

Appendix E Bay Area and Delta Watersheds outside the FPIP Geographic Scope

Introduction

As discussed in Chapter 1, the Ecosystem Restoration Program (ERP) within the CALFED Bay-Delta Program is charged with water and ecosystem health in the Bay-Delta and its greater watershed. This includes, among other things, the enhancement and recovery of anadromous salmonid populations in the Bay Area, Delta, and the Sacramento and San Joaquin River watersheds. The Fish Passage Improvement Program (FPIP) supports ERP goals but has a more narrow geographic scope because FPIP's focus is only on waterways for which CALFED has identified fish passage goals. The Bay Area and Delta have their share of migratory barriers. However, CALFED has not identified fish passage goals for the Bay Area and Delta waterways. Consequently, they do not fall under the FPIP geographic scope at this time. Because of their importance and potential for enhancing ERP goals, we added a limited discussion of Bay Area and Delta waterways that provided habitat in the past or currently support native salmonid populations (Figure E-1). Not all waterways in the greater Bay-Delta are being presented in this version of Bulletin 250. Because of the need to focus FPIP resources on waterways with ERP fish passage goals, some important streams that support salmonid populations have been left out including Coyote, Wildcat, and Stevens creeks and the Guadalupe River.

Readers should understand that bulletins of the Department of Water Resources (DWR) are works in progress and are updated periodically. If and when the FPIP geographic scope is expanded, the following waterway discussions will be updated and presented. We wish to emphasize that the streams presented in this appendix do not represent an exhaustive list.

See Appendix G for bibliographic information on literature cited in this appendix

Figure 3-1 2003 Fish Passage Improvement Program priority waterways and known structures of the Bay Area and Delta

Bay Area and Delta Existing Habitat Conditions and Status of Fish Populations in Bay Area Streams

Alameda Creek – Alameda and Santa Clara Counties

Potential Impediments to Anadromous Fish Migration

There are eight dams, three weirs, a road crossing, and a gas pipeline crossing identified in Alameda Creek. In Alameda Creek, the BART Weir and an inflatable dam block fish passage at River Mile (RM) 9.7. On Upper Alameda Creek, the San Francisco Public Utilities Commission (SFPUC) operates a large water diversion structure—the Upper Alameda Creek Diversion. This structure blocks upstream passage and reduces streamflows downstream.

General Description

The Alameda Creek watershed is the largest drainage in the south bay of the San Francisco Bay Area. It flows from the Diablo Range west through Sunol Valley and Niles Canyon into southeastern San Francisco Bay just north of the Highway 92 bridge. It drains about 700 square miles (Aceituno and others date unknown). Alameda County Water District, the SFPUC, and Zone 7 of the Alameda County Flood Control and Water Conservation District (ACFC & WCD) use Alameda Creek and its tributaries for water supply and transport. The lower 11 miles of the creek have been channelized for flood control (Gunther and others 2000). In addition to Alameda Creek, two large and several small tributaries are described below.

Fish Populations

Alameda Creek is historically home to runs of coho and Chinook salmon, as well as Central California Coastal steelhead (Alameda Creek Alliance 23 Aug 2000). The Alameda Creek Alliance has letters and photographs documenting coho and Chinook salmon and steelhead in the Alameda Creek watershed going back to the early 1900s (Jeff Miller 2004 Jul pers comm.). Chinook salmon remains were excavated from Native American shell mounds (dated from A.D. 1 to A.D. 600) along Alameda Creek in Union City (Schulz 1986).

Today, only steelhead and Chinook salmon ascend the creek. They have recently been observed as far as 8 miles upstream from San Francisco Bay. In July 1995, the California Department of Fish and Game (DFG) did a stream inventory from Calaveras Dam to the Sunol Water Treatment Plant (SWTP). The report identified rainbow trout (DFG 1996a). Fifteen rainbows were caught just upstream of Calaveras Creek during a 1987 DFG fish survey (DFG 1988). Aceituno and others (date unknown) documented in DFG internal reports that rainbow trout were found in Alameda Creek in 1927, 1955, and 1957. NOAA's National Marine Fisheries Services (NMFS) has proposed to list the native resident rainbow trout (*Oncorhynchus mykiss*) in Alameda Creek, its tributaries, and populations in and above Calaveras and San Antonio reservoirs as a threatened species (69FR 33102). Recent

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genetic data strongly suggest that these native resident populations are part of the threatened Central California Coast steelhead evolutionarily significant unit.

In 1999 three steelhead were captured at the BART Weir. The Alameda Creek Alliance has videotape and film of them. In recent years, a few Chinook salmon were seen in the flood control channel downstream of the BART Weir. Salmon were also found in archaeological sites in the lower floodplain of Alameda Creek, but it is unknown if those fish were native or if they were transported to the sites (Gunther and others 2000). Run sizes for the salmon and steelhead runs in Alameda Creek are unknown.

Water Quality

Alameda Creek is perennial in its upper reaches but is periodically dry in Sunol Valley. Many of the creek's tributaries may be cut off from the main stem in the summer due to lack of flow. There are three major reservoirs in the Alameda Creek watershed, and water supply practices have greatly altered the natural flow in both the main stem and its tributaries. The creek is used as a conduit for water by three Bay Area water supply agencies; water from Hetch Hetchy and the South Bay Aqueduct also augment its flows.

The Niles Canyon area of the creek does has high summer temperature, "frequently exceeding 22 °C and occasionally reaching 26 to 28 °C in the upper part of the reach" (Gunther and others 2000). DFG conducted a stream inventory in Alameda Creek from the Calaveras Road Bridge to the Calaveras Creek confluence during July 1995. Water temperatures collected throughout each day ranged from 18 to 29 °C (DFG 1996). Water from the Central Valley flows through this watershed due to releases from the South Bay Aqueduct. This may confuse returning fish and cause straying, but the extent of this straying has not been determined (Gunther and others 2000).

Hydrology

The lower 12 miles of Alameda Creek may become dry during the summer, so flow may be a fish passage issue. The average yearly rainfall for Alameda Creek is about 15 inches (Alameda Creek Alliance 2000). Diversions at the Upper Alameda Creek Diversion Dam (not the main stem), may divert as much as 85 percent of the flow out of the creek (Gunther and others 2000). In 1957 a survey by the California Department of Forestry found flow to range from 6 cubic feet per second to none in May. A 1996 DFG stream inventory reported flows of 3 cfs at the SWTP and 1.5 cfs just upstream of Calaveras Creek. In the same report, temperatures of 18 to 24 °C were recorded for the same reach.

There are eight US Geological Survey (USGS) gaging stations on Alameda Creek and its tributaries; flow data from 1891 are available from the oldest gaging station (Figure E-2). The other stations have data starting from 1912, 1957, 1964, 1994, and 1995 (USGS 2000a-h).

Habitat Quality

The 12-mile section of the creek that runs from San Francisco Bay to the mouth of Niles Canyon is a straight flood control channel. It has a paved bike

Figure E-2 Mean monthly flows from 1891 to 2000 on Alameda Creek at Niles

path on the south side and a gravel equestrian road on the north side. The banks are lined with riprap, and there is little vegetation (Horil 2001). Some spawning has been observed downstream of the BART Weir in this section, but the hatching success is estimated to be low due to gravel siltation, frequent flow fluctuation, and loss of channel features such as pools, riffles, and riparian bank vegetation as a result of the extensive channelization of the creek bed for flood control (Gunther and others 2000). Rearing could not occur in most of this reach. However, this reach may be important habitat for transition between freshwater and ocean habitat because it is tidally influenced (Gunther and others 2000).

The Niles Canyon reach of the river may have supported rainbow trout in the past. Today the lower section may provide suitable habitat, but high temperatures decrease its value. Increased flow due to releases from the South Bay Aqueduct operations in Niles Canyon may help offset the effects of the increased temperature. Flow here is also augmented by releases for municipal water supply operations. Trout were observed in tributaries of this reach in 1999 (Gunther and others 2000). Although high water temperatures are a limiting factor, rearing conditions in wet water years could be quite different. Augmented summer flows in the reach potentially provide fast-water habitat that may allow trout to obtain sufficient food to withstand the warmer temperature (Gunther and others 2000). With sufficient food present, Central Coast steelhead and rainbow trout may tolerate warmer water temperatures than suggested in much of the literature (Smith 1999). Local anglers continue to catch rainbow trout in the Niles Canyon reach, despite the cessation of trout stocking several years ago (Alexander 2003), suggesting possible successful rearing (Jeff Miller 2003 pers comm).

The Sunol Valley reach of Alameda Creek has a wide, braided channel, which results in shallow flow and presents passage issues at low flows (Gunther and others 2000). There is good spawning substrate in this reach. However, rearing would be prevented by low summer flows and high temperatures caused by a lack of riparian cover. With streamflow augmentation, summer temperatures could be lowered, and this reach could support steelhead/rainbow trout (Gunther and others 2000). Others might argue that because of the alluvial nature of the valley substrates and possible infiltration into nearby quarries it would be impractical to provide enough water to keep this reach wetted (SFPUC).

The Lower Ohlone reach of Alameda Creek supports a self-sustaining population of rainbow trout, which would indicate good habitat. The stream dries in spots during the summer, but pools provide adequate habitat (Gunther and others 2000). The Upper Ohlone reach has a relatively healthy hydrology and supports a population of rainbow trout. This reach dries in the summer upstream of the confluence with Valpe Creek (Gunther and others 2000).

Habitat Data

Habitat data for most of the Alameda Creek watershed is available in an assessment of the creek done for the Alameda Creek Fisheries Restoration Workgroup (Gunther and others 2000). Older habitat data is available for small portions of the creek. A 1988 DFG fish sampling report includes

habitat data for the area immediately upstream of the Calaveras Creek and for a reach near the Wooden Bridge Creek crossing (DFG 1988).

Temperature, pH, and dissolved oxygen (DO) measurements were collected in 1973 at six points in Alameda Creek (Aceituno and others date unknown). A May 1957 DFG stream survey contains channel, temperature, and flow data. A 1996 DFG stream inventory of the creek contains temperature, flow, and channel information as well as gravel location and embeddedness. Anecdotal habitat information is available (Spliethoff 2000, Alameda Creek Alliance 2000).

The SFPUC has collected habitat data that has been reported in its annual Aquatic Resource Monitoring and Aerial Survey Reports. Additional information was provided in the SFPUC proposals to remove Niles and Sunol dams.

The most recent habitat typing was done by Hanson Environmental, Inc. (2002). The reconnaissance level study examined seven reaches between the flood control channel and Sunol Regional Park. The measured instream features included pools, riffles, runs, substrate type, water velocity, and water depth. Data for each of seven reaches were broken into percent habitat type availability and, within that, percent of suitability. Habitat constraints and limiting factors that were listed for the various reaches included water velocity, water depth, and availability of suitable spawning gravel.

Fisheries and Restoration Projects

The Alameda Creek Steelhead Restoration Proposal, sponsored by the Alameda Creek Fisheries Restoration Workgroup, recommends removing barriers to anadromous fish migration in the Alameda Creek watershed. The workgroup published a report of habitat conditions and barrier information. The East Bay Regional Parks District (EBRPD) has removed two concrete swim dams at a cost of \$25,000 each (Laura Kilgour 2003 Sep 4 pers comm). The SFPUC has announced that in 2005 it will remove two dams (Sunol Dam and Niles Dam) in the Niles Canyon reach of Alameda Creek (Laura Kilgour 2003 Sep 4 pers comm). The Alameda County Flood Control District and Alameda County Water District have teamed up to apply for funds from US Army Corps of Engineers (USACE) Section 1135 program, Projects for Improvement of the Environment. This money would be used to modify the lower flood control channel dams for fish passage.

Several projects are under way on Arroyo Mocho that include facilities for fish passage. Zone 7 Water Agency is planning to install a fish screen on their new inflatable dam project. Zone 7 is also constructing fish ladders for steelhead passage in their Arroyo Mocho Widening/Arroyo Las Positas Realignment Project. The Lawrence Livermore Lab removed and replaced a concrete roadway crossing with a new bridge in 2004 (Gary Stern 2005 Mar 31 pers comm).

In recent years, there have been various rescue efforts to transport steelhead around barriers, to collect fertilized eggs, rear the young, and release them in the Sunol Park area (Gunther and others 2000). The SFPUC, in cooperation with the Alameda Creek Fisheries Restoration Workgroup, has plans to transplant a yet-to-be-determined number of radio-tagged rainbow trout from

its two East Bay reservoirs into upper Alameda Creek (in the vicinity of the Sunol Valley Water Treatment Plant or the Sunol-Ohlone Regional Park). The study, which was to begin during the 2003-2004 spawning season, will attempt to answer several questions related to that portion of the creek's suitability for sustaining salmonids.

Alameda Creek Tributaries – Alameda and Santa Clara Counties

Arroyo Valle

Potential Impediments to Anadromous Fish Migration

Lake Del Valle is the only reservoir on Arroyo Valle, and Del Valle Dam is a complete barrier to anadromous fish passage. There is also a drop structure in the creek, but it is not considered to be a passage problem.

General Description

Arroyo Valle begins on the west slopes of Black Mountain near the Santa Clara / Stanislaus County line and runs 33 miles northwest to its confluence with Arroyo de la Laguna at RM 6. Arroyo de la Laguna is a tributary to Alameda Creek at RM 17.

Fish Populations

In 1962 “steelhead/rainbow” trout were found by Skinner (cited in Gunther and others 2000) in Arroyo Valle. Today there are self-sustaining populations of rainbow trout in tributaries to Lake Del Valle (Gunther and others 2000). In a 1957 stream survey done by DFG before Del Valle Dam was built, rainbow trout were observed in the upper reaches of the creek. DFG personnel conducting the survey assessed these trout to be resident, not anadromous, trout (DFG 1957). There is no evidence of rainbow trout being stocked in Arroyo Valle before the dam was built, but steelhead rescued from Uvas Creek in Santa Clara County were planted in Arroyo Valle (DFG 1957).

The EBRPD and DFG operate a put-and-take rainbow trout fishery in Lake Del Valle, which is owned and operated by DWR. In 1973, DFG planted 45,672 rainbow trout followed by an additional 59,944 trout in 1994 (DFG 1974 and 1975). In 1990, EBRPD planted 54,144 pounds of rainbow trout and DFG planted 28,700 pounds (DFG 1991). These fish are “planted from September to April or May” (DFG 1991). Sampling of fish in Lake Del Valle by DFG in 1972, 1973, 1976, and 1977 recovered stocked rainbow trout. Rainbow trout are also stocked at Shadow Cliffs Regional Recreation Area (Gunther and others 2000).

Water Quality

Water temperatures in the creek downstream of Lake Del Valle are high. Flow in the lower 11 miles of the creek is heavily influenced by releases from the reservoir. Because it is managed for groundwater recharge, flows in the lower reach are probably erratic (Gunther and others 2000). In 1972 Zone 7 of the ACFC & WCD agreed to release 10 cfs of water from Del Valle

Dam between 24 Apr and 30 Jun. This was arranged so that DFG could stock this area with fish (Zone 7 1972).

Temperature and DO are also problems in Arroyo Valle. In 1973, DFG measured DO and water temperature in Lake Del Valle near the dam. DO ranged from 5.2 to 10.7 mg/L, and temperature ranged from 65 °F at the surface to 51 °F at a depth of 44 feet. DFG fish population surveys between 1972 and 1977 contain minimal temperature data. During a May 1986 survey of the creek downstream of Lake Del Valle, a temperature of 72 °F was recorded (Gray 1986).

Hydrology

Arroyo Valle is generally dry during the summer. A DFG survey done in mid-May 1957 reported no flow downstream of Pleasanton. Flow data from 1957 to 1985 are available from a USGS gage on Arroyo Valle at Pleasanton (Figure E-3) (USGS 2002).

Habitat Quality

Only the uppermost portion of Arroyo Valle has suitable spawning gravel. The portion of the creek downstream of Lake Del Valle is channelized. Water temperatures in the lower reach of the creek are high because there is no shade. There are also high levels of sediment. The portion of this creek accessible to anadromous fish does not offer good spawning or rearing habitat (Gunther and others 2000). A 1957 DFG stream survey of Arroyo Valle described the lower portion of the creek as of little value for fish life, but the survey said the extreme headwaters could “provide fine habitat for trout.” In a 1986 DFG survey of the area 2,000 feet downstream of Del Valle Dam the habitat was found to be “very good.” It was described as having “a large amount of undercut banks, roots and boulders as well as good clean gravel.” Sycamores, alders, and cottonwoods provided an estimated 30 percent canopy cover in this reach (Gray 1986).

Habitat Data

Most of the available habitat data is from habitat surveys done in 1999 in conjunction with An Assessment of the Potential for Restoring a Viable Steelhead Trout Population in the Alameda Creek Watershed, a report published by the Alameda Creek Fisheries Restoration Workgroup. The report also cites a 1962 survey (Gunther and others 2000). According to the assessment, Arroyo Valle is a channelized urban stream from its mouth to Shadow Cliffs Regional Recreation Area; it is predominantly bordered by riprap. In 1986, DFG conducted a survey of the creek 2,000 feet downstream of Del Valle Dam. Some habitat data was collected during the survey (Gray 1986).

Fisheries and Restoration Projects

During the 1986-1987 drawdown, in which the lake level was lowered, EBRPD, DFG, DWR, and area sport fishing clubs conducted fish habitat work at Lake Del Valle. They planted 250 arroyo willow trees in the southern portion of the reservoir where the banks were devoid of cover. They also anchored brush in the reservoir to provide cover for fish. About 600 to 800 hardwood limbs were anchored as well. Local Boy Scout troops also

Figure E-3 Mean monthly flows from 1957 to 1985 on Arroyo Valle at Pleasanton

helped by collecting 200 to 300 Christmas trees and anchoring them in the reservoir, where they would be in slow, shallow water during high water. They were placed in such a way that they would be easy to replace once decomposed (EBRPD 1987).

Arroyo Mocho

Potential Impediments to Anadromous Fish Migration

There are two drop structures and one road crossing on Arroyo Mocho.

General Description

Arroyo Mocho is part of the Alameda Creek watershed. It is 10 miles long and drains into Arroyo de la Laguna at RM 7. Arroyo de la Laguna is a tributary to Alameda Creek at RM 17. Arroyo Mocho runs through the Livermore and Amador valleys.

Fish Populations

“Steelhead/rainbow” trout were documented in Arroyo Mocho in 1962, and today there are self-sustaining populations in the creek (Gunther and others 2000). A 1976 DFG survey found rainbow trout at three places on the creek: Lawrence Livermore pumping station, Cedar Brook Ranch, and Mines Road. A total of 44 rainbow trout were caught at the three sites on 3 February (DFG 1976). In 1978 DFG approved a request to stock trout in a one-mile reach of the creek that runs through Robertson Park in Livermore. Zone 7 of the ACFC & WCD has allocated water from the South Bay Aqueduct for Arroyo Mocho in adequate amounts to sustain the stocked trout (DFG 1978). There are no estimates of the size of the fish run in Arroyo Mocho.

Water Quality/Hydrology

Flow and temperature are the biggest water quality issues in Arroyo Mocho. Quarries and groundwater recharge have altered the natural flow in the creek. During the summer, this tributary to Alameda Creek is one of the driest and most arid (see **Figure E-4**). Arroyo Mocho becomes two distinct sections separated by about 200 yards of creek bed in a gravel quarry area in Pleasanton. That section remains dry for most of the summer. Downstream of this dry reach, water is supplied to Arroyo Mocho by releases from Lawrence Livermore National Laboratories and discharges from quarries (Gunther and others 2000). In the flood control channel reach upstream of the dry area, water supplied by DWR via the South Bay Aqueduct is released into the creek for groundwater recharge (Gunther and others 2000). Summer flows in the upper reaches of the creek are almost entirely due to water purchased from the State Water Project. Because this water is managed for groundwater recharge, it rarely continues downstream. Water infiltration rates are high in the Livermore Valley, so any excess SWP water is absorbed through the channel bottom and does not flow continuously downstream (Gunther and others 2000).

Zone 7 of the ACFC & WCD operates three gaging stations in the Arroyo Mocho watershed. Data from these gages, combined with an estimate for quarry pond releases, has been used to estimate flow and determine its adequacy for fish migration. The data suggest there is a range of 20 to 40 cfs

Figure E-4 Mean monthly flows from 1962 to 1985 on Arroyo Mocho at Pleasanton

in the Pleasanton reach of the flood control channel from January through March and flows are minimal in April and May. During a field survey in October 1999, flows in the upper and lower flood control channel were 10 to 12 cfs. This level of flow appeared to be sufficient for fish migration. Further analysis of the available data led Gunther to the conclusion that there is “a continuous wetted channel adequate for fish migration” through January and March and around storm events (Gunther and others 2000). The quality of water when it is present does not appear to be a limiting factor to anadromous fish populations in Arroyo Mocho (Gunther and others 2000).

Habitat Quality

Downstream of Wente Road, the creek channel is channelized and riprapped but it does have a natural bottom. The lower portion is not considered to be suitable spawning or rearing habitat due to lack of shade and high sedimentation. Between Murrieta’s Well and the South Bay Aqueduct there is a section of natural channel with varying shade. The water temperature here was 21 °C according to a 2000 stream survey and there is predominately a gravel and cobble substrate (Gunther and others, 2000). From the aqueduct to the Mines Road Bridge, flow is low and there is generally less than 25 percent shade. However, temperatures were 20 °C in this reach during a 2000 stream survey, and trout have been documented here (Gunther and others 2000). Boulders become more common upstream of this section. Near the Alameda-Santa Clara County line, the creek becomes largely dry with sections shaded mostly by small willows (Gunther and others 2000).

Habitat Data

Most of the habitat information available is from stream surveys done for a report, An Assessment of the Potential for Restoring a Viable Steelhead Trout Population in the Alameda Creek Watershed, published in February 2000 by the Alameda Creek Fisheries Restoration Workgroup. There are also 1964 to 1999 flow data available from the USGS gaging station on Arroyo Mocho near Livermore (USGS 2000).

Fisheries and Restoration Projects

Two fish passage enhancement projects have been undertaken. A drop structure at RM 0 and a road crossing at RM 12 have been removed.

Calaveras Creek

Potential Impediments to Anadromous Fish Migration

Calaveras Dam is the only barrier on Calaveras Creek, and it is impassable.

General Description

Calaveras Creek is a tributary to Upper Alameda Creek at RM 26. It is 5.4-miles long and has one major reservoir, Calaveras Reservoir, which it empties into from the southeast. The reservoir is fed by natural streams, including the Aroyo Hondo entering from east of the reservoir and north of Calaveras Creek. The reservoir is also fed by a pipeline, which delivers Alameda Creek water from a diversion at the Alameda Creek Diversion Dam on Alameda Creek (Gunther and others 2000).

Fish Populations

Calaveras Creek is a tributary to Alameda Creek upstream of several impediments to fish migration. At least one of these barriers is considered to be impassable. This eliminates any anadromous fish from gaining access to Calaveras Creek. There are self-sustaining populations of rainbow trout upstream of Calaveras Reservoir, in the tributary Arroyo Hondo, and possibly in Smith and Isabel creeks. These populations are probably derived from coastal steelhead, which were trapped in the upper watershed (Gunther and others 2000). According to the Alameda Creek Fisheries Restoration Workgroup report, there were fish surveys of various reaches of Calaveras Creek done in 1905, 1938, 1972, and 1977 (Gunther and others 2000). SFPUC Aquatic Resource Monitoring Reports have documented fish populations in Calaveras Creek, downstream of Calaveras Reservoir, since 1998. A study to estimate the size of the rainbow trout population was scheduled to begin in 2004 (SFPUC 2004 Apr pers comm).

Water Quality

Summer water temperature is relatively high in the creek downstream of Calaveras Dam (Gunther and others 2000). A 1965 limnological study of Calaveras Reservoir contains data about temperature, turbidity, DO, and pH of the water at four sites in the reservoir. Temperatures ranged from 75.5 °F to 47.7 °F; stratification did occur. DO ranged from 1.6 to 9.0 ppm, and pH was 7.5 to 8.5 (DFG 1965). In 1973 DFG recorded water temperature during three fish samplings in the reservoir. The results were 72 °F in late May, 76 °F in mid June, and 62 °F in October. SFPUC Aquatic Resource Monitoring Reports have also been collecting water quality parameters.

Hydrology

During a 15 Apr 1988 fish sampling by DFG, flow in Calaveras Creek was measured at 0.068 cfs. The same point measured in September of the same year had a flow of 0.594 cfs. In April flow was not continuous from Calaveras Dam to the confluence with Alameda Creek. Flow was intermittent upstream of the Hetch Hetchy pipe abutment. While USGS does not have a flow gage on Calaveras Creek, there is one on Alameda Creek downstream of its confluence with Calaveras Creek with data available from 1995 to 1999 (USGS 2000).

Habitat Quality

A 1995 stream survey by DFG found that the area between Calaveras Dam and the confluence with Alameda Creek has a very steep gradient with the substrate being mostly very large boulders. It is believed that passage through this section is difficult or impossible at most flows and is therefore considered “unsuitable for the re-establishment of a trout population” (DFG 1996).

Habitat Data

Other than limnological data, very little habitat data are available for Calaveras Creek. No vegetation data was found. A brief mention of channel gradient and substrate can be found in *An Assessment of the Potential for Restoring a Viable Steelhead Trout Population in the Alameda Creek Watershed* (Gunther and others 2000).

Fish Passage and Restoration Projects

No restoration or fishery projects are being carried out at this time. However, the SFPUC is carrying out several ongoing studies within the watershed. The Alameda Creek Aquatic Resource Monitoring is an ongoing study in Calaveras Creek downstream of the dam. Additionally, there are four ongoing projects in Arroyo Hondo: an Aquatic Resource Monitoring project; a Fish Trapping Study; a Trout Predation Study, and the Reservoir Trout Population Size Study (SFPUC 2003 pers comm).

Arroyo de la Laguna

Arroyo de la Laguna is a tributary to Alameda Creek parallel to Interstate 680. There are no identified barriers on this tributary, and flow appears to be adequate for migration to other tributaries. Downstream of its confluence with Arroyo Mocho, Arroyo de la Laguna has poor breeding and rearing habitat. The substrate is mostly sand. There is poor pool development, and summer temperatures may be high. Sections of Arroyo de la Laguna near Arroyo Mocho have been channelized for flood control. A 1963 survey found rainbow trout in Arroyo de la Laguna; however, DFG fish surveys in 1976 and 1986 did not recover rainbow trout (DFG 1986). Only warm water, nongame fish were caught in these surveys. Some temperature and flow data are available in these fish surveys for limited portions of the creek. Downstream of Pleasanton, Arroyo de la Laguna has had erosion problems. The lowermost portion of the creek may be suitable for trout, and there is little information about the upper reaches (Gunther and others 2000).

Pirate Creek

Pirate Creek is a tributary to Alameda Creek in the Sunol Valley. Rainbow trout were observed in the lower reaches of Pirate Creek during sampling by Alameda County in 1999 (Gunther and others 2000).

San Antonio Creek

San Antonio Creek is a tributary to Alameda Creek just upstream of the Interstate 680 crossing. Historically, there were steelhead in San Antonio Creek but “by the early 1960s, Alameda Creek steelhead runs were essentially eradicated” (DFG 1978). James H. Turner Dam creates San Antonio Reservoir and blocks access to San Antonio, La Costa, and Indian Creek watersheds all of which had steelhead historically (Leidy 1984). Self-sustaining populations of rainbow trout are in tributaries to the reservoir, and habitat upstream of the reservoir is considered potential steelhead habitat (Gunther and others. 2000). A 1978 trout survey by DFG reported dense populations of young-of-year rainbow trout in San Antonio Creek upstream of the reservoir, in lower and upper La Costa Creek, and in lower and middle Indian Creek.

The SFPUC has conducted work in San Antonio, La Costa, and Indian creeks. Two years of fish trapping data (now an ongoing annual project), for both upstream and downstream moving fishes in San Antonio Creek and a single year of data for Indian Creek have been collected. Rearing habitat was evaluated by an aerial survey. A trout predation pilot study was conducted in 2003, and a study to estimate the size of the rainbow trout population is anticipated (SFPUC 2003 pers comm).

Stoneybrook Creek

Stoneybrook Creek is a tributary to Alameda Creek at Palomares Road. DFG found rainbow trout in Stoneybrook Creek in 1976. Rainbow trout have also been documented recently in the creek during sampling by the EBRPD. Temperatures in Stoneybrook Creek were consistently measured below 64.4 °F (18 °C) in summer 1999, which is within the suitable range for steelhead trout (Gunther and others 2000).

Valpe Creek

Valpe Creek is a tributary to upper Alameda Creek. Rainbow trout were seen in Valpe Creek in 1999 (Gunther and others. 2000).

Welsh Creek

Welsh Creek is a tributary to Alameda Creek in Sunol Valley. Alameda County found rainbow trout in the creek during sampling in 1999. There is a natural barrier 0.3 miles from the confluence with Alameda Creek, which blocks access to the rest of the creek (Gunther and others 2000).

Sinbad Creek

Sinbad Creek is a tributary to Arroyo de la Laguna near its confluence with Alameda Creek. This creek historically had steelhead in it but does not have a persistent population of rainbow trout. Temperatures in Sinbad Creek were consistently measured at below 64.4 °F in summer 1999 (Gunther and others 2000). A preliminary assessment of potential steelhead habitat in Sinbad Creek revealed that the entire lower 5 miles of the creek has gravel suitable for spawning. Winter precipitation may provide flows to sustain adult steelhead migration upstream, and isolated pools may provide suitable rearing habitat for juvenile steelhead (Herron, King and McDonald 2003). Restoring Sinbad Creek would involve addressing eleven road crossings and six dams in the first 3.5 miles of creek.

San Francisquito Creek – Santa Clara and San Mateo Counties

Potential Impediments to Anadromous Fish Migration

San Francisquito Watershed creeks have many barriers to fish passage. The Watershed Council has prepared an assessment of those barriers which fall into five major categories: dam, weir, bridge apron, culvert, and “other” (a drop structure, a concrete low water road crossing, and a fence) that could impede anadromous fish migration between Searsville Dam and its discharge into San Francisco Bay. Searsville Dam blocks the migration of steelhead trout to the tributaries upstream of Searsville Lake.

General Description

The San Francisquito Creek watershed extends 45 square miles from the Santa Cruz Mountains to San Francisco Bay. Several creeks draining Skyline Ridge join together and form Searsville Lake in Portola Valley including Corte Madera Creek, Sausal Creek, Dennis Martin Creek, and Alambique Creek. San Francisquito Creek is formed downstream of Searsville Lake at the confluence of Corte Madera Creek with Bear Creek, which with its tributaries of Dry Creek, Bear Gulch, and West Union Creek drains the Town of Woodside. Los Trancos Creek is a downstream tributary of San Francisquito. The creek continues through the hills above Stanford University, then between Palo Alto and Menlo Park and East Palo Alto and finally flows into San Francisco Bay.

Fish Populations

Historically, in addition to steelhead trout, San Francisquito Creek supported a run of Chinook salmon (SFEP 1997). There are no records of Central California coho salmon in the San Francisquito watershed; however, because they are widely distributed, it is possible that they may have inhabited the watershed (Launer and Spain 1998). Today, steelhead trout are the only salmonids inhabiting the San Francisquito watershed. Steelhead trout are found in various tributaries of the Bear Creek watershed (Smith and Harden 2001) and Los Trancos Creek (Launer and Spain 1998), and resident rainbow trout flourish in various tributary creeks upstream of Searsville Lake. Fish surveys have been performed by DFG from 1974 to 1996. Fish surveys from 1974, 1976, and 1981 are available from the San Francisquito Creek Joint Powers Authority (JPA).

Water Quality

The water in San Francisquito Creek has a high silt load and high levels of the pesticide diazinon (USEPA 1998), a widely used organophosphate. As it passes through urban Palo Alto, the rural towns of Woodside and Portola Valley, Menlo Park, and East Palo Alto, the creek receives storm water discharges, which can contain various levels of pesticides, oils, heavy metals and other contaminants. San Francisquito Creek Coordinated Resource Management and Planning staff and volunteers and the city of Palo Alto sampled and analyzed water for various pesticides and heavy metals in the San Francisquito watershed from 1997 to 1998 (San Francisquito Creek San Francisquito Watershed Council 2002). With financial and technical support

from the City of Palo Alto and Stanford University, three long-term monitoring stations are operational: (1) Newell Bridge, (2) San Francisquito at Piers Lane, and (3) Los Trancos at Piers Lane. A fourth is being installed on Bear Creek.

Hydrology

The flows in San Francisquito Creek are highly seasonal (Figure E-5). USGS maintains a streamflow gage at Stanford University, and records are available from 1930 to 1941 and since 1950 (USGS 2000). Historical flows range from peaks of more than 1,500 cfs in the winter to less than 0.5 cfs during summer and early fall (USGS 2000). The creek reportedly runs dry in the summer (Cities of Menlo Park, Palo Alto, East Palo Alto, San Mateo County and the Santa Clara County Water District 2000). One USGS gaging station at Stanford University has data available from 1930 to 1941 and since 1950 (USGS Nov. 28, 2000). Historical flows range from the flood of record, February 1998, when flows ran 7,200 cfs to less than 0.5 cfs during summer and early fall (USGS 2002). Downstream of Junipero Serra Boulevard, the creek reportedly runs dry in the summer (Santa Clara Basin Watershed Management Initiative Watershed Assessment Report 2003).

Figure E-5 Mean monthly flows from 1930 to 2000 on San Francisquito Creek at Stanford University

Habitat Quality

The spawning habitat quality of San Francisquito Creek is variable as it flows from the minimally developed upper watershed lands of Stanford University through the downstream urban areas of Palo Alto, Menlo Park and East Palo Alto and the main Stanford campus. The reach of San Francisquito Creek between Junipero Serra Boulevard and Highway 101 has been described as suboptimal spawning habitat as most of this area is dominated by fine materials such as sand and by gravels and cobbles in the upstream area. This area appears to provide primarily migration habitat for steelhead, although several barriers to migration exist (Cities of Menlo Park, Palo Alto, East Palo Alto, San Mateo County and the Santa Clara County Water District 2000 and Smith and Harden 2001).

The existing shading, summer water temperatures, and spawning habitat have been described as good in the Bear Creek watershed. Upper portions of the watershed are protected in parks or California Water Service Company lands. Streambeds have been described as clean; however, streamflows were low to extremely low in the summer (Smith and Harden 2001; SFRWQCB 2003; SCBWMI WAR, Appendix D 2003).

The upper San Francisquito watershed has been the focus of fish surveys conducted during the 1990s. Bear Creek and Los Trancos Creek contained the largest number of steelhead and seemed to provide the most significant spawning grounds for the species (Cities of Menlo Park, Palo Alto, East Palo Alto, San Mateo County and the Santa Clara County Water District 2000).

Habitat Data

Studies include Stanford University's surveys in 1997, 1998, and 1999 of biotic diversity within various parts of the watershed (San Francisquito Watershed Council 2002), and the San Francisquito Creek Bank Stabilization and Revegetation Master Plan contains a discussion of existing habitat

conditions between Junipero Serra Boulevard and Highway 101. The Watershed Management Plan Watershed Characteristics Report, vol. 1, and Watershed Assessment Report, vol. 2 (SCBWMI 2003) also reported abundant habitat data.

Fisheries and Restoration Projects

San Francisquito Creek lies within many jurisdictions, and, as a result, there are many entities involved in addressing drainage and environmental issues in the watershed. An attempt to build a consensus among the various interests led to the formation in 1993 of the San Francisquito Creek Watershed Council (formerly known as the San Francisquito Creek Coordinated Resource Management and Planning group). The SFWC includes more than 40 government agencies and community organizations (Peninsula Conservation Center Foundation 2000).

The SFWC hired a streamkeeper, a watershed coordinator, and an outreach coordinator. The SFWC also administers three main on-the-ground restoration projects: (1) a volunteer-based riparian vegetation project with nine demonstration sites throughout the watershed, (2) a native plant nursery that supplies plants grown from locally collected seed for the revegetation sites, and (3) a working group called the Steelhead Task Force that develops and implements steelhead habitat restoration and protection projects. It has also produced several documents to facilitate identification and prioritization of restoration opportunities in the watershed, including the 1998 Reconnaissance Investigation Report of San Francisquito Creek, the 2001 Adult Steelhead Passage in the Bear Creek Watershed, and the 2002 Long-term Monitoring and Assessment Plan.

A JPA was formed in May 1999 between the cities of East Palo Alto, Palo Alto, and Menlo Park as well as the Santa Clara Valley Water District and the San Mateo Flood Control District. The San Francisquito Watershed Council and Stanford University are associate members. The JPA is examining flood issues within the San Francisquito watershed (San Francisquito Watershed Council 2002).

The Santa Clara Basin Watershed Management Initiative was established in 1996 by Environmental Protection Agency, the State Water Resources Control Board, and the San Francisco Bay Regional Water Quality Control Board. Water quality issues are being examined in the basin, which includes the San Francisquito Creek watershed (San Francisquito Creek CRMP 2000 and the Santa Clara Basin Watershed Management Initiative: Watershed Characteristics Report and Watershed Assessment Report 2003).

The JPA was awarded \$112,000 from the California Coastal Conservancy in 2001 to conduct planning and design for Bank Stabilization and Revegetation Demonstration Projects. Northwest Hydraulic Consultants was hired in March 2002 to conduct the planning and conceptual design for up to five high-priority sites. The sites have been narrowed to two stretches, involving multiple landowners on both sides of the creek.

The JPA and the Town of Portola Valley were jointly awarded \$72,000 from DWR in March 2003 to expand the Bank Stabilization and Revegetation Master Plan to Corte Madera Creek.

The Searsville Lake Sediment Impact Study was prepared for Stanford University and was completed in 2001. After additional analysis, the JPA accepted the study in May 2003. This project analyzed downstream sediment impacts including existing conditions and conditions based on various scenarios of filling or lowering Searsville Dam (San Francisquito Creek CRMP 2000).

A Comparison of Water Quality in Urban and Rural Stormwater Runoff study was funded by San Mateo County and was completed in October 2000. This project compares pollutants in storm water runoff discharged in urban and rural areas of the watershed (San Francisquito Creek CRMP 2002 quoting H28, Sipes).

In December of 2000, eight watershed stakeholder agencies (co-permittees: Woodside, Portola Valley, San Mateo County Flood, Santa Clara County, Santa Clara Valley Water District, Palo Alto, Menlo Park, and East Palo Alto) were required by the State Water Resource Control Board (SWRCB) to conduct a watershed analysis and an assessment of management practices, and to prepare and implement a sediment reduction plan within the San Francisquito Creek watershed through their National Pollutant Discharge Elimination System permitting process.

The co-permittees asked the JPA to oversee submitting a grant and to manage a project that would meet these requirements. The grant includes a "cost share matching fund" from each co-permittee.

In January 2001, the JPA board authorized submittal of the grant through Resolution #01-1-25. The SWRCB notified the JPA in September of 2001 that the grant had been awarded.

At the request of stakeholder agencies and the SWRCB, the JPA created a technical advisory committee to assist in developing the request for proposals, scope of work, and to review the project as it was completed. The technical advisory committee meets at least quarterly to review and advise the consultant's work.

In November 2002, the JPA board authorized the executive director to enter into a \$235,000 contract for a Watershed Analysis and Sediment Reduction Plan Project under a Costa-Machado Water Act of 2000 (Proposition 13) grant award. The contract with the State was received in February 2003. The JPA has also entered into agreements with the eight co-permittees for their portion of the project cost-share.

San Francisquito Creek Tributary – Santa Clara and San Mateo Counties

Los Trancos Subwatershed

Potential Impediments to Anadromous Fish Migration

There are a series of weirs that are easily passed on Los Trancos Creek near and under Highway 280. There are no significant barriers between the mouth and the Stanford University Felt Lake Diversion Dam, which has a fish ladder that allows migration to 3.5 miles of potential habitat. However, there are three difficult barriers within this reach of potential habitat, including a 6-foot high concrete flashboard dam with concrete-lined basin 0.1 miles upstream of the Los Trancos Road and Alpine Road intersection.

Additionally, there is a double box culvert at the Los Trancos Road crossing upstream of Alpine Road and another double box culvert on the Emergency Fire Access Road 0.1 miles downstream of the second Los Trancos Road crossing (Smith and Harden 2001).

General Description

Los Trancos Creek is a tributary of San Francisquito Creek that is the border between Santa Clara and San Mateo counties, entering San Francisquito Creek about RM 8.3. Los Trancos Creek is about 8 miles long, and its total watershed encompasses about 7.5 square miles, ranging in elevation from 500 feet at its headwaters to 200 feet at its confluence with San Francisquito Creek.

Fish Populations

Steelhead trout are found throughout the San Francisquito Creek watershed, including Los Trancos Creek. One pass electroshocking samples in 1997-1999 found that Los Trancos has an abundance of steelhead 4-5 times higher than that of San Francisquito Creek itself (Launer and Spain 1998, Launer and Holtgrieve 2000).

Water Quality/Hydrology

Streamflow in Los Trancos Creek is highly seasonal and fluctuates sharply in response to winter storms. USGS maintained a stream gage station at Stanford University that measured daily streamflow from 1930 to 1941 (Figure E-6) (USGS 2002).

Habitat Quality

Spawning habitat is common in Los Trancos Creek, and probably provides some fry for stretches of San Francisquito Creek (Harvey and Associates 2001). Rearing habitat also exists in Los Trancos Creek but is constrained by very low late-summer streamflows, even in wet years (Harvey and Associates 2001). Los Trancos Creek downstream of the Stanford Felt Lake Diversion Dam has a steep enough gradient to create riffles and runs likely to support moderate insect production and steelhead feeding even under late summer flows (Harvey and Associates 2001). All of the streams in the San Francisquito Creek watershed run turbid with storm flows, but Los Trancos

Figure E-6 Mean monthly flows from 1930 to 1941 on Los Trancos Creek near Stanford University

Creek, with a relatively undeveloped watershed, appears to clear most rapidly after storms and has relatively clean substrate (Harvey and Associates 2001).

Habitat Data

Habitat Data for Los Trancos Creek is limited. More information is available concerning habitat data for San Francisquito Creek (see San Francisquito Creek in this appendix).

Hankinson and Smith from San Jose State University are doing studies to determine genetic relationships among different populations of South San Francisco Bay and Central California Coast steelhead/rainbow trout and the relative influence of hatchery stocking on population genetics. Their study reach includes Los Trancos Creek. According to Geoff Brosseau, Ecterra, Palo Alto, California, the study, titled Genetic Relationships among Steelhead Rainbow Trout Populations in Tributaries to South San Francisco Bay (Phase 1) was completed (Geoff Brosseau 2003 Jul pers comm).

Some habitat data for Los Trancos Creek are available in Harvey and Associates (2001) Searsville Lake Sediment Impact Study: Biotic Resources Synthesis Report.

Long-term water quality monitoring has been conducted to characterize wet season conditions at Piers Lane. Data from this study are available from Geoff Brosseau, Aceterra, Palo Alto, California.

Fisheries and Restoration Projects

Stanford University is working with DFG to improve the fish ladder at the Felt Lake Diversion Dam, owned by the university, so that it passes fish more readily. Modifications to the fish ladder are estimated to cost around \$1 million, including planning, permitting, and construction. The implementation schedule is contingent upon the university's ability to secure a funding source to share the cost of the project, but if grant funding is available, the project could begin as soon as spring of 2004.

In March 2002 the San Francisquito Creek JPA submitted a grant proposal to the American Rivers – NMFS Community-Based Restoration Program Partnership on behalf of the Watershed Council to fund a project to remove the old Los Trancos flashboard dam. The Watershed Council, tentatively, has been awarded \$49,000 for the modification of the flashboard dam, with funding contingent upon the development of a conceptual plan, cost estimates, permitting, and landowner permissions. DWR's FFPIP provided the conceptual plans and cost estimates to help secure funding for the project.

This report is available online at
http://facilities.stanford.edu/searsville/draft/biotic_resources.pdf.

Marsh Creek, Contra Costa County

Potential Impediments to Anadromous Fish Migration

The lower Marsh Creek drop structure is a grade control structure about 4 miles upstream from the mouth of Marsh Creek at Big Break in the western Delta. This drop structure is the farthest downstream fish passage barrier in the watershed. Marsh Creek Dam is about 7 river miles upstream of the lower Marsh Creek drop structure and is also a major fish passage barrier. Sand Creek, a Marsh Creek tributary, contains a drop structure that is about 3 miles upstream of the Marsh Creek drop structure and impedes migration to perennial pools in upper Sand Creek. These pools are on protected land within the EBRPD's Black Diamond Mines Regional Park.

General Description

Marsh Creek flows for about 30 miles from its headwaters on the eastern flank of Mount Diablo to its mouth at Big Break in the western Delta and drains about 128 square miles. Tributaries of Marsh Creek include Briones, Dry, Deer, and Sand creeks. Marsh Creek and its tributaries flow through a variety of range, farm, and urban lands.

Fish Populations

There is little historical information on salmonid runs in Marsh Creek. Marsh Creek does appear to support reproducing runs of Chinook salmon. Scientists from the Natural Heritage Institute (NHI) observed adult Chinook salmon downstream of the lower Marsh Creek drop structure in the fall of 2002 and 2003. There is also an existing population of rainbow trout in the upper watershed (Robins and Cain 2002). NHI scientists also interviewed local anglers along Marsh Creek who have reported that salmon runs have numbered in the hundreds for at least five years (Robins and Cain 2002). These observations have been substantiated by a limited number of fisheries surveys. Slotton and others (1996) reported five juvenile Chinook salmon in lower Marsh Creek during water quality surveys. Additionally, according to Erika Cleugh, DFG biologist, 13 juvenile Chinook salmon (60-80 mm) were observed downstream of the lower Marsh Creek drop structure. It is unclear if Chinook salmon are successfully reproducing in Marsh Creek or if the juveniles migrated upstream from the Delta to rear in Marsh Creek.

The NHI did a survey downstream of the Marsh Creek drop structure during a weekend in November 2005 and counted about 30 adult salmon. Some of these salmon were observed actively digging redds and spawning, while others were trying to gain passage over the drop structure. It is unknown if these salmon were hatchery fish or were wild stock.

Water Quality

Several factors have led to the degradation of water quality in the Marsh Creek watershed, including extensive agriculture development, urbanization, and mercury mining activities that began in the 1850s. Marsh Creek Reservoir has been closed to fishing since the mid-1980s due to high concentrations of mercury found in fish both in and upstream of the reservoir.

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Hydrology

Streamflows in Marsh Creek fluctuate sharply in response to winter storms. Streamflow is highly seasonal, with the majority of flows occurring in the months of January and February (Figure E-7). The USGS has a stream gage in Byron that recorded peak streamflows from 1954-1983, daily streamflows from 1953-1983, and water quality samples in 1970.

Habitat Quality

The lower portion of Marsh Creek has poor habitat due to a lack of vegetation and gravels. There is riprap on the stream bottom that may be used for spawning (NHI 2001). Widespread clearing of vegetation in the 1960s for flood control purposes has created higher water temperatures, lower DO levels, and increased sediment loading (Robins and Cain 2002).

Despite the poor habitat quality in the lower reaches of Marsh Creek, Robins and Cain (2002) reports that multiple areas of suitable spawning habitat for fall-run Chinook salmon exist in the 7 miles of stream between Marsh Creek Dam and the lower Marsh Creek drop structure. This portion of lower Marsh Creek contains numerous regions of gravel and a narrow band of riparian woodland that forms a canopy over the channel that moderates stream temperatures. In a 2004 report, Levine and Stewart found that upstream of the lowest fish barrier there is suitable gravel quality, quantity, and vegetative cover to support Chinook salmon spawning. In addition, potential spawning and over-summering habitat for both steelhead and Chinook is available in the intermediate and upper zones of the watershed. The presence of rainbow trout in the upper Marsh Creek watershed suggests that there are suitable habitat conditions available (Robins and Cain 2002).

Habitat Data

NHI and the Delta Science Center at Big Break prepared The Past and Present Condition of the Marsh Creek Watershed (Robins and Cain 2002). This document contains a discussion of existing habitat conditions. NHI has also prepared the Corridor Width Report, Parcel Inventory, and Conceptual Stream Corridor Master Plan for Marsh, Sand, and Deer Creeks in Brentwood, California (Walkling 2002). This document contains habitat information as well.

University of California Berkeley graduate students overseen by NHI performed vegetation surveys and pebble count surveys in 2001. Survey information is available from NHI.

The USGS stream gage in Brentwood collected water quality samples in 2000 (USGS 2002).

In 2004 Levine and Stewart via UC Berkeley prepared the following paper: Fall-Run Chinook Salmon Habitat Assessment: Lower Marsh Creek Contra Costa County. This paper documents habitat characteristics on a 1.2-mile reach of Marsh Creek upstream from the lowest fish barrier.

Figure E-7 Mean monthly flows from 1953 to 1983 on Marsh Creek near Byron

Fisheries and Restoration Projects

According to Rich Walkling of NHI in Berkeley, the following projects are planned or proposed: NHI, in partnership with the Delta Science Center and DWR's FPIP, received a \$6,000 grant in 2002 from American Rivers and NOAA to develop a set of alternative designs for modifying or removing the lower Marsh Creek drop structure. This project will enable upstream migration of Marsh Creek's existing run of fall-run Chinook salmon and possibly steelhead trout. These designs will be specifically created for incorporation into corridor restoration plans being developed by NHI and the city of Brentwood.

In 2004 NHI and American Rivers secured approximately \$22,000 from American Rivers/NMFS and \$44,000 from the California Coastal Conservancy to complete the engineering design, construction documents, and permitting for the fish passage project on Marsh Creek. The design and permitting work will be complete by the summer of 2005.

NHI and the City of Brentwood have received \$1.2 million from DWR and California State Parks to purchase the Griffith Parcel; 5 to 11 acres at the confluence of Marsh, Sand, and Deer creeks. Plans include widening and reshaping the channel to restore meander, improve riparian vegetation, and restore the floodplain.

CALFED has awarded \$120,000 to NHI for a watershed assessment, water quality monitoring program, and identification of potential restoration projects.

The California Coastal Conservancy awarded NHI \$30,000 for design of a creek corridor protection plan in Brentwood.

CALFED has funded the purchase and restoration of Dutch Slough. This restoration project involves restoring about 1,000 acres of shallow water tidal marsh at the mouth of Marsh Creek to the east of the current channel.

Contra Costa County Flood Control District has plans for several detention/retention basins in the watershed, including two on Sand Creek, and an expansion of the existing Marsh Creek reservoir a few miles upstream from Brentwood.

The Contra Costa County Flood Control and Water Conservation District plans to remove or redesign the drop structure on Sand Creek to facilitate fish passage if the lower Marsh Creek drop-structure is removed or modified to pass anadromous fish.

San Lorenzo Creek, Alameda County

Potential Impediments to Fish Passage

Various flood control and road projects have created potential impediments to fish passage, and have led to fragmentation and isolation of aquatic habitats. Palomares and Cull Creek are not accessible to anadromous steelhead due to the presence of Don Castro Dam, completed in 1965, and Cull Canyon Dam, completed in 1962. Both of these dams are impediments to fish migration, and both reservoirs provide habitat for introduced warm water species, such as bass, that prey on juvenile salmonids.

Only Castro Valley Creek, Crow Creek, and San Lorenzo Creek downstream of Don Castro Dam are accessible to steelhead. However, steelhead using these areas must pass through a 3.9-mile concrete channel from near the San Francisco Bay to Foothill Boulevard constructed by the USACE between 1953 and 1962. This channel impedes steelhead passage under most flow conditions (Kobernus 1998). Additionally, in 1972 a 2,000-foot section of Crow Creek just upstream of its confluence with Cull Creek was channelized and covered. This section of altered stream likely impedes migration under most flows (Love 2001). The half-mile concrete culvert under Interstate 580 may also impede fish migration (ACFC & WCD 2002).

General Description

San Lorenzo Creek is about 12.5 miles long with a total watershed area of 48 square miles. The headwaters of San Lorenzo Creek are in the mountains above eastern San Francisco Bay, and it flows through the cities of Hayward and San Leandro, where it then drains into the San Francisco Bay. San Lorenzo Creek has several tributaries including Castro Valley Creek, Chabot Creek, Cull Creek, Crow Creek, Norris Creek, Bolinas Creek, Sulphur Creek, Eden Canyon Creek, Hollis Creek, and Palomares Creek.

Fish Populations

According to the ACFC & WCD, stream habitat throughout the San Lorenzo Creek watershed supports native fish populations (ACFC & WCD 2002). However, salmonid populations are low. Rainbow trout are present in low numbers, probably as a result of stocking in Don Castro Reservoir (ACFC & WCD 2002). San Lorenzo Creek had highly productive steelhead runs up until the 1950s (ACFC & WCD 2002). Steelhead-spawning habitat had become severely limited as early as 1953 (DFG 1953 as cited in ACFC & WCD 2002).

The DFG performed fisheries surveys in 1960 and 1975. In 1960 DFG biologists surveyed major tributaries of San Lorenzo Creek, including Cull, Palomares, Crow and Eden Canyon Creeks. Rainbow trout or steelhead fry were found in Palomares Creek only. In 1975 DFG biologists surveyed San Lorenzo and Crow Creeks and found resident adult rainbow trout in Bolinas Creek, which is a tributary to Crow Creek, but no juveniles were found. DFG biologists concluded that the steelhead run was extirpated due to channel degradation (DFG 1975). Leidy (1984) performed a survey in 1981 in Palomares Creek and no adult or juvenile salmonids were found. In 1998 two

rainbow trout were found during surveys by the San Lorenzo Creek Watershed Project, which is administered by the Alameda County Wide Clean Water Program in partnership with the Natural Resources Conservation Service and the Alameda County Resource Conservation District (Greiner Woodward Clyde 1999).

ACFC & WCD (2002) report that there have been numerous reports of adult steelhead and rainbow trout being caught by local anglers or observed in San Lorenzo Creek during wet years from the 1970s to the present. On two occasions, January 2000 and March 2000, ACFC & WCD reported trout in Castro Valley Creek near Knox Street in Hayward. In electroshocking surveys conducted by ACFC & WCD in 2001, three young-of-year rainbow trout were sampled in Crow Creek. Additionally, these surveys gathered adult rainbow trout from Crow Creek and San Lorenzo Creek. Two adult steelhead/rainbow trout were observed in May 2002 in San Lorenzo Creek in the natural section of creek between Foothill Boulevard and 2nd Street in Hayward, according to Emmanuel da Costa, ACFC & WCD, Alameda, California.

Water Quality

Fine sediment loads and episodic poor water quality has limited the numbers and distribution of salmonids in the San Lorenzo watershed. Urbanization has led to increased sediment loading, degraded water quality, altered stream hydrographs, and degraded riparian conditions (ACFC & WCD 2002). Kobernus (1998) found nonpoint source pollutants such as paint, automobile batteries, concrete, soap, and motor oil in San Lorenzo Creek. Fish kills have been reported from chlorine (DFG 1975) and well-drilling sediments (Kobernus 1998). In addition, potentially harmful levels of diazinon have been recorded in the watershed (ACFC & WCD 1997 as cited in ACFC & WCD 2002).

Water temperatures in the reaches upstream of Don Castro Reservoir are generally less than 18 °C. Water temperatures remain relatively warm downstream of Don Castro Dam and the Crow Creek confluence, usually exceeding 21 °C for as much as 25 percent of the time and often exceeding 24 °C. Despite this reach of low-quality habitat, the majority of the watershed has cold water temperatures that can support trout (ACFC & WCD 2002).

Hydrology

Streamflow is highly seasonal and fluctuates sharply in response to winter storms. The USGS maintains several stream gages throughout San Lorenzo Creek watershed. A gage at Don Castro Reservoir recorded peak streamflow from 1981 to 2000, and has recorded daily streamflow and taken water quality samples from 1980 to 2000. A gage in Hayward recorded peak streamflow and daily streamflow from 1940 to 2000 and water quality samples were recorded in 1971. A gage in San Lorenzo recorded peak streamflow from 1968 to 2000, daily streamflow from 1967 to 2000 (Figure E-8), and water quality samples from 1989 to 1993. The USGS also operates a stream gage on Crow Creek, immediately upstream of Crow Canyon Road. This gage recorded peak streamflow from 1998 to 2000, daily

Figure E-8 Mean monthly flows from 1967 to 2000 on San Lorenzo River at San Lorenzo

streamflow from 1997 to 2000, and water quality samples from 1999 to 2000. Cull Creek, which joins Crow Creek immediately downstream of Crow Canyon Road, has a USGS stream gage immediately upstream of Cull Reservoir. This gage has recorded peak streamflow from 1979 to 2000, daily streamflow from 1978 to 2000, and water quality samples from 1979 to 2000. Another USGS station is downstream of the Cull Reservoir Dam. This gage station recorded peak streamflow in 1979, daily streamflow from 1978 to 1979, and water quality samples in 1979 (USGS 2002).

Habitat Quality

Most of the aquatic habitat in the watershed has been greatly altered as a result of urbanization. Fish habitat in San Lorenzo Creek varies significantly from the upper reaches downstream to the San Francisco Bay. Cold water habitat in the upper parts of the watershed would likely support steelhead/rainbow trout in Palomares Creek, Hollis Creek, Eden Canyon Creek, Norris Creek, upper Crow Creek, upper San Lorenzo Creek, Bolinas Creek, Cull Creek, Castro Valley Creek, Chabot Creek, and Sulphur Creek (ACFC & WCD 2002).

However, most of this habitat is isolated upstream of dams and flood control projects. Relatively cool water exists upstream of Don Castro Dam, but high temperatures due to thermal loading exist downstream of the Don Castro Reservoir. San Lorenzo Creek has been highly modified downstream of Foothill Boulevard and does not support fish communities for most of its length. The upper reaches have few deep pools, but good shelter characteristics. The largest and deepest pools are in the lower reaches. There is good riparian vegetation that contributes to instream and overhead cover in the upper reaches (ACFC & WCD 2002). Lower reaches have lower canopy coverage due to widening of the stream channel.

Crow Creek and two of its tributaries, Norris and Bolinas creeks, have the greatest potential for suitable habitat and water temperatures to support rainbow trout (ACFC & WCD 2002). Crow Creek is characterized by a good mixture of pools, glides, and riffles and has relatively deep pools and moderate shelter complexity.

Habitat Data

Habitat data for the San Lorenzo watershed is available in the Fish Habitat and Fish Population Assessment for The San Lorenzo Creek Watershed, Alameda County, California (ACFC & WCD 2002).

Fisheries and Restoration Projects

Michael Love and Associates (2001) assessed the 2,000-foot long culvert on Crow Creek just upstream of its confluence with Cull Creek for fish passage. According to Paul Modrell of ACFC & WCD in Alameda, Alameda County is planning a road-widening project on Crow Canyon Road and the county Environmental Services Division is interested in modifying the culvert to improve fish passage as mitigation.

Alameda County Public Works Agency is preparing a project that will manage sediment accumulations and future sediment inflow at the Don

Castro Reservoir. A pilot project was conducted in 2000, and 15,800 cubic yards of sediment was removed from the delta area. The average annual sediment inflow is 8,600 cubic yards.

The ACFC & WCD and DWR's FPIP are assessing the future of Cull Creek Reservoir and Don Castro Reservoir on San Lorenzo Creek. Management options being assessed range from periodic desilting to removal of the dams.

The ACFC & WCD have been awarded about \$140,000 from the Coastal Impact Assessment Program to assess the feasibility of restoring the entire 5-mile USACE flood control channel. This assessment will be done soon. The ACFC & WCD have also received a \$350,000 grant from the EPA's 319-h program to restore a reach of Palomares Creek and construct a field science center.

The ACFC & WCD are collaborating with Caltrans to have a drop structure removed or modified to allow fish passage into the Eden Creek subwatershed.

York Creek, Napa County

Potential Impediments to Anadromous Fish Migration

There is one dam and one reservoir on the main stem of York Creek. There is also a second reservoir in the York Creek drainage on an unnamed tributary stream (DFG 1973). York Dam is impassable and is the upstream limit of anadromous fish migration.

General Description

York Creek is a west side tributary to the Napa River at RM 36. It is about 4.5 miles long and drains about 5 square miles. The creek originates in the western hills of the Napa Valley at an elevation of about 1,800 feet. It flows through a narrow canyon, into the Napa Valley, through the town of Saint Helena and enters the Napa River at an elevation of 220 feet. Upstream of the Highway 29 crossing the stream drops in elevation an average of 230 feet per mile. Downstream of the Highway 29 crossing the stream is less steep and only loses 30 feet per mile (DFG 1974).

Fish Populations

York Creek was historically a steelhead stream and today supports a run of steelhead downstream of Saint Helena Upper Dam (York Dam) as well as a population of rainbow trout in the 2 miles of habitat upstream of the dam. The most recent survey of York Creek was done in September 2000. The creek was electrofished from the base of the dam to about a mile downstream to a driveway that leads to the city of Saint Helena water tanks. Juvenile steelhead were found to be abundant and were distributed uniformly. Most of the fish were young-of-year with fewer fish being yearlings and older. In the mile sampled, about 200 fish were seen (DFG 2000a). A May 1986 DFG survey of the creek upstream of York Dam revealed 10 rainbow trout in the 500-foot long reach surveyed (DFG 1986). DFG stream surveys in 1974 and 1975 also report steelhead in York Creek. In 1975 there were estimated to be 20 *Oncorhynchus mykiss* every 100 feet from York Dam upstream to the

creek's headwaters (DFG 1975). In 1974, downstream of the dam, young-of-year steelhead trout were estimated to exceed 100 per 100 feet of stream (DFG 1974).

Water Quality

Water quality in York Creek has not been studied extensively. The water temperature is generally cold, but flow may not be adequate downstream of York Dam. Available temperature data include DFG fish surveys in April 1986 and September 2000. Water temperature was 55 °F upstream of the dam in the 1986 survey and 59 °F downstream of the dam in the 2000 survey. There have been several sediment spills in York Creek that resulted in fish kills. Other than these spills there are no documented water quality problems in the creek.

Hydrology

A 1993 DFG stream survey reported flows ranging from 0.1 to 1.4 cfs with an average flow of 0.56 cfs downstream of York Dam on 9 Jul (DFG 1973). In a 1974 DFG stream survey, flow upstream of the dam was estimated at 1.5 cfs. Immediately downstream of the dam, flow was 1.0 cfs and 1,000 feet upstream of Highway 29, the flow was 0.5 cfs. Downstream of Highway 29, flows were intermittent during this 13 Jun survey (DFG 1974). In a 1975 stream survey by DFG the flow at York Dam was determined to be 1.0 cfs on 5 Aug (DFG 1975).

Habitat Quality

The habitat in York Creek can be divided into three reaches: from the confluence with the Napa River upstream to Highway 29, from Highway 29 upstream to York Saint Helena Upper Dam, and from the dam upstream to the headwaters. Downstream of Highway 29 there is little cover, and annual grasses are the predominant vegetation. Upstream the Highway 29 crossing "dense stands of vegetation border the stream" providing adequate cover (DFG 1974). There are also boulders and undercut banks that provide shade and shelter in this reach (DFG 1974). In this area, the riffle to pool ratio is 1:1, and the substrate is 60 percent gravel (DFG 1973). Upstream of the dam there is high quality steelhead habitat. The riffle-to-pool ratio was 3:1 and there was 100 percent cover over 90 percent of the pools in this upper reach in a 1975 DFG survey. About 30-40 percent of the streambed upstream of York Dam was considered good spawning habitat because of the good gravel substrate. Significant logjams were observed in the creek during a 1975 DFG survey. The status of those jams is unknown. The most recent survey of the creek was done on 27 Sep 2000. A large number of steelhead were observed downstream of the dam at this time. Water temperature was 59 °F and "the overhanging riparian tree vegetation provided about 75 percent shade cover" (DFG 2000b) over the surveyed portion of the creek. There was also good shelter and, according to the DFG survey by Fishery Biologist Bill Cox, the area downstream of the dam "provided habitat with a very high potential to support steelhead" (Cox 2000). Gravel was limited, but present, downstream of the dam (DFG 2000b).

Habitat Data

There are three published DFG stream surveys of York Creek available in the Region III office. One was done in 1973 from the mouth of the creek up to York Dam. The second one, done in 1974, covered the same reach. The third survey, done in 1975, covered the creek from the dam upstream to its headwaters. These surveys contain flow and temperature data as well as information about what fish were present and descriptions of the habitat at the time of the surveys. There is no flow gage on the creek.

Fishery and Restoration Projects

As a result of a complaint filed by the DFG, the city of Saint Helena agreed to remove York Dam. The city obtained the required permit from the USACE. The estimated cost of removal was \$500,000 (DFG 2000a). DWR's FPIP began the initial environmental and engineering tasks for removal of the dam. The dam removal project has been turned over to USACE by the city of Saint Helena for further study and evaluations for future removal efforts.

Modifications on the diversion dam, owned by the city of Saint Helena, were completed in 2004. This modification involved removal of the concrete masonry diversion structure. This will enable juvenile steelhead easier migration and increase delivery of spawning sized gravel to lower York Creek and Napa River. Approximately 2.5 miles of high-quality habitat is now accessible.

Fish Passage Activities in the Bay Area

Alameda Creek – Alameda County

A flood control drop structure owned by the ACFC & WCD in lower Alameda Creek has blocked steelhead trout from spawning and rearing habitat in Sunol Regional Wilderness and other areas of the Upper Alameda Creek watershed since the 1960s. There are numerous other structures in the creek that act as barriers or partial barriers to fish passage. These include three inflatable dams and water diversion structures in the lower creek's flood control channel, owned by the Alameda County Water District; 6-foot-high Niles Dam and 12-foot-high Sunol Dam in Niles Canyon owned by the SFPUC, and a PG&E gas-pipeline crossing. **Table E-1** is a partial list of fish passage barriers along Alameda Creek and its watershed. In order to restore a steelhead fishery to Alameda Creek, modification for fish passage and protection at these facilities is being explored, as well as modification of county-owned culverts and a drop structure in Stonybrook Creek and Arroyo Mocho, both tributaries to Alameda Creek.

Table E-1 Partial list of barriers to fish passage in the Alameda Creek watershed

Community and agency support for restoring migratory fish runs has been building. In February 2000, the Alameda Creek Fisheries Restoration Workgroup released a report that concluded it would be feasible to restore a viable steelhead fishery to Alameda Creek. The study outlined the changes necessary to begin restoration and showed there is suitable habitat to support a self-sustaining population of steelhead trout. The report also identified items that required additional study, including the determination of instream-flow requirements to support a steelhead fishery, and the source of water for these flow requirements.

In addition, considerable media attention and new environmental regulations concerning anadromous fish motivated management agencies to participate in the restoration. Participants include Alameda Creek Alliance, ACFC & WCD, Alameda County Water District, the SFPUC, PG&E, DFG, DWR, NOAA Fisheries, the EBRPD, California State Coastal Conservancy, USACE, city of Fremont, Zone 7 Water Agency, Math/Science Nucleus, and Alameda County Supervisor Scott Haggerty.

Among the projects being developed, ACFC & WCD and the Alameda County Water District are working closely with USACE to pursue 1,135 program funds for construction of fish passage improvements in the lower, channelized portion of the creek. A conceptual plan prepared by CH2MHill proposes three fish ladders and seven fish screens in the lower flood control channel. The estimated costs of the proposed fish facilities at the lower barriers, including engineering, mitigation for environmental impacts, construction inspection, and contract administration are \$1.5 million at the lower inflatable dam, \$2.9 million at the BART weir and middle inflatable dam, and \$1.4 million at the upper inflatable dam (photos E-1 and E-2). The estimated cost of the seven fish screens is \$4.1 million. The total estimated cost of the proposed projects is \$9.9 million. If funds are procured construction is expected in 2007.

In addition, SFPUC announced in 2005 it will remove two dams, Sunol Dam and Niles Dam, both in the Niles Canyon reach of Alameda Creek (photos E-3 and E-4). Because of sediment behind Sunol Dam, an environmental assessment was needed. PG&E is also investigating alternatives to improve fish passage at its gas-pipeline crossing. PG&E would place a series of additional articulated concrete mats with backfill to regrade the site, construct a series of step pools in the middle of the existing structure, and build a traditional fish ladder.

In August 2001, EBRPD removed two small swim dams in Sunol Wilderness at a cost of \$25,000. DWR shared the cost of removing the swim dams (Photo E-5).



Photo E-1 Lower Alameda Creek—inflatable dam



Photo E-2 Lower Alameda Creek—BART Weir/Paul Salop photo



Photo E-3 Alameda Creek—Sunol Dam/SFPUC photo



Photo E-4 Alameda Creek—Niles Dam/SFPUC photo



Photo E-5 Alameda Creek—East Bay Regional Parks District swim dam prior to removal in 2001/Jeff Miller photo

Los Trancos Creek – San Mateo and Santa Clara Counties

Los Trancos Creek, a tributary to San Francisquito Creek, sustains a steelhead trout population that has historically been naturally reproducing, primarily in the 2.5 miles of the creek downstream of Stanford University's Felt Lake Diversion Dam. A fishway built at the Felt Lake Diversion Dam in 1995 provided access to an additional 3.5 miles of the creek. DFG has been working with Stanford University to implement improvements to the fishway. However, three structures upstream of the fishway significantly impede upstream steelhead migration to the headwaters of Los Trancos Creek (Table E-2). The first structure upstream of the fishway is an obsolete flashboard swim dam, Los Trancos Flashboard Dam, which presents the most severe steelhead migration barrier in upper Los Trancos Creek (Photo E-6). Two double box culverts also restrict adult steelhead migration under certain flow conditions.

In March 2002, the San Francisquito Creek JPA and San Francisquito Watershed Council submitted a grant proposal to the American Rivers/NOAA Community-based Restoration Program Partnership to fund a project to remove the old Los Trancos/Agosti Dam. American Rivers and NOAA approved the request of \$49,000 for the modification of the structure, and DWR assisted the San Francisquito Watershed Council in planning the project through early 2004. The modification of the Los Trancos/Agosti Dam could occur as early as 2005.

Drop Structure, Marsh Creek – Contra Costa County

Marsh Creek is a tributary of the San Joaquin River in Contra Costa County. The lower Marsh Creek drop structure, in the city of Brentwood, is a grade-control structure about 4 miles upstream from the mouth of Marsh Creek at Big Break in the western Delta (Table E-3 and Photo E-7). Recent repeated observations of adult Chinook salmon have increased interest in this fish barrier. DFG surveys by Darrell Sloten in 1995-1997 and by Erica Cleugh in 2002 found juvenile (60-80 mm) Chinook rearing in lower Marsh Creek.

Modification or removal of the drop structure will open up 4 miles of Marsh Creek, of which approximately 3 miles have shaded riparian vegetation and suitable spawning gravel.

Marsh Creek Dam is about 7 miles upstream of the drop-structure and is a complete barrier to anadromous fish migration. Immediately downstream of the dam a riparian corridor extends for about three miles along Marsh Creek. In a 2004 report, Levine and Stewart state that Marsh Creek, upstream of the lowest fish barrier, has suitable gravel quality, quantity, and vegetative cover to support Chinook spawning. This area does not appear to have any over-summering habitat available for steelhead.

In 2004, NHI and American Rivers secured approximately \$22,000 from American Rivers/NOAA and \$44,000 from the California Coastal Conservancy to complete the engineering design, construction documents, and permitting for the fish passage project on Marsh Creek. The design and permitting work will be complete by the summer of 2005. In addition,

Table E-2 Partial list of barriers to fish passage in Los Trancos Creek – San Mateo and Santa Clara counties



Photo E-6 Los Trancos Creek—Los Trancos Flashboard Dam/ Kevin Murray, S.F. Creek JPA photo

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Table E-3 Partial list of barriers to fish passage in Marsh Creek - Contra Costa County



Photo E-7 Marsh Creek—drop structure/NH photo

CALFED has awarded \$120,000 to NHI for a watershed assessment, water quality monitoring program, and identification of potential restoration projects. The California Coastal Conservancy awarded NHI \$30,000 for design of a creek corridor protection plan in Brentwood. Additionally, the City of Brentwood has received \$1.2 million from DWR and California State Parks to purchase and restore 5 to 11 acres at the confluence of Marsh, Sand, and Deer creeks. CALFED has granted funds for tidal marsh restoration of about 1,000 acres at the mouth of Marsh Creek. These funds also include water quality monitoring, public outreach and education.

San Francisquito Creek – San Mateo County and Santa Clara County

DFG considers the 45-square-mile San Francisquito Creek watershed to be the best remaining steelhead fishery in the southern San Francisco Bay Area (Table E-4). Searsville Dam owned by Stanford University, blocks access to upstream reaches in the Corte Madera Creek watershed, but resident rainbow trout flourish upstream of the dam. Today, about 66 percent of the former spawning waters are available to steelhead (Laura Kilgour 2003 Sep 4 pers comm).

The watershed is listed as impaired by siltation and the urban pesticide diazinon (USEPA 1998). Concern has been expressed about reduction of water to riparian zones in the San Francisquito watershed due to surface water diversion and pumping of shallow groundwater from wells located along the creek banks (CRWQCB 2003 AND SCBWMI 2003).

Stanford University owns the 68-foot-high dam that was built in 1892 (Photo E-8). It is on Corte Madera Creek in the Jasper Ridge Biological Preserve). The creek supports one of the last runs of wild steelhead in the southern San Francisco Bay Area. Searsville Dam blocks the migratory steelhead from reaching abundant aquatic habitat found upstream in several headwater streams including Corte Madera Creek, one of San Francisquito Creek's largest tributaries. The amount of critical spawning and rearing habitat available to steelhead would substantially increase with the removal of Searsville Dam.

The present level of sediment deposition in Searsville Lake is approximately 12 feet below the elevation of the Searsville Dam spillway. Accumulation of an estimated 900,000 to 1.6 million cubic yards of sediment behind the dam has reduced the water storage capacity of the reservoir by about 90 percent. Stanford officials estimate the reservoir may completely fill with sediment in the next 20 years if nothing is done. The dam is an obsolete water diversion source and provides no electricity or flood control. Continued accumulation of sediment within the reservoir is causing serious flooding problems upstream at Family Farm Road.

Many of those in the watershed, including Stanford University, agree that removing Searsville Dam should be considered. However, there are questions about how it could be removed and the effects on the watershed. Stanford funded the Searsville Lake Sediment Impact Study—completed in 2001—to determine if the increase in sediment resulting from the lowering or removal of Searsville Dam is tolerable in the downstream environment. The

Table E-4 Partial list of barriers to fish passage in San Francisquito Creek – San Mateo and Santa Clara counties



Photo E-8 San Francisquito Creek—Searsville Dam/
Matt Stoecker photo

For more information on Searsville study go to <http://www.cityofpaloalto.org/cityagenda/publish/jpa-meetings/1836.pdf>.

determination was that the increase in sediment would not be tolerable. This determination requires sediment management to insure that communities downstream of the dam do not incur a higher risk of flooding. The JPA staff will be working closely with Stanford and other watershed stakeholders as discussions for long-term management options for Searsville progress.

The San Francisquito Creek Steelhead Technical Task Force formed to help implement projects to improve habitat conditions for the creek's steelhead. It is working with the San Francisquito Creek Watershed Council Steering Committee, a well established watershed group formed in 1993. The San Francisquito Creek JPA is an agency empowered to protect and maintain San Francisquito Creek and its 45 square-mile watershed. Stanford University and the Watershed Council serve as associate members. The JPA has acknowledged that the removal of Searsville Dam is an option worth investigating. In addition, the California Water Service Co., owners of the Bear Gulch water diversion farther upstream on Bear Gulch (a tributary of Bear Creek), is considering options for improvements at their dam in the near future.

San Lorenzo Creek – Alameda County

Stream habitat throughout the San Lorenzo Creek watershed supports native fish populations, and San Lorenzo Creek had highly productive steelhead runs up until the 1950s. The ACFC & WCD reports that there have been numerous adult steelhead and rainbow trout being caught by local anglers or observed in San Lorenzo Creek during wet years from the 1970s to the present.

The majority of suitable habitat is now isolated upstream of dams and flood control projects that have created potential impediments to fish passage, and have led to fragmentation and isolation of aquatic habitats (Table E-5). San Lorenzo Creek has been highly modified downstream of Foothill Boulevard and does not support fish communities for most of its length. Palomares and Cull creeks, tributaries to San Lorenzo Creek, are not accessible to anadromous steelhead due to the presence of Don Castro Dam (Photo E-9), completed in 1965, and Cull Canyon Dam, completed in 1962 (Photo E-10). Both of these dams are impediments to fish migration, and both reservoirs provide habitat for introduced warm water species, such as bass, that prey on juvenile salmonids. Relatively cool water exists upstream of Cull Canyon and Don Castro Dams, but high temperatures due to thermal loading exist downstream of both Cull Canyon Reservoir and Don Castro Reservoir.

Both reservoirs are nearly filled with sediment. Upstream land use practices and highly erodible terrain contribute to the severe sediment accumulation problem at the reservoirs. In a 2000 pilot dredging effort, 11,300 cubic yards of sediment were removed from the delta area of Cull Canyon Reservoir. The current average annual sediment inflow is 13,600 cubic yards. At Don Castro Reservoir, 15,800 cubic yards of sediment were removed from the delta area in a similar pilot test in 2000. The current average annual sediment inflow is 8,600 cubic yards.

The ACFC & WCD have undertaken an evaluation of sediment management options at the reservoirs as part of assessing the future of the two reservoirs.

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**Table E-5 Partial list of
barriers to fish passage in
San Lorenzo Creek -
Alameda County**



**Photo E-9 Palomares
Creek—Don Castro spillway**
/ACPWA photo



**Photo E-10 Cull Creek—
Cull Canyon
spillway/ACPWA photo**

Sediment management studies completed in June 2003 ranged from no action, allowing the reservoir to fill in with sediment, periodic desilting, total removal of the dams, to dry-dams for flood storage. Downstream flood capacity issues are currently being addressed. Engineering feasibility studies with the option of flood storage capabilities will be completed in late 2005. Potential concerns being addressed by the project include the desire of homeowners in view of the reservoir to maintain the lakes, how to deal with sediment accumulation, and how to provide fish passage to upstream habitat.

York Creek – Napa County

Saint Helena Upper Dam (also referred to as York Creek Dam) is identified as an impediment to fish passage ([Table E-6](#)). The diversion structure downstream was modified in 2004 to provide passage for adult and juvenile steelhead. York Creek Dam, forming Upper Reservoir on York Creek, is a 50-foot-high earthen dam built around the turn of the 19th century ([Photo E-11](#)). The dam blocks steelhead from approximately 2 miles of habitat found upstream. Little is known about the history of the dam other than it was originally built to provide a water source for private landowners. The city of Saint Helena purchased the dam and maintained it for many years to impound water for release downstream to the diversion structure, which conveys water to Lower Reservoir. Lower Reservoir is still used by the city as a source of irrigation water. Since the city has owned York Creek Dam there have been four silt discharges from the dam into York Creek in 1965, 1973, 1975, and 1992. After the 1992 discharge, DFG filed a complaint with the Napa County District Attorney. As a result, the city agreed to a settlement in 1993 that mandated the removal of York Creek Dam. Since 1993, Upper Reservoir has not been used by the city as a water source, but the reservoir has been dredged by the city and it functions as a detention basin.

Major modifications of the diversion structure were completed in 2004. The modifications involved removal of the concrete masonry diversion structure, creation of cascading steps with resting pools of sufficient depth for steelhead, bank stabilization, and native plant generation. A proposed infiltration gallery designed to prevent juvenile salmonid entrainment may be placed in the streambed after a one- or two-year trial period without any water diversion structure. Approximately 2.5 miles of high-quality habitat is now accessible.

The city of Saint Helena has conducted engineering and fishery studies to investigate several issues:

- Whether the creek provides conditions for fish migration downstream and upstream of the dam
- Whether the topography underlying the dam would act as a barrier to fish migration
- Engineering aspects of using erosion control materials for removal of the dam and sediment

Several years ago the city estimated the cost of removing York Creek Dam at \$500,000. The FPIP assisted the city in engineering aspects and pursuing the environmental documentation to remove York Creek Dam until 2003. A Memorandum of Agreement (MOA) between the city and DWR was developed, outlining DWR's role in providing planning, design, and permit

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**Table E-6 Partial list of
barriers to fish passage in
York Creek – Napa County**



**Photo E-11 York Creek—
dam, downstream face/DWR
photo**

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services to the city for the project. Initially, on behalf of the city of Saint Helena, DWR coordinated with DFG, the NMFS, the Natural Resources Conservation Service, USACE, and the US Fish and Wildlife Service on aspects of the project. The project to remove York Creek Dam is being considered for funding under the USACE Continuing Authorities Program and, therefore, may be carried out by USACE.