CVP (from San Luis Reservoir through the Pacheco Conduit), SWP (through the South Bay Aqueduct), and the San Francisco Public

Utilities Commission (through a diversion from the Hetch-Hetchy Aqueduct in the northern region of SCVWD). SCVWD also has a contract for 350 TAF of groundwater banking storage in the Semitropic Water Bank in the southern portion of the San Joaquin Valley.

As of 2002, irrigation accounted for 75 percent of water use in SBCWD. Prior to contracting with the CVP for water, SBCWD primarily relied on groundwater for agricultural production and M&I use. SBCWD relies on three reservoirs to manage CVP and local runoff. SBCWD imports CVP water through the San Felipe Division to supplement local groundwater and surface supplies and manage different sources of supply through conjunctive use.

**TABLE 2-2. SANTA CLARA VALLEY WATER DISTRICT:
ANNUAL WATER SUPPLIES**

Hydrology	Very Wet (TAF)	Average (TAF)	Multiple Dry (TAF)	Very Dry (TAF)
Representative Year	1983	1926	1987-92	1977
Local Supplies				
Natural Groundwater Recharge	231.0	99.0	52.0	38.0
Managed Recharge	90.0	90.0	34.0	8.0
Imported Supplies				
Central Valley Project	148.0	109.0	77.0	32.5
State Water Project	100.0	70.0	49.0	35.0
Other Supplies				
Other Local Surface Water	15.0	11.0	6.3	1.4
Hetch-Hetchy	72.0	54.0	42.0	36.0
Recycling	7.8	7.8	7.8	7.8
Total	663.8	440.8	268.1	158.7

Source: Draft 2003 Santa Clara Valley Water District Integrated Water Resources Plan, 2004.

San Luis & Delta-Mendota Water Authority

The Authority was established in January 1992 and consists of 32 Federal and exchange water service contractors within the study area. CVP contractors of the San Felipe Division are members of the Authority. The Authority assumed the operation and maintenance responsibilities of certain CVP facilities. It also serves the information and representation needs of its members, and pursues reliable water supply for its member districts.

PRIOR REPORTS

Many reports and ongoing studies relate to water supply and quality issues at San Luis Reservoir, as described below.

California Water Plan

The State, through DWR, prepares and publishes the California Water Plan in its Bulletin 160 series. Eight versions of the plan were published between 1966 and 2006. A 1991 amendment to the California Water Code directed DWR to update the plan every 5 years. The Bulletin 160 series assesses California's agricultural, environmental, and urban water needs and evaluates water supplies to quantify the shortfall between future water demands and supplies.

One of the focuses of the 1998 California Water Plan is water management actions that could be implemented to improve California's water supply reliability. Under existing conditions, the 1998 California Water Plan estimated that the north coast and San Francisco Bay areas would not face shortages under average-year hydrologic conditions; the rest of the State would have shortfalls of between 10 TAF and 900 TAF even in an average-year. Under drought-year conditions, the 1998 California Water Plan estimated that the entire State would face water shortage (DWR, 1998). While the 1998 Bulletin 160 identifies some potential additional supply measures, limited progress has been made in planning and developing these supplies.

The 2006 California Water Plan emphasizes reducing regional water problems with a strong reliance on water use efficiency. The 2006 California Water Plan does not include a water budget (DWR, 2006).

CALFED Bay-Delta Program

The CALFED Bay-Delta Program is a cooperative effort between Federal and State agencies and California's environmental, urban, and agricultural communities to address long-term solutions to four problem areas: (1) water quality, (2) ecosystem quality, (3) water supply reliability, and (4) levee system integrity. The PPA in the CALFED ROD consists of programmatic elements that set the long-term direction of the CALFED Bay-Delta Program to meet its Mission Statement and objectives.

One of the elements described in the PPA is a bypass canal from the Delta export facilities to the San Felipe Division at San Luis Reservoir. When operated in conjunction with local storage, this canal would allow SCVWD to receive water from the Delta pumping facilities, thereby avoiding water quality problems associated with the "low point" water levels in San Luis Reservoir. It was expected that resolving the "low point" issue would increase the effective storage capacity in San Luis Reservoir by up to 200 TAF. Subsequent studies have included assessments of the low point problem in San Luis Reservoir to better define resource issues when the reservoir is drawn down, and other potential solutions to address these issues.

Central Valley Project Improvement Act Yield Replacement Plan

Section 3408 (j) of the Central Valley Project Improvement Act (CVPIA) specified that a least-cost plan for replacing CVP yield reallocated to fishery and wildlife purposes be submitted to Congress by 1995. The 1995 Least-Cost CVP Yield Increase Plan, and the draft report, "*Replacing the Delivery Impact of CVPIA: A Supplement of the Least-Cost CVP Yield Increase Plan*" (Reclamation, 2003b), delineate options to meet the yield replacement specifications of the CVPIA.

Non-Federal Feasibility Report for San Luis Reservoir Low Point Improvement Project

A non-Federal study of potential solutions to water quality and supply reliability problems in the San Felipe Division related to San Luis Reservoir low storage levels led by SCVWD was initiated in 2001. Reclamation was a NEPA lead in the non-Federal study. A preliminary administrative draft of a non-Federal feasibility report was completed in December 2003 (SCVWD, 2003b). Goals of the study are as follows:

- Increase the operational flexibility of San Luis Reservoir by increasing the operational storage.
- Ensure that San Felipe Division contractors are able to use their annual CVP contact allocation to meet their water supply and water quality commitments.
- Provide opportunities for project-related environmental and other improvements.

Reclamation was the Federal lead in the non-Federal feasibility study for compliance with the NEPA but did not direct any study activities. On July 17, 2002, the Notice of Intent (NOI) to prepare an Environmental Impact Statement (EIS) appeared in the Federal Register. SCVWD is the lead for completing an Environmental Impact Report (EIR) in compliance with the California Environmental Quality Act (CEQA).

Anderson Reservoir Study

Anderson Reservoir is the largest surface storage facility in SCVWD. It is a 90.4 TAF reservoir built in 1950. SCVWD is currently completing an operations study of the reservoir that likely will present alternative operations procedures for the reservoir.

Water Transfer Program for the San Joaquin River Exchange Contractors Water Authority

The final EIS/EIR, completed in December 2004 (Reclamation, 2004c), was prepared for a water transfer program for the San Joaquin River Exchange Contractors Water Authority. The program will assist CVP agricultural service contractors in obtaining additional CVP water when full contract deliveries cannot otherwise be made, and provide SCVWD with short-term water supplies to support agriculture and/or M&I uses in Santa Clara County when full contract deliveries cannot otherwise be made.

Lead agencies for the 10-year (2005 to 2014) exchange agreement are Reclamation and the San Joaquin River Exchange Contractors Water Authority.

SCVWD Urban Water Management Plan

In conformance with the Urban Water Management Plan Act (California Water Code, Section 10610), SCVWD prepares an Urban Water Management Plan (UWMP) every 5 years. The plan reflects current water supplies and demands, and SCVWD's projected demands and supplies over a 20-year period.

Integrated Water Resources Planning Study

SCVWD completed a Draft Integrated Water Resources Planning Study (SCVWD, 2004) to identify the process and evaluation framework for SCVWD investment decisions in future water supply management. The evaluation period covers the near term, through 2010 (Phase I), the midterm, 2011-2020 (Phase II), and the long term, through 2040 (Phase III). The report identifies components necessary in meeting future needs through ensuring the long-term viability of SCVWD's existing supplies, infrastructure, and programs.

San Benito County Water District Annual Groundwater Report

SBCWD annually completes a groundwater report assessing the water demands on, and quality of, its groundwater resources. The report shows groundwater usage, groundwater availability, and use of other water supply sources.

Westside Integrated Water Resources Management Plan

The Authority's Board of Directors accepted the Westside Integrated Water Resources Management Plan in July 2005. The plan depicts current issues, including San Luis Reservoir operations and actions that may likely influence regional water use and economic development.

INFLUENCING CONTRACTS, AGREEMENTS, AND CONDITIONS

Following is an overview of several pertinent contracts, agreements, propositions, and plans that could influence operation of CVP and SWP facilities influencing the Authority and San Felipe Division deliveries.

CVP Contracts

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

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

CVP Water Service Contracts

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

Deliveries of CVP water service contract waters are subject to hydrologic conditions, contractor requests, and the CVP shortage policy for water service contractors (**Table 2-3**). Under current policy, M&I allocations are at full contract levels until agricultural allocations are reduced to 75 percent. Under dry conditions, agricultural allocations can be reduced to zero, while M&I allocations can be reduced to 50 percent.

TABLE 2-3. CURRENT CVP SHORTAGE POLICY FOR WATER SERVICE CONTRACTS

Municipal and Industrial Use (Percentage of Contract Amount)	Agricultural Use (Percentage of Contract Amount)
100	100
100	95
100	90
100	85
100	80
100	75
95	70
90	65
85	60
80	55
75	50
75	45
75	40
75	35
75	30
75	25
70	20
65	15
60	10
55	5
50	0
<i>Reduced to 0, if necessary</i>	

Two contracting agencies in the San Felipe Division currently receive delivery of CVP water supply. The total annual contract amount for the division is 196.3 TAF (**Table 2-4**), of which about 65 percent is for M&I use. Reclamation entered into a contract in 1997 with SCVWD for CVP water service and for operation and maintenance of certain works of the San Felipe Division. South-of-Delta water service contractors are members of the Authority. Most of these contractors are part of the West San Joaquin Division. Total annual contract amounts for south-of-Delta water service contractors are 1,979 TAF, of which about 78 percent is for M&I use.

**TABLE 2-4.
SUMMARY OF CVP SAN FELIPE DIVISION ANNUAL CONTRACT AMOUNT**

Total Annual Contract Amount	Municipal and Industrial (TAF)	Agricultural (TAF)	Total (TAF)
Water Service Contracts in San Felipe Division	127.65	68.65	196.30
South-of-Delta In-Basin Water Service Contracts	154.20	1,824.76	1,978.96
San Joaquin River Exchange Contracts			840.00

CVP = Central Valley Project
TAF = thousand acre-feet

San Joaquin River Exchange Contractors

San Joaquin River Exchange Contractors are contractors who receive CVP water from the Delta at the Mendota Pool. Under the Exchange Contracts, the parties agreed to not exercise their San Joaquin River water rights in exchange for a substitute CVP water supply from the Delta. These exchanges allowed for water to be diverted from the San Joaquin River at Friant Dam under the water rights of the United States for storage at Millerton Lake.

The purchase contract dealt primarily with riparian water rights. When Reclamation purchased these rights, they were “extinguished” and thereby made water available for storage and diversion at Friant Dam at the San Joaquin River. This also made water available for storage and diversion at Friant Dam. However, under the Exchange Contract, no transfer of water rights occurred, and Reclamation is responsible for delivering water to these contractors in accordance with these contracts.

The total annual contract amount for the San Joaquin River Exchange Contractors is 840 TAF (**Table 2-4**). Water availability for delivery to the San Joaquin River Exchange Contractors and to Mendota Pool Contractors is approximately based on the Shasta Criteria. The Shasta Criteria are used to establish when a water year is considered critical, based on inflow to Shasta Lake. In critical years, deliveries to the San Joaquin River Exchange Contractors would be reduced to 75 percent of the contract amount.

CVP Operations Criteria and Plan

In June 2004, Reclamation prepared a Long-Term CVP Operations Criteria and Plan (OCAP) to update proposed CVP operation in view of changes in regulations, increases in system demand, and anticipated new programs/projects coming online in the future, including the 1993 Winter Run Biological Opinion (BO), implementation of CVPIA Section 3406(b)(2) water, the Environmental Water Account (EWA), and Joint Point of Diversion (JPOD). Implementation of the revised OCAP is subject to Federal Endangered Species Act (ESA) consultation.

Joint Point of Diversion

The JPOD and Napa Proposal facilitate managerial flexibility for project water pumping, conveyance, and storage. The JPOD allows DWR to regularly enter into agreements with Reclamation to wheel CVP water through SWP facilities. This benefits the CVP because of physical and institutional pumping constraints at the Tracy Pumping Plant. In 1999, SWRCB certified the Final EIR for Consolidated and Conformed Place of Use, giving Reclamation and DWR approval to divert or redivert water from each other’s points of diversion in the south Delta. SWP conveyance is available to the CVP when (1) a surplus condition exists, when the SWP has filled the SWP portion of San Luis Reservoir, and satisfied Article 21 demand and (2) under balanced conditions, when the SWP has satisfied its target storage in San Luis and chooses not to move more water from Oroville Dam to San Luis.

CALFED Conveyance Program - South Delta Improvement Program

The South of Delta Improvement Program (SDIP) considered by Reclamation and DWR includes the installing permanent barriers with operable gates, increasing permitted diversion rates to the Clifton Court Forebay, dredging channels in the South Delta, and extending agricultural diversions. The project was proposed to improve the water quality and protect fish

in the South Delta and increase the reliability and amount of water deliveries to south-of-Delta water users. The proposed physical changes include replacement of seasonal rock barriers with four permanent barriers with operable gates. This would protect fish and improve water circulation and levels in the South Delta. In total, these actions would improve water quality and give farmers improved access to irrigation water. Operation of these permanent barriers could improve the existing practice to ensure water quality for agricultural beneficial use in the South Delta, as required in SWRCB Water Right Decision 1641 (D-1641). Operation of these permanent barriers also could be incorporated into DMC recirculation to reduce the level of operational limitations stemming from water quality concerns in the South Delta.

The draft EIS/EIR for the SDIP was released on November 10, 2005; release of the draft initiates a formal public process. Proposed physical improvements to South Delta infrastructure will be considered during a 90-day review period. If it is decided to build the permanent barriers with operable gates, construction is expected to be complete in April 2009.

Delta-Mendota Canal-California Aqueduct Intertie

An intertie from the Delta-Mendota Canal to the CA would allow more frequent fillings of the San Luis Reservoir, help to ensure that DMC deliveries are maintained during pump outages, and potentially increase direct deliveries. The Proposed Finding of No Significant Impact/Negative Declaration and Draft Environmental Assessment/Initial Study was completed in September 2004, and the Finding of No Significant Impact was approved in May 2005.

The intertie would include a 450 cfs pumping plant at the DMC that would allow approximately 400 cfs to be pumped from the DMC to the CA through an underground pipeline. Because the CA is located approximately 50 feet higher in elevation than the DMC, up to 900 cfs of flow could be conveyed from the CA to the DMC using gravity flow. The intertie would be used in a number of ways to achieve multiple benefits, including meeting current water supply demands, allowing for the maintenance and repair of CVP Delta export and conveyance facilities, and providing operational flexibility to respond to emergencies related to both the CVP and SWP.

Monterey Agreement: State Water Project Extended Carryover Program

The Monterey Agreement (1995) is an agreement between DWR and individual SWP contractors to amend the terms of the SWP long-term contracts. Pursuant to Article 56 of the agreement, contractors can elect to store project water outside their service area for later use within their service area. This includes the use of conservation storage in SWP facilities. No limitation exists on how long a contractor's extended carryover may be stored, as long as the storage space is not required for project purposes, given other contractors' carryover storage and requests for carryover storage. In addition, a contractor may store non-project water as carryover in SWP facilities. A contractor's stored water may be "spilled" or displaced from SWP storage facilities if the capacity is needed by DWR. For the past several years, implementation of this program has resulted in the storage of allocated SWP water in the reservoir, thereby maintaining higher reservoir levels during the late summer.

Central Valley Project Carryover Program

As a result of conservative annual allocations made in April, "late season" allocations often are made in August or September. Because most CVP contractors are agricultural producers, planting decisions have already been made, and additional supplies often cannot augment the

current season's cropping patterns. Late-year allocations can be "carried over" in San Luis until approximately April 16, or 6 weeks into the new contract year.

Some growers have implemented conservation measures to intentionally carry over water as a buffer to potential allocation shortfalls in the following year. The result of these actions is higher reservoir levels than would occur if all allocated water were delivered in a given year.

Safety of Dam Project Management Guidelines

Decision Memorandum 99-IE-BFSSL-01 was prepared in 1999 as directed by, and in accordance with, the Policy on Dam Safety Decision Making in the Reclamation Manual. The Draft Safety of Dam Project Management Guidelines also were used in preparation of the Decision Memorandum. The decision notes that drawdown rates should be limited to less than about 2 feet per day. Short duration drawdowns exceeding this rate would be acceptable provided cumulative drawdown did not exceed that experienced in 1981.

1972 Supplemental Agreement Between the State of California and the United States Bureau of Reclamation

The 1972 Supplemental Agreement between the State of California and Reclamation recognized that, as much as possible, operations of San Luis Reservoir should strive to maintain a storage capacity of 350,000 acre-feet between Memorial Day and Labor Day. It does not supersede the authorization or contractual obligations of the West San Joaquin or San Felipe divisions of the CVP or the obligations of the SWP. CVP and SWP operators have had more difficulty satisfying this agreement in some years as water demands for CVP and SWP contractors have grown toward their full contract amounts and environmental regulations have modified project operations and reduced water supply reliability. In some years, the effects of carryover water under the Monterey Agreement and CVP Carryover Program contribute to higher storage levels that incidentally meet the objectives of this agreement, as described above.

CHAPTER 3. PROBLEM IDENTIFICATION

Existing and future water resources problems associated with low pool levels in San Luis Reservoir are related to growing needs for Federal and State projects to deliver water supplies. Following is a description of significant resources conditions in the study area and a statement of the identified resources problems.

GROWTH IN WATER DEMAND

CVP contract amounts are not expected to increase; however, the proportion of M&I demand has increased over time. For the SWP, it is anticipated that demand on the SWP will increase over time to the full "Table A" amount. Water demands, especially during drought years, exceed supplies in many areas of California, including in the San Felipe Division. Because of the growing statewide demands, it is estimated that in the future, both CVP and SWP facilities will be severely stressed. Local San Felipe Division demands and supply balances suggest that for SCVWD and other members of the Authority that will rely on their CVP contracts to meet most of their future demands, the effect of CVP water supply shortages will become more severe on these districts as the availability of alternative water supplies is reduced.

Statewide

The 1998 California Water Plan estimated California population will increase from 32 million to about 46 million by 2020. State population is projected to reach nearly 60 million people by 2040. The projected increase in population growth will result in increasing demands on water resources systems, including needs for greater quantity and more reliable water supplies, energy supplies, flood control, recreation, and other water-oriented facilities.

Table 3-1 shows the estimated California water demand, supply, and shortages for average and drought year conditions under 1995 and 2020 levels of development. In average years, the shortage will increase from 1.6 to 2.4 MAF due to demand growth; in drought years, the shortage will increase from 5.1 to 6.2 MAF.

**TABLE 3-1.
 CALIFORNIA WATER BUDGET WITH EXISTING FACILITIES AND PROGRAMS**

Level of Development	1995		2020	
Hydrologic Conditions	Average (MAF)	Drought (MAF)	Average (MAF)	Drought (MAF)
WATER USE				
Urban	8.8	9.0	12.0	12.4
Agricultural	33.8	34.5	31.5	32.3
Environmental	36.9	21.2	37	21.2
Total	79.5	64.7	80.5	67.3
SUPPLIES				
Surface Water	65.1	43.5	65.0	43.4
Groundwater	12.5	15.8	12.7	16.0
Recycled and Desalted	0.3	0.3	0.4	.4
Total	77.9	59.6	78.1	59.8
SHORTAGE	1.6	5.1	2.4	6.2

Source: Table 6-1, 1998 California Water Plan Bulletin 160-98.
 Average – average annual over a 73-year hydrologic sequence from water year 1922 through 1994.
 Drought – average annual of 1990 and 1991 water years.
 MAF – million acre-feet

San Felipe Division

Table 3-2 summarizes SCVWD water demands and potential shortages developed under the 2003 SCVWD Integrated Water Resources Plan (IWRP) for different hydrologic conditions from 2005 through 2040 based on water supplies identified in **Table 2-2**. Although water supplies are adequate to meet SCVWD demands in average years through 2020, and wet years through 2040, dry year shortages are estimated to grow by about 40 TAF in 2020 and by over 90 TAF in 2040. This represents a nearly 20 percent increase in water shortages in 2020 from 2005. Accordingly, without SCVWD’s aggressive water conservation and supply management programs, water shortages would be even greater and more frequent. In general, it is expected that SCVWD’s demands for water will exceed supplies.

By 2020, it is estimated that SBCWD annual M&I demands will increase from 10.7 to 11.5 TAF, while agricultural demands will increase from 54.1 to 74.9 TAF. SBCWD relies on CVP deliveries to protect its local groundwater basin and to improve water quality through blending different water sources. Impaired CVP deliveries will force SBCWD to rely heavily on groundwater of high salinity and thus negatively impact agricultural production and profitability. SBCWD has not identified any additional sources of water supplies to date. A combination of growing agricultural and M&I demands, and limited alternative supplies, would result in greater water shortages in SBCWD.

**TABLE 3-2.
SCVWD ANNUAL WATER DEMAND AND SURPLUS/SHORTFALL**

Year	Projected Demand	Projected Surplus/Shortfall (TAF)			
		Very Wet	Average	Multiple Dry	Very Dry
2005	382.0	281.8	58.8	(113.9)	(223.3)
2020	422.0	241.8	18.8	(153.9)	(263.3)
2040	475.0	188.8	(34.2)	(206.9)	(316.3)

Source: Santa Clara Valley Water District Integrated Water Resources Plan, 2003, Draft.
Surplus/shortfall = demand minus supply in Table 2-2.
SCVWD = Santa Clara Valley Water District

San Luis & Delta-Mendota Water Authority

Agricultural members of the Authority are provided with low early contract allocations in a given water year that are subsequently adjusted during the irrigation season as hydrologic conditions allow. This occurs because Reclamation conservatively determines early season allocations to avoid potential delivery shortfalls. The implications of conservative early season allocations include the following:

- The Authority CVP contractors experience annual water shortages for which they compensate by pumping additional groundwater and purchasing water transfers. Authority members are concerned about this practice because current groundwater pumping levels are not at a sustainable level and future water transfer costs are expected to increase.
- Members of the Authority depend on CVP deliveries to a great extent to meet their peak season demands. Interruption to CVP deliveries would adversely affect crop production.
- Regional agricultural production is reduced because low early season water allocations create difficulties in obtaining financing.

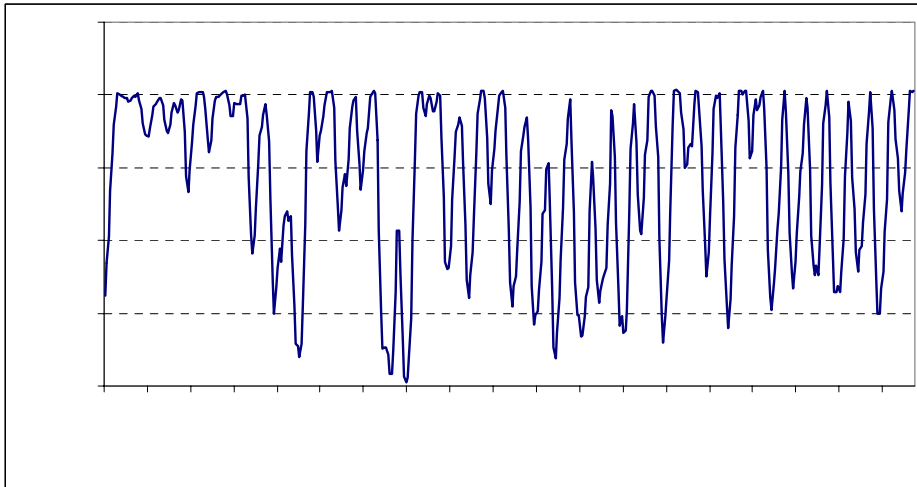
PROJECT OPERATIONS

Of the 2.04 MAF of San Luis Reservoir capacity, the Federal share is 918 TAF and the State share is 1,123 TAF. The Federal share is operated by the Reclamation Central Valley Operations Office (CVOO) while the State's share is operated by the SWP Operation Control Office (OCO). CVP south-of-Delta water demands primarily include M&I, irrigation, refuge, and other environmental purposes. CVOO operates the reservoir on an annual basis to maximize use of available water to meet CVP contractors' annual requests and the requirements of other authorized purposes. Typically, San Luis Reservoir is filled during October through March from available supplies in the Delta and drawn down from April through September. During the rainy season, water from the Delta is pumped into San Luis Reservoir via the CVP DMC and SWP CA. The goal is to fill the reservoir to the maximum extent possible with available supplies from the Delta in the wet season. During the dry season, water previously stored in the reservoir is released through the Pacheco Tunnel to the San Felipe Division and/or through the Gianelli Intake to CVP and SWP contractors south of the Delta.

Annual CVP and SWP allocations are based on the 79 TAF minimum operating pool as a drawdown limit. Of this pool volume, 36 TAF are allocated to the CVP and 43 TAF to the SWP. Operational goals of both the CVP and SWP are to maximize annual water delivery under their respective contracts and to do so to the extent possible without needing to draw the reservoir down to the minimum level. The elevation in San Luis Reservoir during the late summer and early fall periods varies from year to year depending on various conditions, including the amount of stored water carried over from the previous year (carryover water), the volume of water that can be delivered from the Delta (usually depends on hydrologic conditions), demands of Federal and State contractors, and operational decisions made by Reclamation and DWR.

In most years, the historical storage level in San Luis Reservoir (**Figure 3-1**) has remained above 300 TAF. The reservoir has not been drawn down to its minimum operating pool since before the San Felipe Division began deliveries in 1987, when drawdown events occurred in response to droughts and to allow maintenance. As expected, during the drought periods of 1976 to 1977 and 1988 to 1992, the reservoir was drawn down to below 500 TAF. San Luis Reservoir was drawn down to a storage level of 79 TAF to facilitate repairs in 1981 and 1982.

Over the last 10 years, the average reservoir level in late summer was greater than 650 TAF. For the past several years, SWP contractors have selected to carry over allocated water in the reservoir. However, it is expected that this condition will not continue. Hydrology, regulatory requirements, and additional operating responsibility for environmental needs have significantly changed since San Luis Reservoir was constructed. Such changes have increased uncertainties and concerns about water delivery reliability at lower water storage levels in San Luis Reservoir. Water supply reliability problems associated with the CVP and SWP have resulted from multiple factors that, in combination, have reduced the operational flexibility and delivery reliability of the water projects in comparison to originally anticipated project operations that formed the basis for water contract levels. Accordingly, regulatory actions pursuant to the Federal ESA, CVPIA, and Clean Water Act have reduced both the availability of water supplies in upstream storage facilities and the ability to export water supplies through Delta pumping facilities. These reductions in water supply availability have occurred simultaneously with increasing needs for urban water users, which have “hardened” water demands.



Source: California Data Exchange Center

FIGURE 3-1.
HISTORICAL SAN LUIS RESERVOIR BEGINNING-OF-MONTH STORAGE FOR
OCTOBER 1968 THROUGH MARCH 2006

REGULATORY REQUIREMENTS

Since completion of San Luis Reservoir, the institutional and regulatory environment for water management in California has changed. Major influencing changes relate to implementation of provisions contained in the Federal ESA (1973), Water Right Decision 1485 (SWRCB, 1978), Coordinated Operation Agreement (COA) (Reclamation/DWR, 1986), CVPIA (1992), Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (SWRCB, 1995), D-1641 (SWRCB 1999), and the EWA. Many of these regulatory actions have constrained operation of the CVP and SWP, resulting in reduced water supply reliability to contractors receiving exported water from the Delta.

Operation of the CVP is affected by BOs issued under the authority of the ESA to protect endangered winter-run Chinook salmon and threatened delta smelt, spring-run Chinook salmon, and steelhead trout. Operations in compliance with the BOs can affect water supply reliability to CVP contractors, especially for south-of-Delta contractors who rely on Delta exports.

Current CVP operations must comply with Title 34 of the Reclamation Projects Authorization and Adjustment Act of 1992 (PL 102-575), also known as the CVPIA, which added mitigation, protection, and restoration of fish and wildlife to the list of authorized project purposes of the CVP. The CVPIA mandated many changes in management of the CVP, particularly for protection, restoration, and enhancement of fish and wildlife. Paramount among these changes is the reallocation of 800 TAF of CVP yield to environmental purposes, allocation of additional project yield for refuge water supplies, and a reduction in water supply imported from the Trinity River Basin. Implementation of CVPIA provisions has influenced operation of the entire CVP, including San Luis Reservoir, and has resulted in reduced water supply reliability to all CVP contractors.

WITHOUT-PROJECT CONDITIONS

Defining likely without-project conditions is an important step in Federal water resources planning. The without-project conditions aid in accurately defining water resources problems and needs. The without-project conditions serve as a baseline against which alternatives can be evaluated to determine their effectiveness, and to identify resulting impacts. In defining the without-project conditions, changes in parameters are taken into account such as projects related to population, land uses, and new local and regional water resources and programs related to located and regional water resources. Normally, only currently adopted projections, or projects that are either under construction or authorized and funded, would be included in the without-project conditions. This presents a challenge in the highly dynamic south-of-Delta water resources environment where numerous projects and programs are being planned but are far from being established and implemented.

It is estimated that primarily due to significantly higher demands for water in the future, especially in the SWP, it is likely that available San Luis Reservoir storage would be used to the greatest extent possible, resulting in more restrictive reservoir operation and more frequent lower late summer storage levels in the reservoir than have occurred to date. While other factors may influence reservoir operational conditions, it is believed that the system will have less flexibility to meet contractors' historical delivery schedules in the future, or to minimize risk associated with contractual uses and requirements.

IDENTIFIED PROBLEMS

Water supply reliability problems associated with the CVP and SWP result from multiple factors that, in combination, have reduced the operational flexibility and delivery reliability of these water projects compared to originally anticipated project operations that formed the basis for water contract levels. Regulatory actions pursuant to the ESA, CVPIA, and Clean Water Act have reduced both the availability of water supplies in upstream storage facilities and the ability to export water supplies through Delta pumping facilities. As mentioned, these reductions in water supply availability have occurred simultaneously with increasing needs for urban water users that have "hardened" water demands.

Two areas of concern regarding San Luis Reservoir operations have been identified, as described in the following sections.

Delivery Schedule Reliability

Generally, low water storage levels occur in San Luis Reservoir during the late summer at a time when irrigation and urban water demands are at or near peak levels. When water levels in San Luis Reservoir are sufficiently low, increased uncertainty exists regarding the ability to deliver water to south-of-Delta contractors on their requested schedules. In the recent past, low water storage levels have been above elevations that would result in potential delivery interruption.

Figure 3-2 shows the simulated San Luis Reservoir end-of-month storage conditions under the existing (2001) and future (2020) levels of development over a 73-year hydrologic cycle from 1922 through 1994. Simulation results were extracted from OCAP CALSIM II studies. Under the existing level of development, it is expected that only in the rarest of circumstances would storage in San Luis Reservoir be drawn to the minimum conservation pool. However, it also is

expected that based on CALSIM II simulation, with a 2020 level of development, the reservoir storage level would reach the minimum conservation pool about 25 percent of the time. Thus, it is anticipated that increasing and hardening water demands, combined with constrained operational flexibility of the CVP and SWP, will increase temporary delivery interruptions during peak demand periods. Temporary interruptions in CVP delivery would adversely affect contractors' water delivery operations.

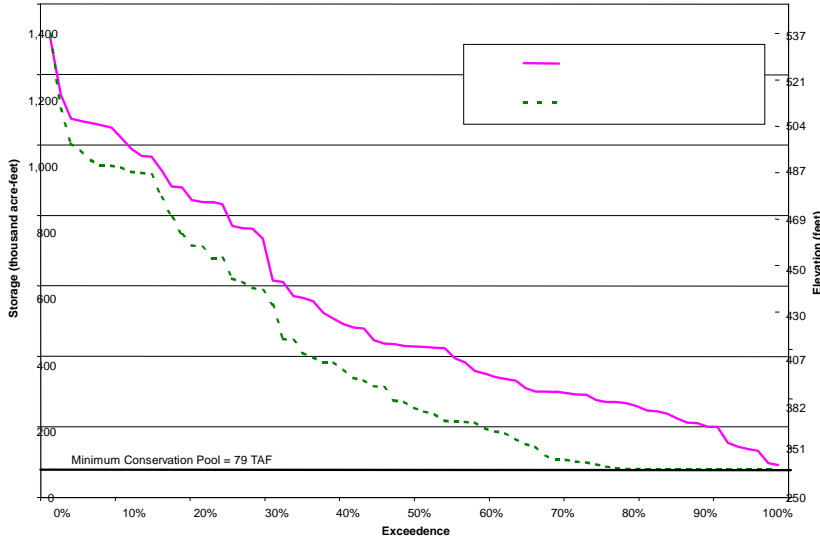


FIGURE 3-2.
EXCEEDENCE PROBABILITY OF SIMULATED SAN LUIS RESERVOIR END-OF-MONTH STORAGE: EXISTING AND FUTURE WITHOUT-PROJECT CONDITIONS

Water Supply Reliability

Each year, Reclamation makes water allocation decisions based on available supply in storage, anticipated inflow, the regulatory environment, and anticipated demands based on known and potential hydrologic conditions. As contract demands have developed, and regulatory requirements have become increasingly restrictive, the ability to provide full contract deliveries to CVP water contractors has been reduced.

To decrease potential future delivery shortfalls and resulting impacts from unanticipated events, Reclamation applies a conservative approach to set early season allocations. As the irrigation season progresses through the spring, Reclamation makes adjustments in allocations in response to actual hydrologic conditions. Generally, allocation levels remain unchanged or increase. Implications of using conservative early season allocations from San Luis Reservoir to members of the Authority (south-of-Delta CVP contractors) include the following:

- Conservative early CVP allocation could limit acres planted and financing opportunities because planting decisions rely on the CVP April allocation forecast. Low early

allocation means a reduction in regional agricultural production and greater difficulty in obtaining financing.

- To maintain a certain level of agricultural activities, farmers would supplement CVP deliveries by pumping additional groundwater and purchasing costly water transfers.
- The use of poor quality groundwater would result in poor quality return flows to the San Joaquin River, thereby further exacerbating a degraded water quality condition in the river.

In addition, to minimize these effects, Reclamation coordinates closely with water contractors and continues to identify methods to improve the accuracy of information considered in real-time operations. It is expected that Reclamation will continue these efforts to minimize unforeseen water supply reductions. Low early water allocations are a significant cause of reduced water supply reliability.

CHAPTER 4. PLAN FORMULATION

This chapter provides information about the plan formulation process and potential water resources management measures and alternatives.

STUDY PROCESS

The basic plan formulation process for Federal water resources studies and projects is as follows:

- Develop a more in-depth identification of water resources problems and needs for CVP contractors dependent on San Luis Reservoir operations and deliveries.
- Refine existing and projected future without-project conditions for the study area.
- Refine planning objectives and define the primary constraints and criteria under which alternative plans are to be formulated.
- Identify and screen individual resource management measures that can influence the study objectives.
- From the retained management measures, formulate potential alternative plans to meet study objectives.
- Compare and evaluate alternatives.
- Determine if at least one alternative would potentially display Federal interest and warrant further study.
- Select a plan for recommended implementation.

FEASIBILITY STUDY OBJECTIVES

Based on the water resources problems identified to date, the following feasibility study objectives were developed:

- Increase the certainty of meeting the requested delivery schedule of annual allocations to CVP contractors dependent on San Luis Reservoir.
- While meeting the first objective, increase the reliability and quantity of annual allocations to CVP contractors.
- To the extent possible, while meeting the first objective, forecast earlier in the season the final allocation to CVP contractors dependent on San Luis Reservoir.

In addition to the above study objectives, it is believed that consideration should be given to modifying operations of San Luis Reservoir to improve water quality conditions for the San Felipe Division contractors, and to provide ecosystem restoration opportunities.

POTENTIAL WATER RESOURCES MANAGEMENT MEASURES

A water resources management measure is a specific feature or activity that addresses a study objective. An alternative is a combination of the most applicable management measures. A number of possible structural and non-structural measures for the Appraisal Study that can address the needs and objectives of potential project stakeholders have been identified in prior non-Federal studies. Numerous measures were identified in the non-Federal feasibility study and are listed below.

Structural Measures

Structural measures would require construction of new facilities or modification of existing facilities. Potential structural measures identified to date have primarily resulted from the non-Federal feasibility study. These measures fall in the categories of conveyance, new or expanded surface storage, expanded groundwater recharge, an expanded water recycling program, and desalination.

Conveyance

New conveyance facilities could include increasing delivery capacity to the San Felipe Division service area from the South Bay Aqueduct or from the San Luis Unit. Various potential San Luis Unit measures have been identified in previous studies. Measures have primarily included a bypass around San Luis Reservoir, generally from the O'Neill or Gianelli pumping plants, directly to the Pacheco Conduit. The non-Federal studies focused on bypass would not increase delivery capacity, but rather water reliability under impairment conditions.

New or Expanded Surface Storage

One of the measures to increase water supply reliability within the San Felipe Division and other CVP divisions would be through constructing additional surface water storage. Prior non-Federal studies considered new storage through expanding one or more of 11 existing dams and reservoirs within the San Felipe Division, including San Luis Reservoir, and constructing new dams and reservoirs. Sediment removal, and/or expanding Calero Reservoir, and expanding Uvas Reservoir also are potential surface storage considerations within SCWVD.

Expanded Groundwater Recharge

Within SCVWD, additional instream and pond recharge has been identified as a near-term investment consideration. This is expected to increase recharge by approximately 20 TAF per year.

Expand Water Recycling Program

SCVWD is evaluating the irrigation opportunities and impacts over recycled water.

Desalination

Several potential desalination concepts have been identified in non-Federal studies, including obtaining and treating water from Monterey Bay and San Francisco Bay, and treating brackish groundwater.

Non-Structural Measures

Non-structural measures could potentially increase the operational flexibility of San Luis Reservoir and thus CVP water supply reliability. By implementing non-structural measures that would facilitate late-season delivery assurance, contractors could potentially depend on greater allocations made earlier in the season. Additionally, some non-structural measures also could provide the San Felipe Division and other members of the Authority with greater certainty that algae-impaired water would occur less frequently. Potential non-structural measures identified to date are described below.

Institutional Agreements

Institutional agreements are primarily agreements between interest groups to facilitate changes in water delivery patterns. This could include long-term water transfer agreements between water districts, exchanges in supplies, or changes in points of delivery during periods of low storage conditions in San Luis Reservoir.

Water Banking

As mentioned, SCVWD participates in water banking with Semitropic Water District in the San Joaquin Valley. This measure would include either enlarging this existing banking program or entering into agreements with other banking programs in the Central Valley.

Water Acquisition

This measure includes acquiring additional supplies from potential future projects developed by others.

Demand Reduction

As opposed to obtaining additional supplies to increase water supply reliability, this measure focuses on reducing water demands and using available supplies more efficiently. SCVWD has a water reuse and use efficiency program in place and plans to implement the program more intensively in the future. This measure could include focusing on ways to conserve water even more aggressively.

SCVWD Water System Reoperation

Reoperation measures could include reoperation of SCVWD facilities in the Los Gatos watershed, water treatment and distribution infrastructure relationships, and surface storage and groundwater storage use.

Potential Alternatives

In addition to the No-Action Alternative, fundamental types of alternative plans can be formulated, including alternatives focusing on structural measures, non-structural measures, or a combination of structural and non-structural measures. Following is a summary of the No-Action Alternative and several general types of alternatives.

No-Action Alternative

Under the No-Action Alternative, no Federal action would be taken to resolve CVP water reliability issues related to San Luis Reservoir operations and facilities. As demands for available water from the CVP and SWP continue to increase, a greater likelihood exists of lower storage levels in San Luis Reservoir. With lower storage levels, greater chances exist of reduced deliveries in some years. These conditions are described in **Chapter 3**, and shown in **Figure 3-2**.

Potential Structural Alternative

A potential structural alternative could include one or more of the structural measures identified above. Several possible alternatives have been identified in non-Federal studies. One alternative includes enlarging Pacheco Dam and Reservoir. Another potential structural alternative would be to enlarge Pacheco Dam and Reservoir in combination with other storage options, including expanded groundwater recharge in the Central Valley. Numerous other potential structural concepts could be developed to address the study objectives.

Potential Non-Structural Alternative

A potential non-structural alternative could include one or more primarily non-structural measures aimed at increasing water supply reliability of the San Felipe Division. Potential elements of a non-structural alternative could include (1) increased banking capacity in Semitropic Water District, (2) water acquisition from potential future new sources developed by others, (3) increased water use efficiency measures within the service area, (4) institutional agreements primarily between SCVWD and San Joaquin Valley water users to exchange supplies during periods of low storage levels in San Luis Reservoir, or (5) a combination of these elements.

Potential Combination Alternative

It is believed that any alternative likely to be formulated to effectively address objectives identified in the Federal feasibility study, and have the potential for implementation, would be a combination of both structural and non-structural measures. Numerous potential combinations of both structural and non-structural measures could help meet near-term and long-term water resources needs identified under the Federal feasibility study.

CHAPTER 5. FEASIBILITY STUDY

This chapter describes the Federal interest in a feasibility study for this project, and included information about likely major study elements necessary to complete the study.

FEDERAL INTEREST

Federal interest exists to address problems associated with delivery schedule reliability and water supply reliability in the study area, and to the extent possible, other service areas of the CVP. It is also believed that one or more potential combinations of measures identified in **Chapter 4** could efficiently and effectively help address future water needs. Although much work has been completed on developing structural measures, further evaluation is needed of these other potential structural and non-structural measures to assess their ability to address study objectives.

As mentioned, PL 108-361 authorized feasibility studies of the San Luis Reservoir Low Point Improvement Project, with the exception of Federal participation in any construction of an expanded Pacheco Reservoir, which would be subject to future Congressional authorization. The scope of a Federal feasibility study would include clear identification of Reclamation and non-Federal sponsor roles for the study.

ELEMENTS OF FEASIBILITY STUDY

The Federal planning process can be broken down into a number of components or phases and displayed in different ways; the plan formulation process in this Appraisal Study includes four basic elements, as shown in **Figure 5-1**:

- Initial Alternatives Phase
- Public Scoping
- Plan Formulation Phase
- Feasibility Report/EIS/EIR Phase

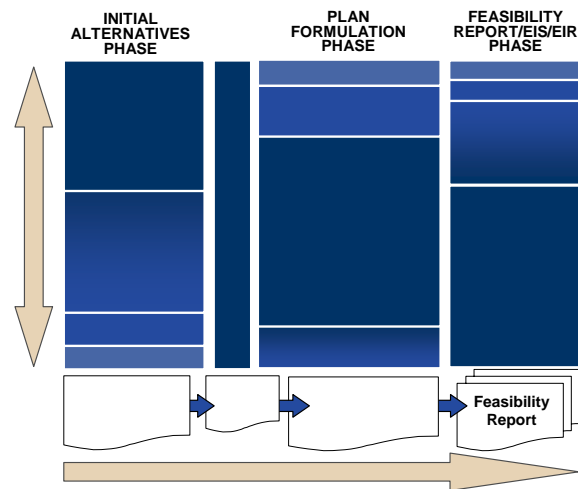


FIGURE 5-1. PLAN FORMULATION PROCESS

Completion of each of the above elements represents a milestone in the planning process, and will be summarized in a milestone document. The focus of each study phase changes as the study progresses toward the final milestone. Accomplishment of each major milestone will need to be coordinated closely with participating Federal, State, and local agencies and their ongoing projects and programs.

Following is a summary of tasks believed necessary for a feasibility study to address the study objectives. These tasks are more fully described in the Draft April 2006 San Luis Reservoir Low Point Improvement Project Plan of Study (Reclamation). The tasks below would incorporate and expand on the existing work completed by SCVWD as part of the ongoing feasibility study.

Initial Alternatives Phase

The first major phase of the feasibility study would be to identify a set of initial alternatives that address the project planning objectives given the identified planning constraints, principles, and criteria. It is intended that preliminary cost and benefit information be used to accomplish the initial comparison and evaluation of the initial alternatives. Following is a list of the major tasks and subtasks for the Initial Alternatives Phase:

- Revise/Develop Problems, Needs, Objectives, Constraints, and Criteria
- Prepare Public Involvement Plan
- Define Without-Project Conditions and Environmental Settings
 - Develop Technical Tools and Data
 - Perform Mapping
 - Review Affected Environment
- Formulate Initial Alternatives
 - Compile Measures from Previous Studies

- Identify Additional Measures
- Screen and Evaluate Measures
- Formulate Initial Alternatives
- Evaluate and Compare Initial Alternatives
 - Review/Update Preliminary Cost Estimates
 - Perform Preliminary Environmental Impact Analysis
 - Identify Economic Benefit Areas
 - Conduct Preliminary Alternatives Screening
- Prepare Initial Alternatives Information Report
 - Draft Initial Alternatives Information Report
 - Review Initial Alternatives Information Report
 - Complete Final Initial Alternatives Information Report

Public Scoping

Public scoping will proceed during completion of the Initial Alternatives Phase. The purpose of this task is to initiate formal scoping for the NEPA and CEQA compliance process for the project. The environmental scoping process is required by CEQA regulations (40 CVR 1501.7) and related environmental compliance requirements. Environmental scoping support consists of the four subtasks listed below:

- Notice of Intent and Notice of Preparation
- Environmental Scoping Meetings
- Regulatory Compliance Technical Memorandum
- Environmental Scoping Report

Plan Formulation Phase

The Plan Formulation Phase consists of developing detailed comprehensive alternatives that address the study objectives. The goal of this phase is to formulate, evaluate, and compare a set of comprehensive alternatives in sufficient detail to identify if one should be tentatively selected for implementation in the Draft and Final Feasibility Report. Following is a list of the major subtasks for the Plan Formulation Phase:

- Further Review Without-Project Conditions, Objectives, Constraints, and Criteria
- Perform Public and Stakeholder Coordination
- Develop Detailed Comprehensive Alternatives
 - Formulate Comprehensive Alternatives
 - Evaluate and Compare Comprehensive Alternatives
 - Identify Tentatively Selected Plan(s)

- Conduct Engineering Evaluations
 - Hydrologic and Hydraulic Analysis
 - Hydrologic Analysis
 - Hydraulic Analysis
 - Reservoir/System Reoperation
 - Geotechnical Studies
 - Engineering Designs and Cost Estimates
 - Real Estate Evaluation and Costs
- Conduct Other Supporting Evaluations
 - Perform Economic Assessment
 - Define Federal and Non-Federal Roles and Responsibilities
- Evaluate Environmental Conditions
 - Affected Environment
 - Preliminary Impact Analysis
 - Environmental Mitigation Measures
 - Cultural Resources Evaluations
- Prepare Plan Formulation Report
 - Initial Draft Plan Formulation Report
 - Draft Plan Formulation Report
 - Final Plan Formulation Report

Feasibility Report and EIS/EIR Phase

The last major Feasibility Study phase is to fully develop the tentatively selected plan and prepare a decision document with supporting information, including full environmental compliance documentation, to be submitted to Congress through Federal and State review levels. This phase also would include ensuring an understanding of the Federal and non-Federal project responsibilities, and identifying a non-Federal sponsor willing and capable of fulfilling the non-Federal project responsibilities. Following is a list of the major subtasks for the Feasibility Report and EIS/EIR Phase:

- Conduct Plan Formulation
 - Develop, Evaluate, and Compare Comprehensive Alternatives
 - Refine Tentatively Selected Plan
- Conduct Engineering Evaluations
 - Geotechnical/Geologic Studies
 - Water Supply and Hydrologic Evaluations

- Engineering Designs
- Cost Estimates
- Real Estate Evaluations
- Conduct Environmental Evaluations
 - Assess Impacts
 - Identify Mitigation
 - Conduct Cultural Resources Evaluations
- Conduct Other Supporting Evaluations
 - Economic Studies
 - Financial Feasibility Studies
 - Initial Cost Allocation and Apportionment
 - Identification of Plan Implementation Considerations
 - Water Rights
- Conduct Public Involvement
- Meet Environmental and Related Requirements and Perform Coordination
 - Coordination Act Report (CAR)
 - Draft CAR
 - Final CAR
 - Action-Specific Implementation Plan
 - Section 106 of the National Historic Preservation Act
 - Section 7 Consultation and BO
 - Section 404(b)(1)
- Prepare Feasibility Report and EIS/EIR
 - Administrative Draft Feasibility Report and EIS/EIR
 - Draft Feasibility Report and EIS/EIR
 - Draft Feasibility Report and EIS/EIR
 - Draft Feasibility Report Circulation Information
 - Final Feasibility Report (Decision Document and EIS/EIR)
 - Responses to Comments
 - Final Feasibility Report and EIS/EIR

THIS PAGE LEFT BLANK INTENTIONALLY

CHAPTER 6. SUMMARY OF FINDINGS AND RECOMMENDATION

SUMMARY OF FINDINGS

The following points summarize the findings of the Appraisal Study:

- Increased regulatory constraints, greater development of water demands statewide, and hydrologic uncertainty create increasing challenges for CVP operations, especially for operating San Luis Reservoir, and Reclamation's ability to meet contract demands and fulfill delivery schedules.
- Although current water supplies and demands are in balance in most years, it is expected that increasing future demands would cause greater reliance on CVP supplies, as well as require new supplies.
- In the future, due to increased water demands, it is likely that all available San Luis Reservoir storage would be used resulting in more restrictive reservoir operation and more frequent lower late-summer storage levels in the reservoir than have occurred to date.
- In the future, an increased frequency of CVP San Luis Reservoir delivery curtailments due to potential water supply shortfalls will likely result in unplanned and costly reoperation of water systems belonging to contractors dependent on San Luis Reservoir.
- On the basis of identified water resources problems, the following planning objectives were identified:
 - Increase the certainty of meeting the requested delivery schedule of annual allocations to CVP contractors dependent on San Luis Reservoir.
 - While meeting the first objective, increase the reliability and quantity of annual allocations to CVP contractors.
 - To the extent possible, while meeting the first objective, forecast the final allocation to CVP contractors dependent on San Luis Reservoir earlier in the season.

In addition to the above study objectives, it is believed that consideration should be given to modifying operations of San Luis Reservoir to improve water quality conditions for the San Felipe Division contractors, and to provide ecosystem restoration opportunities.

- A number of water resources management measures to address the low point and associated water supply reliability problems have been developed in previous studies to date. Measures to increase the certainty of water delivery schedules were developed. It appears that several structural and non-structural measures and potential alternatives could be formulated to address the study objectives in a potential feasibility-level study.

Federal interest exists in a feasibility study that primarily focuses on improving the certainty of the delivery of annual allocations to CVP contractors dependent on San Luis Reservoir.

RECOMMENDTION

It is recommended that a Federal feasibility study be initiated for resolving water resources problems in the study area, particularly through measures to address San Luis Reservoir operations and delivery. The feasibility study program should be closely coordinated with the Authority, the San Felipe Division, and other interests, to ensure that an acceptable plan is developed for implementation.

CHAPTER 7. REFERENCES

- Bay Area Economic Forum. 2002. Hetch Hetchy Water and the Bay Area Economy. San Francisco, California.
- California Bay-Delta Authority. 2004. Consideration of a Resolution Approving Delta Improvements Package Implementation Plan. Agenda Item 12-3. Approval of Resolution 04-08-04. Sacramento, California.
- California Department of Water Resources. 2006. Bulletin 160. California Water Plan. State of California.
- California Department of Water Resources. 2004. Bulletin 132-02, Management of the California State Water Project. State of California. Sacramento, California
- California Department of Water Resources. 2002a. The State Water Project Delivery Reliability Report. Bay Delta Office. Sacramento, California.
- California Department of Water Resources. 2002b. Benchmark Studies Assumptions. September 30, 2002. State of California.
- California Department of Water Resources. 1998. Bulletin 160. California Water Plan. State of California.
- California Department of Water Resources. 1995. Bulletin 132-95, Management of the California State Water Project. State of California. Sacramento, California.
- California Department of Water Resources. 1986. Operating Report.
- California Department of Water Resources. 1974. Bulletin 200. California State Water Project. Volume III: Storage Facilities. November. Sacramento, California.
- California Water Code Appendix. 2001. The Pajaro Valley Water Management Agency Act. Chapter 24; Sections 124-1 to 124-1108. January.
- Common Assumptions. 2004. Ad-Hoc Stakeholder Technical Work Group for Common Assumptions to discuss Proposed CALSIM II Baseline Inputs for Interim Common Assumptions. Draft Meeting Summary for December 17, 2003, and January 14, 2004.
- Levering, Michael R. 1985. Memorandum: Modification to CVP Database, CVP Cost Allocation Program. Economics Branch, Bureau of Reclamation. Sacramento, California.
- MWH. 2003. Technical Memorandum: Using CALSIM II for Long-Term Planning. Prepared for San Benito County Water District. Sacramento, California.
- Pajaro Valley Water Management Agency. 2002. Revised Basin Management Plan. Watsonville, California.
- Reclamation. 2006. Draft San Luis Reservoir Low Point Improvement Project Plan of Study. U.S. Department of the Interior, Bureau of Reclamation. April.
- Reclamation. 2004a. OCAP CALSIM II Modeling Assumptions. U.S. Department of the Interior, Bureau of Reclamation. Sacramento, California.

- Reclamation. 2004b. OCAP CALSIM II Modeling Output. U.S. Department of the Interior, Bureau of Reclamation. Sacramento, California.
- Reclamation. 2004c. Draft EIS/EIR: Water Transfer Program for the San Joaquin River Exchange Contractors Water Authority 2005-2014. SCH #2003101106. Prepared by URS Corporation for the U.S. Department of the Interior, Bureau of Reclamation and for the San Joaquin River Exchange Contractors Water Authority. Oakland. June 7.
- Reclamation. 2003a. Budget Justifications: FY 2003, Mid Pacific Region. U.S. Department of the Interior, Bureau of Reclamation. Sacramento, California.
- Reclamation. 2003b. Draft Report: Replacing the Delivery Impact of CVPIA: A Supplement to the Least-Cost CVP Yield Increase Plan. U.S. Department of the Interior, Bureau of Reclamation, Mid-Pacific Region. Sacramento, California.
- Reclamation. 1999. Decision Memorandum 99-IE-BFSSL-01: Decisions Related to B.F. Sisk Dam, Central Valley Project, California. U.S. Department of the Interior, Bureau of Reclamation. Sacramento, California.
- Reclamation. 1976. Contract Between the United States and Santa Clara Valley Water District for Water Service and for Operation and Maintenance of Certain Works of the San Felipe Division. U.S. Department of the Interior, Bureau of Reclamation. Sacramento, California.
- Reclamation and California Department of Water Resources (Reclamation and DWR). 1986. Coordinated Operation Agreement.
- Santa Clara Valley Water District (SCVWD). 2004. Draft 2003 Integrated Water Resources Plan. San Jose, California.
- SCVWD. 2003a. Water Utility Enterprise Report: Final. August. San Jose, California.
- SCVWD. 2003b. San Luis Reservoir, Low Point Improvement Project: Preliminary Administrative Draft Feasibility Report. December. San Jose, California. December.
- SCVWD. 2001. Santa Clara Valley Water District Urban Water Management Plan. San Jose, California.
- State Water Resources Control Board (SWRCB). 1999. Water Right Decision 1641. State of California.
- SWRCB. 1995. Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary. State of California.
- SWRCB. 1978. Water Right Decision 1485. State of California.
- State Water Resources Control Board and California EPA. 2000. Revised: Water Right Decision 1641; Implementation of Water Quality Objectives for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary; A Petition to Change Points of Diversion of the Central Valley Project and the State Water Project in the Southern Delta; and A Petition to Change Places of Use and Purposes of Use of the Central Valley Project. State of California.
- United States Congress. 2004. Public Law 108-361; 108th Congress, HR 2828, October 25, 2004: An Act. Washington D.C.

- United States Congress. 1967. Public Law 80-72; 90th Congress, S. 11, August 27, 1967: An Act. Washington D.C.
- United States Congress. 1960. Public Law 86-488; 86th Congress, S. 44, June 3, 1960: An Act. Washington D.C.
- Yates, Gus. 2003. Annual groundwater report for the 2003 water year. December. Final. Prepared for San Benito County Water District, Hollister, California. Berkeley, California.
- Yates, Gus. 2002. Annual groundwater report for the 2002 water year. December. Final. Prepared for San Benito County Water District, Hollister, California. Berkeley, California.

THIS PAGE LEFT BLANK INTENTIONALLY