

## CHAPTER II RELATED STUDIES, PROJECTS, AND PROGRAMS

A number of studies, projects, and programs are underway that are important in conducting the Shasta Lake Water Resources Investigation.

### U.S. BUREAU OF RECLAMATION

#### Central Valley Project

Shasta Dam and Reservoir are key elements of the CVP. President Franklin Roosevelt approved the CVP, including Kennet (Shasta), Friant, and Contra Costa (Delta) Divisions of the CVP, on December 2, 1935. The CVP is the largest surface water storage and delivery system in California, with a geographic scope covering 35 of the State of California's (State) 58 counties. The project includes 20 reservoirs, with a combined storage capacity of approximately 11 MAF; eight powerplants and two pump-generating plants, with a combined generation capacity of approximately 2 million kilowatts; and approximately 500 miles of major canals and aqueducts. The CVP supplies water to more than 250 long-term water contractors in the Central Valley, the Santa Clara Valley, and the San Francisco Bay Area. **Plate 3** shows the locations of major CVP facilities, rivers that are controlled or affected by the operation of CVP facilities, and the CVP service area. Shasta Reservoir delivers about 55 percent of the total annual water supply developed by the CVP.

Approximately 90 percent of CVP water is delivered to agricultural users, including prior water rights holders. The CVP has the potential to supply about 7 MAF annually to agricultural and M&I customers and for environmental purposes. Of the 7 MAF, about 6.2 MAF would be for agricultural, 0.5 MAF for urban uses, and 0.3 MAF for wildlife refuges. Municipal customers include the cities of Redding, Sacramento, Folsom, Tracy, and Fresno; most of Santa Clara County; and the northeastern portion of Contra Costa County. The CVP also provides flood control, navigation, power, recreation, and water-quality benefits.

#### *Operational Influences*

CVP operations are influenced by general operating rules, regulatory requirements, and facility-specific concerns and requirements. Inflow and release requirements are the principal elements influencing reservoir storage. Operational decisions consider not only conditions at an individual reservoir, but also downstream flow conditions and conditions at other project reservoirs. Storage space south of the Delta that can only be filled with water exported from the Delta is a major operational consideration involving the geographic distribution of water in storage. Other factors that influence the operation of CVP reservoirs include flood control requirements, carryover storage objectives, lake recreation, power production capabilities, cold water reserves, and pumping costs.

Rivers below some of the CVP dams support both resident and anadromous fisheries and recreation. While resident fisheries are slightly affected by release fluctuations, the anadromous fisheries (e.g., salmon and steelhead) are the most sensitive and are present year-round downstream of some CVP facilities. Maintaining water conditions favorable to spawning,

incubation, rearing, and outmigration of the young anadromous fish is one of the main objectives. CVP operations are coordinated to anticipate and avoid streamflow fluctuations during spawning and incubation whenever possible.

The operation of the CVP is affected by several regulatory requirements and agreements. Prior to the passage of CVPIA, the operation of the CVP was affected by State Water Resources Control Board (SWRCB) Decisions 1422 and 1485, and the Coordinated Operations Agreement (COA). Decisions 1422 and 1485 identify minimum flow and water quality conditions at specified locations, which are to be maintained in part through the operation of the CVP. The COA specifies the responsibilities shared by the CVP and California's State Water Project (SWP) for meeting the requirements of D-1485. In December 1994, representatives of the State and Federal governments and urban, agricultural and environmental interests agreed to the implementation of a Bay-Delta protection plan through the SWRCB, to protect the ecosystem of the Bay-Delta Estuary. The Draft Bay-Delta Water Control Plan, released in May 1995, superseded D-1485. The coordinated operations of the CVP and SWP continue to be based on the COA.

### ***Operation Divisions***

The CVP operations are divided into eight divisions. Those north of the Delta include the Trinity, Shasta, and Sacramento River divisions. They are known collectively as the Northern CVP System. Of the operational divisions south of the Delta, the Delta, West San Joaquin, and San Felipe divisions are known collectively as the Southern CVP System. Both the Eastside and Friant divisions are operated independently of the remainder of the CVP, due to the nature of their water supplies and service areas. The Northern and Southern CVP Systems are operated as an integrated system, and demands for water and power can be met by releases from any one of several facilities. Demands in the Delta and south of the Delta can be met by the export of excess water in the Delta, which can result from releases from northern CVP reservoirs. As a result, operational decisions are based on a number of physical and hydrological factors that tend to change depending on conditions.

### ***CVP Water Users***

During development of the CVP, the United States entered into long-term contracts with many of the major water rights holders in the Central Valley. They are made of three major groups, (1) Sacramento River Settlement Contractors, (2) San Joaquin River Exchange Contractors, and (3) Water Service Contractors.

Sacramento River Settlement Contractors are contractors who, for the most part, claim water rights on the Sacramento River. With the control of the Sacramento River by Shasta Dam, these water right claimants entered into contracts with Reclamation. Most of the agreements established the quantity of water the contractors are allowed to divert from April through October without payment to Reclamation, and a supplemental CVP supply allocated by Reclamation.

San Joaquin River Exchange Contractors are contractors who receive CVP water from the Delta via 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.

Before construction of the CVP, many irrigators on the west side of the Sacramento Valley, on the east and west sides of the San Joaquin Valley, and in the Santa Clara Valley relied primarily on groundwater. With the completion of CVP facilities in these areas, the irrigators signed agreements with Reclamation for the delivery of CVP water as a supplemental supply. Several cities also have similar contracts for M&I supplies. They are known as CVP Water Service Contractors. CVP water service contracts are between the United States and individual water users or districts and provide for an allocated supply of CVP water to be applied for beneficial use. The purposes of a water service contract are to stimulate 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.

### **Prior Studies of Enlarging Shasta Dam**

Several studies have been conducted since the early 1960's to assess the potential feasibility of increasing the storage space at Shasta Reservoir. The most significant occurred in the late 1970's and early 1980's. Evaluations to raise Shasta Dam evaluated structural modifications, environmental and related impacts, water supply and hydropower benefits, costs, and Federal interest. In November 1978, Reclamation produced for Congress an appraisal-level cost evaluation for enlarging Shasta Reservoir. Subsequent to this report, Congress directed Reclamation to engage in a feasibility study with the California Department of Water Resources (DWR) regarding the enlargement of Shasta Lake. Most studies were completed in the early 1980's as part of PL 96-375. These studies culminated with the Final "Wrap-Up Report", completed in 1988. As mentioned, the basic conclusion of this report was that although enlarging Shasta Dam appeared feasible, there was a low demand for new supplies at the time.

No further action was taken on the potential project until the Mid-1990s when Reclamation again prepared an appraisal-level study and report in May 1999 to review the estimated costs for a range of enlargement options and to identify critical issues that would affect project feasibility. Three dam raises were considered in the study: 202.5 feet High Level option, 102.5 feet Intermediate Level option, and 6.5 feet Low Level option. Studies contained in the Shasta Dam and Reservoir Enlargement Appraisal Assessment concluded that raises up to 202.5 feet are technically feasible but higher raises would involve an increasing number of relocations and environmental impacts. The report recommended additional studies be conducted that focused on low-raise options.

### **Central Valley Project Improvement Act**

The CVPIA was signed into law in October 1992 to address conflicts over water rates, irrigation land limitations, and environmental impacts of the CVP. This legislation mandates changes in the management of the CVP, particularly for the protection, restoration, and enhancement of fish and wildlife. The CVPIA also addresses the operational flexibility of the CVP and ways to expand the use of voluntary water transfers and improved water conservation. The general purposes of the CVPIA, as identified by Congress in Section 3402, include the following:

- To protect, restore, and enhance fish, wildlife, and associated habitats in the Central Valley and Trinity River basins of California.
- To address impacts of the CVP on fish, wildlife, and associated habitats.
- To improve the operational flexibility of the CVP.
- To increase water-related benefits provided by the CVP to the State of California through expanded use of voluntary water transfers and improved water conservation.
- To contribute to the State of California's interim and long-term efforts to protect the San Francisco Bay/Sacramento-San Joaquin Delta Estuary.
- To achieve a reasonable balance among competing demands for use of CVP water, including the requirements of fish and wildlife, agriculture, M&I, and power contractors.

The CVPIA redefined the purposes of the CVP to include protection, restoration and enhancement of fish, wildlife, and associated habitats and protection of the San Francisco Bay/Sacramento-San Joaquin Delta Estuary. The CVPIA identified numerous specific measures and programs to meet the new project purpose. It also directed the Secretary of the Interior to operate the CVP consistent with these purposes. Sections of the CVPIA that are important to this study include: dedication of a portion of CVP yield to be used for environment purposes; the Anadromous Fish Restoration Program (AFRP), which included a goal of doubling natural production of anadromous fish in Central Valley rivers and streams; the Restoration Fund; urban water reliability; water transfers; refuge water supplies; restoration of the San Joaquin, Trinity, and Stanislaus rivers; and a stakeholder process.

The combined total amount of water dedicated to the environment by CVPIA suggests an annual amount of up to 1.2 MAF. This includes reallocation of the 800,000 acre-feet contained in Section 3406 (b)(2) of the law (commonly called (b)(2)), dedicated inflows to wildlife refuges of 250,000 acre-feet (called Level 2 Refuge water), and Trinity Reapportion amounting to 150,000 acre-feet. However, after accounting for system operation flexibility, the total impact of the CVPIA for CVP contractors is estimated to amount to 585,000 acre-feet annually. It is estimated that this reduced water supply has resulted in increased groundwater overdraft, fallowing of agricultural land, loss of jobs, and loss of over \$100 million in annual farm income.

Implementation of the CVPIA (b)(2) provision has been a contentious process, marked by conflict between the State and Federal parties, and substantial litigation. The center of the dispute has been whether the (b)(2) water translates into an automatic reduction in exports under the water supply contracts. On January 2, 2003 Reclamation released a draft decision on the implementation of (b)(2) water. The decision incorporates parts of an earlier decision (Interiors 1999 Final Decision), modifies others, and adds new components. The intent of these changes is to simplify and clarify the accounting process for (b)(2) uses and to integrate its dedication and management with CVP operation for other CVP purposes. The decision is divided into sections to addresses calculations of yield, accounting processes, modifications of CVP operations, water banking and transfers/exchanges of water, water to meet the 1995 Bay-Delta Water Quality

Control and Endangered Species Act of 1978 (ESA) obligations, shortage criteria, and coordination.

### ***CVP Water Supply Improvement Plan***

Section 3408 (j) of the CVPIA directed the Secretary of the Interior to prepare a plan to increase the yield of the CVP. This section basically directs the Secretary to develop a least-cost plan to increase the yield of the CVP by an amount equal to that dedicated to fish and wildlife under the CVPIA. This plan is also intended to assist the State in meeting its future water needs. Further, it is to recommend appropriate cost-sharing arrangements to implement the CVP Water Supply Improvement Plan. A preliminary least-cost yield increase plan was completed by Reclamation in 1995. This plan identified cost and supply estimates for a number of new water supply and management options including groundwater storage, land fallowing, conservation and reuse, and surface storage. The plan did not, however, propose a specific CVP yield increase. Reclamation is preparing a supplement to the 1995 plan.

### ***CVPIA Contract Renewal Process***

In accordance with Section 3404(c) of the CVPIA, Reclamation is negotiating long-term water service contracts. It is anticipated that as many as 111 CVP water service contracts, located within the Central Valley, may be renewed during this negotiation process. As part of this process, Reclamation is also negotiating renewal of 55 interim water service contracts.

### **Red Bluff Diversion Dam Fish Passage Program**

The RBDD, which is owned and operated by Reclamation, is located on the Sacramento River about 2 miles southeast of the city of Red Bluff. The 52-foot high 740-foot long dam and 3,900 acre-foot lake are elements of the CVP and designed to provide irrigation water to areas in Tehama, Glenn, and Colusa counties via the Tehama-Colusa and Corning Canals. Although a fish ladder is located on each abutment of the dam, ineffective fish passage at the dam has been identified as a contributing factor in the decline in the populations of anadromous fishes in the upper Sacramento River. Various studies and constructed test projects with a focus on reducing impacts on the anadromous while maintaining irrigation diversion capabilities at the dam have been completed. However, additional studies are ongoing.

### **Trinity River Restoration Plan**

Trinity Dam and Lake are located about 24 miles north west of Redding. Construction of Trinity Dam was completed in 1962. The dam is an earthfill structure 538 feet high with a crest length of 2,450 feet. Trinity Lake drains an area of about 3,000 square miles and has a total capacity of nearly 2.5 MAF. The Trinity River Division of the CVP, which includes Trinity and Whiskeytown Dams, conveys water from the Trinity River to the Sacramento River Basin for export to water-deficient areas of the Central Valley.

In December 2000, the Secretary of Interior issued a ROD documenting the selection of actions necessary to restore and maintain the anadromous fishery in the Trinity River. This culminated a nearly 20-year process of detailed scientific efforts. The Trinity ROD implements a component of the CVPIA (Section 3406(b)(23)). This section is to meet Federal trust responsibilities to

protect the fishery resources of the Hoopa Valley Tribe, and to meet the fishery restoration goals of PL 98-541, October 24, 1984. The ROD adopts a preferred alternative that includes restoration and perpetual maintenance of the Trinity River's fishery resources resulting in rehabilitating the river itself by restoring the attributes that produce a healthy, functioning alluvial river system. The preferred alternative reduced the average annual export of Trinity River water from 74 percent of the flow to 52 percent. The Trinity ROD is a general statement of policy regarding the issues of water flow in both the Trinity and Sacramento River mainstems. It is acknowledged to have broad effect on both rivers' ecosystems and potentially significant economic effect within the Sacramento and Trinity River basins. The major components of the selected course of action include (1) a variable annual instream flow for the Trinity River, (2) physical channel rehabilitation, (3) sediment management including the supplementation of spawning gravels, (4) watershed restoration efforts, and (5) river infrastructure improvements.

### **Battle Creek Restoration Project**

Reclamation in partnership with the Pacific Gas and Electric Company (PG&E), National Marine Fisheries Service (NMFS), U.S. Fish and Wildlife Service (FWS) and the State of California Department of Fish and Game (DFG) are working to restore major reaches of Battle Creek. The Battle Creek Salmon and Steelhead Restoration Project provides for a private and public sector partnership focused on restoring the winter-run, spring-run, fall- and late-fall-run chinook salmon, and steelhead, all of which are already listed or proposed for protection by the ESA. This partnership will provide the framework for restoring one of the most important anadromous fish spawning streams in the Sacramento Valley while maintaining a pollution-free renewable energy resource for electric customers of California. Restoration actions will greatly enhance 43 miles of habitat and should increase all salmon and steelhead runs. Steelhead escapement is expected to increase the most under restored conditions. It is predicted that the adult steelhead population will increase by 5,700, which will more than double the average run to the entire Sacramento River above Red Bluff. The gain of 2,500 adult winter- and spring-run chinook salmon would also appreciably increase the total run size of these species.

### **Sacramento River Diversion Feasibility Study (Sacramento River Water Supply Reliability Study)**

Reclamation and Placer County Water Agency are conducting the Sacramento River Diversion Feasibility Study. The purpose of the study is to develop a plan to implement the objectives of the Water Forum Agreement for the American River Watershed, which includes pursuing a water diversion project from the Sacramento River to help meet future water supply needs of the Placer-Sacramento Region and to promote ecosystem restoration along the Lower American River. The study is being conducted under provisions in Section 103 to PL 106-554.

## **CALIFORNIA DEPARTMENT OF WATER RESOURCES**

### **State Water Project**

The SWP was authorized in 1959 and designated to re-adjust geographical imbalances between California's water resources and water needs. The project extends from Plumas County in the north to Riverside County in the south. Completed project elements include 23 dams and reservoirs, six powerplants, 17 pumping plants, and 533 miles of aqueduct. The principal storage

feature of the SWP is Lake Oroville, with a gross pool capacity of 3.5 MAF located on the Feather River about 4 miles northeast of Oroville. Water released from Oroville Dam flows through the Feather and Sacramento rivers to reach the Sacramento-San Joaquin Delta. The SWP delivers water to service areas in the Feather River Basin, San Francisco Bay area, San Joaquin Valley, Tulare Basin, and southern California. The major SWP conveyance facilities in the Central Valley include the North Bay, South Bay, and California Aqueducts. The North Bay Aqueduct diverts water from the north Delta near Cache Slough for agricultural and municipal uses in Napa and Solano counties. The South Bay and California Aqueducts carry water from the Delta to the San Francisco Bay area and to southern California, respectively. In the southern portion of the Delta, the Harvey O. Banks Delta Pumping Plant lifts water into the California Aqueduct from the Clifton Court Forebay. At 444 miles, the California Aqueduct is the State's largest and longest water conveyance system, beginning at the Banks Pumping Plant and extending to Lake Perris, south of Riverside in southern California. **Plate 3** includes a layout of major SWP facilities.

The SWP has contracted a total of 4.23 MAF for average annual delivery in the San Joaquin River, the Central Coast, and the San Francisco and South Coast areas. Of this amount, about 2.5 MAF is designated for the Southern California Transfer Area, nearly 1.36 MAF to the San Joaquin Valley, and the remaining 370,000 acre-feet to the San Francisco Bay, the Central Coast, and the Feather River areas.

SWP contracts are made up of the Feather River Settlement Contractors and SWP Contract Entitlements. The Feather River Settlement Contractors are water users who hold riparian and senior appropriative rights on the Feather River. SWP Contract Entitlements are contracts executed in the early 1960s that established the maximum annual water amount (entitlement) that each long-term contractor may request from the SWP.

### **California Water Plan**

The State, through the DWR, prepares and publishes the California Water Plan through its Bulletin 160 series. Seven versions of the plan have been published between 1966 and 1998. A 1991 amendment to the California Water Code directs DWR to update the plan every five years. The Bulletin 160 series assesses California's agricultural, environmental, and urban water needs and evaluates water supplies in order to quantify the gap between future water demands and supplies. A focus of the 1998 Bulletin is on water management actions that could be implemented to improve California's water supply reliability. Estimates of existing and likely future without-project water supplies, demand, and shortages in Chapter III are based on the findings in the 1998 Bulletin.

Work is underway for the 2003 update to the plan. The update is being prepared in a highly collaborative environment with a 65-member public Advisory Committee, a 260-person Extended Review Forum, and an outside facilitation team. Key elements of the Update 2003 will include: (1) identifying water management efforts for improving water supplies and minimizing imports from other regions; (2) developing goals and management options; (3) identifying potential evaluation and selection criteria for future system modifications; and (4) identifying indicators and ongoing efforts to monitor and track progress. The 2003 California Water Plan Update will assess potential impacts and implications of global climate change on

California's water system infrastructure and future water supply, quality, and management, including short and long-term recommendations.

## **CALFED BAY-DELTA PROGRAM**

The CALFED Bay-Delta Program is a cooperative effort among State and Federal agencies and California's environmental, urban, and agricultural communities. The Governor of California and the President initiated work on the program in 1995 to address environmental and water management problems associated with the Bay-Delta system. CALFED has taken a broad approach to addressing four problem areas: (1) water quality, (2) ecosystem quality, (3) water supply reliability, and (4) levee system integrity. Many of the problems and solutions in the Bay-Delta system are interrelated. Program implementation began following circulation of the final programmatic Environmental Impact Statement/Environmental Impact Report (EIS/EIR) and the signing of the ROD in August 2000.

The Preferred Program Alternative (PPA) in the CALFED ROD consists of programmatic elements that set the long-term direction of the CALFED program to meet its Mission Statement<sup>1</sup> and objectives<sup>2</sup>. The PPA has several interrelated programs and includes a series of actions to execute them. Implementation of the CALFED programs depend on authorization and funding from participating State and Federal agencies. The PPA is expected to take 25 to 30 years to complete. Implementation is roughly divided into several stages, with Stage 1 lasting seven years.

## **CALFED Programs**

The major CALFED programs consist of Conveyance, Water Transfer, Environmental Water Account, Water Use Efficiency, Water Quality, Levee System Integrity, Ecosystem Restoration and Watershed Management, and Storage.

- **Conveyance** – The Conveyance Program is aimed primarily at increasing export pumping capacity at SWP facilities in the South Delta from their current limit of 6,680 cubic foot per second (cfs) to 8,500 cfs and eventually to 10,300 cfs. Several major projects include: new fish screens at the Clifton Court Forbay and Tracy pumping plant; operable barriers to improve South

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1 **CALFED Mission Statement** - The mission of the CALFED Bay-Delta Program is to develop a long-term comprehensive plan that will restore ecological health and improve water management for beneficial uses of the Bay-Delta system.

2 **CALFED Objectives** - CALFED developed the following objectives:

- Provide good water quality for all beneficial uses.
- Improve and increase aquatic and terrestrial habitats and improve ecological functions in the Bay-Delta to support sustainable populations of diverse and valuable plant and animal species.
- Reduce the mismatch between Bay-Delta water supplies and current and projected beneficial uses dependent on the Bay-Delta system.
- Reduce the risk to land use and associated economic activities, water supply, infrastructure and the ecosystem from catastrophic breaching of Delta levees.

Delta water levels and quality; Tracy Fish Test Facility; Delta Cross Channel Reoperation; Clifton Court Forbay/Tracy Pumping Plant Inter-Tie; CVP/SSWP Aqueduct Inter-Tie; and San Luis Reservoir Low Point Improvement Project.

- **Water Transfer** – Potential water transfers are being evaluated to minimize the effects of a drought. Work is continuing on promoting an effective water transfer market that protects water rights, the environment, and local economies.
  
- **Environmental Water Account** – The Environmental Water Account (EWA) is aimed at adding flexibility to the State's water delivery system to provide water at critical times to meet environmental needs without water supply impacts on cities, farms, and businesses. It gives water managers the tools to acquire, store, transfer, and release water strategically to respond to real-time ecosystem needs. By providing water that otherwise would not be available, the EWA helps to resolve one of the Bay-Delta's most fundamental conflicts: the competing water needs of the environment and people. The EWA buys water from willing sellers or diverts surplus water when safe for fish, then banks, stores, transfers, and releases it as needed to protect fish and to compensate water users. It has set a goal of acquiring at least 190,000 acre-feet of water each year through purchases. An environmental review process has been initiated.
  
- **Water Use Efficiency** – The goal of the Water Use Efficiency Program is to implement an aggressive program to make the best use of existing water supplies, including: definition of appropriate water measurement; certification of urban best management practices (BMPs); and refinement of quantifiable objectives for agricultural water use efficiency. The program supports local water conservation and recycling projects. Savings resulting from the Water Use Efficiency Program will be accomplished through incentive-based, voluntary programs.
  
- **Water Quality** – The focus of the Water Quality Program is to improve water quality from source to tap for Californians whose drinking water supplies come from the Bay-Delta watershed. The program includes (1) developing source improvements and drainage management programs, (2) investing in treatment technology projects, (3) developing a Bay Area Blending and Exchange Program, (4) facilitate efforts to develop alternative sources of water supply for southern California, and (5) improving dissolved oxygen conditions in the San Joaquin River.
  
- **Levee System Integrity** – The Levee System Integrity Program is to reduce the threat of levee failure and seawater intrusion to protect water supplies, water quality, major roadways, cities, towns, agricultural lands, and environmental and aquatic habitat primarily in the Delta. It includes funding for local reclamation districts to reconstruct Delta levees to a base level of protection, development of BMPs for beneficial reuse of dredged material, and refinement of Delta Emergency Management Plans and a Delta Risk Assessment.
  
- **Ecosystem Restoration and Watershed Management** – The Ecosystem Restoration Program consists of improving the ecological health of the Bay-Delta watershed through restoring and protecting habitats, ecosystem functions, and native species. This program offers funding, coordination, and technical assistance to support local watershed activities. Primary program elements include (1) an annual grant program to fund local projects in habitat

restoration, fish passage, invasive species management, and environmental water quality; (2) habitat restoration in the Delta and its tributary watersheds; (3) stream flow augmentation in upstream areas through voluntary water purchases; (4) fish passage improvements through modification or removal of dams, improved bypasses, and ladders; (5) integrate flood management and ecosystem restoration; (6) support efforts to manage watersheds that affect the Bay-Delta system, develop watershed assessments and plans, implement specific watershed conservation, maintenance and restoration actions; and (7) management of the EWA.

- **Storage** – The Water Storage Program element seeks to develop additional storage capacity to help the needs of California’s growing population and to provide increased system flexibility to help improve water quality and restore ecosystems. The first stage of the program consists of increasing the storage capacity at existing reservoirs and strategically located offstream sites by approximately 950,000 acre-feet and implementing major expansion of groundwater storage for an additional 0.5 to 1.0 MAF.

### **Surface Water Storage**

The CALFED product delivery teams prepared numerous documents on all aspects of the programs. An important document in the storage program element for the Shasta Lake Water Resources Investigation is the Integrated Storage Investigation Report - Initial Surface Water Storage Screening (August 2000). Numerous potential reservoir sites were assessed and screened in the report. Of all the potential surface water sites considered, 12 were retained for more detailed evaluation. Of these 12, DWR and Reclamation were tasked to work with other CALFED agencies to take the necessary steps to pursue implementation of five on-stream and offstream projects. The five surface storage projects were subdivided into two categories, “Stage 1” and those requiring significant additional evaluation (CALFED Conditional). Stage 1 actions of the storage component of the PPA include expanding storage capacity at existing reservoirs and strategically located offstream sites amounting to approximately 950,000 acre-feet. The 5 surface water storage projects in the PPA include Enlarge Shasta, In-Delta Storage, Los Vaqueros Reservoir Enlargement, Sites Reservoir (a.k.a. NODOD), and Upper San Joaquin River Storage.

- **Enlarge Shasta** – The enlarged Shasta project in the PPA consists of expanding Shasta Reservoir by approximately 300,000 acre-feet through raising Shasta Dam 6.5 feet. The PPA identifies potential benefits such as increasing the pool of cold water available in Shasta Reservoir to maintain lower Sacramento River temperatures needed by certain fish and provide other water management benefits, such as water supply reliability.
- **In-Delta Storage** – The Delta Wetlands project would convert two Delta islands comprising 11,000 acres (Webb Tract and Bacon Island) into surface storage facilities and two islands comprising 9,000 acres (Bouldin Island and Holland Tract) into managed habitat. The lead agency for this study is the DWR. The two storage islands would provide approximately 220,000 acre-feet of new storage capacity. A pre-feasibility scope review of the project was conducted by DWR and Reclamation, which concluded that the original evaluations were generally well planned. However, the project as proposed requires modifications and significant

additional analyses. DWR and Reclamation are determining if any redesign or reconfiguration of the project could make it feasible for public ownership.

- **Los Vaqueros Reservoir Enlargement** – The Los Vaqueros Project consists of enlarging the 100,000 acre-foot existing reservoir up to 500,000 acre-feet. The project would help interconnect Bay Area conveyance facilities, and develop stakeholder agreement on integrated operation of water supply facilities. The primary purposes of the project would be to improve the quality and reliability of Bay Area drinking water supplies; improve Delta aquatic resources by reducing the effects of water deliveries from the Delta; provide for additional recreational opportunities in the Los Vaqueros watershed; and provide other benefits to the extent possible. The Contra Costa Water District (CCWD) is conducting pre-feasibility studies and supporting technical evaluations. The focus of the current studies are to further the alternatives analysis, environmental review, economic feasibility, public input and outreach, and operations and water quality modeling work necessary to prepare for a public advisory vote on the project in November 2003. Authority for Federal feasibility scope studies to consider the potential to enlarge Los Vaqueros was contained in Section 215 of PL 108-7 in the Fiscal Year 2003 Omnibus Appropriations. Further studies for the project under this authority will be dependent on the outcome of the November 2003 advisory vote.
  
- **Sites Reservoir (CALFED Conditional)** – The PPA also included a 1.9 MAF Sites Reservoir that would be located on the west side of the Sacramento River, about 60 miles northwest of Sacramento. The ROD concluded that extensive additional effort would be required before a decision to implement the project as part of CALFED could be made. As envisioned, the Sites Reservoir project would serve as an offstream storage reservoir filled primarily through pumped diversions from the Sacramento River and its tributaries during high flow periods. The lead agency for this study is the DWR. The primary benefits from the new storage would be increased reliability for water supplies for a significant portion of the Sacramento Valley, enhanced operational flexibility for managing fisheries and water quality, and improved Sacramento River diversion management. The name of the study has been changed to the North of the Delta Offstream Storage Project (NODOS). Public scoping for NODOS has been completed and planning, environmental, engineering, and related work is underway. Authority for Federal feasibility scope studies for the Sites (or NODOS) project was also contained in Section 215 of PL 108-7.
  
- **Upper San Joaquin River Storage (CALFED Conditional)** – The PPA also included a potential storage project on the Upper San Joaquin River. The ROD concluded that extensive additional effort would be required before a decision to implement the project as part of CALFED could be made. Reclamation, in coordination with DWR, is conducting the investigation. It includes developing a comprehensive list of water supply alternatives to support the San Joaquin Storage Investigation. This list consists of adding from 250,000 to 700,000 acre-feet of new storage in the San Joaquin watershed primarily through enlargement of Millerton Lake at Friant Dam or functionally equivalent project. This project would be designed to contribute to restoration of habitat, improve water quality for the San Joaquin River, and facilitate conjunctive management of water exchanges that improve water quality of deliveries to urban communities. Other potential benefits would include increased hydropower production

and enhance flood control operation. Authority for Federal feasibility scope studies for the Upper San Joaquin River Storage Project was contained in Section 215 of PL 108-7.

### **U.S. ARMY CORPS OF ENGINEERS**

Numerous projects, programs, and studies by the Corps influence the Sacramento River and its tributaries including Shasta Dam and Reservoir. Flood control projects range from various dams and reservoirs, hundreds of miles of levee and channel improvements, and a flood bypass system. A report specific to actions at Shasta Dam is the report on Reservoir Regulation for Flood Control, Shasta Dam and Lake, Sacramento River, California (January 1977 as supplemented). This report describes the methods of operation and prescribed regulations for flood control operation of Shasta Dam and Reservoir. In addition to operational regulations for flood control at Shasta Dam and Reservoir, other storage projects in the Sacramento River Basin prescribe flood control storage space, including Black Butte Dam on Stony Creek, Oroville Dam on the Feather River, New Bullards Bar Dam and Englebright Lake on the Yuba River, Indian Valley Dam on Cache Creek, and Folsom Dam on the American River. Within the San Joaquin River Basin, flood operation regulations are prescribed by the Corps for 16 dams and reservoirs.

One of many existing reports prepared by the Corps is the March 1999 Post-Flood Assessment. This report was completed following disastrous flooding that occurred throughout the Central Valley during January 1997. This report describes the impact of recent major floods in the Sacramento and San Joaquin River basins and includes information about the operation of major facilities of the flood control system, including Shasta Dam.

A major ongoing study in the Central Valley by the Corps and DWR that would significantly influence flood damage reduction and ecosystem restoration conditions along the Sacramento and San Joaquin rivers is the Sacramento and San Joaquin River basins Comprehensive Study (Comprehensive Study). Through the Comprehensive Study there is a potential, if approved by Congress, to significantly change the existing flood management system and help implement many of the projects proposed by CALFED.

### **OTHERS**

There are numerous other Federal, State, and local programs and projects that influence the development of water resources projects and programs in the Central Valley of California. Following are several of note.

#### **Phase 8**

After many years of struggling to develop water quality standards for the Sacramento and San Joaquin River Delta, the Bay-Delta Accord (Accord) was signed by multiple partners in 1994. The Accord set water quality standards and required the SWRCB to determine which water users would be responsible to meet these standards. In 1995 the Board adopted the Water Quality Control Plan to implement the Accord. Phases 1 through 7 of the Accord involved the San Joaquin Valley and other issues. Phase 8, involving Sacramento Valley water users, threatened to derail the Accord through lengthy litigation concerning the determination of which entities and individuals would be responsible for meeting the water quality standards. The DWR and Reclamation, as operators of the State and Federal export projects, have claimed that certain

water right holders in the Sacramento Valley must cease diversions or release water from storage to help meet water quality standards in the Delta. Sacramento Valley water users have claimed that their water use has not contributed to any water quality problems in the delta, and, as senior water right holders and water users within the watershed and counties of origin, they are not responsible for meeting these standards.

Rather than proceed with these highly adversarial proceedings, Sacramento Valley water users, DWR, Reclamation, and export water users agreed to defer the Phase 8 proceedings and instead, proceed in a more cooperative spirit to meet water supply, quality and environmental needs in areas of origin and throughout California. This cooperation is evidenced in the Sacramento Valley Water Management Agreement (Agreement). The Agreement includes four successive agreements: (1) Stay Agreement, (2) Short-Term Settlement Agreement, (3) Short-Term Project Implementation Agreements, and (4) Long-Term Agreements. The Agreement includes a process to resolve Phase 8 and related issues and a set of milestones to implement the short- and long-term projects. The Agreement also specifically identifies Sites Reservoir and Shasta Enlargement as potential long-term projects.

During the Short-Term Settlement Agreement, the active parties developed a long-term work plan and expanded program to guide implementation of the Long-Term Agreements. The Short-Term Agreement will continue until 2014 or until it is replaced by the long-term agreement. The Short-Term Agreement includes several provisions including:

- DWR and Reclamation remain obligated under SWRCB order to meet the Delta water quality standards during the term of the agreement.
  
- The agreement calls for unmet demands to be met in the Sacramento Valley, including 25,000 acre-feet of CVP water supplies for use along the Tehama-Colusa Canal and assurances that Feather River supplies can be utilized in the Sutter Bypass/Butte Slough region during dry years.

During development of the Short-Term Agreement, a workplan was developed. The short-term workplan identified and evaluated approximately 45 projects (i.e., projects that could be implemented within 1 to 2 years) including conjunctive management and surface storage reoperation projects. These projects will be developed to provide up to 185,000 acre-feet of capacity during critically dry, dry and below normal years. This capacity will be dedicated to two equal blocks. The first block (up to 92,500 acre-feet) will be made available for local use within the local agency boundary. If this water is not needed locally, it will be made available to the CVP and SWP at a negotiated rate. The second block of water (up to 92,500 acre-feet) will be provided to the SWP and CVP, which will be used to provide Water Quality Control Plan relief.

### **San Joaquin River Restoration**

A major study underway in the San Joaquin River Basin is the development of a restoration plan for the San Joaquin River below Friant Dam by the Friant Water Users Authority (FWUA) and the National Resources Defense Council (NRDC). As part of this work, the FWUA and NRDC

have been considering water supply options that could be developed to provide water for restoration needs.

### **Common Assumptions**

Efforts are underway primarily by DWR and Reclamation to identify a series of Common Assumptions for use in developing each of the CALFED storage projects. The Common Assumptions would primarily be used to develop Without-Project Conditions, which is a critical element in the plan formulation process. The Common Assumptions are to establish recognized baseline conditions including, at minimum: (1) period of analysis; (2) evaluation levels (i.e., 2001 for existing conditions and 2020 for future conditions); (3) water supply demands; (4) water supply system facilities; (5) regulatory standards, including minimum flow and temperature requirements; (6) system operation criteria; and (7) likely foreseeable actions.

The primary planning analytical tool being used for establishing baseline assumptions for water supply budgeting is the California Water Allocation and Reservoir Operations Model (CALSIM-II). This mathematical model is also used for studying the water supply impacts of various potential alternate system operations and project modifications.