Chapter 2
Covered Activities

[Note to Reader: the Covered Activity chapter provides a description of all activities covered by the Alameda Watershed HCP. The impacts from these activities are described and/or quantified in Chapter 4 Impact Analysis. In most cases, the description of the activity provided below will not include a quantification of the impact. Rather, these will be released as part of Chapter 4]

2.1 Introduction

This chapter describes the activities covered by the SFPUC Alameda Watershed HCP. These activities are necessary for SFPUC to serve its customers with reliable, high-quality, and affordable water while responsibly managing the human, physical, and natural resources of lands owned by SFPUC within the upper Alameda creek watershed.

The SFPUC provides water for San Francisco County and portions of Alameda, Santa Clara, and San Mateo Counties. Approximately 85% of this water originates in the Sierra Nevada, and about 15% comes from local rainfall in the East Bay and the San Francisco Peninsula. Through a complex system of tunnels, pipelines, pumping stations, storage reservoirs, and treatment facilities, the water is collected, treated, and transported to surrounding Bay Area communities.

The SFPUC-owned lands in the East Bay include approximately 36,000 acres or 56 square miles of grasslands, oak woodlands, and coastal scrub straddling Alameda and Santa Clara Counties. The study area also includes approximately 10,000 acres of private inholdings, portions of which may be acquired as part of the Conservation Strategy (see Figure 1-1). The majority of local rainfall in this watershed is captured by the SFPUC system as it drains into either San Antonio or Calaveras Reservoir. The covered activities described below and shown in Figure 2-1 include the operations and maintenance of these water-provisioning facilities within the SFPUC-owned portion of the study area. They also include activities associated with the leases and easements and with implementation of the HCP itself.

The discussion of activities has been organized into the following seven sections:

- Section 2.2, Methods for Selecting Covered Activities
- Section 2.3, Watershed Operations and Maintenance

- Section 2.4, Reservoir Operations
- Section 2.5, Water Transmission and Filtration System Operations and Maintenance
- Section 2.6, Lease Permitting and Easements
- Section 2.7, HCP Implementation, and
- Section 2.8, Projects and Activities Not Covered by this HCP

2.2 Methods for Selecting Covered Activities

Selection criteria were developed for all proposed covered activities including capital projects, which may be covered under other regulatory vehicles.

2.2.1 General Criteria

The criteria listed below were used to evaluate all potential covered activities. An activity was proposed for coverage in the HCP if it met all criteria.

- **Location:** The activity will occur on lands owned by SFPUC within the HCP study area.
- **Schedule:** Construction of the activity will begin after the HCP is permitted (2011) and scheduled to finish within 30 years of the permit term. For ongoing activities, the activity is expected to take place during the permit term.
- **Potential for Take:** The activity has a reasonable potential or likelihood to take a covered species, as defined by ESA or CESA.)
- **Impacts Quantifiable:** The location, size, and other relevant aspects of the activity can be defined such that impacts on covered species can be evaluated and conservation measures developed to mitigate those impacts.
- **Project Compatibility:** Inclusion of the activity would not result in undue delays or substantial additional cost to the HCP development and permitting process relative to the benefit of including the activity in the permit (i.e., it would not be more cost effective to permit the activity separately).
- **Coverage under Other Permits:** The project is not already part of a permitting strategy that is ongoing or ahead of the Plan schedule.

All WSIP projects within the study area, namely, the Alameda Creek Fishery Enhancement Project, Calaveras Dam Replacement, Additional 40-Million Gallons per Day (mgd) Treated Water Supply, New Irvington Tunnel, Sunol Valley Waste Treatment Plant Treated Water Reservoirs, and the San Antonio Backup Pipeline were screened using the criteria above. As a result of this analysis, the construction of all new capital projects is not covered under this HCP. This is because alternate regulatory processes (e.g., regulatory processes associated with the Calaveras Dam Replacement Project) address impacts to listed species under Section 7. However, future operational impacts from some capital projects will be covered under Section 10 in this HCP after the Section 7 incidental take permit has expired.

For example, the HCP will cover future operational impacts that will result from the completion of the Calaveras Dam Replacement Project. Calaveras Reservoir is currently operating below its original storage capacity due the seismic instability of the Calaveras Dam. Modifications to the existing Calaveras Dam will help meet seismic safety requirements and will allow the reservoir to reach its original storage capacity of 96,850 acre feet. This, in turn, will allow the reservoir and dam to return to its historic operation regime as discussed in Section 2.5 below. The construction of the Calaveras Dam Replacement Project is covered solely under the Section 7 permit. However, future operational impacts will be addressed under this HCP. Using data from current and historic operations, the covered activities and impacts were developed to reflect the future operation of the dam and reservoir after the completion of the Calaveras Dam Replacement Project. See Sections 1.2.4 and 1.2.5 in Chapter 1, *Introduction*, for additional details on the integration of regulatory approaches.

2.3 Watershed Operations and Maintenance

2.3.1 Road Maintenance and Use

Description: This activity includes vehicle use on roads and road maintenance. The objectives of road maintenance are to minimize erosion and sedimentation from road runoff, improve safety and administrative access, and reduce ongoing road and vehicle maintenance costs. As mandated by the Alameda Watershed Management Plan, the SFPUC has developed a database for the main watershed roads (using GIS) that provides an assessment of road conditions, including culverts, landslides or other geologic hazards, and stream crossings. A report by CDM Consultants was recently prepared (Watershed Road Condition Assessment & Recommended Improvements, September 2009) that provides recommendations (engineering solutions, road closures or abandonment, and best management actions) for road management. Assessment of road conditions and prioritization of road maintenance takes into account the protection and benefits to soil stability, aquatic habitats, stream ecology, and reservoir water quality. Based on the established objectives, maintenance of roads occurs as an ongoing activity.

Road maintenance typically consists of patching potholes, cleaning culverts and ditches, installing rock (spot rocking), repaving, sealing cracks, and minor grading. Rock~~s~~ armoring may be installed to strengthen and protect drainage outlets and inlets, both for culverts and for other drainage structures (e.g., cross drains). Winged inlet structures, consisting of cement or rock wings flanking a drainage or culvert inlet, may also be constructed to prevent erosion and improve passage of woody debris through drainage inlets. Roadways are 10–20 feet wide. Grading may be completed for anywhere from 20 feet to several miles at a time.

Road maintenance may be performed with a grader, a dump truck to distribute road base rock, and a roller to compact it. When needed, a bulldozer is used to clear roads where a grader cannot access or where it exceeds the grader's capability. Work at stream crossing locations is commonly accomplished with a backhoe or excavator to install or modify culverts or other drainage structures. In general, roadside-maintenance activities may involve parking and/or soil disturbance in a strip with an average width of 4 feet on either side of the road. Where roads are located in steep areas, maintenance activities may need to extend further from the road, up to a maximum of 25 feet where slopes greater than 25% are present.

Road maintenance occurs with greater frequency in some locations than others. Some parts of the road system may not undergo maintenance during the HCP term, while other parts of the system may undergo frequent maintenance. For the purposes of this Plan, it is assumed that roadside maintenance activities will occur throughout the entire road system once every year within a 4-foot strip on either side of the road throughout the term of the permit. Some parts of the road system will actually not undergo maintenance during the HCP term, while other parts of the system will undergo frequent maintenance that may involve activity extending more than 4 feet from the roadside. The average width of impact assumes that some parts of the road system will not undergo maintenance during the HCP term, while other parts of the system will undergo frequent maintenance that may involve activity extending more than 4 feet from the roadside.

This task also includes upgrading culverts, cleaning culverts (manually and mechanically), and replacing culverts when needed. Culverts are typically 18–72 inches in diameter. Hand labor and backhoes are used to maintain culverts. Where culverts are utilized, culvert upgrading, repair, and maintenance may affect areas up to 25 feet from the edge of the road. A Routine Maintenance Agreement was established with DFG in April 2003 and subsequently revised and renewed for O&M activities, including culvert maintenance, within streams. Where roads not used during the rainy season cross intermittent streams, armored stream crossings may be installed instead of culverts. Armored crossings are constructed by putting gravel or larger rock into the streambed, allowing a vehicle to ford the streambed without damaging it. Armored crossings restrict flow less than do culverts, and are less susceptible to failure.

Some roads will be reconstructed to improve drainage by replacing inside ditches with drivable waterbars, rolling dips, and additional cross drains. Such improvements are expected to reduce the need for road maintenance and its associated impacts.

Road use includes trips in and out of SFPUC lands in the watershed by all users, including (but not limited to) operations and management staff, watershed keepers, livestock managers, other leaseholders, and contractors to the SFPUC conducting work in the area. Trips include all motorized vehicles: commercial trucks, passenger cars and trucks, and all-terrain vehicles (ATV). The estimated average number of road trips per year totals 5,255. Of these, 3,280 are in the San Antonio Watershed area, where the largest number of trips (1,700) is on the main access road north of the reservoir. Additionally, there is an average of 1,975 trips in the Calaveras Watershed, with largest use (750 trips) on the primary access road south of the reservoir ("Marsh Road"). The remaining trips in both watersheds are split between 11 additional roads (Koopmann pers. comm.).

In some instances, vehicles cross the stream channel during the dry season when the creek is not flowing. Since the flow regime below the reservoirs will change once the Conservation Strategy is implemented, these crossings will be avoided through the construction of new bridges (described in Section 2.3.3 below).

Location: Some maintenance work is likely to occur on virtually the entire road system during the term of the HCP. While certain locations are likely to require frequent maintenance, others may require little or none. Road use will also occur throughout the road network and as described above.

Timing: Repairs are conducted as needed throughout the year but generally occur between April and October, after the spring rains—and before roads become impassible during the winter wet season.

2.3.2 Road Construction

[Note to Reader: this section will be updated with additional information on the location and type of new roads to be constructed along with a figure showing the locations on a map for the next chapter version].

Description: Approximately 30 miles of new unpaved roads are planned in the HCP area. Approximately 20 miles of roads will provide access to new large, enclosed water tanks for cattle- and fire-management purposes along Alameda Creek. These tanks will be placed no more than 0.25 mile from the water source and are designed to reduce livestock impact on sensitive areas such as riparian zones, seeps, and stock ponds currently occupied by covered species.[1] The road will not be one large road parallel to Alameda Creek but will be smaller feeder roads branching off from existing road infrastructure to access new and existing facilities. Additional roads will be constructed to route around existing slide areas or to relocate old roads to mitigate for proximity to watercourses and reduce current impacts to water quality. Not all of the locations of the roads are known at this time, but roads will be sited to minimize impacts to covered species and their habitats.

[1] Instead of livestock drinking directly from the existing stock ponds and/or riparian zones, these areas will be maintained as species habitat, and either gravity-fed piping or low flow pumps will distribute water to nearby tanks to redistribute cattle from historic areas of high impact. SFPUC currently uses water troughs designed to allow wildlife to escape and is also discussing the use of alternative water troughs that conserve water and are wildlife safe. Reduction in use of existing stock ponds will not result in the loss of the ponds and should improve the quality of the pond due to reduced livestock use.

Roads providing access to water tanks will be used seasonally and consist of a drivable, vegetated roadbed, that will be mowed periodically, approximately 12-feet wide and shoulders (including cut slopes and fill slopes) averaging 4 feet in width on each side (total assumed disturbance of 20 feet). An additional 10 miles of roads accessible by larger vehicles may be necessary. In order to comply with Alameda County (County) requirements, such roads will consist of a drivable roadbed approximately 22 feet wide and shoulders (including cut slopes and fill slopes) averaging 4 feet in width (total assumed disturbance of 30 feet). In addition, roads will have turnouts every 0.25 mile.[2] The area of each turnout is approximately 0.15 acre.

Location: The locations of 19 new water tanks for cattle have been identified along a 7-mile reach of Alameda Creek (where five water tanks are under construction or have already been installed). New roads as described above will serve these new water tanks. The location of the remaining roads to future water tanks, or to new facilities, such as radio towers or cell sites, or other access needs is unknown at this time. The location of new roads, which will route roads around existing slide areas, will be constructed to reduce current impacts to water quality **Timing:** Construction will occur between April and October, following the spring rains and before the winter wet season.

2.3.3 Bridge Replacement and Construction

Description: The construction of up to five new bridges and replacement of up to four existing bridges are anticipated over the permit term. The construction of the replacement bridges will require the demolition of the existing structures.

Three vehicle bridges on Alameda Creek need to be replaced with higher-capacity, safer bridges, thus eliminating the need for heavier vehicles to use low water crossings through the streambed adjacent to these bridges. Replacing these three bridges will reduce current impacts from streambed crossings by vehicles that are too heavy to use the current bridges.

The first bridge, located at the terminus of Geary Road near the visitor center for the Sunol Regional Wilderness Park, was built in the 1940s and rebuilt in the 1970s. Currently, it is undersized to carry traffic such as loaded cattle trailers and emergency vehicles of more than 10 tons. This bridge must be reconstructed to safely support heavier loads and emergency traffic.

The second and third bridges across Alameda Creek are located in Sunol Valley at the Alameda Siphons. Alameda Creek meanders and splits into two streams at this location. The two existing bridges extend from the outer creek banks and are connected by a roadway over an island in the center of the stream. These bridges are used for crossing the creek during storm events to service the siphon facilities, as well as to reach quarry offices located to the west of the creek. These

[2] Turn outs every 0.25 mile are required by the County.

aging, deteriorated, substandard bridges are used strictly by pickup trucks and cars. Currently, a large number of heavier vehicles, such as trucks associated with quarry activities, drive across the streambed at this location because they cannot cross safely using the bridge. Replacement options could include two bridges similar to the existing structures or a single span.

A fourth bridge that crosses Arroyo Hondo may also need to be replaced. Located on Arroyo Hondo, this bridge was built in the 1960s by the Santa Clara County Roads Department. It is a Bailey bridge, a steel pre-engineered system of ready-to-assemble components sold as Army surplus. The bridge has had little maintenance since it was built. Although this bridge is working, it is necessary for engineers to inspect and report structural findings. The bridge will be replaced if it is found to be structurally unsound. Bridge reconstruction would entail total removal of the bridges and replacement at the same location. It would necessitate a substantial staging area away from the creek, impoundment and pumping of the lowest flow possible around the project area, machinery in the creek bed to drive piles as necessary, and the rerouting of traffic around the work site, most likely through a low-water crossing. The duration of construction for bridge replacement could be up to six months.

In addition, three new bridges are planned in locations where no bridges currently exist. One would cross San Antonio Creek; the second would cross Alameda Creek just upstream of its confluence with Calaveras Creek, connecting internal highway one[3] to Alameda Creek Diversion Dam Road, and the third bridge would cross Alameda Creek downstream from the Geary Road Bridge. These bridges are necessary to provide year-round access across the creeks and would reduce ongoing impacts from vehicles driving across the streambed in these locations during the dry season. This HCP assumes that in addition to the construction/replacement of the seven bridges described above, an additional two bridges may be constructed over the permit term. For all bridges, bat-friendly designs will be selected if feasible from both an engineering and financial perspective.

Location: Known and mapped.

Timing: June–October.

2.3.4 Fence Installation and Repair

Description: Fencing installation and repair involves the use of small trucks to transport materials, a tractor with an augur to dig postholes, and manual labor to install the posts and wire. Gateposts are set in concrete.

[3] *Internal highway one* is the road that parallels Calaveras Creek to the east of and upstream from the confluence with Alameda Creek.

Approximately 1,000 miles of 5-strand barbed wire fencing protects watershed lands and rights-of-way, and standard chain-link fencing protects water system facilities from vandalism, trespass, encroachment, and/or impacts from livestock grazing. It is anticipated that approximately 200 miles of fencing will be replaced over the course of a 20-year period with a potential 5-foot disturbance area on each side of the fence line.

This activity is ongoing and will include the repair and replacement of perimeter, interior, and facility fencing, as well as the installation of personnel gates and vehicle gates. It is anticipated that an average of five gates will be installed or replaced each year over the term of the HCP, with an impact of 0.35 acre per gate.

New fencing will be installed to control livestock grazing and provide security around new and existing water system facilities. Grazing leases require livestock exclusion from certain areas of Alameda Creek. Areas grazed by livestock are referred to as range management units. New 5-strand barbed wire fencing is planned to exclude livestock from portions of Alameda Creek within ranch management units where there is easy access and no natural barriers exist to prevent livestock access to the creek. Within a ranch management unit, exclusion fencing will be erected at the same time at targeted areas where cattle exclusion is a priority. In other areas, the range management units currently exclude the creek; therefore, no new fencing is required to protect the creek. New fencing is also planned to enhance security. Standard chain-link fencing will be located around new and existing water-system facilities (e.g., diversion dam). SFPUC is discussing with the regulatory agencies the possibility of having a 2-inch to 4-inch vertical clearance from the bottom of the chain link to allow for wildlife passage at specific facilities as long as it doesn’t pose a security risk. It is expected that new fencing will be constructed over the term of the HCP at the rate of approximately 1 mile per year. It has yet to be determined the length of fencing to be used for each purpose as it will be installed as needed over the course of the permit term. A potential 5-foot disturbance area on each side of the fence line is assumed.

Location: Diffuse.

Timing: Year-round.

2.3.5 Vegetation Management

Description: This activity includes integrated pest management (IPM) practices, other mowing and discing, weed-control actions around facilities and roadsides, and vegetation management associated with sludge ponds. Coverage for this activity under the federal ESA does not include the application of any herbicides or pesticides (see Section 2.7.6 below for further clarification).

IPM practices involve the use of grazing, discing, mowing, manual removal, and handheld mechanized weed trimmers (weed whackers) to control weed problems.

IPM involves using the appropriate combination of these technologies to minimize environmental impact and expense. The individual components of the IPM program are discussed below.

Vegetation management along roads. Vegetation along portions of the watershed road system are mechanically mowed an average of 1.5 times a year. Vegetation is typically mowed to a height of 3-6 inches for roadside vegetation management. In some areas, vegetation is mowed in a 30-foot swath along one side of the road. In other areas, vegetation is mowed in a 4-foot strip along both sides of the road.

In other parts of the watershed road system, a 16-foot strip along the road is disced. Along a 2.5 mile stretch of Calaveras Road, beginning near the intersection with Felter Road and progressing north, an 8-foot-wide strip is bladed with a road discer. Grazing helps to control roadside vegetation and vegetation along fence lines throughout much of the study area.

Vegetation management around facilities. Weeds are removed manually and with handheld mechanized weed trimmers around structures such as valve lots, pump stations, the Sunol Valley Water Treatment Plant, Sunol Corporation Yard, Sunol Water Temple, sludge ponds, watershed gates, and watershed cottages. These facilities are located either in or adjacent to natural land covers that may serve or have the potential to serve as species habitat. As such, it is assumed that vegetative management around these facilities has the potential to result in species take. All weeds within 2 feet of buildings, valves, and risers are removed. Weeds are removed within 2–20 feet in landscaped areas and within 10 feet around watershed gates. Weeding routinely occurs late April through August as demand dictates. Vegetation is mowed once a year in a 30-foot strip around two weather stations. Each weather station consists of a 30- by 30-foot fenced area. Vegetation is also mowed within 100 feet of watershed cottages to create a defensible space in case of fire. In addition, a 2-acre area adjacent to the Calaveras Dam face is mowed an average of 1.5 times a year. Eight sludge ponds are located along Calaveras Road upstream of Welch Creek. The area around the ponds consists of annual grassland and dirt roads. The vegetation around these sludge ponds is managed and maintained in accordance with the IPM plan. As such, cattails are either pulled out by hand or removed by an excavator along the entire perimeter annually and are not considered potential habitat. Water is not removed from the sludge prior to maintenance. Mowing also occurs 10 feet on either side along the length of the pipeline to allow access for maintenance.

Weeds prioritized for control in the study area include yellow star-thistle, purple star-thistle, artichoke thistle, and Canada thistle.

Glyphosates are used in spot applications to control purple star-thistle on a total of 5 acres annually (not covered by the HCP). A weed-control program is planned for a 400-acre area above McGuire Springs, which is infested with yellow star-thistle. The area would be burned for at least 2 consecutive years, then treated with an application of Transline herbicide (herbicide application component not covered by HCP). Follow-up treatment would involve monitoring and manual control of remaining star-thistle. The use of pesticides can be permitted under the 2081 CESA permit but not under the Section 10 permit.

Fuel management. Fuel management activities include tree pruning, mowing, grazing (see Section 2.7.4 below) and prescribed burning. Tree pruning and mowing occur primarily adjacent to populated areas and along roads, where the risk from fire is greatest. Fuel management activities in these areas depend on the vegetation type. Where fuel management areas consist of grassland, mowing in a 30-foot swath is used to reduce fuels. Where fuel management areas consist of scrub or chaparral, a Brontosaurus® (an excavator with land-clearing and mulching attachments) is used to crush and compact the brush in a 150-foot swath approximately once every 10 years. This treatment reduces brush growth, facilitates the decomposition of dead wood, and reduces potential flame heights. Where fuel management areas are located in dense woodland or forest, fuel ladders are reduced by opening canopies and trimming limbs from trees typically in 100 to 200- foot-wide strips, approximately once every 5 years.

Prescribed burns have not been used historically in the study area, but are currently incorporated into the watershed management plan. This plan calls for them to be used approximately once every 10 years within the range management units (approximately 36,000 acres total) in targeted native bunchgrass areas to reduce the encroachment of woody vegetation and in areas currently occupied by woody vegetation. For each prescribed burn, a detailed, project-specific plan would be written to incorporate the habitat and fuel management goals for each range management unit, and a 5-year monitoring plan. Prescribed burns that are planned for grassland areas that support native bunchgrasses, and/or the larval host plant for the covered Callippe silverpsot butterfly, should be conducted first in small areas in order to assess the fire-response of this species. Prior to any prescribed burning, a fire break would be in place. If an existing feature (e.g., a road) that could serve as a firebreak is not present, then one would be created through fuel management activities as described above (e.g., mowing or mulching). A prescribed burn can vary greatly from as small as 1 or 2 acres to as large as 500 acres. Sensitive lifecycle periods of covered species (i.e., breeding, larval butterfly stage) would be avoided when planning the timing of the prescribed burn. In general, prescribed burns would take place in the fall after the first rain when moisture levels have increased slightly. The response of native bunchgrasses, larval host plants, and other native plant species to prescribed burns will be monitored for 5 years to assess impacts and inform adaptive management decisions regarding future burns. The monitoring will at a minimum track the effects of burning on native and non-native invasive plant species in the burn areas.

Location: Known and mapped.

Timing: See specific descriptions.

2.3.6 Maintenance of Sludge Ponds

Description: Eight sludge ponds are located along Calaveras Road upstream of Welch Creek. These ponds provide habitat for amphibians such as bullfrogs. It is not known whether or not the ponds provide habitat for covered species (e.g., California red-legged frog), but there is potential for them to be present. Vegetation around the ponds (specifically cattails) is controlled and described as part of the vegetation-management covered activity (see Section 2.3.5 above). The activity of dredging of these ponds is addressed below.

These ponds receive sediment and alum (waste byproducts) from the Sunol Filtration Plant located downstream. Two to three sludge ponds are cleaned out each year. A contractor carries out the dredging either by hand using a small boat or mechanically using a bulldozer and an excavator to move and load the dried sludge. Trucks stage and operate inside the grounds, making a circuit around the ponds to pick up and transport sludge. The area around the ponds consists of annual grassland and dirt roads. The contractor is responsible for disposal of the sludge, which is generally composed of 25% solids or more. The sludge may be disposed of in a landfill or resold. It is always tested before disposal. Sludge disposal is not a covered activity under this Plan. The sludge ponds occupy approximately 6.2 acres. Vegetation management around sludge ponds is described separately above (Section 2.3.5, *Vegetation Management*).

Location: Known.

Timing: Two or three ponds dredged each year.

2.3.7 Recreation

The recreational activities that currently take place or may take place over the course of the permit term are described below.

Recreation on Land Owned and Managed by SFPUC

Description: Public access on SFPUC lands in the Alameda watershed is limited to lands leased to EBRPD and on public roads such as Calaveras Boulevard and Niles Canyon Road. Access to internal roads by non-SFPUC personnel is restricted to contractors and members of the public who wish to engage in educational and scientific activities. All access is regulated by an access permit system through SFPUC's Natural Resources Division.

If SFPUC were to consider opening existing access roads, fire roads, and trails to some form of public use in the future, allowable uses may include hiking, biking, and equestrian use. Current roads are both dirt and paved (see Sections 2.3.1 and 2.3.2 for more information on roads). Overnight camping or off-road use of motorized vehicles would not be allowed. Fishing is not currently permitted under the watershed plan; however, it is possible that fishing for nonnative species may be allowed in the future. Any public use would be strictly controlled by a use permit system or through guided tours similar to those used by SFPUC for the Fifield-Cahill Ridge Trail on the Peninsula Watershed in San Mateo County. New trailhead areas would need to be constructed at certain trailheads, along with restroom facilities and signage or informational kiosks.

Existing roads and trails would be utilized as much as possible, and any new trails or trail amenities would be designed to minimize adverse impacts. For the purposes of this HCP, SFPUC estimates that recreational access could require the construction of up to 5 miles of new trails (up to 14-feet wide) and up to three trailhead areas (0.125–0.25 acre each) for parking and restroom facilities. The new trails will be a soft surface trail, except for the ADA segment where a firm surface is required. The trailhead areas would be the extension of currently disturbed sites; therefore their impact to existing vegetation is expected to be minimal. Additional restrooms (total area of 100 square feet each for disabled accessible restrooms[4]) may need to be constructed every 2.5 miles along trails within the primary watershed. The primary watershed is the watershed that drains to the reservoirs the SFPUC uses for storage and collection prior to water treatment and delivery. Construction of trails would be limited to the periphery of the watershed and linking existing adjacent trail systems and communities in areas that are compatible with water supply and watershed management. As such, trails will be sited to minimize disturbance to sensitive wildlife and vegetation, reduce probability of fire ignition, minimize the spread of invasive weeds. SFPUC will reduce the extent of trailside fencing or install fencing that allows wildlife passage where applicable to reduce impacts to wildlife movement corridors. For some areas, such as the proposed trail through the Sunol Valley, fencing will likely be needed to restrict trail users from grazing lands and SFPUC facilities.

Location: North and central watershed.

Timing: Watershed access permits may be made available throughout the year but may be restricted or temporarily revoked as required by the SFPUC for operations and work; protection of water quality and resources; and during times of biological sensitivity, excessive rain, storm damage and repair, fire danger, or public safety emergencies.

Sunol Valley Landscape and Recreation Plan

The Sunol Valley Landscape and Recreation Plan includes a suite of activities that are phased for implementation over the course of the permit term as the Hansen Aggregates quarry pits are decommissioned[5] (Table 2-1). Currently, active aggregate mining encompasses approximately 500 acres and consists of up to six quarry pits (one north and five south of I-680). Prior to the completion of mining operations, estimated to occur in 2032, the SFPUC plans to restore and landscape a 0.25-mile buffer zone surrounding the quarry pit north of I-680 and will partner with the quarry operators so that the finish grade of the pits can be easily converted to lakes. Upon completion of mining operations in each of the quarry pits, SFPUC plans to use the quarry pits for water storage and will

[4] Each restroom is 10 feet by 10 feet.

[5] Hansen Aggregates, formerly known as Mission Valley Rock, an aggregate resources mining company, is currently mining portions of the Sunol Valley south of Interstate 680 (I-680) under permits from the County and mining leases from SFPUC. Mining will not be covered under the HCP.

implement the Sunol Valley Landscape and Recreation Plan. All activities in Table 2-1 are proposed for coverage under the HCP. However, the implementation of the covered activities is dependent on the decommissioning of the quarry pits and the availability of funding for implementation of the covered activities at that time.

Several documents and processes were used to identify and compile the extent of the covered activities that will take place as part of the Sunol Valley Landscape and Recreation Plan. The *Alameda Watershed Management Plan* (EDAW 2001) (AWMP) identifies several actions associated with recreation in the Sunol Valley subsequent to completion of mining activities and conversion of quarry pits. These actions are further elaborated and discussed at the program level in the conceptual *Sunol Landscape and Recreation Plan* (Appendix I) and the *Sunol Valley Resource Management Element* (EDAW 1998).[6] The *Sunol Valley Resource Management Element* addresses a multitude of activities, including recreation resources, planned in the valley in a comprehensive manner.

Location: Known.

Timing: Upon quarry decommission, estimated to occur in 2032.

2.4 Reservoir Operations

SFPUC owns and operates two dams and reservoirs within the HCP study area: Calaveras Dam and Reservoir on Calaveras Creek and Turner Dam and San Antonio Reservoir on San Antonio Creek (SFPUC also owns the Alameda Creek Diversion Dam [ACDD], which is a diversion structure without storage). A primary objective of the reservoirs behind these dams is to conserve local watershed runoff for water supply. The reservoirs are operated to maximize use of local resources for annual water deliveries, drought supply, emergencies, and to provide critical backup or redundancy in the event of water-quality problems or disruptions in the Hetch Hetchy system.

Calaveras Dam and Reservoir collect and store water from the local watershed only, including drainage from Alameda Creek (through diversion at ACDD), Arroyo Hondo, and Calaveras Creek. The ACDD and tunnel divert flow from Alameda Creek into Calaveras Reservoir. Water from Calaveras Reservoir flows by gravity through the Calaveras Pipeline to the Sunol Valley Water Treatment Plant (SVWTP) for treatment before it is sent to the Alameda Siphons for delivery to the Bay Area. In addition, water from Calaveras Reservoir can also be transferred to San Antonio Reservoir for storage.

Turner Dam and San Antonio Reservoir collect and store water from the San Antonio watershed, including drainage from San Antonio and Indian Creeks. San

[6] Development of the *Sunol Landscape and Recreation Plan* is required under the *Alameda Watershed Management Plan.* See Appendix I for a copy of the *Sunol Valley Resource Management Element*

Antonio Reservoir can also receive and store water from the Hetch Hetchy Aqueduct or from Calaveras Reservoir, as mentioned above. Water from San Antonio Reservoir is conveyed by gravity or via pumping through the San Antonio Pipeline to the SVWTP for treatment before it is sent to the Alameda Siphons for delivery to the Bay Area.

The ACDD, located on Alameda Creek about 2 miles upstream of the Calaveras Creek confluence, diverts flows originating from the southern (uppermost) Alameda Creek watershed through a tunnel to Calaveras Reservoir. The ACDD and tunnel were constructed between 1925 and 1931 following completion of Calaveras Dam. As Alameda Creek backs up behind the diversion dam, water passes through an extensive trash rack (steel grates designed to trap floating debris), spills into a short canal, and then enters the diversion tunnel when the tunnel gates are open. When the tunnel gates are open, the ACDD diverts flows in Alameda Creek up to the capacity of the diversion tunnel (i.e., 650 cfs). When the ACDD is operating, flows in excess of the capacity of the diversion tunnel spill over the diversion dam and continue down Alameda Creek. Operation of the ACDD results in reduced flows in Alameda Creek downstream of the diversion tunnel. Prior to 2002, the ACDD tunnel gates were kept open throughout the winter, even at times when Calaveras Reservoir was full, resulting in spills into Calaveras Creek. Since 2002, the ACDD has operated less frequently because SFPUC has had to maintain lower storage levels in Calaveras Reservoir far below the spillway in response to the DSOD restrictions.

The operation of Calaveras and San Antonio Reservoirs is discussed as part of reservoir management in Section 2.4.1 below. Operation of the ACDD is discussed as part of water transmission and filtration in Section 2.5.1 below.

2.4.1 Reservoir Management

Water Storage

The operation of Calaveras and San Antonio Reservoirs is seasonally driven. During winter, when precipitation and local watershed runoff occur, the reservoirs are managed to store water while minimizing uncontrolled spills. To this end, water from the reservoirs can either be released from the dams to downstream reaches or delivered to the SVWTP to maintain winter storage objectives. In spring, SFPUC manages these reservoirs to capture available watershed runoff with the goal of maximizing storage behind the dams. During the summer, SFPUC minimizes water withdrawals from the reservoirs to ensure that water is available in the event of a disruption of flow from Hetch Hetchy Reservoir or other unplanned disruptions in the system. As water demand in the Bay Area exceeds the capacity of the Hetch Hetchy aqueduct, stored water from Calaveras and/or San Antonio Reservoir is utilized.

Calaveras Reservoir: Calaveras Reservoir was designed for a maximum storage capacity of 96,850 acre-feet (af). Current seismic safety restrictions imposed by the DSOD require that Calaveras Reservoir currently be maintained at a maximum of 38,000 af. SFPUC is also required to maintain the reservoir between a maximum of 705 feet[7] (imposed by DSOD) and a minimum of 690 feet, or approximately 31,000 af, as agreed to in an Memorandum of Understanding (MOU) with DFG in 1991. This MOU addressed Calaveras Reservoir intake screen design and operating procedures to minimize entrainment of fish in the reservoir by recognizing critical season periods, operating levels, and fish-screen approach velocities. The proposed Calaveras Dam Replacement Project, scheduled for completion in 2013, would allow the SFPUC to return storage in the reservoir to its original design capacity of 96,850 af.

Figure 2-2 shows the historical water levels for Calaveras Reservoir. Reservoir storage levels reflect seasonal patterns of runoff, which are a function of precipitation, diversions from Alameda Creek via the ACDD, and withdrawals for water-supply purposes and reservoir releases. For the period of record (water years [WYs] 1957-2008), the water level of Calaveras Reservoir generally rose in January through April (1.7-6.3 ft on average) and declined throughout the rest of the year (Table 2-2). The largest declines were generally in June through October (2.3-3.2 ft per month), although not all years conformed to this pattern. The 2002 DSOD restrictions resulted in reservoir fluctuations that were smaller in magnitude, with the largest exception being a 9.8- ft monthly decrease in February 2002. Prior to DSOD restrictions, the above patterns of accumulation and export resulted in the highest water levels in April and May (median [50-percentile] across all available years was 745 and 743 ft, respectively) and the lowest median levels in December and January (median across all available years was 725 for both months) (Table 2-3a). Under DSOD restrictions, the above patterns of accumulation and export resulted in the highest water levels in March and April (median across all available years was 715 and 714 ft, respectively) and the lowest levels in October and November (median across all available years was 700 ft for both months) (Table 2-3b).

Future storage levels in Calaveras Reservoir over the permit term following completion of the proposed Calaveras Dam Replacement Project have been estimated using the Hetch Hetchy/Local Simulation Model (HH/LSM) and July 1920–September 2002 hydrology (Figure 2-3). Modeled conditions assume that the operational capacity of Calaveras Reservoir is restored and that periodic, scheduled maintenance of the Hetch Hetchy conveyance system would constrain Hetch Hetchy diversions each year, but primarily every fifth year. During these maintenance events, additional water would be drawn from San Antonio Reservoir (and other bay area reservoirs) to serve systemwide deliveries when limited or no water would be available from the Hetch Hetchy System (see discussion below under *San Antonio Reservoir*). Based on the simulated hydrologic record, the greatest amount of fluctuation in Calaveras Reservoir is predicted to occur in October through March (Table 2-4). The greatest declines are expected to occur in October and November (median drawdown across all years is 3.1 and 3.5 ft, respectively), while the greatest increases are expected to occur in January and February (median gains across all years is 2.8 and 1.6 ft,

[7] All elevations used to describe the HCP Study Area are referenced with respect to the National Geodetic Vertical Datum of 1929 (NGVD or NGVD 29).

respectively). During spring and summer, declines in reservoir storage will rarely exceed 1 ft per month. During years when Hetch Hetchy diversions will be most constrained, the declines in reservoir storage in November and December will be greater than normal, with a maximum draw-down of approximately 6.6 ft per month (e.g., November of WYs 1950 and 1960; Table 2-4). The median elevation of the water surface in Calaveras Reservoir resulting from changes in storage will generally range from 746 ft in November and December to 756 ft in March through May (Table 2-5).

San Antonio Reservoir: San Antonio Reservoir was designed for a maximum storage capacity of 50,500 af. Unlike Calaveras Reservoir, there are no interim seismic safety restrictions currently being imposed at San Antonio Reservoir. Figure 2-4 shows the historical water levels for San Antonio Reservoir for WYs 1972-2008. Unlike Calaveras Reservoir, the seasonal patterns in reservoir storage levels at San Antonio Reservoir can reflect water transfers from the Hetch Hetchy aqueduct and/or from Calaveras Reservoir. The water level of San Antonio Reservoir generally follows the pattern of rising in winter months and declining throughout the rest of the year (especially in summer). Relative to Calaveras Reservoir, the months during which the changes occurred were less regular (note also that the period of record is 15 years shorter). January through April rises were 1.0-1.7 ft on average, and July through October declines were 0.8-1.5 ft on average (Table 2-6). Many months and water years did not conform to the above pattern or had atypically large or small water-level changes (e.g., December 2004, March 1986, and WY 1987). The DSOD restrictions on Calaveras Reservoir resulted in lower-magnitude fluctuations than earlier in the period of record, as seen in Calaveras Reservoir. Prior to DSOD restrictions, the above patterns of accumulation and export resulted in the highest median water surface elevations in April, June, and July (458 ft) and the lowest median water surface elevations in October and December (451 ft), across all years (WYs 1972-2001; Table 2-7a). Under Calaveras Reservoir DSOD restrictions, the above patterns in accumulation and export resulted in the highest water levels in April (median across all years was 466 ft) and the lowest levels in October through December (median across all years was 460 ft)(Table 2-7b).

As discussed above for Calaveras Reservoir, future storage levels in San Antonio Reservoir over the permit term and following completion of the proposed Calaveras Reservoir Dam Replacement Project have been estimated using the HH/LSM using July 1920 to September 2002 hydrology (Figure 2-5). Based on the simulated hydrologic record, the greatest amount of fluctuation in San Antonio Reservoir is predicted to occur in November through February (Table 2-8). On average, the greatest declines are expected to occur in June through September (median drawdown across all years is 0.5-0.6 ft), while the greatest increases are expected to occur in January (median gains across all years is 0.3 ft). During years when Hetch Hetchy diversions will be most constrained as a result of scheduled maintenance in the conveyance system, the effect on San Antonio Reservoir storage (and therefore fluctuations) will be greater than in Calaveras Reservoir. For example, the declines in reservoir storage in November and December will be greater than normal, with a maximum drawdown of approximately 16.4 ft (average drawdown during this period is expected to be 11.3 ft per month) (Figure 2-5). Temporary disruptions in Hetch Hetchy deliveries also will periodically result in greater than normal increases in reservoir storage in January and February and will average 8.7 ft per month (maximum increase is expected to be approximately 24.6 ft) (Figure 2-5). Monthly water-level fluctuations in spring are expected to be less than 1 ft, and often there will be no change (i.e., median monthly change in March through May is expected to be 0 ft). The median elevation of the water surface in San Antonio Reservoir resulting from changes in storage will generally range from 456 ft in September through December to 468 ft in March through May (Table 2-9).

Controlled Releases

There are four primary ways water leaves the reservoirs: reservoir withdrawals sent to the SVWTP for treatment (i.e., releases for water supply); scheduled releases to the creek for instream flow; controlled spills by way of valve releases (i.e., valve releases); and uncontrolled spills over the spillway (i.e., spillway releases). Other ways that water can leave the reservoirs is by evaporation and seepage, although these make up a small proportion of the total annual withdrawals from the reservoirs. Releases for water supply and instream flow are considered controlled releases; these covered activities are described below. Controlled and uncontrolled spills are not considered a covered activity and are discussed as changed circumstances in *Chapter 7*. Evaporation and seepage losses are negligible relative to water released through the primary mechanisms and are not discussed further.

Releases for Water Supply

Water-supply releases from Calaveras Reservoir flow into the Calaveras Pipeline and are directed to either the SVWTP or to San Antonio Reservoir for storage. Water-supply releases from San Antonio Reservoir flow into the San Antonio Pipeline and are directed to the SVWTP. Because water-supply releases are directed into the transmission system (i.e., pipelines), water does not enter the creek channels as part of these releases. The volume of water released from Calaveras and San Antonio Reservoirs for water-supply purposes varies substantially based on system-maintenance requirements, weather conditions (e.g., drought), and reservoir water quality. Generally, releases from the reservoirs for water-supply purposes are greatest during fall through spring and are minimized beginning in late spring or early summer.

Valve Releases

Calaveras and Turner Dams have multipurpose outlet structures to permit the downstream discharge of reservoir water. The Fixed Cone Valve (V-33) at Calaveras Dam and the Howell-Bunger Valve (Y-22) at Turner Dam each provide the means to release large volumes of water at a controlled and known rate. These valves provide only high-volume releases, with no provisions for small adjustments in flow (i.e., the flow range of the cone valve at Calaveras Dam is between 130 and approximately 1,000 cfs depending on reservoir elevation). In 2006, SFPUC installed a temporary, 12-inch, low-flow water-release valve (V-37) adjacent to the existing cone valve at Calaveras Dam. This low-flow valve is designed for releases at lower rates (i.e., between 5 and 25 cfs). These valves are located at the base (downstream side) of the dams. The valves are operated manually and can be opened to whatever flow increment is needed by adjusting the operator on the valve. The amount of water released through the valves is a function of how much and for how long the valve is open and the amount of head (i.e., water pressure) created by the reservoir. The latter is a function of the surface-water elevation of the reservoir when the valve is open (i.e., higher reservoir surface elevations equate to greater water pressure, or head). As part of the Calaveras Dam Replacement Project, the existing Fixed Cone Valve at Calaveras Dam will be relocated and will discharge into the new stilling basin at the toe of the replacement dam. Two new low-flow valves capable of releasing from 0.5 to 35 cfs each will also be constructed at the toe of the replacement dam (the second low-flow valve will serve as a backup to the first valve). These new low-flow valves will discharge water into a separate energy dissipater before it is released to Calaveras Creek.

Valve releases are used to meet scheduled releases for instream flow, to quickly reduce reservoir storage through controlled spills, to prevent water from spilling over the spillway as an uncontrolled spill, and during valve exercising and valve safety tests. Operations requiring valve releases are discussed below.

Scheduled Releases for Instream Flow

There are currently no releases from Calaveras and Turner Dams with the objective of meeting aquatic species and habitat needs. Fishery enhancement objectives will be developed for the Calaveras Dam Replacement Project and incorporated into the HCP. These conservation flows for Fishery Enhancement are described below in section 2.7.3. The 1997 MOU with the DFG describes future releases from Calaveras, not including these enhanced flows. Because no water is currently being released in support of fisheries, the 1997 DFG flows and the WSIP PEIR flows below ACDD are considered part of the future baseline for covered activities and are described herein A detailed description of baseline is provided in Chapter 4.

Although such releases for downstream fisheries have not yet occurred from Calaveras Dam, SFPUC has recently installed a low-flow valve to allow for future low-volume releases (see discussion above under “Valve Releases”). A flow bypass is also proposed for ACDD as part of mitigation requirements for the Calaveras Dam Replacement Project (see Section 2.5.1 below). These scheduled releases for instream flow are considered part of reservoir management. Additional releases to benefit fish are considered part of HCP implementation and, as mentioned above, are described separately in section 2.7.3.

Valve Maintenance Releases

DSOD safety protocols require that the primary outlet valves V-33 and Y-22 be exercised annually and tested every three to five years. Annual exercising of the valves involves cracking the valves to 5% open to demonstrate that the valves can be opened and closed successfully and to maintain the working components of the valve assembly. Valve testing, as opposed to annual valve exercising, involves conducting a wide open test of the valve to prove that the reservoir can be evacuated to relieve pressure on the dams during an emergency. In recent years, DSOD has allowed SFPUC to isolate the valves in sequence during valve exercising and valve testing, thereby limiting the amount of water discharged from the outlet valves.

Historically, annual exercising and testing of the primary outlet valves resulted in a brief but large discharge of water from the dams. The peak flow rate that occurred during these releases was approximately 1,740 cfs at valve V-33 and 805 cfs at valve Y-22. During these tests, the valves were cycled between full-open and closed over 45 to 60 minutes (20-30 minutes to open and approximately 30 minutes to close). In the future, annual exercising of the valves and valve testing will be done with the valves sequentially isolated. Under these conditions, only an incidental amount of water will be released from the dams during valve maintenance and safety testing. However, in the event that DSOD requires that the valves be tested wide open under full head, SFPUC will time the valve tests to coincide with precipitation runoff in November or December to minimize impacts on covered fish and amphibian species. The peak flow rate during these releases is expected to be the same as historical releases during valve maintenance and testing.

2.4.2 Boat Launch Construction

Description: A new boat launch is planned for Calaveras Reservoir. The boat launch construction would affect approximately 1 acre adjacent to a road on the reservoir shoreline. Its location will be along the western shore of the reservoir, adjacent to Calaveras Boulevard. The implementation and location of this activity is dependent on changes to Calaveras Reservoir. A second boat launch may be developed over the course of the permit term.

Location: Somewhere along the western shore of the reservoir, adjacent to Calaveras Boulevard.

Timing: Unknown.

2.4.3 Maintenance of Dams and Spillways

Description: Debris is removed from the face of the Calaveras and San Antonio Dams and spillways using manual labor, a large crane, a large net, and a dump truck to haul debris offsite. A crane is parked on an established road. Debris is loaded into a large net by hand, which is picked up and transferred to the dump truck by a crane. On average, this activity occurs once every 2 years and lasts from several days to a week at each dam.

Vegetation is mechanically removed by weed whacking, cutting, and/or pulling. Infrequently, winching of a tree is necessary when they have become established on the dam or in the groins. For winching, a truck with a cable winch is parked on an established road. The cable is wrapped around willows growing in the dirt in the riprap around the dam groins. The willows are then winched out. Vegetation removal from the dam face occurs when inspectors state that it is warranted. Inspections of the dam faces and spillways are conducted several times a year. Vegetation removal generally occurs annually in the spring and summer months. San Antonio and Calaveras Dams are accessed via San Antonio Dam Road and Calaveras Dam Road, respectively. If winching is required, it would take place during low-moisture periods in the late summer.

Equipment movement and parking for vegetation and debris removal is all carried out on established roads.

In some instances, ground squirrel populations must be controlled at or near dam faces and spillways in order to preserve the integrity of the structures. Ground squirrel (*Spermophilis beecheyi*) populations have been minimally managed since the implementation of the 1996 San Francisco IPM Ordinance. The 1996 IPM Ordinance included a list of lower-risk pesticides that were approved for use by the San Francisco Department of the Environment (DOE). Each year, following passage of the Ordinance, the DOE Commission may revise the low-risk pesticide list to add or subtract products based upon testimony and evidence as presented. Ground squirrels at or near dam faces may be controlled using the anti-coagulent Diphacinone presented as grain bait or through the use of a tool called a Rodentator which injects a propane\oxygen mix into active squirrel burrows (as evidenced by fresh soil mounding), which is ignited. Use of the Rodentator would be restricted seasonally to avoid impacts to covered species that utilize ground-squirrel burrows.

Mowing of access roads to dams is described in Section 2.3.5, *Vegetation Management*.

Location: On Turner and Calaveras Dams.

Timing: Seasonal. Spring and summer months, after the bird nesting season and the covered amphibian breeding period.

2.5 Water Transmission and Filtration System Operations and Maintenance

[Note to Reviewers: Information on reservoir releases was rewritten and moved to Section 2.4 (Reservoir Operations and Maintenance) above.]

2.5.1 Alameda Creek Diversion Dam Operations and Maintenance

Description: At the diversion dam, water is redirected from the upper Alameda Creek watershed to Calaveras Reservoir through the diversion tunnel. The diversion dam includes a dam/spillway, a sluice gate at the bottom of the dam that is used annually to wash out sediments that have accumulated behind the dam (approximately 900 cubic yards via 50-cfs flow releases), as well as to pass flows when the tunnel gates are closed, a diversion sluiceway that directs water to the diversion gates, and a second sluice gate in the diversion sluiceway.

Following the completion of the Calaveras Dam Replacement Project, diversions at ACDD will be restored to pre-DSOD levels with the exception of flow bypasses (discussed below. The reoperation of the diversion dam would divert water at the dam to the tunnel at a rate of up to 650 cfs. Inflows exceeding 650 cfs (or when the tunnel gates are closed) would flow past the diversion dam and continue downstream in Alameda Creek. In wet years, sufficient water would continue to flow through the creek to support fish and other aquatic species. However, in dry years, a minimum bypass flow will be maintained in the creek when upstream flow is available to prevent fish stranding and/or other impacts to amphibians.

As part of the WSIP PEIR, the minimum flow will be determined by site-specific studies and will bypass the diversion dam and continue down Alameda Creek. The current estimate is approximately 10 cfs, but that number will be adjusted based on the result of the site-specific surveys (SFPUC 2007). Bypass releases from ACDD will increase the amount of water in Alameda Creek downstream of the diversion dam compared to conditions before the DSOD restrictions were in place. The minimum flow requirement will likely benefit steelhead trout, resident rainbow trout, and other aquatic species. Negative impacts to other covered species (e.g., yellow-legged frogs) and native warm water fishes from the minimum flow will be avoided, to the maximum extent practicable, by adjusting the magnitude and seasonality of minimum flow requirements.

Location: On Alameda Creek, approximately 2.35 miles upstream from the confluence of Alameda Creek and Calaveras Creek.

Timing: Annually, between December 1 and April 30.

2.5.2 Alameda East Portal Emergency Discharges

Description: The Alameda East Portal connects the western end of the Coast Range Tunnel directly to the three buried Alameda Siphons (siphons). The siphons are three transmission lines that cross Sunol Valley beneath Alameda Creek and allow water to be sent directly to either the Irvington Tunnel or the San Antonio Pump Station, where it can be pumped to San Antonio Reservoir for storage, pumped to the Sunol Valley Water Treatment Plant, or released directly to San Antonio Creek via the Howell Bunger Valve. Under existing conditions, when the quality of Hetch Hetchy water does not meet standards for safe drinking water, precluding its delivery to the Bay Area, SFPUC must redirect this water elsewhere. When such an event occurs, the first option is to redirect the water to San Antonio Reservoir where it can be stored for later use. However, in some cases it is necessary to release this water to San Antonio Creek via a release through the Howell Bunger Valve at Turner Dam. Under a worst-case scenario, releases of up to 250 mgd (capacity of the Howell Bunger Valve) are possible.

Planning for the Alameda Siphons Seismic Reliability Upgrade Project is underway. As part of this project, an overflow pipeline will be constructed from which future emergency discharges will be made. Instead of discharging water into the percolation channel, discharges will be made to Mission Valley Rock's SMP 24, pond F3 East, a nearby quarry pit, with a capacity for over 2 billion gallons. The discharges could range in volume from a few thousand up to 10 million gallons. Prior to discharge, the water would be pH adjusted and dechlorinated. The pipeline outlet structure will include riprap or other features to reduce the velocity and potential for erosion of the discharges. After discharge into the quarry pit, the water would either infiltrate into the ground within the quarry or it would be pumped into existing settling ponds and ultimately into Alameda Creek (permitted by quarry operator's existing National Pollutant Discharge Elimination System permit). This upgrade will allow impacts to covered species to be avoided.

In addition to these releases, water can be released from a hydraulic release shaft at Alameda East Portal, prior to the siphons. This shaft serves as an emergency water-diversion spill site when water supply exceeds demand, when other operational changes affect the flow of water from Hetch Hetchy, or when moderate seismic activity requires downstream valves be closed. Dechlorination facilities onsite treat the discharges, but no pH adjustment occurs at this location. Drinking water released at this location will meet required pH standards.

Under low-flow conditions the diverted water spills to a cobble-bottomed channel and percolates into the ground, and under higher-flow conditions, the water can jump the channel banks and flood portions of the surrounding area. Under exceptionally high-flow conditions that are very rare, the water may reach Alameda Creek. The channel is approximately 4–5 feet deep and 700 feet long. Up to 90 mgd can be discharged from this location, although releases of this magnitude may never have occurred. Under rare conditions, releases of 5–10 mgd may occur when downstream valves are suddenly shut or demand quickly drops. In these situations, water backs up in the system and spills out of the hydraulic release shaft at the Alameda East Portal.

Covered species will be avoided. Maintenance activities in the Coast Range Tunnel and Alameda Siphons require discharge of water to the drainage channel that ultimately runs to Alameda Creek. Coast Range Tunnel drainage takes place through a 16-inch valve located at Alameda East Portal. The Alameda Creek Siphons are drained by pumping water to the drainage channel from manholes located on top of the siphons. Temporary treatment facilities are set up to dechlorinate these rare releases.

Location: Alameda East Portal, where the eastern section of the Hetch Hetchy aqueduct traverses the Sunol Valley.

Timing: 3 times annually.

2.5.3 Rare Discharges from Sunol Valley Water Treatment Plant

Description: Planned and emergency discharges could occur at the Sunol Valley Water Treatment Plant (SVWTP). Both planned and emergency discharges are described in the following text. Planned discharges are not anticipated to impact covered species and the description provided below is for context only. Emergency discharges may have impacts on covered species. These impacts will be assessed and the activity will be covered by the Plan.

Planned Discharges

Planned discharges of unchlorinated water are diverted to the backwash water-recovery basins and then to the sludge lagoons as needed to conduct maintenance activities. There is no discharge to waters of the state of California during this event. Planned discharges of chlorinated water are first dechlorinated in a 100,000 gallon containment basin prior to discharge to Alameda Creek. This type of discharge is consistent with the plant's National Pollutant Discharge Elimination System (NPDES) discharge permit and has little potential to negatively affect covered species. Planned discharges will thus not be covered by the Plan.

Unplanned Emergency Discharges

There are two types of potential unplanned emergency discharges that could occur, both of which are covered by the Plan. The first is a discharge of chlorinated water. This could occur during a SVWTP effluent pipeline overflow. Water would be diverted to the 100,000 gallon containment basin referred to above, and then manually dechlorinated before being discharged to Alameda Creek. Should a spill to the containment basin exceed the basin's capacity, chlorinated water would flow to Alameda Creek. The containment basin and pipeline overflow are alarmed to prevent this type of chlorinated discharge. Since the installation of the containment basin approximately 10 years ago this type of release has not occurred.

Emergency, unplanned discharges of unchlorinated raw water could also occur from the SVWTP. These would be discharged to backwash water-recovery basins and then to the sludge lagoons. Under very rare circumstances, it is possible for the sludge lagoons to overflow into Alameda Creek. Prior to creek entry, the overflow would pass over an energy-dissipation structure. Although the water would not be chlorinated, this emergency discharge could introduce sediment and elevated turbidity into the creek.

. These permitted releases would be consistent with the established limits outlined in the Regional Water Quality Control Board permit.

Location: Alameda Creek.

Timing: 6 times during permit term.

2.5.4 Pipeline Maintenance

Description: This activity consists of ongoing monitoring and replacement of transmission pipelines including maintenance work (routine and unplanned), assessments of pipeline condition, facility maintenance, facility upgrades, corrective repairs, replacement of pipelines as needed, and draining of pipelines for inspection and/or repair. Pipeline maintenance includes all electrical conduits, drinking-water pipelines, irrigation lines to nurseries, and an aqueduct to a golf course.

Inspection of large underground pipes involves dewatering pipes and entering them to conduct inspections, followed by pipeline flushing and disinfection. Dewatering results in water released from portions of pipelines into nearby drainages. Water release points are evaluated by SFPUC biologists prior to the release. Where there is potential for damage to biological resources through erosion or direct impact from the force of the water, measures are taken to dissipate the force of the water and to reduce erosion. Such measures include Best Management Practices (BMPs) as required. In addition, discharged drinking water is dechlorinated, and all discharged water is tested and treated onsite to maintain the pH of discharged waters between 6.5 and 8.5 and to avoid increasing ambient turbidity of receiving waters beyond 10% of background.

When leaks are identified in pipes, a trench is dug (generally 10 by 10 feet, but as large as 20 by 20 feet, depending on the size of the pipe), and the pipe is examined and repaired. The trench is backfilled with the onsite soil and conditions are returned to pre-inspection level. Pipeline inspections and repairs occur on average once a year. A major repair, which requires replacement of multiple sections of pipe, could be expected to occur approximately four times over the 30-year term of the HCP. Major repairs would involve, on average, ground disturbance over a 40,000-square-foot area (1,000 feet by 40 feet). Large pipeline repairs are phased, such that approximately a 100-foot-long trench would be open at a given time.

Location: Unknown.

Timing: Year-round.

2.6 Lease Permitting and Easements

2.6.1 Telecommunication Sites Operations and Maintenance

Description: Telecommunication sites on SFPUC property are leased by the following companies.

- GTE Mobilnet—(0.008 acre).
- Nextel of California—(0.02 acre).
- Pacific Bell Mobile Services—(0.0034 acre).
- Sprint Spectrum—(0.006 acre).

Maintenance of these sites usually requires mowing around the communication towers to maintain clear access and to reduce fire risk. For the purposes of this HCP, a 40- by 40-foot area is estimated to be mowed around each site once a year. Telecom company employees access these sites approximately once a month. Company visits may be less frequent during the rainy season. Currently, lease compliance is the responsibility of the range manager and SFPUC's Real Estate Services (RES); coverage of this activity is third-party coverage.

Location: Sunol (Parcel 65).

Timing: Year-round.

2.6.2 High-Traffic Livestock Areas

Description: This HCP covers impacts associated with high-traffic livestock areas. These areas include up to 100 acres of holding fields and corrals where livestock are brought for transport off the watershed, as well as watering stations, supplemental feeding sites, and "loafing areas" where livestock congregate. Concentration of livestock in these areas can results in soil compaction and temporary removal of vegetation. Livestock congregate in some of these areas (e.g., holding fields) for brief periods before the end of the growing season; in such areas, vegetation recovers during the same growing season. In other areas, livestock congregate after the growing season and vegetation does not recover until the following season. Livestock coming in from outside areas may be quarantined in these areas to both ensure herd health (i.e., all livestock have the appropriate vaccines) and confined defecation. In this manner, the livestock expel their contents that may contain noxious weed seeds in one site rather than spreading them throughout the watershed. Growth of noxious weeds in these areas is managed in compliance with the vegetative management program (Section 2.3.5 above).

Location: Multiple locations within the watershed, almost exclusively in annual grassland areas. A small area (approximately one acre) of oak woodland is also affected by corrals or other known holding fields.

Timing: Year-round.

2.6.3 Nurseries Operations and Maintenance

Description: Nurseries in the Alameda watershed are located in the Sunol Valley along Alameda Creek. Five nurseries occupy approximately 130 acres of the Alameda watershed in the valley. The nurseries all employ drip irrigation, substantially reducing the risks of polluted runoff. In addition to state restrictions on pesticide use, the nurseries must comply with the City of San Francisco's pesticide ordinance.[8] SFPUC receives chemical use forms documenting the nurseries' pesticide use. The nurseries' leases will most likely be renewed over the term of the HCP. At that point, new restrictions on setbacks from the creek and chemical and fertilizer storage are likely to be imposed. Only the operations of existing nurseries will be covered by the HCP. General nursery operations such as vehicle movement, foot traffic, and other activities that may inadvertently result in harassment or take of mobile covered species such as Alameda whipsnake or California red-legged frog are covered activities under this HCP.

Location: Sunol Valley, along Alameda Creek.

Timing: Year-round.

2.6.4 Golf Course Operations and Maintenance

Description: The Sunol Valley Golf Course, located north of I-680 in the northern portion of the Alameda watershed, is used by approximately 88,000 people per year (Environmental Science Associates 2000). The golf course occupies approximately 215 acres. The golf course no longer receives water directly from Alameda Creek; it receives water from a pipeline that begins at a turnout of the Sunol Aqueduct and an adjacent stream. The pipeline receives its water supply from the Sunol Temple infiltration galleries. This water replenishes holding ponds located above the maintained golf course; the water is drawn from these holding ponds for use in irrigation. Land cover types on the golf course comprise turf, pond, and limited oak woodlands.

The golf course is mowed regularly, and fertilizers, pesticides, and herbicides are applied for maintenance. Operations and maintenance activities, such as mowing,

[8] According to an Amendment to the San Francisco Administrative Code (Chapter 39; October 6, 1996), the policy states that pesticide use must be eliminated or reduced by City departments to the maximum extent feasible and an Integrated Pest Management policy developed and implemented The use of Toxicity Category I Pesticides is banned.

water distribution, and application of fertilizers, are covered activities under this HCP. Application of and runoff from fertilizers does not affect the holding ponds as they are located up slope from the maintained golf course. Impacts from runoff of the fertilizers into the adjacent creeks are not likely to occur due to seasonality of application. Runoff would only occur during a storm event rather than during scheduled irrigation. As such, take could occur from resulting decrease in water quality. The Section 10 permit does not cover herbicide and pesticide application.

Location: Sunol Valley.

Timing: Year-round.

2.7 HCP Implementation

2.7.1 Riparian and Pond Habitat Enhancement

Fencing and Development of Alternative Water Sources

Description: Riparian and pond enhancement includes the maintenance and construction of fencing to exclude livestock from some riparian areas and ponds, as well as the development of alternative water sources for livestock. Activities involved in maintenance and construction of pond and riparian fencing are described in Section 2.3.4, *Fence Installation and Repair*. Planned water sources involve solar pumps that will direct groundwater into storage tanks, which will feed watering stations. Two such alternative water sources are expected to be constructed each year over the term of the HCP, for a total of 60 alternative water sources. Water sources concentrate livestock activity and can increase trampling and soil compaction where the stations are located. Disturbance from trampling is estimated at 0.5 acre per site.

Roads will be constructed to access water storage tanks (see Section 2.3.2, *Road Construction*, for details). These roads are needed to haul heavy equipment required for maintenance of the water storage tanks that cannot be transported using off-road quads. Restricted access or seasonal exclusion of livestock from portions of ponds and from riparian areas will lead to increased growth of emergent vegetation, increasing their habitat quality and water quality function. Sites with restricted access (e.g., placement of exclusion fencing) will still be limitedly grazed for vegetative management.

Pond Spillway Repair, Drain Installation, and Sediment Removal

The study area contains more than 150 stock ponds that serve as water sources for livestock. Approximately 50 of these ponds are currently maintained for livestock water; others are historic stock ponds that currently exist without management intervention. The ponds exist in varying states of disrepair. Common problems include siltation and spillway deterioration. During the life of the HCP, a number of pond spillways will need to be replaced or repaired, accumulated sediment removed, and in very few cases, a pond may need to be decommissioned. Pond decommissioning would include removal of only the dam and spillway and would retain all other pond features. Protocol level surveys would be conducted at all ponds proposed for decommissioning prior to the action and would be retained in full if covered species are determined to be present. If a pond would be decommissioned, its water storage capacity and potential change in habitat value would be taken into account. Even if a pond is decommissioned, water may remain in the depression during the wet season to provide potential species habitat. In order to maintain breeding habitat for California red-legged frog, silted ponds may need to be excavated to be a minimum of 2 feet deep. Approximately three spillway repairs will occur every 2 years, although more or fewer repairs may take place based on the conditions on the ground. As such, a per-event impact of 0.05 acre, exclusive of the staging area, is anticipated each year over the term of the HCP, for a total of 45 spillway repairs. If excavation of sediment is also required, it will be done in conjunction with the spillway repair. Both spillway repairs and sediment removal will be done in the dry season when the pond is dry and the pond bed itself is used as a staging area. Drains will be installed in these ponds at the time of spillway repair in order to allow the ponds to be drained for control of bullfrogs and other invasive exotics that reduce habitat quality for California red-legged frog, California tiger salamander, and western pond turtle. Although these activities may result in take of individual covered species, their primary effect will be to enhance habitat for covered species.

Location: Diffuse. Pond locations are known; however, the maintenance needs of each are not known.

Timing: Assumed to be seasonal (limited to dry season).

2.7.2 Stream Restoration

Description: Large and small stream restoration projects are expected to be implemented; these projects will entail bioengineering for bank stabilization (e.g., willow bundles), channel realignment to increase sinuosity and restore historic gradient and grading and planting to restore floodplain habitat. These restoration projects will be implemented primarily between May 15 and October 15 to avoid or minimize impacts on covered species, including covered fish and amphibians. However, some restoration actions may necessitate working in the channel outside of this time period. For example, some restoration actions may need to be done when water is flowing in the creek to better understand the kind of action that is needed, or to determine whether the restoration action achieve their desired effect. While specific stream reaches (discussed below) have been slated for restoration, it should be noted that stream restoration work will be performed in selected areas of these reaches that are in need of restoration, rather than over the continuous length of the reaches identified below. This is because not all segments of every reach slated for restoration are in need of restoration actions.

Location: Expected restoration programs to be implemented over the 30-year permit duration are proposed for selected areas within a 150-foot-wide corridor along Alameda Creek from approximately 1,000 feet upstream of the Alameda Creek Diversion Dam to the eastern boundary of the study area (Figure 2-1). The 150-foot-wide corridor includes both sides of the creek measured from the ordinary high water mark.

Restoration is also planned for selected areas on Alameda Creek starting approximately 1,500 feet upstream of the Sunol Valley Water Treatment Plant and continuing downstream through the Sunol Valley and Niles Canyon to the western boundary of the study area (Figure 2-1). In the Sunol Valley, the restoration corridor is 500 feet wide and includes both sides of the creek measured from the ordinary high water mark. In Niles Canyon, the restoration corridor is 150 feet wide.

Restoration is ongoing and is expected to continue for selected areas in a 150-foot corridor on Arroyo de la Laguna from the northern boundary of the study area to its confluence with Alameda Creek (Figure 2-1). The 150-foot-wide corridor includes both sides of the creek measured from the ordinary high water mark.

Restoration is also proposed on lower San Antonio Creek where it flows through the quarries and on San Antonio Creek upstream of San Antonio Reservoir. On lower San Antonio Creek, restoration actions will cover the lower 1,000 feet (upstream of its confluence with Alameda Creek) within a 150-foot corridor. The 150-foot-wide corridor runs on both sides of the creek measured from the ordinary high water mark. Bank and slope stabilization is planned in a 60-foot-wide strip on the south side of San Antonio Creek upstream of the reservoir.

On Calaveras Creek, restoration is proposed for selected areas of the creek above the confluence of Alameda Creek and below the Calaveras Dam. Additional restoration sites will be identified through modeling and targeted during early plan implementation.

2.7.3 Releases for Fishery Enhancement

In 1997, SFPUC and DFG entered into a MOU regarding the magnitude and timing of flows to be released from Calaveras Dam to improve habitat conditions for fish in Calaveras and Alameda Creeks downstream of the dam. Figure 2-6 shows the magnitude and timing of seasonal flows that will be released from Calaveras Dam once the MOU with DFG is implemented. There is currently no release agreement to support fish and fish habitat in San Antonio Creek downstream of Turner Dam. However, the Calaveras Dam Replacement Project requires the release of water to minimize the impacts of water storage on covered fish species and to benefit native fish (San Francisco Planning Department 2009).

The Conservation Strategy for this Plan will also require water releases to benefit covered fish (See Chapter 5, *Conservation Strategy*, for details).

Additional controlled releases to support fisheries will be implemented after the completion of the WSIP Calaveras Dam Replacement Project in 2011 in accordance with the California Department of Fish and Game MOU stipulations (1997) and as part of the BO for the Calaveras Dam Replacement Project and as part of the conservation strategy under this HCP.[9] These releases will occur mainly in the summer to supplement summer base flows (flows that occur in the absence of any recent rainfall) in Calaveras Creek below the Calaveras Dam and Alameda Creek downstream of its confluence with Calaveras Creek. The flow schedule for these releases will be developed as part of the HCP.

This activity will benefit steelhead trout, resident rainbow trout, and other aquatic species. Negative impacts to other covered species (e.g., yellow-legged frogs) and native warm water fishes from future fishery releases will be avoided by adjusting the magnitude and seasonality of flow releases.

2.7.4 Implementation of Grazing Management Plan

Description: Grazing is currently allowed throughout the Alameda watershed. Grazing units or leases are based on an animal-unit-month basis, both in terms of stocking levels and payment methods. Annual Operating Plans are required by the lessee for each grazing unit. These plans must be submitted by October 1 annually. The Alameda watershed has been subdivided into three geographic watershed protection areas (WPAs): the San Antonio, Calaveras, and Lower Alameda Creek. The San Antonio WPA consists of one grazing unit, Calaveras consists of four, and the Lower Alameda Creek consists of seven. Table 2-10 summarizes the gross acres and estimated animal unit month for each WPA. In 1997, SFPUC approved the *Alameda Watershed Grazing Resource Management Element*, which sets specific requirements for implementing current and future grazing. The following six guiding principles comprise the foundation of the grazing management plan.

1. Noncalf, noncorral buffers will be maintained around reservoirs and streams with riparian habitat to prevent the entry of waterborne pathogens into the areas of greatest sensitivity.
2. Calving will be limited to August through October to lessen the risk of young calves (less than 4 months of age) shedding cryptosporidium during the peak runoff season.
3. Water developments and supplemental feeders will be located away from stream channels, swales, floodplains, or other sensitive areas approximately 300 to 500 feet to a maximum of 0.25 mile.

[9] Flow bypasses (not releases) will occur upstream on Alameda Creek at the Alameda Creek Diversion Dam. These will also occur at after the completion of the Calaveras Dam Replacement Project and are described in *Section 2.5.1*.

4. Each lessee will develop a herd-health program for the prevention and care of general parasitic disease, to maintain healthy immune systems, and to minimize diarrhea infection.

5. Stocking rates will be established for each parcel to achieve a target residual dry matter (RDM) of 1,000 pounds/acre (lbs/ac) to insure even distribution of livestock and utilization of forage. In no event shall RDM levels fall below 800 lbs/ac. This range of RDM has been recommended for the Los Vaqueros Watershed in order to minimize erosion and protect water quality, to reduce the probability of frequent wildfires, and to provide cover and forage for wildlife species (Nuzum 2005). This range of RDM at the end of October is typically associated with a total plant (live and dead biomass) cover density greater than 70% and an average plant height of 2 to 4 inches.

6. The feral pig control program, established in 1998, will be continued. Adjustments to the program will be made if necessary if feral pig densities undergo unacceptable increases. Unacceptable increases are determined by observation of detrimental impacts from pigs (i.e., rutting) and/or large spike in number of young.

2.7.5 Reservoir Shoreline Protection and Restoration

Description: Steep slopes along portions of San Antonio and Calaveras Reservoirs suffer from erosion that reduces water quality for covered species. SFPUC plans to grade the steep slopes and install logs for erosion control in a 60-foot-wide strip along a portion of San Antonio Reservoir. The placement of these logs is designed to form hillside terraces along the regraded contours. As such, the slope will be reduced, along with hillside erosion. This action should improve water quality, enhancing the quality of habitat for some covered species.

2.7.6 HCP Conservation Measures and other Land Management

Description: HCP conservation measures will consist of a number of activities already described above. This category includes all management actions required by the HCP or other actions that might be necessary to achieve HCP biological goals and objectives. Management actions that will be used within the watershed are described in detail in Chapter 5, *Conservation Strategy*. These actions may include but are not limited to the activities listed below. It should be noted that many of these activities overlap.

- Vegetation management using livestock grazing, manual labor, and/or prescribed burning. Pesticide use to achieve biological goals and objectives (e.g., exotic plant control), in accordance with label instructions, and in compliance with state and local laws. Pesticide use is proposed for coverage only under the CESA, not the federal ESA.

- Fire management including prescribed burning, mowing, and fuel-break establishment.
- Travel through the watershed on foot, ATV, truck, or other off-road vehicle to inspect or maintain facilities, move or manage livestock, and patrol the study area.
- Demolition or removal of structures or roads to restore habitat.
- Control of introduced predators (e.g., feral cats and dogs, pigs, red fox, nonnative fish, bullfrogs).

See Chapter 5, *Conservation Strategy*, for a detailed description of conservation measures.

2.7.7 HCP Monitoring

SFPUC personnel or their contractors will conduct surveys for covered species, vegetation communities, and other resources within the study area on a regular basis for monitoring, research, and adaptive management. Surveys for covered species will be conducted by individuals with the qualifications specified in DFG, NMFS, and USFWS survey guidelines (DFG and NMFS 2000, USFWS 2005, USFWS and DFG 2003). These surveys may require physical capture and inspection of specimens to determine identity, mark individuals, or measure physical features; such activities are considered harm under ESA and CESA. Surveys for covered species will also be conducted on private land being considered for purchase to provide mitigation for impacts on covered species. Although these surveys are not expected to require handling of individuals, disturbance or take of covered species may still occur due to vehicle movement and foot traffic. All such survey activity consistent with this Plan is covered by the Section 10(a)(1)(B) permit. The permit also covers research conducted by SFPUC personnel or their contractors within the study area, as long as the research projects are conducted by individuals with the qualifications specified in DFG and USFWS survey guidelines, survey staff have appropriate handling permits for covered species. If research projects do not meet these guidelines, approval of the permitting agencies is required before research can be conducted. Research conducted by outside individuals (e.g., academic scientists) is not covered by the permit because the nature and impacts of these future research projects cannot be predicted at this time and these researchers are not bound by the terms of the permit.

2.8 Projects and Activities not Covered by this HCP

During development of the HCP, several projects and activities were considered but rejected for coverage. Although a very broad range of activities and projects was brought under consideration, Table 2-11 summarizes the projects that underwent a systematic analysis and were ultimately excluded from the Plan. A description of each project can be found in Appendix H.

Table 2-1. Additional Activities contained in the Sunol Valley Recreation Plan[1]

Activity
■ Water Storage north of 680 – 16,100 acre feet in one pit(mining would be completed by 2035)
■ Water Storage south of 680 – Either 38,800 acre feet in 4 pits (gravel extraction within current permit area to a depth of 200 feet; mining would be completed in 2014) or 47,100 acre feet in 5 pits (with expansion of mining, completed by 2021)
■ Restored historic entry (historic view corridor with orchards and native California landscape
■ Security Improvements (including lighting)
■ Entry Kiosk / Guard Station
■ Day use areas (including restrooms, visitor center and/or events area with a small amphitheater)
■ Interpretive Area – Water Temple and Archeological Sites (including displays)
■ Individual and group picnic areas
■ Boating / Fishing (including boat launch facility and/or fishing dock)
■ Parking (approximately 50 spaces)
■ Riparian Enhancement and Restoration of Wildlife Areas (Alameda, San Antonio and Arroyo de la Laguna Creeks)
■ Wetland Area
■ Landscaped Berms, Buffers, Setbacks and Mounds
■ Trail Connection to Niles Canyon /Pleasanton Ridge and EBRPD Sunol and Ohlone Preserves (including staging area or trailheads) and to the Sunol Regional Wilderness as a link with the trail connections established north of I-680 (including staging area or trailheads)
■ Expansion and/or upgrade of SFWD Corporation yard
■ Pedestrian Bridge (Arroyo de la Laguna) and quarry lake trail system
■ Agriculture (e.g., vineyards, orchards, row crops, working farm, aquaculture)
■ Farmer's Market
■ Watershed Native Plant Nursery
■ Utilities, pumping station, MVR Conveyor, fencing
■ Water transmission pipelines, reservoir water supply pipelines, boat launch, and reservoir port inlet and outlet towers
■ Operations and Maintenance of lake (shoreline and beach stabilization, water treatment, monitoring, patrol, fish stocking/management, maintenance of cutoff slurry walls) and facilities (maintenance and repair of roads, trails, parking areas, restrooms, drainage areas, landscaped areas, visitor center and facilities, operations facilities, Sunol Temple, etc.)
■ Nursery
■ Commercial site (near the intersection of I-680 and Route 84 to provide limited supplies, such as gas and groceries, for visitors using the recreation facilities north of I-680 and the overnight nature study area)
■ Overnight nature study south of Hetch Hetchy Aqueduct to provide educational programs for school children

[1] *Sunol Valley Resource Management Element* and the *Preliminary Sunol Landscape and Recreation Plan* are included as appendices.

Table 2-2. Change in Average Monthly Water Surface Elevation (feet) for Calaveras Reservoir, Water Years 1957-2008

Water Year	October	November	December	January	February	March	April	May	June	July	August	September
1957		-2.63	-3.73	-3.59	-0.27	8.20	1.82	0.96	0.31	-3.32	-4.11	-3.99
1958	-3.70	-1.50	0.40	2.99	18.86	16.42	2.07	-0.81	-2.22	-4.19	-5.33	-5.56
1959	-5.68	-5.70	-5.41	-1.53	5.53	8.30	0.44	-1.73	-2.72	-3.06	-3.22	-2.18
1960	-0.81	-1.17	-1.21	-0.44	9.55	4.13	0.54	-0.32	-2.61	-3.24	-3.50	-3.76
1961	-3.61	-3.09	0.66	0.13	1.29	0.88	1.20	0.43	0.00	-0.47	-2.04	-2.41
1962	-2.75	-1.64	0.47	0.22	11.88	19.49	3.00	-0.31	-3.31	-4.01	-4.25	-4.33
1963	-3.17	-1.29	-1.44	-0.80	10.92	3.65	11.92	7.68	-2.00	-1.59	-3.98	-5.33
1964	-5.35	-4.87	-4.69	-3.21	5.32	0.42	0.71	-1.50	-3.69	-4.55	-5.09	-5.33
1965	-5.48	-2.13	6.16	34.31	7.54	1.37	4.20	-0.41	-4.21	-3.42	-4.68	-5.39
1966	-4.48	-3.19	-1.16	5.27	2.51	-0.79	-2.50	-3.93	-4.65	-2.34	-2.86	-2.83
1967	-2.93	-1.35	4.03	5.02	19.00	7.30	9.83	-1.57	-2.40	-3.95	-4.45	-4.17
1968	-3.51	-2.55	-1.26	-3.02	-0.62	-2.31	0.63	-0.46	-2.66	-5.66	-5.17	-4.93
1969	-1.90	-0.10	0.50	8.82	30.66	9.82	-0.30	-0.90	-1.64	-2.76	-3.26	-1.61
1970	-1.42	-1.78	-0.79	4.38	7.33	2.41	-0.62	-0.44	-1.25	-4.22	-4.37	-3.61
1971	-2.47	-1.65	6.38	5.92	-1.40	-2.62	-0.35	-0.24	-2.09	-2.67	-3.03	-3.18
1972	-2.56	-4.06	-3.57	0.82	1.52	0.79	-0.87	-1.79	-2.02	-1.88	-2.01	-1.77
1973	-1.54	1.23	2.52	7.82	21.78	7.26	-4.79	-8.71	-11.14	-8.08	-3.25	-2.97
1974	-2.61	-2.15	-2.25	3.22	-5.43	-1.74	2.57	-7.96	-11.12	-9.78	-0.90	-0.28
1975	-0.02	0.23	-1.62	0.63	25.19	21.87	17.07	-0.28	-0.58	-0.21	-0.66	-1.02
1976	-3.01	-4.31	-5.44	-5.08	-2.35	0.69	-2.55	-6.18	-6.64	-7.27	-1.87	-0.47
1977	-0.07	-0.32	-0.18	0.30	0.23	0.21	0.15	-0.09	-0.36	-0.70	-0.96	-0.92
1978	-0.70	-0.35	0.41	17.46	20.29	12.51	2.86	-1.47	-4.23	-4.16	-3.71	-1.54
1979	-2.06	-0.52	-0.10	1.83	4.13	9.92	3.56	0.31	-0.44	-0.53	-0.66	-0.59
1980	-0.24	0.10	-0.03	7.88	4.67	-0.52	0.03	-0.05	-0.98	-3.38	-5.35	-5.39
1981	-4.94	-4.26	-5.04	-2.05	7.86	4.19	6.08	0.38	-1.05	-4.66	-4.33	-1.54
1982	-1.13	0.98	2.70	11.76	4.90	5.27	0.63	-2.31	-2.25	-2.31	-3.67	-4.59
1983	-4.27	-3.76	5.13	6.34	11.94	0.20	-1.29	0.24	-1.86	-3.64	-4.50	-4.15
1984	-2.57	-1.17	7.33	4.79	-2.31	-0.77	1.28	0.84	0.32	-0.60	-2.55	-4.38
1985	-4.42	-1.19	1.41	-3.37	-0.23	1.14	3.74	-2.97	-3.69	-2.32	-2.76	-1.88
1986	-1.25	-0.92	-0.20	-0.79	16.54	17.66	-1.99	-2.42	-1.26	-2.15	-3.52	-5.06
1987	-2.68	-3.70	-2.92	-3.92	-2.95	0.07	-0.67	-0.58	-0.29	-0.48	-0.51	-0.63
1988	-1.54	-1.38	-0.25	2.01	1.67	0.41	0.08	0.26	-0.88	-2.16	-0.93	-0.58
1989	-0.65	-0.93	0.00	2.65	0.91	2.22	1.97	0.24	-0.91	-5.11	-3.75	-1.53
1990	-0.39	-0.57	-1.17	-1.66	-3.18	-2.13	-3.30	-1.46	-3.66	-1.98	-2.60	-6.75
1991	-9.63	-10.22	-8.76	-6.37	-1.19	18.20	21.30	-9.85	-14.14	-16.12	-1.23	0.11
1992	-0.01	0.43	0.64	8.44	19.86	20.53	4.21	0.65	-0.10	-0.86	-0.33	-0.32
1993	-0.64	-0.14	1.54	21.96	20.65	14.02	-0.08	-0.26	-0.38	-1.90	-1.98	-0.88
1994	-0.51	-1.69	-2.39	-2.05	0.29	2.36	-0.76	-0.68	-2.12	-2.22	-3.04	-1.55
1995	-1.00	-2.23	-1.17	14.28	8.53	0.74	0.46	0.03	-0.41	-2.33	-3.08	-2.46
1996	-1.28	-1.29	-1.23	2.84	10.09	-0.47	-0.58	-1.02	-1.45	-2.52	-3.58	-4.16
1997	-2.13	-2.32	5.25	12.68	-1.06	-4.24	-1.39	-2.55	-1.15	-0.57	-3.44	-3.61
1998	-2.19	-2.86	-0.37	6.29	16.32	0.52	0.10	-0.31	-0.80	-3.77	-4.60	-3.12
1999	-2.48	-1.86	-0.77	-0.45	7.52	5.75	3.50	0.71	0.11	-1.68	-3.67	-2.90
2000	-2.85	-4.74	-4.42	0.16	12.38	8.24	-3.09	-2.14	-3.31	-4.03	-4.73	-4.39
2001	-2.39	-0.74	-1.67	-2.39	0.62	10.43	1.40	-0.29	-5.55	-6.86	-6.29	-4.00
2002	-1.95	-1.30	-0.84	-4.74	-9.81	0.92	1.99	-1.58	-0.70	-0.45	-0.54	-0.56
2003	-2.68	-3.69	7.33	13.84	-5.44	-3.44	1.31	5.40	-1.66	-2.08	-2.42	-2.07
2004	-1.52	-1.36	-0.99	3.38	2.96	12.98	-0.78	-1.64	-4.18	-3.89	-1.61	-0.99
2005	-0.21	0.06	0.81	13.82	2.87	2.40	-4.97	-9.32	-1.98	-0.25	-0.59	-0.80
2006	-0.28	-0.34	-0.30	9.85	-0.12	5.53	12.04	-9.55	-12.36	-2.80	-0.23	-0.30
2007	-0.16	0.12	-0.33	-0.88	-2.13	1.95	-0.59	-0.91	-0.36	-1.34	-1.41	-0.56
2008	-0.24	-0.07	0.22	3.72	12.92	2.39	-1.66	-1.07	-2.54	-6.47	-2.56	-2.16
Mean	**-2.28**	**-1.84**	**-0.23**	**3.78**	**6.32**	**4.90**	**1.72**	**-1.38**	**-2.72**	**-3.29**	**-2.95**	**-2.68**

Notes:

Negative change — Little to no change — Postive change

Source: SFPUC, WISKI Database.

Table 2-3a. Distribution (by Percentile) of Average Monthly Water Surface Elevations for Calaveras Reservoir, Water Years 1957 through 2001 (prior to DSOD restrictions)

Percentile	October	November	December	January	February	March	April	May	June	July	August	September
0%	646	647	647	649	648	666	688	678	664	647	646	646
10%	696	696	697	709	707	710	712	705	702	698	697	697
20%	712	711	710	716	720	724	724	724	723	719	715	713
30%	716	716	716	720	726	729	732	729	726	723	720	718
40%	722	721	720	722	729	735	740	739	733	729	725	722
50%	732	728	725	725	733	740	745	743	741	738	733	732
60%	734	732	727	728	740	747	747	747	746	745	741	738
70%	737	734	733	736	747	752	755	754	751	749	745	740
80%	738	737	738	745	749	756	756	755	754	750	746	742
90%	743	740	744	747	756	757	757	756	755	752	748	744
100%	751	749	747	757	757	757	757	757	756	755	752	751
Mean	723	721	721	724	732	737	739	738	735	732	728	725

Notes:

Lowest elevation — Highest elevation

Source: SFPUC, HH/LSM Model.

Table 2-3b. Distribution (by Percentile) of Average Monthly Water Surface Elevations for Calaveras Reservoir, Water Years 2002 through 2008 (during DSOD restrictions)

Percentile	October	November	December	January	February	March	April	May	June	July	August	September
0%	693	689	696	699	696	697	699	697	697	696	696	695
10%	695	693	696	701	699	700	701	700	700	699	698	697
20%	698	697	697	702	702	702	703	703	702	701	699	699
30%	698	697	698	703	702	703	703	706	705	703	701	699
40%	698	698	700	705	703	708	707	708	706	704	702	700
50%	700	700	703	706	705	715	714	708	706	705	703	701
60%	702	702	703	708	709	716	715	711	707	705	703	702
70%	703	703	703	711	713	717	716	713	708	705	703	702
80%	704	703	704	712	714	718	717	714	708	705	704	703
90%	704	704	708	714	717	720	722	717	710	706	705	704
100%	705	705	713	716	719	722	730	721	712	706	705	705
Mean	700	699	702	707	707	711	712	709	706	703	702	701

Notes:

Lowest elevation — Highest elevation

Source: SFPUC, HH/LSM Model.

Table 2-4. Change in Simulated Average Monthly Water Surface Elevation (feet) for Calaveras Reservoir, Based on 1920-2002 Hydrology

Water Year	October	November	December	January	February	March	April	May	June	July	August	September
1920											-0.9	-1.5
1921	-3.4	-3.5	3.1	5.9	1.0	0.0	0.0	-0.1	-0.6	-0.8	-0.9	-0.8
1922	-3.4	-3.5	0.0	3.0	7.1	0.0	0.0	0.0	-0.6	-0.8	-0.8	-1.0
1923	-3.4	-3.5	6.8	0.9	0.2	0.4	1.7	-0.1	-0.6	-0.8	-0.9	-0.9
1924	-3.4	-3.5	-0.3	-0.7	-1.2	-1.0	-0.6	-0.8	-0.8	-1.0	-0.9	-0.8
1925	-0.7	-5.0	-3.2	0.6	11.6	-0.2	1.0	1.0	-0.7	-0.9	-0.9	-0.8
1926	-0.6	-0.4	-1.4	0.6	14.8	0.7	2.6	-0.3	-0.6	-0.9	-0.9	-0.8
1927	-3.2	-1.9	-1.6	3.5	6.6	0.0	0.0	0.0	-0.5	-0.8	-0.8	-1.1
1928	-3.4	-3.5	-0.2	1.0	2.0	7.3	0.0	0.0	-0.8	-0.8	-0.9	-0.8
1929	-3.4	-3.5	0.0	1.5	1.0	2.2	0.7	-0.4	-0.6	-0.9	-0.9	-0.8
1930	-0.6	-5.4	-4.2	2.5	2.1	9.6	0.4	-0.3	-0.7	-0.9	-0.9	-0.8
1931	-0.6	-2.1	-1.0	0.6	-0.4	-0.3	-0.4	-0.6	-0.7	-0.9	-0.9	-0.8
1932	-0.6	-0.4	6.5	3.4	3.4	0.2	0.2	-0.3	-0.6	-0.9	-0.9	-0.8
1933	-0.6	-3.3	-1.2	2.2	0.0	0.5	0.4	-0.1	-0.7	-0.9	-0.9	-0.8
1934	-0.6	-0.4	2.4	3.5	3.0	0.5	-0.1	-0.5	-0.7	-0.9	-0.9	-0.8
1935	-0.6	-6.0	-3.8	10.6	0.1	3.1	3.6	0.0	-0.9	-0.8	-0.9	-0.8
1936	-3.3	-3.5	-1.0	2.1	9.0	0.0	0.0	0.0	-0.6	-0.8	-0.9	-1.0
1937	-3.4	-3.5	0.0	0.5	7.5	2.1	0.0	0.0	-0.8	-0.8	-0.8	-0.9
1938	-3.4	-3.5	0.0	3.4	6.7	0.0	0.0	0.0	-0.6	-0.7	-0.8	-1.1
1939	-3.4	-3.5	0.0	0.5	1.6	1.4	0.2	-0.4	-0.6	-0.9	-0.9	-0.8
1940	-0.6	-4.8	-4.3	10.8	8.9	0.0	0.0	0.0	-0.6	-0.8	-0.8	-1.1
1941	-3.4	-3.5	0.0	5.3	4.8	0.0	0.0	0.0	-1.9	-0.7	-0.8	-0.7
1942	-2.5	-3.5	0.0	8.5	1.6	0.0	0.0	0.0	-1.6	-0.8	-0.8	-0.7
1943	-2.7	-3.5	-0.6	9.8	0.9	0.0	0.0	0.0	-0.6	-0.8	-0.8	-1.0
1944	-3.4	-3.5	0.0	0.2	6.4	3.5	0.0	0.0	-0.6	-0.9	-0.9	-1.0
1945	-3.4	-6.4	-3.4	1.3	11.9	3.3	0.0	0.0	-0.6	-0.8	-0.8	-1.0
1946	-3.4	-3.5	7.7	0.6	-1.5	1.3	1.0	0.4	-0.5	-0.8	-0.9	-0.8
1947	-3.1	-3.5	0.0	0.5	1.1	1.9	1.1	0.0	-0.6	-0.9	-0.9	-0.8
1948	-0.6	-0.9	-1.0	-0.3	-0.4	1.1	2.6	0.8	-0.6	-0.9	-0.9	-0.8
1949	-0.6	-0.3	0.2	-0.1	0.5	10.7	0.1	0.0	-0.7	-0.9	-0.9	-0.9
1950	-3.4	-6.6	-4.1	5.6	5.7	0.6	0.6	-0.1	-0.6	-0.9	-0.9	-0.8
1951	-0.6	-0.3	7.0	1.6	0.5	0.0	0.0	0.0	-0.6	-0.8	-0.8	-1.1
1952	-3.4	-3.5	1.5	8.6	0.0	0.0	0.0	0.0	-0.5	-0.7	-0.8	-1.2
1953	-3.4	-3.5	2.9	7.2	-3.2	3.1	0.2	0.0	-0.8	-0.8	-0.8	-0.8
1954	-3.4	-3.5	0.0	2.8	4.0	3.3	0.0	0.0	-0.6	-0.9	-0.9	-1.0
1955	-3.4	-6.5	-0.7	5.1	0.8	0.9	0.7	0.2	-0.6	-0.9	-0.9	-0.8
1956	-0.6	-0.3	10.2	0.0	0.0	0.0	0.0	0.0	-0.4	-0.7	-0.8	-1.3
1957	-3.4	-3.5	0.0	0.3	6.5	1.1	0.7	1.2	-0.6	-0.9	-0.9	-0.8
1958	-3.1	-3.5	-0.8	4.2	6.6	0.0	0.0	0.0	-1.3	-0.7	-0.8	-0.7
1959	-3.1	-3.5	0.0	3.0	4.0	0.6	0.3	-0.2	-0.6	-0.9	-0.9	-0.8
1960	-1.1	-6.6	-4.2	0.4	5.1	-0.3	-0.1	-0.3	-0.7	-0.9	-0.9	-0.8
1961	-0.6	-0.1	-0.8	0.0	-0.4	0.8	-0.2	-0.4	-0.7	-0.9	-0.9	-0.9
1962	-0.7	-0.4	0.0	-0.4	14.4	5.1	0.6	0.2	-0.6	-0.9	-0.9	-0.8
1963	-1.3	-3.5	-1.0	6.8	4.2	0.0	0.0	0.0	-2.3	-0.8	-0.8	-0.7
1964	-2.0	-3.5	0.0	3.4	-0.9	0.1	0.3	-0.2	-0.6	-0.9	-0.9	-0.8
1965	-0.6	-4.5	7.5	8.3	-1.7	0.7	1.0	0.0	-0.7	-0.8	-0.8	-1.0
1966	-3.4	-3.5	0.0	2.8	3.3	0.7	-0.3	-0.4	-0.6	-0.9	-0.9	-0.8
1967	-0.6	-2.4	0.0	8.3	0.8	1.0	0.0	0.0	-2.6	-0.8	-0.8	-0.7
1968	-1.7	-3.5	-0.7	4.2	2.3	2.3	0.9	0.2	-0.6	-0.9	-0.9	-0.8
1969	-2.5	-3.5	0.0	10.1	0.0	0.0	0.0	0.0	-0.3	-0.8	-0.8	-1.4
1970	-3.4	-6.5	-3.3	9.9	2.7	3.8	0.0	-0.1	-0.5	-0.9	-0.8	-1.0
1971	-3.4	-3.5	5.6	-0.6	-0.8	2.2	1.0	0.1	-0.5	-0.8	-0.9	-0.8
1972	-1.2	-3.5	0.0	0.5	1.1	-0.5	-0.3	-0.6	-0.7	-0.9	-0.9	-0.8
1973	-0.6	3.8	-0.2	10.3	0.0	0.0	0.0	0.0	-0.5	-0.8	-0.8	-1.2
1974	-3.4	-3.5	5.6	4.5	-3.3	3.3	0.0	0.0	-0.5	-0.7	-0.8	-1.4
1975	-3.4	-6.4	-3.3	1.3	14.6	0.6	0.0	0.0	-0.5	-0.7	-0.7	-1.3
1976	-3.4	-3.5	-0.9	-0.5	-0.7	-0.2	-0.3	-0.6	-0.8	-0.9	-0.9	-0.8
1977	-0.6	-0.3	-0.2	-0.2	-0.8	-0.6	-0.4	-0.6	-0.8	-1.0	-0.9	-0.8
1978	-0.7	-0.4	0.3	18.0	5.6	1.0	0.0	0.0	-0.5	-0.8	-0.8	-1.2
1979	-3.4	-3.5	-0.1	3.5	4.5	2.2	0.0	0.0	-0.6	-0.9	-0.9	-0.9
1980	-3.4	-6.4	-1.6	10.2	4.5	0.0	0.0	0.0	-0.4	-0.8	-0.8	-1.3

Table 2-4. Continued

Water Year	October	November	December	January	February	March	April	May	June	July	August	September
1981	-3.4	-3.5	-0.9	4.3	-0.3	7.0	0.0	-0.2	-0.6	-0.9	-0.9	-0.8
1982	-3.3	-3.5	0.0	10.1	0.0	0.0	0.0	0.0	-1.5	-0.7	-0.8	-0.7
1983	-2.9	-3.5	1.5	8.6	0.0	0.0	0.0	0.0	-2.3	-0.6	-0.7	-0.7
1984	-2.3	-3.0	7.3	-3.9	0.3	0.9	0.9	0.7	-0.5	-0.8	-0.8	-0.8
1985	-0.6	-4.2	-2.8	0.1	2.4	2.9	0.0	-0.2	-0.6	-0.9	-0.9	-0.8
1986	-0.6	-0.3	-0.7	-0.3	13.8	0.0	0.0	0.0	-0.6	-0.8	-0.8	-1.1
1987	-3.4	-3.5	-0.1	-0.3	0.1	0.3	-0.2	-0.6	-0.7	-0.9	-0.9	-0.8
1988	-0.6	-0.3	-0.2	1.1	-0.6	-0.7	-0.2	-0.6	-0.8	-0.9	-0.9	-0.8
1989	-0.7	-0.4	0.1	-0.3	-0.7	0.6	-0.2	-0.6	-0.8	-1.0	-0.9	-1.0
1990	-0.7	-4.5	-4.1	0.4	0.3	-0.3	-0.3	-0.5	-0.8	-1.0	-1.0	-1.1
1991	-0.7	-0.4	-0.1	-0.7	-1.0	10.5	0.8	-0.3	-0.7	-0.9	-0.9	-1.0
1992	-0.7	-0.4	0.2	0.0	16.3	3.3	0.9	-0.2	-0.6	-0.9	-0.9	-0.9
1993	-0.6	-0.4	1.3	13.7	4.1	0.0	0.0	0.0	-0.6	-0.8	-0.8	-1.1
1994	-3.4	-3.5	0.0	-0.1	5.3	0.1	0.2	0.0	-0.7	-0.9	-0.9	-0.8
1995	-0.6	-5.4	-3.5	17.4	-2.5	2.5	0.0	0.0	-0.8	-0.4	-0.7	-1.4
1996	-3.4	-3.5	-0.5	8.6	2.0	0.0	0.0	0.0	-0.5	-0.7	-0.8	-1.3
1997	-3.4	-2.0	8.6	0.0	-2.1	0.9	0.4	-0.2	-0.5	-0.8	-0.8	-0.7
1998	-2.8	-3.5	-0.3	10.0	0.4	0.0	0.0	0.0	-1.0	-0.1	-0.5	-1.8
1999	-3.4	-3.5	0.0	3.5	6.6	0.0	0.0	0.0	-0.5	-0.6	-0.7	-1.5
2000	-3.4	-6.5	-4.2	4.1	11.9	1.4	0.0	0.0	-0.5	-0.8	-0.8	-1.2
2001	-3.4	-3.5	-1.1	0.8	7.1	3.3	0.0	-0.2	-0.7	-0.9	-0.9	-0.8
2002	-3.3	-3.5	0.0	2.9	0.7	3.4	0.5	-0.2	-0.6	-0.9	-0.9	-0.8
Mean	-2.2	-3.1	0.2	3.7	3.1	1.4	0.3	-0.1	-0.7	-0.8	-0.8	-0.9
Median	-3.1	-3.5	0.0	2.8	1.6	0.6	0.0	0.0	-0.6	-0.8	-0.9	-0.8

Notes:

Negative change — Little to no change — Postive change

Source: SFPUC, HH/LSM Model.

Table 2-5. Distribution (by Percentile) of Simulated Average Monthly Water Surface Elevations for Calaveras Reservoir, Based on 1920-2002 Hydrology

Percentile	October	November	December	January	February	March	April	May	June	July	August	September
0%	716	716	716	715	714	722	722	721	720	719	718	717
10%	739	739	738	739	742	743	742	743	742	741	740	740
20%	745	742	739	743	746	748	748	749	748	747	746	746
30%	748	743	742	746	749	752	752	752	751	751	750	749
40%	750	746	745	747	751	753	754	754	753	753	752	751
50%	750	746	746	749	753	756	756	756	755	754	753	753
60%	750	746	746	750	754	756	756	756	755	755	754	753
70%	750	746	746	751	755	756	756	756	755	755	754	753
80%	750	746	746	754	756	756	756	756	756	755	754	753
90%	750	746	749	756	756	756	756	756	756	755	754	753
100%	750	748	756	756	756	756	756	756	756	755	755	753
Mean	746	743	744	747	750	752	752	752	751	750	750	749

Notes:

Lowest elevation → Highest elevation

Source: SFPUC, HH/LSM Model.

Table 2-6. Change in Average Monthly Water Surface Elevation (feet) for San Antonio Reservoir, Water Years 1972-2008

Water Year	October	November	December	January	February	March	April	May	June	July	August	September
1972		1.9	-2.0	0.5	0.5	-1.4	-1.9	-1.2	-1.0	-1.6	-1.7	-1.3
1973	-0.2	0.9	1.4	3.9	9.9	6.1	2.1	4.1	2.0	-1.1	-2.0	-2.0
1974	-1.4	-3.7	1.1	4.2	0.0	0.6	4.4	2.3	3.0	1.9	-3.5	-3.8
1975	-2.7	-2.0	-1.8	-0.8	1.6	4.4	5.2	1.0	-4.5	-6.0	-6.3	-5.8
1976	-0.3	1.8	3.4	2.1	-0.1	-2.0	-4.4	-7.0	-5.4	-5.9	-4.8	-4.2
1977	1.1	5.1	5.5	5.1	0.6	-3.5	-3.2	-3.1	-0.7	6.4	9.2	6.2
1978	2.3	3.9	3.9	6.8	-0.9	-2.9	-2.3	-3.0	-2.0	-2.8	-1.7	-2.8
1979	-3.0	3.2	7.5	5.5	9.3	5.1	0.4	-2.1	-1.2	-1.4	-1.5	2.7
1980	-1.5	2.2	-1.3	0.1	1.1	3.6	-2.8	1.0	-0.9	-2.4	-3.1	-3.0
1981	-2.9	-2.0	-1.8	-3.2	-1.9	-2.1	-1.0	3.4	-0.2	-5.0	-4.2	-1.7
1982	1.9	5.5	5.7	7.2	2.8	2.2	6.9	-2.2	-2.5	0.1	-0.2	-2.3
1983	-3.0	-2.7	1.4	3.9	6.6	-0.5	2.8	-2.5	-1.0	-1.8	-1.9	-4.7
1984	-6.2	0.4	5.1	3.5	-0.7	0.3	-3.3	-5.9	-4.5	-3.6	-1.5	-2.3
1985	-1.9	0.1	1.2	-0.3	0.7	1.8	2.0	-0.2	-0.9	-1.7	-1.2	-1.3
1986	-0.4	-0.6	0.0	-0.3	4.2	16.0	6.6	-0.3	-1.7	-0.6	-1.6	-2.0
1987	-0.1	-3.9	-3.3	-5.0	-9.4	-9.0	-9.7	-4.7	-7.2	-7.1	-5.2	-11.0
1988	-7.0	0.3	8.1	11.4	9.1	4.3	3.0	3.1	1.4	-0.7	-0.8	2.9
1989	3.1	-2.1	-0.8	0.2	0.2	3.9	10.4	6.4	3.1	3.6	-0.5	-0.6
1990	2.3	-0.2	-0.2	-0.5	-0.4	0.2	-0.4	-4.1	-2.1	-0.8	-0.4	1.9
1991	4.6	-3.8	-5.4	2.4	1.7	1.0	9.7	9.1	1.0	4.2	1.1	-2.3
1992	-0.7	-0.1	-0.4	0.5	2.1	2.1	1.8	-3.3	-0.8	-2.3	-4.0	-4.9
1993	-1.4	4.5	-4.2	2.1	7.8	5.2	2.4	0.1	-0.3	-0.7	-0.7	-0.6
1994	-0.6	-0.4	-0.3	-2.5	-1.0	-0.4	-1.7	-1.2	-0.9	-2.6	-1.7	2.1
1995	1.9	-0.3	0.0	4.7	4.0	2.0	-1.6	0.7	0.2	-0.4	-1.6	-2.1
1996	-2.4	-3.5	-0.8	1.7	7.2	2.0	1.2	-0.3	-0.5	-1.5	-1.4	-1.2
1997	-1.7	-0.7	1.2	2.7	-2.6	-4.5	-3.4	-0.4	-0.4	-0.1	3.5	2.1
1998	-0.5	-0.2	0.7	1.1	2.9	-2.3	6.4	2.2	-0.7	-0.6	-0.7	-1.5
1999	-3.7	-2.4	0.1	0.4	3.6	2.9	1.7	0.5	-0.3	-0.6	-1.5	-2.0
2000	-1.9	-1.9	-1.1	-0.8	1.0	4.9	-0.9	-0.7	-0.4	-0.6	-0.7	-0.6
2001	-2.1	-2.1	0.2	-0.2	-1.2	2.3	-0.2	-1.5	4.6	5.5	2.2	-0.6
2002	-0.9	-2.9	-1.0	1.8	0.4	0.9	0.7	-0.3	-1.5	-2.4	-0.9	-0.6
2003	-0.1	-0.2	-0.5	3.2	2.2	0.5	0.6	0.5	-0.4	-0.6	-0.7	-0.6
2004	-1.1	-3.6	-11.5	-7.9	0.5	3.6	0.3	-0.1	3.5	1.7	-1.8	-2.4
2005	-1.4	0.5	-1.7	4.6	5.4	5.9	1.6	1.4	2.8	-0.1	-2.8	-1.1
2006	-0.5	0.2	1.1	-0.7	-0.6	3.9	4.4	-4.7	-2.7	-1.8	-2.0	-1.7
2007	-1.6	-1.1	4.8	6.0	1.6	2.1	-0.8	-0.3	0.4	-0.7	-1.1	-2.5
2008	-2.1	-0.1	2.4	-0.7	-0.1	1.2	0.0	-1.4	-0.3	3.6	-0.6	-0.6
Mean	**-1.0**	**-0.3**	**0.5**	**1.7**	**1.8**	**1.6**	**1.0**	**-0.4**	**-0.6**	**-0.8**	**-1.3**	**-1.5**

Notes:

Negative change | Little to no change | Postive change

Source: SFPUC, WISKI Database.

Table 2-7a. Distribution (by Percentile) of Average Monthly Water Surface Elevations for San Antonio Reservoir, Water Years 1972 through 2001 (prior to DSOD restrictions at Calaveras Reservoir)

Percentile	October	November	December	January	February	March	April	May	June	July	August	September
0%	373	374	382	393	402	406	410	411	404	397	391	380
10%	427	427	429	433	434	427	430	432	428	426	428	426
20%	437	438	437	437	438	440	442	439	439	439	437	438
30%	439	441	445	444	444	445	447	449	446	443	442	440
40%	445	446	449	450	450	455	453	454	455	452	450	448
50%	451	452	451	453	457	457	458	457	458	458	456	455
60%	455	454	453	456	459	460	462	462	461	462	461	458
70%	457	456	456	459	461	462	465	464	463	464	462	460
80%	459	458	458	460	463	465	467	466	466	465	463	462
90%	461	460	460	461	464	466	468	467	467	466	466	465
100%	465	466	464	464	467	469	469	468	468	467	468	467
Mean	446	446	446	448	450	452	453	452	451	450	449	448

Notes:

Lowest elevation — Highest elevation

Source: SFPUC, HH/LSM Model.

Table 2-7b. Distribution (by Percentile) of Average Monthly Water Surface Elevations for San Antonio Reservoir, Water Years 2002 through 2008 (during DSOD restrictions at Calaveras Reservoir)

Percentile	October	November	December	January	February	March	April	May	June	July	August	September
0%	444	445	443	440	441	444	445	445	448	450	448	446
10%	449	449	446	445	448	453	454	455	456	456	454	452
20%	454	453	450	450	454	460	461	462	461	460	458	457
30%	457	456	456	458	459	463	463	462	462	462	461	460
40%	460	460	459	461	461	464	465	463	463	463	461	461
50%	460	460	460	462	462	464	466	464	465	465	462	461
60%	461	460	461	463	464	465	466	465	465	465	464	462
70%	461	460	462	463	465	466	466	466	465	465	465	463
80%	461	460	462	464	465	466	467	466	466	466	465	464
90%	462	461	463	464	465	466	468	467	467	466	465	464
100%	463	461	463	464	465	468	469	467	467	466	465	464
Mean	457	456	457	457	459	461	462	462	462	462	460	459

Notes:

Lowest elevation — Highest elevation

Source: SFPUC, HH/LSM Model.

Table 2-8. Change in Simulated Average Monthly Water Surface Elevation (feet) for San Antonio Reservoir, Based on 1920-2002 Hydrology

Water Year	October	November	December	January	February	March	April	May	June	July	August	September
1920											-0.6	-1.0
1921	-0.3	-0.2	2.5	0.3	0.0	0.0	0.0	0.0	-0.4	-0.6	-0.6	-0.6
1922	-0.3	-0.2	1.1	0.3	1.4	0.0	0.0	-0.2	-0.8	-0.6	-0.6	-0.5
1923	-0.3	-0.1	3.2	0.0	0.0	0.0	0.0	0.0	-0.5	-0.6	-0.6	-0.5
1924	-0.2	-0.2	-0.1	-0.1	-0.8	-0.2	-0.3	-0.4	-0.5	-0.6	-0.6	0.2
1925	2.3	-11.6	-15.7	2.4	16.5	1.0	1.7	3.0	-0.5	-0.6	-0.6	2.3
1926	1.9	-0.2	-2.9	-0.1	5.1	1.5	0.4	0.0	-0.5	-0.6	-0.6	-0.5
1927	-0.3	1.4	-1.1	0.0	2.2	-0.1	0.1	0.0	-0.3	-0.6	-0.6	-0.7
1928	-0.3	-0.2	-0.3	0.6	-0.4	2.9	0.0	0.0	-0.5	-0.6	-0.6	-0.5
1929	-0.3	-0.1	0.1	0.1	-0.5	0.4	-0.2	0.8	-0.5	-0.6	-0.6	-0.2
1930	1.5	-10.0	-15.2	1.1	12.2	9.2	0.0	1.5	-0.4	-0.6	-0.6	1.1
1931	1.5	-0.2	-2.5	0.1	0.6	0.0	-0.2	0.5	-0.5	-0.6	2.0	1.4
1932	-0.3	-0.2	0.7	-0.6	2.4	0.0	0.0	-0.1	-0.5	-0.6	-0.6	-0.5
1933	-0.3	-0.2	-2.9	0.5	0.1	0.3	0.0	-0.2	-0.5	-0.6	-0.6	0.0
1934	1.5	0.0	1.3	1.0	-0.4	0.3	-0.1	1.0	-0.5	-0.6	-0.6	0.6
1935	0.0	-8.6	-15.2	11.5	6.3	3.3	6.1	0.0	-1.5	-0.6	-0.6	-0.5
1936	0.3	-0.2	-2.8	0.4	5.5	0.0	0.0	0.0	-0.7	-0.6	-0.6	-0.5
1937	-0.3	-0.2	0.0	0.1	2.8	0.0	0.0	0.0	-1.4	-0.6	-0.6	-0.5
1938	-0.3	-0.2	2.4	-1.2	2.4	0.0	-0.1	0.1	-1.4	-0.6	-0.6	-0.5
1939	0.3	0.2	0.2	0.0	-0.6	0.5	-0.1	-0.3	-0.5	-0.6	-0.6	0.0
1940	1.5	-11.2	-15.6	10.5	15.5	3.8	0.0	0.0	-1.1	-0.6	-0.6	-0.5
1941	0.0	-0.2	1.7	1.2	0.0	0.0	0.0	0.0	-5.4	-0.6	-0.6	0.3
1942	1.6	0.1	1.9	2.7	0.0	0.0	0.0	0.0	-4.3	-0.6	-0.6	-0.5
1943	1.7	0.1	-1.6	5.7	0.0	0.0	0.0	0.0	-1.1	-0.6	-0.6	-0.5
1944	-0.2	-0.1	0.0	0.1	0.9	1.8	0.4	0.0	-0.5	-0.6	-0.6	-0.5
1945	-0.3	-7.7	-14.4	0.4	15.3	4.8	3.4	0.8	-0.8	-0.6	-0.6	-0.5
1946	-0.3	0.3	2.7	0.0	0.0	0.0	0.0	0.0	-0.5	-0.6	-0.6	-0.6
1947	-0.3	0.0	0.1	0.1	0.1	0.7	0.8	0.8	-0.5	-0.6	-0.6	-0.5
1948	-0.3	-0.2	-2.7	0.0	0.0	0.4	1.1	2.2	-0.5	-0.6	-0.6	0.6
1949	0.0	-0.2	0.0	0.0	-0.2	2.9	0.3	0.0	-1.0	-0.6	-0.6	-0.5
1950	-0.3	-7.8	-14.3	1.8	11.7	0.3	0.1	-0.2	-0.5	-0.6	-0.5	2.9
1951	3.9	3.1	2.9	0.0	0.0	-0.1	0.1	0.0	-1.1	-0.6	-0.6	-0.5
1952	-0.1	-0.1	3.1	0.0	0.0	0.0	0.0	0.0	-1.1	-0.6	-0.6	-0.5
1953	-0.3	-0.1	3.2	0.0	0.0	0.0	0.0	0.0	-1.4	-0.6	-0.6	-0.5
1954	-0.3	0.5	0.3	0.3	1.1	1.3	0.0	0.0	-0.5	-0.6	-0.6	-0.5
1955	-0.3	-7.7	-13.0	6.2	6.3	0.9	0.4	1.8	-0.5	-0.6	-0.6	3.6
1956	1.5	0.0	4.3	0.0	0.0	0.0	0.0	0.0	-0.8	-0.6	-0.6	-0.5
1957	-0.3	-0.1	0.2	0.1	0.2	1.0	0.4	0.9	-0.5	-0.6	-0.6	-0.5
1958	-0.3	-0.1	-2.0	1.3	3.5	0.0	0.0	0.0	-3.7	-0.6	-0.6	-0.2
1959	0.3	-0.1	0.3	1.1	3.5	0.0	0.0	0.0	-0.5	-0.6	-0.6	-0.5
1960	-0.3	-7.8	-14.5	0.2	11.7	0.1	-0.1	1.3	-0.5	-0.6	-0.6	5.0
1961	2.3	1.0	-2.1	0.8	1.3	1.5	0.4	1.9	-0.5	-0.6	0.2	-0.7
1962	-0.3	-0.2	0.0	0.0	2.3	1.2	0.0	0.0	-0.5	-0.6	-0.6	-0.5
1963	-0.1	-0.2	-2.6	5.1	0.0	0.0	-0.2	0.2	-6.4	-0.6	-0.6	-0.5
1964	1.6	1.9	0.7	0.9	-2.7	0.2	0.0	-0.2	-0.5	-0.6	-0.6	-0.5
1965	2.1	-11.5	-1.2	18.5	0.0	0.0	0.0	0.0	-1.4	-0.6	-0.6	-0.5
1966	-0.2	0.2	0.8	0.1	-0.9	0.3	-0.2	0.6	-0.5	-0.6	-0.6	0.4
1967	1.5	-0.1	0.1	2.3	0.0	0.0	0.0	0.0	-7.2	-0.6	-0.6	0.0
1968	3.7	-0.1	-2.0	2.6	-1.7	0.8	0.7	1.8	-0.5	-0.6	-0.6	0.3
1969	1.1	-0.1	0.4	2.5	0.0	0.0	0.0	0.0	-0.4	-0.6	-0.6	-0.7
1970	-0.3	-7.7	-14.2	13.4	-0.1	11.3	0.0	0.0	-0.5	-0.6	-0.6	-0.5
1971	-0.3	0.2	2.4	0.0	-5.1	0.8	1.0	1.7	-0.5	-0.6	-0.6	-0.1
1972	0.1	-0.2	1.7	-0.5	-0.6	0.0	-0.2	-0.4	-0.5	-0.6	-0.6	-0.2
1973	1.5	1.8	-0.8	2.9	0.0	0.0	0.0	-0.1	-0.8	-0.6	-0.6	-0.5
1974	-0.3	0.6	2.3	0.0	0.0	0.0	0.0	0.0	-1.3	-0.6	-0.6	-0.5
1975	-0.3	-7.7	-14.5	0.5	20.2	4.9	0.0	0.0	-1.4	-0.6	-0.6	-0.5
1976	-0.2	-0.1	-2.4	0.0	0.1	0.0	-0.2	0.4	-0.5	-0.6	-0.6	2.4
1977	0.0	0.8	-0.1	0.0	-0.1	0.0	-0.2	1.7	-0.5	-0.6	0.7	1.4
1978	-0.4	-0.2	-1.4	3.7	0.0	0.0	0.0	0.0	-1.0	-0.6	-0.6	-0.5
1979	0.1	-0.2	-0.1	0.5	2.3	0.0	0.0	0.0	-0.5	-0.6	-0.6	-0.5
1980	-0.3	-7.7	-13.0	11.9	11.5	0.0	0.0	0.0	-0.6	-0.6	-0.6	-0.5

Table 2-8. Continued

Water Year	October	November	December	January	February	March	April	May	June	July	August	September
1981	-0.3	-0.2	-2.4	2.3	-3.2	4.4	1.8	0.0	-0.5	-0.6	-0.6	-0.5
1982	-0.3	0.4	0.3	1.9	0.0	0.0	0.0	0.0	-4.2	-0.6	-0.6	-0.4
1983	2.1	0.3	3.3	0.0	0.0	0.0	-0.3	0.3	-7.0	-0.5	-0.5	0.4
1984	2.7	2.5	2.5	0.0	-3.7	0.4	0.8	2.1	-0.5	-0.6	-0.6	-0.5
1985	-0.3	-7.1	-13.7	0.5	10.9	2.2	-0.1	1.4	-0.5	-0.6	-0.6	3.8
1986	1.5	0.1	-2.4	0.0	7.6	0.0	0.0	0.0	-1.1	-0.6	-0.6	-0.5
1987	-0.1	-0.2	0.0	0.0	-0.7	0.2	-0.1	-0.4	-0.5	-0.6	-0.6	0.8
1988	0.0	0.8	-2.0	0.2	0.0	-0.1	-0.2	1.1	-0.5	0.3	2.0	1.4
1989	-0.3	-0.2	0.0	0.0	-0.2	0.6	2.1	0.0	-0.5	-0.6	-0.6	-0.8
1990	-0.3	-10.5	-16.4	6.4	11.5	3.4	3.4	5.2	0.0	-0.6	-0.6	-1.4
1991	-0.3	-0.2	-0.1	0.0	-0.1	2.3	1.1	-0.1	-0.5	-0.6	-0.6	-0.9
1992	-0.3	-0.2	0.0	0.0	0.8	2.2	0.1	-0.2	-0.5	-0.6	-0.6	-0.8
1993	-0.3	-0.2	0.2	2.9	0.0	0.0	0.0	0.0	-0.9	-0.6	-0.6	-0.5
1994	0.0	-0.2	0.1	0.0	1.4	0.2	0.0	-0.2	-0.5	-0.6	-0.6	0.5
1995	0.0	-9.6	-15.2	24.6	1.0	2.0	0.0	0.0	-2.7	-0.5	-0.5	-0.5
1996	1.2	-0.2	-1.0	4.2	0.0	0.0	0.0	0.0	-1.2	-0.6	-0.6	-0.5
1997	0.4	0.0	2.4	0.0	0.0	0.0	0.0	-0.1	-0.5	-0.6	-0.6	-0.5
1998	-0.3	0.3	-0.9	3.1	0.0	-0.1	0.1	0.0	-2.9	-0.4	-0.5	-0.4
1999	-0.3	-0.1	1.0	1.9	1.7	0.0	0.0	0.0	-1.7	-0.6	-0.6	-0.5
2000	0.4	-7.7	-14.2	1.1	18.9	5.0	0.0	-0.2	-0.7	-0.6	-0.6	-0.5
2001	-0.3	-0.1	-2.9	0.2	2.8	2.8	0.0	0.0	-0.5	-0.6	-0.6	-0.5
2002	-0.3	-0.1	1.0	-0.1	-1.4	1.1	0.2	1.5	-0.5	-0.6	-0.6	-0.5
Mean	0.3	-1.6	-2.6	2.0	2.4	1.0	0.3	0.4	-1.1	-0.6	-0.5	0.0
Median	-0.2	-0.2	-0.1	0.3	0.0	0.0	0.0	0.0	-0.5	-0.6	-0.6	-0.5

Notes:

Negative change — Little to no change — Postive change

Source: SFPUC, HH/LSM Model.

Table 2-9. Distribution (by Percentile) of Simulated Average Monthly Water Surface Elevations for San Antonio Reservoir, Based on 1920-2002 Hydrology

Percentile	October	November	December	January	February	March	April	May	June	July	August	September
0%	462	451	437	440	454	455	455	456	456	455	455	458
10%	463	457	443	445	459	463	463	463	462	461	461	462
20%	464	463	461	462	463	464	464	466	464	463	463	463
30%	465	464	462	464	464	465	466	468	465	465	464	465
40%	465	465	464	465	465	467	468	468	466	466	465	465
50%	465	465	465	466	466	468	468	468	467	466	466	465
60%	465	465	465	466	468	468	468	468	467	467	466	466
70%	466	465	466	468	468	468	468	468	467	467	466	466
80%	466	465	466	468	468	468	468	468	468	467	466	466
90%	466	466	468	468	468	468	468	468	468	467	466	466
100%	466	467	468	468	468	468	468	468	468	468	467	467
Mean	465	463	461	463	465	466	466	467	466	465	465	465

Notes:

Lowest elevation — Highest elevation

Source: SFPUC, HH/LSM Model.

Table 2-10. Summary of Gross Acres and Estimated Animal Unit Month for Each Watershed Protection Area on SFPUC Owned Alameda Watershed Lands

Watershed Protection Area	Gross Acres	Estimated Animal Unit Month
San Antonio		
San Antonio Creek	5,830	4,440
Calaveras		
Calaveras Creek	363	6,240
Frog Pong	1,850	1,140
Black Mountain	1,963	984
Mission Peak	2,158	1,260
Miscellaneous	672	504
Lower Alameda Creek		
Sunol Park	1,316	660
Sheridon	1,962	1,056
McGuire Peaks	1,654	960
Hayes	612	480
Turner Dam	1,168	1,135
Sheep Camp	481	480
Paloma	165	160
Miscellaneous	1,442	1,800
Total	**21,636**	

Table 2-11. Projects or Activities not Covered by the HCP

Project or Activity	Description
San Antonio Backup Pipeline	Project includes construction and/or improvements to three proposed facilities, namely, the new San Antonio Backup Pipeline from San Antonio Reservoir to San Antonio Pump Station, San Antonio Creek discharge facilities, and Alameda East Portal vent overflow pipeline and portal modifications. Project is already part of a permitting strategy that is ongoing and ahead of the Plan schedule; however, specific aspects of operations and maintenance of the reservoir will be covered as detailed in Section 2.5 *Water Transmission and Filtration System Operations and Maintenance*.
New Irvington Tunnel	
Alameda Siphon #4	
Sunol Quarry reservoirs	This project will construct a reservoir adjacent to the existing plant. This capital improvement project will not be covered by the HCP because the project did not meet all of the criteria outlined at the beginning of Chapter 2.
San Antonio emergency pump stations	This activity involves the installation of emergency generators at the San Antonio Pump Station. This capital improvement project will not be covered by the HCP because the project did not meet all of the criteria outlined at the beginning of Chapter 2.
Sunol Valley Water Treatment Plant Expansion and Treated Water Reservoir	This project is to increase the filtering capacity of the Sunol Water Treatment Plant. This capital improvement project will not be covered by the HCP because the project did not meet all of the criteria outlined at the beginning of Chapter 2.
PG&E Operations and Maintenance Activities	These projects and activities involve the operation and maintenance of gas pipelines and electric transmission lines in the HCP study area. These activities are not covered by the HCP because they will be covered through a plan prepared by PG&E to cover its operations and maintenance activities throughout the San Francisco Bay Area.
Apperson Quarry Road	This project is the construction of a new paved road to access Apperson Quarry. Construction of this road will be covered through a separate permit process under Section 7 of ESA and Section 2081 of the California Fish and Game Code by the SMP 17 permittee.
Quarries Operation and Maintenance	This activity involves operations and maintenance at quarries within the HCP study area and their future reclamation. Not enough information is currently available to cover future reclamation of quarries. This activity may be covered through an amendment to this HCP or separate permitting process.
Chevron Pipeline Operations and Maintenance	Activities to maintain and operate the Chevron pipeline, which traverses the HCP study area, were determined to be outside the scope of this HCP.
Upper Alameda Creek Filter Gallery	Project recaptures water released fromthe Calaveras Dam Replacement Project and returns is to the regional water system for use. The new facility would recapture water through a system of infiltration galleries located beneath the Alameda Creek streambed in the Sunol Valley. Maintenance of the infiltration gallery would require back-flushing of the intakes to the infiltration gallery to remove accumulated fine sediments. Project design and impacts are not well defined at this time.

Project or Activity	Description
Calaveras Dam Replacement	The dam at Calaveras Reservoir will be replaced to meet the seismic safety requirements. The new dam will provide the maintenance of storage capacity of the reservoir (96,800 acre-feet), but the replacement dam would be designed to accommodate enlargement of the future. A new earthfill dam, intake tower, outlet valve for water releases for in-stream flow requirements and new or rehabilitated outlet works for seismic safety are included as part of this project, along with improved operations and maintenance. In addition, the reservoir would be operated to release up to 6,300 acre-feet per year of water to Alameda Creek to support fisheries. The project is already part of a permitting strategy that is ongoing and ahead of the Plan schedule, however; specific aspects of operations and maintenance of the reservoir will be covered as detailed in Section 2.4.1 *Operations of Calaveras and San Antonio Reservoirs*.
Additional 40-mgd Treated Water Supply	Project includes an addition of 40 mgd of treatment capacity at the Sunol Valley Water Treatment Plant (WTP) to increase the sustainable capacity of the WTP to 160 mgd. Project is already part of a permitting strategy that is ongoing and ahead of the Plan schedule.
New Irvington Tunnel	Project includes the construction of a new tunnel parallel and south of the existing Irvington Tunnel to convey water from Hetch Hetchy system and the Sunol Valley WTP to the Bay Area. Construction includes new tunnel, portal, valves and equipment to control and monitor flows and modifications to the existing Alameda West and Irvington Portals. Project is already part of a permitting strategy that is ongoing and ahead of the Plan schedule.
Sunol Valley Waste Treatment Plant Treated Water Reservoirs	Project includes the construction of new treated water storage reservoirs at the Sunol Valley WTP to comply with requirements of the California Department of Health Services. Project is already part of a permitting strategy that is ongoing and ahead of the Plan schedule.

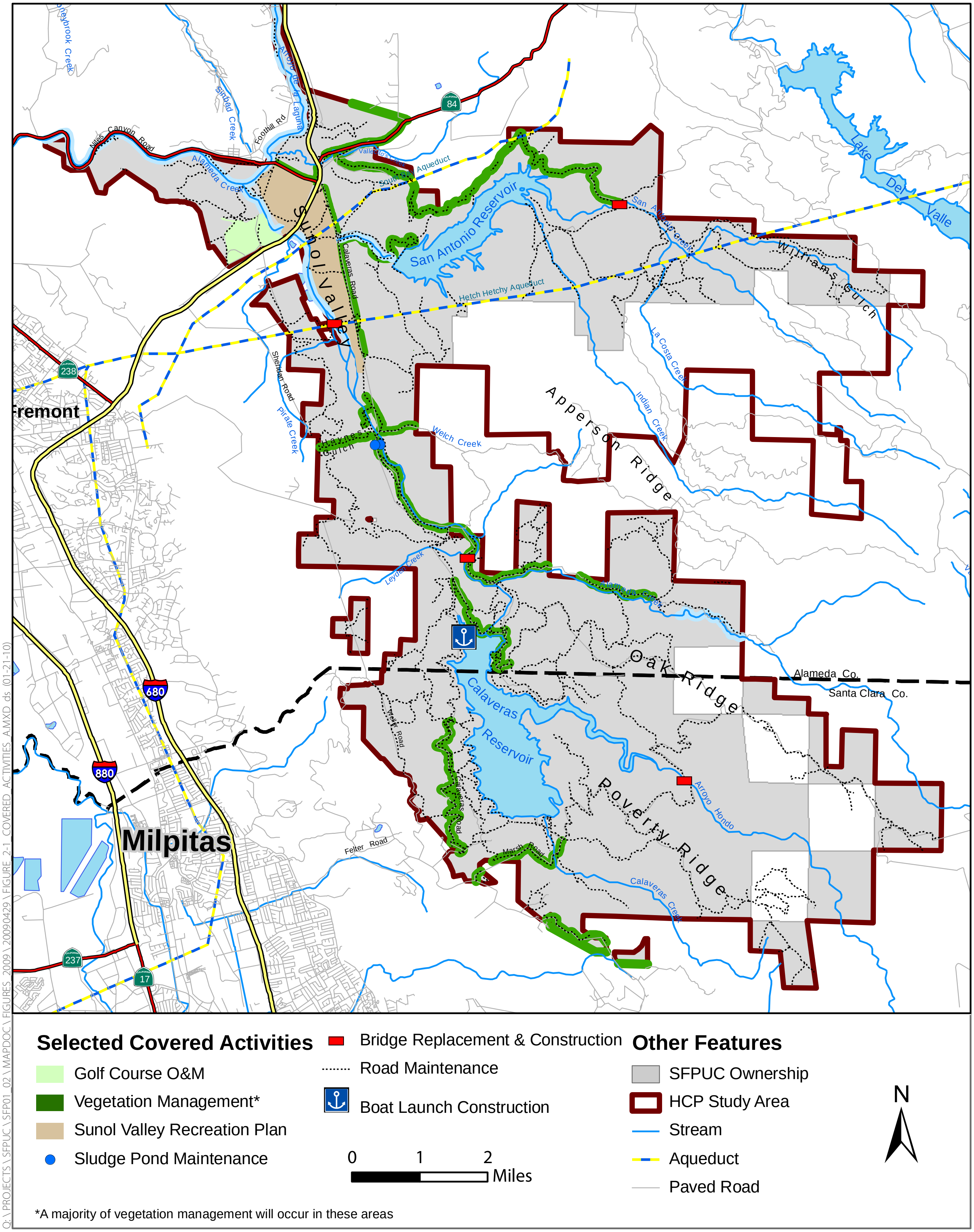

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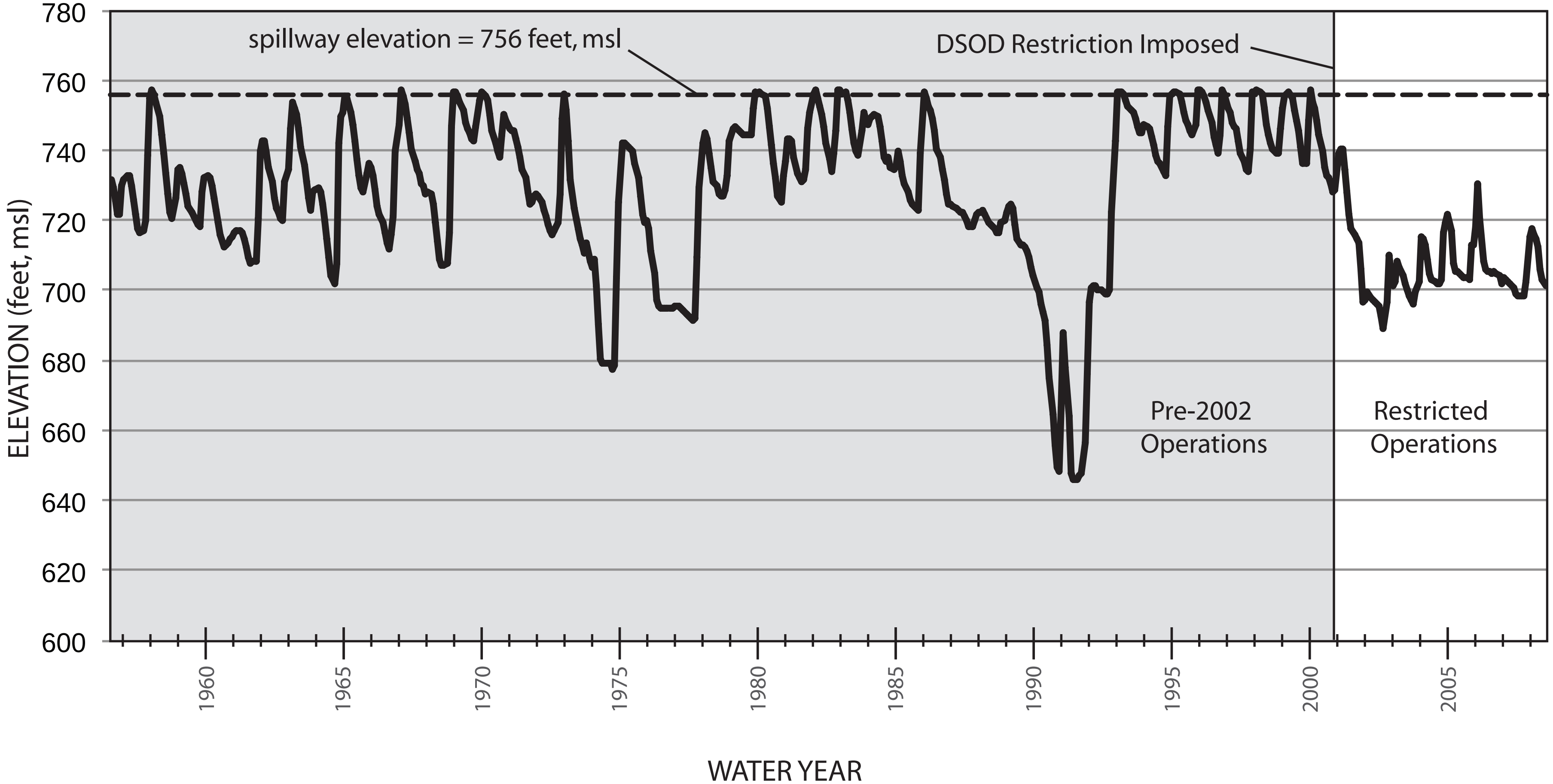
Figure 2-1
Alameda Watershed HCP Selected Covered Activities



Source: SFPUC, WISKI Database

SFP01.02 HCP (7-09)

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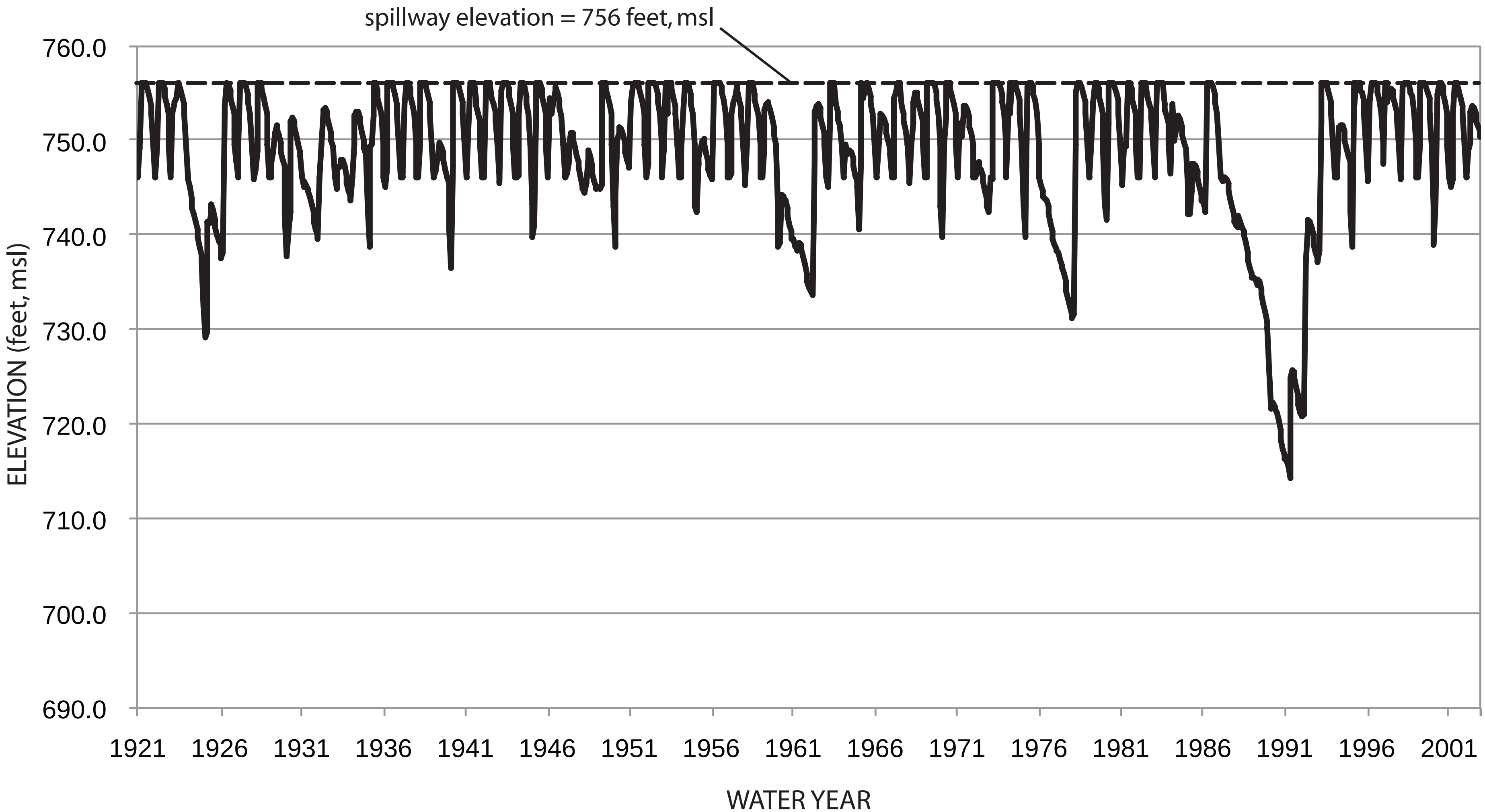
Figure 2-2
Historical Average Monthly Water Levels for Calaveras Reservoir, Water Years 1957 to 2008



Source: SFPUC, HH/LSM Model

SFP01.02 HCP (10-09)

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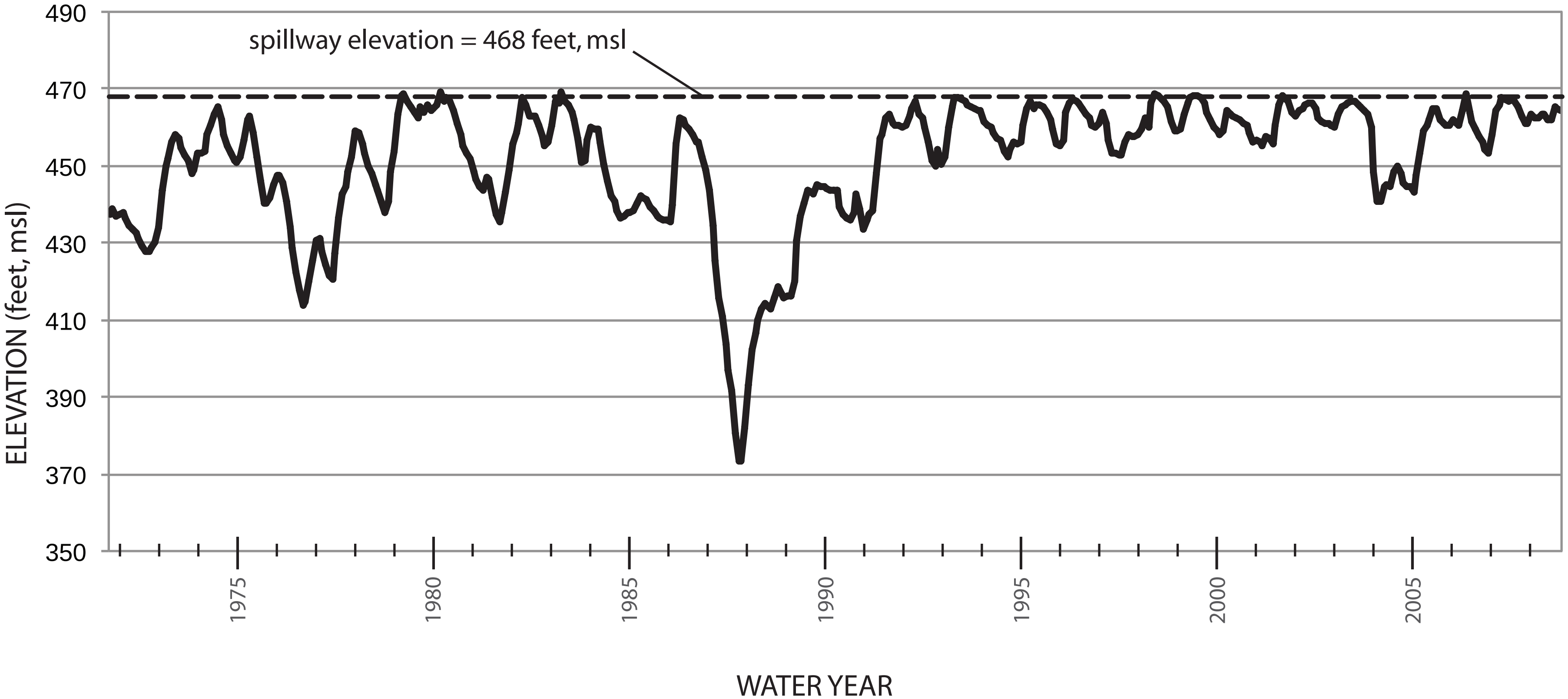
Figure 2-3
Simulated Average Monthly Water Levels for Calaveras Reservoir, Based on 1921 to 2002 Water Year Hydrology



Source: SFPUC, WISKI Database

SFP01.02 HCP (10-09)

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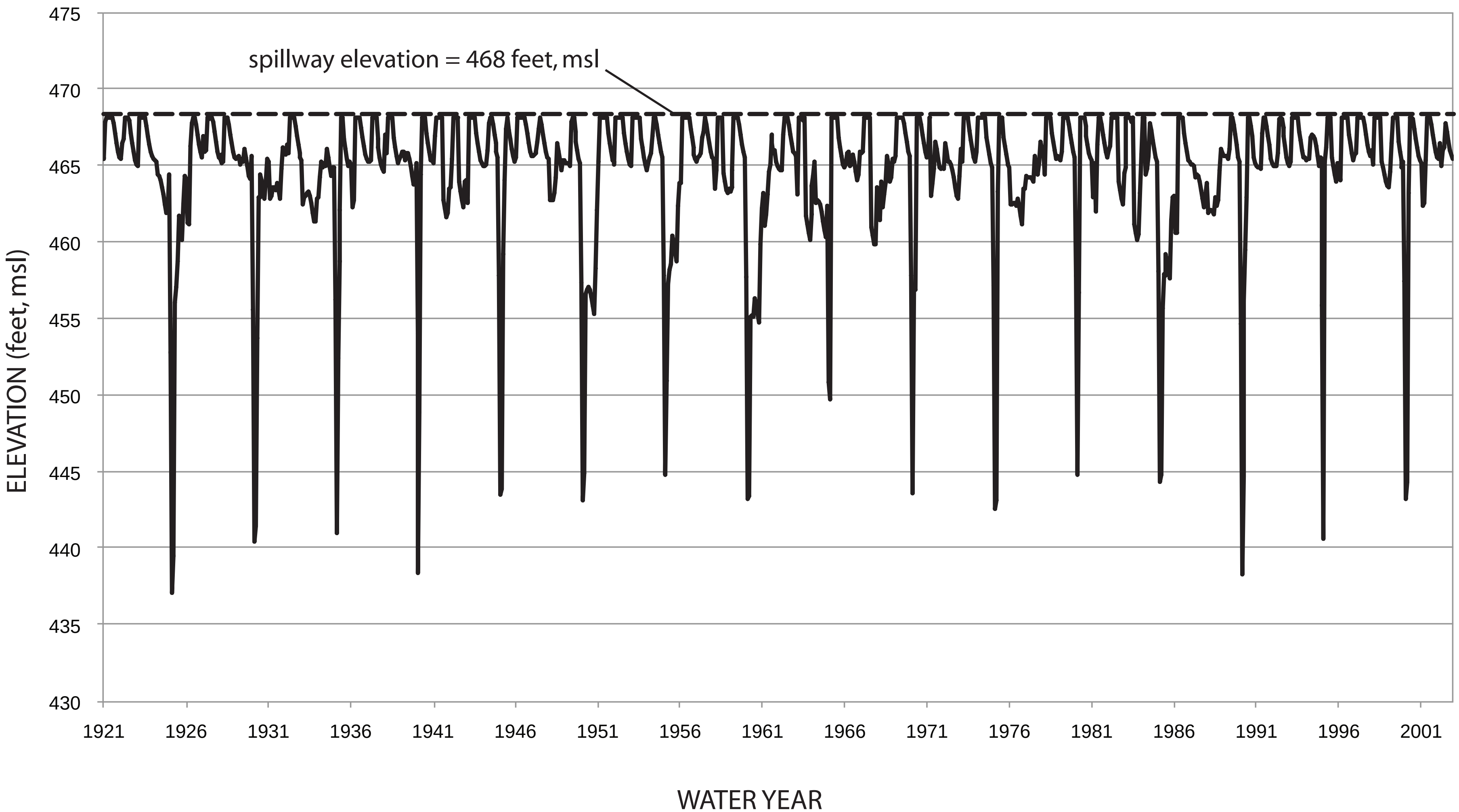
Figure 2-4
Historical Average Monthly Water Levels for San Antonio Reservoir, Water Years 1972 to 2008



SFP01.02 HCP (10-09)

Source: SFPUC, HH/LSM Model

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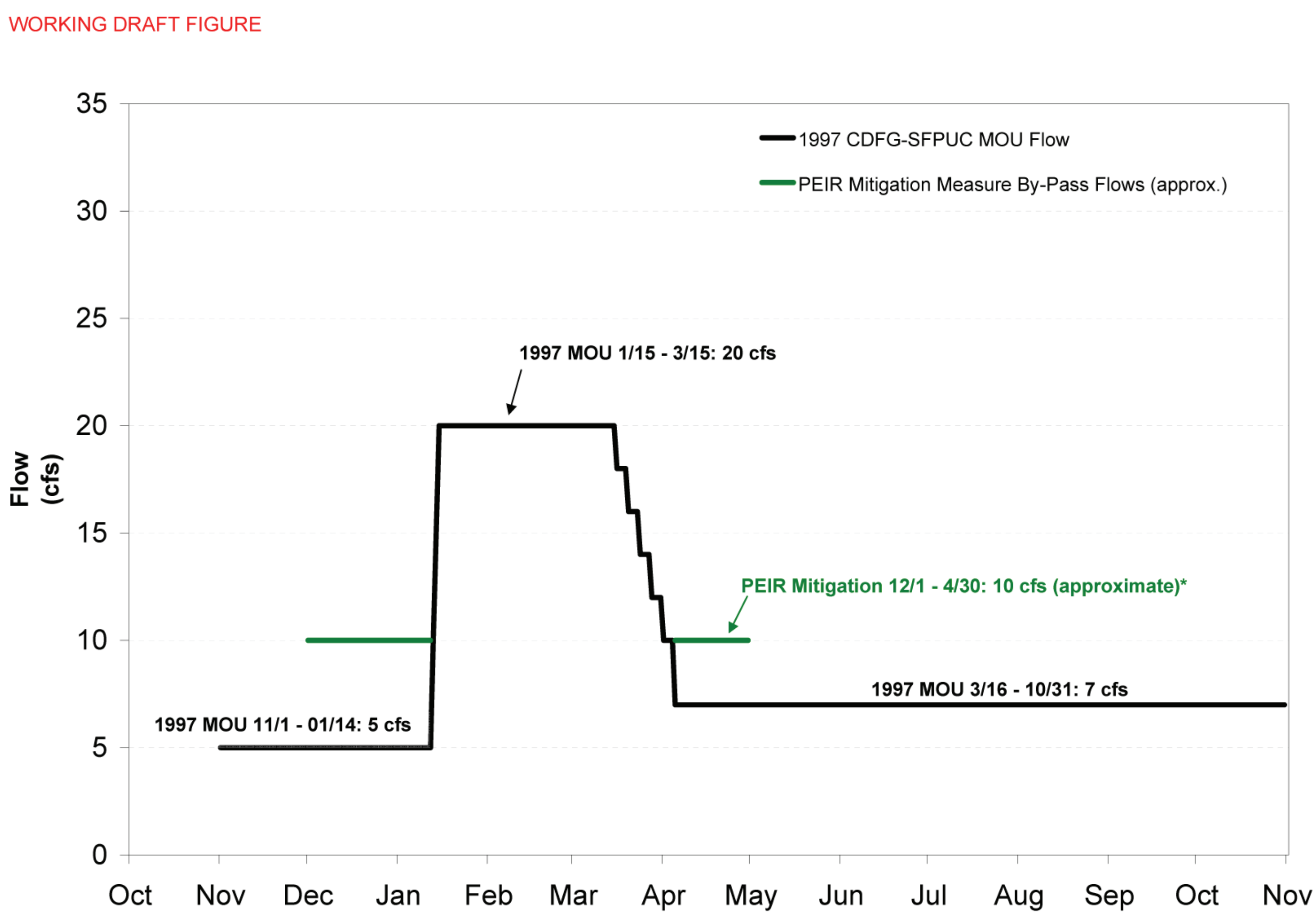
Figure 2-5
Simulated Average Monthly Water Levels for San Antonio Reservoir, Based on 1921 to 2002 Water Year Hydrology



Notes:
In presenting graphed flows, 1997 MOU flows are shown over PEIR Mitigation Flows.
* Actual flow amount to be determined by SFPUC NRLMD field studies in conjunction with input from applicable resource agencies, as noted in mitigation measure, along with other details.

Source: SFPUC, 2008.

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Figure 2-6
Alameda Creek Combined Flows:
1997 MOU Flows and PEIR Mitigation Flows