CHAPTER IV
RESTORATION AND CONSERVATION PROGRAMS AND PROJECTS

Various Federal and State agencies, and numerous local working groups and private organizations, are active in environmental restoration and conservation in the study area. This section describes some of the ongoing programs and potential projects specific to the primary study area. Although this is not an all-inclusive list of the participation of various groups in the study area, it highlights some of the key environmental resource problems and solutions that have been identified in the upper Sacramento River region.

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 Improvement Act

Enacted in 1992, the Central Valley Project Improvement Act (CVPIA) amended the authority of the CVP to include fish and wildlife protection, restoration, and mitigation as having equal priority with other purposes. A portion of this authority directed the development and implementation of actions to ensure that, by 2002, the natural production of anadromous fish in Central Valley streams would be sustainable, on a long-term basis, at levels at least twice the average levels of natural production in the 1967 through 1991 baseline period.

The Anadromous Fish Restoration Program (AFRP) was established under the CVPIA in 1995 and determined baseline production estimates for Central Valley streams for naturally produced chinook salmon and other anadromous species. The six species identified for restoration under this program are chinook salmon, steelhead, striped bass, American shad, white sturgeon, and green sturgeon. Numerous actions to improve the natural production of anadromous fish have been recommended and/or funded by AFRP through the CVPIA program, including numerous projects in the study area. Several specific projects include: improvements to the intakes at the Coleman National Fish Hatchery on Battle Creek; the installation of a temperature control device 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.

Battle Creek Salmon and Steelhead Restoration Plan

In 1999, a Memorandum of Understanding was established between Reclamation, PG&E, U.S. Fish and Wildlife Service (FWS), NOAA Fisheries, and the DFG that outlines activities to be undertaken on Battle Creek to promote anadromous fish passage for winter-run, spring-run, fall- and late-fall run chinook salmon and steelhead. As shown in Figure 6, there are numerous natural and man-made barriers in the Battle Creek watershed that prevent access to valuable cold-water spawning grounds. Actions include the removal of dams, construction of fish screens and ladders, and flow augmentation to increase salmonid habitat. Actions are expected to enhance and re-establish connection with over 40 miles of habitat, increase steelhead populations

by 5,700, and increase the adult winter- and spring-run chinook salmon population by 2,500. Various federal, state, and local entities, including FWS and the Western Shasta Resource Conservation District, are implementing different phases of the project. Construction of initial features began in 2002.

Source: AFRP website http://www.delta.dfg.ca.gov/afrp/watershed

Figure 6 – Barriers to Fish Passage in the Battle Creek Watershed

Red Bluff Diversion Dam Fish Passage Improvement Project

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 is 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) the 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.

Red Bluff Diversion Dam *on the Sacramento River*

Five alternatives have been identified by the fish passage improvement project:

- The **4-Month Improved Ladder Alternative** proposes that the RBDD gates-in operational period remain the same (May 15 to September 15), but the left and right fish ladders be expanded and improved.
- The **4-Month Bypass Alternative** also proposes that the gates-in period remain the same and that the right fish ladder be expanded an improved, but proposes a fish bypass channel be constructed on the left bank rather than improving the existing ladders.
- The **2-Month Improved Ladder Alternative** suggests a reduced 2-month gates-in period (July and August). This option would allow for gravity diversion into the Tehama-Colusa Canal systems during the two highest irrigation demand months, July and August, but would require additional pumping during the extended gates-out period. The right and left abutment fish ladders would also be expanded and improved.
- The **2-Month Alternative with Existing Ladders** also proposes a 2-month gates-in period (July and August), but the existing ladders would remain unchanged.
- The **Gates-out Alternative** proposes to leave the gates out at all times of the year, eliminating both the fish passage barrier and the formation of Lake Red Bluff. Additional pumping facilities would need to be constructed to meet the high summer irrigation needs.

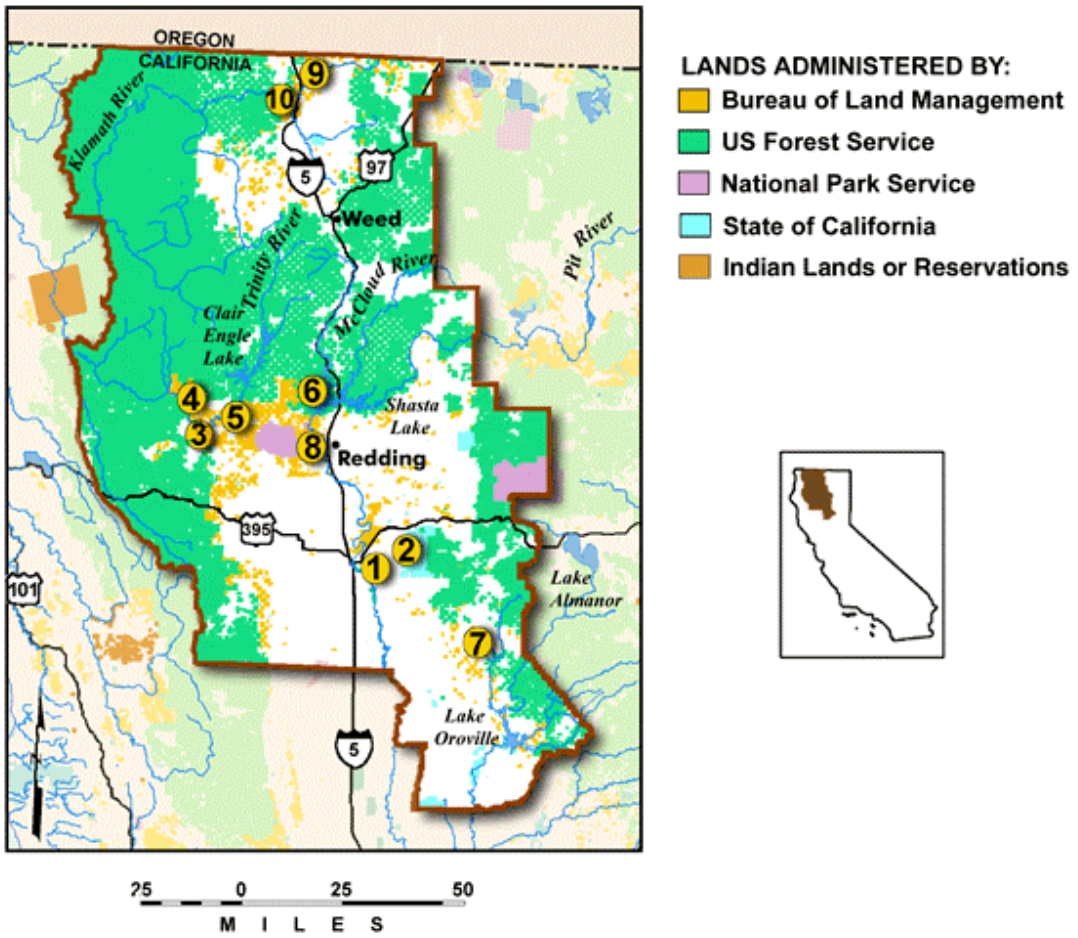
The public comment period ended in November 2002 for the Draft Environmental Impact Statement/Environmental Impact Report released in August 2002. The environmental review process is currently in the "respond to comments – develop final EIS/EIR" stage. The environmental document is currently scheduled to be completed at the end of 2004. The schedule has been delayed pending completion of the Reclamation Operations Criteria and Plan Process (OCAP).

BUREAU OF LAND MANAGEMENT

The U.S. 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 7, 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 NFP.

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 the 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 seven miles of Paynes Creek are eligible for National Wild & Scenic River status, and acquired roughly 17,000 acres in the Sacramento River Bend management area. Congressional action is required to confirm these proposed designations.



Source: Bureau of Land Management website http://www.blm.ca.gov/redding.

Figure 7 – Lands Administered by BLM and other Public Agencies

FISH AND WILDLIFE SERVICE

The U.S. Department of the Interior, Fish and Wildlife Service (FWS) 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, ACID Program, and RBDD Fish Passage Improvement Project. FWS is also instrumental in the implementation of the AFRP and the NFP, providing scientific research, monitoring, environmental compliance, and restoration planning support.

NATIONAL MARINE FISHERIES SERVICE

The U.S. Department of Commerce, National Oceanographic and Atmospheric Administration, National Marine Fisheries Service (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.

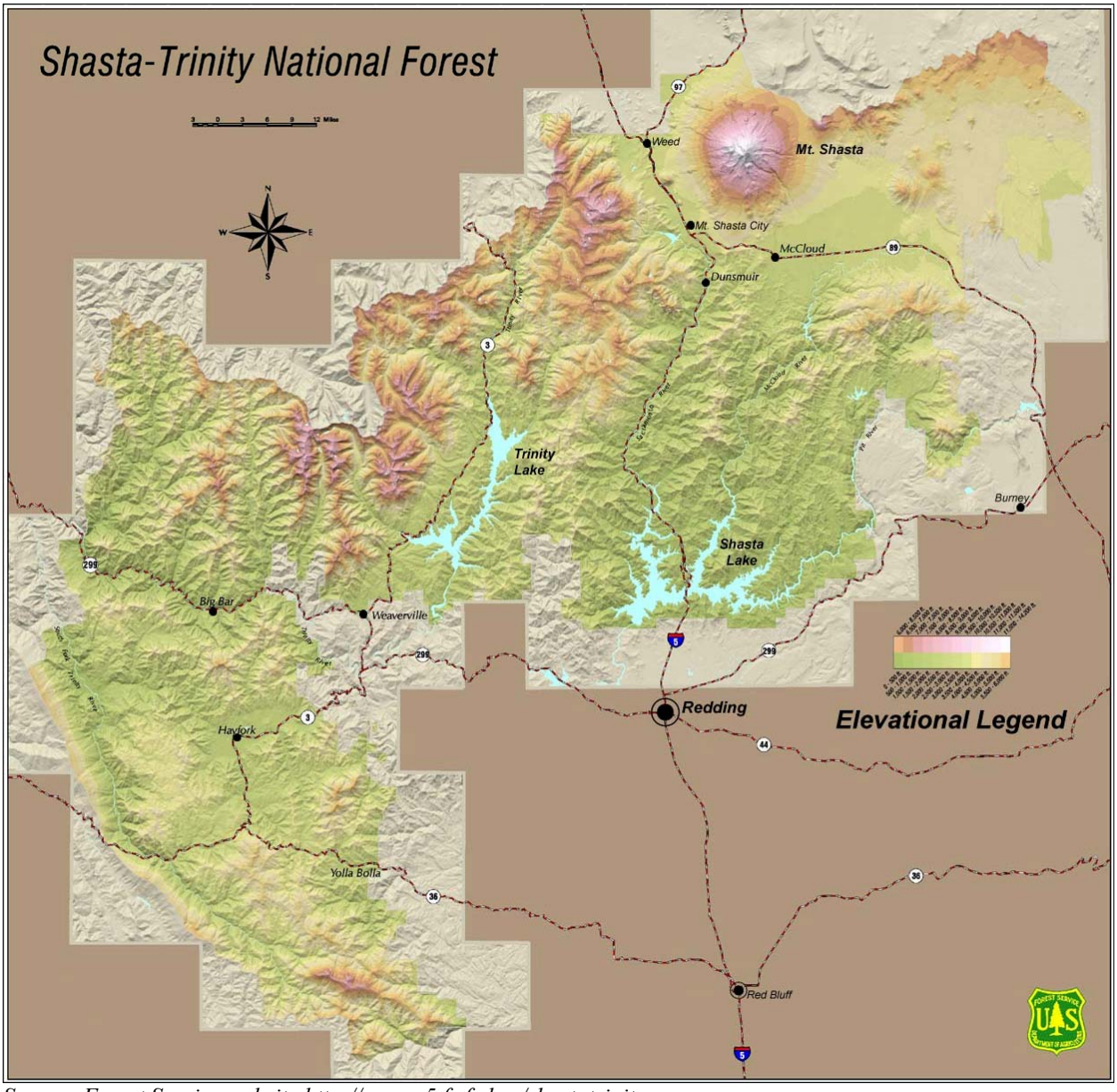
NOAA Fisheries has designated Critical Habitat for the Federally listed winter-run chinook salmon to be the Sacramento River from Keswick Dam downstream to the Golden Gate Bridge. The Central Valley recovery planning domain also includes Central Valley spring-run chinook salmon, Central Valley steelhead, 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 the 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 the 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 the ACID's dam operations, or by modifying or replacing the facility; inventory and assess water withdrawal sites and take 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.

U.S. DEPARTMENT OF AGRICULTURE, FOREST SERVICE

The U.S. Department of Agriculture, Forest Service (FS) is responsible for lands within the Shasta-Trinity National Forest, shown in Figure 8, including the Whiskeytown-Shasta-Trinity National Recreation Area and Shasta McCloud Management Unit. The FS 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 NFP.



Source: Forest Service website http://www.r5.fs.fed.us/shastatrinity.

Figure 8 – Shasta-Trinity National Forest

The FS manages the majority of the land and facilities surrounding Shasta Lake. It also owns a 299-acre parcel at the Red Bluff Recreation Area (not shown in Figure 8), which is undergoing restoration in cooperation with the Sacramento River Discovery Center. The 1995 Shasta-Trinity National Forest Land Management Plan 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.

U.S. ENVIRONMENTAL PROTECTION AGENCY

The 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 the acid and metal contamination in surface water. Other planned activities include construction of an acid mine drainage treatment plant in the Boulder Creek watershed. Other agency participation in cleanup activities related to the mine complex is discussed later in this section.

U.S. ARMY CORPS OF ENGINEERS

The U.S. Army Corps of Engineers (Corps) participates in the planning, design, construction and operation of water resources projects, including navigation, flood control, and environmental protection. The Corps administers a regulatory program providing environmental protection for wetlands and waterways under the Rivers and Harbors Act of 1899 and Clean Water Act of 1972. The Corps recently formalized a set of "Environmental Operating Principles" applicable to all of its decision-making and programs. The principles are geared toward environmental sustainability and recognition of our dependence upon the physical environment.

The Sacramento and San Joaquin River Basins Comprehensive Study, California is a joint effort between the Corps and the State of California, Reclamation Board. Initiated by an act of Congress following the devastating 1997 flood event in the Central Valley, the project has dual objectives of flood damage reduction and environmental restoration. The December 2002 Interim Report presents guiding principles and an implementation strategy for future projects within the flood management system such that flood management and ecosystem values can coexist. The report does not present any specific recommendations for the Sacramento River between Shasta Dam and Red Bluff, but the Reclamation Board's jurisdiction covers the entire Central Valley, including all tributaries and distributaries of the Sacramento River. Through the Comprehensive Study there is a potential, if approved by Congress, to significantly change the existing flood management system and implement many of the projects proposed by CALFED.

CALIFORNIA DEPARTMENT OF FISH AND GAME

The California Department of Fish and Game (DFG) is responsible for managing California's fish and wildlife resources and oversees the restoration and recovery of threatened and

endangered species under the California Endangered Species Act. DFG participates in conservation planning, environmental compliance and permitting, coordinated resource management planning, and restoration and recovery programs. They are 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 DFG, administers a capital outlay program for wildlife conservation and related recreation projects. Within the study area, the 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.

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

- **Battle Creek Wildlife Area, Shasta & 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 & Tehama Counties –** 571 acres located at the confluence of Cottonwood Creek and the Sacramento River.
- **Tehama Wildlife Area –** 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 –** 264 acres managed by the City of Anderson.

CALIFORNIA DEPARTMENT OF WATER RESOURCES

The California Department of Water Resource (DWR) is involved in numerous restoration and conservation actions in the study area, managed primarily through their Northern District in Red Bluff. Technical services provided by DWR include monitoring, habitat and hydrologic mapping, restoration planning, resource investigations, and other support services. Activities include:

- **Sacramento River Fishery Restoration –** coordination with CVPIA, CALFED, local watershed groups, and other government agencies.
- **Sacramento River Riparian Habitat –** technical support for Sacramento River Conservation Area (SRCA), site specific planning and geospatial support.
- **Tributary Riparian Habitat Conservation –** habitat inventory and mapping services, and technical support to local watersheds groups and other government agencies.
- **Spawning Gravel Restoration Programs –** including studies of instream and offstream gravel mining and gravel replenishment programs between Keswick Dam and Red Bluff.

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 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. Program implementation began following circulation of the final programmatic Environmental Impact Statement/Environmental Impact Report (EIS/EIR), the signing of the ROD, and the EIR being adopted by the Reclamation Board on 28 August 2000.

The Preferred Program Alternative (PPA) in the CALFED-ROD consists of programmatic elements that set the long-term direction of the program. The PPA has seven interrelated programs: Levee System Integrity Program, Water Quality Program, Ecosystem Restoration Program (ERP), Water Use Efficiency Program, Water Transfer Program, Watershed Program, and Storage and Conveyance. The ERP is the principal Program component designed to restore the ecological health of the Bay-Delta system. It identifies and provides recommendations for actions in several ecological management zones, two of which fall within the primary study area: The North Sacramento Valley Ecological Management Zone, and the Cottonwood Creek Ecological Management Zone.

North Sacramento Valley Ecological Management Zone

The North Sacramento Valley Ecological Management Zone includes four sub-units: the Clear Creek, Cow Creek, Bear Creek, and Battle Creek ecological management units. CALFED has helped to fund several projects in the zone, including removal of McCormick-Saeltzer Dam and work on Battle Creek. Problems and recommendations for the units are described below.

- **Clear Creek Ecological Management Unit –** The ERP recognizes Clear Creek's unique potential to provide cool flows for anadromous fisheries, including fall- and late fall-run chinook salmon. It identifies water diversions and subsequently depressed flows, former gravel mining operations, impeded gravel production from upper reaches by dams and other facilities, and fish passage and escapement as key environmental problems. Recommendations include increasing gravel production by 25 to 50 tons per year, removing diversions or supplying alternate water sources, supplemental sediment injections and channel re-configuration in lower Clear Creek, and increasing flows by 150 to 200 cfs.
- **Cow Creek Ecological Management Unit –** The ERP recognizes Cow Creek for its support of fall-run and late-fall-run chinook salmon, although warm summer water temperatures do not provide suitable conditions for spring-run. It identifies unscreened agricultural diversions, reduced flow resulting from water and power diversions, past gravel mining practices, the destruction of riparian habitat by grazing animals, and urban encroachment as problems within the watershed. Recommendations include increasing flows by 25 to 50 cfs, fencing selected riparian areas, screening diversions, and improving fish passage.
- **Bear Creek Ecological Management Unit –** The ERP notes limited runoff and agricultural diversions as contributing to low use of Bear Creek by anadromous fish. Unscreened irrigation diversions operating during the juvenile emigration period were identified as

significantly reducing survival rates. The ERP recommends a cooperative program among water users to increase streamflows by 10 to 20 cfs.

- **Battle Creek Ecological Management Unit –** Battle Creek is noted as having the best connection between the Sacramento River and mountainous areas of any of the ecological management units. However, hydropower operations divert as much as 98 percent of base streamflows and the Coleman National Fish Hatchery blocks fall-run salmon migration, greatly reducing salmon and steelhead populations in upper reaches. Recommendations include screening or removing diversions on the North and South forks, increasing streamflows, halting the removal of gravel that accumulates at diversions, fish hatchery improvements, and water supply management. These issues are being addressed by Reclamation's Battle Creek Salmon and Steelhead Restoration Plan (discussed previously) and related community efforts.

Cottonwood Creek Ecological Management Zone

The Cottonwood Creek Ecological Management Zone is recognized as the primary source of coarse sediments and spawning gravel for the Sacramento River, supplying almost 85 percent of the gravel between Redding and Red Bluff. Cottonwood Creek has an extensive riparian and riverine aquatic plant community, plays an important role in supplying flows and controlling temperatures in the Sacramento River, and provides habitat for chinook salmon and steelhead. The zone is divided into two ecological management units: the Upper Cottonwood Creek and Lower Cottonwood Creek Fan ecological management units.

- **Upper Cottonwood Creek Ecological Management Unit -** Recommendations in the unit include maintaining coarse sediment recruitment, improving habitat for salmon and steelhead, improving habitat corridors, and restoring riparian and riverine plant communities, primarily though the development of a watershed management plan.

- **Lower Cottonwood Creek Fan Ecological Management Unit -** Recommendations for the unit include restoring, reactivating, and maintaining coarse sediment supply, floodplain and flood processes, gravel recruitment, and stream meander.

Potential actions include augmenting summer and fall flows, instream habitat enhancement and reconstruction, preserving the 2 percent to 1 percent floodplain, revegetating disturbed lands, installing stream grade control structures, relocation of instream gravel mining activities, and finding alternative water sources in the upper watershed.

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 Red Bluff Diversion Dam (under study)
- Potential modification of Spring Creek Tunnel intake for temperature control
- A 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
- Controlling gravel mining, improve spawning areas, improve land management practices in the watershed, and protect and restore riparian vegetation along Cottonwood Creek.

IRON MOUNTAIN MINE RESTORATION PLAN

The Iron Mountain Mine Trustee Council, formed by the FWS, DFG, 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. The 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 has also 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.

Ongoing restoration actions are funded by $9 million set aside from the approximately $160 million settlement paid by the mine owner for release from all environmental liability. The solicitation and funding of restoration projects occurs through the CALFED program and BLM's Interlakes Special Recreation Management Area recreation planning process.

RIPARIAN HABITAT JOINT VENTURE

The Riparian Habitat Joint Venture (RHJV) was initiated in 1994 and includes signatories from eighteen 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 are:

- 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; and
- Guide land managers and organizations to prioritize conservation actions.

The RHJV's conservation and action plans are documented in the *Riparian Bird Conservation Plan* of August 2000. The conservation plan targets fourteen '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. The RJHV 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 are 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 watersheds. These reports evaluate environmental resource conditions within watersheds, identify problems, and make recommendations for future management actions.

Ongoing restoration work by the District includes erosion control and vegetation management; agreements on the timing of water flows from area dams; assisting local landowners and interested parties in forming watershed groups; spawning gravel injections at strategic locations; isolating deep gravel pits to eliminate fish stranding; and channel reconstruction at former instream mining locations. Other areas of concern include noxious and non-native 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 multi-agency 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 re-grading to prevent fish stranding.
- **Battle Creek –** The Western Shasta RCD is a local participant in the Battle Creek Community Strategy and is assisting in the implementation of the Battle Creek Salmon and

Steelhead Restoration Plan. Various program components are yet to be implemented, including the 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 for fecal coliform contamination (due to grazing); and instream spawning area restoration.

Tehama County Resource Conservation District

The Tehama County Resource Conservation District (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) 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 PRIVATE ORGANIZATIONS

Sacramento Watersheds Action Group

The Sacramento Watersheds Action Group (SWAG) is a non-profit 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 supports 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 the development of policies, programs, and activities of the program 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 of the principal objectives 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, implementation, and monitoring of multi-disciplinary restoration projects to promote anadromous salmonids on Clear Creek. Activities to benefit fishery populations that are proposed for implementation include increased water releases from Whiskeytown Dam; improving upstream passage for migrating chinook salmon and steelhead to historical habitat; spawning gravel augmentation; restoration of sediment transport; and reducing fine sediment input from upland erosion.

Battle Creek Watershed Conservancy

The Battle Creek Watershed Conservancy is actively involved in monitoring the actions connected to the Battle Creek Salmon and Steelhead Restoration Project. The conservancy 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. The Conservancy 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.

Sulfur Creek Coordinated Resource Management Plan

The mission of the Sulphur Creek CRMP is to promote the 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); 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 participated in 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 the SWRCB and the Packard Foundation to conduct the *Cow Creek Watershed Assessment* in 2001. Action options considered in the watershed assessment include:

- Installation of fish screens and/or ladders on diversions
- Screening pump intakes in Old Cow Creek and the main stem of Cow Creek
- Increasing flows in Cow Creek and tributaries through irrigation efficiency, 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
- Restore and protect oak woodlands in the lower watershed
- Initiate a prescribed fire/burn program to enhance habitat
- Eradication or control programs for non-native invasive plants
- Consider augmenting streamflows by offsite storage and retention of winter flood flows to improve habitat for fish and wildlife
- Vegetation management to augment streamflows and improve habitat
- Improve spawning substrate in upper reaches.

Cottonwood Creek Watershed Group

This 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, liaison, cooperation, and education. Watershed stewardship issues include timber harvesting, fuel management and fire suppression, erosion control, maintaining 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 the FWS.

Sacramento River Preservation Trust

The Sacramento River Preservation Trust is a private, non-profit organization that is 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 the securing of lands for the Sacramento River National Wildlife Refuge. Although the group has had limited activity in the study area, it is pursuing the 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, non-profit 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 the Fenwood Ranch of southern Shasta County and for various properties east of Redding. The Trust is a potential local partner for restoration activities in the Shasta Dam to Red Bluff sub-area.

The Trust for Public Land

The Trust for Public Land is a national, non-profit 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 the DFG, FWS, Central Valley Regional Water Quality Control Board, California Sportfishing Protection Alliance, and the 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, non-profit 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 the FWS or DFG 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 their 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 in order 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 streamside 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, 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 to control 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. 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 the removal of several dams and the 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, non-profit 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 the 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 the 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.