

CHAPTER II

RELATED STUDIES, PROJECTS, AND PROGRAMS

This chapter presents the related activities of various Federal and State agencies and numerous local working groups and private organizations in the study area. Many of these entities, including Reclamation, the California Bay-Delta Authority (CBDA), and the Corps, are performing current studies, projects, and programs that are important to the SLWRI.

BUREAU OF RECLAMATION

As the owner and operator of Shasta Dam and Reservoir, Keswick Dam and Reservoir, and various related components of the CVP in the study area, Reclamation has a significant effect on environmental resources in the region. Ongoing projects or continuing programs relevant to the primary study area are described below.

Central Valley Project

Shasta Dam and Reservoir are key elements of the CVP. President Franklin Roosevelt approved the CVP, including the Kennett (Shasta), Friant, and Contra Costa (Delta) divisions, on December 2, 1935. The CVP is the largest surface water storage and delivery system in California, with a geographic area 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; 8 powerplants and 2 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 this 7 MAF, about 6.2 MAF would be for agricultural uses, 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 individual reservoirs, but also downstream flow conditions and conditions at other project reservoirs. Storage space south of the Delta that only can 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 CVP dams support both resident and anadromous fisheries and recreation. While resident fisheries are slightly affected by release fluctuations, 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 out-migration of juvenile anadromous fish is one of the main objectives of CVP operations. CVP operations are coordinated to anticipate and avoid streamflow fluctuations during spawning and incubation whenever possible.

Operation of the CVP is affected by several regulatory requirements and agreements. Prior to passage of the CVPIA, operation of the CVP was affected by State Water Resources Control Board (SWRCB) Decisions 1422 and 1485 (D-1422 and D-1485), and the Coordinated Operations Agreement (COA). D-1422 and D-1485 identify minimum flow and water quality conditions at specified locations that are to be maintained in part through 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 implementation of a San Francisco Bay/Sacramento-San Joaquin River Delta (Bay-Delta) protection plan through the SWRCB that would protect the ecosystem of the Bay-Delta Estuary. The Draft Bay-Delta Water Control Plan, released in May 1995, superseded D-1485. Coordinated operations of the CVP and SWP continue to be based on the COA.

Operation Divisions

CVP operations are divided into eight divisions. Operations north of the Delta include the Trinity, Shasta, and Sacramento River divisions, known collectively as the Northern CVP System. Those south of the Delta, and 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. Operational decisions are based on a number of physical and hydrological factors that change depending on conditions.

CVP Water Users

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

Members of Sacramento River Settlement Contractors primarily claim water rights on the Sacramento River. Because of the significant influence on flows in the Sacramento River, controlled 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 exchange contracts, the parties agreed not to 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 for use by water service contractors in the San Joaquin Valley and Tulare Lake Basin.

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 completion of CVP facilities in these areas, irrigators signed agreements with Reclamation for delivery of CVP water as a supplemental supply. Several cities also have similar contracts for M&I supplies; these irrigators and cities 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 uses.

Prior Studies of Enlarging Shasta Dam

Several studies have been conducted since the early 1960s to assess the feasibility of increasing storage space at Shasta Reservoir. The most significant studies occurred in the late 1970s and early 1980s. Evaluations of raising Shasta Dam considered 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 enlarging Shasta Lake. Most studies were completed in the early 1980s as part of PL 96-375, culminating with a final “wrap-up report,” completed in 1988. This report concluded that although enlarging Shasta Dam appeared feasible, a low demand for new supplies existed at that time.

No further action was taken on the potential project until the mid-1990s when Reclamation initiated an appraisal-level study that culminated in May 1999. The CVPIA was a major impetus for the appraisal study. The Shasta Dam and Reservoir Enlargement Appraisal Assessment reviewed estimated costs for a range of enlargement options and identified critical issues that would affect project feasibility. Three dam raises were considered in the study and documented in the appraisal report: 202.5 feet (high-level option), 102.5 feet (intermediate-level option), and 6.5 feet (low-level option). Studies 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 that additional studies be conducted that focus 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

management of the CVP, particularly for protection, restoration, and enhancement of fish and wildlife. The CVPIA also addresses the operational flexibility of the CVP and methods 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:

- Protect, restore, and enhance fish, wildlife, and associated habitats in the Central Valley and Trinity River basins of California.
- Address impacts of the CVP on fish, wildlife, and associated habitats.
- Improve the operational flexibility of the CVP.
- Increase water-related benefits provided by the CVP to the State of California through expanded use of voluntary water transfers and improved water conservation.
- Contribute to the State of California's interim and long-term efforts to protect the Bay-Delta Estuary.
- Achieve a reasonable balance among competing demands for CVP water, including water requirements for 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 Bay-Delta Estuary as having equal priority with other purposes. The CVPIA identified numerous specific measures and programs to meet the new project purpose and also directed the Secretary of the Interior to operate the CVP consistent with these purposes. Sections of the CVPIA important to the SLWRI include those focused on dedication of a portion of CVP yield to be used for environmental 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. Several specific projects include improvements to the intakes at the Coleman National Fish Hatchery on Battle Creek; installation of a temperature control device (TCD) on Shasta Dam; removal of McCormick-Saeltzer Dam on Clear Creek; land acquisition and watershed planning on Battle Creek; and a spawning gravel replenishment program.

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 CVPIA (commonly called (b)(2) water), dedicated inflows to wildlife refuges of 250,000 acre-feet (called Level 2 Refuge water), and Trinity Reapportion water 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 a reduction of 585,000 acre-feet annually. It is estimated in the CVPIA Programmatic Environmental Impact Report (EIR) that reduced water supplies and other CVPIA provisions would result in increased groundwater overdraft, fallowing of agricultural land, loss of jobs, and loss of over \$150 million in annual agricultural revenues. Most of this loss would be the result of the reduction in water supplies.

Implementation of the CVPIA (b)(2) provision has been a contentious process, marked by conflict between State and Federal parties, and substantial litigation. The primary dispute has been whether (b)(2) water translates into an automatic reduction in exports under water supply contracts. In May of 2003, Reclamation released a final decision on the implementation of Section 3406 (b)(2). The decision incorporates parts of an earlier decision (United States Department of the Interior 1999 Final Decision), modifies other decisions, and adds new components. The intent of these changes was to simplify and clarify the accounting process for (b)(2) water uses and to integrate (b)(2) water dedication and management with CVP operations for other CVP purposes. The decision is divided into sections that address 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 Plan and Federal Endangered Species Act (ESA) of 1978 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 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 was also intended to assist the State in meeting its future water needs. Further, appropriate cost-sharing arrangements to implement the CVP Water Supply Improvement Plan were to be recommended. A preliminary least-cost yield increase plan was completed by Reclamation in 1995 that 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 currently 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.

Operations Criteria and Plan

In March 2004, Reclamation and DWR prepared a Long-Term CVP and SWP Operations Criteria and Plan (OCAP) to address how the CVP and SWP would be operated in the future as several proposed projects come on-line and as water demands increase. This document is a revision of the previous 1992 OCAP release. It incorporates numerous additional constraints and criteria that have arisen since 1992. Several incorporations include the 2000 Trinity Record of Decision (ROD), AFRP flow objectives, the 1993 Winter Run Biological Opinion (BO), the revised decision on CVPIA Section 3406(b)(2) water, the Environmental Water Account (EWA), and the Joint Point of Diversion (JPOD).

Red Bluff Diversion Dam Fish Passage Improvement 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 contributing to the decline in populations of anadromous fish in the upper Sacramento River. Various studies and constructed test projects have been completed that focus on reducing impacts to anadromous fish while maintaining irrigation diversion capabilities at the dam; however, additional studies are ongoing.



Figure II-1 The Red Bluff Diversion Dam on the Sacramento River, looking west.

The Red Bluff Diversion Dam Fish Passage Improvement Project on the Sacramento River is a cooperative effort led by Reclamation and the Tehama-Colusa Canal Authority. The project consists of developing a long-term solution to relieve conflicts between fish passage and agricultural diversion needs. The two primary fish passage issues associated with the RBDD are (1) the delay and blockage of adults migrating upstream, and (2) impedance and losses of juveniles emigrating downstream. The reach of the Sacramento River upstream of RBDD is the primary spawning habitat for the endangered winter-run chinook and the fall- and late fall-run chinook salmon. Fish ladders located on each abutment of the dam have been ineffective, limiting access to remaining spawning habitat between Keswick Dam and Red Bluff. Predation is also problematic in Lake Red Bluff.

Five alternative plans were developed to improve fish passage at the RBDD. Public comment on those plans ended in November 2002 for the Draft Environmental Impact Statement/ Environmental Impact Report (EIS/EIR) released in August 2002. The environmental document is scheduled for completion at the end of 2004. The schedule has been delayed pending completion of the Reclamation OCAP process.

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 River drains an area of about 3,000 square miles. Trinity Dam and Reservoir has a 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 ROD was the culmination of a nearly 20-year process of detailed scientific efforts. The Trinity ROD implements a component of the CVPIA (Section 3406(b)(23)) intended to meet Federal trust responsibilities for protecting 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 that would result in rehabilitation of the river itself through restoration of 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 River and Sacramento River mainstems. It is acknowledged to have a broad effect on both rivers' ecosystems and potentially significant economic effects within the Sacramento River and Trinity River basins. 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 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 Oceanic and Atmospheric Administration (NOAA) Fisheries, formerly National Marine Fisheries Service (NMFS), United States Fish and Wildlife Service (USFWS), and the State of California Department of Fish and Game (CDFG), is 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 under the Federal and State ESAs. This partnership will create 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. Numerous natural and man-made barriers exist in the Battle Creek watershed that prevent access to valuable cold water spawning grounds. Actions will include removing dams, constructing fish screens and ladders, and augmenting flows to increase salmonid habitat. Restoration actions are expected to enhance and re-establish 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 in the Sacramento River above Red Bluff. The gain of 2,500 adult winter- and spring-run chinook salmon also would appreciably increase the total run sizes of these species. Various Federal, State, and local entities, including USFWS and the Western Shasta Resource Conservation District, are implementing different phases of the project. Construction of initial features began in 2002.

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.

BUREAU OF LAND MANAGEMENT

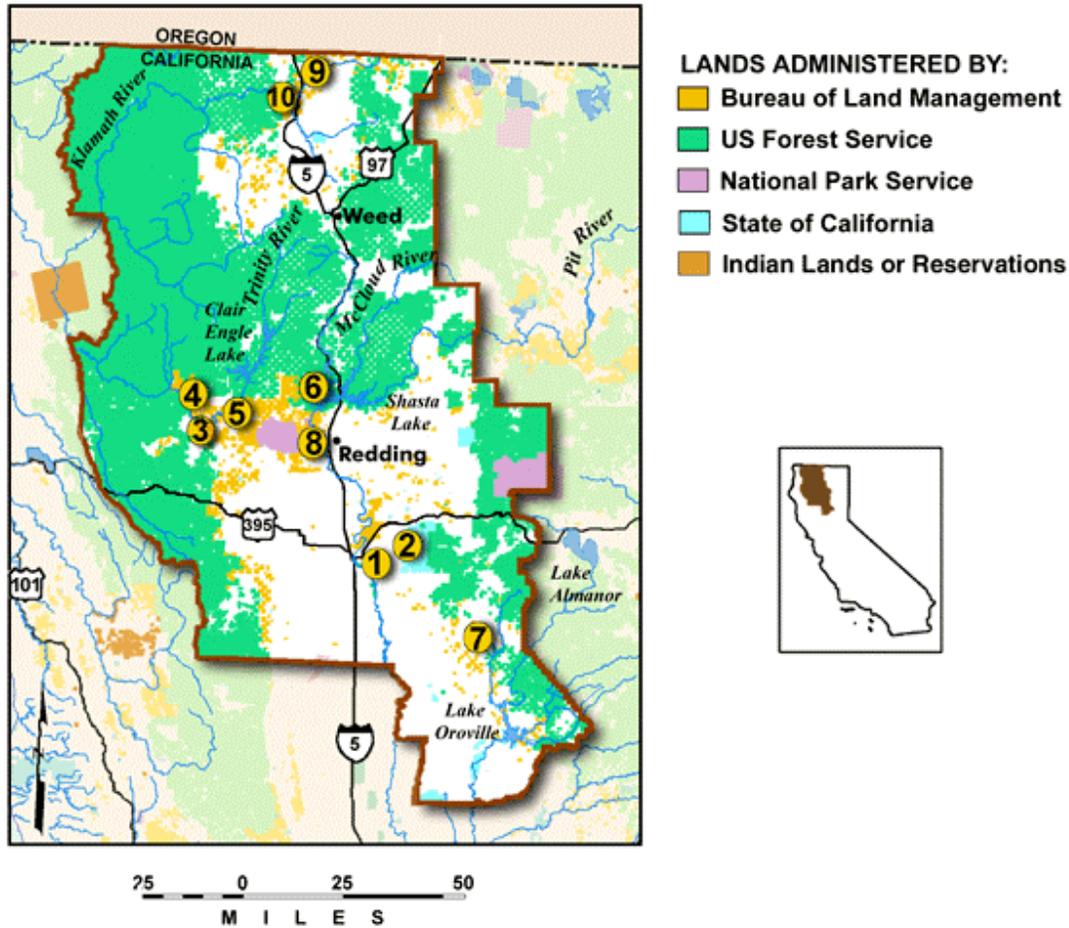
The United States Department of the Interior, Bureau of Land Management (BLM) is responsible for the administration of natural resources, lands, and mineral programs on approximately 250,000 acres of public land in Northern California. BLM lands within the study area, shown in **Figure II-2**, are located predominantly west of the Sacramento River, and include the 17,000-acre Sacramento River Bend area south of Jelly's Ferry, and off-highway vehicle areas near Shasta Lake. BLM has been involved in numerous restoration and conservation projects in area watersheds, including the Clear Creek Floodplain Restoration Project. BLM is also a responsible party in implementation of the Northwest Forest Plan.

Over 40,000 acres of public lands along the Sacramento River between Redding and Red Bluff have been proposed for designation as National Conservation Areas. Designation as a National Conservation Area would prevent construction of dams or other instream infrastructure, and ensure continued public access to the lands. Other areas that have been proposed for National Conservation Area or National Wilderness designations within the primary study area include the Backbone/Sugarloaf wilderness area, the Girard Ridge area (northeast of Shasta Lake), the Devil's Rock area adjacent to Squaw Creek near Shasta Lake, and the Beegum area in the Cottonwood Creek watershed. The BLM determined that 25 miles of the Sacramento River and about 7 miles of Paynes Creek are eligible for National Wild and Scenic River status, and BLM acquired roughly 17,000 acres in the Sacramento River Bend management area. Congressional action is required to confirm these proposed designations.

UNITED STATES FISH AND WILDLIFE SERVICE

USFWS has participated in numerous projects and programs within the study area, many related to species listed under the Federal ESA. The upper Sacramento River is recognized as critical habitat for endangered winter-run chinook salmon and other threatened or endangered species. Activities include investigations at the Coleman National Fish Hatchery, the Battle Creek Restoration Program, Clear Creek Restoration Program, Anderson Cottonwood Irrigation District (ACID) Program, and RBDD Fish Passage Improvement Project. USFWS is also instrumental in implementing the AFRP and Northwest Forest Plan, providing scientific research, monitoring, environmental compliance, and restoration planning support.

The CVPIA included fish and wildlife protection, restoration, and mitigation as project purposes having equal priority with irrigation and domestic use, and fish and wildlife enhancement as a project purpose equal to power generation. Section 3406(b)(1) of the CVPIA directs the implementation of a program that makes all reasonable efforts to at least double natural production of anadromous fish in California's Central Valley streams on a long-term, sustainable basis. The major resulting program to accomplish this goal is the AFRP administered by USFWS. The AFRP includes the following general objectives:



Source: Bureau of Land Management web site <http://www.blm.ca.gov/redding>.

Figure II-2 – Lands administered by BLM and other public agencies.

- Improve habitat for all life stages of anadromous fish through provision of flows of suitable quality, quantity, and timing, and improved physical habitat.
- Improve survival rates by reducing or eliminating entrainment of juveniles at diversions.
- Improve the opportunity for adult fish to reach their spawning habitats in a timely manner.
- Collect fish population, health, and habitat data to facilitate evaluation of restoration actions.
- Integrate habitat restoration efforts with harvest and hatchery management.
- Involve partners in implementing and evaluating restoration actions.

To help restore the overall ecosystem function of the upper Sacramento River as part of the AFRP, a number of potential actions have been proposed. Among them are increasing minimum objective flows in the river downstream from Keswick Dam, primarily during the winter and spring, from the current minimum flow of 3,250 cubic feet per second (cfs) to over 5,000 cfs.

NOAA FISHERIES

United States Department of Commerce, NOAA Fisheries, is involved in comprehensive recovery planning for listed salmonid species in the Central Valley. NOAA Fisheries is required under the Federal ESA to assess factors affecting the species, identify recovery criteria, identify the entire suite of actions necessary to achieve these goals, and estimate the cost and time required to carry out the actions.

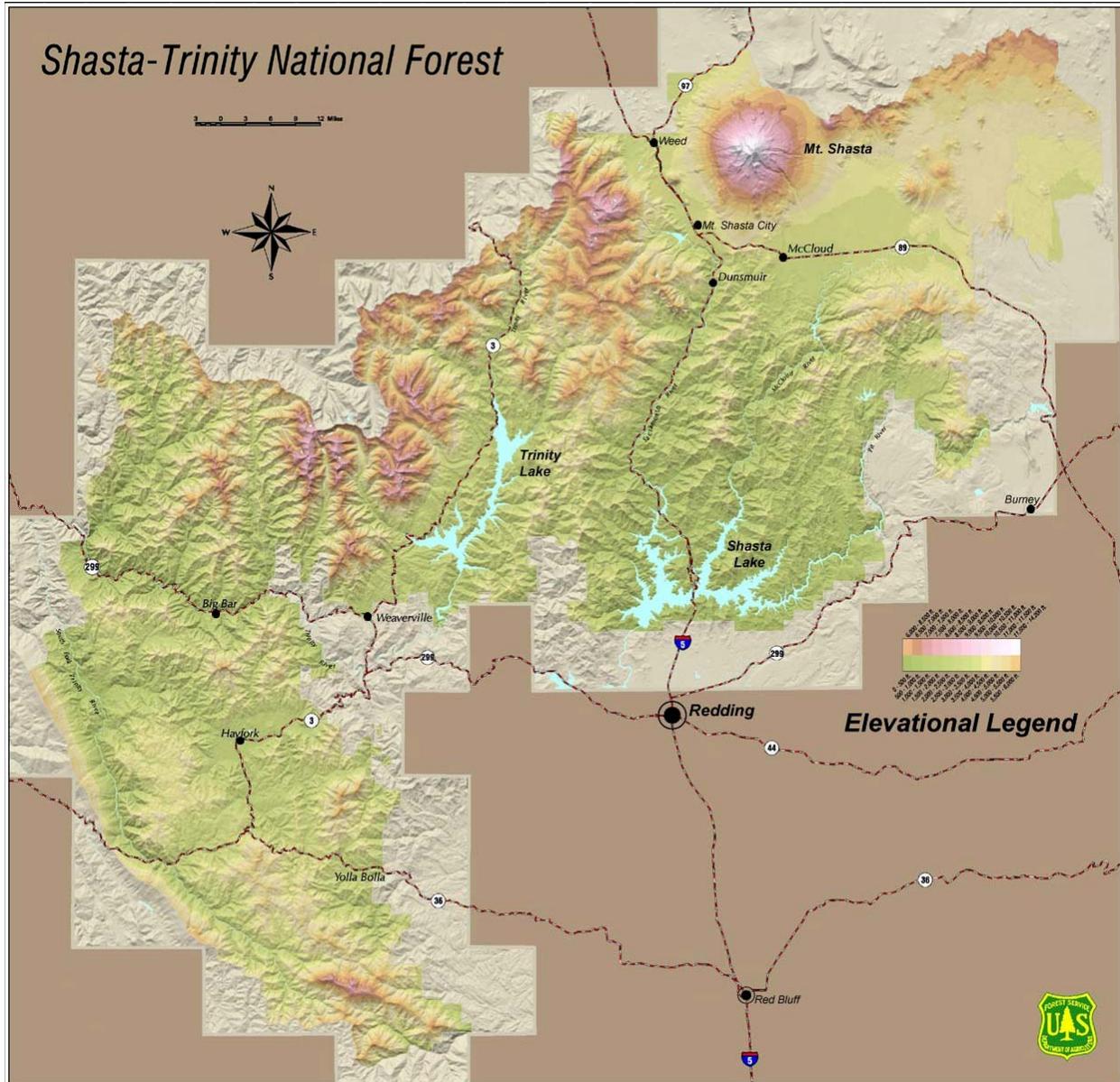
NOAA Fisheries has designated Critical Habitat for the Federally listed winter-run chinook salmon to be the Sacramento River from Keswick Dam downstream to the Golden Gate Bridge. The Central Valley recovery planning domain also includes Central Valley spring-run chinook salmon, Central Valley steelhead, and also Federal candidate species fall/late fall-run chinook salmon. Clear, Cow, Bear, Battle, and Cottonwood creeks have been identified as Essential Fish Habitat. The Proposed Recovery Plan for Sacramento River Winter-Run Salmon, August 1997, presents restoration goals and actions, some of which would be applied within the SLWRI study area. Proposed elements include the following:

- **Provide suitable water temperatures for spawning, egg incubation, and juvenile rearing between Keswick Dam and Red Bluff** – Actions include operating the CVP to consistently attain water temperature objectives; operating and maintaining temperature control curtains at Whiskeytown and Lewiston reservoirs; and regulating the river and reservoir system using a comprehensive temperature monitoring program and model.
- **Reduce pollution in the Sacramento River from Iron Mountain Mine** – Actions include alleviating pollution problems from the mine during winter-run incubation periods; treating and/or controlling heavy metal waste prior to discharge to the Sacramento River; diluting heavy metal waste discharges through effective water management; eliminating scouring of toxic metal-laden sediments in Spring Creek and Keswick reservoirs; and monitoring metal concentrations and waste flows.
- **Provide optimum flows in the Sacramento River between Keswick Dam and Chipps Island** – Actions include maintaining flows of 5,000 to 5,500 cfs from October through April, when possible; eliminating adverse flow fluctuations by modifying ACID dam operations, or by modifying or replacing the facility; inventorying and assessing water withdrawal sites and taking action to increase streamflows.
- **Protect and maintain gravel resources in the Sacramento River and its tributaries between Keswick Dam and Red Bluff** – Actions include restoring and replenishing spawning gravel in the Sacramento River; implementing a plan to protect natural sources of spawning gravel along the Sacramento River and its tributaries; and controlling excessive silt discharges from tributary watersheds to protect spawning gravel.

Some of these actions are ongoing or are currently under study.

UNITED STATES DEPARTMENT OF AGRICULTURE, FOREST SERVICE

The United States Department of Agriculture, Forest Service (USFS) is responsible for lands within the Shasta-Trinity National Forest (STNF), shown in **Figure II-3**, including the Whiskeytown-Shasta-Trinity National Recreation Area and Shasta McCloud Management Unit. USFS is involved in fire hazard and fuel reduction projects, forest health and ecosystem management, timber sales, conservation planning, wildlife monitoring, recreation facilities, and administration of the Northwest Forest Plan.



Source: Forest Service web site <http://www.r5.fs.fed.us/shastatrinity>

Figure II-3 – Shasta-Trinity National Forest.

USFS manages the majority of the land and facilities surrounding Shasta Lake. It also owns a 299-acre parcel at the Red Bluff Recreation Area, which is undergoing restoration in cooperation with the Sacramento River Discovery Center. The 1995 Shasta-Trinity National Forest Land Resource Management Plan (STNFLRMP) provides guidance for national forest lands and includes the designation of Riparian Reserves. Riparian Reserves are located along all perennial and intermittent streams and provide special protection to riparian and aquatic values in these areas.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

The United States Environmental Protection Agency (EPA) is involved in remediation and cleanup activities related to the Iron Mountain Mine Superfund site in the Clear Creek drainage, west of the Sacramento River. Acid mine drainage from the former copper mine has significantly impacted the Clear Creek watershed and caused fish kills in the Sacramento River. This site is being addressed through interim emergency actions and long-term remedial phases, focusing on water management, cleanup of major sources in Boulder Creek, the Old Mine/No. 8 Mine, area source acid mine drainage discharges, and sediments. Remedial actions taken to date have significantly reduced acid and metal contamination in surface water. Additional planned activities include construction of an acid mine drainage treatment plant in the Boulder Creek watershed. Participation by other agencies in cleanup activities related to the mine complex is discussed later in this section.

UNITED STATES ARMY CORPS OF ENGINEERS

Numerous projects, programs, and studies by the Corps affect the Sacramento River and its tributaries. 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 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. 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 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. The report describes the impact of recent major floods in the Sacramento River and San Joaquin River basins and includes information about 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.

CALIFORNIA DEPARTMENT OF WATER RESOURCES

DWR programs and projects that could affect the SLWRI are described in this section.

State Water Project

The SWP was authorized in 1959 and designated to readjust 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, 6 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. Lake Oroville is 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 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. 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 M&I 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 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, central coast, and 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 for the San Joaquin Valley, and the remaining 370,000 acre-feet for San Francisco Bay, the central coast, and Feather River areas.

SWP contracts involve 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 DWR, prepares and publishes the California Water Plan through its Bulletin 160 series. Seven versions of the plan were published between 1966 and 1998. A 1991 amendment to the California Water Code directs 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 gap between future water demands and supplies. A focus of the 1998 Bulletin is 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 published in the 1998 Bulletin.

Work is underway on an update to the plan. The update is being prepared in a highly collaborative environment with a multimember public Advisory Committee. Key elements of the update 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 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.

CALIFORNIA DEPARTMENT OF FISH AND GAME

CDFG is responsible for managing California's fish and wildlife resources and oversees the restoration and recovery of threatened and endangered species under the California ESA. CDFG participates in conservation planning, environmental compliance and permitting, coordinated resource management planning, and restoration and recovery programs. CDFG is involved in numerous investigations, projects, and monitoring activities in the study area, including fish passage, riparian restoration, and aquatic habitat restoration. The Wildlife Conservation Board (WCB), established under CDFG, administers a capital outlay program for wildlife conservation and related recreation projects. Within the study area, WCB has participated in restoration activities at Turtle Bay, the Nature Conservancy's Lassen Foothills Project, and various local projects in Redding and Red Bluff.

CDFG oversees three mitigation banks in the study area: the Cottonwood Creek, Battle Creek, and Stillwater Plains mitigation banks. CDFG also manages several Wildlife Areas and other properties within the study area, including the following:

- **Battle Creek Wildlife Area, Shasta and Tehama Counties** – 582 acres of riparian forests, marshes, and oak woodland adjacent to the Coleman National Fish Hatchery.
- **Mouth of Cottonwood Creek Wildlife Area, Shasta and Tehama Counties** – 571 acres located at the confluence of Cottonwood Creek and the Sacramento River.
- **Tehama Wildlife Area, Tehama County** – 46,862 acres of oak woodland, rugged canyons, grassland, and chaparral east of Redding near Paynes Creek.
- **Cantara - Ney Springs Wildlife Area, Siskiyou County** – 93 acres of mixed conifer, hardwoods, and riparian vegetation along the upper Sacramento River.
- **Anderson River Park, Shasta County** – 264 acres managed by the City of Anderson.

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 of the United States 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 EIS/EIR and 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 Statement¹ and objectives.² The PPA has several interrelated programs and includes a series of actions to execute the programs. Implementation of the CALFED programs depends 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 7 years.

In 2003, the State of California formed the CBDA to help oversee 23 state and federal agencies working cooperatively to implement the CALFED PPA. The California Bay-Delta Act of 2003 established the CBDA as the new governance structure and charged it with providing accountability, ensuring balanced implementation, tracking and assessing CALFED Program progress, using sound science, assuring public involvement and outreach, and coordinating and integrating related government programs.

CALFED Programs

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

- **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 cfs to 8,500 cfs

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.

and eventually to 10,300 cfs. Several major projects include new fish screens at the Clifton Court Forebay and Tracy Pumping Plant; operable barriers to improve South Delta water levels and quality; Tracy Fish Test Facility; Delta Cross Channel Reoperation; Clifton Court Forebay/Tracy Pumping Plant Intertie; CVP/SWP Aqueduct Intertie; 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** –EWA consists of two primary elements: (1) assisting fish population recovery for at risk native fish species, and (2) increasing water supply reliability by reducing uncertainty associated with fish recovery actions. It is aimed at adding flexibility to the State's water delivery system for providing water at critical times to meet environmental needs without water supply impacts on cities, farms, and businesses. EWA 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, EWA helps to resolve one of the Bay-Delta's most fundamental conflicts: the competing water needs of the environment and people. EWA buys water from willing sellers or diverts surplus water when safe for fish, and then EWA banks, stores, transfers, and releases the water as needed to protect fish and to compensate water users. EWA has set a goal of acquiring at least 190,000 acre-feet of water each year through purchases. The CALFED ROD defined EWA as a 4-year program, unless EWA agencies agree to extend the program. A final EIS/EIR was issued in January 2004.
- **Water Use Efficiency** – The goal of the Water Use Efficiency Program is to aggressively make the best use of existing water supplies through defining appropriate water measurement; certifying urban best management practices (BMPs); and refining 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) facilitating 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 purpose of 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. The program includes funding for local reclamation districts to reconstruct Delta levees to a base level of protection, develop BMPs for beneficial reuse of dredged material, and refine Delta Emergency Management Plans and a Delta Risk Assessment.

- **Ecosystem Restoration and Watershed Management** – The Ecosystem Restoration Program (ERP) 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 for 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) integration of flood management and ecosystem restoration; (6) support for efforts to manage watersheds that affect the Bay-Delta system, development of watershed assessments and plans, and implementation of specific watershed conservation, maintenance, and restoration actions; and (7) management of EWA.
- **Storage** – The Water Storage Program element seeks to develop additional storage capacity to help meet the needs of California’s growing population and to provide increased system flexibility for helping to 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

CALFED product delivery teams have prepared numerous documents on all aspects of CALFED programs. An important document in the storage program element for the SLWRI is the Integrated Storage Investigation Report - Initial Surface Water Storage Screening (August 2000), which assessed and screened numerous potential reservoir sites. Of numerous potential surface water storage projects considered, 12 were retained for more detailed evaluation. Of these 12, DWR and Reclamation were tasked to work with other CALFED agencies to pursue implementation of 5 onstream and offstream projects. The 5 surface water storage projects in the PPA include Enlarge Shasta, In-Delta Storage, Los Vaqueros Reservoir Enlargement, Sites Reservoir (a.k.a. North of Delta Offstream Storage (NODOS)), and Upper San Joaquin River Storage.

- **Enlarge Shasta** – The Enlarge 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 to 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 DWR. The two storage islands would provide approximately 220,000 acre-feet of new storage capacity. A prefeasibility 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 whether 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), Reclamation, and DWR are conducting feasibility studies and supporting technical evaluations. The focus of the current studies is on defining alternatives to address identified problems, environmental review, public input and outreach, and operations and water quality modeling. Authority for the Federal feasibility study to consider enlarging Los Vaqueros was contained in Section 215 of PL 108-7 in the 2003 Omnibus Appropriations.
- **Sites Reservoir** – The PPA 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 could be made to implement the project as part of CALFED. 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 DWR. 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 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 also was contained in Section 215 of PL 108-7.
- **Upper San Joaquin River Basin Surface Storage** – The PPA included a potential storage project on the Upper San Joaquin River. The ROD concluded that extensive additional effort would be required before a decision could be made to implement the project as part of CALFED. Reclamation, in coordination with DWR, is conducting an investigation that includes developing a comprehensive list of water supply alternatives that could add 250,000 to 700,000 acre-feet of new storage in the San Joaquin watershed, primarily through enlarging Millerton Lake at Friant Dam or developing a 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 the water quality of deliveries to urban communities. Other potential benefits would include increased hydropower production and enhanced flood control operation. Authority for Federal feasibility scope studies for the Upper San Joaquin River Storage Project also was contained in Section 215 of PL 108-7.

SACRAMENTO RIVER CONSERVATION AREA PROGRAM

California Senate Bill 1086 called for a management plan for the Sacramento River and its tributaries to protect, restore, and enhance both fisheries and riparian habitat. The Sacramento River Conservation Area Program has an overall goal of preserving remaining riparian habitat and reestablishing a continuous riparian ecosystem along the Sacramento River between Redding and Chico, and reestablishing riparian vegetation along the river from Chico to Verona. The program is to be accomplished through an incentive-based, voluntary river management plan. The Upper Sacramento River Fisheries and Riparian Habitat Management Plan, January 1989, identifies specific actions to help restore the Sacramento River fishery and riparian habitat between the Feather River and Keswick Dam. The Sacramento River Conservation Area Forum Handbook, 2002, is a guide to implementing the program.

The Keswick Dam to Red Bluff portion of the Conservation Area includes areas within the 100-year floodplain, existing riparian bottomlands, and areas of contiguous valley oak woodland, totaling approximately 22,000 acres. The 1989 fisheries restoration plan recommended several actions specific to the study area that have not yet been completed:

- Fish passage improvements at RBDD (under study).
- Potential modification of Spring Creek Tunnel intake for temperature control.
- Spawning gravel replacement program.
- Development of side-channel spawning areas, such as those at Turtle Bay in Redding.
- Structural modifications to the ACID dam to eliminate short-term flow fluctuations.
- Maintaining instream flows through coordinated operation of water facilities.
- Improvements at the Coleman National Fish Hatchery (partially complete).
- Measures to reduce acute toxicity caused by acid mine drainage and heavy metals.
- Various fisheries improvements on Clear Creek (partially complete).
- Flow increases, fish screens, and revised gravel removal practices on Battle Creek.
- Control of gravel mining, improvement of spawning areas, improvement of land management practices in the watershed, and protection and restoration of riparian vegetation along Cottonwood Creek.

IRON MOUNTAIN MINE RESTORATION PLAN

The Iron Mountain Mine Trustee Council, formed by the USFWS, CDFG, NOAA Fisheries, BLM, and Reclamation, developed the Final Restoration Plan for Natural Resource Injuries from Iron Mountain Mine, April 2002. The plan identifies restoration actions to address injuries to, or lost use of, natural resources resulting from acid mine drainage from the Iron Mountain Mine complex. Specific goals of the plan are to restore the following resources affected by toxic mine releases: salmonids, riparian habitat, and instream ecological functions. Proposed actions are

located along the Sacramento River and its tributaries between Keswick Reservoir and the RBDD. Injured resources identified in the plan include the following:

- **Anadromous fish** – Fall-run chinook salmon.
- **Instream resources of creeks draining the mine** – Acid mine drainage and toxic metals have sterilized many creeks, including Boulder, Slickrock, Flat, and Spring creeks.
- **Riparian habitat** – Acid mine drainage and toxic metals have severely impacted stream-side soils and habitats along Boulder, Slickrock, Spring, and Flat creeks, resulting in a loss of approximately 39 acres of riparian habitat; stream hydrology also has been altered by diversion dams constructed to collect affected drainage.
- **Lost human-use** – Loss of recreation and other public uses of the land.

Restoration actions were also chosen from those listed in the CALFED ERP, including the following:

- **Fish passage improvements** – Removal of culvert crossings, modification or removal of locally-owned dams and diversions, fish screens, acquisition of water rights from willing sellers to increase flows, and gravel replenishment in the Sacramento River ranging from 10,000 to 20,000 cubic yards annually.
- **Instream habitat restoration** – Large-scale habitat development, including artificial riffles, placement of woody debris, and programs to address turbidity and other water quality impairments.
- **Riparian restoration** – Livestock exclusion fencing, stream bank restoration and plantings, riparian land acquisition from willing sellers, conservation easements, and invasive species management.

RIPARIAN HABITAT JOINT VENTURE

The Riparian Habitat Joint Venture (RHJV) was initiated in 1994 and includes signatories from 18 Federal, State, and private agencies. The RHJV promotes conservation and restoration of riparian habitat to support native bird populations. The three goals of the RHJV include the following:

- Promote an understanding of the issues affecting riparian habitat through data collection and analysis.
- Double riparian habitat in California by funding and promoting on-the-ground conservation projects.
- Guide land managers and organizations to prioritize conservation actions.

RHJV conservation and action plans are documented in the Riparian Bird Conservation Plan, August 2000. The conservation plan targets 14 “indicator” species of riparian-associated birds and provides recommendations for habitat protection, restoration, management, monitoring, and policy. The report notes habitat loss and degradation as one of the most important factors causing the decline of riparian birds in California. RHJV has participated in monitoring efforts

within the Sacramento National Wildlife Refuge Complex and other conservation areas. The RHJV's conservation plan identifies Lower Clear Creek as a prime breeding area for Yellow Warblers and Song Sparrows, advocating a continuous riparian corridor along lower Clear Creek. Other recommendations of the conservation plan apply to the SLWRI study area in general.

RESOURCE CONSERVATION DISTRICTS

There are numerous resource conservation districts (RCDs) within the study area. Once known as Soil Conservation Districts, RCDs were established under California law with a primary purpose to implement local conservation measures. Although RCDs are locally governed agencies with locally appointed, independent boards of directors, they often have close ties to county agencies and the National Resource Conservation Service. RCDs are empowered to conserve resources within their districts by implementing projects on public and private lands and to educate landowners and the public about resource conservation. They are often involved in the formation and coordination of watershed working groups and other conservation alliances. In the Shasta Lake and upper Sacramento River vicinity, districts include the Western Shasta County RCD and the Tehama County RCD. To the east are the Fall River and Pit River RCDs, and to the west and north are the Trinity County and Shasta Valley RCDs. Several of the RCDs and their activities relevant to the study area are described in the following sections.

Western Shasta Resource Conservation District

The Western Shasta Resource Conservation District (Western Shasta RCD) is a partner in resource management, watershed management, conservation, and restoration programs within western Shasta County. The Western Shasta Resource Conservation District Strategic Plan for 1999-2003 established strategic areas of focus for the district, one of which is watershed restoration. Recognizing that an important resource issue in the region is anadromous fisheries, the district has also placed emphasis on improving spawning habitat. The Western Shasta RCD has participated in numerous comprehensive watershed analyses in the primary study area, including studies of the Cow Creek, Cottonwood Creek, Squaw Creek, Upper Clear Creek, and McCloud River watersheds. These reports evaluate environmental resource conditions within watersheds, identify problems, and make recommendations for future management actions.

Ongoing restoration work by the Western Shasta RCD includes erosion control and vegetation management; agreements on the timing of water flows from area dams; assist area for local landowners and interested parties in forming watershed groups; spawning gravel injections at strategic locations; isolation of deep gravel pits to eliminate fish stranding; and channel reconstruction at former instream mining locations. Other areas of concern include noxious and nonnative weeds, erosion control, and fire and fuels reduction. The Western Shasta RCD is participating in the following ongoing programs in the primary study area:

- **Lower Clear Creek Floodway Rehabilitation Project** – The Western Shasta RCD has participated in this multiagency channel and floodplain restoration project along the lower reaches of Clear Creek. The project has filled former gravel pits, realigned segments of the channel to a more natural state, revegetated floodplains, and constructed wetlands. Elements of the project that have not yet been funded or completed include channel reconstruction and

revegetation at a former gravel mining location; annual spawning gravel injections; erosion control at the Saeltzer Dam site and Sunrise Bluffs; channel realignment at Pirate's Den; and channel regrading to prevent fish stranding.

- **Battle Creek** – The Western Shasta RCD is a local participant in the Battle Creek Community Strategy and is assisting in implementation of the Battle Creek Salmon and Steelhead Restoration Plan. Various program components are yet to be done, including removal of dams, construction of fish screens and ladders, and flow augmentation to increase salmonid habitat.
- **Shasta West Watershed** – The Western Shasta RCD developed a watershed assessment for the Shasta West Watershed that recommended restoration activities along various western tributaries to the Sacramento River. Recommended projects that have not yet been completed include culvert removals along Salt Creek; debris cleanout at Swasey Dam; spawning gravel injections on Middle, Salt, and Olney creeks; and erosion control along various creeks to reduce fine sediment input.
- **Cow Creek** – The Western Shasta RCD recently completed a watershed assessment on Cow Creek and began implementing restoration recommendations. Projects that have not yet been funded or implemented include various fish passage and diversion projects; installation of fish screens on diversions; water quality improvement to address fecal coliform contamination (due to grazing); and instream spawning area restoration.

Tehama County Resource Conservation District

The Tehama County RCD encompasses about 1.7 million acres within Tehama County, excluding the incorporated cities of Red Bluff, Corning, and Los Molinos. Waterways in the district include Battle, Mill, Paynes, and Cottonwood creeks. The mission of the Tehama County RCD is to manage natural resources at a watershed level through the education and cooperation of residents and stakeholders, focusing on upper watershed and riparian health, water quantity, and water quality.

Fall River Resource Conservation District

The Fall River RCD encompasses over 1.1 million acres of land within Lassen, Modoc, Shasta, and Siskiyou counties. The district includes the Fall River, Pit River, Hat Creek, and Burney Creek watersheds. One of the most prominent environmental resource issues in the district is management of erosion and sedimentation, which has significantly impaired aquatic habitat in numerous streams and creeks. Management measures include (1) controlling bank erosion by livestock exclusion fencing, muskrat control, and boat speed regulation enforcement, (2) restoring and protecting high priority stream and meadow systems in Upper Bear Creek and Dry Creek, and (3) performing sediment removal activities on Fall River. The district is participating in the Fall River Restoration Project and received funding in 2000 from the McConnell Foundation to purchase conservation easements.

OTHER PROGRAMS AND PROJECTS

Numerous other Federal, State, and local programs and projects influence development of water resources projects and programs in the Central Valley of California.

Phase 8

After many years of struggling to develop water quality standards for the Delta, the Bay-Delta Accord (Accord) was signed by multiple partners in 1994. The Accord set water quality standards and required SWRCB to determine which water users would be responsible to meet these standards. In 1995, SWRCB adopted a Water Quality Control Plan to implement the Accord. Phases 1 through 7 of the Accord involved San Joaquin Valley matters and other issues. Phase 8, involving Sacramento Valley water users, threatened to derail the Accord through lengthy litigation concerning determination of which entities and individuals would be responsible for meeting the water quality standards. DWR and Reclamation, as operators of State and Federal export projects respectively, have claimed that certain water rights 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 rights holders and water users within the watershed and counties of origin, they are not responsible for meeting these standards.

Rather than continue these adversarial proceedings, Sacramento Valley water users, DWR, Reclamation, and export water users agreed to defer Phase 8 and instead, work 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 comprises 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 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, 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 to 2014 or until it is replaced by the Long-Term Agreement. The Short-Term Agreement includes several provisions:

- DWR and Reclamation remain obligated under an SWRCB order to meet Delta water quality standards during the term of the agreement.
- Unmet demands should 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 used in the Sutter Bypass/Butte Slough region during dry years.

During development of the Short-Term Agreement, a work plan was developed. The Short-Term Agreement work plan 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, and 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 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, FWUA and NRDC have been considering water supply options that could be developed to provide water for restoration needs.

OTHER PROGRAMS AND PRIVATE ORGANIZATIONS

Other programs and private organizations related to the SLWRI are described in this section.

Sacramento Watersheds Action Group

The Sacramento Watersheds Action Group (SWAG) is a nonprofit corporation that secures funding for, designs, and implements projects that provide watershed restoration, streambank and slope stabilization, erosion control, watershed analysis, and road removal. SWAG has successfully worked with local groups, agencies, and organizations to fund and complete restoration projects on the Sacramento River and tributaries downstream from Keswick Dam, including development of the Sulphur Creek Watershed Analysis and Action Plan; the Whiskeytown Reservoir Shoreline Erosion Control Project; the Sulphur Creek Streambank Stabilization and Channel Reconstruction Projects; the Secret Canyon Stream Crossing Restoration Project; and the Lower Sulphur Creek Realignment and Riparian Habitat Enhancement Project. SWAG is a potential local sponsor for watershed restoration actions in the study area.

Sacramento River Watershed Program

The Sacramento River Watershed Program is an effort to bring stakeholders together to share information and work together to address water quality and other water-related issues within the Sacramento River watershed. The group is funded congressionally through the EPA. The program's primary goal is "to ensure that current and potential uses of Sacramento River watershed resources are sustained, restored, and where possible enhanced while promoting the long-term social and economic vitality of the region." Additional goals of the program are to:

- Sustain effective processes to improve watershed quality and protect beneficial uses of water that meet the interests of all stakeholders in the Sacramento River basin.
- Provide dependable and accessible information through scientifically sound monitoring.
- Provide sound information to support decisions and actions of watershed stakeholders.

- Provide and support an effective process that sustains locally led and community-based environmental management that meets State and Federal regulatory requirements in locally appropriate ways.
- Develop a stewardship approach to collaborative, whole watershed management.
- Ensure that the interests represented in development of program policies, programs, and activities reflect the diversity of interests represented by all stakeholders of the watershed.

The Sacramento River Watershed Program manages grants for the Sacramento River Toxic Pollutants Control Program, performs extensive water quality monitoring, data collection, and data management for the watershed, and is instrumental in the study and monitoring of toxic pollutants. Although the program does not implement restoration projects, it is a potential provider of technical information for future water quality improvement programs in the study area.

McCloud River Coordinated Resource Management Plan

Participants and signatories to the McCloud River Coordinated Resource Management Plan (CRMP) include Federal, State, and local government agencies, private landowners, industry, and environmental groups. One principal objective of the CRMP is to protect the free-flowing nature of the McCloud River. Also of concern is the river's fishery, which supports a significant commercial sport-fishing industry. The CRMP has several active working groups, including a Research and Monitoring group, but specific projects have not been identified at this time.

Pit River Watershed Alliance

The Pit River Watershed Alliance is a collaborative effort between private and public interests and local landowners to improve aquatic habitat in the Pit River watershed. Environmental concerns include water quality, threatened and endangered species, and noxious weeds. Participants include the Fall River, Central Modoc, Pit, and Goose Lake RCDs. The Alliance is a potential partner for environmental restoration actions in the Pit River watershed.

Clear Creek Coordinated Resource Management Plan

The Clear Creek CRMP Group, which consists of stakeholders and local landowners, has been involved since 1995 in planning, implementing, and monitoring multidisciplinary restoration projects to promote anadromous salmonids on Clear Creek. Proposed activities to benefit fishery populations include increasing water releases from Whiskeytown Dam; improving upstream passage for migrating chinook salmon and steelhead to historical habitat; augmenting spawning gravel; restoring sediment transport; and reducing fine sediment input from upland erosion.

Battle Creek Watershed Conservancy

The Battle Creek Watershed Conservancy (BCWC) is actively involved in monitoring actions connected to the Battle Creek Salmon and Steelhead Restoration Project. BCWC participates in numerous working groups associated with projects on Battle Creek, including the Battle Creek Working Group, Adaptive Management Working Group, Coleman National Fish Hatchery meetings, Spring-Run Group, Steelhead Group, and CALFED Watershed Program Workgroup.

BCWC administered the first phase of projects on Battle Creek, including conservation easements, noxious weed controls, and restoration in the lower watershed. The group is a potential partner in future restoration actions in the Battle Creek watershed.

Sulphur Creek Coordinated Resource Management Plan

The mission of the Sulphur Creek CRMP is to promote restoration and enhancement of the Sulphur Creek Watershed near Redding by providing a forum for communication and cooperation among interested individuals, groups, businesses, and local, State, and Federal agencies. Key issues identified by the CRMP include protecting and enhancing the watershed's natural and cultural resources (riparian and upland plant communities, fish and wildlife habitat, water quality); providing education and recreation opportunities in the urbanizing Redding region; and linking the Sulphur Creek watershed with other natural areas and parkways. A watershed analysis revealed that extensive instream mining, road building, and railroad construction within the watershed, and backwater from the Sacramento River, have resulted in channel degradation and deterioration of aquatic and riparian habitat. The CRMP has been part of several streambed restoration projects with financial assistance from SWAG, CALFED, DWR, and the Cantara Trust.

Cow Creek Watershed Management Group

The Cow Creek Watershed Management Group is a nonprofit organization formed by citizens to manage the resources of the Cow Creek Watershed in a way that “meets the needs of today without infringing on the needs of future generations.” The Western Shasta RCD assists the group in an advisory capacity and secured grants from SWRCB and the Packard Foundation to conduct the Cow Creek Watershed Assessment in 2001. Action options considered in the watershed assessment include the following:

- Installing fish screens and/or ladders on diversions
- Installing screening pump intakes in Old Cow Creek and the mainstem of Cow Creek
- Increasing flows in Cow Creek and tributaries through practicing irrigation efficiency and vegetation management, purchasing water rights from willing sellers, developing alternate water sources during important flow periods, and implementing a conjunctive use program
- Obtaining landowner easements along key habitat corridors and conducting riparian habitat restoration
- Restoring and protecting oak woodlands in the lower watershed
- Initiating a prescribed fire/burn program to enhance habitat
- Conducting eradication or control programs for non-native invasive plants
- Considering augmenting streamflows by off-site storage and retention of winter flood flows to improve habitat for fish and wildlife
- Managing vegetation to augment streamflows and improve habitat
- Improving spawning substrate in upper reaches

Cottonwood Creek Watershed Group

The mission of the Cottonwood Creek Watershed Group is to work to preserve the environment, private property and water rights, and economic resources of the Cottonwood Creek watershed through responsible stewardship, coordination, cooperation, and education. Watershed stewardship issues include timber harvesting, fuel management and fire suppression, erosion control, maintenance of riparian zones, sediment supply and floodplain processes, and spawning and rearing habitat for salmon in the lower watershed. Specific recommendations are being developed, and fish passage projects are underway in coordination with USFWS.

Sacramento River Preservation Trust

The Sacramento River Preservation Trust is a private, nonprofit organization active in environmental education and advocacy to preserve the natural environmental values of the Sacramento River. The Trust has participated in various conservation and land acquisition projects, including securing lands for the Sacramento River National Wildlife Refuge. Although the group has had limited activity in the study area, it is pursuing designation of a portion of the Sacramento River between Redding and Red Bluff as a National Conservation Area (see previous discussion on BLM activities).

Shasta Land Trust

The Shasta Land Trust is a regional, nonprofit organization dedicated to conserving open space, wildlife habitat, and agricultural land. The Trust works with public agencies and private landowners and is funded primarily through membership dues and donations. It employs various voluntary programs to protect and conserve valuable lands using conservation easements, land donations, and property acquisitions. Current efforts include work in the Cow Creek and Bear Creek watersheds. The Shasta Land Trust has purchased or negotiated conservation easements in Fenwood Ranch of southern Shasta County and various properties east of Redding. The Trust is a potential local partner for restoration activities in the Shasta Dam to Red Bluff subarea.

The Trust for Public Land

The Trust for Public Land is a national, nonprofit organization involved in preserving lands with natural, historic, cultural, or recreational value, primarily through conservation real estate. The Trust's Western Rivers Program has been involved in conservation efforts along the Sacramento River between Redding and Red Bluff (the BLM's Sacramento River Bend Management Area), Battle Creek, Paynes Creek, Inks Creek, and Fenwood Ranch in Shasta County. The group promotes public ownership of conservation lands to ensure public access and enjoyment.

Cantara Trustee Council

The Cantara Trustee Council was established to administer settlement funds stemming from the 1991 spill of metam sodium into the upper Sacramento River, upstream from Shasta Lake. Over 19,000 gallons of the herbicide were released into the Sacramento River when a Southern Pacific train derailed on the Cantara Loop, a rail line near Dunsmuir. The spill resulted in the destruction of nearly all aquatic life within the upper Sacramento River between the spill and Shasta Lake. The Cantara Trustee Council includes representatives from CDFG, USFWS, the

Central Valley Regional Water Quality Control Board (CVRWQCB), California Sportfishing Protection Alliance, and Shasta Cascade Wonderland Association. The Council monitors fish and wildlife along the affected reach and has concluded that major components of the ecosystem have successfully recovered from the spill. The Council also administers a grant program that has provided funding for numerous environmental restoration projects in the primary study area, including programs in the Fall River watershed, Sulphur Creek, upper Sacramento River, Middle Creek, lower Clear Creek, Battle Creek, Salt Creek, and Olney Creek. The Council is a potential local sponsor for future restoration actions in the primary study area.

The Nature Conservancy

The Nature Conservancy (TNC) is a private, nonprofit organization involved in environmental restoration and conservation throughout the United States and the world. TNC approaches environmental restoration primarily through strategic land acquisition from willing sellers and obtaining conservation easements. Some of the lands are retained by TNC for active restoration, research, or monitoring activities while others are turned over to government agencies such as USFWS or CDFG for long-term management. Lower in the Sacramento River Basin, the TNC has been instrumental in acquiring and restoring lands in the Sacramento River National Wildlife Refuge and manages several properties along the Sacramento River. It has also pursued conservation easements on various properties at tributary confluences, including Cottonwood and Battle creeks. Within the study area, TNC manages the McCloud River Preserve and lands within the Lassen Foothills Project, described below.

McCloud River Preserve

The McCloud River Preserve was initially formed in 1974 when the McCloud River Club, one of the oldest private fishing clubs in the state, donated 2,330 acres of its stream-front land to TNC. The preserve is located just downstream from McCloud Dam and Lake on the lower McCloud River, and hosts the famous McCloud River trout. The public is permitted limited access to maintain the wild nature of the preserve, and prevent fish poaching and other disturbances.

Lassen Foothills Project

Launched in 1997, the Lassen Foothills Project encompasses about 900,000 acres of grasslands, oak woodlands, and stream-side forests in the upper Sacramento Valley, roughly between Red Bluff and Mount Lassen. The project has focused on purchasing and obtaining conservation easements on large, working ranches in the area and preventing urbanization and land development while developing wildlife-friendly ranching practices. Land management practices and research projects have included prescribed burning, rotational grazing, reseeding native grasses, research on blue oak woodlands, and various methods of controlling invasive weeds. Restoration actions have included riparian habitat projects along the lower floodplains and streams.

One of the first management properties in the project was the 37,540-acre Gray Davis Dye Creek Preserve, located in the foothills below Mount Lassen. The Dye Creek Ranch came under TNC management in 1987 as the result of a 25-year lease with the State of California. TNC continues to operate the ranch, and the preserve supports a variety of habitat types and native wildlife.

Also, the preserve hosts education and research activities, land management, and prescribed burn experiments, and various habitat restoration projects, primarily along lower Dye Creek.

The latest addition to the Lassen Foothills Project is the 1,844-acre Wildcat Ranch in the upper Sacramento Valley, also part of the Battle Creek Restoration Project. TNC has assisted the Battle Creek Restoration Project in arranging for removal of several dams and construction of fish ladders to promote anadromous fisheries migration within the ranch. Working with the BCWC, agreements were reached with PG&E and various government agencies to open over 40 miles of migratory fish habitat. The partners in the project received the 1999 Governor's Environmental and Economic Leadership Award for environmental restoration and rehabilitation.

California Trout

California Trout (CalTrout) is a private, nonprofit organization with a mission to protect and restore wild trout and steelhead and their waters throughout California. CalTrout conservation priorities include the Wild Trout Campaign, grazing reform on public lands, hydropower and dam regulation, and the Steelhead Recovery Campaign. In 1999, CalTrout completed the Conservation Plan for the New Millennium, which sets forth restoration policies and details site-specific restoration projects or actions to support steelhead and trout fisheries statewide. CalTrout focuses much of its efforts on flow regulation, including operation of dams and hydropower facilities to benefit native fisheries. CalTrout has been involved in numerous Federal Energy Regulatory Commission (FERC) dam relicensing projects, including current relicensing efforts on the Pit and Hat rivers. Other activities include stream restoration and protection projects. CalTrout is a potential partner in future fisheries restoration programs in the study area.

COMMON ASSUMPTIONS FOR CALFED SURFACE WATER STORAGE PROJECTS

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. Common Assumptions would be used to develop without-project conditions, which is a critical element in the plan formulation process. Common Assumptions is meant 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 water supply impacts of various potential alternate system operations and project modifications. A description of the application of the model as studied for the SLWRI is contained in **Appendix A** (CALSIM II System Operation Simulation).

THIS PAGE LEFT BLANK INTENTIONALLY