EAST BAY MUNICIPAL UTILITY DISTRICT
LOW EFFECT EAST BAY HABITAT CONSERVATION PLAN

April 2008

Section 1. Introduction

The East Bay Municipal Utility District (EBMUD) owns and manages 28,200 acres of land in the East Bay, providing water and wastewater treatment to 1.3 million and 640,000 customers, respectively. EBMUD manages this large watershed area as open space, primarily as protection for water quality, and as species habitat in the otherwise developed East Bay.

Although most of EBMUD's East Bay watershed lands and facilities were constructed or acquired prior to the enactment of the Federal Endangered Species Act (ESA), ongoing operations and maintenance procedures may result in the take of sensitive species. For this reason EBMUD is pursuing an Incidental Take Permit under Section 10(a)(1)(B) of the ESA. Concurrently, EBMUD is pursuing an authorization from the state under California Fish and Game Code Section 2080.1. The term of the permit and accompanying state decision requested will be thirty years.

The ESA prohibits unauthorized "take" of listed threatened or endangered species (see Section 1.2 for definition of "take"). The ESA also permits the take of species incidental to otherwise lawful activity. Section 10 of the ESA requires that, as part of the process for obtaining an incidental take permit, an applicant prepare a "habitat conservation plan" (HCP) that specifies the potential impacts of activities associated with the take of listed species occurring in the Plan area. The applicant is required to avoid, minimize, mitigate, and monitor for such impacts.

As required, general and species specific biological goals are identified in this plan. General goals include managing for maintenance of existing covered species habitat types, and education of EBMUD personnel regarding identification and avoidance of sensitive species. Species goals are to provide for covered species individuals and habitats on EBMUD watershed, and to work toward general species recovery within the HCP area.

The plan area is mapped in Figure 1-1 and described in Table 1-2.

Section 2. Biological Resources

There are two plant and five animal species covered under this HCP: pallid manzanita – listed as federally threatened (FT), Santa Cruz tarplant (FT), Oncorhynchus mykiss (*O.*

mykiss), in Pinole Creek and above USL Dam, California red-legged frog (FT), western pond turtle, Alameda whipsnake (FT), and pallid bat. Western pond turtle, pallid bat and Oncorhynchus mykiss (resident populations) are not currently listed as federally threatened or endangered, but may be listed during the course of the permit.

Classifications of California Native Plant Society vegetation communities on EBMUD watershed lands are listed in a table and referenced to the source document. Known and estimated associations of covered species with these communities are shown in a matrix.

Life histories for the seven HCP-covered species are described in Appendix A where their distribution, threats, legal (listing) status, and any recovery plans or designated critical habitat are discussed. Their presence in the HCP area is described and mapped at the end of each species account. EBMUD's East Bay Watershed reservoir and non-reservoir basin vegetation communities are described and mapped. Occurrence of listed species on these described watershed lands is shown in a matrix.

Section 3. Activities

The East Bay Watershed Master Plan (WMP) was adopted in 1996 to define long-term management of EBMUD lands. Specific WMP programs addressed in this HCP include water quality, biodiversity, forestry, livestock grazing, agricultural operations, fire and fuels management and recreation and developed trails. The trench spoils program for placement and removal of trench spoils (defined in Section 3.2.8) from watershed lands is included as a separate program. Other programs are addressed for their potential to impact species from vehicle strikes on EBMUD watershed roadways. These programs include the reservoir water quality monitoring program, fire patrols, educational programs, access for research, access by EBMUD contractors, and other fire road travel. Activities for these programs are described in Section 3.

Section 4. Impacts and Incidental Take

Potential impacts associated with these programs may result in the incidental take or modification of habitat for HCP covered species. Take is defined under section 3(18) of the ESA and referenced to Section 1.2 of this document.

The relative health of the populations and their natural variability, and the potential for and avoidance of incidental take for the two main species (red-legged frog and Alameda whipsnake) are discussed. EBMUD is requesting authorization for incidental take resulting from modification of habitat, incidental harassment, and species mortality for all

described watershed maintenance and range activities as performed under this HCP for *O. mykiss*, California red-legged frogs, western pond turtle, Alameda whipsnake, and pallid bat. Should the *O. mykiss* (resident populations), western pond turtle or pallid bat be listed during the course of the permit, EBMUD would already be covered under this HCP from incidental take of these species as described herein.

Section 5. Avoidance and Minimization Measures

General protection measures are described. They have been designed to avoid and minimize potential impacts from watershed programs on covered species. These measures include a staff and operator education and awareness program, vehicle speed restrictions, and pre-project monitoring.

Because pond and wetland work may rarely require handling animals, avoidance procedures for ponds and wetlands relative to the protection of California red-legged frogs and western pond turtles are described. Assurances are given that pre-project surveys will occur for these species and specific limited procedures for capturing and holding species (if necessary) at project sites are described.

Specific avoidance and minimization measures are discussed for species relative to selected activities identified as potentially harmful. Protection measures for each covered species are described, and maps of known species locations are in Appendix A.

Section 6. Mitigation

General mitigation measures are described that include: rectification, reduction of impacts, and compensation for unavoidable impacts. Individual species rectification, reduction of impacts, and compensation measures are listed as required by the HCP handbook.

Section 7. Monitoring

Monitoring is divided between Compliance and Effectiveness monitoring. Compliance monitoring will track the implementation of the HCP and Incidental Take Permit (ITP). Funding, reporting, and policy implementation will be tracked.

Effectiveness monitoring will determine if the HCP is achieving the biological goals and objectives by tracking take, species status, habitat condition, biological goals, and mitigation. In addition to following covered species and habitat, “effectiveness

monitoring", as described in the HCP handbook, will measure or determine the efficacy of the species mitigation and enhancement measures.

Monitoring for the two covered plant species will consist of monitoring known sites and of advising the USFWS of any new observed locations. Monitoring will be presence/absence and habitat based for *O. mykiss*, and habitat based for red-legged frog and Alameda whipsnake. Known sites will be monitored for western pond turtles and pallid bats.

Reporting requirements include annual reports of monitoring and take, and three-year, six-year, and ten-year overall HCP reports to address adaptive management. After the ten year report, reports will be made every five years.

Section 8. Adaptive Management

Adaptive management will be implemented consistent with the federal HCP Five Point Policy. Trigger points for adaptive management of each species are described in Section 8. The required interim reports at three, six, and ten years, and every five years thereafter will address program adaptive management based on monitoring results. Program changes will be implemented based on study results as determined through discussion with USFWS, and will be reviewed at the next five-year interval.

Section 9. Unforeseen Circumstances/Plan Amendments/Adaptive Management

Foreseeable changes in circumstances are listed in a table and include acquisition of new species information, impacts from non-native species, changed circumstances resulting from wildfire under 100 acres (based on 25 years of record) including loss of habitat such as the April Creek barn, forest die-off due to cold or disease, spread of disease, and landscape change due to a "strong" earthquake registering up to 6.9 on the Richter scale. The regulatory assurances also apply to changes from unforeseen circumstances such as unforeseeable facility failure or accidents.

In the event of a change in status for a species (listing of a new species), new data that significantly changes management strategies and procedures, or other altering circumstance, an amendment procedure to the HCP may be initiated by either EBMUD or USFWS as described in Section 9.

Events which cannot be foreseen at this time such as damage to the watershed resulting from a wildfire greater than 100 acres or an earthquake of 7.0 or higher, an unknown

disease, or other circumstance that cannot reasonably be anticipated will be considered an unforeseen circumstance subject to regulatory assurances as described herein.

A statement is included to clarify that this HCP will not prevent EBMUD from creating a mitigation bank or selling habitat mitigation credits (e.g., wetlands, riparian) or otherwise using the Pinole Valley watershed for mitigation in the future.

Section 10. Funding

A statement of funding source and commitment is included as part of the incidental take permit process. Funding for HCP operations and mitigation has been budgeted as part of EBMUD's commitment under the Habitat Conservation Plan and Implementation Agreement. Total EBMUD HCP labor costs will be 1.18 FTE, of which 0.12 is from biological contractors. A total of 0.36 FTE, work currently performed for the East Bay Watershed Master Plan (WMP) will cover both plans. Total new EBMUD commitment will be 0.70 FTE (1450 hours per year) dedicated to the HCP. Annual HCP labor costs will be $101,000 and one time capital costs will be $45,000. Annual costs, including FTE labor costs, are adjusted for inflation in each biennial budget. A rationale is given to show how EBMUD has conservatively planned for inflation.

Section 11. Alternatives

A "no HCP" alternative would require EBMUD to address each watershed activity that may impact listed species on a case-by-case basis, requiring a greater commitment of personnel with a reduced likelihood of positive results for the species. Only the No Action alternative need be considered for a low-effect HCP.

Appendices

Life histories of HCP covered species, the EBMUD Integrated Pest Management Program (2003), and the EBMUD Natural Resources/CDFG Section 1600 Memorandum of Understanding are presented in Appendices A through C, respectively.

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GLOSSARY

List of Acronyms used in the Document

AGP	Annual Grazing Plan
AMM	Avoidance and Minimization Measure
AMP	Allotment Management Plan
ATV	All-terrain Vehicle
BMP	Best Management Practice
CDF	California Department of Forestry
CDFG	California Department of Fish and Game
CESA	California Endangered Species Act
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
DSOD	California Division of Safety of Dams
EA	Environmental Assessment
EBMUD	East Bay Municipal Utility District
EBRPD	East Bay Regional Park District
EHC	Equivalent Habitat Components
WMP	East Bay Watershed Master Plan (EBMUD)
EIR	Environmental Impact Report
ESA	Endangered Species Act
ESU	Evolutionarily Significant Unit
EBMUD F&W	EBMUD Fisheries and Wildlife Division
HCP	Habitat Conservation Plan
IPM	Integrated Pest Management
ITP	Incidental Take Permit

LLMP	Limited Landuse Management Plan
MGD	Million Gallons per Day
MOU	Memorandum of Understanding
NMFS	National Marine Fisheries Service
PEIR	Programmatic Environmental Impact Report
USFWS	US Fish and Wildlife Service
USL	Upper San Leandro Reservoir
VMC	Vegetative Management Consortium
YOY	Young of the Year

Definition of Terms

Adaptive management –A management system in which answers are obtained to crucial questions by conducting experiments in conjunction with management activities. Responsive species management actions are then based on the new information.

Aestivate – To pass the summer in a state of torpor or inactivity.

Avoidance and Protection Measures – Project-specific guidelines, generally promulgated following a biological survey, which specify how best to avoid and protect species and habitats.

Best Management Practices – General guidelines for conducting activities with a minimum of environmental impacts.

Blackline – Margin of area where fuels have been burned off to provide firebreak.

Carapace – The upper case or shell, as of a turtle.

Core Alameda whipsnake habitat – Defined by Swaim (1994, 2000) as "chaparral, Diablan sage scrub, northern coyote brush scrub, and riparian scrub, with open or partially open canopy on east, southeast, south and southwest facing slopes or in nearby grassland habitats (within 500 feet of scrub) with the same aspects."

Coldtrial – Fuel break created by removing combustible vegetation down to mineral soil; usually performed with hand tools.

Fire control line – A firebreak line such as a discline, black line, or line of mowed vegetation.

Ecotone – A transition zone between two ecological communities such as forest and grassland.

Emergencies – The term emergencies shall include watershed fire fighting related activities, chemical spills, earthquakes and resultant collateral damage, rescue operations, and other activities responding to imminent threats to injury, life, property or wildland habitat.

Enhancement – Management activities that improve or augment existing habitat values for the benefit of natural communities or a specific species.

Equivalent Habitat Component – Take in habitat or preferred habitat components (e.g., depth of 2 feet for California red-legged frogs) that is determined by the Services to be equal in take to one HCP covered species individual.

Exerted – Thrust forward, as when a plant stigma is exerted from the flower.

Fuel loads – The weight of specific combustible materials expressed in tons per acre.

Fuelbreak – A wide strip of land, strategically placed for fighting anticipated fires, where hazardous fuels have been replaced with less burnable fuels. May include blacklines, coldtrails, disclines, and mowed areas.

Ground disturbing activity – Ground disturbing activities shall include all watershed activities that result in loss of soil surface integrity. Activities such as blading, disking, grazing if RDM < 1200 lbs/acre or >24% bare ground in primary fields. Road construction and logging are examples of ground disturbing activities.

Herbicide – Any chemical used to destroy or inhibit plant growth, especially of weeds or other undesirable vegetation.

Hibernacula – A shelter that is occupied during the winter by a dormant animal.

Hydrologic – Of or relating to the properties, distribution and circulation of water.

Mesic – Having or characterized by a moderate amount of moisture. Neither hydric (wet) nor xeric (dry).

Mitigation – Measures taken to diminish or compensate for the negative environmental impacts of a project or activity.

Non-point source pollution – Pollution that originates from many diffuse sources and is usually not regulated.

Perennial stream – A stream that flows continuously throughout the year.

Plastron – The ventral part of the shell of a tortoise or turtle consisting typically of nine symmetrically placed bones overlaid by horny plates.

Point source pollution – Pollution discharged from a specific location such as a pipe or other conduit.

Prescribed burns – The purposeful setting afire of vegetation in an attempt to imitate the natural fire regime.

Redd – Nest or depression in the gravel of a streambed made by salmonids for egg deposition.

Restoration – Management activities whereby a community, species, or habitat type is reinstated in an area where it occurred under natural conditions.

Riparian – The vegetated zone adjacent to a stream or any other water body.

Riprap – Stones of varying sizes used to stabilize streambanks and other slopes.

Serpentine – General term for rocks with unusually high concentrations of magnesium and iron or the soils derived from them. Both are characterized by low levels of calcium and other nutrients and high levels of magnesium, iron and certain toxic metals. Many plant taxa are restricted to or excluded from serpentine soils.

Standard Practices – General EBMUD watershed guidelines for conducting management activities. It is a generally broader category than Best Management Practices (BMPs), which usually directs limits to impacts. Where Standard Practices and Best Management Practices are the same, the term BMPs is used in this document as the more common term.

Take – To harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct with respect to federally listed endangered species of wildlife.

Terminal reservoir – East Bay reservoirs which receive water from the Mokelumne Aqueduct.

Trench spoils – Material excavated from trenches in the process of repairing and maintaining the District's pipelines and facilities.

Watershed – An area of land that drains into a particular river or body of water.

1 INTRODUCTION

1.1 INTRODUCTION

The East Bay Municipal Utility District (EBMUD) owns and manages approximately 28,000 acres of watershed in the San Francisco East Bay Area (Figure 1-1). These lands surround five reservoirs (Briones, San Pablo, Upper San Leandro – USL, Chabot, and Lafayette) and a portion of one basin that does not have a reservoir (Pinole Valley). EBMUD's reservoirs store drinking water and emergency water supplies for 1.3 million people residing in Alameda and Contra Costa Counties.

EBMUD is guided in managing these lands by the primary goals identified in the East Bay Watershed Master Plan (WMP): to protect water quality and biodiversity. To achieve these goals, EBMUD maintains its East Bay watershed lands as open space with limited and controlled public access. These lands are a significant resource that provide habitat and benefit a variety of species near an East Bay metropolitan area with a population of 2.4 million. EBMUD is a relatively built-out district and the watershed is expected to remain intact. These undeveloped areas will retain species habitat value.

EBMUD must undertake certain activities on these watershed lands to meet its various obligations as a public entity to provide water service to its customers in the East Bay. As a publicly owned utility formed under California's Municipal Utility District Act, EBMUD is required to provide drinking water that meets or exceeds all primary and secondary regulatory standards established by the U.S. Environmental Protection Agency and the California Department of Health Services. EBMUD is also committed to attaining the highest water quality and dependability of service at the lowest possible rates. Customer demands, legislative mandates, state and federal regulations, and district goals require that EBMUD facilities be adequately constructed and maintained to ensure public health, safety, and reliability. EBMUD's policies allow for uses of its watershed lands that are compatible with the primary purpose of protecting the water supply, with emphasis on protecting open-space values.

EBMUD activities include programs for water quality, biodiversity, forestry, livestock grazing, agricultural operations, fire and fuel management, recreation and developed trails, and the storage and removal of trench spoils. By EBMUD's continued preservation of these lands as open space, and the affirmative actions of the District summarized

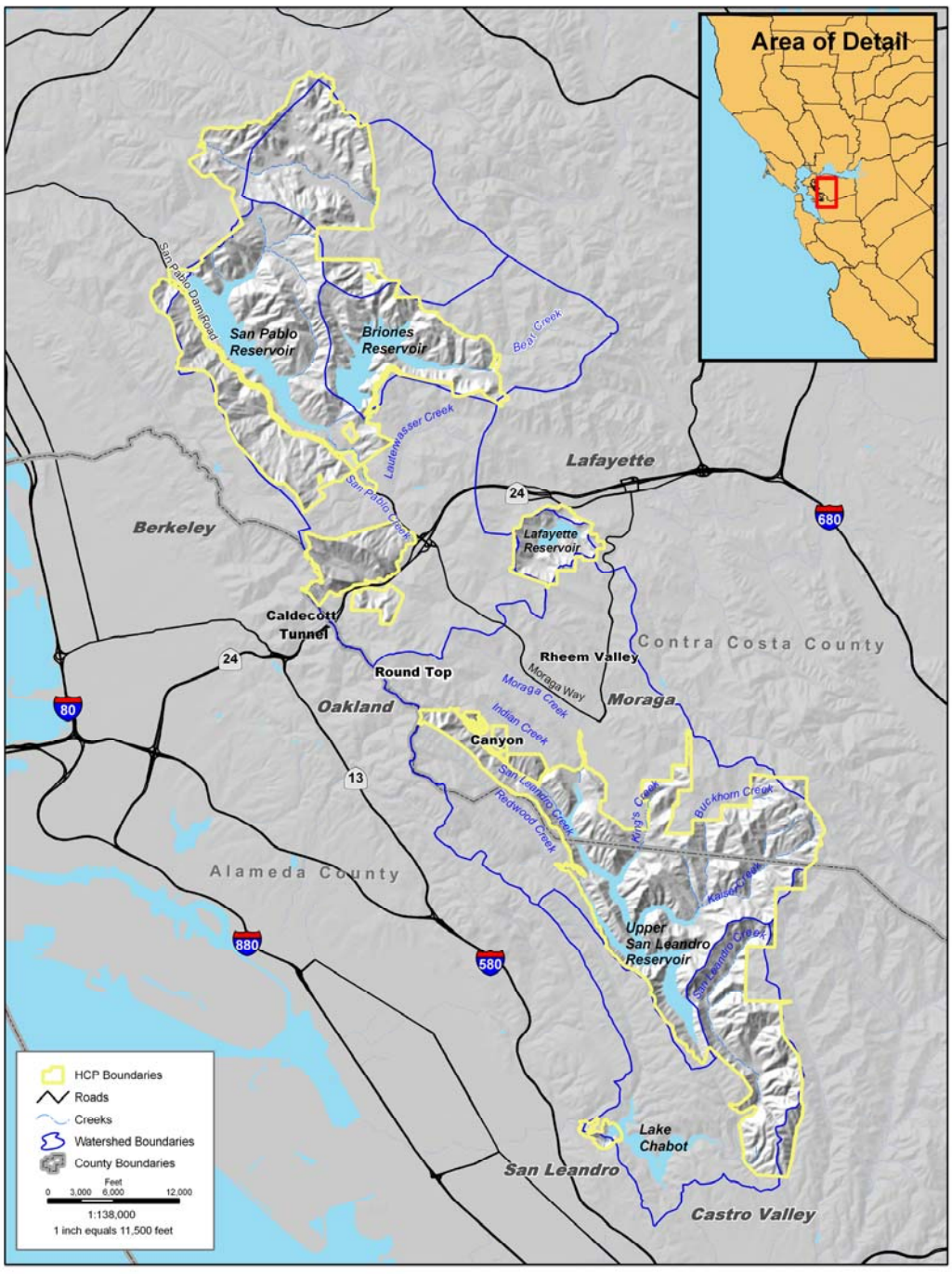

Figure 1.1 Lands to be covered under the EBMUD Habitat Conservation Plan

below, this Habitat Conservation Plan (HCP) should improve the habitat conditions of sensitive species. These sensitive species include those requiring protection afforded by the Federal and State endangered species acts, respectively the ESA and CESA. Some of the actions EBMUD is required to undertake may result in minor inadvertent incidental take on its watershed lands. This potential incidental take creates the need for both this Habitat Conservation Plan (HCP) to preserve and protect these species, and an application for an Incidental Take Permit from the U.S. Fish and Wildlife Service (USFWS).

This HCP does not propose any new permanent project footprint that will displace existing species. Still, a incidental take permit is requested for any incidental take that may result from EBMUD's continued operations on these lands.

1.1.1 Sources of Water Supply

Mokelumne River - Most of the water used by EBMUD comes from the 577-square-mile watershed draining the Mokelumne River basin in Alpine, Amador, and Calaveras Counties, California. The Mokelumne River Watershed basin is located on the west slope of the Sierra Nevada from the crest of the Sierra Nevada Mountains (elevation 10,000 feet) to Pardee Reservoir (maximum water surface elevation 567 feet). EBMUD has water rights for up to 325 million gallons (997 acre feet) per day from the Mokelumne River, and the average usage is about 220 million gallons per day (MGD). EBMUD has an amendatory contract with the US Bureau of Reclamation, for a maximum of 133,000 acre-feet of water per year, with a limit of 165,000 acre-feet of water (total) during three consecutive dry years, at a maximum rate of diversion of 100 MGD from the Sacramento River at Freeport.

Local runoff - In average rainfall years, District reservoirs in the East Bay receive an additional 30,000 acre-feet of water from local watershed runoff. Much of it is stored in the East Bay reservoirs for system use. In dry years, evaporation may exceed local runoff.

1.1.2 East Bay Terminal Reservoirs

EBMUD takes its Mokelumne River water from Pardee Reservoir, 38 miles northeast of Stockton, California near the town of Jackson. EBMUD's Camanche Reservoir, located 10 miles downstream from Pardee Dam on the Mokelumne River, provides recreation, flood control, power generation, and agricultural water as well as needs for resident and

downstream fisheries. Water from Pardee Reservoir is treated prior to conveying the water 92 miles to East Bay water treatment plants or terminal reservoirs.

Water not immediately routed through water treatment plants and into the distribution system is stored in five East Bay terminal reservoirs (Table 1-1, Figure 1-2). Their combined maximum capacity is 151,670 acre-feet of raw water, about a six-month domestic supply for EBMUD's customers.

Table 1-1.
EBMUD East Bay Reservoirs.

	Briones	Chabot	Lafayette	San Pablo	Upper San Leandro
Year Completed	1964	1875	1928	1919	1926
Capacity (acre-feet)	60,510	10,350	4,250	38,600	37,960
Water surface (acres)	725	340	126	834	771
Shoreline (miles)	14	9	3	14	25
Watershed area (square miles)	9	12	1	23	30

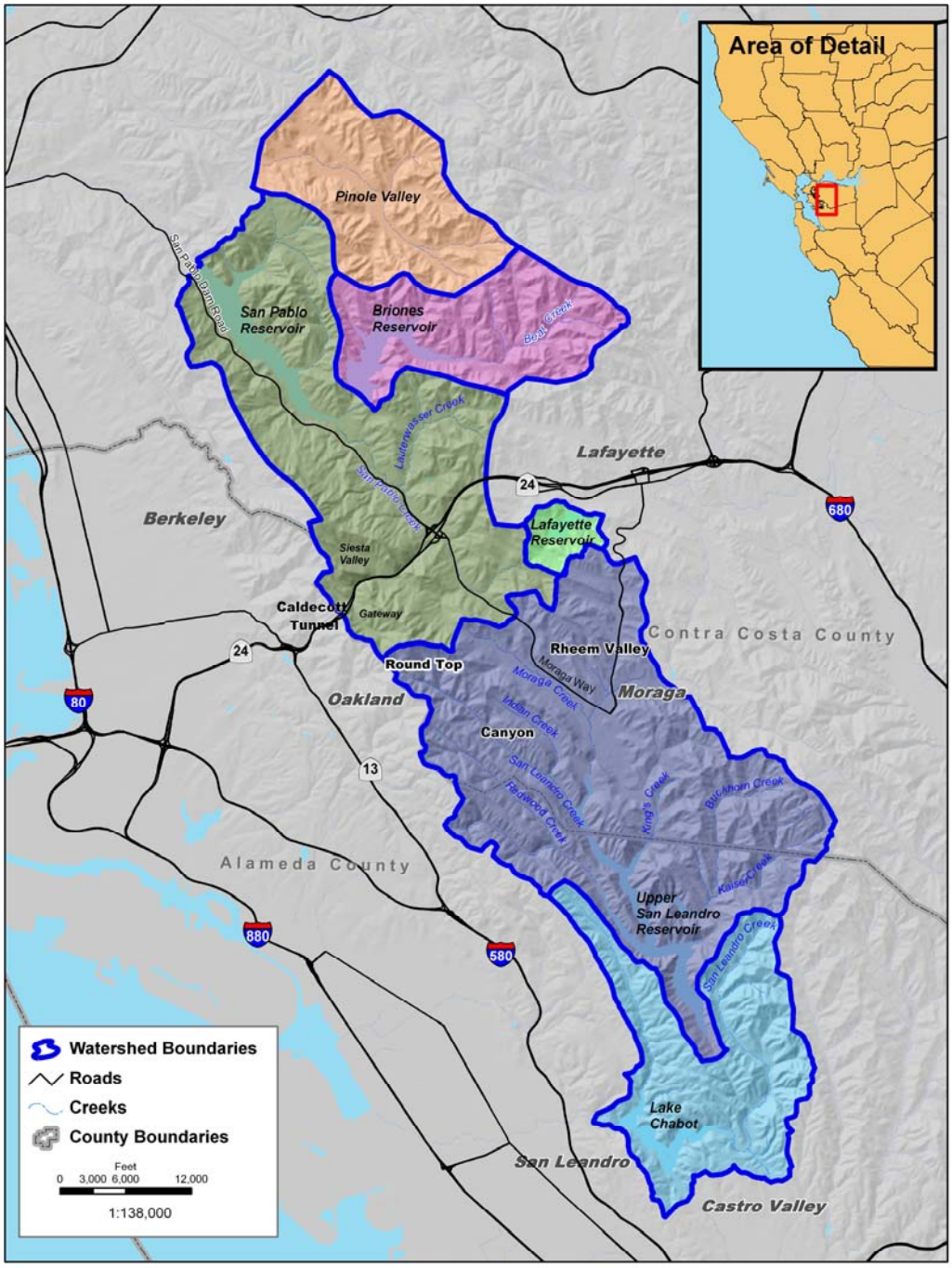

Figure 1-2. Watershed basins of EBMUD terminal reservoirs, Contra Costa and Alameda counties, California.

1.2 APPLICABLE LAW

The East Bay Municipal Utility District was formed and operates under the Municipal Utility District Act of the State of California as codified by the Public Utilities Code of the State of California, Ch. 764, Stats. 1951, and as amended. EBMUD governance is vested in a board of directors. Elected from wards, the seven-member Board determines policy. The EBMUD Board establishes recreation fees, rules and regulations, contracts, practices, and schedules, for or in connection with any service, product, or commodity owned or controlled by EBMUD.

The Federal Endangered Species Act (ESA), 15 USC Section 1531 et seq., provides for the protection and conservation of fish, wildlife, and plants that have been listed as threatened or endangered. Activities otherwise prohibited by ESA Section 9 and subject to the civil and criminal enforcement provisions of ESA Section 11 may be authorized for appropriate Federal agency action pursuant to ESA Section 7 and for other persons pursuant to ESA Section 10.

Under section 3(18) of the ESA, take is defined as "… to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct" with respect to federally listed species of fish or wildlife. Federal regulations provide the same taking prohibitions for threatened fish or wildlife species unless otherwise authorized at the time of listing [50 CFR 17.31(a)]. Harm is defined in regulations implementing the ESA promulgated by the Department of the Interior as an act "which actually kills or injures" listed fish or wildlife; harm may include "significant habitat modification or degradation where it actually kills or injures [fish or] wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering" (50 CFR 17.3). Harass is defined in regulations implementing the ESA promulgated by the Department of the Interior as "an intentional or negligent act or omission which creates the likelihood of injury to [fish or] wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, and sheltering" (50 CFR 17.3).

Pursuant to ESA Section 10(a)(1)(B), the USFWS may issue permits, under such terms and conditions as the Secretary of the Interior or the Secretary of Commerce, respectively, may prescribe, for acts otherwise in violation of the ESA Section for the taking of any species incidental to an otherwise lawful activity. Section 10(a)(2)(B) requires an applicant for an Incidental Take Permit to submit a "Habitat Conservation

Plan" (HCP) that specifies, among other things, the impacts that are likely to result from the taking and the measures the applicant will undertake to monitor, avoid, minimize and mitigate such impacts.

The California Endangered Species Act (CESA), California Department of Fish and Game (CDFG) Code, Section 2050 et seq., provides for the protection and conservation of fish, wildlife and plants that have been listed by the State of California as threatened, endangered, or as candidate species. Activities prohibited by Section 2080 and subject to the civil and criminal enforcement provisions of Section 12000 et seq. may be authorized pursuant to Sections 2080.1, 2081 and 2084. CDFG has indicated that if this HCP satisfies their requirements for state-listed species, incidental take may be authorized under Section 2080.1 (Janice Gann, personal communication).

1.3 EBMUD HABITAT CONSERVATION PLAN

The development of the East Bay into a major industrial and residential area, especially since 1900, has resulted in changes to natural biological communities. Native plant and wildlife species that depend on the natural communities have obviously been affected. Some of these affected species have been listed as endangered or threatened, or have been proposed for listing as threatened or endangered by the USFWS and the CDFG.

The foundation of EBMUD's HCP is to protect and enhance the natural ecosystems that support the native species of the East Bay, and to implement species' protection measures. This plan addresses seven species (referred to as covered species). Covered species include two animal species and two plant species listed as federally threatened: California red-legged frog (*Rana aurora draytonii*); Alameda whipsnake (*Masticophis lateralis euryxanthus*); (Santa Cruz tarplant (*Holocarpha macradenia*) (listed as federally threatened – FT), and pallid manzanita (*Arctostaphylos pallida*) (FT). Unlisted covered species include: *Oncorhynchus mykiss* (referred to hereafter as *O. mykiss*), western pond turtle (*Clemmys marmorata*), and pallid bat (*Antrozous pallidus*). Alameda whipsnake is also listed as a State Threatened (ST) species under the California Endangered Species Act (CESA). On the EBMUD watershed, resident *O. mykiss* are found in Pinole Creek and above Upper San Leandro Dam. This plan covers the resident form should it become listed. The Plan identifies EBMUD's existing and prospective maintenance and operation activities that may result in incidental take of endangered, threatened, or candidate species. The Plan also describes the measures EBMUD will employ to avoid, minimize, or mitigate such impacts. The plan identifies biological goals and objectives for purposes

of monitoring the HCP, adaptive management measures and triggers for changing the HCP, a 30-year plan duration, and public participation in the HCP process.

1.4 BIOLOGICAL GOALS AND OBJECTIVES

1.4.1 General Biological Goals

Many of the general biological goals for the HCP are existing components of the WMP and its subdocuments: the Range Resource Management Plan (RRMP), and the Fire Management Plan (FMP). Links to the East Bay Watershed Master Plan as well as the two Plan sub documents listed above may be found on the web at the following web-page:

http://www.ebmud.com/water_&_environment/environmental_protection/east_bay/default.htm

The HCP general biological goals are listed below.

- Maintain covered species habitats currently on EBMUD watershed lands within natural weather-driven variability.
- As outlined in the WMP, protect water quality by managing the watershed for high biodiversity.

1.4.2 Specific Biological Goals and Objectives

Specific biological goals and objectives for HCP covered species are listed below in Sections 1.4.2.1 through 1.4.2.7.

1.4.2.1 SANTA CRUZ TARPLANT BIOLOGICAL GOALS AND OBJECTIVES	
GOAL: A. Maintain and improve conditions for survival of Santa Cruz tarplant at known site of experimental population.	
OBJECTIVES:	SUCCESS CRITERIA/PERFORMANCE STANDARDS:
A.1 Provide optimal conditions for germination and growth of tarplant.	A.1 Grazing of area maintained to level sufficient to reduce competition with other plants.

1.4.2.2 PALLID MANZANITA BIOLOGICAL GOALS AND OBJECTIVES	
GOAL: A. Improve site conditions for germination and growth of pallid manzanita	
OBJECTIVES:	SUCCESS CRITERIA/PERFORMANCE STANDARDS:
A.1 Remove competing species (pines, madrones) to improve light penetration.	A.1 Trees removed in first year; other plants shading the site pruned as necessary.
A.2 Introduce pallid manzanita seeds or seedlings into the Big Burn peninsula area of USL following a watershed fire.	A.2 Pallid manzanita germination and plant growth monitored post burn.

1.4.2.3 RAINBOW TROUT BIOLOGICAL GOALS AND OBJECTIVES	
GOAL: A. Maintain and improve conditions for *O. mykiss* in Pinole Creek and tributaries of Upper San Leandro Reservoir.	
OBJECTIVES:	SUCCESS CRITERIA/PERFORMANCE STANDARDS:
A.1 Install and manage new permanent exclusion of livestock from Pinole Creek riparian corridor and manage existing exclusions on Kaiser, Buckhorn, Moraga, San Leandro, Indian, and Redwood creeks to protect existing riparian vegetation and structure.	A.1 Maintain permanent or electric fencing during grazing activities in the pastures bordering Pinole Kaiser, Buckhorn, Moraga, San Leandro, Indian, and Redwood creeks. Livestock are normally prevented from entering riparian areas. Fence out remaining 1,400meter (4,200ft) section riparian area on Pinole Creek. Fences are gated to allow for later riparian grazing as a management tool. Minimum buffer of 17meters (50ft) will be allowed between fence and creek bank.
A.2 Inventory and remove debris jams that prevent fish passage below natural waterfall within District-managed portion of Pinole Creek. Inventory and remove debris jams that prevent fish passage within District-managed portion of USL watershed within one year of discovery.	A.2 Debris jams/barriers identified and removed before spawning season. Also, EBMUD will encourage modification of existing culvert barrier at old railroad trestle on Indian Creek through issuance of Watershed Entry Permits and letters of support to funded project or project proposals.

1.4.2.4 CALIFORNIA RED-LEGGED FROG BIOLOGICAL GOALS AND OBJECTIVES	
GOAL: A. Maintain and improve California red-legged frog aquatic habitat on EBMUD watershed lands.	
OBJECTIVES:	SUCCESS CRITERIA/PERFORMANCE STANDARDS:
A.1 Maintain stockponds known to contain red-legged frog based on California red-legged frog recovery plan criteria (USFWS 2002).	A.1 Red-legged frog habitat components in stockponds maintained through necessary maintenance or rebuild of one to five stockponds per year.
A.2 Remove or treat non-native species to favor California red-legged frog in specific habitats.	A.2 Ponds containing bullfrogs drained as per California red-legged frog recovery plan criteria. With the exception of Nunes Pond (see Section 6.2.5), non-native fish species in watershed ponds removed when found.
A.3 Protect Pinole Creek from grazing activities.	A.3 Remaining 1,400meter (4,200 ft) unfenced portion of Pinole Creek electrically fenced during grazing. Permanent fence completed to replace 1,400 meter electric fence within five years of start of HCP.
A.4 Maintain fences bordering perennial stream habitat on watershed.	A.4 Permanent and electric fencing maintained to exclude livestock from perennial streams.

1.4.2.4 CALIFORNIA RED-LEGGED FROG BIOLOGICAL GOALS AND OBJECTIVES (Cont.)	
GOAL: B. Maintain California red-legged frog riparian and upland retreat habitat on the watershed.	
OBJECTIVES:	SUCCESS CRITERIA/PERFORMANCE STANDARDS:
B.1 Manage watershed to protect riparian cover.	B.1a Additional protection measures activated for unfenced streams if monitoring shows localized impact from covered activities (a reduction >10% streamside vegetation). B.1b Watershed grazing program follows moderate levels as delineated in WMP (1996) and RRMP (2001) (refer to HCP Section 3.2.4).
B.2 Maintain California red-legged frog dispersal cover during winter and spring dispersal periods.	B.2 Follow livestock grazing and land management activities as described in the RRMP and FMP and as outlined in residual dry matter (RDM) standards to maintain dispersal cover (e.g., 840-1,400 lbs/acre of minimum RDM, depending on slope) (RRMP 2001).

1.4.2.5 WESTERN POND TURTLE BIOLOGICAL GOALS AND OBJECTIVES	
GOAL: A. Maintain and improve western pond turtle habitat on the watershed.	
OBJECTIVES:	SUCCESS CRITERIA/PERFORMANCE STANDARDS:
A.1 Maintain the integrity of five stockponds containing turtles (Ponds: 11, 22, 28, 62, and 85) (Stebbins 1996) and the overall amount of western pond turtle habitat.	A.1 Existing western pond turtle pond habitats maintained or rehabilitated where necessary. Dam integrity maintained. Pond maximum depth at least 1.5 meters (5 ft) for escape from predators.
A.2 Annually survey for and remove non-native turtle species when encountered.	A.2 Non-native turtle species populations are removed when encountered on EBMUD watershed. Non-native turtles removed from reservoirs when feasible (i.e., reservoirs reduced by operations or for facilities repair).
A.3 Maintain fences and gates on western pond turtle stream habitat on watershed.	A.3 Existing fences on perennial drainages maintained. Annually inspect fences before livestock are moved into adjacent fields.
A.4 Fence out or manage watershed to limit public access to western pond turtle ponds.	A.4 Stockponds that serve as western pond turtle habitat are fenced out and signage installed within first five years of permit to limit or discourage public access.
A.5 Provide basking areas in western pond turtle habitats within first two years of HCP.	A.5 Basking habitats installed or maintained in five known watershed turtle ponds (ponds 11, 22, 28, 62, and 85) (Stebbins 1996).

1.4.2.6 ALAMEDA WHIPSNAKE BIOLOGICAL GOALS AND OBJECTIVES	
GOAL: A. Maintain overall amount of Alameda whipsnake habitat on the watershed.	
OBJECTIVES:	SUCCESS CRITERIA/PERFORMANCE STANDARDS:
A.1 Alameda whipsnake habitat (coastal scrub and chaparral) will not drop, except through wildfire or USFWS approved burn, below 99% of original acreage identified in initial watershed mapping.	A.1 Alameda whipsnake habitat (coastal scrub and chaparral) not reduced by over 1% over the life of the permit (approximately 3,414 hectares) (8,435 acres).

1.4.2.7 PALLID BAT BIOLOGICAL GOALS AND OBJECTIVES	
GOAL: A. Maintain active pallid bat nursery colonies on EBMUD watershed lands.	
OBJECTIVES:	SUCCESS CRITERIA/PERFORMANCE STANDARDS:
A.1 Maintain bat habitat at the existing April Creek barn site.	A.1a Barn structure reinforced if necessary to stabilize habitat. A.1b Bat habitat provided, in the form of bat boxes, at or near April Creek Barn site.

1.5 PLAN AREA

EBMUD's East Bay HCP area comprises approximately 28,200 acres of watershed lands owned and operated by EBMUD in Contra Costa and Alameda Counties, California (Figure 1-1). The Plan area is described in Section 2.4 and includes land within the Briones, San Pablo, Upper San Leandro, and Chabot reservoir watersheds. It also includes all of the Lafayette Reservoir watershed, approximately 1,497 hectares (3,700 acres) of Pinole Valley, and an additional 256 hectares (633 acres) of non-watershed land (Figure 1-2). The HCP area is located in the Oakland-Berkeley Hills, is bisected by State Highway 24, and includes all EBMUD watershed property within the map area designations listed in Table 1-2. EBMUD filtration plants, water treatment plants, and other facilities outside the watershed boundary are not included in this HCP.

Table 1-2.
USGS Map References EBMUD East Bay HCP Plan Area
(all EBMUD watershed lands within listed map references)*

TOWNSHIP	RANGE	SECTIONS
01N	02W	7, 18, 31
01N	03W	2-24, 26-36
01N	04W	1, 11-14, 24, 25
01S	02W	6, 7, 17-22, 26-35
01S	03W	1-5, 8-16, 22-27, 34-36
02N	03W	28-34
02S	02W	3-10, 15-23, 27-34
02S	03W	1, 2, 12

***** Data from Teale Data Center.

1.6 PUBLIC INVOLVEMENT

The watershed activities described in Section 3 are taken from the East Bay Watershed Master Plan (WMP) (EBMUD 1996), the Range Resource Management Plan (RRMP) (EBMUD 2001), and the Fire Management Plan (FMP) (EBMUD 2000). The WMP was

created from a process requiring extensive public involvement, including a 25 member Community Advisory Committee (CAC). The CAC met monthly for at least 3 hours over a 4 ½ year period and received expert testimony on the management of Fire and Fuels, Biodiversity, Water Quality, Livestock, Recreation, and a number of other programs. The CAC used this information, in collaboration with EBMUD staff, to develop program direction and policy guidance that was ultimately adopted by the EBMUD Board of Directors.

The WMP Programmatic Environmental Impact Report (PEIR) (EBMUD 1995) described the potential impacts from implementation of the WMP and the benefits of the described management activities. The PEIR analysis compared the impacts associated with implementing fire management strategies proposed in the WMP to existing watershed conditions. One component of the WMP was the development and implementation of the FMP. The subsequent FMP was covered under the PEIR. After analyzing potential impacts of the RRMP with impacts described in the WMP programmatic EIR, a mitigated negative declaration was prepared for the RRMP. Because the WMP, FMP, and RRMP support maintenance and enhancement of habitats for listed and other sensitive species, the biological program was not controversial. A public hearing was conducted to provide additional information and interpretation of the RRMP. Written comments were received and addressed during the review period.

The low effect HCP will be accompanied by a Categorical Exclusion as NEPA documentation to support a USFWS decision. There will be a 30-day public comment period for the HCP.

1.7 REFERENCES

The information presented here was compiled from EBMUD documents and other documents as cited. Species descriptions and information are from the Federal Register notices, California Department of Fish and Game listings, cited texts, refereed and technical documents, or personal communications as cited in Section 12 and Appendix A.

2 BIOLOGICAL RESOURCES

2.1 BACKGROUND

The topography of the EBMUD Watershed lands is varied, ranging in elevation from 43 meters (140 feet) at Pinole Valley to 617 meters (2,024 feet) at Rocky Ridge. The regional climate is complex and average daily temperature may range from 15.5-21ºC (60-70°F) on the west near San Francisco Bay to over 37.8ºC (100°F) on the east side of the Oakland Hills. Annual rainfall near Pinole Valley in the north end of the HCP area averages about 36 cm (14 inches), while nearby San Pablo Reservoir may receive more than twice that amount. The local Mediterranean climate has about 90% of rainfall from October to April. This combination of climate and topography creates diverse biological communities. The most significant current effects on the area's biodiversity and resources are from human development. However, the area still supports populations of sensitive species (CNDDB 2001, Stebbins pers. observ.).

2.2 VEGETATION COMMUNITIES

Both native and non-native vegetation communities occur within the HCP Area (Figures 2-1a and 2-1b). These communities are identified based on descriptions from A Manual of California Vegetation (Sawyer and Keeler-Wolf 1995). Plant species nomenclature conforms to The Jepson Manual (Hickman 1993). Vegetation communities and their relative acres within the HCP are listed in Table 2-1.

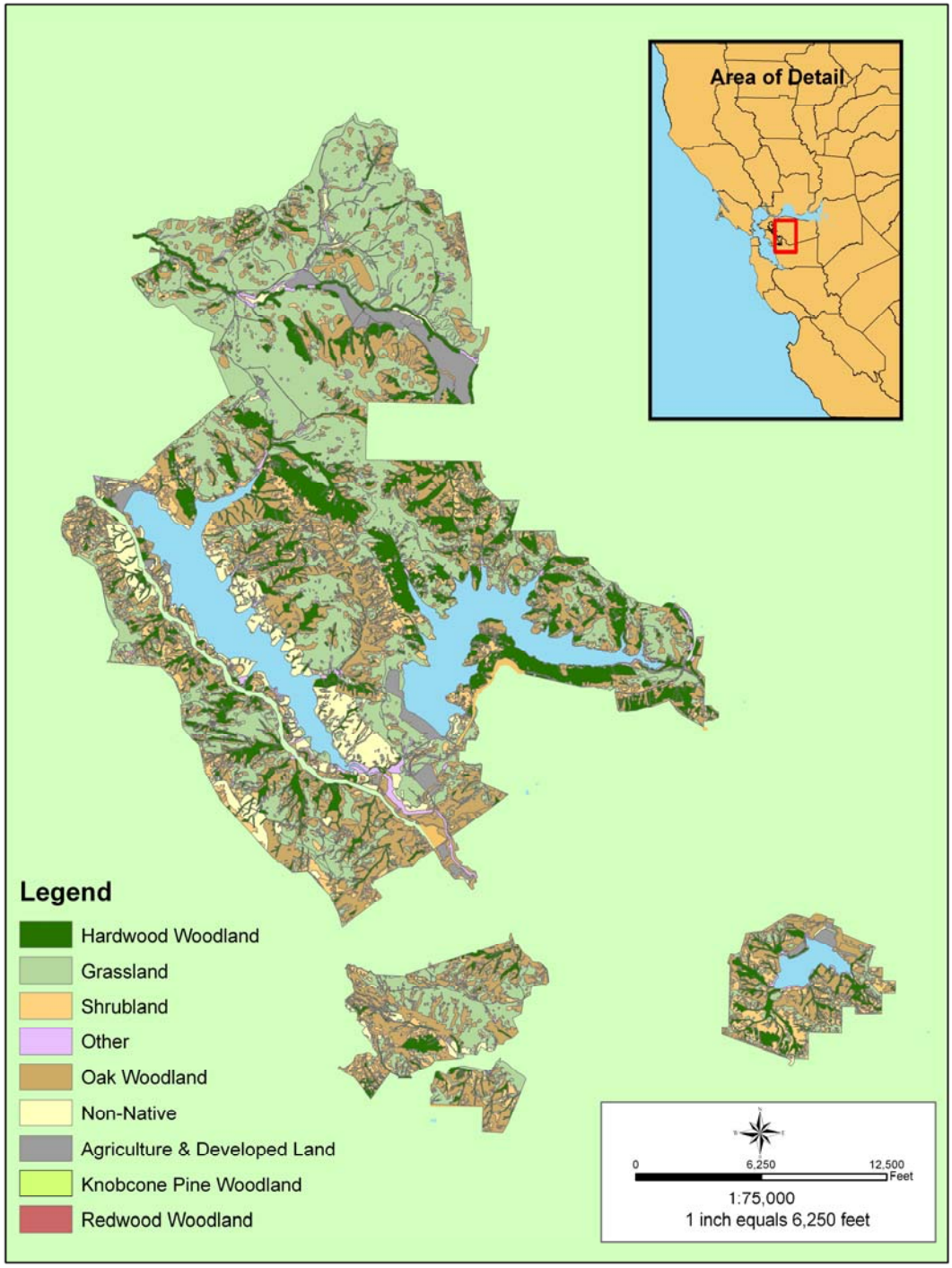

Figure 2-1a. Vegetation category map of north watershed EBMUD HCP covered lands, Contra Costa County, California

Figure 2-1b. Vegetation category map of south watershed EBMUD HCP covered lands, Contra Costa and Alameda counties, California

2.2.1 Tree Dominated Communities

Arroyo willow series

Arroyo willow (*Salix lasiolepis*) is the sole or dominant shrub or tree in the canopy. Bigleaf maple (*Acer macrophyllum*), black cottonwood (*Populus balsamifera*), box elder (*Acer negundo*), California sycamore *(Platanus racemosa*), coyote brush (*Baccharis pilularis*), Fremont cottonwood (*Populus fremontii*), blue elderberry (*Sambucus mexicana*), mulefat (*Baccharis salicifolia*), American dogwood (*Cornus sericea*), wax-myrtle (*Myrica californica*), white alder (*Alnus rhombifolia*), and willows (*Salix* spp.) may be present. Trees are typically less than 10 meters (32.8 ft) in height and the canopy is continuous. Shrubs are sparse under the tree canopy, and the ground layer is sparse to abundant. This community is usually seasonally flooded or saturated and occurs in floodplains, low gradient depositions along rivers and streams. It is distributed in California ranges from sea level to about 1,800 m (5,905 ft) in elevation.

This series occurs on approximately 64 hectares (159 acres) of the HCP area (Figures 2-1a and 2-1b) and is characterized by arroyo willow, red willow (*Salix laevigata*), coast live oak (*Quercus agrifolia*), valley oak (*Quercus lobata*), California bay (*Umbellularia californica*), California buckeye (*Aesculus californica*), black walnut (*Juglans californica*), blue elderberry, red elderberry (*Sambucus racemosa*), mulefat, California blackberry (*Rubus ursinus*), Himalayan blackberry (*Rubus discolor*), California rose (*Rosa californica*), stinging nettle (*Urtica diocia*), rushes (*Juncus* spp.), sedges (*Carex* spp.), nutsedge (*Cyperus eragrostis*), creeping wildrye (*Leymus triticoides*), annual beard grass (*Polypogon monspeliensis*), water cress (*Rorippa nasturtium-aquaticum*), horsetails (*Equisetum* spp.), and non-native annual grasses and weeds.

Black Oak series

Black oak (*Quercus kelloggii*) is the sole, dominant, or important tree in the canopy. California bay, California buckeye, canyon live oak (*Quercus chrysolepis*), coast live oak, knobcone pine (*Pinus attenuata*), madrone (*Arbutus menziesii*), Oregon white oak (*Quercus garryana*), and/or valley oak may be present. Trees are typically less than 40 m (131 ft) in height and the canopy is continuous or intermittent. Shrubs are infrequent to common, and the ground layer

is grassy. Its distribution in California ranges from about 60 to 2,500 m (197-8202 ft) in elevation.

This series occurs on approximately 29 hectares (72 acres) of the HCP area (Figures 2-1a and 2-1b) and is characterized by black oak, California bay, California buckeye, valley oak, coast live oak, western leatherwood (*Dirca occidentalis*), poison-oak (*Toxicodendron diversilobum*), coyote brush, toyon (*Heteromeles arbutifolia*), California coffeeberry (*Rhamnus californica*), snowberry (*Symphoricarpos albus* var. *laevigatus*), creeping snowberry (*Symphoricarpos mollis*), oso berry (*Oemleria cerasiformis*), California fescue (*Festuca californica*), blue wildrye (*Elymus glaucus*), bent grass (*Agrostis pallens*), woodrush (*Luzula comosa*), mugwort (*Artemesia douglasiana*), hound's tongue (*Cynoglossum grande*), poison sanicle (*Sanicula bipinnata*), aster (*Aster radulinus*), soaproot (*Chlorogalum pomeridianum*), death camas (*Zigadenus fremontii*), *Nemophila heterophylla*, Chinese houses (C*ollinsia heterophylla)*, mission bells (*Fritillaria affinis*), giant trillium (*Trillium chloropetalum*), western trillium (*Trillium ovatum*), coffee fern (*Pellaea andromedifolia*), and wood fern (*Dryopteris arguta*).

California Bay series

California bay is the sole or dominant tree in the canopy. Coast live oak, interior live oak *(Quercus wislizenii*), madrone, redwood (*Sequoia sempervirens*), western leatherwood (*Dirca occidentalis*), and/or coyote brush may be present. Trees are typically less than 25 m (82 ft) in height. The canopy is continuous, shrubs are infrequent and the ground layer is sparse or absent. It occurs on sandstone or schist-derived soils and streamsides from about sea level to 500 m (1,640 ft) in elevation.

This series occurs on approximately 63 hectares (156 acres) of the HCP area (Figures 2-1a and 2-1b) and is characterized by California bay, coast live oak, madrone, poison-oak, California blackberry, snowberry, wood fern, sword fern (*Polystichum munitum*), Torrey's melic (*Melica torreyana*), woodland daisy (*Arnica discoidea*), wild ginger (*Asarum caudatum*), and angelica (*Angelica tomentosa*).

California Buckeye series

California buckeye is the dominant or important tree in the canopy. California bay, coast live oak, interior live oak, valley oak, coffeeberry, and/or toyon may be present. The trees are typically less than 10 meters (32.8 ft) in height and the canopy is continuous or intermittent with one or two tiers. Shrubs are infrequent and the ground layer is sparse. It occurs on north-facing, steep slopes with shallow, moderately to excessively drained soils. Elevation ranges from about 100 to 1,500 m (328-4921 ft).

This series occurs on approximately 5 hectares (12 acres) of the HCP area (Figures 2-1a and 2-1b) and is characterized by California buckeye, California bay, toyon, oso berry, California blackberry, blue wildrye, and non-native annual grasses and weeds.

California Sycamore series

California sycamore is the sole or dominant tree in the canopy as widely spaced trees. Arroyo willow, black willow, Oregon ash (*Fraxinus latifolia*), black walnut, bigleaf maple, California bay, coast live oak, Fremont cottonwood, red willow, valley oak, white alder, and/or yellow willow may be present. Trees are usually less than 35 m (115 ft) in height and the canopy is open. Shrubs may be common or infrequent, and the ground layer is grassy.

This series occurs on approximately 13 hectares (32 acres) of the HCP area and is characterized by California sycamore, coast live oak, black oak, valley oak, arroyo willow, red willow, and/or California bay.

Canyon Live Oak series

Canyon live oak is the sole, dominant, or important tree in the canopy. Bigleaf maple, black oak, California bay, madrone, and coast live oak may be present. Trees are usually less than 30 m (98.4 ft) in height and the canopy is continuous and may be two-tiered. Shrubs are infrequent and the ground layer is sparse or absent.

This series occurs on approximately 1 hectare (2.5 acres) of the HCP area and is characterized by canyon live oak, usually in a dense continuous canopy with little or no understory.

Coast Live Oak series

Coast live oak is the sole, dominant or important tree in the canopy. Bigleaf maple, blue oak (*Quercus douglasii*), valley oak, box elder (*Acer negundo* var. *californicum*), California bay, California buckeye, elderberry, toyon, coffeeberry, and /or madrone may be present. Trees are typically less than 30 m (98.4 ft) tall in the continuous, intermittent or open canopy. Shrubs occur occasionally to commonly and the ground layer is grassy or absent. It occurs on steep slopes, raised streambanks and terraces on sandstone or shale-derived soils from about sea level to 1,200 m (3,937 ft) in elevation.

This series occurs on approximately 1,653 hectares (4,083 acres) of the HCP area (Figures 2-1a and 2-1b 1) and is characterized by coast live oak, bigleaf maple, California bay, madrone, black oak, valley oak, blue elderberry, coyote brush, poison-oak, snowberry, soap root, hound's tongue, bent grass, blue wildrye, and non-native annual grasses, forbs, and weeds. This series is usually found in the HCP area as an intermittent or open canopy.

Eucalyptus series

Eucalyptus (*Eucalyptus* spp.) is the sole or dominant tree in the canopy with few other species present. Trees are typically less than 50 m (164 ft) in height with a continuous canopy. Shrubs are infrequent and the ground layer is usually sparse. It occurs on all slopes from sea level to about 300 m (985 ft) in elevation.

This series occurs on approximately 65 hectares (160 acres) of the HCP area (Figures 2-1a and 2-1b) and is characterized by blue gum (*Eucalyptus globulus*), other species of eucalyptus, coast live oak, California bay, madrone, and California blackberry

Fremont Cottonwood series

Fremont cottonwood is the sole, dominant, or important tree in the canopy. Gooddings black willow (*Salix gooddingii*), box elder, California sycamore,

California bay, valley oak, coast live oak, narrowleaf willow, Oregon ash, Pacific willow (*Salix lucida* spp. *lasiandra*), red willow, and/or walnut may be present. Trees are typically less than 25 m (82 ft) in height in a continuous or open canopy. Shrubs and grape lianas are infrequent to common and the ground layer is variable. This series occurs on soils intermittently or seasonally flooded or saturated in riparian corridors, floodplains subject to high-intensity flooding, and low-gradient depositions along rivers, streams and seeps. Fremont cottonwood series is found from sea level to about 2,400 m (7,874 ft) in elevation.

This series occurs on approximately 2 hectares (5 acres) of the HCP area (Figures 2-1a and 2-1b) and is characterized by Fremont cottonwood, box elder, California sycamore, narrowleaf willow, bigleaf maple, California black walnut, red willow, white alder, Oregon ash, arroyo willow, valley oak, blackberry, snowberry, ninebark (*Physocarpus capitatus*), stinging nettle, Barbara sedge (*Carex barbarae*), and water smartweed (*Polygonum amphibium* var. *stipulaceum*).

Knobcone Pine series

Knobcone pine is the sole or dominant tree in the canopy of this fire-dependent community. Canyon live oak, interior live oak, hybrid oaks, chinquapin (*Chrysolepis chrysophylla* var. *minor*), Monterey pine (*Pinus radiata*), brittleleaf manzanita (*Arctostaphylos tomentosa* ssp. *crustacea*), coyote brush, and/or deerweed (*Lotus scoparius*) may be present. Trees are typically less than 25 m (82 ft) in height in the continuous, intermittent or open canopy, which may be two-tiered. Shrubs are infrequent or continuous and the ground layer is sparse. This series occurs on ridges and upper slopes on infertile, rocky, dry soils. Knobcone pine series occurs from about 180 to 2,000m (591-6562 ft) above sea level.

This series occurs on approximately 41 hectares (102.5 acres) of the HCP area (Figures 2-1a and 2-1b) and is characterized by knobcone pine, canyon live oak, interior live oak, coast live oak, California bay, chamise (*Adenostoma fasciculatum*), brittleleaf manzanita (*Arctostaphylos tomentosa* ssp. *crustacea*), huckleberry (*Vaccinium ovatum*), coyote brush, toyon, ocean spray (*Holodiscus discolor*), bush poppy (*Dendromecon rigida*), chaparral pea (*Pickeringia montana)*, poison-oak, snowberry, deerweed, honeysuckle, bracken, soaproot, skullcap (*Scutellaria tuberosa*), woodfern, bush monkeyflower (*Mimulus aurantiacus*), Indian warrior (*Pedicularis densiflora*), Rupert's scurf-pea (*Rupertia physodes*),

California everlasting (*Gnaphalium californicum*), woodrush, Torry's melica, bentgrass, reedgrass (*Calamagrostis koelerioides*), foxtail fescue (*Vulpia myuros*), and pine mushroom (*Chroogomphus tomentosus*).

Madrone series

Madrone is the sole or dominant tree in the canopy. California bay, black oak, coast live oak, hybrid oaks, and/or other native and non-native woody and herbaceous species may be present. Trees are usually less than 12 m (39.4 ft) in height and the canopy is generally closed. Shrubs are scattered or infrequent and the ground layer may be sparse or patchy.

This series occurs on approximately 4 hectares (10 acres) of the HCP area and is characterized by madrone, coast live oak, California bay, and/or black oak with native and/or non-native shrubs and herbaceous species in the understory.

Mixed Hardwood series

California bay, coast live oak, valley oak, black oak, hybrid oaks, California buckeye, madrone, bigleaf maple, elderberry, and/or box elder are important trees in the canopy. Trees are typically less than 30 m (98.4 ft) in height and the canopy is continuous. Shrubs may be common or infrequent and the ground layer is usually sparse or patchy.

This series occurs on approximately 2,388 hectares (5,901 acres) of the HCP area and is characterized by California bay, coast live oak, poison-oak, blackberry, snowberry, and woodfern.

Mixed Oak series

Black oak, blue oak, coast live oak, interior live oak, hybrid oaks, canyon live oak, and/or valley oak are important trees in the canopy. California bay, California buckeye, Douglas fir, foothill pine, madrone, and/or ponderosa pine may be present. Trees are typically less than 30 m (98.4 ft) in height in the continuous canopy that may be two-tiered. Shrubs are infrequent to common and the ground layer is sparse to abundant and may be grassy. Mixed oak series occurs in valleys and gentle to steep slopes on moderately deep soils. The elevation range for this series is from 250 m to about 2,000 m (820-6562 ft) above sea level.

Mixed oak series occurs on approximately 750 hectares (1,852 acres) of the HCP area (Figures 2-1a and 2-1b) and is delineated from other oak series. This series is characterized by coast live oak, black oak, valley oak, interior live oak, canyon live oak, hybrid oaks, bigleaf maple, California bay, blue elderberry, poison-oak, blackberry, snowberry, creeping snowberry, coyote brush, toyon, oso berry, Jim brush (*Ceanothus oliganthus var. sorediatus*), western leatherwood, Ithuriel's spear (*Triteleia laxa*), hound's tongue, poison sanicle, bentgrass, mugwort, woodland daisy, giant trillium, western trillium, woodrush, blue wildrye, and hedgehog dogtail (*Cynoserus echinatus*). This series is usually found in the HCP area as woodland but occasionally occurs as savanna.

Mixed Willow series

More than one willow species is important in the shrub or tree canopy. Arroyo willow, big-leaf maple, black cottonwood, box-elder, California sycamore, Fremont cottonwood, narrowleaf willow, red willow, and/or white alder may be present. If shrubland, emergent trees may be present. Trees are typically less than 10 meters (32.8 ft) in height and the canopy is continuous. Shrub and ground layers are sparse. The elevation range for this series is from sea level to 1,800 m.

This series occurs on approximately 23 hectares (57.5 acres) of the HCP area and is characterized by arroyo willow, red willow, and/or narrowleaf willow. White alder, California sycamore, and Fremont cottonwood may also be present.

Pine series

Monterey pine is the sole or dominant tree in the canopy, and coast live oak may be important. Bishop pine (*Pinus muricata*), Douglas fir, madrone, and/or redwood may be present. Trees are typically less than 30 m (98.4 ft) in height in the continuous or intermittent canopy. Shrubs are absent, infrequent or common and the ground layer is sparse or abundant. It occurs on maritime terraces and headlands on excessively drained soils. Elevation ranges from sea level to about 300 m (984 ft). This series occurs on approximately 208 hectares (520 acres) of the HCP area (Figures 2-1a and 2-1b) and is characterized by Monterey pine, ponderosa pine, other *Pinus* species, coast live oak, madrone, California bay, poison-oak, purple needlegrass (*Nassella pulchra*), Italian thistle (*Carduus*

pycnocephalus), hedgehog dogtail, and pungent slippery jack mushroom (*Suillus pungens*).

Red Willow series

Red willow is the sole or dominant shrub or tree in the canopy. California sycamore, coyote brush, Fremont cottonwood, blue elderberry, coast live oak, valley oak, California buckeye, California bay, elderberry, dogwood, mulefat, white alder, and/or willows may be present. Trees are typically less than 15 m (49.2 ft) in height with a continuous canopy. Shrubs are sparse under the tree canopy. Ground cover is variable. It occurs in seasonally flooded or saturated ditches, floodplains, lake edges and low-gradient deposits along rivers and streams from sea level to about 1,700 m (5,577 ft) in elevation.

This series occurs on approximately 8 hectares (20 acres) of the HCP area (Figures 2-1a and 2-1b) and is characterized by red willow, arroyo willow, coast live oak, valley oak, black walnut, California bay, California buckeye, coyote brush, blue elderberry, mulefat, blue elderberry, poison-oak, creeping wildrye, sedges, rushes, horsetail, mugwort, stinging nettle, California blackberry, and non-native annual grasses and weeds.

Redwood series

Redwood is the sole, dominant, or important tree in the canopy. California bay, Douglas fir, madrone, box elder, and/or coast live oak may be present. Trees are typically less than 120 m (394 ft) in height in the continuous or intermittent canopy, which may be two-tiered. Shrubs are infrequent or common. The ground layer varies from absent to abundant. It occurs on sandstone or schist-derived soils on slopes and raised stream benches and terraces from about 10 to 600 m (32.8-1,969 ft) in elevation.

This series occurs on approximately 129 hectares (318 acres) of the HCP area (Figures 2-1a and 2-1b) and is characterized by redwood, California bay, madrone, coast live oak, interior live oak, wood rose (*Rosa gymnocarpa*), sword fern, wood fern, lady fern, and giant chain fern. Notable is the complete absence of tanoak (*Lithocarpus densiflorus*) and Douglas fir.

Valley Oak series

Valley oak is the sole or dominant tree in the canopy. Black oak, blue oak, California sycamore, coast live oak, hybrid oaks, California bay, California buckeye, dogwood, toyon, coffeeberry, and/or Oregon ash may be present. Trees are typically less than 30 m (98.4 ft) in height in the continuous, intermittent or open canopy. Shrubs occur occasionally and lianas are common. The ground layer is grassy. This series occurs on alluvial or residual soils intermittently flooded or seasonally saturated in valley bottoms, gentle slopes and summit valleys. It is found from sea level to about 775 m (2,543 ft) in elevation.

Valley oak series occurs on approximately 182 hectares (455 acres) of the HCP area (Figures 2-1a and 2-1b) and is characterized by valley oak, coast live oak, black oak, blue oak, buckeye, oso berry, toyon, buckeye, poison-oak, California bay, Ithuriel's spear, blue wildrye, hedgehog dogtail, and non-native annual grasses, forbs, and weeds. This series is found in the HCP area in intermittent or open canopy.

White Alder series

White alder is the sole or dominant tree in the intermittent or open canopy. Bigleaf maple, California sycamore, California bay, California buckeye, coast live oak, valley oak, walnut, willows, and/or Oregon ash may be present. Trees are typically less than 35m (115 ft) in height. Shrubs are common or infrequent and the ground layer is variable. It occurs on intermittently flooded or saturated riparian corridors, floodplains subject to high-intensity flooding, incised canyons, river and stream margins, banks and terraces and seeps. This series is found from sea level to about 2,500 m (8,202 ft) in elevation.

This series occurs on approximately 0.4 hectare (1 acre) of the HCP area (Figures 2-1a and 2-1b) and is characterized by white alder, California bay, arroyo willow, nut sedge, *Juncus patens*, common rush (*Juncus effusus*), California blackberry, and stinging nettle.

Sitka Willow series

Sitka willow (*Salix sitchensis*) is the sole or dominant shrub or tree in the continuous canopy. Bigleaf maple, black cottonwood, California sycamore,

Fremont cottonwood, blue elderberry, dogwood, white alder, Monterey pine, and/or other willows may be present. Trees are typically less than 7 m (23 ft) in height and shrubs are sparse under the tree canopy. The ground layer is variable. This series occurs in seasonally flooded or saturated floodplains and low-gradient depositions along rivers and streams. It is found from sea level to about 400 m (1,312 ft) in elevation.

This series occurs on approximately 0.4 hectare (1 acre) of the HCP area (Figures 2-1a and 2-1b) and is characterized by Sitka willow, nutsedge, rushes, leopard lily (*Lilium pardalinum)*, arroyo willow, American dogwood, coyote brush, poison-oak, California blackberry, lady fern (*Athyrium filix-femina*), fragile fern (*Cystopteris fragilis*), hedgenettle (*Stachys pycnantha*), Franciscan thistle (*Cirsium andrewsii)*, stinging nettle, annual beard grass (*Polypogon monspeliensis*), cut-leaf parsley (*Berula erecta)*, wax-myrtle, *Montia fontana*, *Epilobium densiflorum*, dwarf bullrush (*Scirpus cernuus*), horkelia (*Horkelia californica* ssp. *frondosa*), willow dock (*Rumex salicifolius*), common spikerush (*Eleocharis macrostachya*), California lousewort (*Scrophularia californica*), bitter dogbane (*Apocyum androsaemifolium*), mugwort, gooseberry (*Ribes californicum*), mule fat, and poison hemlock (*Conium maculatum*).

2.2.2 Shrub Dominated Communities

Broom series

Broom is the sole or dominant shrub in the canopy. French broom, gorse, Spanish broom, Scotch broom, and/or other species of *Cytisus* or *Genista* may be present. Emergent trees may be present. Shrubs are usually less than 6 m (19.7 ft) in height and the canopy is continuous. The ground layer is sparse.

This series occurs on approximately 4 hectares (10 acres) of the HCP area and is characterized almost exclusively by French broom (*Genista monspessulana*). French broom is a target species when clearing fuel breaks and in the control of invasive plants; however, there are seed sources on most lands surrounding EBMUD watershed, especially on county roadsides.

Bush Monkeyflower series

Bush monkeyflower is the sole or dominant shrub in the canopy. California

sagebrush, coyote brush, silver lupine, and herbaceous species may be present. Shrubs are usually less than 5 m (16.4 ft) in height and the canopy may be continuous or intermittent. The ground layer is sparse or patchy.

This series occurs on approximately 0.4 hectare (1 acre) of the HCP area and is characterized by bush monkey flower, California sagebrush, silver lupine, and/or coyote brush.

California Sagebrush series

California sagebrush is the sole or dominant shrub in the intermittent or continuous canopy. Black sage, bush monkeyflower, chamise, manzanita, coyote brush, deer weed, silver lupine, poison-oak, may be present. Emergent blue elderberry may be present. Shrubs are typically less than 2 m (6.6 ft) in height and the ground layer is variable. It occurs on steep, south-facing slopes and rarely on flooded low-gradient deposits along streams on alluvial or colluvial-derived, shallow soils. It is found from sea level to about 1,200 m (3,937 ft) in elevation.

This series occurs on approximately 17 hectares (42.5 acres) of the HCP area (Figures 2-1a and 2-1b) and is characterized by California sagebrush, bush monkeyflower, coyote brush, and non-native annual grasses and weeds.

Chamise series

Chamise is the sole or dominant shrub in the continuous canopy of this fire-dependent community. Black sage (*Salvia mellifera*), buckwheats (*Eriogonum spp.*), ceanothus (*Ceanothus* spp.), manzanita (*Arctostaphylos* spp.), poison-oak, interior live oak, coast live oak, California bay, scrub oak (*Quercus berberidifolia*), and/or toyon may be present. Emergent trees may be present. Shrubs are typically less than 3 m (9.8 ft) in height and the ground layer is sparse. It occurs on all slopes on shallow soils that may be mafic-derived. It is found from about 10 to 1,800 m (32.8-5,905 ft) in elevation.

This series occurs on approximately 39 hectares (97.5 acres) of the HCP area (Figures 2-1a and 2-1b) and is characterized by chamise, brittleleaf manzanita, coast live oak, poison-oak, toyon, coyote brush, deerweed (*Lotus scoparius*), foothill needlegrass, bush monkeyflower, California sagebrush (*Artemisia californica*), soaproot, bush poppy, chaparral pea, bracken, goldenback fern

(*Pentagramma triangularis*), bush monkeyflower, peak rush-rose (*Helianthemum scoparium*), foothill needlegrass (*Nassella lepida*), California everlasting, soaproot, and foxtail fescue.

In some areas of the chamise series, brittleleaf, or pallid manzanita is the sole or dominant canopy species. These occurrences are found on East Ridge (where the pallid manzanita can be over-topped by madrone if not treated) and in the Rodeo Shale soils of the hills between Briones Reservoir and Orinda.

Chamise-Black Sage series

Chamise and black sage are important shrubs in the continuous canopy of this fire-dependent community. Buckwheat, wedgeleaf ceanothus (*Ceanothus cuneatus*), and/or mountain mahogany (*Cercocarpus betuloides*) may be present. Shrubs are typically less than 3 m (9.8 ft) in height and the ground layer is sparse. This series occurs on south-facing slopes on shallow, often rocky soils. It is found from about 10 to 1,600 m (32.8-5249 ft) in elevation.

This series occurs on approximately 55 hectares (137.5 acres) of the HCP area (Figures 2-1a and 2-1b) and is characterized by chamise, black sage, mountain mahogany, coast live oak, California bay, wedgeleaf ceanothus, coyote brush, brittleleaf manzanita, deerweed, bush monkeyflower, California sagebrush, California blackberry, and soaproot.

Coyote Brush series

Coyote brush is the sole or dominant shrub in the continuous or intermittent canopy. California blackberry, Himalayan blackberry, California coffeeberry, California sagebrush, poison-oak, buckwheats, bush monkeyflower, toyon, and/or silver bush lupine (*Lupinus albifrons*) may be present. Shrubs are typically less than 2 m (6.6 ft) in height and the ground layer is variable. This series occurs on stabilized dunes of coastal bars, river mouths, spits along the coastline, coastal bluffs, open slopes, and terraces from sea level to about 1,000 m (3,281 ft) in elevation.

This series includes approximately 961 hectares (2402.5 acres) of the HCP area (Figures 2-1a and 2-1b) and is characterized by coyote brush, California sagebrush, coast live oak, bush monkeyflower, poison-oak, ocean spray, California

blackberry, toyon, California coffeeberry, silver bush lupine, imperfect melic (*Melica imperfecta*), California everlasting, soaproot, and woolly Indian paintbrush (*Castilleja foliolosa*).

Coyote Brush with Emergent Trees series

Coyote brush is the dominant shrub but coast live oak, California bay, and/or blue elderberry are present, usually as scattered young trees emerging from the scrub. Poison-oak, blackberry, bush monkeyflower, silver lupine, and/or California coffeeberry (*Rhamnus californica*) may be present. Shrubs are typically less than 2 m (6.6 ft) in height and trees are typically less than 10 m (32.8 ft). The shrub canopy can be continuous or intermittent. The tree canopy is widely intermittent. The ground layer is sparse or patchy.

This series occurs on approximately 6 hectares (15 acres) of the HCP area and is characterized by coyote brush, coast live oak, California bay, California coffeeberry, blue elderberry, and/or poison-oak.

Coyote Brush – Poison-oak series

Coyote brush and poison-oak are the dominant shrubs in the canopy, usually in equal or near-equal proportions. California sagebrush, bush monkeyflower, and/or blackberry may also be present. Shrubs are usually less than 5 m (16.4 ft) in height and the canopy may be continuous or intermittent. The ground layer is sparse or patchy.

This series occurs on approximately 0.4 hectare (1 acre) of the HCP area and is characterized by coyote brush and poison-oak, usually in equal portions. California sagebrush, bush monkeyflower, and/or blackberry may also be present.

Holodiscus series

Ocean spray is the sole, dominant, or important shrub in the intermittent canopy. Coyote brush, bush monkeyflower, snowberry, silktassel (*Garryaelliptica*), poison-oak, service berry (*Amelanchier alnifolia*), and/or California fescue may be present. Emergent trees may also be present. The shrubs are typically less than 1 m (3.3 ft) in height and the ground layer is sparse. It occurs on ridges, upper slopes

and steep talus on loam, sand, rocky skeletal soils. This series is found from 700 to 2,800 m (2,297-9,186 ft) in elevation.

This series occurs on approximately 4 hectares (10 acres) of the HCP area (Figures 2-1a and 2-1b) and is characterized by ocean spray, coast live oak, California bay, California blackberry, honeysuckle (*Lonicera hispidula* var. *vacillans*), poison-oak, bush monkeyflower, coyote brush, blue elderberry, imperfect melic, Torry's melic, soaproot, bent grass, blue wildrye, and California fescue.

Blue Elderbery Scrub series

Blue elderberry is sole or dominant in the canopy. Coyote brush, willows, poison-oak, and/or Oregon ash may be present. Emergent Fremont cottonwood, coast live oak, California bay, or valley oak may be present. Shrubs are less than 8 m (26.2 ft) in height and the canopy can be continuous, intermittent, or open. The ground layer is grassy.

This series occurs on approximately 2 hectares (5 acres) of the HCP area and is characterized by blue elderberry, poison oak, and blackberry.

Mixed Chaparral series

Pallid manzanita (*Arctostaphylos pallida*) is sole or abundant in the canopy. Brittleaf manzanita (*Arctostaphylos tomentosa ssp. crustacea*) madrone, coast live oak, California bay, Monterey pine, deerweed, and/or other native and non-native woody and herbaceous species may be present. Shrubs are usually less than 3 m (9.8 ft) in height and the canopy may be closed, continuous or open, and can be over-topped by trees. The ground layer is sparse, covered with litter, or grassy.

This series occurs on approximately 1 hectare (2.5 acres) of the HCP area and is characterized by pallid manzanita, brittleleaf manzanita, Monterey pine, and coast live oak.

Mule Fat series

Mule fat is the sole or dominant shrub in the continuous canopy. Arroyo willow, coast live oak, valley oak, California bay, California sycamore, black walnut, white alder, red willow and/or narrowleaf willow may be present. Shrubs are typically less than 4 m (13.1 ft) in height and the ground layer is sparse. It occurs in

seasonally flooded or saturated soils in canyon bottoms, irrigation ditches and stream channels from sea level to about 1,250 m (4,101 ft) in elevation.

This series occurs on approximately 0.2 hectare (<0.5 acre) of the HCP area (Figures 2-1a and 2-1b) and is characterized by mulefat, sedges, rushes, poison-oak, mugwort, willow herb (*Epilobium ciliatum* ssp. *ciliatum*), oxtongue thistle (*Picris echioides*), sow thistle (*Sonchus asper*), and stinging nettle.

Narrowleaf Willow series

Narrowleaf willow is the sole or dominant shrub in the continuous canopy. Fremont cottonwood, white alder, coast live oak, valley oak, California bay, smartweed and/or other willows may be present. Emergent trees may also be present. Shrubs are typically less than 7 m (23 ft) in height and the ground layer is variable. It occurs on seasonally flooded or saturated floodplains and depositions along rivers and streams. It is found from sea level to about 2,700 m (8,858 ft) in elevation.

This series occurs on approximately 4 hectares (10 acres) of the HCP area (Figures 2-1a and 2-1b) and is characterized by narrowleaf willow, water smartweed, cockleburr (*Xanthium strumarium*), stinging nettle, and knotgrass *(Paspalum distichum*).

Poison-oak Scrub series

Poison-oak is the sole or dominant species in the canopy. Coyote brush, California sagebrush, bush monkeyflower, California blackberry, Himalaya blackberry, and/or other native or non-native woody or herbaceous species may be present. Shrubs are typically less than 2 m (6.6 ft) tall and the canopy is usually continuous. The ground layer is sparse or patchy.

This series occurs on approximately 3 hectares (7.5 acres) of the HCP area and is characterized by poison-oak, coyote brush, blackberry, and/or bush monkeyflower.

Silver Lupine series

Silver bush lupine is the sole or dominant shrub in the canopy. Coyote brush, California sagebrush, annual grasses and forbs, and other native or non-native woody and herbaceous species may be present. Shrubs are typically less than 1.5 m

(5 ft) in height and the canopy is generally open. The ground layer may be sparse or grassy.

This series occurs on approximately 0.8 hectare (2 acres) of the HCP area and is characterized by silver bush lupine and California sagebrush.

2.2.3 Herbaceous Dominated Communities

Bulrush series

Bulrushes (*Scirpus* spp.) are the sole or dominant species in the herbaceous canopy. Broadleaf cattail, California bulrush, common three-square, common tule, narrowleaf cattail, rushes, saltgrass, saltmarsh bulrush, southern cattail, spikerush, nutsedge, water-plantain, water smartweed, and/or yerba mansa may be present. Herbs are typically less than 4 m (13.1 ft) in height and cover is continuous, intermittent, or open. It occurs on permanently, regularly, semipermanently, seasonally and irregularly flooded soils in bays, estuaries, dune swales, slough terrace edges; berms, backwaters, banks and bottomland margins of rivers; channels, creeks, ditch margins; lake beds; and the margins of lagoons, ponds and reservoirs. It is found from sea level to about 2,100 m (6,890 ft) in elevation.

This series occurs on approximately 4.5 hectares (11 acres) of the HCP area (Figures 2-1a and 2-1b) and is characterized by bulrush, cattail, stinging nettle and duckweed.

Bulrush-cattail series

Bulrushes and cattails are important herbs emerging from the water. Broadleaf cattail, California bulrush, common three-square, common tule, narrowleaf cattail, rushes, saltgrass, saltmarsh bulrush, southern cattail, spikerush, nutsedge, water-plantain, water smartweed, and/or yerba mansa may be present. Herbs are typically less than 4 m (13.1 ft) in height and the cover is continuous, intermittent or open. It occurs on permanently, regularly, semipermanently, seasonally and irregularly flooded soils in bays, estuaries, dune swales, slough terrace edges; berms, backwaters, banks and bottomland margins of rivers; channels, creeks, ditch margins; lake beds; and the margins of lagoons, ponds and reservoirs. It is found from sea level to about 2,100 m (6890 ft) in elevation.

This series occurs on approximately 2 hectares (5 acres) of the HCP area (Figures 2-1a and 2-1b) and is characterized by bulrush, cattail, stinging nettle and duckweed.

California Annual Grassland series

Non-native annual grasses and herbs dominate in the ground layer. Bromes (*Bromus* spp.), barleys (*Hordeum* spp.), California poppy (*Eschscholzia californica*), filarees (*Erodium* spp.), goldfields (*Lasthenia* spp.), lupines (*Lupinus* spp.), mustards (species in *Brassica, Hirschfeldia, Sinapis* and *Sisymbrium)*, oats (*Avena* spp.), owl's-clovers (*Castilleja* spp.), annual ryegrass (*Lolium multiflorum*), and/or star-thistles *(Centaurea* spp.) may be present. Emergent shrubs and trees may also be present. Grasses are typically less than 1 m (3.3 ft) in height and cover may be continuous or open. It occurs in all topographic locations from sea level to about 1,200 m (3,937) in elevation.

This series occurs on approximately 3,059 hectares (7647.5 acres) of the HCP area (Figures 2-1a and 2-1b) and is characterized by soft chess (*Bromus hordeaceus*), ripgut (*B. diandrus*), slender wildoat (*Avena barbata*), foxtail fescue, annual ryegrass, wild barley (*Hordeum murinum* ssp. *leporinum*), mustards, filarees, star-thistles, oxtongue thistle, milk thistle (*Silybum marinum*), bull thistle (*Cirsium vulgare*), Italian thistle, whorled dock (*Rumex conglomeratus*), California poppy, hayfield tarweed (*Hemizonia congesta*), and miniature lupine (*Lupinus bicolor*).

California Oatgrass series

California oatgrass *(Danthonia californica*) is the sole or dominant grass in the ground layer. Bracken (*Pteridium aquilinum*), California melic (*Melica californica*), foothill sedge (*Carex tumulicola*), Idaho fescue (*Festuca idahoensis*), one-sided bluegrass (*Poa secunda*), purple needlegrass, red fescue (*Festuca rubra*), and/or velvet grass (*Holcus lanatus*), may be present. Emergent trees and shrubs may also be present. Grass is typically less than 1 m (3.3 ft) in height and cover is open. This series occurs in seasonally or permanently saturated valley bottoms and lower portions of alluvial slopes as well as coastal bluffs, terraces, slopes, and ridges. California oatgrass series is found from sea level to about 2,200 m (7,218 ft) in elevation.

This series occurs on approximately 1.6 hectares (4 acres) of the HCP area (Figures 2-1a and 2-1b) and is characterized by California oatgrass, purple needlegrass, blue wildrye, California brome (*Bromus carinatus*), yarrow (*Achillea millifolium*), lupines, mustards, blue dicks (*Dichelostemma capitatum*), Ithuriel's spear, bracken, hayfield tarweed, miniature lupine, blue lupine (*Lupinus formosus*), California yampa (*Perideridia kelloggii*) and non-native annual grasses, forbs, and weeds.

Cattail series

Cattails (*Typha* spp.) are the sole or dominant herb emerging from water. Broadleaf cattail (*Typha latifolia*), California bulrush (*Scirpus californicus*), common three-square (*Scirpus americanus*), common tule (*Scirpus acutus*), duckweed, narrowleaf cattail (*Typha angustifolia*), rushes, saltgrass *(Distichlis spicata*), saltmarsh bulrush (*Scirpus maritimus*), southern cattail *(Typha domingensis*), nutsedge, spikerush, water-plantain (*Allisma plantago-aquatica*), water smartweed, and/or yerba mansa (*Anemopsis californica*) may be present.

Herbs are typically less than 4 m (13.1 ft) in height and ground cover is continuous, intermittent or open. It occurs in permanently, regularly, semipermanently, seasonally and irregularly flooded or irregularly exposed soils in bay, estuary, dune swale, slough terrace edges; berm, backwater, bank, bottomland, mouth margins of rivers; channel, creek, ditch margins; lake beds; lagoon, pond, reservoir margins; and along geologic faults. It is found from sea level to about 2,000 m (6,562 ft) in elevation.

This series occurs on approximately 2.8 hectares (7 acres) of the HCP area (Figures 2-1a and 2-1b) and is characterized by cattails, bulrushes, stinging nettle, rushes, duckweed, and other aquatic plants.

Creeping Ryegrass series

Creeping wildrye is the sole or dominant grass in the ground layer. Bromes, oats, thistles, purple needlegrass, foothill needlegrass, yarrow, yampah, mustards, wild lettuce, poison hemlock, and/or squirreltail (*Elymus* spp.) may be present. Emergent shrubs may be present. Grasses are typically less than 1 m (3.3 ft) in height and ground cover is open. It occurs in permanently saturated valley bottoms and lower portions of alluvial slopes from sea level to about 2,300 m (7,546 ft) in elevation.

This series occurs on approximately 49 hectares (122.5 acres) of the HCP area (Figures 2-1a and 2-1b) and is characterized by creeping wildrye and hayfield tarweed.

Duckweed series

Duckweeds (*Lemna* spp.) are the sole or dominant plants floating on the water surface. Duckmeats (*Spirodela* spp.), Mexican mosquito fern (*Azolla mexicana*), mosquito fern (*Azolla filiculoides*), mud-midgets (*Wolffiella* spp.), potamogeton (*Potamogeton* spp.), water milfoil (Myriophyllum spp.), and/or water-meals (*Wolffia* spp.) may be present. Emergent plants may also be present. Plants are 0.3 to 8 mm (0.01-0.3 in) in size and cover may be continuous, intermittent or open. It occurs in permanently, semipermanently or seasonally flooded ditches, rivers, stream channels, and ponds. This series is found from sea level to about 2,300 m (7,546 ft) in elevation.

This series occurs on approximately 0.4 hectare (1 acre) of the HCP area (Figures 2-1a and 2-1b) and is characterized by duckweed and Mexican mosquito fern. Most duckweed is in the understory of riparian woodland.

Foothill Needlegrass series

Foothill needlegrass is the sole or dominant grass in the ground layer. California fescue, California melic, one-sided bluegrass, purple needlegrass, yarrow, and/or other native and non-native annual and perennial herbs may be present. Emergent shrubs and trees may be present. Grass is typically less than 1 m (3.3 ft) in height and cover is open. This series occurs in all topographic locations on sandstone or ultramafic-derived soils with high clay content. It is found from sea level to about 1,700 m (5,577 ft) in elevation.

This series occurs on approximately 2 hectares (5 acres) of the HCP area (Figures 2-1a and 2-1b) and is characterized by foothill needlegrass, California melic, imperfect melica, purple needlegrass, blue wildrye, soaproot, blue dicks, Ithuriel's spear, Mariposa lily (*Calochortus argillosus*), bracken, yarrow, and non-native annual grasses, forbs and weeds.

Idaho Fescue series

Idaho fescue is the sole or dominant grass in the ground layer. California melic, California oatgrass, California fescue, bracken, foothill sedge, one-sided bluegrass, purple needlegrass, red fescue, velvet grass, and/or other native and non-native annual and perennial herbs may be present. Emergent shrubs and trees may also be present. Grass is typically less than 1 m (3.3 ft) in height and cover is open. This series occurs on slopes and ridges from about 20 to 1,800 m (65.6-5,906 ft) in elevation.

This series occurs on approximately 2.4 hectares (6 acres) of the HCP area (Figures 2-1a and 2-1b) and is characterized by Idaho fescue, California melic, California oatgrass, California brome, woodrush, one-sided bluegrass, purple needlegrass, blue wildrye, Junegrass (*Koeleria micrantha*), Diablo sunflower (*Helianthella castanea*), soaproot, lupines, blue dick, Ithuriel's spear, Mariposa lily, gold nuggets (*Calochortus luteus*), bracken, squirreltail, yarrow, California yampa, hayfield tarweed and non-native annual grasses, forbs and weeds.

Introduced Perennial Grassland series

Introduced perennial grasses are the sole or dominant grasses in the ground layer. Harding grass (*Phalaris aquatica*), blue wildrye, bracken, California oatgrass, California brome, other bromes, barleys, creeping bent (*Agrostis stolonifera*), foothill sedge, Kentucky bluegrass (*Poa pratensis*), one-sided bluegrass, orchard grass (*Dactylis glomerata*), red fescue, velvet grass, and/or other native and non-native annual and perennial herbs. Emergent shrubs and trees may also be present. Grasses are typically less than 1 m (3.3 ft) in height and cover is open. It occurs in seasonally and permanently saturated clay, loam and sand soils in all topographic locations. This series is found from sea level to about 3,500 m (11,483 ft) in elevation.

This series occurs on approximately 5 hectares (12.5 acres) of the HCP area (Figures 2-1a and 2-1b) and is characterized by Harding grass, and non-native grasses, forbs and weeds.

Mixed Native Perennial Grassland series

Native perennial and annual forbs and grasses are dominant, abundant, or scattered.

Purple needlegrass, foothill needlegrass, one-sided bluegrass, California fescue, Idaho fescue, red fescue, Junegrass, California melic, California oatgrass, California brome, blue wildrye, squirreltail, soaproot, lupines, blue dicks, Ithuriel's spear, Mariposa lily, gold nuggets (*Calochortus luteus*), bracken, yarrow, California yampah, hayfield tarweed, and non-native annual grasses, forbs and weeds may be present. Widely scattered shrubs or trees may be present. The ground layer is generally grassy.

This series occurs on approximately 80 hectares (200 acres) of the HCP area and is characterized by purple needlegrass, one-sided bluegrass, California fescue, Idaho fescue, red fescue, Junegrass, California melic, California oatgrass, California brome, blue wildrye, squirreltail, soaproot, miniature lupine (*Lupinus bicolor*), summer lupine (*Lupinus formosus*), blue dicks, Ithuriel's spear, bracken, yarrow, California yampah, hayfield tarweed, and/or other native or non-native annual grasses, forbs and weeds.

One-sided Bluegrass series

One-sided bluegrass is the sole or dominant grass in the ground layer. Big squirreltail, creeping wildrye, mission bells (*Fritillaria affinis*), squirreltail, and/or other native and non-native annual and perennial herbs may be present. Emergent shrubs and trees may also be present. Grasses are typically less than 1 m (3.3 ft) in height and cover is open. This series occurs in seasonally and permanently saturated valley bottoms, and lower portions of alluvial slopes as well as all topographic locations in uplands. It is found from sea level to about 3,800 m (12,467 ft) in elevation.

This series occurs on approximately 0.4 hectare (1 acre) of the HCP area (Figures 2-1a and 2-1b) and is characterized by one-sided bluegrass, blue wildrye, California brome, bracken, blue lupine, Ithuriel's spear, Mariposa lily, gold nuggets, mission bells, yarrow, and non-native annual grasses and forbs.

Purple Needlegrass series

Purple needlegrass (*Nassella pulchra*) is the sole or dominant grass in the ground layer. Blue wildrye, California fescue, California melic, California brome, Junegrass, one-sided bluegrass, imperfect melica, yarrow and/or other native and non-native annual and perennial herbs may be present. Annual grasses and flowers

are common. Emergent shrubs and trees may also be present. Grasses are typically less than 1 m (3.3 ft) in height and cover is open. It occurs in all topographic locations on deep soils with high clay content. It is found from sea level to about 1,300 m (4,265 ft) in elevation.

This series occurs on approximately 56 hectares (140 acres) of the HCP area (Figures 2-1a and 2-1b) and is characterized by purple needlegrass, squirreltail, miniature lupine, yarrow, bracken, hayfield tarweed, and non-native annual grasses, forbs and weeds.

Rush Riparian series

Iris-leaved rush, common rush, Baltic rush or bog rush are the sole or dominant species in the grassland. Nutsedge, cattails, sedges, spikerush, toadrush (*Juncus bufonius*), creeping wildrye, and/or other native or non-native aquatic, riparian, and upland woody and herbaceous species may be present. The cover can be closed, continuous, or open. Shrubs may be widely scattered or infrequent. The ground layer may be sparse or grassy.

This series occurs on approximately 21 hectares (53 acres) of the HCP area and is usually dominated by iris-leaved rush or common rush. Other characteristic species are nutsedge, toadrush, spikerush, creeping wildrye, and sedges.

Sedge series

Sedges are the sole, dominant or important herbs in the ground layer. Bulrushes, cattails, rushes, nutsedge, spiny cocklebur (*Xanthium spinosum*), other sedges and/or spikerushes (*Eleocharis* spp.) may be present. Herbs are typically less than 1 m (3.3 ft) in height and canopy is continuous or intermittent. This series occurs in seasonally, semipermanently and permanently flooded or saturated channel, lake, pond, reservoir, river and stream margins; and depressions, seeps and swales from sea level to about 2,900 m (9,514 ft) in elevation.

Sedge series occurs on approximately 18 hectares (45 acres) of the HCP area (Figures 2-1a and 2-1b) and is characterized by sedges, nutsedge, rushes, common spikerush, stinging nettle, annual beard grass, water cress, cattails, creeping wildrye, monkeyflower (*Mimulus guttatus*), willow herb, *Epilobium densiflorum* and non-native annual grasses, forbs, and weeds.

Spikerush series

Spikerushes are the sole or dominant herb in the ground layer. Bulrushes, spikerushes, cattails, nutsedge, monkey flower, rushes, and/or sedges may be present. Herbs are typically less than 0.5 m (1.6 ft) in height and cover is continuous or intermittent. This series occurs on seasonally, semipermanently and permanently flooded or saturated channel, lake, pond, reservoir, stream and river margins; and depressions, swales and seeps. It is found from sea level to about 2,500 m (8,202 ft) in elevation.

This series occurs on approximately 1.2 hectares (3 acres) of the HCP area (Figures 2-1a and 2-1b) and is characterized by common spikerush, nutsedge, rushes, duckweed, Mexican mosquito fern, annual beard grass, watercress, and sow thistle.

Table 2-1.
Vegetation Communities in the HCP Area.

COMMUNITY	HABITAT	ACRES WITHIN HCP AREA*
Tree Dominated		
Arroyo Willow series	Valley Foothill Riparian	159
Black Oak series	Montane Hardwood	72
California Bay series	Montane Hardwood	156
California Buckeye series	Montane Hardwood	12
California Sycamore series	Valley Foothill Riparian	32
Coast Live Oak series	Coastal Oak Woodland	4,083
Eucalyptus series	Eucalyptus	160
Fremont Cottonwood series	Valley Foothill Riparian	5
Knobcone Pine series	Closed-Cone Pine-Cypress	41
Madrone series	Coastal Oak Woodland	9
Mixed Hardwood series	Montane Hardwood	5,901
Mixed Oak series	Coastal Oak Woodland	1,852
Mixed Willow series	Valley Foothill Riparian	57
Pine series	Closed-Cone Pine-Cypress	513
Red Willow series	Valley Foothill Riparian	20
Redwood series	Redwood	318
Valley Oak series	Valley Oak Woodland	451
White Alder series	Valley Foothill Riparian	1
Sitka Willow series	Valley Foothill Riparian	1
Shrub Dominated		
Bush Monkeyflower series	Coastal Scrub	1
California sagebrush series	Coastal Scrub	42
Chamise series	Chamise-Redshank Chaparral	96
Chamise-Black Sage series	Chamise-Redshank Chaparral	137
Coyote Brush series	Coastal Scrub	2,373
Coyote Brush with Emergent Trees series	Coastal Scrub	14
Coyote Brush – Poison Oak series	Coastal Scrub	1
Holodiscus series	Montane Chaparral	9
Mixed Chaparral series	Mixed Chaparral	2
Mule Fat series	Valley Foothill Riparian	< 0.5
Narrowleaf Willow series	Valley Foothill Riparian	10
Silver Lupine series	Coastal Scrub	2
Poison Oak scrub series	Coastal Scrub	7
Blue elderberry series	Freshwater emergent wetland	4

* Total EBMUD acreage additionally includes orchard, pond, developed, cultivated, and golf course land classifications (not featured here).

Table 2-1.
Vegetation Communities in the HCP Area. (Cont.)

COMMUNITY	HABITAT	ACRES WITHIN HCP AREA*
Herbaceous Dominated		
Bulrush series	Lacustrine	11
Bulrush-cattail series	Lacustrine	5
California Annual Grassland series	Annual Grassland	7,559
California Oatgrass series	Annual Grassland	4
Cattail series	Lacustrine	7
Creeping Ryegrass series	Perennial Grassland	122
Duckweed series	Perennial Grassland	1
Foothill Needlegrass series	Perennial Grassland	4
Idaho Fescue series	Perennial Grassland	6
Introduced Perennial Grassland series	Perennial Grassland	12
Mixed Native Perennial Grassland series	Perennial Grassland	198
One-sided Bluegrass series	Perennial Grassland	1
Purple Needlegrass series	Perennial Grassland	140
Rush riparian series	Perennial Grassland	53
Sedge series	Perennial Grassland	43
Spikerush series	Freshwater Emergent Wetland	3

* Total EBMUD acreage additionally includes orchard, pond, developed, cultivated, and golf course land classifications (not featured here).

2.3 COVERED SPECIES

The HCP covered species include those animals and plants that occur on EBMUD watershed land and are in least one of the following categories:

- listed as threatened or endangered under the federal ESA;
- listed as threatened or endangered under the CESA;
- proposed for listing under the federal ESA;
- candidate for listing CESA (California Fish and Game Code);
- California state species of special concern;
- Plants known to occur on EBMUD watershed and listed by California Native Plant Society as C1b (rare and endangered in California and elsewhere; nearly extinct).

Table 2-2 lists the covered species and their status. Table 2-3 lists the covered species and the vegetation communities where EBMUD GIS species records exist in the HCP area. Most of the other vegetation communities support at least one HCP species at some point in their life cycle. Biological information (species distribution, occurrence and ecology) for the species addressed in this plan is presented in Appendix A.

Table 2-2
Plant and Animal Species Addressed in EBMUD's
East Bay Habitat Conservation Plan

Common Name	Species	Federal Status	State Status	Critical Habitat in HCP Area
Santa Cruz tarplant	*Holocarpha macradenia*	T	E; C1b	No
Pallid manzanita	*Arctostaphylos pallida*	T	E; C1b	No
Resident Wild Rainbow Trout	*Oncorhynchus mykiss*	None	None	No
California Red-legged Frog	*Rana draytonii*	T	SSC	No
Western Pond Turtle	*Clemmys marmorata*	None	None	No
Alameda Whipsnake	*Masticophis lateralis euryxanthus*	T	T	Yes
Pallid Bat	Antrozous pallidus	None	SSC	No

STATUS: **E** = Endangered; **T** = Threatened; **SSC** = California Species of Special Concern; **C1b** = California Native Plant Society 1b (rare and endangered in California and elsewhere; nearly extinct).

Table 2-3.
EBMUD Watershed Vegetation Communities with Survey Records for HCP Covered Species.*

Vegetation Community Series	Santa Cruz Tarplant	Pallid Manzanita	Rainbow Trout	CA Red-legged Frog	Western Pond Turtle	Alameda Whipsnake	Pallid Bat	Number of Sensitive Species
Tree Series								
Arroyo Willow				✓	✓			2
California Bay				✓				1
California Black Walnut			✓					1
Coast Live Oak				✓	✓	✓		3
Eucalyptus			✓					1
Mixed Hardwood			✓	✓	✓	✓		4
Mixed Willow Riparian			✓	✓	✓			3
Mixed Oak				✓	✓	✓		3
Pine Series (all pines)					✓	✓		2
Red Willow			✓	✓				2
Redwood			✓					1
Valley Oak				✓	✓			2
Shrub Series								
Chamise Chaparral						✓		1
Coyote Brush						✓		1
Mixed Chaparral		✓						1
Herbaceous Series								
Bulrush					✓			1
Bulrush-cattail					✓			1
California Annual Grassland	✓			✓	✓	✓	✓	5
Cattail				✓	✓			2
Creeping Ryegrass				✓				1
Duckweed Riparian				✓	✓			2
Introduced Perennial Grassland					✓			1
Mixed Native Perennial Grassland					✓	✓		2
Purple Needlegrass	✓							1
Rush Riparian Grassland				✓	✓			2
Sedge Riparian				✓	✓			2
Spikerush Riparian				✓	✓			2

*Source: EBMUD Geographic Information System sensitive species and vegetation community data layers.

2.4 HABITAT CONSERVATION PLAN AREAS

The approximately 11,412 hectares (28,530 acres) of HCP Plan area is divided naturally into discrete watersheds or "conservation areas" where conserved habitats are managed as a single unit. Conservation areas include sites of habitat protection, enhancement, and restoration as well as buffer areas and other lands included in the conservation area design.

2.4.1 San Pablo Reservoir Watershed

The watershed area contiguous with San Pablo Reservoir comprises coastal foothills 91-488 meters (300-1,600 feet) in elevation, interspersed with flat to gently rolling valley floors and a few level, mid-elevation benches. Major vegetation communities include California annual grassland, mixed oak woodland, coast live oak, Monterey pine, eucalyptus, and coyote brush series. EBMUD owns 2,842 hectares (7,105 acres) (Figure 1-2) of this watershed area. HCP covered species recorded in the San Pablo Reservoir watershed are listed in Table 2-4.

2.4.2 Siesta Valley

Siesta Valley, located near the middle latitude of the HCP area (Figure 1-2) near State Highway 24, is slightly more than 405 hectares (1,012.5 acres) in the headwaters of the San Pablo Reservoir basin. The central section of the property is a valley between steep, U-shaped ridges of volcanic strata that dip beneath the valley floor on one side and reappear on the opposite ridge. The valley has geological significance and has been used for many years as an outdoor geology laboratory by various colleges and universities. The valley floor has gently sloping benches and covers about 16.1 hectares (40 acres). Primary vegetation types include coast live oak, coyote brush, and California annual grassland series. The valley floor and western slopes support stands of eucalyptus and cypress that were planted from 1912 to 1915. HCP covered species recorded in Siesta Valley are listed in Table 2-4.

2.4.3 Gateway Area

This area is an isolated 99 hectare (247.5 acre) parcel located south of Siesta Valley and State Highway 24 (Figure 1-2), also within the upper portion of the San Pablo Reservoir basin. The land consists of moderate to steep slopes rising

abruptly to a ridge that carries over from Siesta Valley. Relatively level areas are present where two ravines were filled as a result of Bay Area Rapid Transit District work and freeway expansion in the area. Primary vegetation communities include mixed oak, coyote brush, and California bay series. The slopes also support some of the best examples of native perennial grasses and forbs found on EBMUD land. No HCP covered species has been recorded in the EBMUD owned portions of Gateway Valley, although it includes Alameda whipsnake habitat (Swaim, 1999).

Table 2-4.
General locations of EBMUD HCP covered species*

	Briones Watershed	Gateway	Lafayette Watershed	Pinole Valley	San Pablo Watershed	Siesta Valley	Upper San Leandro	Chabot Watershed	Non Reservoir
Santa Cruz Tarplant					✓				
Pallid Manzanita							✓		
Rainbow Trout				✓			✓		
California Red-legged	✓			✓	✓		✓	✓	✓
Western Pond Turtle	✓		✓	✓	✓		✓	✓	✓
Alameda Whipsnake	✓			✓	✓	✓	✓	✓	
Pallid Bat				✓	✓				

*Source: EBMUD GIS species database, 2005.

2.4.4 Briones Reservoir Watershed

Briones Reservoir covers 293 hectares (732.5 acres) and EBMUD owns 1,069 hectares (2,672.5 acres) of Briones watershed lands, about 50% of the entire basin (Figure 1-2). The area ranges in elevation 175 to 457 meters (575-1,500 feet). Primary vegetation types include mixed oak, coast live oak, coyote brush, and California annual grassland series. HCP covered species recorded in the Briones Reservoir watershed are listed in Table 2-4.

2.4.5 Lafayette Reservoir Watershed

EBMUD owns the entire Lafayette basin, which comprises 308 hectares (770 acres), including the 51 hectare (127.5 acre) reservoir (Figure 1-2). Watershed lands range in elevation from about 107 meters (350 ft) to more than 305 meters (1,000 ft). Primary vegetation types are mixed oak, coast live oak, and coyote brush series. HCP covered species recorded in Lafayette Reservoir watershed are

listed in Table 2-4. Over 850,000 people visit Lafayette Reservoir watershed annually, and the area is nearly enclosed by residential development. A USFWS protocol Alameda whipsnake-trapping effort was undertaken at Lafayette Reservoir in 2000 by Swaim Biological. After no whipsnakes were observed, Ms. Swaim suggested that whipsnakes might have been extirpated from this small watershed due to development and a loss of connectivity with surrounding habitat. It was further speculated that an introduced population would not survive in the area (Swaim 2000b).

2.4.6 Upper San Leandro Watershed

Upper San Leandro Reservoir covers 321 hectares (802.5 acres). It is a dendritic reservoir with 25-miles of shoreline (Table 1-1) located in the south portion of the HCP area in seven steep-walled canyons. EBMUD owns 3,285 hectares (8212.5 acres) of the watershed, which comprises 43% of the basin (Figure 1-2). This area ranges in elevation from 140 to 610 meters (460-2,000 ft) and is both rugged and ecologically diverse. Primary vegetation types include California annual grassland, coyote brush, chamise-black sage chaparral, mixed oak, coast live oak, and eucalyptus series. This area also contains the only occurrences of knobcone pine forest and a large stand of second growth redwood. HCP covered species recorded in Upper San Leandro Reservoir watershed are listed in Table 2-4.

2.4.7 Chabot Reservoir Watershed

Chabot Reservoir is located in the south end of the HCP area. The 138 hectare (345 acre) reservoir and approximately 1,538 hectares (3,845 acres) of surrounding land are leased to East Bay Regional Park District (EBRPD). Operations in this area are performed by EBRPD and are not included in this HCP.

EBMUD's maintains a 48 hectare (120 acre) area of the San Leandro watershed between the base of Chabot Dam and the edge of Chabot Park, and these activities are included in this HCP. Also included are EBMUD's activities on infrastructure, including spillway cleanout, below Chabot Dam.

2.4.8 Pinole Valley

Pinole Valley is the northernmost portion of the HCP area, two miles north of San Pablo Reservoir (Figure 1-2). The valley (1,490 hectares (3,725 acres) was purchased in the 1920s as a potential reservoir site. About 154 hectares (380 acres)

in the valley floor are flat, and much of this is Class-I farmland cultivated for red oat hay production. The rest of the area, with slopes of 30-70%, rises up to 305 meters (1,000 ft). Vegetation types include California annual grassland, valley oak savanna, and coast live oak series. HCP covered species recorded in Pinole Valley are listed in Table 2-4.

2.4.9 Other Non-Watershed Areas

EBMUD owns approximately 256 hectares (633 acres) of land that are not reservoir watershed or part of Pinole Valley. These areas are below dams or on ridges where runoff would not contribute to one of the five EBMUD terminal reservoirs. Vegetation types are varied and include coast live oak, eucalyptus, coyote brush, and annual grassland series. HCP covered species recorded in non-watershed areas are listed in Table 2-4.

2.4.10 Potential Mitigation Lands

As noted elsewhere in the HCP, EBMUD may desire to use all or a portion of its watershed lands in the future to provide compensatory mitigation for projects undertaken by EBMUD or others. EBMUD intends to ensure that the provisions of this HCP are consistent with these plans and that nothing in the HCP will conflict with efforts to further restore, or enhance these lands for use for mitigation.

3 ACTIVITIES

3.1 EAST BAY WATERSHED LANDS

Public access to most EBMUD-owned watershed lands is limited to use by permit only, in accordance with a comprehensive set of rules and regulations designed to protect water quality and other natural resources (EBMUD 1996). EBMUD lands are fenced, posted, and patrolled by contract law enforcement officers and EBMUD rangers to protect water quality and natural resources. EBMUD opened Lafayette Reservoir to non-body contact public recreation in 1966. Lake Chabot, which is leased to EBRPD, was opened for public use in 1966; and San Pablo Reservoir was opened to recreation in 1973. In 1973 and 1974, 104 kilometers (65 miles) of trails were opened to the public, and 1,028 hectares (2,541 acres) were set aside for environmental education purposes in 1976 (Table 3-1). Briones Reservoir is closed to the public, except for the trail system surrounding the reservoir and limited use for practice by local university crew rowing teams. Upper San Leandro Reservoir watershed remains closed to public access except for the trail system.

Table 3-1.
Acreages of Educational Use Areas (1 acre = 0.4 hectare)

WATERSHED	Acres
San Pablo	853
Briones	232
Siesta Valley	200
Upper San Leandro	1,038
Chabot	218
Total Acres	**2,541**

The Board of Directors approved EBMUD's East Bay Watershed Master Plan (WMP) and related Environmental Impact Report (EIR) in 1996, as well as the Fire Management Plan (FMP) in 2000 and the Range Resource Management Plan (RRMP) and related Mitigated Negative Declaration (MND) in 2001. These documents establish long-term

management direction for the activities on EBMUD-owned lands and reservoirs that will ensure the protection of EBMUD's natural resources and water quality (EBMUD 1996).

The WMP describes the management direction for the programs (water quality, biodiversity, forestry, fire and fuels, livestock grazing, agricultural operations, recreation and trails, and environmental education) and associated maintenance activities on the watershed lands. It also provides goals and objectives for the biodiversity management program, and guidelines to enhance biodiversity and minimize impacts of other management programs to covered species.

The activities for these programs follow EBMUD practices (including Best Management Practices (BMPs)) and guidelines from the Natural Resource Conservation Service (NRCS). Many conservation measures described in the WMP were developed specifically for EBMUD's watersheds and we refer to them generally in this document as BMPs. In addition to these conservation measures, project sites are surveyed by qualified staff prior to project initiation, to develop project and site-specific Avoidance and Minimization Measures (AMMs) for species covered by this HCP.

Applicable BMPs are listed at the end of most activity descriptions below. Potential impacts and incidental take from these activities are discussed in Section 4.

3.2 ACTIVITIES

Guidelines in the HCP Handbook require an HCP to include a description of all actions within the planning area that (1) are likely to result in incidental take, (2) are reasonably certain to occur over the life of the permit, (3) for which the applicant or landowner has some form of control.

Subject to the conditions and restrictions identified in this Plan, activities covered by the authorization for incidental take include:

- Water Quality Program
- Biodiversity Program
- Forestry Program
- Livestock Grazing Program
- Agricultural Operations Program
- Fire and Fuels Program
- Recreation and Trails Program

- Trench Spoils Storage and Removal Program
- Multiple Program Activities

Where possible, these watershed activities are presented as they are in the WMP to facilitate coordination with that parent document. As a result, a few similar activities appear in more than one place. For instance, "Construct and Maintain Boundary Fences" (Water Quality Program Section 3.2.1.6) has similar on-site impacts as "Construct and Maintain Fences and Corrals" (Livestock Grazing Program Section (3.2.4.1). However, these activities often occur at different times, impact different amounts of habitat, and with different access. "Prescribed Burning" (sections 3.2.6.2, 3.2.2.2,) also appears in more than one place for similar reasons. Finally, "Vehicular Access to Watershed Roads and Trails" is the only potential impact for many activities, including activities such as Water Quality sampling that are not contained in the WMP. These activities have all been listed together under Vehicular Access to Watershed Roads and Trails (Section 3.2.9.1) at end of the WMP programs.

3.2.1 Water Quality Program

EBMUD's water quality program as described in the WMP involves activities to maximize drinking water quality by encouraging natural sediment control, biofiltration processes, and point and non-point source pollution control. It also includes existing source water treatment (oxygenation) in Upper San Leandro Reservoir, and ongoing water quality monitoring in reservoirs and tributary streams. Key elements of this program are identification and prompt repair of erosion problems, and coordination with other agencies to minimize impacts to reservoir water quality from non-EBMUD land-use activities.

The goal of the water quality program is to maximize reservoir water quality to comply with current and anticipated future drinking water regulations. The objectives are:

- Manage for high quality water stored in EBMUD reservoirs.
- Ensure that riparian buffers and upland residual dry matter allow sufficient filtering of surface runoff from EBMUD watershed lands to minimize contaminant loading.
- Restore degraded areas on the watershed that are a source of excessive sediment which may reduce the life of reservoirs.

- Address existing and potential water quality impacts from lands not owned by EBMUD in reservoir basins.

The specific activities associated with the water quality program that have the potential to result in the incidental take of covered species include:

3.2.1.1 Operation of reservoirs.

Briones, San Pablo, and Upper San Leandro reservoirs are used to store water for ongoing domestic use, whereas Lafayette and Chabot reservoirs are used only in emergencies. All EBMUD reservoirs are also operated to provide storage for stormwater run-off. In the winter, water may be released through (blowoff) valves to the outfall at the base of the dams to maintain water levels within the operational range of the reservoir. Uncontrolled releases occur when water exits the reservoirs via the spillway.

Subsequent to the 2007-08 San Pablo Dam Seismic Upgrade Project (see Section 3.2.1.3 below), red-legged frog and western pond turtle habitat will be permanently reduced under US Army Corps of Engineers (USACE) permit and Section 7 consultation by 1.0 wetland hectare (2.46 acres) (ESA 2006). The remaining San Pablo Dam area habitat will be subsequently maintained as short grassland to facilitate dam inspection. Only incidental take for activities extending beyond the San Pablo Dam Section 7 coverage, such as for subsequent maintenance of the redesigned channels, will be covered under this HCP.

At Upper San Leandro Reservoir, a 0.25 hectare (0.62 acre) defined creek segment below the spillway will be cleared of vegetation and maintained for the ongoing Upper San Leandro Reservoir Spillway and Channel Restoration Project on a semi-annual basis (Sycamore 2006). This project will also result in the daylighting of 63 meters (190 feet) of a currently culverted section of Miller Creek that opens to the spillway area. Like the San Pablo Dam Project, the Upper San Leandro Spillway and Channel Restoration Project is currently being permitted separately by the US Army Corps and related Section 7 consultation, and incidental take is covered under that consultation. Only incidental take for activities extending beyond the USL Section 7 coverage, such as for subsequent maintenance of the redesigned channels, will be covered under this HCP.

Appendix A describes species presence relative to reservoir operations (see “Presence in HCP Area” for each species).

3.2.1.2 Manage creek beds.

EBMUD leaves fallen riparian vegetation in the creek bed and on banks for fish and wildlife habitat unless it will increase erosion. However, removal of sediment and vegetation is done near roads to maintain the channel's capacity to carry peak runoff and prevent flooding. The work may include excavating roots within the channel and grading to accommodate peak runoff. This work is typically conducted in summer and early fall with manual labor, backhoe, and/or excavator. These projects are limited to sites of less than 0.04 hectare (less than 0.1 acre). Projects are performed when one of the following criteria is met:

1) Material deposition alters flow patterns to create a potential for erosion.
2) Channel carrying capacity is reduced to cause or create a hazard of flooding.
3) Material deposition and impoundment is a safety or operational concern.

BMPs for creek bed management projects are:

- Perform a biological survey of project area for covered species and develop site specific AMMs prior to project initiation.
- Follow CDFG guidelines as outlined in the 2003 CDFG Section 1601 Lake and Streambed Alteration Agreement Memorandum of Understanding (MOU) (Appendix C) for working in stream channels.
- Conduct projects between mid-April and October.
- Minimize channel disturbance by using the nearest safe access to the channel.
- Minimize heavy equipment use adjacent to and on creek banks.
- Retain trees and shrubs necessary for bank stabilization and wildlife habitat, unless otherwise ordered by the State of California Department of Water Resources Division of Safety of Dams (DSOD).
- Remove green slash from creek.
- Reduce exposure of bare soil to erosion through seeding and/or mulching, as necessary.

3.2.1.3 Manage spillways.

San Pablo, Briones, Upper San Leandro, and Chabot dams each have concrete spillways that function to release (uncontrolled) water. At the end of each spillway there are energy dissipaters and an associated sill to reduce the velocity of water exiting the spillway.

Each of the spillway outfalls is located downslope from the dam base. The 61- meter (200 ft) distance downstream of the end (sill) of each spillway channel consists of a designed creek bed consisting of concrete sacks, large riprap, and sculpted banks.

EBMUD is preparing permits for a major project to seismically strengthen San Pablo Dam. EBMUD (ESA 2006) has also obtained federal and state permits to clean out the Upper San Leandro Dam spillway (BO#1-1-07-F-0176) (USFWS 2007), to replace or daylight two occluded culverts near the spillway, and to stabilize a large landslide in the Chabot Reservoir watershed that may affect the Upper San Leandro Reservoir spillway area.

The USACE permits for these projects will also seek, through Section 7 consultations, ESA take coverage for a period of follow up maintenance. However, this incidental take coverage will be limited to five to ten years, much shorter than the term of this HCP. EBMUD therefore seeks incidental take coverage under this HCP to manage these two spillways for the balance of the 30-year term of this permit.

Spillway management activities as ordered by DSOD at Briones, Chabot, and Lafayette reservoirs will also be included. All EBMUD spillways are inspected monthly for structural defects, vegetation encroachment, logs, trash and other impediments to water flow. Spillway management projects are planned each year according to the following guidelines:

- Within the limits of the structure, this includes the areas constructed of concrete or pipe and the areas within the overflow line along the banks of the downstream lined spillway channel.
- An additional 61 meter (200 ft) downstream of the termination of the concrete lined or bagged (erosion-protected) spillway channel as required by DSOD.
- When required after inspection by DSOD: management of the spillway includes removing vegetal root systems and sediment to the surface of concrete or erosion protection, and draining pools of stagnant water within the concrete structures.

The 61-meter (200 ft) distance downstream of the end of the spillway channel may consist of a designed creek bed, which is managed under the guidelines and BMPs of Section 3.2.1.2. The estimated area of creek channel affected below the San Pablo and USL spillways is 0.13 hectare (0.33 acre) for each project. No management projects have

been implemented in the San Pablo or Upper San Leandro spillways since 1996. Vegetation may be removed annually using hand tools, chainsaw, backhoe, and/or excavator. EBMUD is proposing to conduct ongoing maintenance to defined quadrats within the 0.40- hectare (0.62 acre) area below the USL Dam spillway on a biennial (every two years), rotating basis. This biennial, rotating quadrat approach will reduce the temporal loss for covered species i.e., refugia, foraging, and dispersal.

BMPs for spillway management projects are:

- Perform a biological survey of project area for covered species and develop site specific AMMs prior to project initiation.
- Follow CDFG guidelines as outlined in the 2003 CDFG Section 1601 Lake and Streambed Alteration Agreement (Appendix C) for working in stream channels.
- Conduct projects mid-April through October.
- Use the least disturbing economically feasible technique to clear vegetation and sediment to allow spillways to function as designed.
- Construct temporary sediment retention devices as necessary, to minimize potential erosion.
- Follow regulations for dam maintenance to limit the cleared area.

3.2.1.4 Culvert installation and replacement.

There are approximately 200 (0.3m to 2.4m dia) (1ft to 8ft dia) culverts on EBMUD watershed property, 42% of them in the San Pablo and Lafayette reservoir recreation areas. Each of the recreational areas will replace an average of one culvert per year or 60 total culverts over the term of the permit. The frequency of replacement varies. In some years, no culverts will be replaced but in years following runoff from 50-100 year storm events (e.g. January 1997), up to ten may be replaced. This situation is likely to occur once during the permit term, but the overall number of replacements over the permit term should not increase. Culverts are replaced when they fail or when roads or trails are rebuilt. Work is typically done with a shovel, backhoe, track loader and/or excavator when the channel is dry. These projects follow the 2003 CDFG Section 1602 Lake and Streambed Alteration Agreement (Appendix C) that delineates BMPs, monitoring and development of AMMs, and replacement of lost vegetation and habitat.

Up to three culverts are replaced each year on the remainder of the watershed or up 30 culverts for the term of the permit. The old culvert is excavated and the new culvert installed. Fill is then placed around the culvert and rock is added as needed (up to 10 cu/m) to prevent erosion. Mulching is done manually or with a straw blower. Seeds are sown using a hand-operated broadcast-seeder.

It is anticipated that in a small percentage of culvert replacements (approximately 4%) work will be conducted while the channel is wetted and/or flowing. These projects are typically conducted when the failure (actual or imminent) of the culvert restricts access to a facility or endangers the integrity of a road. In these instances, the wetted areas 30 meters (100ft) upstream and downstream of the project will be surveyed for red-legged frog, western pond turtle and *O. mykiss*. If any of these species are found and judged to have the potential to move into the actual project site (footprint), they will be moved outside of the project site but within the drainage using approved NMFS protocols and/or standard protective methods. The moved species individuals would have unrestricted access to the project site after project completion, so relocations would likely be temporary. Projects conducted under wetted conditions would require the presence of an approved biologist. Flowing water will be diverted around the project area by a screened bypass.

BMPs for culvert installation and replacement projects are:

- Perform a biological survey of project area for covered species and develop site specific AMMs prior to project initiation.
- Minimize channel disturbance by using the nearest safe access to the channel.
- Minimize heavy equipment use adjacent to and on creek banks.
- Retain trees and shrubs necessary for bank stabilization and wildlife habitat.
- Construct temporary sediment retention devices as necessary, to minimize potential erosion.
- Remove easily eroded material from channel resulting from culvert replacement.
- Use appropriately sized culverts to handle peak flows.
- Place culverts slightly below channel bottom to avoid outfall barriers. Do not alter upstream channel, unless necessary to protect fill material or prevent culvert blockage.

- Compact fill material to prevent erosion, seepage, and failure. Armor inlet and outlet with rock or other suitable material where needed.
- Install or replace culverts so as to maintain existing fish passage.
- Reduce exposure of bare soil to erosion through seeding and/or mulching, as necessary.

3.2.1.5 Control invasive plants.

EBMUD conducts vegetation management activities to eliminate weeds, control brush and trees around facilities and at the wildland/urban interface, and to control selected state-listed noxious weeds (including French broom) throughout the watershed. This activity is performed for fire hazard reduction, safety of the public, district employees and property, to improve native species' habitat, and to provide maintenance access. EBMUD also eliminates noxious weed seed sources; to reduce poisonous and allergy producing plants (e.g., poison oak in high use public areas). Projects are timed to avoid or minimize impacts.

EBMUD's Integrated Pest Management (IPM) program (EBMUD 2003) prioritizes the most environmentally safe practices for pest control (Appendix B). The IPM program evaluates all appropriate alternatives for pest control, including no control, physical/mechanical control, biological control, and chemical control (not covered under this HCP). Invasive plants are removed mechanically or by hand. The forestry program is also designed to discourage and prevent establishment of new stands of non-native woody vegetation and the expansion of existing native stands (refer to Section 3.2.3.1). Remediation methods are site and species specific, but may include reseeding, protection (caging) of native trees present, and/or allowing native plants to establish. Finally, vegetation shading the pallid manzanita site is periodically trimmed with hand tools.

BMPs for control of invasive plants are:

- Perform a biological survey of project area for covered species and develop site specific AMMs prior to project initiation.
- Minimize heavy equipment use adjacent to and on creek banks.
- Use only hand tools to clear invasive plants in areas where covered species may occur.

3.2.1.6 Construct and maintain boundary fences.

EBMUD restricts public access to the watershed through the construction and maintenance of boundary fence lines and posting in accord with Section 555 of the California Penal Code. Violators are cited for trespassing. Fence construction and maintenance necessitates site access by 4WD vehicles or all-terrain-vehicles (ATVs) off established roads. Fence construction and maintenance may be necessary year-round with one or more five to six person crews. Fencelines are selected to minimize impacts and to avoid large trees and brush where possible. It is estimated that approximately 1219.2 meters (4000 feet) of boundary fence may be constructed or repaired annually. An annual average of 0.45 hectare (1.1 acres) of linear watershed area is affected by the removal of coastal scrub and overgrown vegetation, for a maximum of 13.3 hectares (33 acres) during the permit term. If funding becomes available (e.g., grant monies), it is anticipated that one to three projects of 8-9.6 kilometers (5-6 miles) of fenceline may also be done. This would accelerate boundary fence work on some years (up to 2194.6 meters (7200 feet) per year), but would not change the total amount of boundary fence to be completed over the permit term.

BMPs for construction and maintenance of boundary fences are:

- Perform a biological survey of project area for covered species and develop site specific AMMs prior to project initiation. AMMs will include project timing for least potential impact.
- Habitat features for covered species will be flagged as areas to avoid. Staff or workers will use discretion in placing postholes to avoid the flagged areas, and with their direction of access to help to accomplish this avoidance goal.
- Ground disturbing activities will follow applicable BMPs for erosion control (Section 3.2.1.4 and Section 3.2.1.5).

3.2.2 Biodiversity Program

The biodiversity program is an important element of the WMP. It consists of activities that EBMUD undertakes to protect and enhance habitats and species, including species covered in this HCP. These activities maintain or improve biological diversity on EBMUD property through active management and careful coordination with other resource management programs. Biodiversity management guidelines are included as a key element in all other management activities. EBMUD's commitment to biological diversity is achieved by actively monitoring and maintaining ecosystem processes,

especially those that also protect or enhance water quality. The objectives of the biodiversity management program are:

- Maintain, enhance and where practically feasible, restore plant and animal communities.
- Implement an ecosystem management approach that maintains and enhances natural ecological processes.
- Apply an adaptive management strategy using inventory, management, monitoring, and research.
- Coordinate all resource management programs to ensure that biological resources are protected.

The specific activities associated with the biodiversity program that intend to enhance the habitat for covered species, but may also result in incidental take include:

3.2.2.1 EBMUD monitoring of species populations.

Biological monitoring and sampling programs are conducted to enumerate plant and animal species and to monitor populations on EBMUD watershed property. Sampling and collecting are conducted under the authority of scientific collecting permits issued to EBMUD staff by CDFG and through Section 10(a)(1)(A) (recovery permits) issued by USFWS and NOAA Fisheries (NMFS).

Monitoring and sampling techniques include electrofishing, seining, netting, live trapping, salvaging, and observing without handling (visually, aurally). All sampling and collecting is currently conducted in accordance with the terms, conditions, and authorizations specified by CDFG in California scientific collecting permits, special request NMFS endangered species handling permits requiring NMFS steelhead sampling protocols, Federal ESA 10(a)(1)(A) permits currently held by consultants, and other species protective handling methods.

During the course of monitoring, covered species may be unavoidably taken. These short-term effects are offset by the improvement of resource management activities to better protect and enhance species populations. As part of the adaptive management program, EBMUD may revise its monitoring and sampling methods during the term of this permit.

General monitoring for projects throughout the watershed lands is done 1-10 times per month, but electrofishing is annual or biannual. Typically, up to 305 meters (1000 ft) of stream is electrofished in each watershed surveyed.

Electrofishing of reservoirs is performed annually. Other activities are performed within limits of approved NMFS sampling protocols or as needed to adequately sample species populations.

BMPs for biological monitoring and sampling are:

- Assess the project area during initial site contact and, develop site specific AMMs before proceeding
- Include monitoring results with regular reports to USFWS (see Section 7.2) to support species recovery programs and to facilitate long term ecosystem management.

3.2.2.2 Conduct habitat restoration activities.

Current and possible future habitat restoration projects include:

- Fisheries habitat enhancement (see also Section 3.2.1.2)
- Riparian restoration
- Stock pond restoration (see also Section 3.2.4.2)
- Bat and bird habitat enhancement
- Prescribed burning for enhancement of native species (see also Section 3.2.2.2)
- Improvement of site conditions for pallid manzanita
- Control of invasive plants (see also Section 3.2.1.5)
- Control of non-native animals (see also Section 3.2.2.3)

Fisheries habitat enhancements, trash removal along creek drainages, riparian restoration, and pond restorations are conducted with the knowledge and approval as appropriate of USFWS, NMFS, and/or CDFG. Prescribed burning is coordinated with the California Department of Forestry and Fire Protection (CDF), and other agencies as appropriate. Structural improvements in habitats, such as may be needed for mitigation, are built

under the guidelines of CDFG (Flosi and Reynolds 1994, McEwan and Jackson 1996) and under the guidelines described herein.

EBMUD manages a native species habitat enhancement program. Wood duck boxes, bluebird boxes, osprey platforms, and bat houses are all installed and maintained on watershed land by volunteers from the California Wood Duck Program, the Bluebird Recovery Program, EBMUD, and private individuals respectively. With no negative impact to covered species habitats, these programs maintain habitat for their target species and many non-target species.

EBMUD sponsors classroom activities on the watershed that are designed to teach the enhancement of riparian areas. District Rangers work with local classrooms to plant willows and restore denuded watershed creek channels. The ephemeral creek channels targeted for these restoration activities are badly degraded and have little or no flow when worked on. The school children are taught willow wattling techniques and willow shoot planting on these dirt slopes to help stabilize the creekbanks. There is some sedimentation caused by their activities, but it is compensated by the beneficial affects of the willows that hold the soil later in the year and thereafter. EBMUD has used this technique to restore approximately 11 acres with success since the early 1990s.

BMPs for habitat restoration projects are:

- Assess the project area during initial site contact and, develop site specific AMMs before continuing.

3.2.2.3 Control non-native animals.

EBMUD may contract annually with animal control specialists or wildlife biologists to remove feral or nonnative animals from the watershed including, but not limited to, pigs, cats, wild turkeys, non-native turtles, and bullfrogs. This activity positively impacts native species, including covered species.

Pigs are removed under a Memorandum of Understanding with CDFG. Non-target animals are not harmed and impacts are limited to access. Pigs are destructive, and their removal from the watershed reduces damage to watersheds and displacement of indigenous species.

Bullfrogs may be removed in areas where red-legged frogs have been extirpated. Where the two species are sympatric, bullfrog removal is done only after the red-legged frog breeding season (January to March) is over and while bullfrogs are still breeding

(February to July). Red-legged frogs and bullfrogs are identified by both visual and aural differences. Bullfrog egg masses are identified by mass size, egg size, position in the water column, and date present. To prevent the possibility of confusion with other egg masses (newts, red-legged frogs), they are removed when found after April 1.

Non-native turtles and Mississippi diamondback watersnakes (*Nerodia rhombifera*) may be captured using live traps in Lafayette Reservoir. Traps are checked twice daily, and set so turtles and non-target snakes will not drown. They are immediately removed from the watershed. Non-target animals, including western pond turtles, are released unharmed. Watersnake trapping has not been necessary since 1998, but may occur before the end of the permit term. Watersnakes may be kept alive after trapping for radio-tagging. The snakes are then followed in cold weather by an animal control contractor to the winter hibernacula where many animals may be removed at one time. Non-native species (including non-native turtles) cannot be legally released elsewhere in California, nor transferred out of state where they may spread disease. The Mississippi diamondback watersnake only occurs in Lafayette Reservoir where red-legged frogs are absent.

Turkeys are a threat to larval and young red-legged frogs and to whipsnakes. They are currently removed when authorized by CDFG. The future status of turkey populations in the Bay Area is unknown, and EBMUD may increase its efforts for turkey control under the appropriate CDFG permits. BMPs for non-native animal control projects are:

- Assess the project area during initial site contact and, develop site specific AMMs before continuing.

3.2.3 Forestry Program

EBMUD's lands support a substantial area of native and non-native forest habitats. Native forest communities include redwood, knobcone pine, and several hardwood-dominated forest types. Most of the non-native forest stands consist of monocultures of Monterey and other pines planted 1940s and 1950s for soil stability, and eucalyptus stands planted between 1910 and 1920 to provide wood for fuel, lumber, and windbreaks. Forest management includes planned selective removal of the non-native stands, the encouragement of the natural understory, and the maintenance and enhancement of the habitat values of native forests.

The goal of the forestry program is to develop and implement a long-term management strategy for native forests that will maintain and enhance resources such as water quality, fire protection, biodiversity, and aesthetic quality. The objectives are:

- Develop and implement a long-term management strategy for non-native forest species that includes maintenance of stand health and vigor and step-wise conversion of non-native forests to native forests or other ecologically suitable habitats.
- Use forest management as a tool to achieve strategic fire management goals, biodiversity goals, and other resource goals.
- Protect water quality and other resource values during forest management program implementation.
- Manage trees in areas of high public use to ensure visitor safety and to maintain aesthetic values.

The specific activities associated with the forestry program that have the potential to result in the incidental take of covered species include:

3.2.3.1 Remove diseased and hazard trees, and convert Monterey pine and Eucalyptus stands.

Tree removal on EBMUD's watershed lands targets very specific vegetation management objectives and is not performed for timber production. Except for the removal of single trees for public safety (typically less than 0.4 hectare (1 acre) annually), forestry management targets the step-wise removal of stands of Monterey pine and eucalyptus.

Monterey pines on EBMUD lands are outside their normal range (i.e., within the fog belt 11.2 kilometers – 7 miles – of the coast) and are approaching or have surpassed their typical life expectancy. Because of the confirmed occurrence of pitch canker in these trees, approximately 10 hectares (24.7 acres) are being removed over approximately 60-80 days annually and the native understory vegetation allowed to naturally succeed. In the event of a large die-off, a larger scale removal effort will be planned to manage the resulting fire hazard (refer to Section 9.2.2).

Harvest operations are typically conducted by EBMUD staff and/or contractors from July through October to minimize soil erosion impacts and encounters with nesting bird species. Felling crews conduct tree-falling operations; yarding techniques (skyline or skidding) are used when removal of harvested material from the site is required. Hand

removal, removal by draft horses, or heavy equipment may be used for ground skidding, depending on the project requirements and site conditions.

More than four years of monitoring show that the Monterey pine removal program has no detectable effect on resident amphibians or nesting birds. Trees are surveyed before removal. If wildlife or nesting birds are found, the tree will be avoided or the project delayed, if the tree is not a safety hazard. Oak trees, sycamores, or cottonwoods may contain large enough cavities for bat roosting. Live Monterey pines that become hazard trees are removed before they can develop the hole nests found in other trees. Dead Monterey pines are only left standing as snags in non-public areas. A large Monterey pine shades the single pallid manzanita site in the USL watershed. It will be topped or removed after the adoption of this plan.

EBMUD prefers thinning over clear-cutting for the following reasons:

- Both eucalyptus and Monterey pines provide habitat for native plants and animals.
- Clear cutting favors the spread of invasive weeds.
- Clear cutting increases surface fuel loading.

  BMPs for diseased and hazard tree removals are:

- Perform a biological survey of project area for covered species and develop site specific AMMs prior to project initiation.
- Avoid operating equipment where soil compaction and rutting may cause erosion that affects water quality.
- Fill in ruts, reseed and mulch skid trails and landings to prevent erosion and sedimentation in creeks and reservoirs.
- Monitor erosion control measures during and after storms to ensure efficacy.
- Do not pile slash where it may wash into creeks, wetlands, or reservoirs.
- Locate landings outside riparian management zones.
- Use existing landings if possible.
- Locate residue piles (sawdust, chips, etc.) away from drainages.
- Keep skid trail grades to 15% or less.
- Use existing trails, if possible.

3.2.4 Livestock Grazing Program

Livestock grazing has occurred on East Bay grasslands for 100 years or more. Prior to 1992, grazing pressure on EBMUD rangeland was optimized to produce beef, prevent brush encroachment, reduce wildfire potential, provide revenue to EBMUD, and increase runoff. The livestock program was refocused in 1993 to reduce impacts on water quality and biodiversity, to use grazing selectively to reduce fire hazard (particularly at the wildland/urban interface), and to provide revenues to EBMUD. Grazing levels were reduced over standard levels by the following WMP policy directive (EBMUD 1996):

> *LG.5 As a general standard, establish livestock stocking rates (in animal unit months [AUMs]) to maintain approximately 140% of minimal residual dry matter standards (modified U.S. Soil Conservation Service Standards). Stocking rates for individual areas may vary from this standard to meet site-specific management objectives and may need to be higher or lower in strategic fuels management areas.*

The objectives of the livestock grazing program are:

- Use grazing by domestic livestock (horses, cattle, llamas and goats) as a tool to manage vegetation for other resource needs (including fire hazard reduction).
- Eliminate or restrict grazing in areas where substantial impacts on water quality, biodiversity, fire control, or other management objectives may occur.
- Retain current levels of runoff by managing for water capture, storage, and beneficial release (Section 2.1 RRMP) (2001).
- Generate livestock grazing revenue for EBMUD where consistent with other resource values.

The specific activities associated with the livestock grazing program that have the potential to result in the incidental take of covered species include:

3.2.4.1 Construct and maintain fences and corrals.

This activity is typically performed during dry periods in spring, summer, and fall. An estimated twelve fence and corral projects are performed each year. The projects range from 3.6 meters (12 feet) to 61 meters (200 feet), with a footprint of 3 meters (10-feet) wide. The annual footprint for potential disturbance from this activity is up to 0.22 hectare (0.55 acre), or a total permit-length temporary disturbance of up to 6.7 hectares

(16.5 acres). The average fence project requires access of 0.05 hectare (0.12 acres) (or approximately 500 linear feet) in vehicles going overland from a managed fire road.

BMPs for construction and maintenance of fences and corrals are as follows (see also Section 3.2.1.6):

- Perform a biological survey of project area for covered species and develop site specific AMMs prior to project initiation.
- Permanent fencing may be used in areas that have multiple management objectives (ESA species, water quality issues, slumping, mass-wasting, or other degradation) that require long term protection from livestock.
- Corrals will not be constructed within 30 meters (100 ft) of Alameda whipsnake or red-legged frog habitats (i.e., chaparral and wetlands, respectively).

3.2.4.2 Construct, maintain, and repair ponds, spring boxes, and troughs.

Ponds on EBMUD Watershed lands are constructed to collect and hold runoff for livestock and wildlife. Design considerations include size of drainage area, pond capacity, topographical suitability, environmental compatibility, and sedimentation rate. Typically, a basin is excavated with a bulldozer and/or backhoe, and an earthen embankment and spillway is constructed from the excavated material. Depending on soil erodibility, a spillway may be constructed and lined with rock. Fill slopes are seeded to reduce erosion potential. Depending on habitat needs or water quality concerns, the pond may be surrounded by a fence and/or off-site water may be provided by a drain line or solar pump.

Pond management is performed periodically with the use of a backhoe, excavator, or bulldozer to remove sedimentation and repair dams. This activity is usually performed to repair a failed or compromised dam and/or to clear out sediment accumulation. In most cases material dredged from the pond is used to repair the dam or spillway. Management is generally performed in the fall on 10-15 of approximately 115 ponds, 130 troughs, and 65 developed springs per year. Ponds and springs provide most of the remaining perennial habitat for red-legged frogs. The five turtle pond habitats shown in Figure 3-1 and identified in Section 6.2.5 will be repaired when necessary as soon as practicable under prevailing conditions, typically in late spring or summer.

Troughs are plumbed from municipal water supplies, springs, or ponds. Water is collected from springs, either by spring boxes or by horizontal drilling. An excavator or backhoe is used to dig out a spring to accommodate the box. Drain rock is set around the box to aid in water seepage into the box. Typically the spring box, horizontal drilling, and springs are surrounded by a fence to protect from livestock trampling.

BMPs for the construction and management of ponds, spring boxes, and troughs are:

- Perform a biological survey of project area for covered species and develop site specific AMMs prior to project initiation.
- Minimize heavy equipment use adjacent to and on creek banks.
- Pond design guidelines outlined in the red-legged frog recovery plan will be followed to the extent possible (hard pan limitations, access restrictions).
- Retain trees and shrubs necessary for bank stabilization and wildlife habitat.
- Perform maintenance on ponds when dry except for ponds 11, 22, 28, 62 and 85 (Stebbins 1996) which do not typically dry up (Figure 3-1).

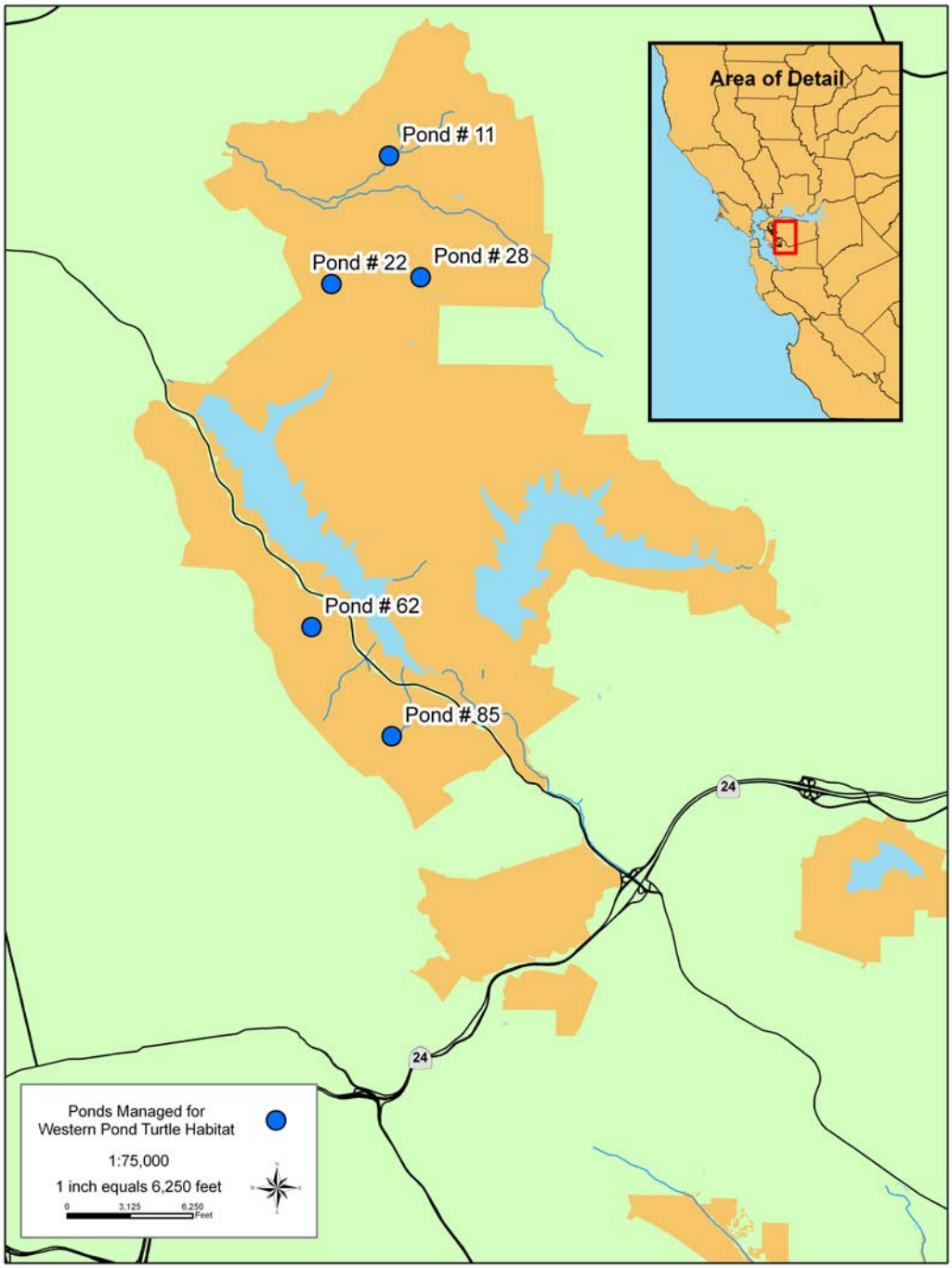

Figure 3-1. Ponds managed for western pond turtle on EBMUD lands, Contra Costa and Alameda counties, California.

3.2.4.3 Conduct livestock grazing.

While pasture rotation schedules limit overuse of any single annual grassland habitat, unfenced creeks may be subject to trampling. Ponds and creek pools may be reduced in size by cattle use through the summer, and herding may concentrate animals and exacerbate ground-disturbing activities. EBMUD has reduced livestock use of open water sources by systematically fencing out ponds and riparian areas, while developing other water sources for livestock (e.g., plumbed troughs). Grazing allotment lessees space molasses and salt blocks so as to minimize impacts from uneven livestock distribution.

BMPs for livestock grazing are listed below:

- Resource managers and biologists will review livestock management plans.
- Adaptively manage livestock grazing where impacts result in increased sedimentation, degraded water quality, decreased riparian vegetation, or decreased habitat quality for covered species.
- Manage livestock grazing to promote riparian vegetation and to improve wildlife and aquatic habitat and reduce pollutants in stormwater runoff.
- Exclude cattle along perennial *O. mykiss* streams as needed to maintain a healthy and diverse riparian habitat.
- Review grazing plans at the close of the year for efficacy in achieving fuel reduction and wildlife habitat goals.

3.2.5 Agricultural Operations Program

Agricultural operations occur on approximately 88 hectares (217 acres) of EBMUD land (Figure 3-2) classified by the Natural Resource Conservation Service as "Prime Farmland." Red-oat hay is currently grown in Pinole Valley, and Christmas trees are currently produced in the Chabot Reservoir watershed. Future agricultural uses may include viticulture, U.C. Berkeley farming operations, and organic farming. The agricultural operations are conducted through leasing arrangements with growers.

The goals of the program are to perform farming operations on a limited scale using methods that are consistent with the integrated pest management program and designed to protect water quality and other resource values.

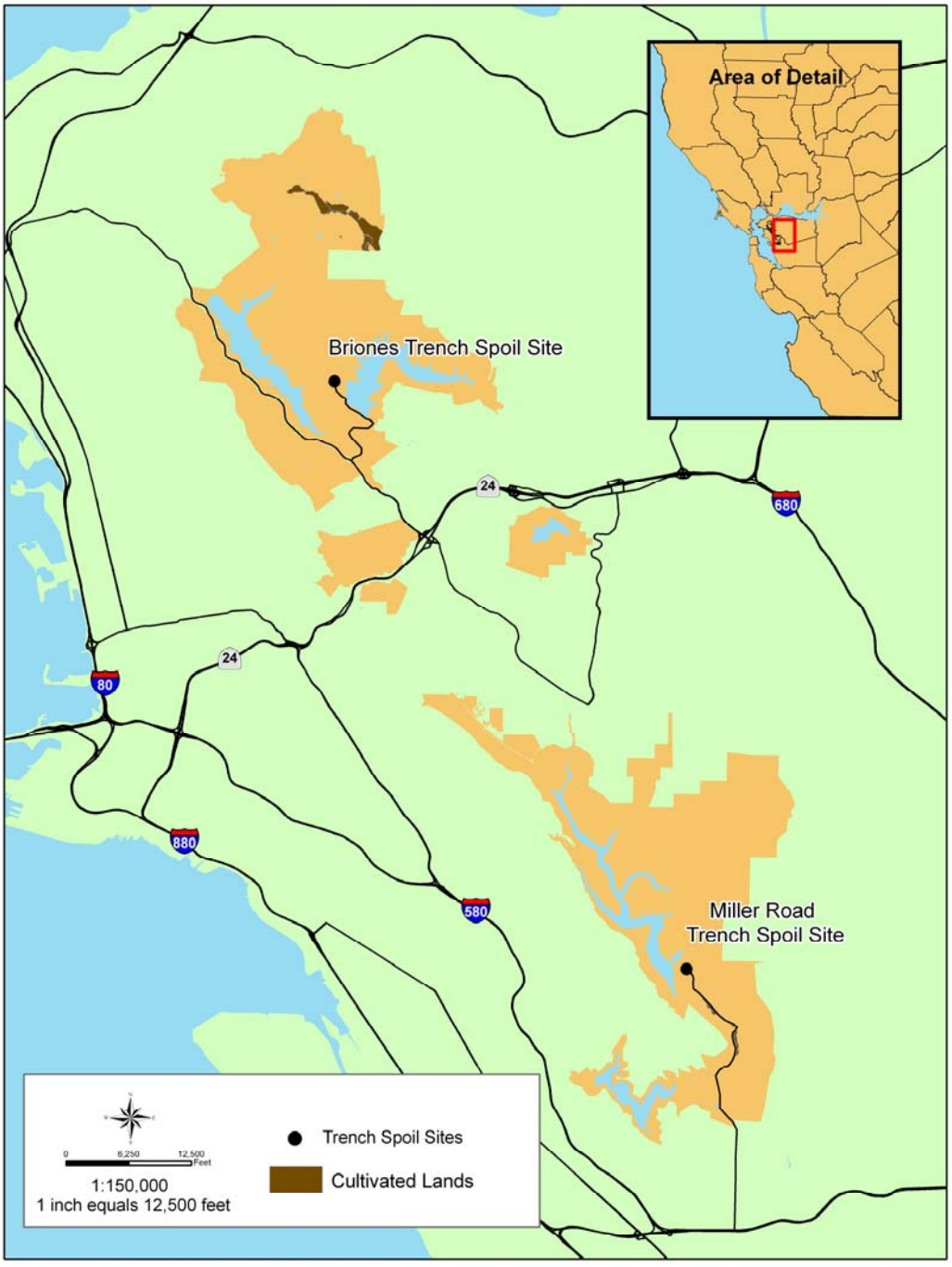

Figure 3-2. Trench spoil sites and cultivated lands on EBMUD property, Contra Costa and Alameda counties, California.

The specific activities associated with the agricultural operations program that have the potential to result in the incidental take of covered species include:

3.2.5.1 Use of farm machinery.

Disc and harrow machinery are normally used in the course of hay farming over 80 hectares (197 acres) on EBMUD property. These fields have been in continual use for the past 40-50 years. Discing is performed each year during late fall through early winter just prior to sowing seed. Hay is harvested in June when the soil surface and crop is dry, and seed is dry but still green.

BMPs for the use of farm machinery are:

- EBMUD will conduct classes and/or distribute educational material to educate the lessees on the identification of covered species.
- Farm machinery operators will be instructed to stop work if they encounter a covered species and to contact EBMUD Natural Resources staff.
- Follow land contours when discing to reduce erosion.
- Do not disc across stream channels.
- Avoid discing area adjacent and parallel to creek banks.
- Do not disc slopes greater than 15%.
- Avoid using ungraveled fire roads during wet periods.
- Manage erosion control features through periodic inspection and maintenance.
- Leave an undisturbed vegetated buffer of 24-30 meters (80-100 feet) between the farming activity and the center of the creek bank as described in the RRMP Section 3.4.4 (2001).

3.2.6 Fire and Fuels Program

The EBMUD Fire Management Plan (EBMUD 2000) includes activities conducted to protect human life and property, provide for public safety, protect and enhance water quality and other natural resources including watershed land uses on EBMUD land and adjacent properties.

All East Bay watershed lands except the Lafayette Reservoir watershed are State Responsibility Areas; the California Department of Forestry and Fire Protection (CDF) has primary responsibility for fire prevention and suppression. By formal agreement with

the Contra Costa County Local Agency Formation Commission (LAFCO) and the counties' fire agencies, EBMUD is required to maintain fuel breaks and fire roads, provide qualified wildland firefighters and fire suppression equipment, perform initial attack, and handle mop-up activities. Since wildfire suppression is a multi-agency activity, EBMUD does not have sufficient control over it to include it in this HCP (see Section 3.2 for criteria). Changed conditions resulting from wildfire are included in Section 9.

To ensure regional coordination in fire and fuels management planning, the program (WMP WQ23 1996) incorporates those elements of the Vegetation Management Consortium's (VMC's) Fire Hazard Mitigation Program and Fuel Management Plan for the East Bay Hills that are consistent with EBMUD's water quality and natural resource management goals. The objectives of the fire and fuels program are:

- Provide an appropriate level of fire protection for all EBMUD property and adjacent lands, and emphasize protection of life, public safety, and property values in wildland-urban interface areas.
- Implement measures to protect water quality from the impacts of a major wildfire including soil erosion and sedimentation.
- Use a strategic planning approach to fire management to ensure activities are consistent with other resource objectives.
- Recognize the importance of fire as a natural ecological process, and use prescribed burning and other techniques to reduce hazardous fuel loads to achieve long-term fire safety, water quality protection, and biological diversity.
- Cooperate with other agencies, adjacent property owners, and homeowner groups. And, participate actively in developing Coordinated Resource Management Plans and other cooperative multi-agency agreements for fire hazard reduction and fire incident management.
- Maintain fire management program funding that supports implementation of adopted Fire Management Plan elements (EBMUD 2000).
- Maintain fire-fighting equipment; perform training and routine patrols to retain the basic level of fire safety and necessary initial response.

Measures will be taken to restore vegetation post-fire (using native species when feasible) to minimize erosion, prevent the spread of non-native species, and enhance

habitat. The specific activities associated with the fire and fuels program that have the potential to result in the incidental take of covered species include:

3.2.6.1 Construct and manage fuel treatment areas, and fuel breaks.

Alameda and Contra Costa counties mandate discing for fire control. It is conducted by a tractor pulling a disc, typically in grassland areas of wildland/urban interfaces and public roadways from April through August to reduce the potential for wildfire to spread. The width of the discline depends on location, slope, and fuel type, and ranges from 6-18 meters (20-60 feet). It is estimated that 1,620 meters (53,150 linear feet) of existing discline are annually redisced.

Fuel break maintenance is conducted in specific areas (typically wildland/urban interfaces from June through October) by thinning and removing vegetation to reduce fuel density. Draft horses, bulldozers with brush rakes, goat and cattle grazing, manual labor, and mechanical mowing are all used to complete this task. Fuel breaks can be up to 91 meters (300 feet) in width.

The FMP (2000) summarizes environmental protections in Section 4 and Table 4-1.:

BMPs for construction and management of fuel treatment areas and fuel breaks are:

- Perform a biological survey of project area for covered species and develop site specific AMMs prior to project initiation.
- Follow land contours to reduce erosion.
- Provide equipment operator with map of area to be disced or mowed. Mow to a minimum height of four inches.
- Avoid discing area adjacent and parallel to creek banks.
- Avoid discing in riparian buffer zones, wetlands and/or springs unless essential for fuel break connectivity and can be done with minimal disturbance.
- Do not disc slopes greater than 35%.
- If new fuel areas are mowed or disced, such as for a prescribed burn, identify and protect covered plant species within the mower's swath or disclines.

3.2.6.2 Conduct prescribed burning.

Prescribed burning is incorporated in the Integrated Pest Management (IPM) program to reduce fuels that carry wildfire. Fall and summer burning is done in annual grassland habitat to control goat grass (*Aegilops triuncialis*), and may be expanded to treat other species such as medusa head (*Taeniatherum caput-medusae*) or other invasive or undesirable plants if they occur in the future. Prescribed fires in other vegetation habitats (including chaparral) may also occur during the life of this permit. EBMUD has met with USFWS regarding chaparral burns for Alameda whipsnake habitat improvement, and a joint-agency project may occur within the next 30-years under federal and state permits acquired for the burn project. EBMUD currently surveys and compiles data on mortality of Alameda whipsnakes after seasonal wildfires.

EBMUD biologists survey proposed burn sites prior to preparation for burning and project managers' schedule burns to specifically effect target species. Native plants are adapted to fire. So, native vegetation communities should be enhanced by this activity.

The area to be burned is surrounded by a discline, dozerline, black line or some natural impediment to fire. The fuel break width ranges from 1.8-6 meters (6-20 ft) depending on location and slope. Construction of fuel breaks has the potential to impact the Santa Cruz tarplant; however, the only currently known population is not in an area that will be burned except for tarplant enhancement. Six to ten fire-fighting vehicles typically gather at staging areas at the edge of areas to be burned.

During the life of the permit it is estimated that 20 prescribed burns may be conducted for the IPM program. Area and habitats covered by past burns are listed in Table 3-2.

Table 3-2.
Past controlled burns on the East Bay Watershed

Year	Acres Burned	Habitat type
1993	6	Grassland
1994	4	Grassland
1996	80	Grassland
1997	107	Grassland

Burns are performed during periods when red-legged frogs are typically in riparian habitats or are aestivating underground. BMPs for prescribed burning are:

- Perform a biological survey of project area for covered species and develop site specific AMMs prior to project initiation.
- Minimize heavy equipment use adjacent to and on creek banks.
- Burn riparian areas only for specific resource management goals and under tightly controlled conditions developed by interdisciplinary team planning.
- Wherever feasible, utilize black line control lines instead of dozer lines to protect potential covered species habitat during prescribed fires.

3.2.6.3 Maintain fire roads.

Approximately 258 kilometers (160 miles) of existing fire roads are maintained annually for fire suppression activities. These roads also provide access for other management activities. Roads are between 2.4 and 3.6 meters wide (8-12 feet). Maintenance of the roads is conducted from March through November and consists of surface mowing and/or grading with a motorgrader. Some road surfaces (typically less than 0.8 kilometer (0.5 mile) annually) are maintained by the addition of rock (road base) to minimize erosion and allow use during winter months. Some access roads are mowed annually to serve as fuel breaks. Mowing is done from March through November and includes mechanical mowing of grass or brush, and may be done to a distance of 3 meters (10 feet) from existing access roads.

BMPs for fire road maintenance are:

- Perform a biological survey for known covered species sites within the project area (road system).
- Review AMMs developed with the heavy equipment operator (HEO) before commencement of work.
- Avoid using fire roads during wet periods except with emergency or low-ground pressure equipment (LGPE).
- Manage erosion control features through periodic inspection and maintenance.
- Avoid cutting the toe of slopes when grading fire roads.
- Avoid cutting into or damaging rootcrowns of trees during grading.
- Avoid pushing graded material over creek bank top, into creeks and drainage channels.

- Leave a 3-30.4 meter (10-100 foot) buffer between the mowing or grading and the top of the creek bank.
- Plant and/or seed bare soil and bank disturbance as necessary to prevent erosion.

3.2.7 Developed Trails and Recreation Program

EBMUD's trails and recreation program provides the public with diverse recreational opportunities ranging from outdoor activities (angling, play structures, picnicking, etc.) in developed facilities, to hiking on developed trails on watershed lands.

San Pablo and Lafayette reservoirs provide a variety of recreational opportunities including boating, fishing, hiking, picnicking, wildlife viewing, and special events. The recreation areas are very popular during the summer. San Pablo Reservoir is closed between mid-November and mid-February; but Lafayette Reservoir, though less visited in winter, is open all year.

EBMUD also manages a 105 kilometer (65-mile) recreational trail system on its East Bay watershed lands. Recreational use of the District's undeveloped watershed land is limited compared to other public recreation opportunities because of EBMUD's primary goal of providing high-quality drinking water to its service area. Public access is allowed under a system of trail use and watershed entry permits. Allowable uses include hiking, horseback riding, and scientific studies by students from local colleges and universities including UC Berkeley, St. Mary's College, and Mills College. Motor vehicle and bicycle access to trails and fire roads by the public is not allowed. Only 34 kilometers (21 miles) of these trails are the narrow gauge type trails covered under this activity, and only five miles of these trails are maintained annually. These numbers will increase by about 5% if EBMUD assumes responsibility for maintenance of its portion of the Bay Area Ridge Trail (BART) that may one day pass through its property. Alternatively, maintenance of fire roads may increase 1% if the BART is limited only to fire roads. This activity would then be covered under Section 3.2.6.3 (above).

The objectives of the Recreation and Developed Trails Program are:

- Promote environmental values in recreational use and management.
- Provide a high quality recreational experience for users of the watershed lands that does not compromise the District's goals for high water quality and watershed management protection.

- Provide reasonable access routes between watershed lands and adjacent open space areas consistent with District resource management goals.
- Ensure that currently permitted or new recreational trail activities do not increase the potential for additional soil erosion, landscape modification or pollutant loading, or adversely affect other watershed or reservoir resources.
- Ensure that no net increase in adverse environmental effects will result from additions or modifications of EBMUD's trail management program.

The specific activities associated with the Recreation and Developed Trails Program with the potential to result in the incidental take of covered species include:

3.2.7.1 Construct and manage trails, access roads, and recreation facilities.

Facility maintenance is regularly performed for developed sections of the recreation areas. High public use irrigated lawns are normally mowed with power/heavy equipment. High pedestrian traffic areas may be mulched regularly. Surfaced parking lots, roads, and trails are repaired and repaved as required for maintenance and to protect public safety. Infrastructure (underground water/wastewater pipes, electrical and phone lines) is routinely maintained and/or upgraded to meet regulatory and safety standards. Shoreline docks are adjusted as reservoir levels change throughout the year. Installation of new, replacement, or failing facilities and/or infrastructure (i.e. restrooms and other buildings, benches, picnic tables, play grounds, drinking fountains, etc.) is ongoing within these areas. Management of the fisheries within both reservoirs includes a fish stocking program and occasional mechanical removal of vegetation to improve fish habitat or shoreline access. Additionally, activities from the Water Quality Program (3.2.1.2, 3.2.1.4, and 3.2.1.5), Forestry Program (3.2.3.1), and Fire and Fuels Program (3.2.6.1) can occur in the developed recreation areas. The BMP's are followed as listed for those activities.

BMP's for constructing and managing trails, access roads, and recreation facilities within developed recreation areas are:

- Update and maintain GIS species database for recreation areas to identify areas likely to sustain covered species.
- Annually review recreation facility maintenance activities with Supervising Ranger to identify where covered species may be encountered.

- Perform a biological survey of project areas for covered species where there is a potential for them to occur, and develop site specific AMMs prior to project initiation.

3.2.7.2 Construct and manage trails, access roads, and facilities on undeveloped lands.

Permits are required for EBMUD trail access. Approximately 4,500 trail permits are active in any given year. These permit regulations are enforced by police officers from the East Bay Regional Park District (EBRPD) who patrol the watershed through a Joint Powers Agreement (JPA). All trail users must carry their permits and identification and are subject to citation if they do not comply.

Hillside hiking trails are constructed to allow drainage at intervals during runoff. The trails are outsloped so runoff can flow across, to prevent elevated erosion rates that occur when water runs down the length of the trail. Causeways (elevated trails usually lined with ditches) are constructed in wetter areas to minimize erosion, provide year-round trail access, and to funnel user traffic to reduce other ecosystem impacts. Water is guided through culverts below the causeway.

Trail maintenance is performed annually on areas needing repair. Vegetation is pruned or mowed, the trail tread is graded, and damage repaired. Typically, trees and shrubs are pruned with loppers, handsaws, and/or chainsaws. Herbaceous plants are cut with hand tools, motorized weed-whips, and motorized lawn mowers. The trail tread is graded as necessary to remove gullies and berms; berms are pulled in towards the center of the trail to fill the gullies. Bridges are constructed or culverts installed to cross creeks. Riprapped low-water crossings may also be constructed as appropriate.

There are staging areas for the trail system on the East Bay watersheds. These staging areas may be paved, graveled, or dirt and require periodic maintenance. Dirt islands may be created within the staging areas and trees planted to enhance local habitat.

Approximately 914 meters (3,000 feet) of existing dirt fire road in the Upper San Leandro watershed will be upgraded to an all-weather road for the proposed Lindsey Wildlife Rehabilitation Center to be constructed and managed by the Lindsey Wildlife Museum. The conversion will require periodic maintenance, but the improved road condition should reduce the need for annual maintenance (i.e., road-blading).

BMPs for construction, maintenance of trails, access roads, and recreation facilities are listed below and in Section 3.2.6.3:

- Perform a biological survey of project area for covered species and develop site specific AMMs prior to project initiation.
- Construct temporary sediment retention devices as necessary to minimize potential erosion.
- Avoid construction during wet weather.

3.2.8 Trench Spoils Storage and Removal Program

EBMUD excavates trenches during its year-round operations for repair/replacement of water pipes throughout the service area, and stores the material, weather permitting, at two sites in the East Bay. Materials, otherwise known as trench spoils, are reused for fill or transported offsite once sites are filled to capacity. One site is located next to Miller Road below Upper San Leandro Reservoir and the other is on the west side of Briones Reservoir near the Dam and boat ramp (Figure 3-2). Access to the Miller Road site is via 2.9 kilometers (1.8 miles) of all-weather gravel road, while access to the Briones site is over 1.2 kilometers (0.8 mile) of paved and all-weather gravel road. Trench spoils are made of clean fill material that does not contain asphalt, oils, or other contaminants. Species awareness and site specific avoidance minimization measures used by equipment operators limit the chance for encroachment of the spoils site on covered species habitat. The objectives of the trench spoils storage and removal program include:

- Store clean trench spoils on EBMUD property with a minimum of erosion.
- Periodically remove spoils material to an offsite location.
- Minimize impact to EBMUD watershed lands and infrastructure.

The specific activities associated with the trench spoils storage and removal program that have the potential to result in the incidental take of covered species include:

3.2.8.1 Conduct trench spoils placement and maintenance.

Trench spoils are hauled to the Briones spoils site via Bear Creek Road and Briones Dam (Figure 3-2) by dump trucks (capacity of 7.6-15.3 cubic meters – 10-20 cubic yards). The trench spoils are stockpiled at the site for recycling or reuse. Once deposited on site the spoils are graded with a bulldozer. The Briones spoils site has rocked roads, graded relief ditches, and culverts to facilitate necessary year round access.

A second trench spoils site is located off Miller Road below Upper San Leandro Reservoir (Section 3.8, Figure 3-2). Trench spoils are hauled to the Miller Road site via Redwood Road; the trench spoils are stockpiled at the site for recycling or reuse. Similar equipment and erosion control procedures are implemented at the Miller Road spoils site. Access to the sites for trench spoils placement is covered under general vehicle access to the watershed (refer below to Section 3.2.9.1).

Both sites are maintained to mange the shape and structure of the spoils pile. If necessary, embankments are seeded and BMPs (refer to Section 3.2.1.4) are implemented to minimize erosion. Access routes are routinely altered to allow even deposits and removal of spoils material. Management of the site is done with the use of heavy equipment.

BMPs for trench spoil storage and removal are in sections covering Erosion Control (3.2.1.4), Operation of Farm Machinery (3.2.5.1), and Vehicular Access of Watershed Roads (3.2.9.1).

3.2.8.2 Conduct trench spoils removal.

A contractor removes trench spoils as necessary from Briones or Miller Road spoils sites. The contractor uses excavation equipment to dig and load material into trucks. Trench spoil removal occurs approximately every ten years at the Briones spoils site and approximately every six years at the Miller Road site. Truck traffic near the Briones and Miller Road spoils site may increase significantly during these operations, with up to eighty (round trip) truck-loads per day for a period of up to 45 calendar days for Briones and 80 days for Miller Road. Access to the sites for trench spoils removal is covered under general vehicle access to the watershed (refer below to Section 3.2.9.1).

BMPs for trench spoils removal are the same as for Trench spoils placement and maintenance (Section 3.2.8.1).

3.2.9 Multiple Program Activities

Multiple program activities are those common to many programs that have potential to impact covered species. Vehicle access to EBMUD fire roads and other private roads and trails is common to most programs.

3.2.9.1 Vehicular access on watershed roads and trails.

Take of covered species from a vehicle strike has never been documented on EBMUD watershed roads. However, it has twice occurred on high speed, high volume public roads adjacent to watershed lands. There are several watershed programs for which road-kills or injuries caused by vehicles on EBMUD land are the only identified potential incidental take.

Routinely sample water quality. Access by truck and boat occurs weekly at Briones, Lafayette, San Pablo, and Upper San Leandro reservoirs, and less frequently to tributary creeks. Vehicle access to all reservoirs is by paved or all-weather gravel roads.

Operation and maintenance of Upper San Leandro Reservoir hypolimnetic oxygenation system water treatment facilities. This activity includes access by staff in trucks, and delivery of liquid oxygen to the Upper San Leandro Reservoir dam for system maintenance and service.

Perform field studies and investigations. EBMUD conducts field studies and investigations in its water supply reservoirs. These studies include access to tributary streams and the reservoirs by vehicle. It is estimated that access to the streams and reservoirs for these field studies will be an average of 100 days per year.

Patrols for control of non-native animals. EBMUD contractors access the watershed fire roads by truck and by all-terrain-vehicle (ATV) to trap and remove feral pigs or other non-native animals. Access is also made via paved roads, depending on the location of the animals. Patrols may occur up to 100 days per year.

Conduct fire prevention patrols and other vehicle patrols. Fire patrols are conducted on a daily basis throughout the fire season (typically May through October). Depending on the fire-weather conditions, one to four fire-patrol vehicles may be deployed per day during the fire season. Similar vehicles are used for daily watershed patrol throughout the rest of the year.

Conduct environmental education programs. EBMUD staff access the watershed for interpretive and other environmental programs about sixty times per year.

Studies by outside researchers. An average of 25-35 studies annually occurs on watershed lands. EBMUD Watershed Management controls access for these studies through the issuance of conditional Watershed Entry Permits. All conditions necessary to

avoid incidental take of covered species, including species awareness training, are required of the researchers in the entry permits. Access frequency varies among researchers from one time to up to twenty times annually.

Lindsey Wildlife Rehabilitation Facility. Vehicle traffic will increase to three people/cars daily over an improved all-weather road to the proposed Lindsey Wildlife Rehabilitation Facility in the Brown Ranch area of Upper San Leandro Reservoir watershed.

Vehicular use of trails and access roads by the public and administrative personnel. Vehicle traffic unrelated to those programs occurs on a weekly basis by EBMUD administrative personnel and by the public. Watershed speed guidelines require drivers to not travel faster than allows for reasonable avoidance of snakes and other animals in the roadway.

Access to Briones trench spoils site and the Miller Road trench spoils site for spoils placement and removal. This activity occurs during the dry season (March through October). Typically, five to ten trucks access the Briones spoils site per day during good weather, and fewer than five trucks access the Miller Road site per day. Truck traffic near the Briones and Miller Road spoils sites may increase significantly during spoils removal operations, with up to eighty truck-loads per day for Briones; and up to one hundred truck-loads per day for Miller Road. The removal activity may be intermittent and can last in total more than a month at Briones and more than two months at Miller Road.

BMPs for vehicular access to the watershed are:

- Except in emergencies, drive slow enough to allow reasonable avoidance of animals in the road.
- Avoid using fire roads during wet periods.
- Make acknowledgement of vehicle speed guidelines and an agreement to follow road safety procedures a condition of watershed entry permits.
- Manage groups involved in “observation” education programs to minimize disturbance of covered species. Maximize the use of carpooling during group events.

4 IMPACTS AND INCIDENTAL TAKE

4.1 INTRODUCTION

Watershed activities described in Section 3 may result in incidental take as defined in Section 1.2. Anticipated incidental take is summarized for covered species known to occur on EBMUD watershed lands in Table 4-1 for each EBMUD program. Take described below includes take from the activities as well as take that may occur from avoidance and minimization measures done because of the activities (such as take from moving or confining species as described in Section 5.3).

Section 4.4 (below) describes the total incidental take requested for covered species. It is noted where habitat may be temporarily removed. It is also noted that watershed activities will also create small amounts of habitat, and that there should be no net permanent habitat loss over the course of the permit.

The use of BMPs and EBMUD standard practices as outlined in the management plans, and the implementation of the AMMs as described in Section 5 will minimize impacts to covered species populations and sensitive habitats.

4.2 INCIDENTAL TAKE FROM ACTIVITIES

Subject to the conditions and restrictions identified in this Plan, activities covered by the authorization for incidental take are listed below and described in Section 3:

- Water Quality Program
- Biodiversity Program
- Forestry Program
- Livestock Grazing Program
- Agricultural Operations Program
- Fire and Fuels Program
- Recreation and Trails Program
- Trench Spoils Storage and Removal Program
- Multiple Program Activities

4.2.1 Water Quality Program

The specific activities associated with the Water Quality Program, as described in Section 3, that may result in incidental take of covered species are listed below and shown in Table 4-1.

Table 4-1:
Potential Incidental Take of HCP Covered Species

	Activity	Rainbow trout	Red-legged frog	Western pond turtle	Alameda whipsnake	Pallid bat
	Water Quality Program					
4.2.1.1	Operation of reservoirs		x			
4.2.1.2	Manage creek beds	x	x			
4.2.1.3	Manage spillways		x	x		
4.2.1.4	Culvert installation and replacement	x	x	x		
4.2.1.5	Control invasive plants		x		x	
4.2.1.6	Construct and maintain boundary fences		x		x	
	Biodiversity Program					
4.2.2.1	EBMUD staff monitoring of species populations	x	x	x		x
4.2.2.2	Conduct habitat restoration activities	x				
4.2.2.3	Control non-native animals			x		
	Forestry Program					
4.2.3.1	Remove diseased and hazard trees		x	x	x	
	Livestock Grazing Program					
4.2.4.1	Construct and maintain fences and corrals		x	x	x	
4.2.4.2	Construct and manage ponds, spring boxes, and troughs		x	x	x	
4.2.4.3	Conduct livestock grazing	x	x		x	
	Agricultural Operations Program					
4.2.5.1	Use farm machinery	x	x	x	x	
	Fire and Fuels Program					
4.2.6.1	Construct and maintain fuel treatment areas and fuel breaks	x	x	x	x	
4.2.6.2	Conduct prescribed burning	x	x		x	
4.2.6.3	Maintain fire roads	x	x	x	x	
	Developed Trails Program					
4.2.7.1	Construct and manage trails, access roads, and recreation facilities	x	x		x	
	Trench Spoils Storage and Removal Program					
4.2.8.1	Conduct trench spoils placement and maintenance		x	x	x	
4.2.8.2	Conduct trench spoils removal		x	x	x	
	Multiple Program Activities					
4.2.9.1	Vehicular access on watershed roads and trails		x	x	x	

4.2.1.1 Operation of reservoirs.

Reservoirs are managed when necessary through release of water to reduce the potential for spill events below the dams. Reservoir spills (when capacity is exceeded and water is discharged via the spillway) are beyond the control of EBMUD and do not fit the definition of activities needing incidental take coverage (see Section 4.1). However reservoir releases allow some control within the bounds of responsible reservoir operations, and red-legged frog egg masses may occur in January-February within the vegetated areas of the discharge channels immediately below San Pablo and Upper San Leandro dams. Initial controlled reservoir releases may dislodge egg masses in these channels. Incidental take may occur if frog egg masses are present within the 61 meter (200 ft) of channel below the blowoff valves during these releases. Western pond turtles are not likely to occur in the shallow channel at San Pablo Dam after the Seismic Upgrade, and near the USL spillway can easily escape the effects of increased flow by moving to side channel pools. Therefore, no incidental take is likely for western pond turtles from reservoir releases either from San Pablo Dam or USL. In the period from 1964 through 2006, reservoir releases during frog spawning in January and February occurred in 16 years (40%) from San Pablo Dam and 13 years (33%) from USL.

There is insufficient depth for red-legged frog breeding below Briones Dam, predators are abundant, and red-legged frog larva have never been recorded in Bear Creek between San Pablo Reservoir and Briones Dam. The Division of Safety of Dams (DSOD) requires that the Briones spillway be periodically cleaned out, thus preventing the development of usable habitat. No incidental take is expected at Briones Dam for covered species from reservoir releases.

There is no record of red-legged frogs or western pond turtles below Lafayette Reservoir (see Appendix A). No incidental take of covered species is expected from reservoir releases at Lafayette Reservoir.

EBMUD requests incidental take authorization for 5 red-legged frog egg masses during the course of the permit for the operation of reservoirs. No incidental take is expected for other covered species.

4.2.1.2 Manage creek beds.

These projects will occur annually during the course of the permit. However, severe winter storms with high winds may cause an increase in the frequency of channel-clearing projects. The maximum annual proposed creek area cleared will be up to 0.4 hectare (1 acre), or up to 12.1 hectares (30 acres) over the permit term.

Incidental take of red-legged frogs may occur, but project timing and AMMs will minimize impacts. Red-legged frogs may be temporarily held as described in Section 5.3 as a minimization measure during project activities and released on-site. Red-legged frogs hiding in vegetation or exposed tree roots may not be found and removed during preconstruction surveys. These frogs may be taken if trees are removed. Post-project siltation may contribute to poor water quality which can affect *O. mykiss* spawning gravel and rearing juveniles on Pinole, San Leandro, Kaiser, Buckhorn, Redwood, and Moraga creeks.

EBMUD requests incidental take authorization for 10 *O. mykiss* and 5 red-legged frogs during the course of the permit to manage creek beds. No incidental take is expected for other covered species.

4.2.1.3 Manage spillways.

Vegetation may be removed in spillways annually as ordered by DSOD within 61 meters (200 feet) of the release valves. These projects may annually affect approximately 0.13 hectare (0.33 acre) of red-legged frog habitat and 0.13 hectare (0.33 acre) of western pond turtle habitat below San Pablo Spillway.

It will also affect a total of 0.25 hectares (0.62 acres) of red-legged frog and 0.25 hectares (0.62 acres) of western pond turtle habitat below the USL Spillway.

Red-legged frogs and/or western pond turtles that are not excluded or detected and removed prior to work commencing may be injured or killed through the use of hand tools, chainsaws, and heavy equipment such as excavators and backhoes. Incidental take is most likely to occur during the first clearing of the San Pablo and Upper San Leandro spillways as no clearing has been done since 1996. This first clearing will be done in these areas under incidental take coverage provided by separate Section 7 consultations for the San Pablo Dam Seismic Upgrade Project and the USL Spillway Channel Restoration, respectively. The spillway vegetation will be removed on an annual basis at

San Pablo Reservoir spillway after these projects. With this reduction of habitat value, the likelihood of encountering covered species and of subsequent incidental take will also be reduced. No incidental take is anticipated from covered species at Briones or Lafayette reservoir spillways.

EBMUD requests incidental take authorization for 5 red-legged frogs and 5 western pond turtles during the course of the permit to manage spillways. No incidental take is expected for other covered species.

4.2.1.4 Culvert installation and replacement.

In many years, no culverts are replaced at San Pablo and Lafayette recreation areas. However, up to ten culverts in one year may be replaced during rehabilitation projects at these sites. There will be a maximum of two such rehabilitation projects at each recreation site during the permit term. Up to three culverts are replaced each year elsewhere on the watershed. Total area of impact per culvert is up to 0.024 hectare (0.06 acre) annually or up to 2.2 hectares (5.4 acres) for the estimated 90 culverts replaced on the watershed and recreation areas during the permit term.

Incidental take may occur if frogs move into the area after pre-project surveys are completed. These frogs may be crushed or injured during the culvert removal process. Incidental take of *O. mykiss* may occur during capture and confinement.

EBMUD requests incidental take authorization for 5 *O. mykiss*, 5 red-legged frogs, and 3 western pond turtles during the course of the permit to for culvert installation and replacement. No incidental take is expected for other covered species.

4.2.1.5 Control invasive plants.

Historically, covered species have not been observed during this activity because of project timing and BMPs. The maximum area treated annually is 0.2 hectare (0.5 acre) or up to 6 hectares (15 acres) during the permit term.

Alameda whipsnake and red-legged frog may occur on the perimeters of these areas and may be harassed during these activities.

EBMUD requests incidental take authorization for 3 red-legged frogs and 2 Alameda whipsnakes during the course of the permit to control invasive plants. No incidental take is expected for other covered species.

4.2.1.6 Construct and maintain boundary fences.

Boundary fence may be constructed or repaired each year in all perimeter areas of EBMUD watershed property up to a total of 13.3 hectares (33 acres) for the permit term. Of this total, GIS analysis indicates that 0.29 hectare (0.73 acre) of Alameda whipsnake core habitat (chaparral and scrub communities) and 2.3 hectares (5.78 acres) of red-legged frog habitat will be affected by this activity.

Red-legged frogs may be injured or killed by off-road vehicle use in and adjacent to riparian areas. Alameda whipsnakes may be injured or killed by off-road vehicles use in grassland and chaparral. The EBMUD watershed fire road system is dense, roads are not far apart, and off-road access is limited to the shortest safe distance from the fire roads to the project area. Many boundary fences are along paved roads, and GIS analysis shows that access to boundary fences varies from 0 - 701 meters (0 – 2,300 feet).

EBMUD requests incidental take authorization for 3 red-legged frogs and 2 Alameda whipsnakes during the course of the permit to construct and maintain boundary fence. No incidental take is expected for other covered species.

4.2.1-T Incidental Take From Water Quality Program

EBMUD requests incidental take authorization over the permit term for its Water Quality Program for a total disturbance of up to 0.8 hectare (2 acres) annually or up to 24.3 total hectares (61 acres) over the term of the permit for incidental take of red-legged frog habitat. In addition, EBMUD requests incidental take authorization over the permit term for a total annual disturbance of up to 0.01 hectare (0.024 acre), or up to 0.29 total hectare (0.73 acre) over the term of the permit for incidental take from disturbance of Alameda whipsnake habitat, and 0.26 hectare (0.66 acre) annually or up to 7.9 hectares (19.8 acres) from incidental take of western pond turtle habitat. EBMUD also requests incidental take authorization due to effects of sedimentation (less than 1 acre over the permit term) on *O. mykiss* habitat from creek bed management activities.

EBMUD requests incidental take authorization over the permit term for take of red-legged frogs, *O. mykiss*, western pond turtles, and Alameda whipsnake incurred while conducting the above described activities for the Water Quality Program.

4.2.2 Biodiversity Program

The specific activities associated with the Biodiversity Program, as described in Section 3, that may result in incidental take of covered species are listed below and shown in Table 4-1.

4.2.2.1 EBMUD monitoring of species populations.

Pallid bat may be harassed during monitoring of April Barn and bat habitat structure. Surveys will occur 1-2 times per year while the colony is active." During monitoring, there will be incidental take of covered species. Most monitoring is visual with no incidental take, though there is harassment of red-legged frog larvae when they are dipnetted, seined, or trapped, or when *O. mykiss* are electrofished. With the exception of Pinole Creek, there are currently no electrofishing sites where red-legged frogs and *O. mykiss* are sympatric. But as they may occur together during the permit term, red-legged frogs may someday be impacted by electrofishing. General monitoring for projects throughout the watershed lands is done 1-10 times per month, but electrofishing is annual or biannual. Typically, up to 305 meters (1000 feet) of stream is electrofished in each watershed surveyed.

Incidental take from monitoring of *O. mykiss*, red-legged frogs, and western pond turtles is expected to occur. *O. mykiss*, western pond turtle and red-legged frog tadpoles and red-legged frogs may be harmed, harassed, and killed during seining, dipnetting, live trapping, and electrofishing activities.

EBMUD requests incidental take authorization for 20 *O. mykiss*, 3 red-legged frogs, 20 Pallid bats and 2 western pond turtles during the course of the permit to monitor species populations. No incidental take is expected for other covered species.

4.2.2.2 Conduct habitat restoration activities.

These projects are designed specifically to improve the habitat for covered species as well as other native flora and fauna on EBMUD property. Restoration activities that may impact covered species are riparian restoration, and prescribed burning.

Up to 2 hectares (5 acres) of relatively denuded landscape may be affected annually by riparian restoration during access by volunteers. Impacts are limited to *O. mykiss* due to minimal sedimentation early in the project from the restored tributary into Pinole Creek. Though incidental take authorization is requested for temporary impacts from habitat

restoration, the goal is for these activities to be self-mitigating over the course of the permit. Incidental take of *O. mykiss* may occur due to increased sedimentation from these activities. However, sedimentation will be reduced over the course of the permit as these projects mature. Pre-project surveys and related AMMs will minimize near term impacts. The denuded channels do not provide habitat for California red-legged frogs or western pond turtles.

EBMUD requests incidental take authorization for habitat equivalent to 10 *O. mykiss* during the course of the permit to conduct habitat restoration activities. No incidental take is expected for other covered species.

Prescribed burning is addressed below under Section 4.2.6.2.

4.2.2.3 Control non-native animals.

EBMUD may contract annually with an animal control specialist or wildlife biologist to remove feral or non-native animals from the watershed. EBMUD contractors have trapped and removed feral pigs, Mississippi diamondback watersnakes (*Nerodea rhombifera*), and other non-native animals from the watershed as necessary each year since 1992. To date, no covered species have been inadvertently trapped or harmed during this activity. However, incidental take of western pond turtles may occur during trapping of aquatic animals such as watersnakes. Red-legged frogs are not known to occur in Lafayette Reservoir, but would be released unharmed if found.

EBMUD requests incidental take authorization for 5 western pond turtles during the course of the permit to control non-native animals. No incidental take is expected for other covered species.

Incidental take from this activity may also occur from watershed vehicle access and is identified below under Section 4.2.9.1.

4.2.2-T Incidental Take From Biodiversity Program

EBMUD requests incidental take authorization over the permit term for its Biodiversity Program for temporary annual disturbance of 2 hectares (5 acres) or up to 61 hectares (150 acres) of red-legged frog and western pond turtle habitats over the course of the permit. EBMUD requests incidental take authorization over the permit term for take of

red-legged frogs, *O. mykiss* and pond turtles incurred while conducting the above described activities for the Biodiversity Program.

4.2.3 Forestry Program

The specific activities associated with the Forestry Program, as described in Section 3, that may result in incidental take of covered species are listed below and shown in Table 4-1.

4.2.3.1 Remove diseased and hazard trees, and convert Monterey pine and Eucalyptus stands.

Extensive monitoring of these projects has shown no occurrence of whipsnakes within the affected areas.

This activity will result in the potential disturbance from selective thinning of up to 10 hectares (25 acres) annually of watershed over the course of this permit. Alameda whipsnakes and red-legged frogs are rare within these habitats, but may occur at the margins. Some incidental take may occur during project access as described under Section 4.2.9.1, and from sedimentation into ponds not under the canopy.

Therefore a small unknown amount of incidental take of red-legged frogs, western pond turtles, and Alameda whipsnake may occur in these non-native habitats. Because of selective thinning and AMMs (see Section 3.2.3.1), pallid bats or other bats have not been found roosting in tree cavities. Also, pallid bats are unlikely to day roost in the open canopy.

EBMUD requests incidental take authorization for 2 red-legged frogs, 2 western pond turtles, and 2 Alameda whipsnakes during the course of the permit to remove diseased and hazard trees, and convert Monterey pine and Eucalyptus stands. No incidental take is expected for other covered species.

4.2.3-T Incidental Take From Forestry Program

EBMUD requests incidental take authorization over the permit term for its Forestry Program as described above for incidental take authorization of California red-legged frogs, western pond turtles, and Alameda whipsnake on 303.5 hectares (750 acres) of watershed land.

4.2.4 Livestock Grazing Program

The specific activities associated with the Livestock Grazing Program, as described in Section 3, that may result in incidental take of covered species are listed below and shown in Table 4-1.

4.2.4.1 Construct and maintain fences and corrals.

This activity is mostly maintenance of existing fences, which has a smaller impact on covered species than construction of new fences. Based on the average of 12 projects per year, there is an annual potential for incidental take of red-legged frogs in up to 0.22 hectare (0.55 acre) and for Alameda whipsnakes in up to 0.22 hectare (0.55 acre) within corral areas that border their habitats. There is also annual potential for incidental take from vehicle access. GIS analysis shows that access to interior fences varies from 0 - 610 meters (0 - 2000 feet), and annual access would be through 0.1 hectare (12,000 square feet) of off road watershed land. Maintenance is done as needed and access would not occur every year.

Incidental take of red-legged frogs and western pond turtles may occur on the impact area of 0.63 hectare (1.5 acres) during the Pinole Creek riparian fencing project.

EBMUD requests incidental take authorization for 5 red-legged frogs, 2 western pond turtles, and 2 Alameda whipsnakes during the course of the permit to construct and maintain fences and corrals. No incidental take is expected for other covered species.

4.2.4.2 Construct maintain and repair ponds, spring boxes, and troughs.

Typically, maintenance is performed on 10-15 of approximately 115 ponds, 130 troughs, and 65 developed springs per year. Work is scheduled for periods when sensitive species are absent from the area.

Most pond repair on EBMUD watershed is done when ponds, spring boxes, or troughs are dry and potential incidental take is avoided or minimized. Ponds 11, 22, 28, 62 and 85 (Stebbins 1996) (Figure 3-1) which do not typically go dry, may need maintenance during the permit term. Within these five ponds, red-legged frogs and western pond turtles may be taken during refurbishment activities through moving animals, and through the use the use of heavy equipment such as backhoes and excavators. Pre-projects surveys will limit incidental take. Construction impacts may include: soil

disturbance, loss of vegetation, disruption of existing watercourses, temporarily decreased surface and groundwater downstream of the pond, and the creation of habitat for bullfrogs and other non-native species. Frogs and whipsnakes could be injured or killed through crushing when heavy equipment enters the pond area to remove excessive sediment and thin vegetation. Incidental take from temporary loss of red-legged frog breeding habitat is possible if hardpan is broken and the water holding capacity of the pond is reduced or eliminated

Incidental take of red-legged frogs, western pond turtles, and Alameda whipsnakes may occur for up to a total of 0.81 hectare (2 acres) of pond, spring box, and trough habitat.

EBMUD requests incidental take authorization for 10 red-legged frogs, 5 western pond turtles, and 3 Alameda whipsnakes during the course of the permit to construct, maintain, and repair ponds, spring boxes, and troughs. No incidental take is expected for other covered species.

4.2.4.3 Conduct livestock grazing.

EBMUD's grazing program is consistent with the listing rule for the red-legged frog which states "light to moderate carefully managed livestock grazing that prevents or minimizes the excessive trampling of riparian and wetland habitat" will not result in a violation of Section 9 (61 Federal Register 25832). Periodically, cows may escape to otherwise protected habitat or may impact ponds and other wetland areas beyond moderate levels. Cow dung may be deposited directly into unfenced pond habitats or during animal escapes and may affect water quality.

There will be incidental take from sedimentation into *O. mykiss* habitat on Pinole Creek and in the creeks draining into USL from erosion due to livestock grazing of 4,013.3 hectares (9,917 acres) of watershed; however existing fencing of the riparian corridor on the USL drainages and new fencing on Pinole Creek will exclude livestock from direct contact.

Incidental take from harassment of Alameda whipsnakes may occur mostly at the edge (about 1%) of the 1,740.1 hectares (4,300 acres) of whipsnake core habitat within the livestock pastures, or 17.4 hectares (43 acres).

EBMUD requests incidental take authorization for covered species habitat equivalent to 5 *O. mykiss*, 3 red-legged frogs and 2 Alameda whipsnakes during the course of the permit for livestock grazing. No incidental take is expected for other covered species.

4.2.4-T Incidental Take From Livestock Grazing Program

EBMUD requests incidental take authorization over the permit term for its Livestock Grazing Program for incidental take of *O. mykiss*, red-legged frogs, western pond turtles, and Alameda whipsnakes incurred while conducting the above described activities for the Livestock Grazing Program. EBMUD also requests incidental take authorization over the permit term for its Livestock Grazing Program of watershed land containing perennial *O. mykiss* streams.

4.2.5 Agricultural Operations Program

The specific activities associated with the Agricultural Operations Program, as described in Section 3, that may result in incidental take of covered species are listed below and shown in Table 4-1.

4.2.5.1 Use farm machinery.

Agricultural discing is done annually on 80 hectares (197 acres) of Pinole Valley. Impacts to *O. mykiss* spawning habitat in Pinole Creek may occur due to sediment runoff. Natural Pinole Watershed sediment sources and upstream sources constitute a greater impact than agricultural operations on EBMUD property (Pearce 2005). Red-legged frogs may be vulnerable to farm machinery if they move through the agriculture fields during late fall while discing is taking place. Western pond turtles are rarely seen in Pinole Creek near the agricultural fields, but may occur there. Turtle nests constructed in the agricultural fields may be destroyed during late fall or early winter discing. No coastal scrub or chaparral borders the agricultural fields in Pinole Valley, so the incidental take from mortality of Alameda whipsnakes will be unlikely. There is a potential of incidental take from displacement of foraging whipsnakes.

EBMUD requests authorization for incidental take habitat equivalent to 5 *O. mykiss*, and to impacts resulting in the take of 5 red-legged frogs, 5 western pond turtles, and 2 Alameda whipsnakes for the 197 acre area where farm machinery is used. No incidental take is expected for other covered species.

4.2.5-T Incidental Take From Agricultural Operations Program

EBMUD requests incidental take authorization over the permit term for take of red-legged frogs and western pond turtles, and for harassment of Alameda whipsnake and habitat impacts to downstream *O. mykiss* habitat resulting from the cultivation of agricultural land incurred while conducting the above described activities for the Agricultural Operations Program,

4.2.6 Fire and Fuels Program

The specific activities associated with the Fire and Fuels Program, as described in Section 3, that may result in incidental take of covered species are listed below and shown in Table 4-1.

4.2.6.1 Construct and manage fuel treatment areas, and fuel breaks.

Incidental take of Alameda whipsnakes during fuel break maintenance will be limited due to the poor quality of habitat within the maintained areas. A majority of the existing fuel breaks are maintained on a yearly basis and therefore are not able to develop the core habitat components preferred by Alameda whipsnakes. New fuel breaks will be evaluated for distance from coastal scrub or chaparral habitat and the likelihood the new fuel treatment areas may contain whipsnakes at some time. It is doubtful that fuel break maintenance in Lafayette Reservoir watershed will impact Alameda whipsnake (Swaim 2000) as whipsnakes were not found in the watershed after a 2000 protocol survey, and it is doubtful they could survive passing through the surrounding residential and urban area.

On the remainder of the watershed, incidental take of *O. mykiss* through habitat loss and harassment or harm of red-legged frogs and Alameda whipsnakes may occur from this activity.

A total of 9.9 hectares (24.5 acres) of watershed, unrelated to road or trail maintenance, is disced or mowed annually for fire control. Discing or mowing is performed for both the agricultural and the fire and fuels programs. Incidental take may result from crushing frogs during the discing process and an increase risk of predation when frogs, turtles, or whipsnakes cross open disclines. Though western pond turtles are rarely found adjacent to the agricultural leases, there is potential for incidental take from discing for fire control to turtle nests in non-agricultural areas. Mowing may cause incidental take of red-legged frogs, western pond turtles, and Alameda whipsnakes.

EBMUD requests incidental take authorization for 5 *O. mykiss*, 5 red-legged frogs, 3 western pond turtles, and 3 Alameda whipsnakes during the course of the permit to construct and manage fuel treatment areas, and fuel breaks. No incidental take is expected for other covered species.

As indicated in Section 3.2.6, wildfire suppression is not included as a specific activity in the HCP. A wildfire changed landscape is addressed in Section 9 (Assurances).

4.2.6.2 Conduct prescribed burning.

EBMUD has met with USFWS regarding chaparral burns for Alameda whipsnake habitat improvement, and joint-agency projects may occur within the next 30 years under other federal and state permits. EBMUD currently surveys for mortality of Alameda whipsnakes after seasonal wildfires.

Prescribed burns may be conducted for the Integrated Pest Management (IPM) program. Up to 10.1 hectares (25 acres) may be affected by each prescribed burn, and EBMUD requests incidental take authorization for a maximum of 20 burns over the course of the permit.

Prescribed burning may result in some incidental take through temporary loss of habitat for red-legged frog, Alameda whipsnake, and *O. mykiss.* An unknown amount of incidental take may occur through mortality of red-legged frogs or Alameda whipsnakes.

EBMUD requests incidental take authorization for 5 *O. mykiss*, 5 red-legged frogs, and 2 Alameda whipsnakes during the course of the permit to conduct prescribed burning. No incidental take is expected for other covered species.

4.2.6.3 Maintain fire roads.

A total of 258 kilometers (160 miles) of existing roads are maintained annually. When these roads are bladed for maintenance the total program area of potential displacement of Alameda whipsnakes using these bladed areas is 93.8 hectares (232 acres).

Maintenance of fire roads has the potential for increasing erosion into creeks where spawning *O. mykiss* may occur. Also, though mowing is limited to periods when the grass is dry and red-legged frogs are usually absent, there is potential for incidental take of red-legged frogs. Mowing of scrub habitat adjacent to roads (10 feet on both sides)

may result in take of Alameda whipsnakes through the temporary loss of up to 34 hectares (84 acres) of habitat.

Incidental take of *O. mykiss*, red-legged frogs, western pond turtles, and Alameda whipsnakes may occur during fire road maintenance. EBMUD requests incidental take authorization for 5 *O. mykiss*, 5 red-legged frogs, 5 western pond turtles, and 3 Alameda whipsnakes during the course of the permit to maintain fire roads. No incidental take is expected for other covered species.

4.2.6-T Incidental Take From Fire and Fuels Program

A maximum of 103 hectares (257 acres) of existing disclines, and existing roads may be temporarily disturbed by these activities. Up to 10 hectares (25 acres) may be disturbed through prescribed burning with an annual average of 0.6 hectare (1.5 acres) for the permit term.

EBMUD requests incidental take authorization over the permit term for take of red-legged frogs, western pond turtles, *O. mykiss* and Alameda whipsnakes as described above for the Fire and Fuels Program.

4.2.7 Developed Trails and Recreation Program

The specific activities associated with the Developed Trails and Recreation Program, as described in Section 3, that may result in incidental take of covered species are listed below and shown in Table 4-1.

4.2.7.1 Construct and manage trails, access roads, and recreation facilities.

Only 33.8 kilometers (21 miles) of narrow gauge trail of the 104 kilometers (65 miles) of total EBMUD watershed trail length are included in this activity. Only 8 kilometers (5 miles) of these trails are maintained annually. Maintaining these trails is largely done by hand, but may also be done using a bobcat (trail-wide tractor). A maximum potential annual disturbance for trail maintenance is 1.2 hectares (3 acres). Incidental take of *O. mykiss* through habitat degradation, and incidental take from harassment of red-legged frogs and Alameda whipsnakes may occur. Incidental take from harm and/or mortality of red-legged frogs and Alameda whipsnakes may also occur.

Recreation activities may affect covered species that occur in the recreation areas (San Pablo and Lafayette reservoirs). Despite a USFWS protocol trapping effort in 2000 for

Alameda whipsnakes as well as surveys for other species, the western pond turtle is the only HCP covered species found at Lafayette Reservoir. Whipsnakes may occur in proximity to recreational anglers at San Pablo Reservoir, but no impacts have been reported. Maintenance activities for recreational facilities such as border fencing, and road and trail maintenance are covered under other activities described in Section 3.

EBMUD requests incidental take authorization for 3 *O. mykiss*, 3 red-legged frogs and 3 Alameda whipsnakes during the course of the permit to construct and manage trails, access roads, and recreation facilities. No incidental take is expected for other covered species.

4.2.7-T Incidental Take From Developed Trails and Recreation Program

EBMUD requests incidental take authorization over the permit term for take of red-legged frogs, *O. mykiss* and Alameda whipsnakes as described above for its Developed Trails and Recreation Program.

4.2.8 Trench Spoils Storage and Removal Program

The specific activities associated with the Trench Spoils Storage and Removal Program, as described in Section 3, that may result in incidental take of covered species are listed below and shown in Table 4-1.

4.2.8.1 Conduct trench spoils placement and maintenance.

Trench spoils placement, maintenance and recovery is done using BMPs within areas of ground disturbance. Both red-legged frogs and Alameda whipsnakes have been observed within a distance of the spoils access routes or sites that might normally include their annual range of movement. The Briones and USL spoil sites access roads are 1.29 and 1.93 kilometers (0.8 mile and 1.2 miles) long, respectively.

Because of the proximity of species records and the length of the permit term, incidental take of red-legged frogs, western pond turtles, and Alameda whipsnakes may occur from this activity.

EBMUD requests incidental take authorization for 3 red-legged frogs, 5 western pond turtles, and 3 Alameda whipsnakes during the course of the permit to conduct trench spoils placement and maintenance. No incidental take is expected for other covered species.

4.2.8.2 Conduct trench spoils removal.

Trench spoil removal occurs approximately every ten years at the Briones spoils site and approximately every six years at the Miller Road site as described in Section 3.2.8.

Incidental take of red-legged frogs, western pond turtles, and Alameda whipsnakes from vehicle strikes may occur at either site during site access and for red-legged frogs and western pond turtles at the Miller Road site because of stream habitat proximity.

EBMUD requests incidental take authorization for 3 red-legged frogs, 5 western pond turtles, and 3 Alameda whipsnakes during the course of the permit to conduct trench spoils removal. No incidental take is expected for other covered species.

4.2.8-T Incidental Take From Trench Spoils Storage and Removal Program

EBMUD requests incidental take authorization over the permit term for red-legged frogs, western pond turtles, and Alameda whipsnakes as described above for its Trench Spoils Storage and Removal Program.

4.2.9 Multiple Program Activities

Vehicular access on watershed roads and trails as described in Section 3.3.9 is associated with multiple programs, and may result in incidental take of covered species as listed below and shown in Table 4-1.

4.2.9.1 Vehicular access on watershed roads and trails.

There are several watershed programs for which road-kills or injuries caused by vehicles on EBMUD land are the only identified potential incidental take. EBMUD has no record of a vehicle strike of a covered species from any of these activities, however there are records of mortality of covered species on highly traveled public roads in these areas, and there are covered species records from these areas.

Incidental take of 5 red-legged frogs, 5 western pond turtles, and 3 Alameda whipsnakes may occur during the course of the permit. No incidental take is expected for other covered species.

4.2.9-T Incidental Take From Multiple Program Activities

EBMUD requests incidental take authorization over the permit term for its Multiple Program Activities from vehicle strikes to red-legged frogs, western pond turtles, and Alameda whipsnakes.

4.3 CURRENT STATUS OF COVERED SPECIES IN HCP AREA

The current status of the covered species is discussed below and in Appendix A by species. They are summarized here to facilitate the discussion of impacts.

4.3.1 ***Santa Cruz tarplant***: There is one potentially remaining experimental population of three experimental sites started in the San Pablo Reservoir watershed in 1983. No plants have been observed from this last remaining population since 1997.

4.3.2 ***Pallid Manzanita***: There is one small population high in the Upper San Leandro Reservoir watershed. The only EBMUD activities scheduled for this site are for habitat enhancement of pallid manzanita.

4.3.3 ***Rainbow trout***: Resident *O. mykiss* are known to occur in several year classes in Pinole Valley (see Appendix A). Eight redds were observed within the residential area of the City of Pinole in 2006. No redds or spawned fish have been observed on EBMUD property, despite repeated annual surveys.

"Salmo irideus" were described by Gibbons in 1855 from the San Leandro Creek watershed. This population still exists (now *Oncorhynchus mykiss irideus*), apparently un-hybridized with hatchery strains in this watershed above Upper San Leandro Reservoir. Allozyme studies showed a linkage with the Central California Coast Steelhead ESU (Gall 1990) (see Appendix A). These fish can be found in at least six creeks that drain into the reservoir: Redwood, San Leandro, Indian, Moraga, Kaiser, and Buckhorn creeks. The fish are monitored in Redwood Creek by East Bay Regional Park District (Alexander 2001).

There is a small population of *O. mykiss* within the few hundred feet of stream below Chabot Dam; the origin of these fish has not been determined.

4.3.4 ***California Red-legged frog:*** There are two main dynamic populations that occur on EBMUD land. One population in Pinole Valley has at least three sites where the animals were able to survive the 1987-1992 droughts. A second population in

the Upper San Leandro watershed is reduced, and only survives in Miller-San Leandro Creek and through the maintenance of livestock ponds. A third sub-population, perhaps related to the Pinole Valley population and associated with San Pablo Reservoir exists mostly in livestock and sediment ponds. Their numbers continue to vary with rainfall (Appendix A).

4.3.5 ***Western pond turtle***: Western pond turtles can be found in every EBMUD terminal reservoir, in several stockponds, and in some of the larger creek pools. It is a locally common species on the EBMUD watershed lands.

4.3.6 ***Alameda whipsnake:*** Alameda whipsnakes are not common animals, even where they occur regularly (Swaim 2000). Trapping for Alameda whipsnakes on watershed property has shown them to be in the north and south watersheds, but absent from Lafayette Reservoir which is surrounded by residences and where there is intense human use (>800,000 visitors annually). Habitat where whipsnakes were previously recorded has either not been impacted or has rarely been temporarily impacted by EBMUD activities, so it is likely that whipsnakes still occupy the same areas. The vegetation series and habitat components associated with Alameda whipsnake occur throughout the HCP area. To better focus restoration, research, and mitigation efforts, an analysis was performed to identify primary (core) whipsnake habitat on HCP lands. Using vegetation data in the EBMUD GIS community map (based on the Draft Recovery Plan for Chaparral and Scrub Community Species East of San Francisco Bay, California (USFWS 2002)) and historic whipsnake observations, it is estimated that approximately 3,400 hectares (8,400 acres) of primary (core) Alameda whipsnake habitat exist on EBMUD watershed lands (Figure A-6). The primary habitat is split into three areas, which cover three of the recovery units listed in the recovery plan.

4.3.8 ***Pallid Bat***: The April Creek barn in Pinole Valley is the only known location for pallid bats on EBMUD Watershed. The animals use it seasonally for a nursery. At least two other bats species share the site. The barn has been weakened by the theft of some of the side planks. Despite signage installed to educate and help prevent this problem, criminal activity remains the primary threat to this remote species site.

4.4 IMPACTS

Impacts of incidental take under EBMUD management actions on species' populations depend on population size and species' reproductive rates. The highest potential for impacts from EBMUD watershed activities is for *O. mykiss*, red-legged frogs, and Alameda whipsnakes. All of these species are limited on EBMUD watershed lands, but total population numbers for covered species are not known for the HCP area. Their status is discussed in detail in Appendix A and summarized above in Section 4.3.

EBMUD requests incidental take for these three species as described above (Sections 4.2.1 through 4.2.9). It is estimated that populations of Alameda whipsnakes and *O. mykiss* on EBMUD watershed lands, while they vary with the current weather patterns, are stable, and that estimated total annual incidental take is more than offset by EBMUD's management of the HCP area. Species records of California red-legged frogs on the watershed have become less frequent since the late 1990's, but there is insufficient data to quantify the likely change. Potential for incidental take of Santa Cruz tarplant and pallid manzanita is unlikely.

Although the western pond turtle and pallid bat are currently unlisted, EBMUD also requests authorization for incidental take of these species as described above.

5 AVOIDANCE AND MINIMIZATION MEASURES

5.1 INTRODUCTION

The activities identified in Section 3 have the potential to result in incidental take of individuals of plant and wildlife species covered by this HCP. Implementation of the avoidance and minimization measures (AMMs) identified in this section and the BMPs identified in Section 3 will substantially reduce or eliminate the potential for incidental take. Implementation of the mitigation measures described in Section 6 will protect the habitat and sustain populations of the species covered by this HCP.

5.2 GENERAL AVOIDANCE AND MINIMIZATION MEASURES

The following measures are designed to avoid or minimize incidental take of covered species on EBMUD watershed lands.

1. Education and public awareness are essential to the conservation and enhancement of the species covered by this HCP. Within one year of approval of this HCP, all EBMUD staff and contractors who conduct operations and maintenance activities on EBMUD watershed lands will participate in an education program. The program will include the following topics:
    - Distribution and general ecology of covered species
    - Recognition of covered species' habitats
    - Sensitivity of the covered species to human activities
    - Legal protection of covered species and penalties for violations
    - Reporting requirements
    - Protection measures for covered species
    - Emergency contact information for EBMUD Fisheries and Wildlife personnel
2. EBMUD Natural Resources staff in the East Bay will begin training in the HCP within one month of their date of hire or transfer to the area. HCP training of newly hired EBMUD East Bay biologists will be completed, along with USFWS approval, before they monitor listed species.
3. EBMUD vehicles, contractor vehicles, and vehicles used by those with a Watershed Entry Permit shall maintain an awareness of the roadway and travel no faster than the

posted speed limit, or will travel at a speed sufficient (5-15mph as appropriate on fire roads) to allow reasonable avoidance of animals in the roadways. These speed restrictions will be determined on a case-by-case basis for watershed entry permits, during pre-project classes, and during EBMUD HCP education classes.

4. The EBMUD policy of minimizing the construction of new access roads and fire roads (EBMUD 1996) will be continued.

5. Specific sensitive areas proposed for HCP covered activities will be surveyed by EBMUD biologists or other qualified biologists within 30 days prior to the start of a project, using NMFS protocols or other protective methods developed or approved by USFWS or NMFS. Populations of plant species covered by this HCP, western pond turtle nests, and any other covered species related features identified during the pre-activity survey will be suitably flagged to identify areas to avoid. Activities shall be conducted to minimize disturbance in the delineated sensitive areas. Should a covered species need to be relocated during a project, an EBMUD biologist will move the animal using methods as described below or as agreed upon with USFWS in the future.

5.3 SPECIFIC AVOIDANCE AND MINIMIZATION MEASURES

The East Bay Watershed Master Plan (WMP) and its affiliated documents provide general protection and mitigation measures that protect watershed biodiversity and the water quality of watershed runoff. In addition to these general measures, this HCP contains specific measures to protect covered species and their natural habitats. These measures include species-specific avoidance, minimization, rectification, reduction, and compensation directives to be followed throughout the term of the HCP. Species-specific avoidance and minimization measures are described in Table 5-1.

Wetland and Pond Surveys Biologists will perform pre-project surveys for covered species within 10 days of the project start date to determine if the project site has water and, if so, to allow for rescheduling, or to plan for clearing the area of covered species before the project starts. If the biologist determines that covered species presence is possible at the site, a biologist will again survey the area just prior to the project start. Animals present may be temporarily excluded from the work area by the biologist. Temporary exclusion may be done in two ways. A small project area may be blocked off with seines to prevent animal access for the few hours necessary to complete work; for a

larger project a biologist may capture and confine animals. Service-approved biologists will not use soaps, oils, creams, lotions, repellents, or solvents of any sort on their hands within two hours before and during periods when they are capturing and relocating red-legged frogs or tiger salamanders. If necessary, frogs or turtles will be held in temperature controlled (i.e., shaded or cooled as necessary with ice) buckets or tubs large enough to easily accommodate them during the project, but for no longer than 12 hours for frogs and 24 hours for turtles. Removal will be done by capturing by hand or net all observed frogs while the pond is drawn down in stages. Turtles will be trapped or captured by hand (such as by snorkeling). Wherever possible, frogs or turtles will be returned to the (still wetted) ponds after management activities are finished. In the event wetted ponds are dewatered, sequestered animals will be released in a sufficiently large nearby wetted habitat and USFWS will be notified.

Table 5-1.
Species-specific Avoidance and Minimization Measures

5.3.1 Santa Cruz Tarplant

Management Activity	**Potential Impact**	**Avoidance and Minimization Measures**	**Status on HCP Lands**
Prescribed burning	Ground disturbance may remove plants.	Identify current and historic locations of plants before project initiation. Flag individual plants for workers if project is proposed for known Santa Cruz Tarplant area. Schedule projects in Santa Cruz tarplant area when plants are visible and easily avoided during ground-disturbing procedures (April-June).	Federally threatened, State endangered, CNPS list C1b. Only successful experimental population was on San Pablo watershed. (Figure A-1). No plants observed since 1997.

Table 5-1. Species-specific Avoidance and Minimization Measures (continued)			
5.3.2 Pallid Manzanita			
Management Activity	**Potential Impact**	**Avoidance and Minimization Measures**	**Status on HCP Lands**
Conduct habitat restoration activities Control Invasive Plants	Ground disturbance may remove plants.	Identify current and historic locations of plants before project initiation. Flag individual plants for workers if project is proposed for known Pallid Manzanita area. Provide location maps to all EBMUD staff, lessees, and contractors that may conduct activities in area.	Federally threatened, State endangered, CNPS list C1b. One population high in San Leandro Canyon near Pinehurst Road and Skyline Blvd. No trails, roads, fences, or routine activities in area (Figure A-2).

Table 5-1. Species-specific Avoidance and Minimization Measures (continued)			
5.3.3 Rainbow Trout			
Management Activity	**Potential Impact**	**Avoidance and Minimization Measures**	**Status on HCP Lands**
Manage creek beds Habitat restoration	Removal of trees, stumps, logs, boulders, and/or gravel may disturb instream structures that are important for *O. mykiss* spawning, rearing, or cover.	Except in cases of road flooding, excessive erosion, or to improve fish passage, instream structures will be left in place to increase stream habitat complexity.	Populations in Pinole Creek and Upper San Leandro Reservoir and watershed (Figure A-3).
Culvert installation and replacement	Dewatering of creeks for culvert projects may require relocating *O. mykiss*. Handling *O. mykiss* can harm animals.	Electrofishing for relocations for the two known perennial creek culverts (see Section 3.2.1.4) will follow NMFS steelhead sampling protocols. Any bypass diversions will be screened. If necessary, block nets will be used to exclude fish from project area. If available, fish will be held in pools upstream of the project site. EBMUD biologists will clean hands before touching animals to prevent contamination from foreign matter such as sunscreen.	
EBMUD staff monitoring of species populations	Electrofishing may take *O. mykiss*.	Electrofishing of creeks will follow NMFS steelhead sampling protocols. Electrofishing of reservoirs will not be done near creek/reservoir confluences where *O. mykiss* may stage to ascend creeks.	

Table 5-1. Species-specific Avoidance and Minimization Measures (continued)			
5.3.3 Rainbow Trout (continued)			
Management Activity	**Potential Impact**	**Avoidance and Minimization Measures**	**Status on HCP Lands**
Livestock grazing Use Farm machinery Construct and manage fuel treatment areas and fuel breaks Prescribed burning Maintain fire roads Construct and manage trails, access roads, and recreation facilities	May cause increased sedimentation in creeks that can decrease survival of *O. mykiss* eggs and embryos.	Livestock grazing, discing, mowing, road grading, trail maintenance, and other potential sediment-producing activities will be conducted using BMPs (refer to Section 3) designed to limit these impacts. Fences will be maintained at Pinole Creek to provide a minimum 15.4 meters (50 ft) vegetation buffer, and an average 15.4 meters (50 ft) vegetation buffer will be maintained for new fencing at other creeks due to topographical variability as a biological goal of this HCP (Section 1.4.2.3), and as part of the RRMP.	Populations in Pinole Creek and Upper San Leandro Reservoir and watershed (Figure A-3).

Table 5-1. Species-specific Avoidance and Minimization Measures (continued)			
5.3.4 California Red-legged Frog			
Management Activity	**Potential Impact**	**Avoidance and Minimization Measures**	**Status on HCP Lands**
Operation of reservoirs	Release of winter storm water downstream of San Pablo and Upper San Leandro reservoirs may dislodge red-legged frog egg masses.	Upon notification of a planned January or February release, qualified biologists will perform surveys for egg masses in the path of the flow velocity increase. If necessary, egg masses will be moved to an unaffected area.	Federally Threatened. In perennial creeks and stockponds on watershed (Figure A-4).
Manage creek beds Manage spillways Culvert installation and replacement	Creek bed, spillway operation, and culvert maintenance projects may take red-legged frogs. Handling red-legged frogs can harm animals.	Qualified biologists will perform surveys within ten days prior to project initiation. Red-legged frogs found in the project area will be avoided through rescheduling the activity, or the frogs will be temporarily held (no more than 12 hours) at the project site or moved to an unaffected area. (see section 5.3) To avoid breeding and larval frogs, spillway projects will only be performed when stream channel is dry or when pre-project surveys determine red-legged frog larvae are not present. EBMUD biologists will clean hands before touching animals to prevent contamination from foreign matter such as sunscreen.	

Table 5-1. Species-specific Avoidance and Minimization Measures (continued)			
5.3.4 California Red-legged Frog (continued)			
Management Activity	**Potential Impact**	**Avoidance and Minimization Measures**	**Status on HCP Lands**
Control invasive plants Construct and maintain boundary fences Construct and maintain livestock fences and corrals Habitat restoration	May take red-legged frogs as they move through wet, grassy areas, between sources of water, or as they aestivate in uplands adjacent to breeding sites.	Frogs found during pre-project surveys will be allowed to move out of project area on their own, or will be excluded from the project area, captured and confined during the project and re-released on site, or will be relocated within the distance of a typical home range.	Federally Threatened. In perennial creeks and stockponds on watershed (Figure A-4).
Control non-native animals	May take red-legged frogs.	Bullfrog removal is done only after the red-legged frog breeding season. Bullfrog egg masses are removed when encountered.	
Construct and manage ponds, spring boxes, and troughs for grazing activities.	Repair of dams or removal of sediment or emergent plant growth may result in take of red-legged frogs.	Structural problems will be repaired; excessive sedimentation and emergent plant growth will be addressed using USFWS recovery plan guidelines. See also Section 5.3.	

Table 5-1. Species-specific Avoidance and Minimization Measures (continued)			
5.3.4 California Red-legged Frog (continued)			
Management Activity	**Potential Impact**	**Avoidance and Minimization Measures**	**Status on HCP Lands**
Use Farm machinery Construct and manage fuel treatment areas and fuel breaks Prescribed burning Maintain fire roads Construct and manage trails, access roads, and recreation facilities	Heavy equipment operation may take red-legged frogs as they move through wet, grassy areas, between sources of water, or as they aestivate in uplands adjacent to breeding sites.	Mowing, discing, and grading within habitat areas will be conducted when dry except in emergency response to fires and discing related to agricultural operations.	Federally Threatened. In perennial creeks and stockponds on watershed (Figure A-4).
Conduct trench spoils placement and maintenance Conduct trench spoils removal	May decrease the quality of red-legged frog habitat (pool depth) by increased sedimentation from Upper San Leandro Reservoir trench spoils site.	Manage erosion control features through weekly inspection and maintenance during periods of rain from November-April.	
Vehicular access on watershed roads and trails	Vehicles may strike red-legged frogs.	See Section 5.2.	

Table 5-1. Species-specific Avoidance and Minimization Measures (continued)			
5.3.5 Western Pond Turtle			
Management Activity	**Potential Impact**	**Avoidance and Minimization Measures**	**Status on HCP Lands**
Manage spillways Habitat restoration	May take western pond turtles.	Qualified biologists will perform surveys within ten days prior to project initiation. Western pond turtles found in the project area will be avoided through project rescheduling or temporarily held using methods described in Section 5.3. If repaired ponds are dewatered, turtles will be moved to a sufficiently large nearby wetted habitat.	Unlisted. Federal Species of Concern. Present in perennial ponds and reservoirs (Figure A-5).
Control non-native animals	May inadvertently trap western pond turtles.	Traps are set to capture all turtles alive; traps are checked twice daily.	
Manage ponds	Repair of dams, removal of sediment, or emergent plant growth may result in take of western pond turtles. Handling western pond turtles can harm animals.	Turtles will be avoided during minor repair work by project rescheduling, or removed and held temporarily near the project site until the minor repair is complete. EBMUD biologists will clean hands before touching animals to prevent contamination from foreign matter such as sunscreen.	

Table 5-1. Species-specific Avoidance and Minimization Measures (continued)			
5.3.5 Western Pond Turtle (continued)			
Management Activity	**Potential Impact**	**Avoidance and Minimization Measures**	**Status on HCP Lands**
Conduct trench spoils placement and maintenance Conduct trench spoils removal	Operation of heavy equipment may result in take of western pond turtles.	See Section 5.2.	Unlisted. Federal Species of Concern. Present in perennial ponds and reservoirs (Figure A-5).
Vehicular access on watershed roads and trails	Vehicles may strike western pond turtles.	See Section 5.2.	

Table 5-1. ***Species-specific Avoidance and Minimization Measures (continued)***			
5.3.6 Alameda Whipsnake			
Management Activity	**Potential Impact**	**Avoidance and Minimization Measures**	**Status on HCP Lands**
Control invasive plants Construct and maintain boundary fences Construct and maintain livestock fences and corrals Habitat restoration (prescribed burning)	May take Alameda whipsnakes.	Projects within core habitat areas will be completed without using heavy equipment.	Federally Threatened, State Threatened. Present in shrub habitats and near rock outcrops. Also uses grassland, riparian, and woodland habitats (Figure A-6).
Manage ponds, spring boxes, and troughs Use Farm machinery Construct and maintain fuel treatment areas and fuel breaks Maintain fire roads Construct and manage trails, access roads, and recreation facilities	Heavy equipment operation may take Alameda whipsnakes.	See Section 5.2. Projects will be suspended if Alameda whipsnakes are observed in project areas.	

Table 5-1. Species-specific Avoidance and Minimization Measures (continued)			
5.3.6 Alameda Whipsnake (continued)			
Management Activity	**Potential Impact**	**Avoidance and Minimization Measures**	**Status on HCP Lands**
Conduct livestock grazing	Grazing lessees may encounter whipsnakes during watershed projects.	All livestock grazing lessees will be trained in identification and avoidance of Alameda whipsnakes.	Federally Threatened, State Threatened. Present in shrub habitats and near rock outcrops. Also uses grassland, riparian, and woodland habitats (Figure A-6).
Vehicular access on watershed roads and trails	Vehicles may strike basking or hunting Alameda whipsnakes.	See Section 5.2.	

Table 5-1. **Species-specific Avoidance and Minimization Measures (continued)**			
5.3.7 Pallid Bat			
Management Activity	**Potential Impact**	**Avoidance and Minimization Measures**	**Status on HCP Lands**
EBMUD staff monitoring of species populations	May take pallid bats.	Monitoring will be conducted using video or sonic techniques.	California Species of Special Concern. One known nursery colony in Pinole Valley. (Figure A-7)
Conduct livestock grazing	Maintenance activities on barn may result in take of breeding or sheltering pallid bats.	See Section 5.2. Restrict maintenance activities on barn to periods when bats are absent.	

6 MITIGATION

6.1 GENERAL MITIGATION

The HCP Handbook does not establish rules for mitigation for selected species or habitat, but instead directs mitigation to be "adequate and consistent" regardless of whether USFWS or NMFS is responsible for the covered species. Accordingly, the handbook notes that mitigation includes, in addition to avoidance and minimization measures (Section 5):

1. Rectification through restoration and revegetation of disturbed areas;
2. Reduction or elimination of impacts over time; and,
3. Compensation for impacts by habitat restoration.

1. Rectification through restoration and revegetation of disturbed areas. For example, for fire disturbed areas post suppression restoration may include:

- Re-grading and contouring of control lines (particularly if line was constructed with a bulldozer)
- Seeding, strawing, or mulching the burn area
- Construction or installation of stormwater runoff diversion devises
- Construction or installation of sediment retention systems

Rectification is accomplished through the Biodiversity and Forestry programs (refer to Section 3), is done as part of the Livestock Grazing Program, or is specific to particular project impacts such as streambank disturbance. The Biodiversity Program promotes revegetation of denuded drainages that have resulted from over 100 years of area use for livestock grazing at levels that exceeded the current target levels from the RRMP (base RDM level of 840-1,400lbs/acre, depending on slope). The Forestry Program includes the selected removal of non-native trees such as Monterey pine and eucalyptus to enhance growth of underlying native vegetation such as bay trees and valley oaks. The Grazing Program element from the RRMP requires the maintenance of fencelines to exclude illegal trespass and allow for better pasture rotation.

2. Reduction or elimination of impacts over time. The grazing program element of the RRMP, as based on the East Bay Watershed Master Plan, significantly reduces the level of impacts from livestock management that has long been in place in the East Bay. Through changed grazing levels and management of watershed land for higher amounts

of residual dry matter (RDM), the general health of the watershed is improved. Native species continue to flourish under the new program, and covered species such as the red-legged frog, Alameda whipsnake, and pallid bat benefit indirectly from the improved management.

3. Compensation for impacts by habitat restoration. Habitat for covered species may be lost, such as when a pond dam fails and the pond no longer holds water. Such failures are expected; however, annual biological monitoring followed by directed fall rehabilitation efforts will result in a near end-of-year habitat equilibrium as pond failures are offset by restoration and maintenance of other ponds. Similarly, minor impacts which may occur during non-native forest thinning are compensated by the replacement of the non-native trees with native species within the understory. The native species, especially oaks, provide food and shelter to far more species than non-native trees such as eucalyptus.

6.2 SPECIFIC MITIGATIONS

Incidental take will be offset by mitigation programs and normal watershed maintenance designed to protect biodiversity.

6.2.1 Santa Cruz tarplant

1. Rectification through restoration and revegetation of disturbed areas: Since the experimental population at the Sather Canyon site (see Figure A-1) has been extirpated, no revegetation will be conducted. Measures under adaptive management, Section 8.2.1, to stimulate growth from fire-adapted seeds will be implemented.

2. Reduction or elimination of impacts over time: EBMUD will change the grazing level at sites to benefit the tarplant through first five years of permit.

3. Compensation for impacts by habitat restoration: Species may be currently extirpated from the watershed. No compensation is required for the Sather Canyon site. Adaptive management measures will be implemented if species is not observed (Section 8.2.1).

6.2.2 Pallid manzanita

1. Rectification will not be necessary under watershed activities, which will not impact the area. Suppression of wildfires may impact the site, but the species is fire-adapted and recruitment should be enhanced by the occurrence of fire.

2. Reduction or elimination of impacts over time: Pallid manzanita should be helped by removal of overhanging vegetation (see below). Shading of existing plants by competing vegetation may impact their health. Removal of overhanging madrone trees, a single very large (non-native) Monterey pine and bay trees will improve the survival of the small known pallid manzanita population (7-14 plants). It is unknown if this action will promote propagation, but it will improve the health of existing plants so propagation can occur when possible.

3. Compensation for impacts by habitat restoration: No watershed activities are scheduled for the area where pallid manzanita is located; therefore EBMUD is not proposing any compensation for impacts.

6.2.3 Rainbow trout

1. Rectification through restoration and revegetation of disturbed areas: Measure 3 (below – fencing of perennial streams) will induce restoration and revegetation through reduced livestock impacts.

2. Reduction or elimination of impacts over time: EBMUD will fence the Pinole Creek riparian zone to reduce impacts to *O. mykiss* habitat from watershed grazing (e.g., removal or disturbance of the riparian zone, and sedimentation into creeks). However, impacts will be determined each fall. If damaged areas are identified (e.g., downed fence, exclusion is ineffective), they will be addressed at the damaged site(s) and mitigated by restoration (see below). Fencing along perennial streams in the Upper San Leandro Reservoir drainage, including Buckhorn, Indian, Kaiser, Moraga, San Leandro, and Redwood creeks is part of the grazing program under the WMP, and will be maintained in order to minimize sedimentation into the creeks and the future disturbance of *O. mykiss* spawning gravel.

3. Compensation for impacts by habitat restoration: Habitat restoration will occur as a result of fencing and, if necessary, measures from adaptive management (refer to Section 8.2.3). Loss of riparian vegetation due to covered EBMUD watershed activities will require revegetation of the impacted area or an area of equal size within 152 meters (approximately 500 feet) on the same stream.

6.2.4 California red-legged frog

1. Rectification through restoration and revegetation of disturbed areas: Annually in July/August, red-legged frog habitat will be compared with the previous year. Reduction of habitats due to watershed management activities will be addressed and mitigated. Ponds will be examined for habitat suitability and repaired or enhanced as needed to maintain their function as habitat for red-legged frogs (refer to Section 8.2.4).

2. Reduction or elimination of impacts over time: Fencing of perennial watershed creeks will improve habitat for red-legged frogs over time. Riparian vegetation may increase in fenced areas if no longer available to livestock.

3. Compensation for impacts by habitat restoration: Watershed pond monitoring and maintenance will result in continuation of red-legged frog habitat in spite of temporary losses due to dam failure, slumping, sedimentation, or other pond habitat loss.

6.2.5 Western pond turtle

1. Rectification through restoration and revegetation of disturbed areas: Enhancement Ponds 11, 22, 28, 62, and 85, (Simas Pond, Nunes Pond, Nunes Lagoon, Inspiration Pond, and Baby Bottle Pond respectively) (Stebbins 1996) will be inspected each year. Loss of pond integrity in these known key turtle habitats shall be addressed by EBMUD each fall during its annual pond maintenance activities.

2. Reduction or elimination of impacts over time: Boundary fencing (Section 3.2.1.6) will limit human impacts during the course of the permit.

3. Compensation for impacts by habitat restoration: If surveys of these five turtle ponds show that one or more are damaged or have lost their integrity, impacts will be rectified or compensated by constructing a similar pond within the same drainage with comparable wildlife habitat. If turtle basking sites are lost, new basking sites will be constructed and installed. Observation of two platforms filled with basking turtles on three occasions, or two full platforms with additional turtles in the water will require the installation of a third basking platform. No more than three basking platforms will be installed at any pond.

6.2.6 Alameda whipsnake

1. Rectification through restoration and revegetation of disturbed areas: primary Alameda whipsnake habitat (i.e., mature coastal scrub or chaparral: core habitat) will be tracked during the HCP using a Geographic Information System (GIS) program. Some natural variance will occur from year to year. However, a sustained three-year loss resulting in combined removal of 1% of Alameda whipsnake core habitat (cumulative 34 hectares or 84 acres) due to natural variation and watershed activities (other than approved prescribed burning) will be mitigated within three years of reported habitat loss. As mitigation, scrub and/or chaparral habitat will be allowed to encroach in areas away from urban interface until habitat volume has recovered. This rectification does not include damage from wildfires.

2. Reduction or elimination of impacts over time: Education programs and speed limits will reduce impacts to Alameda whipsnakes.

3. Compensation for impacts to coastal scrub and chaparral habitat: All impacts are anticipated to be temporary (1-3 years) and less than a total of 34 hectares (84 acres). Natural coastal scrub encroachment on grassland habitats as modified by the grazing program will compensate for these minor losses over time, therefore further compensation is not required.

6.2.7 Pallid bat

1. Rectification through restoration and revegetation of disturbed areas: None suggested other than maintenance of moderate grazing level as outlined in the RRMP (2001).

2. Reduction or elimination of impacts over time: Grazing lessees and Bay Area Ridge Trail Users will be prohibited from using the April Creek barn for storage or other activities. No other impacts currently identified.

3. Compensation for impacts by habitat restoration: The April Creek barn is abandoned, and may fail during the course of the permit. It will be braced as feasible to preserve it. A habitat structure designed for pallid bats will be placed within the area near the barn. If the barn fails or is destroyed more rapidly such as by fire, earthquake, or vandalism, the new habitat structure will already be available for use by the bats.

7 MONITORING

7.1 MONITORING

Monitoring for this HCP is comprised of *Compliance Monitoring*, monitoring to verify compliance with HCP agreement terms; and *Effectiveness Monitoring*, monitoring to determine if the HCP and its components are having the desired effects (achieving biological goals and objectives).

7.1.1 COMPLIANCE MONITORING

Compliance monitoring will ensure that the terms and conditions of the HCP are being followed. Anticipated terms and conditions fall under the general categories of funding, reporting, and policy implementation.

Implementation of the HCP will be funded through EBMUD's annual operating budget. The budget will be routinely monitored to ensure that individual mitigation and monitoring components covered by the agreement are adequately funded. Additionally, annual staffing plans will be developed and reviewed to ensure that adequate FTE (full time employee) support is available to comply with the terms and conditions of the HCP.

Annual review of reporting requirements and actions will be conducted to ensure that all reporting measures included in the HCP are being met. Reporting requirements include updates on incidental take, sightings of new ESA species or populations (covered or not by this HCP), and habitat measurements or estimations as required.

The HCP and associated agreements call for a number of programs (education, monitoring, regulatory) to be implemented. Annual review will be done for each of these programs to ensure they are implemented properly and are effective. Educational programs will be reviewed to confirm that up-to-date materials are available for all staff operating on covered watershed lands. Records will be kept and inspected to confirm that all staff required training as stipulated in the HCP is completed. Annual reviews of HCP related monitoring projects will be conducted to ensure all components are addressed as required. Regulatory aspects of the HCP will be reviewed annually to confirm their effectiveness. Examples include, but are not limited to, vehicle speed guidelines, implementation of appropriate BMPs and AMMs, and submission of sensitive species records to the California Natural Diversity Data Base (CNDDB).

7.1.2 EFFECTIVENESS MONITORING

Effectiveness monitoring is intended to evaluate the effects of the permitted action and to determine if the HCP is achieving the biological goals and objectives. The effectiveness monitoring program is designed to address and/or answer the following:

- Account for incidental take occurring in conjunction with permitted activities
- Species status (report of presence, reproduction)
- Habitat condition
- Changes in habitat availability
- Progress in achieving biological goals
- Fulfillment of mitigation objectives

The following sections describe the effectiveness monitoring plans for each of the covered species. This material is shown also in Table 7-1.

7.1.2.1 Santa Cruz tarplant

Determine Species Locations. There is one experimental stand of Santa Cruz tarplant in the HCP area (Figure A-1). From a peak of 3000 plants in 1988 five years after it was introduced, the high number for this stand during the 1990s was 100 in 1995 & 1996. Santa Cruz tarplants have not been observed on the watershed since 1997. This population site will be annually surveyed for the first three years of the ITP in June or, depending on weather patterns, during the period most favorable to discovery.

Report HCP species occurrences. The Santa Cruz tarplant site will be monitored and any plants found will be counted, their condition assessed, and adaptive management strategies developed if necessary. Results will be reported annually.

Determine change in total covered plant species numbers related to covered activities. The Santa Cruz tarplant grazed area will be monitored for residual dry matter to determine if there is excessive thatch that may prevent germination. Monitoring results will be reported monthly from March through June to EBMUD Natural Resources, and then annually to the Service for two years following a prescribed burn of the experimental population area.

Determine *efficacy of species specific enhancement measures.* Monitor Santa Cruz tarplant experimental sites during first three years of permit to determine the baseline population. Monitor annually to determine if Santa Cruz tarplant numbers are improved

under the HCP. Adaptively manage (i.e., burn area) if species not found (refer to Section 8.2.1). The six-year report to USFWS will contain results of adaptive management efforts. If at the six-year report Santa Cruz tarplant has not been found in the known area, the species will not have been observed for over 13-yrs and it will be presumed extirpated from the known 1983 experimental site.

TABLE 7-1.
EBMUD HCP Effectiveness Monitoring Summary

	Santa Cruz tarplant	Pallid Manzanita	*O. mykiss*
Determine Species Habitat	One experimental stand in HCP area (Figure A-1). Surveyed annually in June or period most favorable to discovery under RRMP for the first two years.	The EBMUD watersheds support one population of pallid manzanita (Figure A-2).	There is approximately 5.3 km (3.2 mi) of resident *O. mykiss* habitat in HCP area on Pinole Creek (Figure A-3) and approximately 25 km (15.5 mi) on EBMUD lands above USL.
Report HCP Species Occurrences	Experimental site will be monitored for presence, any plants counted, condition assessed, and adaptive management strategies developed if necessary. Results reported annually	Known location surveyed every two years in Oct-Nov and results reported. Plants counted, condition assessed, and management strategies adjusted. Six-year report with discussion PM population health within East Bay. Adaptive management suggested.	Monitoring on Pinole Creek will consist of: 1) ID extent of *O. mykiss* spawning, rearing, and holding habitat, including water temp, within Pinole creek within the first 3-yrs of implementation. Verify integrity of exclusion fencing; 2) Monitor again after 2-yrs & 5-yr intervals. Monitoring for irideus in streams above USL will consist of: 3) ID extent of O. m. irideus spawning, rearing, and holding habitat, including water temp, within Buckhorn, Indian, Kaiser, Moraga, and San Leandro creeks within first 3-yrs of implementation. Note integrity of riparian exclusion; 4) Monitor again after 2-yrs & 5yr intervals.
Determine Change in Total Species Habitat	The SCTP grazed area monitored RDMs to determine if thatch may prevent germination. Report results and adaptively manage to benefit species.	Report any impacts on PM from covered EBMUD watershed activities	Note and report unmaintained fences, siltation and sources (if known), and estimated change in habitat at three year intervals.
Determine Efficacy of Species Enhancement	Monitor experimental sites during first three permit years to determine baseline population. Monitor annually to determine if SCTP numbers improved under HCP. If no plants found during the first two years of permit, a control burn will be done to stimulate germination. Monitoring to continue for three years. Six-year report to have results of burn and subsequent SCTP recruitment. If SCTP not found by six years, population will be presumed extirpated.	If wildfire at the USL Big Burn peninsula area, introduce PM seeds or seedlings into burned site. Monitor new plants annually. Monitoring stopped if plants extirpated before flowering. Monitor after flowering through course of permit.	Monitor spawning trends of wild trout in EMBUD creeks.

TABLE 7-1. EBMUD HCP Effectiveness Monitoring Summary (Continued)				
	California Red-legged Frog	**Western Pond Turtle**	**Alameda whipsnake**	**Pallid Bat**
Determine Species Habitat	California red-legged frogs are found in the Pinole Valley, San Pablo, Briones and USL watersheds (Figure A-4).	WPT habitat on Lafayette, San Pablo, Briones, and Upper San Leandro reservoirs and in ponds with adequate habitat components throughout north watershed. Ponds include 11, 22, 28, 62, and 85 (as ID'd in Stebbins 1996) (Figure 3-1).	Monitoring to be habitat-based. Coordinate with USFWS approved biologist to assess AWS core, forage, and movement habitats in plan area. Results of assessment entered in GIS as baseline occurrence within two years. Dispersal cover annually measured in grazed pastures.	One pallid bat nursery colony (Figure A-7). Other pallid bat colonies discovered will be noted in the GIS species database and added to monitoring program when discovered.
Report HCP Species Occurrences	Monitor habitat and presence of CRLF populations prior to specific watershed activities using appropriate protective methods as shown in Sections 3 & 5, and annually monitor permanent ponds in Fig A-4.	Turtle counts done in habitat ponds (see Appendix A & Figure A-5). Potential habitats surveyed with project-related CRLF monitoring. Turtles counted, non-native species noted, habitat value determined based on known WPT habitat preferences.	Monitoring is habitat based to reduce incidental take from harassment. Results of pasture monitoring will report passage habitat annually. Whipsnake habitats adjacent to or within project areas also assessed, and results added to GIS.	Staff to monitor colony and others as discovered annually and within 30 days prior to any project within 152 meters (500 feet).
Determine Change in Total Species Habitat	Monitor CRLF habitat components, including pond integrity, fencing, and presence of non-natives in stockponds and other known sites every 2-yrs. Measure Residual Dry Matter (RDMs) on watershed to determine if grazing management is within goals.	Known WPT ponds surveyed for structural integrity.	EBMUD will obtain new aerial photographs every six years as available to compare whipsnake habitat total area to baseline habitat assessment, and vegetation coverage for AWS core habitat will be updated (five updates during 30-year permit).	Colony size estimated before and after planned mitigation (off-season structural reinforcement of existing barn), and reported during first subsequent annual report, then during five year reports.
Determine Efficacy of Species Enhancement	Monitor ponds after non-native species removal to determine use by CRLF. Determine if grazing management is within goals.	Monitor use of artificial WPT basking habitats. RRMP monitoring to record RDMs on watershed to determine if grazing management is within plan goals. Survey supplemental nesting substrate for WPT nests.	Perform GIS database modeling to determine extent of AWS core habitat. Obtain new aerial photos of HCP watershed area every six years throughout the permit, and update vegetation layer through available aerial photography to compare with previous data every six years. Report change in total core habitat and relate to management activities.	Record presence of pallid bats at know nursery colony for first 2-yrsof permit. Record pallid bat presence during breeding season and nursery period to determine effectiveness of the maintenance activities on April Creek Barn.

7.1.2.2 Pallid Manzanita

Determine Species Locations. Determine likely pallid manzanita sites on EBMUD east bay watershed property based on the species life history (Appendix A) and other known occurrences in the East Bay (Kanz 2004).

Report HCP species occurrences. The EBMUD watersheds support one population of pallid manzanita (Figure A-2). This population has been generally declining. A local creek group surveyed fifteen East Bay populations in 2004 and reported that pallid manzanita numbers at the EBMUD site has dropped from 25 in 1985 to 7 stunted adult plants in 2004. The poor health was attributed to shading from a maturing forest (Kanz 2004). EBMUD surveyed this location in June 2006 and found only 4 adult plants and four juvenile plants. All appeared stressed (Lake 2006). This location will be surveyed by EBMUD staff every two years during October-November and the results included in the annual report to USFWS. The plants will be counted, the condition of the plants assessed, and management strategies adjusted as necessary. The five-year report will contain a discussion of the health of the pallid manzanita population relative to its recent historical numbers and other East Bay populations, and suggested adaptive management.

Determine change in total covered plant species numbers related to covered activities. Report any impacts on pallid manzanita from covered EBMUD watershed activities.

Determine *efficacy of species specific enhancement measures.* During the biannual surveys of the pallid manzanita site, EBMUD will monitor the health of the plants and the efficacy of removing or trimming the surrounding vegetation.

7.1.2.3 Oncorhynchus mykiss

Determine Species Habitat. There are approximately 5.3 km (3.2 miles) of resident *O. mykiss* habitat in the HCP area on Pinole Creek (Figure A-3) and approximately 25 km (15.5 miles) of resident *O. mykiss* habitat on EBMUD lands above Upper San Leandro Reservoir. Habitat will continue to be monitored as outlined below.

Report HCP species occurrences.

Monitoring for species occurrence on Pinole Creek will consist of the following:

1. Identify the extent of *O. mykiss* spawning, rearing and holding habitat, including water temperature using thermographs from spring through fall within Pinole Creek on EBMUD land within the first three years of implementation of this

HCP. Habitat will be mapped using guidelines outlined in California Salmonid Stream Habitat Restoration Manual (Flossi and Reynolds 1994). Verify the integrity of the Pinole Creek exclusion fencing.

2. Habitat within the creek on EBMUD land will be remapped at five-year intervals.

3. Surveys to determine presence and/or absence of *O. mykiss* will be conducted yearly at fixed reference sites within Pinole Creek on EBMUD lands.

Monitoring for species occurrence in streams above Upper San Leandro Reservoir will consist of the following:

1. Identify the extent of *O. mykiss irideus* spawning, rearing, and holding habitat, including water temperature using thermographs from spring through fall, within Buckhorn, Indian, Kaiser, Moraga, Redwood, and San Leandro creeks on EBMUD property within the first three years of implementation of this HCP. Habitat will be mapped using guidelines outlined in California Salmonid Stream Habitat Restoration Manual (Flossi and Reynolds 1994). Verify the integrity of the riparian exclusion fencing.

2. Habitat within these creeks on EBMUD land will be remapped at five-year intervals.

3. Surveys to determine presence and/or absence of *O. mykiss* will be conducted yearly at fixed reference sites within the USL creeks on EBMUD lands.

Determine change in total species habitat related to covered activities. Note and report estimated change in habitat at three year intervals, paying particular attention to changes in riparian vegetation and spawning habitat.

Determine *efficacy of species specific enhancement measures*. Monitor *O. mykiss* spawning in Pinole Creek, and compare to *O. mykiss* spawning in Wildcat Creek (if data available).

7.1.2.4 California Red-legged Frog

Determine Species Habitat. California red-legged frogs are found in the Pinole Valley, San Pablo, Briones, and Upper San Leandro reservoir watersheds of the HCP area (Figure A-4). Other potential habitats will be determined based on the species life history (Appendix A).

Report HCP species occurrences. A qualified biologist will monitor for habitat and presence of the California red-legged frog populations prior to specific watershed activities using appropriate protective methods, including those outlined in Sections 3 and 5, and will annually monitor within perennial ponds as shown in Figure A-4.

Determine change in total species habitat related to covered activities. Qualified EBMUD staff will also monitor red-legged frog habitat components, including pond integrity, integrity of protection fencing, and the presence of non-native species in stockponds and other known red-legged frog sites every two years. RRMP monitoring will measure Residual Dry Matter (RDM) on watershed to determine if grazing management is within plan goals of light to moderate grazing levels.

Determine efficacy of species specific enhancement measures. Monitor ponds subsequent to complete bullfrog removal efforts to determine use by red-legged frogs. Use RRMP monitoring results (measure of RDM on watershed, see above) to determine if grazing management is within plan goals of light to moderate grazing levels.

7.1.2.5 Western Pond Turtle

Determine Species Habitat. Suitable western pond turtle habitat is found on Lafayette, San Pablo, Briones, and Upper San Leandro reservoirs and in ponds with adequate habitat components throughout the north watershed. These ponds include pond numbers 11, 22, 28, 62, and 85, (Simas Pond, Nunes Pond, Nunes Lagoon, Inspiration Pond, and Baby Bottle Pond respectively) (Figure A-5) (Stebbins 1996). Other potential habitats will be determined based on the species life history (Appendix A).

Report HCP species occurrences. Pre-project surveys (turtle counts) will be performed by a qualified biologist in western pond turtle habitat ponds (see Appendix A). Other potential habitats will be surveyed concurrent with project-related and biannual red-legged frog monitoring. Turtles will be counted, presence of non-native species noted, and habitat value will be determined based on the presence of known habitat components for western pond turtles.

Determine change in total species habitat related to covered activities. Known turtle ponds will be surveyed for structural integrity during red-legged frog surveys (refer to Section 7.1.2.4 above).

Determine *efficacy of species specific enhancement measures*. Monitor use of artificial western pond turtle basking habitats. Survey supplemental nesting substrate for western

pond turtle nests. Seven turtle basking habitats, designed for durability and to facilitate turtle access and escape, have been installed in perennial stockponds with great success. EBMUD will install additional habitats at the remaining potential sites and will maintain them to facilitate counting the animals.

7.1.2.6 Alameda whipsnake

Determine Species Habitat. Monitoring for whipsnakes will be habitat-based. EBMUD staff will coordinate with a qualified biologist to perform an assessment of Alameda whipsnake core habitats within the HCP area (Figure A-6). Results of this habitat assessment will be entered into the EBMUD GIS as a baseline whipsnake habitat/occurrence map, and provided to USFWS and CDFG within two years of the implementation of this HCP.

Determine quality of covered species habitat. Capture of whipsnakes will harass this covered species disproportionately to the expected level of incidental take. Habitat monitoring will therefore substitute for species numbers. Yearly monitoring (measuring residual dry matter (RDM)) will be used in grazed areas to assess the condition of California grassland habitat that may be used by Alameda whipsnake or its prey species. Depending on slope the goal RDM is between 800lbs and 1,400lbs. Whipsnake habitats adjacent to or within project areas will be assessed for habitat components, and the results will be added to the GIS.

Determine change in total species habitat related to covered activities. EBMUD will obtain new aerial photographs as available within six years of the analysis, or from contracted aerial photography, to compare whipsnake habitat total area as defined in the Draft Recovery Plan for Chaparral Species (USFWS 2002) to the baseline habitat assessment every six years; and vegetation coverage for Alameda whipsnake core habitat (USFWS 2002) will be updated (a total of five updates during the 30-year permit). Critical habitat as designated in 2006 lies within these areas and will be included in the assessments (71 Federal Register 26311).

Determine *efficacy of species specific enhancement measures*. Perform GIS database modeling to determine extent of Alameda whipsnake core habitat. Update vegetation layer through available aerial photography to compare with previous data every six years. Report change in total core habitat related to management activities.

7.1.2.7 Pallid Bat

Determine Species Habitat. One pallid bat nursery colony is known to occur in a barn located in Pinole Valley (Figure A-7). Other pallid bat colonies will be noted in the GIS species database and added to the monitoring program as they are discovered.

HCP species occurrences. Qualified biologists will visually monitor this colony and any other discovered pallid bat nursery sites annually and within 30 days prior to any project within 152 meters (500 feet). The colony(ies) will be video monitored every two years.

Determine change in total species habitat related to covered activities. Colony size will be estimated before and after planned mitigation (off-season structural reinforcement of existing barn or installation of bat boxes), and reported during first subsequent annual report, then during five year reports.

Determine efficacy of species specific enhancement measures. Record presence of pallid bats at known nursery colony for first two years of permit. Record pallid bat presence during breeding season and nursery period to determine effectiveness of mitigation measures on the April Creek Barn. Surveys will be continued every two years for permit term.

7.2 REPORTING

EBMUD reports to USFWS and CDFG will consist of the following:

1. Annual reports due in November that:
    a. update covered species status,
    b. summarize project monitoring (compliance monitoring),
    c. report on effectiveness of protection measures (effectiveness monitoring),
    d. report on incidental take of species, if applicable,
    e. report on adaptive management, where applicable.
2. Three year (due June 2011) and six year (due June 2014) HCP status reports, followed by reports every five years (due June of each of the following years; 2019, 2024, 2029, 2034) that:
    a. summarize annual reports;
    b. update GIS species location maps;
    c. report on effectiveness of protection measures;

d. measure HCP species habitat;

e. report on incidental take of species, if applicable;

f. report on adaptive management, where applicable;

g. report on covered species habitat enhancement efforts.

8 ADAPTIVE MANAGEMENT

8.1 ADAPTIVE MANAGEMENT

An adaptive management process that follows species progress and the effectiveness of various avoidance, minimization, and mitigation measures is an important element of any watershed management plan. The USFWS HCP five-point policy suggests adaptive management where species may benefit as a strategy to assure HCP effectiveness. An adaptive management approach allows for up-front, mutually agreed-upon changes in operating conservation plans that may be necessary for the species in light of new information. In order to be successfully implemented, adaptive management provisions are linked to measurable biological goals and monitoring. EBMUD personnel responsible for monitoring and research will continually evaluate, and if necessary recommend necessary modifications to management practices. Resource management personnel will review results of ongoing monitoring programs and revise management practices as needed to meet or exceed the goals of watershed management implementation plans.

The EBMUD-HCP adaptive management plan incorporates the four elements USFWS recommends for adaptive management strategies in an HCP (65 FR 35252):

- Identify uncertainties and the questions that need to be addressed to resolve the uncertainties.
- Develop alternative strategies and determine which experimental strategies to implement.
- Integrate a monitoring program that is able to detect the necessary information for strategy evaluation.
- Incorporate feedback loops that link implementation and monitoring to a decision-making process.

EBMUD will implement the following adaptive management practices:

- All adaptive management practices including monitoring, reporting as described in Section 7, and remedial provisions as described in Sections 3, 5, and 6 will be observed.
- To ensure effectiveness of the HCP, adaptive management prescriptions will be revised and incorporated into the HCP based on biannual evaluations. The evaluations will review the HCP status and make recommendations regarding the various HCP components and covered species. Trigger points are shown below.

8.2 SPECIES ADAPTIVE PROTECTION MEASURES

The effectiveness of protection measures for covered species based on monitoring results will be summarized and reviewed. If needed, recommendations for adjustments to species protection measures will be developed. The following table shows situations and trigger points that will require a response from EBMUD. Cost estimates will be adjusted for each budget cycle based on the SF Bay Area average Consumer Price Index.

Table 8-1.
EAST BAY HCP ADAPTIVE MANAGEMENT

SPECIES	CIRCUMSTANCE TO TRIGGER ADAPTIVE MANAGEMENT	RESPONSE ACTION	SCHEDULE AND PRELIMINARY COST ESTIMATES
8.2.1 Santa Cruz Tarplant	Monitoring germination of Santa Cruz tarplant. Fails to germinate within 3 years (i.e., no plants found by three year report). (See Appendix A for discussion of Santa Cruz tarplant seed germination.)	Explore germination enhancement - Area within 61 meters (200 feet) of known experimental site of introduction (1.8 hectares or 4.5 acres) will be burned to stimulate germination. Adjust management of area to reduce potential competition with other species.	Burn within two years of deadline. Cost: $150.00, plus labor and use of equipment. If no plants germinate after two years, the population will be presumed extirpated.

Table 8-1. EAST BAY HCP ADAPTIVE MANAGEMENT (continued)			
SPECIES	**CIRCUMSTANCE TO TRIGGER ADAPTIVE MANAGEMENT**	**RESPONSE ACTION**	**SCHEDULE AND PRELIMINARY COST ESTIMATES**
8.2.2 Pallid Manzanita	Population at known site continues to deteriorate (two years consecutive population count) by more than 50% from start of HCP. No new sites are found on watershed.	Introduce pallid manzanita seeds or seedlings into the Big Burn peninsula area of Upper San Leandro Reservoir following a watershed fire. Identify other areas on watershed where pallid manzanita may be introduced successfully.	Enhancement sites planted within one year after wildfire at cost of materials and labor. Success of enhancement site reported to USFWS and CNPS.
8.2.3 Rainbow trout	No *O. mykiss* spawning observed in USL drainages on EBMUD watershed lands.	Install up to 10 cubic meters of spawning gravel as necessary on USL drainages to provide *O. mykiss* spawning habitat. If no *O. mykiss* spawning observed after treatment during a five year period containing normal and above normal water year types based on rainfall, EBMUD is not required to repeat the action.	Compete within two years. Cost: $ 5,000 for materials and additional labor cost for permitting and gravel placement.

Table 8-1.
EAST BAY HCP ADAPTIVE MANAGEMENT (continued)

SPECIES	CIRCUMSTANCE TO TRIGGER ADAPTIVE MANAGEMENT	RESPONSE ACTION	SCHEDULE AND PRELIMINARY COST ESTIMATES
8.2.4 California Red-legged Frog	California red-legged frog available habitat drops 10% in three successive years for a total of 27% of total known habitat at start of HCP (i.e., a total of 10% of ponds or other habitat is lost for three years, despite adjusting for water year type).	Review EBMUD operations to determine if EBMUD permitted activities are the cause (as reviewed from annual report by USFWS). If yes, adjust identified EBMUD operations to limit impacts and implement the following: 1. Restore damaged stock ponds as necessary to recover lost habitat. 2. Monitor new ponds for presence of red-legged frog habitat components. 3. Monitor frog presence in new and existing ponds. 4. Include element in educational program addressing new information or policy.	Finish half within one year and complete within two years of identification of adaptive management trigger. Restoration done at cost of labor and materials for review, implementation, and monitoring. New educational materials printed at cost of development and production.

Table 8-1. EAST BAY HCP ADAPTIVE MANAGEMENT (continued)			
SPECIES	**CIRCUMSTANCE TO TRIGGER ADAPTIVE MANAGEMENT**	**RESPONSE ACTION**	**SCHEDULE AND PRELIMINARY COST ESTIMATES**
8.2.5 Western Pond Turtle	A) Turtle population within the local watershed as measured by largest turtle basking counts falls by 20% within three years.	Evaluate predation during turtle nesting. Provide nesting substrate at up to three sites where reproduction not observed.	Within two years. Cost: $3,000 for labor. Within six months of determination. Cost: $2,500 for materials. Two days of staff time for substrate placement.
	B) Overall turtle population within the local watershed as measured by maximum basking counts falls by 20% within five years due to natural causes	Install fencing and signage at turtle ponds accessible to public. Investigate for disease or other cause for decline in local turtle population. If dead turtles are found, a representative sample will be analyzed for disease. Control measures will be developed and implemented.	Within one year at cost of materials and labor. Study done at cost of analysis, staff labor, and development of control measures up to $2,500. Control measures implemented at cost of materials and staff education.
	C) Illegal turtle harvest identified.	Report to CDFG and EBRPD enforcement. EBMUD will coordinate with agencies as necessary to limit further illegal activity.	Additional staff labor for agency coordination and within ongoing Joint Powers Agreement with EPRPD Police

Table 8-1. EAST BAY HCP ADAPTIVE MANAGEMENT (continued)			
SPECIES	**CIRCUMSTANCE TO TRIGGER ADAPTIVE MANAGEMENT**	**RESPONSE ACTION**	**SCHEDULE AND PRELIMINARY COST ESTIMATES**
8.2.6 Alameda Whipsnake	Alameda whipsnake habitat as defined in the Draft Recovery Plan for Chaparral Species (2002) falls by more than 1% of original acreage identified in initial watershed mapping due to EBMUD activities.	Contact with USFWS to review management to recover lost habitat. Develop improved minimization measures and recovery plan. New information on Alameda whipsnake and other species will be included in the species education program.	Contact within one year of reaching trigger point. Improved AMMs incorporated in education program and Natural Resource Supervisors notified to inform staff within one month. Cost of staff time to complete management tasks.
8.2.7 Pallid Bat	Known nursery colony not observed for two years within extant structure(s).	Examination of nursery colony area to determine possible causes. Extirpation of non-indigenous predator species such as opossum, or black or Norway rats from nursery colony.	Implement before following expected seasonal occurrence of bats. Contract labor cost not exceeding $3,000.00.

9 CHANGED/UNFORSEEN CIRCUMSTANCES

9.1 INTRODUCTION

This section discusses the procedures to be used to deal with changed circumstances and unforeseen circumstances that may arise during the implementation of the HCP. It also discusses and outlines processes for changing or amending the HCP as required, and discusses assurances to be provided to EBMUD.

9.2 ASSURANCES REQUESTED BY EBMUD

9.2.1 Regulatory Assurances

Pursuant to section 10(a)(1)(B) and the implementing regulations, the USFWS provides assurances to HCP participants and subsequent ITP permit holders that no additional mitigation will be required once the permit is final for unforeseen circumstances that might occur and otherwise require such actions absent the consent of the permittee. These assurances are available if a permittee is properly implementing an approved HCP, and ensure that no further financial or resource commitments will be required by the federal agencies in the event of unforeseen circumstances. *Properly implemented*, means that the commitments of the HCP have been carried out.

Each covered species in the HCP has been treated as if it were listed under the ESA. EBMUD requests that all the covered species addressed in this HCP are included on the ITP. Take of listed plants is not prohibited under the ESA and cannot be authorized under a Section 10(a)(1)(B) permit. The pallid manzanita and Santa Cruz tarplant are proposed to be included on the ITP in recognition of the conservation benefits provided for them under the HCP. These plants would receive no surprises assurances under the "No Surprises" regulation (63 FR 8859).

The No Surprises Regulation requires potential changed circumstances to be identified in the HCP along with measures that would be taken by EBMUD to respond to these changes. EBMUD requests regulatory assurances for all covered species in this HCP.

9.2.2 Changed Circumstances

Changed circumstances are defined as those circumstances affecting a species or geographic area covered by the HCP that can be reasonably anticipated by EBMUD or the permitting agencies and to which the parties can plan a response. Potential changed

circumstances are identified in the HCP along with remediation measures to be taken by the permittee. The changed circumstances that could occur during the course of the permit have been identified and listed below.

9.2.2.1 Changed Circumstances Relevant to Listing of Species

1. Circumstance

A species found in the HCP area is federally listed as threatened or endangered and is added to the covered species.

2. Actions to Minimize Circumstance/Hazard

EBMUD will research and implement take avoidance measures for the newly listed species, including educating staff and others of the change.

3. Response Action

EBMUD will apply for an amendment to the HCP. If there is potential incidental take from EBMUD watershed activities and the species is not already addressed, EBMUD will request to add the organism as a covered species.

4. Schedule and Preliminary Cost Estimate

Within 1 month of listing. Cost estimate: $15,000 of staff time.

9.2.1.2 Changed Circumstances Relevant to Non-Native Plant and Animal Species.

1. Circumstance

A detrimental non-native species (i.e., Mississippi diamondback watersnake *Nerodia rhombifera*) is documented in known covered species habitat (e.g., bass found in Simas Pond).

2. Actions to Minimize Circumstance/Hazard

EBMUD surveyors will note the presence of non-native or feral species during all pond, riparian, or aquatic species monitoring. They will implement a non-native species removal program at the most effective period within one year.

3. Response Action

EBMUD will develop, fund, and implement a control plan for the non-native species.

4. Schedule and Preliminary Cost Estimate

EBMUD will develop a plan within one month of documented covered species predation. The plan will be implemented at a time judged to be most efficacious for removing the non-native species. Cost estimate: $5,000 per occurrence.

9.2.1.3-A Changed Circumstances as a Result of Wildfire

1. Circumstance

The watershed is denuded of vegetation when wildfire burns landscape area smaller than 33.4 hectares (100 acres) (see Table 9.1 for fire history).

2. Actions to Minimize Circumstance/Hazard

EBMUD will perform an immediate survey of wildlife mortality from fire and report covered species mortality to USFWS.

3. Response Action

EBMUD will monitor for effects of wildfire on covered species. EBMUD will remap the vegetation layer within the area burned by the fire for their GIS database to show change in seral stage and habitat.

4. Schedule and Preliminary Cost Estimate

EBMUD will remap and implement the other measures within 1 year of a wildfire. Time estimate: 50-100 hours for botanist or equivalent worker.

9.2.1.3-B Changed Circumstances as a Result of Wildfire

1. Circumstance

Wildfire results in denuded landscape.

2. Actions to Minimize Circumstance/Hazard

EBMUD will immediately implement erosion control measures specific to a wildfire denuded landscape, including reseeding. EBMUD will adjust their watershed activities to minimize erosion until vegetation has become re-established.

3. Response Action

EBMUD will review its long-term use of the affected landscape to minimize erosion and promote increased biodiversity.

4. Schedule and Preliminary Cost Estimate

These actions will occur within 1 year of a wildfire.

Cost estimate: $25,000 for labor and materials.

9.2.1.3-C Changed Circumstances as a Result of Wildfire

1 Circumstance

Pond habitats lost during wildfire

2. Actions to Minimize Circumstance/Hazard

EBMUD will perform a post-fire analysis of pond structural integrity within five working days of the conclusion of the wildfire.

3. Response Action

EBMUD will schedule and repair damaged ponds as necessary before the succeeding rainy season.

4. Schedule and Preliminary Cost Estimate

EBMUD will do damage repair before subsequent November at cost of labor, machinery rental, and materials.

9.2.1.3-D Changed Circumstances as a Result of Wildfire

1. Circumstance

April Creek Barn with pallid bat roost is destroyed by fire.

2. Actions to Minimize Circumstance/Hazard

EBMUD will research bat house designs to determine one that may work for pallid bats. EBMUD will order construction of bat houses from their carpenter shop.

3. Response Action

EBMUD will install bat houses sufficient to hold 200 bats within 75 feet of the April Creek barn site. EBMUD will monitor the site and report annually to USFWS. If artificial bat habitats are used, bat houses may be increased in size or number as necessary up to a capacity of 500 bats.

4. Schedule and Preliminary Cost Estimate

EBMUD will construct, install, and monitor bat houses at estimated materials cost of $1,000. Installation will be done by EBMUD.

9.2.1.4-A Changed Circumstances in Habitat Relevant to Storms, Drought, and Earthquake

1. Circumstance

EBMUD may remove trees that are dead or damaged due to cold (eucalyptus), or disease (pitch canker, Sudden Oak Death, etc.).

2 Actions to Minimize Circumstance/Hazard

EBMUD will identify the cause of the tree die-off. EBMUD will determine if selected tree removal will help the area (relative to public safety, covered species habitat, biodiversity), then implement a program as necessary. EBMUD will harvest dead trees, if necessary, as they occur to limit fire danger for the watershed and to preserve the surrounding habitats. If feasible, dead trees will be left for wildlife habitat.

3. Response Action

EBMUD may log large areas of dead trees as per activity 3.2.3.1. If the local die off of trees exceeds 25% for one species, it will be addressed as an unforeseen circumstance (see below).

4. Schedule and Preliminary Cost Estimate

A program will be developed within six-months of an EBMUD determination that the dead trees pose threat to public safety or are an environmental hazard, Cost estimate: $50,000 nominal removal costs.

9.2.1.4-B Changed Circumstances in Habitat Relevant to Storms, Drought, and Earthquake

1. Circumstance

A prolonged drought (e.g., >5 years) resulting in unseasonable fire danger, desiccation of frog and western pond turtle habitats. See Section 9.2.5 for rationale for an unforeseen prolonged drought.

2. Actions to Minimize Circumstance/Hazard

During the 6th drought year, EBMUD will take actions to minimize effects of a possible prolonged drought including fire and fuels management, grazing management, and potential supplemental watering of selected critical ponds as determined by the EBMUD biologists in coordination with the USFWS. These designated ponds will vary with annual circumstances. EBMUD's supplemental pond watering will be concentrated on no more than two critical ponds in a watershed.

3. Response Action

A two-to-five year drought is to be expected in California's Mediterranean climate. Within the 6^{th} year of a drought with excessive desiccation of pond habitat, EBMUD in consultation with USFWS and CDFG will assess the extent of potential covered species impacts. The reports of this EBMUD assessment will include a remediation program to be implemented when the drought breaks

4. Schedule and Preliminary Cost Estimate

EBMUD will implement this program after the fifth year of a prolonged drought. The report cost will be up to $3,000 EBMUD's cost for pond damage repair and maintenance will be at the cost of labor and materials.

9.2.1.4-C Changed Circumstances in Habitat Relevant to Storms, Drought, and Earthquake

1. Circumstance

Heavy rains, landslides, earthquake, or other circumstances result in the failure of five or more ponds, compromising habitat for WPT and CRLF.

2. Actions to Minimize Circumstance/Hazard

EBMUD will inspect these identified ponds during a wet year within two weeks of a Bay Area 50-year storm event or at the beginning of March (average Moraga/Orinda/Lafayette rainfall>110% of normal-to-date by February). EBMUD will inspect all known covered species habitat ponds within two months of a strong earthquake (Richter scale 6.0-6.9).

3. Response Action

EBMUD will repair ponds and replant vegetation as necessary to reconstruct previous habitat.

4. Schedule and Preliminary Cost Estimate

EBMUD will complete repairs for the ponds within one year. Cost estimate for labor and materials is up to $10,000.

9.2.1.5 Changed Circumstances in Animal Population From Disease

1. Circumstance

Mortality of many birds or other animals from disease on watershed (e.g., West Nile Virus, Avian Flu, chytrid fungus).

2. Actions to Minimize Circumstance/Hazard

EBMUD biologists will meet with USFWS to discuss control measures (pick up dead animals, procedures for disinfecting equipment, etc.). EBMUD will draft a plan to minimize impacts on covered species.

3. Response Action

EBMUD will implement control plan as soon as possible and will include the results from that plan in their annual report to USFWS.

4. Schedule and Preliminary Cost Estimate

EBMUD will implement a control plan within one year of an observation of an infected covered species. The ongoing HCP educational program will be amended to include material relevant to this changed circumstance. Cost will be for labor up to $5,000.

9.2.3 Changes in the Status of Plan Species or Acquisition of New Information about Species and Habitat Management

An unlisted species will be deemed to be "adequately covered" by a HCP and subject to the provisions set forth above when the species is addressed in the HCP as if it were already listed, and the conservation measures in the HCP for that species would satisfy permit issuance criteria.

The Section 10(a)(1)(B) permit and HCP will cover four federally listed species and three unlisted species. Listed species will be covered by this HCP as of its effective date. Should USFWS list a covered species during the permit term, take coverage will become effective for that species at the time of listing provided the HCP is being properly implemented. No changed to the terms and conditions of the HCP is required. USFWS shall evaluate and consider protections and conservation measures afforded such species by this HCP and any other affected HCPs as part of the listing process.

If a species not covered by this HCP is subsequently listed, proposed, or petitioned for listing, EBMUD may request that USFWS amend the permits and plan as appropriate to add that species. EBMUD may apply for an amendment to the existing HCP or for separate coverage for a species not previously included under a new Section 10(a)(1)(B) permit (See Amendment Procedure, Section 9.3.2, below). The decision to add the species will be based on the same criteria used to create the original list: presence of the species within the HCP area, likelihood of affect to the species from EBMUD activities, and that these lawful actions could result in incidental take.

9.2.4 Changed Circumstances – Natural Disasters and Accidents

Changed Circumstances may include certain changes to the landscape resulting from emergencies. An "Emergency" is defined as a sudden, unexpected occurrence involving a clear and imminent danger, demanding immediate action to prevent or mitigate loss of, or damage to, life, health, property, or essential public services. "Emergency" includes such occurrences as wildfire, flood, earthquake, or other soil or geologic movements, as well as such occurrences as riot, accident, or sabotage (from the definition in CEQA, Public Resources Code Section 21060.3).

Some emergencies may be anticipated but all are unpredictable and could occur at any time. Surface disturbance could result in the incidental take of individuals and damage to habitat.

In the event of an emergency (i.e., fire, flood, and earthquake) where it is necessary to deviate from the operational commitments under this HCP, EMBUD shall contact USFWS within 1 month to provide information regarding the actions EBMUD has taken to address the event. At that time, EBMUD and USFWS shall coordinate on any actions that may reasonably be undertaken to minimize impacts to covered species while EBMUD handles the disaster and works to restore normal operations.

Emergencies require personnel to take actions necessary to provide an appropriate level of protection for all watershed lands, emphasizing the protections of life and public safety, and property values in interface areas (EBMUD FMP 2000). It also may be necessary to ignore time of day or season constraints when conducting emergency repairs. Environmental personnel shall be called immediately to the site and, whenever possible shall assist with implementing measures to avoid or minimize impacts to covered species. Once the emergency has been stabilized, the action will be halted and USFWS contacted for review in the development of a restoration plan.

9.2.5 Unforeseen Circumstances

Section 10(a)(1)(B) states that a HCP must detail "procedures to be used to deal with unforeseen circumstances." Unforeseen circumstances are defined by federal regulation (17 CFG § 17.3):

> "…changes in circumstances affecting a species or geographic area covered by a conservation plan that could not reasonably have been anticipated by plan developers and the USFWS at the time of the conservation plan's negotiation and development, and that result in a substantial and adverse change in the status of the covered species."

These changes in circumstances affecting populations of HCP species or their habitats would occur independently of EBMUD′s activities within the HCP area. USFWS will have the burden of demonstrating that unforeseen circumstances exist, using the best scientific and commercial data available. Except where there is substantial threat of imminent, significant, adverse impacts to covered species, the Services will provide EBMUD at least sixty (60) calendar days written notice of a proposed finding of unforeseen circumstances. Where the HCP is being properly implemented and an unforeseen circumstance has occurred, the additional measures required of EBMUD must be as close as possible to the terms of this HCP and must be limited to modifications within a conserved habitat area or to adjustments within the proposed conservation

measures. Additional conservation and mitigation measures shall not involve the commitment of additional land or financial compensation or restrictions on the use of land or other natural resources otherwise available for development or use under the original terms of the HCP without the consent of EBMUD.

An example of an unforeseen circumstance that cannot be reasonably anticipated at this time would be the spread of an unknown disease affecting one of the covered species, an increase in ambient ultraviolet radiation, the effect of climate change on vegetation patterns or water flow within the HCP Area, or a wildfire of unforeseeable proportions. Table 9-1 lists all watershed fires from 1980-2005. The 208 fires during the 26-year period range from 0.1-0.4 hectare (0.25-1 acre) (46 fires) to 60 acres, but only two of these fires were between 20 and 24 hectares (50 and 60 acres), and only 8 were from 4 to 20 (10-49 acres). An amount of 57% of the fires were classified as spot fires <0.1 hectare (<0.25 acre).

Table 9-1.
Fire Sizes on EBMUD East Bay Watershed from 1980-2005

Acres	60-50	49-10	9 to 5	4 to 2	1 to 0.25	Spot	Total Fires
Total Fires	2	8	18	16	46	118	208

With these data on fire size, EBMUD will consider fires in excess of 33.4 hectares (100 acres) to be unforeseeable at this time. As discussed previously, landscape changes resulting from all smaller fires are treated as changed circumstances. These will be addressed, and given the nature of past events and the benefits provided by EBMUD on its lands, it is unlikely that foreseeable fire events would affect a significant portion of the habitat provided for species at any single point in time.

Changed circumstances from diseases are addressed above, but for the purpose of this HCP an infestation of a new or existing diseases or invasive non-native species that effects covered or dominant species in the watershed vegetation communities, or the spread of existing invasive species beyond 25% of the baseline condition of the covered species vegetation community habitats are considered unforeseen circumstances. The monitoring program will identify the extent of disease and existing non-native species on the watershed so that new non-native species can be identified quickly and removed.

Earthquakes also are frequent in the Bay Area, but strong Earthquakes ("strong" defined as Richter measurement of 6.0-6.9) are rare. An earthquake measuring 6.7 on the Richter scale has the shortest recurrence rate (232 years) of the major Bay Area faults on the Hayward-Rodgers Creek Fault, which runs through the HCP area. The chance of such an earthquake is estimated at 32% by the year 2030 (USGS, 1999). This HCP is written for 30 years, to about 2037. Therefore there are contingencies under changed circumstances for earthquake damage on the watershed from a strong earthquake on the Hayward fault. An earthquake with a Richter measurement of >7.0 is considered unforeseeable and is treated as an unforeseen circumstance in this HCP.

Prolonged droughts may occur in California, and local rainfall records show they range from two to five years in length. EBMUD reviewed 52 years of rainfall data for three East Bay sites (Lafayette, Orinda, and Walnut Creek). Using 75% of average rainfall to define a "drought" year, there has been an average of three 2-year droughts in the 52-year period and one 5-year drought. As there have been no instances of a 6-year drought, EBMUD will use a 6-year period of drought to define a rainfall pattern that is an unforeseen circumstance.

Unforeseen circumstances such as these are impossible to plan for with certainty and are an example of where it is justifiable to ensure that no additional mitigation, including restorative activities such as channel clearing of earth slumps, additional restrictions on the restoration of watershed facilities, or other resources would be required beyond that which is agreed to elsewhere in this HCP.

9.3 AMENDMENT PROCEDURE

The HCP can be amended under USFWS regulations and the terms of the permit agreement. This process can be divided into modifications and minor amendments, and major amendments. Either EBMUD or the permitting agencies can request an amendment to the Plan.

9.3.1 Minor Permit Modifications and Amendments

9.3.1.1 Administrative Changes

Administrative changes are internal changes to the HCP that do not require preauthorization from USFWS. Examples are given below:

- Annual Cost of Living Adjustment (COLA) for mitigation costs to account for inflation;

- Minor surveying protocol changes, improvements, or adjustments that are not delineated in the Plan;
- Edits to the Plan during reprints that do not affect the intended meaning;
- Changes in staffing provided the staff is trained in the covered species and to implement the HCP as outlined in the Plan.

9.3.1.2 Minor Changes in the HCP

Minor modifications are changes in the HCP that do not affect the ability of EBMUD to fulfill the biological goals and objectives of the Plan, and do not change the impact assessment or general strategy for achieving the desired conservation results. These minor changes do not require an amendment to the permit, but they do require pre-approval by USFWS before implementation:

- minor map and habitat adjustment based updated aerial photogrammetry, vegetation growth, changes in seral stage, and new species information;
- minor changes in the biological goals or objectives in response to adaptive management; and
- minor changes in reporting protocol.

9.3.2 Major Modifications - Permit Amendments

The permit can be amended or modified in accordance with USFWS regulations. Amendments to the permits would be required for any change in the following:

- the listing under the ESA of a new species not currently addressed in the HCP that may be taken by EBMUD activities;
- occurrence of an already listed species not included in the HCP that may be disturbed by EBMUD activities;
- changes to the permit-area boundary that are at least 5% of the original plan area or which does not otherwise qualify for a minor modification;
- modification of any project action or mitigation component under the HCP, including funding, that may significantly affect authorized incidental take levels, effects of the project, or the nature or scope of the mitigation program, with the exception of those HCP modifications specifically addressed in the original HCP and permit applications;
- extending the permit term beyond 30 years, and

- any other modifications of EBMUD operations likely to result in incidental take of covered species not addressed in the original HCP and permit applications.

9.3.2.1 HCP Amendment Process

The amendment process will be initiated when EBMUD submits the appropriate application to USFWS. The application must include a revised HCP, permit application form, required fees, and the required documents under NEPA. The revised HCP will include a description of the unforeseen event or activity and an assessment of its impacts (including quantification of expected incidental take of covered species). The impact assessment may be in terms of "sensitive habitats affected" if the impacts are similar to those previously described, or in terms of "impacts to populations" of particular species if the information is available. Finally, the amendment will describe appropriate changes to the mitigation measures and habitat enhancement to protect species covered by the HCP.

The appropriate related NEPA documentation will depend on the nature of the proposed amendment.

9.4 Potential to Include Pinole Valley Lands for Conservation Easements or Mitigation Bank

EBMUD has discussed with the Service the potential to undertake measures on the Pinole Valley lands that would provide further benefits for species and allow for compensatory mitigation for resource impacts experienced elsewhere. It is intended that the inclusion of these lands within this HCP will not preclude the ability to manage these lands as a conservation bank or otherwise use measures undertaken on these lands in the future to provide compensatory mitigation. Lands and measures or projects that have been used as mitigation or compensation for HCP impacts would not be included as part of potential conservation banks.

10 FUNDING

10.1 INTRODUCTION

Under Section 10(a)(2)(A) of the ESA and the ESA implementing regulations (50 CFR §§ 17.22(b)(1), 17.32(b)(1), and 222.22), a HCP submitted in support of an incidental take permit must detail "the funding that will be available to implement such steps" [the steps an applicant will take to monitor, minimize, and mitigate the impacts from incidental take].

Sections 5 through 8 present measures to avoid, minimize, mitigate, monitor, and adaptively manage the potential impacts associated with this HCP. This section describes the funding that will be required for the performance of these measures.

EBMUD is committed to implementing the HCP throughout the 30-year term of the permit. EBMUD's financial condition continues to be sound, with a stable revenue base and rates that compare favorably with other Bay Area water and wastewater agencies. Responsible fiscal management and planning, as confirmed by external auditor's reports, give EBMUD the financial means to ensure reliable water and wastewater system operations, while consistently meeting its principal and interest payments on bond debt (EBMUD 2005a). One of the top priorities in EBMUD's Strategic Plan is to "Manage the Mokelumne and East Bay watersheds in a way that ensures a high quality water supply and protect natural resources." Top-priority tasks include: Continue to implement the District's East Bay Watershed Master Plan and improved standards for endangered species management; complete East Bay HCP and coordinated data collection and review (Goal: Water Quality and Environmental Protection; from EBMUD 2005b).

The costs to implement the HCP will be funded through EBMUD's biennial budget. As required, EBMUD will notify the USFWS if EBMUD is unable to fund this work. If EBMUD is unable to fund this work it will work with the Federal agencies to resolve funding issues. The agencies may suspend the permit while these issues are resolved. At the agencies discretion and according to regulation, the agencies may revoke the permit.

10.2 HCP IMPLEMENTATION COSTS

Costs for habitat and species avoidance, take minimization, mitigation, monitoring, and adaptive management measures have been totaled and listed below based on Sections 5 through 8. Budgeting for EBMUD's commitment will be based on these figures.

Through implementation of the WMP, EBMUD already performs many of the task requirements for the HCP. EBMUD labor costs for existing and new efforts to implement the HCP (existing, annual, biennial, and the one time costs) are estimated at 1.06 full time employees (FTE = 2080 hours/year) divided as follows:

Table 10-1.
Summarized Total Annual Implementation Hours

Total Annual Implementation Hours	HCP Hours	FTE*
Existing EBMUD Biol. Hours	1100	0.36
Existing HCP Contractor Hours	250	0.12
New EBMUD Biologists Hours	1450	0.70
Total Hours	**2447**	**1.18**

* FTE = full time employee equivalent.

A total of 0.70 FTE is for new efforts (refer to Table 10-2). The required reporting and additional field work will be performed by reallocating resources and reprioritizing work. EBMUD Biologists and contractors currently perform 0.48 FTEs of WMP (HCP-related) work, comprising most of the additional hours. Annual costs, including FTE labor costs, are adjusted for inflation in each biennial budget.

Table 10-2.
Summarized Implementation Costs

EBMUD Costs	Labor (Hrs)	FTE[1]	Annual Labor ($'s)	Services/ Supplies
Annual New HCP Costs	1063	0.51	$101,000	$1,000
Biennial New HCP Costs	706	0.17	$67,000	$10,000
One-time Costs	1003	0.02	$4,000	$45,000
New Annual HCP Costs Subtotal	1450	0.70	$138,000	$7,500
Existing Annual EBMUD WMP Labor Cost	997	0.48	$95,000	$70,000
HCP Total Costs[2]	**2447**	**1.18**	**$233,000**	**$77,500**

[1] Full Time Employee.

[2] Total annual HCP cost does not include changed circumstances ($23,000) or unforeseen circumstances ($111,000), which may be implemented in amounts varying from $150-$50,000 depending on specific conditions (non-native species impacts, earthquake, wildfire, etc. – see sections 8 & 9).

10.3 HCP MITIGATION COSTS FOR SPECIES INCIDENTAL TAKE

As described in Sections 10.1 and 10.2, EBMUD will budget for and operationally fund species' avoidance, impact minimization, monitoring, enhancement, and reporting mechanisms. Incidental take from mortality of covered species, while not expected should be anticipated. EBMUD plans to prevent further mortality caused through the activities covered by improving AMMs and BMPs on a case by case basis. Incidental take and adjustments to EBMUD activities will be addressed in annual reports and adaptive management where applicable.

11 ALTERNATIVES

11.1 INTRODUCTION

The goal of this HCP is to implement a program to avoid, minimize, and mitigate for incidental take of sensitive plant and wildlife species on EBMUD watershed lands by implementing practices and procedures that eliminate or reduce impacts of EBMUD's watershed operation and maintenance activities on covered species. This goal will be partially accomplished by operating under guidelines that avoid or minimize contact with covered species, provide the greatest protection in areas of potential unavoidable contact, and monitor the efficacy of these operation procedures.

Alternatives to the HCP include:

Alternative 1. No Action. EBMUD would continue to operate and maintain its watersheds without a Federal Section 10(a)(1)(B) permit issued by the USFWS or a Section 2080.1 or 2081 incidental take authorization from the CDFG. Under this alternative, EBMUD would not implement the protection measures as described in the HCP. Instead, EBMUD would address projects that may impact endangered and threatened species on a case-by-case basis.

EBMUD watershed lands subject to impacts from operation and maintenance activities are widely distributed throughout the East Bay. A significant portion of the value of these lands results from their connectivity to other watershed habitats. EBMUD watershed lands also represent a substantial portion of three of the seven units designated as critical habitat for Chaparral Species which includes Alameda whipsnake. These species would not benefit as much under a case-by-case approach to incidental take as under a watershed-wide HCP that encompasses cumulative effects. In addition to these positive HCP effects, the status of covered species is currently less well known due to more limited monitoring. Species and habitat monitoring activities will equal 25% of EBMUD's HCP funding commitment.

Activities that would occur within suitable habitats and involve the covered species would also be subject to separate Section 7 consultation with federal agencies as to appropriate species' protection and mitigation. This approach would affect EBMUD's ability to plan and schedule appropriate operation and maintenance activities. Without implementation of an HCP, the overall cost to the resource agencies and EBMUD for protection and monitoring of listed species on EBMUD watershed lands would increase

above current levels. The combined cost of the many individual reviews of watershed programs and projects would far exceed an HCP approach. Also, the certainty of watershed management the agencies will have regarding EBMUD activities as described in Section 3 would be gone.

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APPENDIX A:
SPECIES ACCOUNTS FOR EAST BAY MUNICIPAL UTILITY DISTRICT'S EAST BAY WATERSHED HABITAT CONSERVATION PLAN

Santa Cruz Tarplant (*Holocarpha macradenia*)

Description: Santa Cruz tarplant is an aromatic, glandular annual herb in the sunflower family (Asteraceae). It is one of four species in the genus *Holocarpha*, which is endemic to California. Unlike the other three species, which prefer hot, dry, inland valley-foothill grasslands, the Santa Cruz tarplant was historically found on the clay soils of grassy coastal, or near coastal, terraces and mesic grasslands and coastal prairie surrounding the San Francisco Bay. These cool, sometimes foggy habitats reduce exposure to severe heat and dryness (Boersig and Norris 1988).

Seeds produced in the ray flowers have a thick seedcoat that requires scarification for germination, while seeds produced by disc flowers do not have a thick seedcoat requiring scarification, are less fertile than ray flower seeds, and usually germinate in the first year. Ray flower seeds comprise about 90% of the total seed production (Boersig and Norris 1988).

Santa Cruz tarplant flowers during the summer. During the late winter and spring, while most other annual grassland species are rapidly growing upwards and reaching maturity, the tarplant remains relatively low to the ground, concentrating its energy into deeper root formation. About the time the other grassland annuals begin dying, the tarplant stem grows rapidly, using nutrients tapped from the deeper soil sources. Then during summer, after most of the grassland has turned brown, the Santa Cruz tarplant flowers. Researchers believe that the glandular exudates produced by tarplants help protect them against desiccation, predation, and excessive solar radiation during a long, dry summer (Boersig and Norris 1988).

Distribution: Santa Cruz tarplant was once found in most San Francisco Bay area counties south to Monterey. The species has been extirpated from Marin and Alameda counties, and all wild populations have been extirpated from Contra Costa County. All existing Contra Costa County populations were established from seeds taken from Pinole (Diablo clay) and Richmond (Tierra loam) sites prior to commercial development. The

last known wild Contra Costa County population was extirpated in Pinole in the mid 1990's

Threats: This species is threatened by urbanization, agriculture, non-native plants, and lack of appropriate ecological disturbance.

Status: The USFWS listed the Santa Cruz tarplant as a threatened species on March 20, 2000 (65 Federal Register 14898). It is listed by the CDFG as "endangered" and the CNPS as "1b" (endangered in California and elsewhere; nearly extinct). A final Critical Habitat designation was made on October 16, 2002 for 2,902 acres in Contra Costa, Santa Cruz, and Monterey counties. No portion of the HCP covered area was included in the designation.

Recovery Plan: USFWS has not produced a recovery plan. CDFG has determined that a habitat conservation plan is needed for the Santa Cruz tarplant that should include reintroduction of the species into protected, historic habitat in Marin, Alameda, and Contra Costa Counties (CDFG 1995).

Status on HCP Lands: There is one known stand of Santa Cruz tarplant in the HCP area (Figure A-1). The site is a gentle, southeast-facing slope of Diablo clay managed by moderate cattle grazing. It is one of three sites where seeds were sown in an attempt to establish this species on the watershed during 1983. All sites were chosen for their favorable aspect and soil type; however, a reduced exposure to fog may make the San Pablo Reservoir watershed a marginal habitat. Other native grassland species growing at the current known site include hayfield tarplant, (*Hemizonia hermannii*), scattered blue lupine (*Lupinus formosus*,) and purple needlegrass. According to the CDFG database cited above, 850 plants were estimated at the HCP site in 1987. In 1988, an estimated 3,000 plants comprised the stand. No data was reported between 1989 and 1994. In 1995 and 1996, about 100 plants were counted. Despite annual surveys, no plants have been found since 1997.

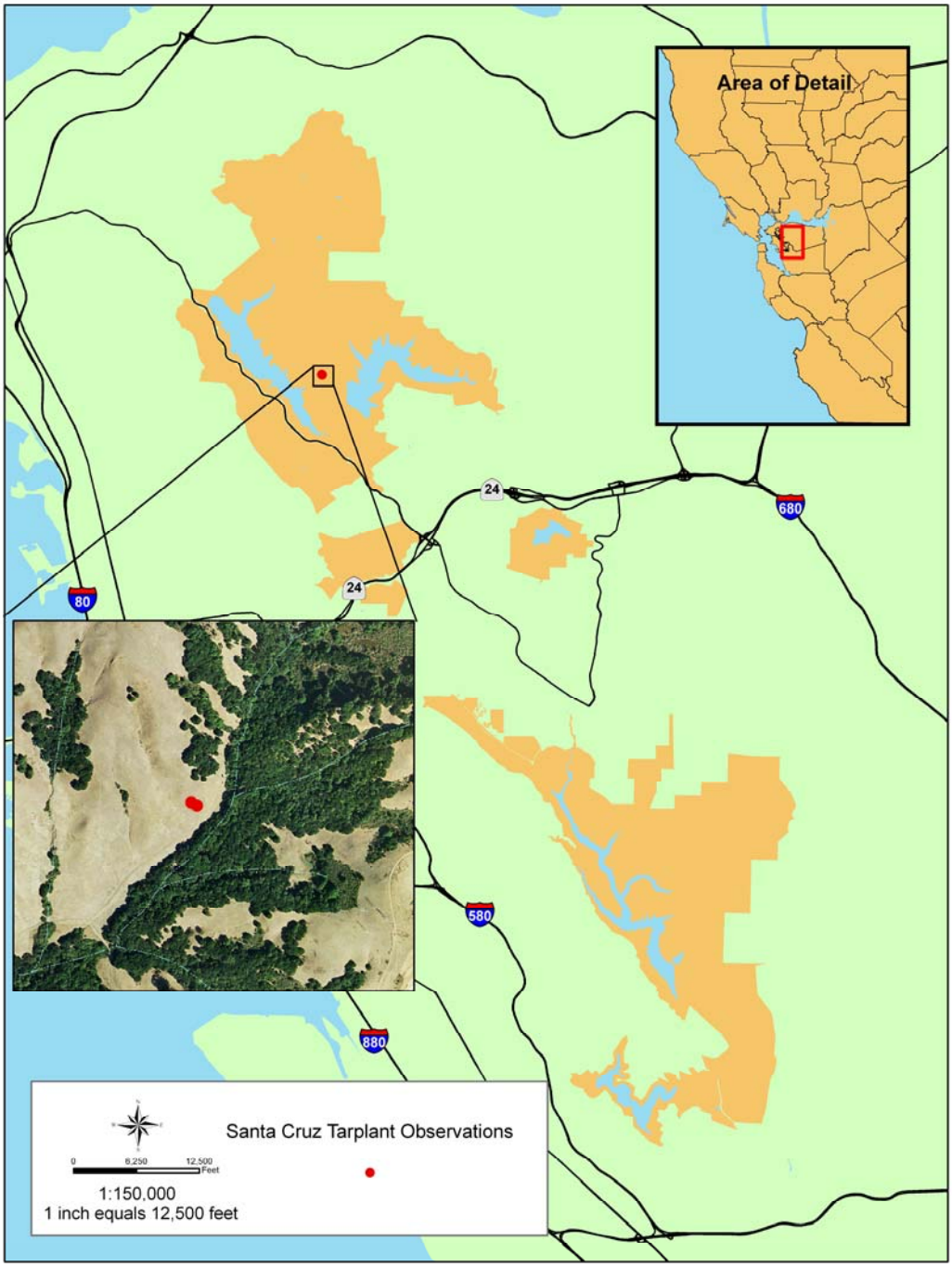

Figure A-1. Santa Cruz tarplant observation location on EBMUD lands, Contra Costa County, California.

Pallid Manzanita (*Arctostaphylos pallida*)

Description: Pallid manzanita is a shrub in the heath family (Ericaceae) that grows to a height of 4 m or more and flowers from January through March. According to Amme et al. (1986) pallid manzanita is a fire-adapted plant found in chaparral communities that grow on sterile acid soils such as sandstone and shale and are influenced by summer fog. Soils in the area where pallid manzanita is found are relatively moist throughout much of the summer. Adjacent soils on the same slope and aspect (Felton series) support vegetation such as redwood and are moist through most of the year. Portions of chaparral that support pallid manzanita grow on the shady side of ridges. Regeneration of pallid manzanita following a burn depends on scarification of the seed by fire (or other disturbance) in order for germination to occur. Also, this species is capable of reproduction by layering, as when stems come into contact with the soil and root, resulting in a clone of the original plant.

Distribution: Pallid manzanita has a very limited known distribution. The largest population is found on Sobrante Ridge, in Sobrante Ridge Regional Park in El Sobrante, Contra Costa County. This population is about one mile north of the San Pablo Reservoir dam. Another large population is found on Huckleberry Ridge, in Huckleberry Botanic Regional Preserve (EBRPD), Contra Costa County (just east of the town of Montclair). This area is slightly less than one mile north of the HCP area stand. Several small stands and individual plants are located along Skyline Blvd. Many of these are associated with homes, home-building activities, and road building and maintenance activities.

Threats: This species is threatened by urbanization, alteration of fire regimes, invasion and replacement by non-native plants, and fungal infection.

Status: The USFWS designated the pallid manzanita as a proposed threatened species in 1997. It is listed by the CDFG as endangered and the California Native Plant Society (CNPS) as 1b (endangered in California and elsewhere; nearly extinct).

Recovery Plan: The pallid manzanita is included in the 2002 USFWS Recovery Plan for Chaparral and Scrub Community Species East of San Francisco Bay, California. Priorities for this plan are 1) to preserve existing populations through management, including fire (where feasible); 2) reintroduction of pallid manzanita to historical sites; and 3)

introduction to new sites within the species' historical range. On public lands a 460 meter (500 yard) buffer is suggested around each existing population. Because the species populations are fragmented and kept small by necessary fire control in an area near urban development, USFWS suggests that populations on public lands will need to be protected in perpetuity (USFWS 2002).

Status on HCP Lands: The EBMUD watersheds support one population of pallid manzanita (Figure A-2). A survey in 1997 (Dunne) found 14 adults (10-14 feet tall), 7 seedlings (+ 4 inches tall), and 4 post-seedlings (<7 inches tall and multiple stemmed). A survey in 2001 (Lake 2001) found 8 adults and 10 seedlings, as well as 2 dead adults. Most seedlings looked young and only one was post-seedling stage. It is assumed that the other 3 post-seedlings seen in 1997 have died. No plants between post-seedling and adult stage were seen in 1997 or 2001. Though the USFWS (2002) lists the EBMUD population at 25 plants, a survey of the area in 2004 showed 7 plants (Kanz 2004), and an EBMUD survey in 2006 counted 14 plants (6 adult and 8 juvenile) (Setka 2006). Other species present include madrone, coast live oak, Monterey pine, California bay, bush monkeyflower, huckleberry, silver bush lupine, yerba buena, blue wildrye, dogtail grass, and a single plant of brittleleaf manzanita. Seedlings and saplings of coast live oak, madrone, and Monterey pine are also present.

The HCP population of pallid manzanita grows in a long, narrow stand that had become over-topped by relatively young madrones (Figure A-2). A road cut may have generated this stand. The presence of brittleleaf manzanita and deerweed within the stand suggest the probability that chaparral once was more prevalent in this area.

Lack of fire and the resulting effect of over-topping woodland vegetation may have resulted in a decline in the extent of chaparral at the EBMUD HCP site. The influence of these woodland trees on the soil surface, bark stripping and pathogens may also be impacting this population (Amme et al. 1986).

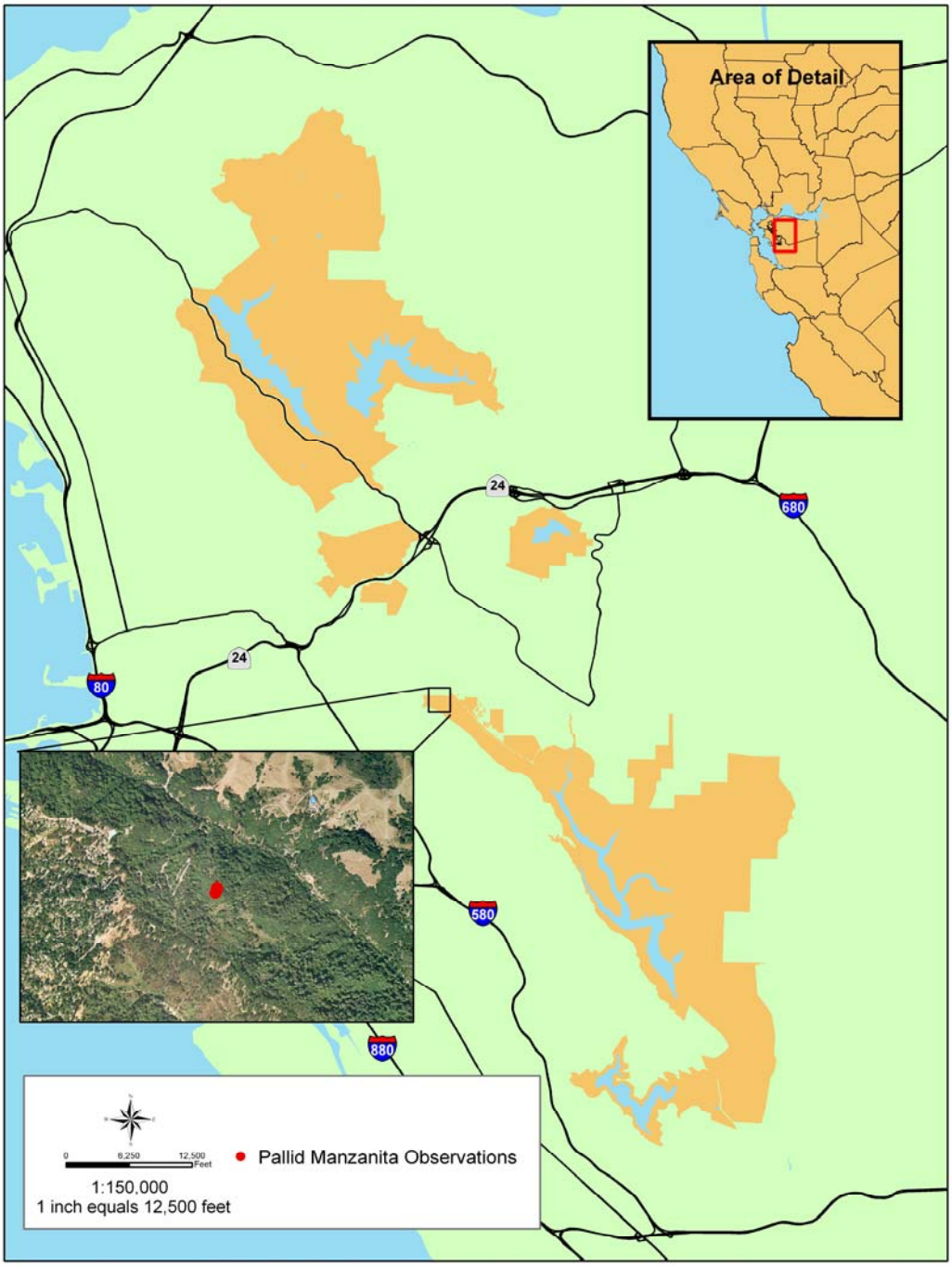

Figure A-2. Pallid manzanita observation location on EBMUD land, Contra Costa County, California.

Resident Wild Rainbow Trout (*Oncorhynchus mykiss*)

Description: This HCP covers only resident wild rainbow trout (*O. mykiss*) that exist in the drainages above Upper San Leandro Reservoir and in Pinole Creek. Pinole Creek also has an anadromous *O. mykiss* (steelhead) population. To better differentiate the life history of the resident form of *O. mykiss*, some of the anadromous *O. mykiss* life history is included below.

O. mykiss exhibit one of the most complex suites of life history traits of any salmonid species. *O. mykiss* may exhibit anadromy (i.e., they migrate as juveniles from fresh water to the ocean and then return to spawn in fresh water) or freshwater residency (i.e., they reside their entire life in fresh water). Resident forms are usually referred to as ”rainbow“ or ”redband“ trout, while anadromous life forms are termed ”steelhead.” *O. mykiss* typically migrate to marine waters after spending two years in fresh water. They then reside in marine waters for typically two or three years prior to returning to their natal stream to spawn as four- or five-year-olds. Unlike Pacific salmon, *O. mykiss* are iteroparous, (i.e., they are capable of spawning more than once before they die). However, it is rare for *O. mykiss* to spawn more than twice before dying; most that do so are females. Both *O. mykiss* residents and steelhead adults typically spawn between December and June (Bell 1990, Busby et al. 1996). Depending on water temperature, *O. mykiss* eggs may incubate in “redds” (nesting gravels) for 1.5 to 4 months before hatching as “alevins” (a larval life stage dependent on food stored in a yolk sac). Following yolk sac absorption, young juveniles or ”fry” emerge from the gravel and begin actively feeding. Juveniles rear in fresh water from 1 to 4 years, and then migrate to the ocean as “smolts.” Resident fish remain in their natal stream or drainage throughout their lives. Fish in Upper San Leandro Reservoir (USL) may remain resident or may emigrate to USL (as if it were the ocean) to rear for several years before returning to their natal stream. It is unknown if *O. mykiss* that emigrate to USL ever migrate and spawn in a stream other than their natal water (e.g., if *O. mykiss* originating in San Leandro Creek ever migrate and spawn in Redwood Creek).

Distribution: *O. mykiss* are presently distributed from the Kamchatka Peninsula, east and south along the Pacific coast of North America, to at least Malibu Creek in southern California. This species occupies a wide variety of habitats and may migrate through corridors of water unlike those in which they spawn and grow before emigrating to the ocean. Spawning and rearing areas may be roughly equivalent in riffle and pool habitats,

with high levels of dissolved oxygen. These habitats have well shaded banks, fast water rarely exceeding 23°C, instream woody debris, and cobble substrates (Moyle 2002).

Threats: Threats to *O. mykiss* include land-use activities such as logging, grazing, farming, road construction in riparian areas and other activities that may cause mass-wasting and surface erosion into waterways. Such erosion may reduce intergravel flow in *O. mykiss* nesting areas, thus reducing egg and larval viability. Destruction or alteration of *O. mykiss* habitat such as removal of large woody debris or riparian shade canopy is also a negative impact. Discharge or dumping of toxic chemicals or other pollutants (e.g., sewage, oil, gasoline) into waters or riparian areas supporting listed *O. mykiss*, violation of discharge permits, pesticide applications, and unauthorized moving and planting of *O. mykiss* are all contributors to the decline of this species. Infectious disease is one of many factors that can influence adult and juvenile *O. mykiss* survival. The introduction of non-native pisciverous species, such as brown trout and striped bass, likely to prey on *O. mykiss* or displace them from their habitat has been especially bad because established non-native species can be difficult to extirpate. *O. mykiss* have supported an important recreational fishery throughout their range; however, during stressful periods recreational fishing may significantly impact native anadromous stocks (62 Federal Register 43942).

Status: There have been a number of federal actions regarding the status and habitat of *O. mykiss*, however the final listing determination was published in January 2006 (71 Federal Register 052104F). The determination stated that only the anadromous distinct population segment (DPS) within each of the ESUs was covered by the ESA listing. Resident trout are not included in the NMFS listing and are the responsibility of USFWS.

Recovery Plan: No plan developed.

Presence in the HCP Area: *O. mykiss* (rainbow trout/steelhead) are known to occur in the Pinole and USL watersheds located in the HCP area (Figure A-3). Lafayette, Chabot and San Pablo Reservoirs are stocked with hatchery-reared rainbow trout in a put-and-take fishery. These populations are non-native and are not anadromous.

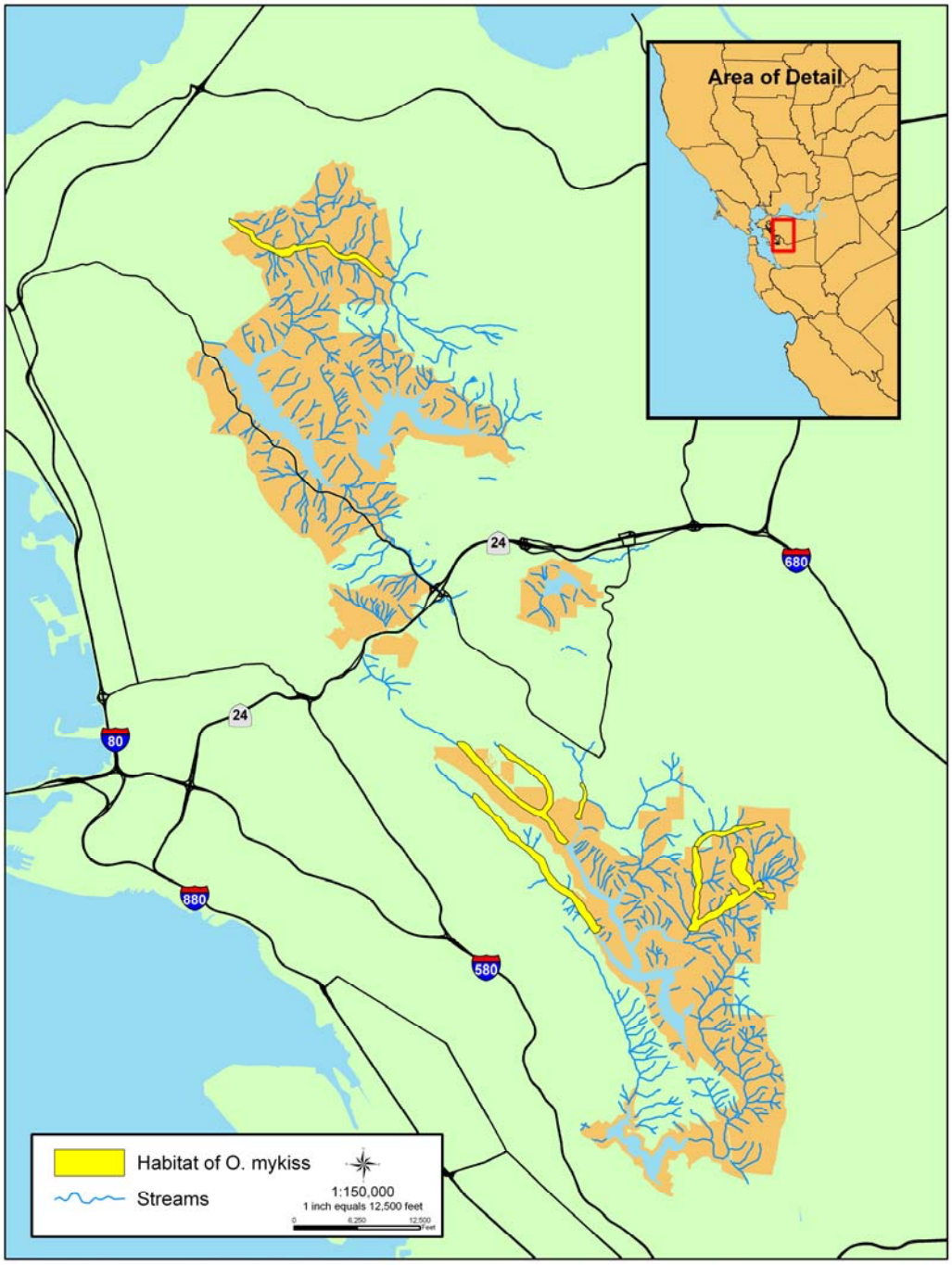

Figure A-3. Resident rainbow trout habitat on EBMUD lands, Contra Costa and Alameda counties, California.

An approximate 6 km stretch of Pinole Creek runs through EBMUD lands to San Pablo Bay. A total of 5.3 km of this area may be inhabited by trout during some portion of the year. A natural falls (location noted in Figure A-3) likely blocks access to upper portions of the watershed by *O. mykiss* at most flows. Records of *O. mykiss* sightings in Pinole Creek date back to the mid-seventies (Leidy 1984), and EBMUD personnel have conducted periodic surveys since that time.

Reviews of CDFG records located at its Region 3 Headquarters (Yountville, CA) indicate that various plants of *O. mykiss* have occurred in the Pinole Creek Basin. During electrofishing surveys, trout of various age classes have been captured. The presence of juvenile trout indicates that spawning occurs in Pinole Creek; however spawning locations and habitat characteristics of the area are largely unknown. An unspawned female of 600mm was found in Simas Creek, a tributary to Pinole Creek. Two large steelhead redds (fish estimated > 24") were observed downstream of the Highway 80 after the fish were observed holding in the area for more than a week because flows at the time were insufficient to allow passage upstream of the highway. EBMUD F&W staff has observed spawning *O. mykiss* downstream of EBMUD property within the city limits of Pinole. It is unknown if these redds were from resident or anadromous *O. mykiss*.

San Pablo, Lafayette, and Chabot reservoirs are all heavily planted fisheries, with no native *O. mykiss* in the reservoirs or upstream tributaries. *O. mykiss* has not been observed in Briones Reservoir since shortly after the dam was completed in the 1964. Upper San Leandro Reservoir contains an important population of native rainbow trout (*O. m. irideus)* that spawns in five of the tributary creeks. This population provided the type specimens for rainbow trout (then named *Salmo irideus*, now *O. m. irideus*), first collected and described on the west coast by Dr. W. P. Gibbons in 1855. The creeks draining into Upper San Leandro are thus a type-locality for an early description of "rainbow trout" (*Salmo* sp.), and the population is historically important. There has been no known planting of hatchery trout into Upper San Leandro Reservoir, and the population has been shown to be genetically related to the Central California Coastal Steelhead ESU (Gall et al. 1990). These fish were landlocked when Chabot Dam (downstream) was constructed in 1875, and have survived within USL through the droughts of 1976-77 and 1987-92 when the deepest portion of the lakes was reduced to 87 feet and 102 feet, respectively (normal mean maximum depth is 116+ feet) (EBMUD 1999 bathymetric survey, R. Jung, pers. comm.). Because *O. mykiss* populations have persisted within USL, even through the intense droughts mentioned above, it is apparent

that a range of reservoir operations do not jeopardize this landlocked population. Also since 2003 a hypolimnetic oxygenation system (HOS) to inject dissolved oxygen into the summer-depleted lower levels of the reservoir was installed in Upper San Leandro Reservoir, and this HOS has increased available trout habitat as shown by telemetry studies and seasonal water quality profiles (Jose Setka, personal communication). There are no planted or native *O. mykiss* trout known to reproduce below Lafayette, Upper San Leandro, and San Pablo reservoirs. Planted trout have spilled over the San Pablo and Chabot dams, or have been observed to swim upstream from Chabot Reservoir to Upper San Leandro Reservoir spillway, but spawning has not been observed and the reproductive status of these hatchery fish within the creek is unknown. There is a small population of *O. mykiss* within a few hundred feet of San Leandro Creek below Chabot Dam; the origin of these fish has not been determined.

California Red-legged Frog (*Rana draytonii*)

Description: The California red-legged frog is one of two subspecies of the red-legged frog (*Rana aurora*) found on the Pacific Coast, and is the largest native frog in the western United States (Wright and Wright 1949), ranging from 4 to 13 cm in length (Stebbins 1985). All red-legged frogs in the San Francisco Bay Area are this subspecies.

The abdomen and hind legs of adults are largely red; the skin on the animal's back is characterized by small black flecks and larger irregular dark blotches with indistinct outlines on a brown, gray, olive or reddish background color. These dorsal spots usually have light centers (Stebbins 1985). Dorsolateral folds are prominent on the back. Larvae (tadpoles) range from 14 to 80 mm in length and the background color of the body is dark brown and yellow with darker spots (Storer 1925) (61 Federal Register 25813).

California red-legged frogs in the San Francisco Bay region breed from January through February (Jennings 1996). Egg masses that contain about 2,000 to 5,000 moderate-sized (2.0 to 2.8 mm in diameter), dark reddish brown eggs are typically attached to vertical emergent vegetation, such as bulrushes or cattails (Jennings et al. 1992). California red-legged frogs are often prolific breeders, laying their eggs during or shortly after large rainfall events (Hayes and Miyamoto 1984). Eggs hatch in 6 to 14 days (Jennings 1988). Larvae undergo metamorphosis 3.5 to 7 months after hatching (Storer 1925, Wright and Wright 1949, Jennings and Hayes 1990). Of the various life stages, larvae probably experience the highest mortality rates, with less than 1 percent of eggs laid reaching metamorphosis (Jennings et al. 1992). Sexual maturity normally is reached at 3 to 4 years

of age (Storer 1925, Jennings and Hayes 1985), and California red-legged frogs may live 8 to 10 years (Jennings et al. 1992) (61 Federal Register 25814).

Range: The historical range of the California red-legged frog extended coastally from the vicinity of Point Reyes National Seashore, Marin County, California, and inland from the vicinity of Redding, Shasta County, California, southward to northwestern Baja California, Mexico (Jennings and Hayes 1985, Hayes and Krempels 1986). The Navarro River represents the approximate dividing line between *R. a. draytonii* and a fifteen-mile intergraded zone with the northern red-legged frog (R.a.aurora) (B. Shaffer, 2002).

Habitat: The California red-legged frog occupies a fairly distinct habitat, combining both specific aquatic and riparian components (Hayes and Jennings 1988, Jennings 1988). The adults require dense, shrubby or emergent riparian vegetation closely associated with deep (>0.7 m) still or slow moving water (Hayes and Jennings 1988). The largest densities of California red-legged frogs are associated with deep-water pools with dense stands of overhanging willows and an intermixed fringe of cattails (*Typha latifolia*) (Jennings 1988). Well-vegetated terrestrial areas within the riparian corridor may provide important sheltering habitat during winter (61 Federal Register 25813).

California red-legged frogs estivate in small mammal burrows and moist leaf litter (Jennings and Hayes 1994). California red-legged frogs have been found up to 30 m from water in adjacent dense riparian vegetation for up to 77 days (Rathbun et al. 1993, Galen Rathbun, National Biological Service 1994). Rathbun (1994) found that the use of the adjacent riparian corridor was most often associated with drying of coastal creeks in mid to late summer (61 Federal Register 25814).

Migration/Seasonal Requirements: California red-legged frogs disperse upstream and downstream of their breeding habitat to forage and seek estivation habitat. Estivation habitat is essential for the survival of California red-legged frogs within a watershed. This species may occupy all aquatic and riparian areas within its range and estivation habitat may include any landscape features within 300 feet of a riparian area that provide cover and moisture during the dry season. Such habitat could include boulders or rocks and organic debris such as downed trees or logs; industrial debris; and agricultural features, such as drains, watering troughs, spring boxes, abandoned sheds, or hay-racks. Incised stream channels with portions narrower than 18 inches and depths greater than 18 inches may also provide estivation habitat (61 Federal Register 25814).

Threats: The California red-legged frog has sustained a 75 percent reduction in its geographic range in California as a result of several factors acting singly or in combination (Stebbins 2003). Habitat loss and alteration, overexploitation and introduction of non-native predators were significant factors in the California red-legged frog's decline in the early- to mid-1900s.

Water diversions, groundwater well development and stock pond or small reservoir construction projects can degrade or eliminate habitat (USFWS 1995) (61 Federal Register 25825). Storm damage repair, flood control maintenance on streams and management of water bodies for flood control are current threats to California red-legged frogs (61 Federal Register 25825).

Road-killed California red-legged frogs have been documented at several locations in San Mateo and Santa Cruz Counties (Coyote Creek Riparian Station, in litt., 1993; Westphal, Coyote Creek Riparian Station 1995). Road kills may deplete frog aggregations in borderline habitat and otherwise protected areas. Where roads cross or lie adjacent to California red-legged frog habitat, they may act as barriers to seasonal movement and dispersal (61 Federal Register 25825)

Heavy livestock grazing is another form of habitat alteration that is contributing to declines in the California red-legged frog. Studies, summarized in Behnke and Raleigh (1978) and Kauffman and Krueger (1984), have shown that heavy livestock grazing negatively affects riparian habitat. Livestock disturb and destroy vegetative cover, trample plants and seedlings and cause erosion (61 Federal Register 25827)

Status: The California red-legged frog was listed by the USFWS as threatened on June 24, 1996. It is a California state Species of Special Concern. A designation of proposed critical habitat for California red-legged frog was finalized in March 2001. A final designation of critical habitat was published in the Federal Register on April 13, 2006 (71 Federal Register, 19244). The critical habitat area covers approximately 182,255 hectares (450,288 acres). In addition, it contains a 4(d) rule pertaining to ranching activities that could impact red-legged frogs. Exempted is incidental take from are routine ranching activities such as maintenance and management of stock ponds and discing of ground squirrel burrows. None of the HCP area is included in the designation.

Recovery Plan: A formal recovery plan for red-legged frogs was proposed in March 2000 and finalized in September 2002. Actions identified in the proposed recovery plan to assist in the recovery of the California red-legged frog are:

1. Protect known populations and reestablish populations.
2. Protect suitable habitat, corridors and core areas.
3. Develop and implement management plans for preserved habitat, occupied watersheds, and core areas.
4. Develop land use guidelines.
5. Gather biological and ecological data necessary for conservation of the species.
6. Monitor existing populations and conduct surveys for new populations.
7. Establish an outreach program.

The plan estimated that delisting could occur by 2025 if recovery criteria have been met.

Presence in the HCP Area: California red-legged frogs are found in the Pinole Valley, San Pablo, Briones and USL watersheds of the HCP area (Figure A-4) (Dunne 1994). Habitat where California red-legged frogs have been observed includes active stock ponds with dense emergent and bank vegetation, active relatively large stock ponds with little or no emergent or bank vegetation, stream glides and pools on first order streams protected and unprotected from livestock impacts.

Pinole Valley contains the largest of the California red-legged frog populations within the HCP area. Surveys in the Simas Valley watershed (a sub-watershed of Pinole Valley) and along Pinole Creek have documented numerous areas inhabited by California red-legged frogs. The Pinole Valley population of the California red-legged frog has expanded and contracted over time in response to consecutive wet or dry years. In 1989 after 3 years of drought the population shrunk to only two stock ponds but expanded greatly during the wet period from 1995-1999 to occupy most of the newly wetted ponds and creek pools in Pinole Valley. The population again trended downward following lower rainfall years and results from USFWS protocol survey in 2002 showed the fewest red-legged frogs in Pinole Valley since 1989. The current California red-legged frog population in Pinole Valley has expanded since 2002 with several stock ponds and creek pools occupied.

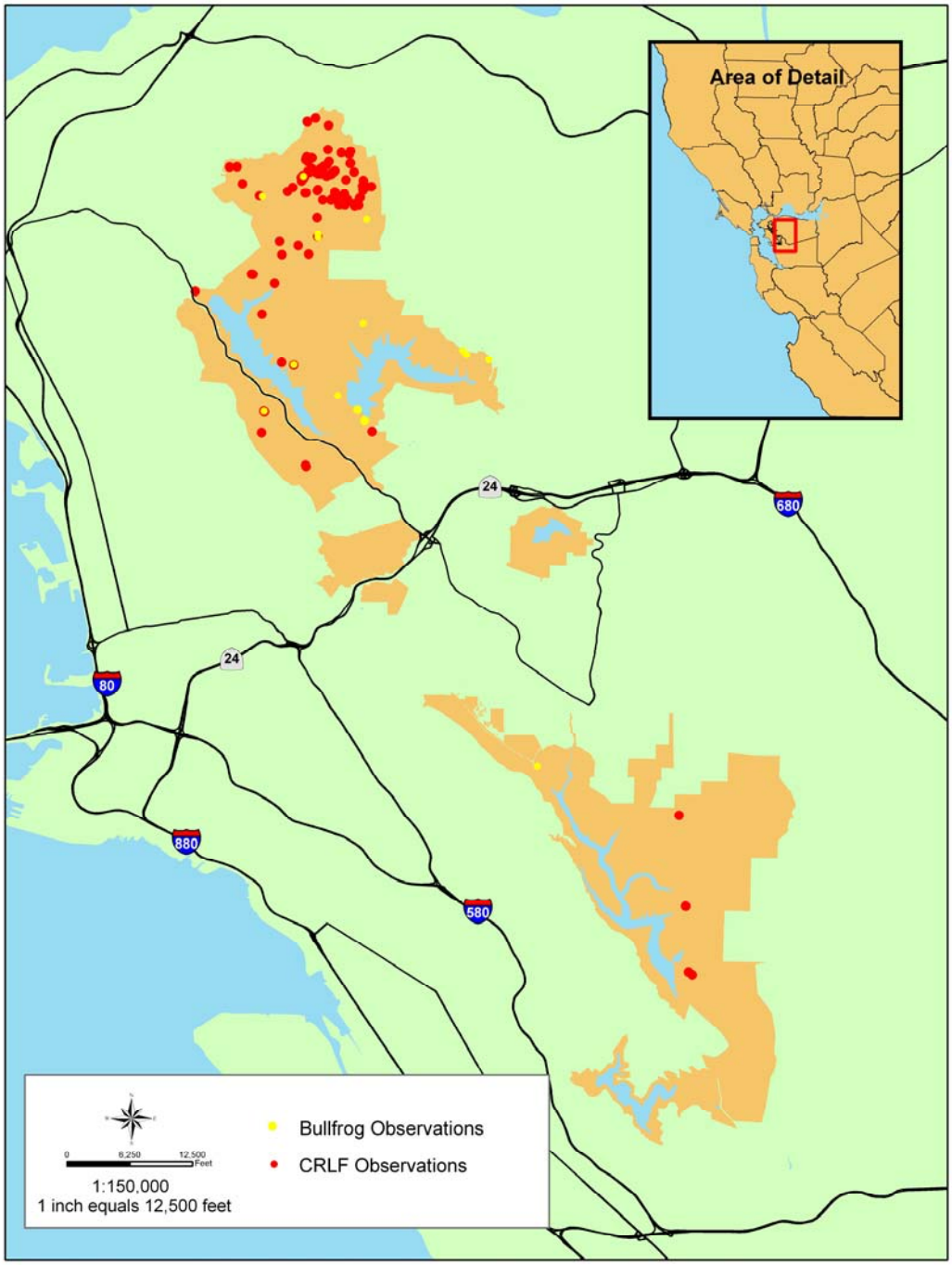

Figure A-4. California Red-legged frog observation locations on EBMUD lands, Contra Costa and Alameda counties, California.

The second largest density of California red-legged frogs in the HCP area occurs along the Oursan Creek drainage, north of the Scow Canyon arm of San Pablo Reservoir watershed. California red-legged frogs have been found in sediment pools in the Oursan drainage at the reservoir's edge upstream to Lagoon Pond, a stock pond located at the headwaters of Oursan Creek. The creek has a mix of protected and unprotected habitats. Lagoon Pond is the largest stock pond (1.3 hectares) in the HCP Area, and water usually persists during drought periods. While non-native predators, such as bullfrogs and largemouth black bass, inhabit the San Pablo Reservoir and nearby Nunes Pond, none have been observed in Oursan Creek or Lagoon Pond.

California red-legged frog populations within the EBMUD's Briones Reservoir Watershed occur sporadically and may suffer from competition with and predation from bullfrogs. The upper portion of the watershed is occupied by EBRPD's Briones Regional Park that has stock ponds with populations of California red-legged frogs.

The USL Watershed Basin contains three known areas inhabited by California red-legged frogs: Riley Cove Pond, Callahan Pond, and San Leandro Creek below USL Dam. The first documentation of red-legged frogs at Riley Cove Pond was in 1995. Whether this is a relic population that is self-sustaining, or part of a larger population is unknown. Red-legged frogs were observed in Riley Cove Pond every year from 1995-2001, but have not been seen since that time. Red-legged frogs were first seen in Callahan Pond in 2007. California red-legged frogs have been observed within the channel and rarely along tributaries of San Leandro Creek between USL and Chabot Reservoirs since 1994.

There are no known instances where California red-legged frogs have been identified in the Lafayette Reservoir Watershed Basin. (Beeman pers. com.)

In June 2004 EBMUD biologists, in conjunction with a permitted biologist, began a long-term telemetry project in order to track movements of California red-legged frogs on watershed lands. Over 64 individual frogs have been tagged with a passive integrated transponder (PIT) and/or radio tagged through February 2008 in the north and south watersheds. Although the project is ongoing, early results show that habitat occupancy varies from year to year.

Western Pond Turtle (*Clemmys marmorata*)

Description: The western pond turtle is a medium-sized olive green, brown, or blackish turtle, lacking distinct carapace markings. Males typically develop a light-colored throat

through sexual maturity; this contrast relative to darker body parts becomes more distinct with age. Females retain a dark or mottled throat typical of juvenile turtles. Plastron coloration varies considerably among individuals, ranging from entirely light to dark, or patterned with light or dark markings (Jennings and Hayes 1994).

In California, reproductive maturity occurs between 7 and 11 years of age. Mating typically occurs in late April to early May, but may occur year-round (Holland 1985, 1991; Jennings and Hayes 1994). Females move 1,300 feet or more from aquatic sites to upland nesting sites (see Habitat), and lay from 1 to 13 thin-shelled eggs in a 25- to 30-inch deep dry nest (Holland 1991, Rathbun et al. 1993). The young overwinter in the nest, emerge in early spring, and migrate to the aquatic site.

Range: Historically, the western pond turtle occurred in most Pacific slope drainages from Washington south through California to Baja, California (Slater 1962, Stebbins 1985, Jennings and Hayes 1994). The known elevation range of the western pond turtle extends from sea level to 1432 meters (4,700 feet) (Jennings and Hayes 1994). The species has been observed at higher elevations (2042 meters - 6,700 feet), but turtles are known to have been introduced at all of these higher-elevation sites (Holland 1991).

Habitat: The western pond turtle is an aquatic species that leaves aquatic habitats only to reproduce and, in some cases, overwinter. Turtles require ponds, lakes, or slow-water aquatic habitat, although they can occur at low densities along higher-order streams (Jennings and Hayes 1994). One of the most important determinants of aquatic habitat quality is the availability of basking sites such as logs, rocks, or dense aquatic vegetation mats (Holland 1991), and turtle abundance is often positively correlated with the amount of basking area. Western pond turtles normally get 2-4 hours of atmospheric basking per day (Bettaso 2005). In addition to aquatic sites, turtles require an upland oviposition site near aquatic habitat (Holland 1991). Nest sites must support the thermal and hydric requirements of the incubating eggs, and dry, unshaded areas are typically considered suitable nesting sites. Nesting sites have been found up to 400 m from basking sites, although most nests are located within 200 m of basking areas (Holland 1991), and often closer (Shafer 2005).

Migration/Seasonal Requirements: In a study on Waddell Creek, Smith (2005) found that turtles moved upland or onto island in response to flooding, and back to the water in response to increased seasonal temperatures. Males have home ranges of up to 350 meters in length while female home ranges may be half as large (Bury 2005). Movement

away from aquatic habitat, except to nest, was rare in a pond environment noted by Rathbun et al. (1993). In another case, turtles showed high variation in movement patterns adjacent to stream habitat. Some individuals remained close to the watercourse to aestivate, nest, or overwinter, while others moved relatively long distances. Adults can tolerate up to 7 days without water, and turtles will move considerable distances in response to changes in local habitat. Little is known about juvenile dispersal abilities or site recolonization after local population extirpation (Jennings and Hayes 1994).

Threats: Western pond turtle populations lose about 10% of the animals per year (Bury 2005). Besides predation, land use practices that involve frequent ground disturbance, such as cattle grazing and farming, can result in nesting failures. These impacts can lead to increasingly adult-biased populations (Holland 1991, Jennings and Hayes 1994). Upland nesting sites can be destroyed by farming activities (including plowing and irrigation) (Smith 2005), or by predation from raccoons and skunks after eggs have been deposited (Jennings and Hayes 1994). This species also suffers from competition with several introduced species, including other turtle species such as the red-eared slider (*Trachemys scripta elegans*) and the soft-shelled turtle (*Apalone sp*). Other factors affecting pond turtle populations include juvenile predation by introduced bullfrogs (Holland 1991, Jennings and Hayes 1994) and introduced fish (Holland 1991, Jennings and Hayes 1994). Pond turtles have been heavily exploited for food in parts of the species' range (Holland 1991); they are also incidentally captured by bait fisherman and released without hook removal, which can significantly impair their foraging ability (Mader 1988, Holland 1991, Jennings and Hayes 1994).

Status: The western pond turtle has no federal or state listing or sensitive species designation.

Recovery Plan: The western pond turtle is not listed as Threatened or Endangered by the USFWS; therefore no recovery plan has been developed.

Presence in the HCP Area: The western pond turtle is known to inhabit reservoirs, creeks and ponds throughout the East Bay Municipal Utility District East Bay watershed (Figure A-5). Suitable habitat is found on Lafayette, San Pablo, Briones, and Upper San Leandro reservoirs and in ponds with adequate habitat components throughout the north watershed. Ponds 11, 22, 28, 62, and 85, (Simas Pond, Nunes Pond, Nunes Lagoon, Inspiration Pond, and Baby Bottle Pond respectively) all contain populations of western pond turtles (Stebbins 1996).

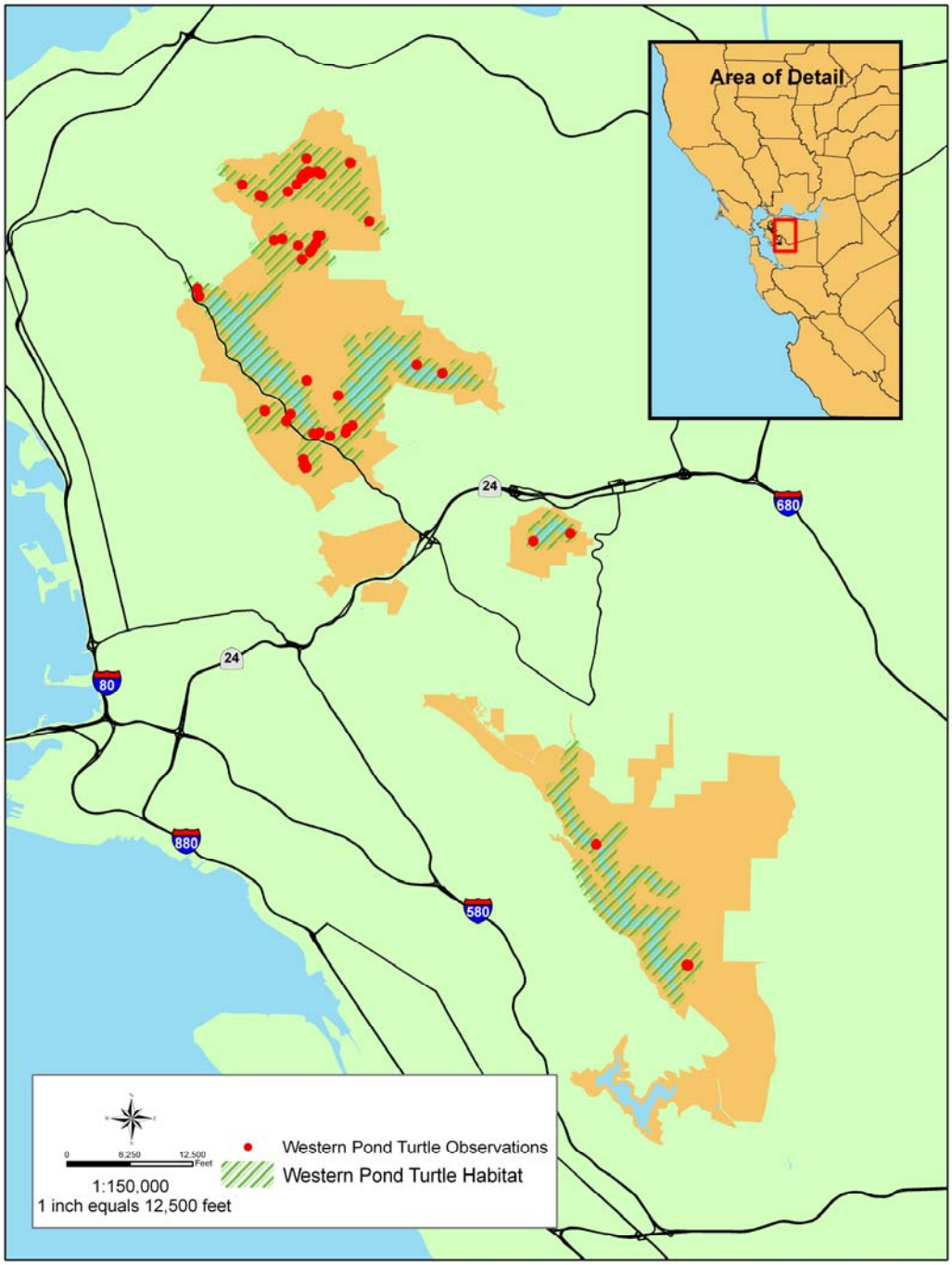

Figure A-5. Western pond turtle observation and habitat locations on EBMUD lands, Contra Costa and Alameda counties, California.

This species suffers from competition in Lafayette Reservoir with the non-native red-eared slider (*Trachemys scripta elegans*), and in San Pablo Reservoir from competition with sliders, non-native spiny softshell turtles (*Trionyx spiniferus*), and non-native snapping turtles (*Chelydra serpentina*).

Alameda Whipsnake (*Masticophis lateralis euryxanthus*)

Description: The Alameda whipsnake was described by William Reimer (1954) from six specimens collected in the Berkeley Hills, Alameda County, California, and near Somersville, Contra Costa County, California. It is a slender, fast moving diurnal snake with a narrow neck and a relatively broad head with large eyes. The dorsal surface is colored sooty black or dark brown with a distinct yellow-orange stripe down each side. The anterior portions of the ventral surface are orange-rufous colored, the midsection is cream colored, and the tail is pinkish. The adults reach a length of 91 to 122 cm. This subspecies is distinguished from the more common California whipsnake (M. l. lateralis) by its sooty black dorsum, its comparatively wide orange stripes that run laterally down each side, the lack of a dark line across the rostral, an uninterrupted light stripe between the rostral and eye, and the virtual absence of spotting on the venter of the head and neck (62 Federal Register 64308).

Breeding occurs from March through June. A clutch of 6–11 eggs are laid from May through July (Stebbins 1985). The young hatch and emerge in the late-summer to early fall (Swaim 1994) (62 Federal Register 64308). The diet of the Alameda whipsnake includes lizards, small mammals, snakes and nesting birds (62 Federal Register 64308).

Range: The Alameda whipsnake inhabits the inner Coast Range in western and central Contra Costa and Alameda Counties (McGinnis 1992, Swaim 1994). Due to extensive urban development within its historical range, the population has been fragmented into five populations: 1) Sobrante Ridge, Tilden/Wildcat Regional Parks area to the Briones Hills, in Contra Costa County (Tilden-Briones population); 2) Oakland Hills, Anthony Chabot area to Las Trampas Ridge, in Contra Costa County (Oakland-Las Trampas population); 3) Hayward Hills, Palomares area to Pleasanton Ridge, in Alameda County (Hayward-Pleasanton Ridge population); 4) Mount Diablo vicinity and the Black Hills, in Contra Costa County (Mount Diablo-Black Hills population); and 5) Wauhab Ridge, Del Valle areas to the Cedar Mountain Ridge, in Alameda County (Sunol-Cedar Mountain population) (62 Federal Register 64308). Much of these areas are owned by public utilities, are in private ownership, or are parks (62 Federal Register 64308).

Habitat: The Alameda whipsnake usually is found in northern coastal scrub or chaparral, but may also occur in adjacent habitats, including grassland and oak and oak/bay woodlands (Swaim 1994).

Threats: The primary cause of the decline of the Alameda whipsnake is the loss of habitat from human activities. The fragmentation of habitats resulting from development makes some populations of this species more vulnerable to extinction. The Tilden-Briones and Oakland-Las Trampas populations occur in a relatively narrow band of ridgetop chaparral between Oakland and Berkeley on the west and the Highway 680 corridor to the east. Habitats in these areas may have a high proportion of edge-to-interior, making them less valuable for whipsnakes. The Tilden-Briones habitats may be less than 1.6 km wide in some places, imposing a significant constraint to an animal whose home range may be as large as 9 ha. Also, trapping studies have produced few animals, suggesting that these snakes may be relatively scarce, even in suitable habitats (Swaim 1994) (62 Federal Register 64313).

A number of native and non-native animals are known to prey on the Alameda whipsnake including California kingsnake (L*ampropeltis getula californiae*) (Swaim 1994), raccoon (*Procyon lotor),* striped skunk *(Mephitis mephitis),* opossum *(Didelphis virginianus*), coyote (*Canis latrans*), gray fox (*Vulpes cinereoargenteus*), and various hawks (*Buteo* spp.) (Goodrich and Buskirk 1995). The introduced red fox (*Vulpes vulpes*), feral pigs (*Sus scrofa*), feral cats (*Felis domestica*) and dogs (*Canis familiaris*) all prey on the whipsnake, particularly where urban development brings them into more frequent contact with whipsnake habitat (62 Federal Register 64313). In the past seven years, EBMUD Natural Resource staff and others in the East Bay have noted an increase in the frequency of encounters with wild turkeys. Single encounters were often described in the 1990s, whereas in 2005 there were many EBMUD watershed sighting of wild turkey flock of over 100 birds. They are particularly numerous in Siesta Valley, a key portion of the Tilden-Briones population; and in the watershed East of Upper San Leandro Reservoir in the Oakland-Las Trampas population. There are records for road kills of dispersing juvenile whipsnakes during June in theses areas (EBMUD 2005) (CNDDB 2004). It is unknown if the increasing turkey population will threaten these small snakes, but juvenile turkeys eat a high percentage of animal material (mostly invertebrates) (Bent 1938) and the possibility cannot be discounted.

Status: The federal listing for the Alameda whipsnake as a threatened species became final on December 5, 1997 (62 Federal Register 64306). The State of California also lists

it as a threatened species. In October 2006 a final critical habitat designation was published (71 Federal Register 58219). The critical habitat is divided into seven units of which three; Tilden-Briones, Oakland-Las Trampas and the Caldecott Tunnel Unit include EBMUD HCP lands.

Recovery Plan: The Alameda whipsnake was is one of six species included in the "Draft Recovery Plan for Chaparral and Shrub Community Species East of San Francisco Bay" (USFWS 2002). The recovery strategy for the whipsnake includes:

1. Long-term protection of identified lands within the five major recovery units

2. Protection in perpetuity of strategically situated focus areas.

Also identified was protection of essential connectivity between recovery units, including lands in public ownership. Although the focus of the recovery plan for whipsnakes is on specific areas, the plan also stresses the importance of the habitat surrounding the recovery units (USFWS 2002).

Presence in HCP Area: Alameda whipsnakes have been found in the Upper San Leandro Reservoir (USL) (EIP 1991), Briones, and Pinole watersheds (Beeman 1990), in Siesta Valley, and near San Pablo Dam in the HCP area (EBMUD 2006). Habitat for this species has been identified in Gateway Valley (Swaim 1994). The CNPS vegetation communities in the HCP area where snake can potentially be found include, arroyo willow, coast live oak, knobcone pine, mixed oak, valley oak, red willow, chamise chaparral, chamise-black sage chaparral, coyote brush scrub, California sagebrush scrub, mule fat scrub, California annual grassland, California oatgrass grassland, creeping ryegrass grassland, foothill needlegrass grassland, Idaho fescue grassland, one-sided bluegrass grassland, introduced perennial grassland, purple needlegrass grassland, and sedge riparian grassland. Specific site locations are shown in Figure A-6. This species is closely associated with soil type and vegetation.

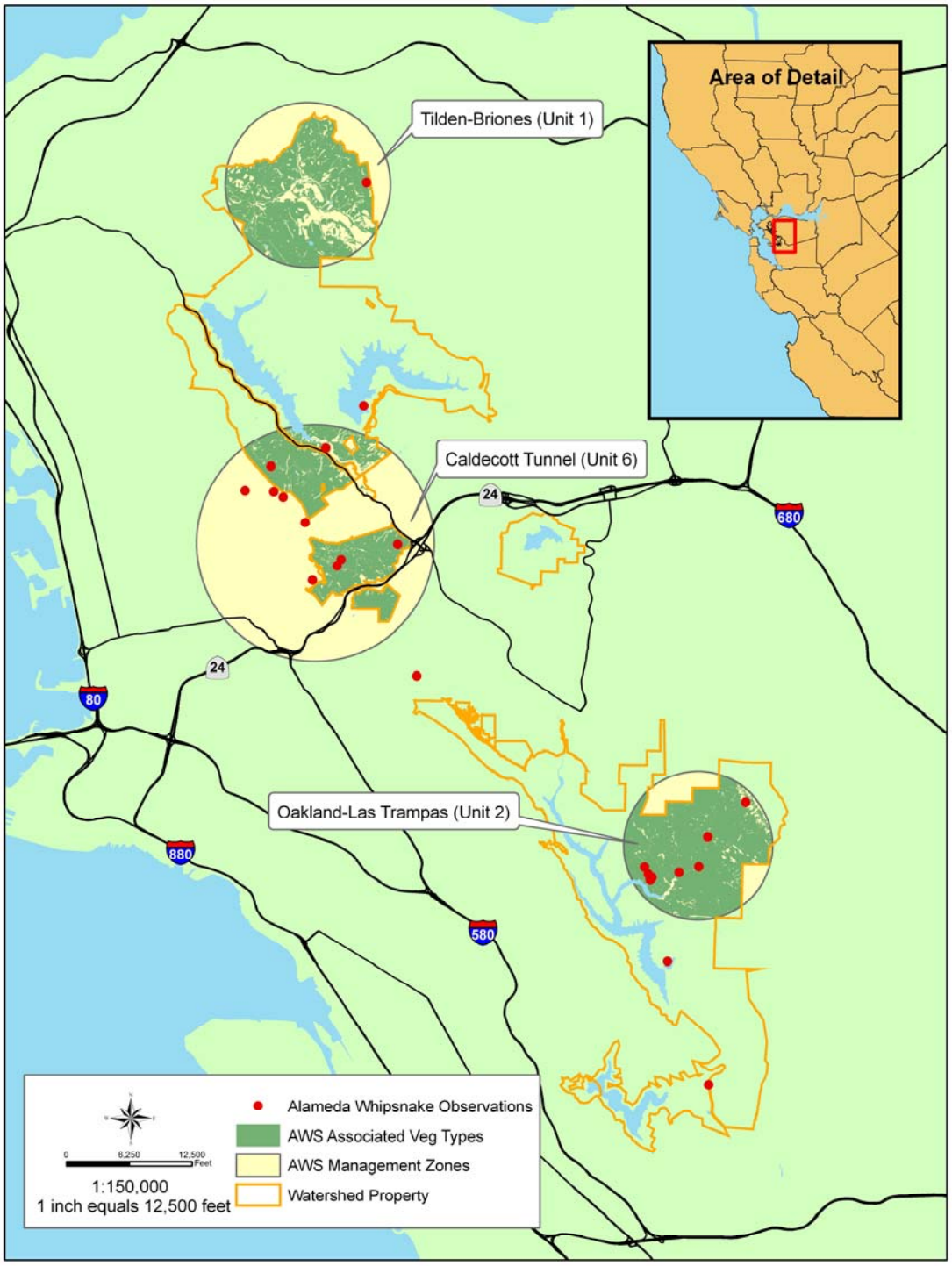

Figure A-6. Alameda whipsnake observation and management zone locations, Contra Costa and Alameda counties, California.

Pallid Bat (*Antrozous pallidus*)

Description: The pallid bat is a relatively large, pale, and yellowish bat in the family Vespertilionidae. Desert forms of this species are palest, while the darkest members occur in the Pacific Northwest (Burt and Grossenheider 1980). Its ears are large and not joined, naked, and crossed by 9 or 11 transverse lines; the bases of its hairs are nearly white with dusky tips. Pallid bats show a large light spot between their shoulders, and their underparts are paler and lack dusky-tipped hairs (Davis and Schmidly 1994).

This species mates between late October and February, and females typically mate in their first year while males delay until their second year. Gestation lasts 53-71 days, and maternity colonies of up to 100 individuals form in early April. Young are born from April to July and are weaned after 7 weeks. Average litter size is 2 and ranges from 1 to 3; females reproducing for the first time typically rear 1 young. Males may or may not roost with the maternity colony in summer.

Range: The pallid bat is a locally common bat found at low elevations in California (Zeiner et al. 1990). Its range includes most of California, excluding the Sierra Nevada range from Shasta to Kern Counties, and the northwest corner. Roost sites have been reported along the coast from Sonoma south to San Diego County; in the arid regions of southern and eastern California, including Kern, Inyo, Mono, Imperial, Riverside, and San Bernardino Counties; in the Sierra foothills of Tuolumne and Mariposa Counties; and in the San Joaquin Valley (Natural Diversity Database 1999).

Habitat: The pallid bat uses a wide variety of habitats including grasslands, shrublands, woodlands, and forests, but prefers open dry areas for foraging near roosting sites (Zeiner et al. 1990, Natural Diversity Database 1999). Small colonies use both day and nighttime roosts, sometimes shared with other bat species. Daytime roosts may be in rock crevices, cliffs, mines, caves, and hollow trees; night roosts are in the open and include highway bridges, open buildings, porches, and rock shelters (Barbour and Davis 1969).

Migration/Seasonal Requirements: The pallid bat is a winter and summer resident throughout its range in California. This species exhibits post-breeding dispersal and moves locally to hibernation sites in winter (Zeiner et al. 1990); however, little is known about specific movement patterns.

Threats: Pallid bats are highly sensitive to human disturbances; if harassed, they may abandon a roost and not return for several years (Barbour and Davis 1969). Mining

operations and development also threaten pallid bat populations (Natural Diversity Database 1999).

Status: The pallid bat is designated as a California species of special concern by the Department of Fish and Game.

Recovery Plan: The U. S. Fish and Wildlife Service does not list the pallid bat as Threatened or Endangered; therefore no recovery plan has been developed.

Presence in the HCP Area: One pallid bat nursery colony is known to occur in a barn located in Pinole Valley (Figure A-7). Adult and juvenile bats are usually present from late winter to late spring. The colony is located behind one of two large hayloft doors. Estimates place the number of bats from 100 to 150 (E. Pierson, and W. Rainey 2001). The amount of available habitat at the barn was doubled in 2001 by volunteer enhancement efforts (Bob Wisecarver, pers. comm.) when the second hayloft door was "repaired" to the specifications of the door currently being used. This second door has received little use, though configuration, spacing, and aspect all duplicate the current habitat. The colony is shared with the free-tail bat (*Tadarida brasiliensis*) (E Pierson and W. Rainey 2001). A supplemental colony structure placed within 75' of the April Creek barn may cause some spill over from the original barn colony. However, it is unlikely that this colony will exceed 300 bats, whether in the current silo door, a supplemental colony structure, or both (G. Tartarian, pers.comm.).

Figure A-7. Pallid bat colony location on EBMUD lands, Contra Costa County, California.

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Appendix B:

Integrated Pest Management

Taken from: 2003 EBMUD Environmental Compliance Manual

Appendix B:

7.0 INTEGRATED PEST MANAGEMENT

7.1 Introduction

The District is responsible for implementing pest control management practices within much of the 28,000 acres of East Bay watershed lands, recreation areas, right-of-ways, facility grounds and other areas located throughout the District. The District is committed to using the most environmentally safe practices for pest control to ensure the protection of the public and District employees, and to protect potable water sources, other aquatic resources, and public and private property.

The District has established an Integrated Pest Management (IPM) Committee to develop a consistent approach toward pesticide usage and management throughout the District, and to monitor the use of herbicides and pesticides. The IPM Committee has developed an IPM Program for use throughout the District that provides written guidance for determining the most appropriate pest control methods for a particular application, including the use of chemicals. Pests include a wide range of both plant and animal species capable of creating a nuisance.

The District's IPM Committee meets on a quarterly basis and develops annual reports summarizing the types, quantities, and locations of pesticide and herbicide usage throughout the District. IPM procedures and practices that have been developed by the IPM Committee are provided to managers and supervisors of work units having pest management responsibilities.

The District does not handle or use any restricted use pesticides. The IPM Committee reviews the use of pesticides on new projects, and is responsible for ensuring that pesticides are used in an appropriate manner, and that alternatives to chemical applications are used to the extent possible. Pesticides are applied in a 1% solution, and consist primarily of Roundup Pro, Surflan, and smaller amounts of other Class 3 pesticides.

District practice on watersheds is to use chemical controls to achieve an acceptable maintenance level for the identified pest, and then to use a combination of chemicals and physical methods to keep the pests under control. Physical methods include using brush rakes, chain saws, disking, and in the case of controlling star thistle, actual removal by hand. The District continues to use horse, cattle, and occasionally goat grazing as a means of pest control, including the use of draft horses for removing eucalyptus trees. In addition, controlled burns are conducted for both weed control and fire fighting training.

7.2 Definitions of Key Terms

Integrated Pest Management (IPM) is a pest management strategy that focuses on long-term prevention of pests with minimum impact on human health, the environment, and non-target organisms. A pest management strategy may include one or more of the following elements:

- No controls;
- Physical/mechanical controls (e.g., hand labor, soil tilling, mowing);
- Biological controls (e.g., animal grazing, use of predators or parasites);
- Chemical controls (preferably low toxicity materials such as soaps and oils); and
- Other controls (e.g., mulching, alternative vegetation, prescribed burns).

Pests are: (1) any insect, rodent, nematode, fungus, weed; or (2) any other form of terrestrial or aquatic plant or animal life or virus, bacteria, or other micro-organism (except viruses, bacteria, or other micro-organisms on or in living man or other living animals) that are declared to be a pest under the Federal, Insecticide, Fungicide, and Rodenticide Act.

Pest Problem means a pest infestation and its consequences, or any condition for which the use of plant regulators, defoliants, or desiccants would be appropriate.

Herbicides are substances or mixtures of substances intended to prevent or inhibit the growth of, kill or destroy plants and plant parts that are declared to be pests. Herbicides include, but are not limited to:

- *Direct contact herbicides* intended to kill or destroy weeds, unwanted brush and trees, or unwanted plant parts, or to mitigate their adverse effects on desirable plants;
- *Soil treatment herbicides* intended to kill or destroy weeds, unwanted brush and trees, or unwanted plant parts, or to prevent the establishment of any or all plants;
- *Pre-emergence herbicides* intended to prevent or inhibit the germination or growth of weed seeds or seedlings;
- *Root control herbicides* intended to prevent the growth of, or kill roots in certain sites such as sewer lines and drainage tiles;
- *Aquatic herbicides* intended to prevent, inhibit, or control the growth of, or kill aquatic weeds;

- *Algaecides*, except slimicides, intended to prevent or inhibit the multiplication of, or destroy algae in ponds, swimming pools, aquaria or similar confined sites;

- *Debarking agents* intended to kill trees by treatment of bark on trunks; and

- *Biological weed-control agents* such as specific pathogenic organisms or entities prepared and utilized by man.

Pesticides are any substances or mixtures of substances that are intended prevent, destroy, repel, or mitigate any pest, or intended for use as a plant regulator, defoliant, or desiccant. Pesticides are classified as being for either general use or restricted use.

- *General Use Pesticides* are pesticides that may be used without creating unreasonable adverse effects on the environment.

- *Restricted Use Pesticides* are pesticides that may have unreasonable adverse effects on the environment, including injury to the applicator. The use or possession of restricted pesticides requires a written permit from the local agricultural commissioner, and the commissioner has the authority to deny a permit for use if the commissioner finds that the proposed use will have adverse environmental effects that outweigh the benefits.

Signal Words: The following definitions apply to signage associated with the use of pesticides:

- *"Caution"*: Least Hazardous to Human Health

- *"Warning"*: Intermediate Hazard to Human Health

- *"Danger"*: Requires Pesticide Applicator

7.3 Roles and Responsibilities

7.3.1 IPM Committee

The responsibilities of the IPM Committee include the following:

- Review IPM practices on an annual basis to ensure consistency among District work groups;

- Review pesticide usage requests and plans for the use of new chemicals or for pesticide applications within environmentally sensitive areas, as needed;

- Provide guidance and consistency on District-wide pest management practices in accordance with District Policy 71; and

- Meet quarterly to discuss IPM practices and issues that arise concerning pesticide usage.

Current representation on the IPM Committee includes the following District staff:

Manager, Watershed and Recreation
Maintenance Manager
Water Systems Production Manager
Aqueduct Maintenance Foreman
Fisheries and Wildlife Manager
Grounds Foreman
Director, Natural Resources
Environmental Compliance Manager
Environmental Compliance Specialist

7.3.2 District Work Units

All District work units that practice pest management on District property (including watershed lands, recreation areas, aqueducts, and other rights-of-way, facility grounds, etc.) are responsible for implementing Best Management Practices (BMPs) that have been developed by the IPM Committee. These work units include:

Water Production – Pardee
Natural Resources – Pardee
Water Production – Stockton
Water Production – Bixler
Water Production – Walnut Creek
Natural Resources – East Bay
Grounds Maintenance, East and West of the Hills

Each work unit is responsible for developing pest control strategies, documenting pest control activities, complying with regulatory requirements, and maintaining records in accordance with the document titled *East Bay Municipal Utility District Integrated Pest Management Program*. Additional work unit responsibilities include meeting applicable license requirements for appropriate staff, and maintaining effective working relationships with local regulators.

7.3.3 ECS Staff

ECS staff responsibilities include leading IPM Committee meetings, providing staff support to the IPM Committee, preparing written documents for review by the IPM Committee, reviewing all pesticide and herbicide use requests before presenting them to the IPM Committee, maintaining files concerning pesticide

usage request reports, and maintaining information concerning various pesticides used throughout the District.

7.4 Summary of Applicable Regulations

7.4.1 Federal Regulations

Title 7, United States Code, Section 136 –136y, and 40 Code of Federal Regulations, Parts 152 – 186 established the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), which provides the federal regulatory framework governing pesticides and herbicides. FIFRA requires that all pesticides must be registered, and that no one can use a pesticide unless it has been registered. FIFRA further specifies whether a pesticide is classified as a restricted use or general use pesticide.

7.4.2 State Regulations

The Pest Control Operations Laws are located in Title 3, California Code of Regulations, Section 300 *et seq*, and in the Food and Agricultural Code, Section 11401 *et seq*. These laws establish the Department of Pesticide Regulations (DPR) as the agency responsible for oversight of state regulation of pesticides. The California pesticide program parallels FIFRA. The DPR enforces federal and state-defined pesticide laws and regulations, and certifies applicators that use restricted use pesticides.

7.4.3 Jurisdiction of Local Agencies

County agricultural commissioners are employees of the California Department of Food and Agriculture, having responsibility for local pesticide regulation under the direction of the DPR. The DPR enforces state and federal requirements, and the commissioners enforce local standards. The commissioners have the authority to adopt regulations governing pest control operations upon approval of the DPR.

7.4.4 Additional Regulations

Additional regulations concerning pesticides include the following:

- Clean Water Act, for spills to a receiving water, sanitary sewer, or storm sewer;

- Hazardous Materials Business Plan/Community Right to Know Laws, which require inclusion of pesticides in Hazardous Materials Business Plans, if the quantities stored exceed 55 gallons or 500 pounds;

- Hazardous Waste Control Laws, under which pesticide wastes (with the exception of empty containers) are considered to be hazardous wastes in the state of California, and subject to regulation by the Department of Toxic Substances Control (DTSC);

- Safe Drinking Water Act, which establishes Maximum Contaminant Levels (MCLs) for certain chemicals that are components of pesticides; and

- Clean Air Act, which classifies certain pesticides as Hazardous Air Pollutants (HAPs).

7.5 General IPM Best Management Practices at EBMUD

The BMPs described in this section are to be implemented by all District work units that practice pest management on District property.

7.5.1 Identify Potential Pests within Management Area

All personnel having pest management responsibilities for pest management shall be trained to accurately identify major pests and the damage that such pests may cause. Field manuals and other resources shall be made available to staff to assist in pest identification, as necessary.

7.5.2 Establish Injury Levels and Action Thresholds for Individual Pest Species

An injury level is the pest population size or density associated with intolerable damage (e.g., height and thickness of grasses under aqueducts or number of ground squirrels burrowing in an earthen dam). An action threshold is the set of conditions required to trigger a control action (e.g., emergence of Bermuda grass along a right of way).

District staff shall determine the infestation levels that will be intolerable or that will cause unacceptable damage at different times of the year, during various plant growth stages, and for other situations. At the same time, a monitoring plan must be devised for detecting these pest infestation levels and determining when to implement control actions. Action thresholds are usually reached when:

- Monitoring results indicate that the pest population will reach the injury level, if left untreated;

- Biological or environmental factors cannot be expected to reduce the pest problem within a reasonable amount of time; and

- Pest management costs (including any environmental or health impacts) are considered to be lower than costs associated with potential pest damage.

7.5.3 Establish Monitoring Guidelines

Pest monitoring programs have two primary objectives:

- To identify where and when pest problems become intolerable; and
- To determine the effectiveness of treatment actions.

Monitoring methods may vary from site to site, and from pest to pest, but all monitoring methods must involve regular inspections for pests and/or damage symptoms.

Written monitoring reports shall be prepared by each of the work units performing IPM activities so that management strategies can be reliably evaluated. All reports shall include date, time, location, observed pest species, and degree of the pest problem.

Develop a List of Acceptable Management Strategies for Individual Sites, Types of Sites, and Pests

Each work unit practicing IPM shall develop a list of acceptable management strategies for the areas under which it has authority and responsibility. The criteria listed below should be used in developing these management strategies. Since these criteria may not be met in every case, or met to varying degrees, judgment must be exercised to maximize the benefits associated with each strategy.

- Least damaging to the general environment;
- Least hazardous to human health;
- Least toxic to non-target organisms;
- Absence of listed species or known listed species habitats;
- Most likely to produce permanent reduction of the pest;
- Easiest to carry out effectively; and
- Most cost-effective in the short and long term.

As strategies are developed, they may include a combination of various management alternatives. The preferred methods in an IPM program are those that permanently prevent pest problems, thereby eliminating the potential for pest

damage. Pest management strategy may include one or more of the following elements:

- No controls;
- Physical/mechanical controls (e.g., hand labor, soil tilling, mowing);
- Biological controls (e.g., animal grazing, use of predators or parasites);
- Chemical controls (preferably low toxicity materials such as soaps and oils); and
- Other controls (e.g., mulching, alternative vegetation, prescribed burns).

7.5.4 Establish a Recordkeeping System

Accurate recordkeeping is essential for evaluating and improving an IPM program, as well as for reference purposes in the event that District management, the Board of Directors, or the public requests information on measures taken by the District to control certain types of pests. Each work unit is responsible for maintaining written records that include the following information, which should be reviewed and updated annually:

- A list of pests identified in a given management area (see 7.5.1 above);
- A description of unacceptable injury levels and action thresholds for a given management area (see 7.5.2 above); and

A list of acceptable management strategies for a given management area (see 7.5.4 above).

In addition, written records shall be kept of observations of the management area based on the monitoring guidelines established in Section 7.5.3 above. These observations should include:

- The degree of pest infestation using density, distribution, or other appropriate parameters (a map of the management area is useful);
- Information concerning the treatment method used for the pest problem, including a description of the treatment method, area treated, time(s) and date(s) of treatment, location of treatment, personnel performing treatment, and the cost of treatment;
- An assessment of the effectiveness of the treatment method in minimizing or eradicating the pest problem, in both the short and long term;

- A description of side-effects of the treatment on non-target organisms; and
- A summary of any citizen complaints and/or positive comments received, and a description of any other issues that arise.

7.6 Specific IPM Procedures and Practices at EBMUD

7.6.1 Pesticide Usage Practices

In many cases, District work units applying IPM include pesticide use (primarily herbicides) as an element of their management strategies. The District's pesticide usage practices are summarized as follows:

- If chemical pesticides/herbicides are used, use the least toxic pesticide/herbicide that will adequately achieve IPM goals. Take into consideration overall risk to the applicator and impact to the environment.
- Comply with all federal, state and local laws and regulations. Key regulatory contacts are as follows:

Table 7-1: Key IPM Regulatory Contacts

Agency Type	Regulatory Agency Name	Telephone No.
Federal	USEPA Air and Toxics Division, Pesticides	(415) 744-1087
State	Cal-EPA Department of Pesticide Regulation	(916) 445-4300
State	Cal-EPA Department of Pesticide Regulation – Regional Office, Richmond	(510) 669-0295
Local	Alameda County Agricultural Commissioner	(510) 670-5232
Local	Amador County Agricultural Commissioner	(209) 223-6487
Local	Calaveras County Agricultural Commissioner	(209) 754-6504
Local	Contra Costa County Agricultural Commissioner – Brentwood Office	(510) 634-5682
Local	Contra Costa County Agricultural Commissioner – Concord Office	(510) 646-5250
Local	San Joaquin County Agricultural Commissioner	(209) 468-3300

- Read and follow all chemical product label instructions.
- Review the history of a site and determine pest conditions. Monitor problem areas periodically in order to identify the level of pest condition. Establish an action threshold for each pest species or pest type as part of a pesticide use decision. This action threshold should be consistent with the work unit's IPM strategy.

- Apply pesticides at the appropriate time and under adequate weather conditions to maximize their effectiveness on the target organism and minimize the likelihood of discharging non-degraded pesticides in storm water runoff.

- Do not mix pesticides adjacent to a storm drain inlet, culvert, watercourse, or filter bed. Mix in an area where spillage, if it occurs, can be easily contained.

- Select pesticides and application techniques along roadsides that will retain some vegetative cover, if possible. This will help prevent soil erosion, slow the rate of storm water runoff and minimize potential for contaminated runoff.

- Calibrate field equipment regularly to ensure the desired application rate.

- Mix only as much material as necessary for the application.

- Maintain a record of pesticide usage for each site. This record shall include the type and quantity of pesticide used.

- If there is likely to be public contact within the area to be sprayed with a pesticide, adequate notification or posting must be provided.

- At District filter plants, pesticides shall not be used within 25 feet of the filter beds or sedimentation basins. On watershed lands, pesticides shall not be used within 1,000 feet of reservoirs or tributary creeks, except for spot treatment of pest plant species only. Work units that propose to use pesticides within this 1,000-foot zone shall gain approval of such use from the IPM Committee. Currently, the following pesticide uses within the 1,000-foot zone are approved:

    - Use of Rodeo or Accord for vegetation control in the Pardee spillway expansion joints.

    - Use of Rodeo or Accord for vegetation control on the downstream faces of the Camanche Reservoir dikes.

    - Use of Rodeo or Accord along rights of way, including Briones Aqueduct Road.

  Work units shall annually review pesticide use within the 1,000-foot zone to ensure that the practice is still required and that there are no impacts to non-target organisms.

- Monitor success of the pesticide treatment and adjust usage based on monitoring. This monitoring shall be consistent with the program established under Section 7.5.3.

7.6.2 District-Approved Pesticide List

The following pesticides are approved for use for application by District staff and contractors on District property, rights of ways or other areas where chemical pest control is necessary.

Table 7-2: Approved Pesticide List

Product Name	EPA Registration No. *
Accord	524-326
Diquat	Multiple products, multiple registration numbers
Direx	Multiple products, multiple registration numbers
Expedite	524-432-66435
Garlon	62719-40
Karmex DF	352-508
Krovar	352-505
Oust	352-401
Rodeo	524-343
Ronstar	Multiple products, multiple registration numbers
Roundup Pro	524-475
Roundup Drypak	524-436
Simtrol 90 DF	35915-12-60063
Surflan A.S.	62719-113-AA
Telar	342-404
Diazinon 4E	655-457
Diazinon (Knox out 2FM ant spray)	Multiple products, multiple registration numbers
Pyrethrin based wasp & hornet sprays	
Demon TC	10182-107-AA
Tempo 20WP	3125-380-AA
Combat	64240-25-AA
Dragnet	279-3062-AA

* EPA Registration Numbers are listed on the pesticide containers and are specific to the formulation of the pesticide. These numbers will change if a manufacturer changes a formulation, regardless of any change in the product name. Always check EPA Registration Number to confirm that the product is consistent with the above list.

Rodenticides with 0.01% Diphain or p-Chlorophenyl Phenylacetyl 1, 3-Indandlone as active ingredients are also approved for use.

7.6.3 Pesticide Storage

Pesticides shall be stored in locked buildings. All pesticide containers shall be labeled. The label shall include the name of the pesticide, signal word, owner's company name and section (e.g., EBMUD, Aqueduct Section).

7.6.4 Pesticide Disposal

Triple rinse empty pesticide containers immediately upon emptying contents. Place rinse water in spray tank incorporating it into the pesticide mixture. Dispose of the container rinse water or spray tank rinse water as a product over a targeted area within the application site

Dispose of triple-rinsed empty pesticide containers according to County Agricultural Commission and manufacturer's recommendations. For containers larger than five gallons and for work units that produce more than six empty pesticide containers per year, the triple-rinsed containers shall be rendered unusable. These containers shall be stored in a secure area until such time that the County Agricultural Commission can inspect them and certify them as being safe for disposal. At that time, they shall be disposed of in an appropriate landfill. For work units that produce fewer than six empty containers (five gallon size or smaller) per year, the triple-rinsed containers should be rendered unusable and can then be disposed of with other non-hazardous trash produced at the site.

If possible, unwanted or unused pesticides should be returned. Procedures for unwanted pesticides are as follows:

- Contact other District work units or one or more of the District warehouses to determine if they can use the pesticide in their operations;
- Return unopened containers to the manufacturer; or
- Find a qualified buyer for the pesticide and sell it using the District Material Sale Form (form 5-014).

If reusing or returning unwanted pesticides is not feasible, contact the Regulatory Compliance Office at extension 1669 to arrange for disposal.

7.6.5 Pesticide Spill Response

Spill kits shall be prepared and maintained at pesticide storage areas and on all application equipment having a tank capacity of 50 gallons or more.

Spill kits shall include the following: an instruction sheet with a contact notification list and phone numbers, absorbent material capable of absorbing up to

five gallons of liquid, shovel, broom, dustpan, gloves, and warning tape to secure the area in case clean-up cannot be accomplished immediately. Appendix 7-A summarizes the District's emergency notification procedure for pesticide/herbicide spills.

Employees that apply pesticides will be trained in the use of the spill kits. Work units shall maintain a written pesticide spill response and notification procedure and all employees that apply pesticides shall be familiar with the procedure.

7.6.6 Annual Pesticide Usage Reports

Each District Division or Department that uses pesticides shall produce an Annual Pesticide Usage Report. The report shall contain the following information, at a minimum:

- Type of pesticide used (product name is acceptable);
- Quantity of each pesticide used; and
- Locations where pesticides were used.

Reports shall be submitted to the IPM Committee, which will compile and maintain the information.

7.7 Fines and Penalties

There are three levels of penalties: Administrative, Civil, and Criminal. Under an administrative action, the DPR may issue Cease and Desist Orders, or deny, revoke, or suspend licenses and permits.

Civil penalties can range from $1,000 to $25,000 per violation. Criminal penalties include fines ranging from $500 to $5,000 and up to six months in jail.

7.8 Fees

Applicator licenses cost $30, and expire annually on December 31.

7.9 Training and Certification

Pesticide applicators shall obtain a state pesticide applicator certification or work under the direction of an employee who has obtained the state certification.

As a general rule, the District does not use Restricted Pesticides. The use or possession of restricted materials requires a written permit from the County Agricultural

Commissioner. The commissioner may elect to be present at the time the restricted material is being used.

Pesticide applicators shall be trained in general IPM practices, the safe use of pesticides and proper inspection of applicator equipment to prevent accidental pesticide leaks, spills, and potential hazards to applicators and the environment. Training shall be conducted annually. The work unit shall maintain records of staff that received the training for at least three years. New employees shall not apply pesticides until they have received the appropriate training or until their supervisor confirms that they have skills and knowledge equivalent to the training.

7.10 Recordkeeping

The monitoring and observation records for a given management area should be kept for a minimum of five years and filed with the work units conducting IPM.

Each District Division or Department that uses pesticides shall produce an Annual Pesticide Usage Report. The report shall contain the information listed in Section 7.6.6, at a minimum.

Reports shall be submitted to the IPM Committee, which will compile and maintain the information.

State law requires that a Restricted Pesticide use report be submitted to the County Agricultural Commissioner within seven days after each use of a restricted material.

Appendix C:
EBMUD/CDFG 1601
Memorandum of Understanding

STATE OF CALIFORNIA THE RESOURCES AGENCY
DEPARTMENT OF FISH AND GAME
CENTRAL COAST REGION
(707) 944-5520
Mailing address:
POST OFFICE BOX 47
YOUNTVILLE CALIFORNIA 94599
Street address:
7329 SILVERADO TRAIL
NAPA CALIFORNIA 94558

RECEIVED
APR 29 2003

GRAY DAVIS, GOVERNOR

April 23, 2003

Notification Number: R3-2002-0160

Mr. Steven Abbors / East Bay Municipal Utilities District
Natural Resources Department/Watershed and Recreation Division
500 San Pablo Dam Road
Orinda, California 94563

1601 LAKE AND STREAMBED ALTERATION AGREEMENT

This agreement is issued by the Department of Fish and Game pursuant to Division 2, Chapter 6 of the California Fish and Game Code:

WHEREAS, the applicant Mr. Steven Abbors / East Bay Municipal Utilities District, Natural Resources Division, hereafter called the Operator, submitted a signed NOTIFICATION proposing to substantially divert or obstruct the natural flow of, or substantially change the bed, channel, or bank of, or use material from the streambed or lake of the following water: Upper San Leandro, Pinole Creek, Lafayette, and San Pablo watershed tributaries, channels, ponds, & reservoirs, located in East Bay Municipal Utility District Watershed lands, in the Counties of Alameda and Contra Costa, State of California; and

WHEREAS, the Department has determined that such operations may substantially adversely affect existing fish and wildlife resources including water quality, hydrology, aquatic or terrestrial plant or animal species; and

WHEREAS, the project has undergone the appropriate review under the California Environmental Quality Act; and

WHEREAS, the Operator shall undertake the project as proposed in the signed PROJECT DESCRIPTION and PROJECT CONDITIONS (attached). If the Operator changes the project from that described in the PROJECT DESCRIPTION and does not include the PROJECT CONDITIONS, this agreement is no longer valid; and

WHEREAS, the agreement shall expire on December 31, 2007; with the work to occur between April 15 and October 15; and

WHEREAS, nothing in this agreement authorizes the Operator to trespass on any land or property, nor does it relieve the Operator of the responsibility for compliance with applicable Federal, State, or local laws or ordinances. Placement, or removal, of any material below the level of ordinary high water may come under the jurisdiction of the U. S. Army Corps of Engineers pursuant to Section 404 of the Clean Water Act;

THEREFORE, the Operator may proceed with the project as described in the PROJECT DESCRIPTION and PROJECT CONDITIONS. A copy of this agreement, with attached PROJECT DESCRIPTION and PROJECT CONDITIONS, shall be provided to contractors and subcontractors and shall be in their possession at the work site.

Failure to comply with all conditions of this agreement may result in legal action.

This agreement is approved by:

Robert W. Floerke
Regional Manager
Central Coast Region

cc: Warden Kozicki
Lieutenant Young
Kristine Atkinson

STATE OF CALIFORNIA THE RESOURCES AGENCY GRAY DAVIS, GOVERNOR
DEPARTMENT OF FISH AND GAME
2003 APR 23 AM 9:13
CENTRAL COAST REGION
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YOUNTVILLE, CALIFORNIA 94599
Street address:
7329 SILVERADO TRAIL
NAPA, CALIFORNIA 94558

1601 RMA Notification Number: R3-2002-0160
East Bay Municipal Utility District, Alameda and Contra Costa Counties

Stephen Abbors
EBMUD, Natural Resources Department
Watershed and Recreation Division
500 San Pablo Dam Road
Orinda, California 94563

PROJECT DESCRIPTION and PROJECT CONDITIONS

Description

East Bay Municipal Utility District (EBMUD) (Operator) proposes to conduct routine maintenance activities that are subject to Fish and Game Code Section 1601 in numerous creeks, channels, ponds and reservoirs within Alameda and Contra Costa Counties. Routine maintenance shall be defined as those periodically scheduled and implemented activities necessary to maintain the water transport capacity of stream channels and maintain the structural and functioning integrity of existing stock ponds and water detention structures on or affecting streams.

Maintenance activities which both parties agree may be considered "routine" are listed on Attachment A and are hereby made a part of this 1601 Routine Maintenance Agreement (RMA). In brief summary, these activities include, clearing of debris from existing culverts, minor vegetation removal, culvert replacement, debris removal in streams sufficient to restore water flow, routine maintenance dredging of stock ponds, bank stabilization and erosion control using bio-engineered techniques, maintenance and repair of existing roads and trails, and removal of hazardous man-made structures from water bodies for public safety and habitat improvement. Routine maintenance is understood not to include any new work other than described in attachment A. Routine maintenance does not include the removal of or damage to living riparian vegetation other than that specified in Attachment A.

This 1601 RMA consists of the Agreement and Attachment A (list of routine activities), and Attachment B (map of the creeks and reservoirs).

1601 Agreement Conditions

The Department of Fish and Game (Department) has determined that the creeks within the EBMUD district boundaries provide habitat for some fish and wildlife in the area and these resources may be impacted by project activities. The following measures to reduce, avoid, and minimize impacts to fish and wildlife resources and watercourses shall be implemented:

1. Only those activities specifically mentioned in Attachment A to this Agreement may be conducted under this 1601 RMA.

2. EBMUD shall submit separate written notification pursuant to Code Section 1601 (Form FG 2023), together with the required fee prescribed in the Department's Streambed Alteration Agreement fee schedule, and otherwise follow the normal notification process prior to the commencement of work activities in all cases where:

   (a) The proposed work does not meet the criteria established for routine maintenance in Attachment A,
   (b) The proposed work was not included in the annual notification required by Condition 3,
   (c) The nature of the proposed work is substantially modified from that described in the annual notification and this Agreement,
   (d) work will occur at a location where the Department advises EBMUD that conditions affecting fish and wildlife resources on the site have substantially changed or such resources would be adversely affected by the proposed activity, or
   (e) The proposed work will adversely impact a State of California Species of Special Concern or State of California (State) or federally listed rare, threatened, endangered or candidate species or its habitat.

3. EBMUD shall provide to the Department of Fish and Game Central Coast Region written notification of proposed routine maintenance activities to be performed that year by May 1 of each year. The written notification of proposed routine maintenance activities shall describe the project location, length and width of impact area, sizing of roads, culverts, rip rap, and other materials. Each annual notification of proposed routine maintenance activities shall be added to this 1601 RMA as Attachment C-Year (e.g. C-2002, C-2003, etc.)

4. The Department may review in the field any project submitted and/or may require that additional conditions be applied to specific activities and amended into this 1601 RMA or that certain projects may require separate notification and development of a separate 1601 Agreement.

5. EBMUD shall provide to the Department of Fish and Game Central Coast Region written notification of maintenance projects completed within the preceding quarter (quarterly reports). Quarterly reports shall be submitted whether or not maintenance projects were conducted in that quarter. The Department may terminate this Agreement immediately if late reports are not submitted within 30 days of a written request from the Department. Due dates for submitting quarterly reports shall be as follows:

May 15	for first quarter projects (January through March)
August 15	for second quarter projects (April through June)
November 15	for third quarter projects (July through September)
February 15	for fourth quarter projects (October through December)

6. A fee payable to the Department shall accompany each quarterly report. The fee amount shall be in accordance with the current fee schedule, as published by the Department for work performed under a MOU (memorandum of understanding) based on the number of maintenance projects completed within each quarter. The Department may terminate this Agreement immediately if late fees are not paid within 30 days of a written request from the Department.

7. All written notifications herein provided to be given or which may be given by either party to the other, shall be deemed to have been fully given when made in writing and deposited in United States mail postage prepaid and addressed as follows:

To EBMUD at:
Manager of Watershed and Recreation
Natural Resources Department
East Bay Municipal Utility District
500 San Pablo Dam Road
Orinda, California 94563

To Department at:
Regional Manager
Department of Fish and Game
Central Coast Region
Post Office Box 47
Yountville, California 94599

8. If the Operator finds more time is needed to complete the authorized activity, the work period may be extended on a day-to-day basis by a local Department of Fish and Game representative.

9. Work in all creeks, ponds, and reservoirs may be conducted only when the area is at its driest but no earlier then April 15 and no later then October 15. Work within creeks and ponds known to support populations of CA red-legged frog (RLF) shall take place after August 1, work in ponds known to support populations of California Tiger Salamander (CTS) shall be conducted after June 15. Debris removal ***immediately*** necessary to prevent flooding may be conducted at any time.

10. For all projects within creeks and ponds known to support habitat for RLF, CTS, and/or western pond turtle (WPT), a qualified biologist shall conduct pre-construction surveys. If listed species or species of concern are located during pre-construction surveys at a project site, EBMUD shall not conduct the project under this 1601 RMA and shall notify the Department for a separate 1601 Agreement. Capture and relocation of Endangered, Threatened, or Species of Special Concern is not authorized by this 1601 RMA.

11. EBMUD is not authorized to take any California Species of Special Concern, State or federally listed threatened or endangered species. If the Department determines that a federally-listed threatened, endangered, proposed or candidate species or its habitat is present at any of the proposed work sites, the Department shall immediately notify EBMUD, the United States Army Corps of Engineers (USACE), and the United States Fish and Wildlife Service (FWS) as appropriate. EBMUD shall immediately cease all operations at that location until the USACE, FWS, or NMFS has notified EBMUD and the Department in writing that the endangered species concerns have been resolved and the proposed work may commence.

12. A silt filter barrier shall be constructed immediately downstream of the work area prior to the beginning of any work. The barrier shall consist of either hay bales or clean river rock (less then 15% fines).

13. No equipment shall be operated in a live stream channel.

14. In ephemeral streams, all construction will be done while the work site is dry. Vehicles will not be driven or equipment operated in water covered portions of the stream, or where wetland vegetation, riparian vegetation, or aquatic organisms may be destroyed, except as otherwise provided for in the agreement. If the stream is flowing at the time work is to be done, the Contractor shall implement a water diversion plan which allows stream flows to gravity flow around or through the work site using temporary culverts. In lieu of a gravity flow diversion system, stream flow may be pumped around the work site using pumps and hoses. Cofferdams shall be constructed no more than 20' up or downstream from the project area. Flows shall be diverted only when construction of the diversion is completed. Cofferdams constructed shall only be built from materials such as clean gravel, sandbags or sheet piling, which will cause little or no siltation. Cofferdams shall be installed both upstream and downstream of the work site. Cofferdam construction shall be adequate to prevent seepage into or from the work area. The entire work area shall be dewatered. Aquatic life stranded in the dewatered area shall be relocated up or down stream. Sandbags shall be filled with clean sand. The cofferdam dewatering system shall remain in place until all creek work is complete. Normal flows will be restored to the affected stream immediately upon completion of work at that location by removing the dewatering system.

15. No trees over 4 inches diameter at breast height (dbh) may be removed from the riparian corridor, or pond or reservoir margins. Exceptions require the prior approval of a Department representative. All disturbed slopes around and on the banks shall be seeded,

mulched and fertilized with a blend of a minimum of three local native grass species from the following list: Meadow Barley (Hordeum brachyantherum ssp. californicum) Blue Wildrye (Elymus glucus) California Brome (Bromus carinatus) Creeping Wildrye (Leymus triticoides) California Oatgrass (Danthonia Californica), California melic (Melica californica). One or two nonnative grass species may be added to the seed mix provided that amount does exceed 25% of the total seed mix by count. Locally native wildflower and/or shrub seeds may also be included in the seed mix. Seeding shall be completed between October 1 and October 31 of the year construction begins.

16. No concrete shall be placed or poured on-site in a location that may contact creek water within 30 days of pouring unless the concrete is isolated from the creek water through appropriate wrapping, water barrier implemented, or commercial sealants in consultation with the Department.

17. Culvert replacement shall not increase culvert size by more than 12 inches or overall length.

18. Department personnel or its agents may inspect the work site at any time. A copy of this agreement must be provided to the Contractor and all subcontractors who work within the stream zone and must be in their possession at the work site.

19. Building materials and/or construction equipment shall not be stockpiled or stored where they could be washed into the water or where they will cover aquatic or riparian vegetation.

20. Debris, soil, silt, bark, rubbish, creosote-treated wood, raw cement/concrete or washings thereof, asphalt, paint or other coating material, oil or other petroleum products, or any other substances which could be hazardous to aquatic life, removed from the channel banks, channel bottom, deltas and sediment catch basins, resulting from project related activities, shall be prevented from contaminating the soil and/or entering the waters of the state. These materials shall be removed to a location where they shall not re-enter the waters of the State. Any of these materials, placed within or where they may enter a stream or lake, by Operator or any party working under contract, or with the permission of the Operator, shall be removed immediately.

21. The contractor shall not dump any litter or construction debris within the riparian/stream zone. All such debris and waste shall be picked up daily and properly disposed of at an appropriate site.

22. If, in the opinion of the Department, conditions arise, or change, in such a manner as to be considered deleterious to the stream or wildlife, operations shall cease until corrective measures approved by the Department are taken.

Amendments, Renewals and Termination

23. The Operator shall notify the Department before any modifications are made in the project plans submitted to the Department. Project modifications may require an amendment or a new notification.

24. The terms and conditions of this Agreement may be amended at any time provided such amendments are agreed to in writing by both parties to this Agreement. If EBMUD would like to modify this Agreement or projects submitted under this Agreement, a written request for an amendment must be submitted to the Department (1600 Program, Post Office Box 47, Yountville, California 94599). The fee for an amendment is half (½) the original notification fee. Amendments to the original agreement are issued at the discretion of the Department.

25. This 1601 RMA may be terminated by either party at any time with 60 days prior written notification.

26. This agreement is NOT transferable to subsequent owners of the project property.

27. This 1601 RMA shall expire on December 31, 2007. If requested by EBMUD prior to expiration, the Department may review the 1601 RMA and determine whether to amend and renew this Agreement or develop a new Agreement.

28. If the Operator would like to renew the agreement beyond the expiration date, a written request for a renewal must be submitted to the Department (1600 Program, Post Office Box 47, Yountville, California 94599) for consideration at least 30 days before the agreement expiration date. A renewal requires a fee. The Fee Schedule can be obtained at www.dfg.ca.gov/1600 or by phone at (707) 944-5520. Renewals of the original agreement are issued at the discretion of the Department.

Please note that you may not proceed with your project until after the Department has received the Project Description and Conditions signed by the Operator, the proposed project has undergone CEQA review, and the Department Regional Manager signs and returns the Agreement to the Operator.

I, the undersigned, state that the above is the final description of the project I am submitting to the Department for CEQA review, leading to an Agreement, and agree to implement the above project conditions developed by the Department as part of my project. I will not proceed with this project until the Department signs the Agreement. I also understand that CEQA review may result in the addition of measures to the project to avoid, minimize, or compensate for significant environmental impacts.

Operator's name (Print): STEPHEN E. ABBORS

Operator's signature: Stephen E. Abbors

Signed the 21st **day of** April, **2003**

ATTACHMENT A
Authorized Activities

1. Removal of parts of woody and herbaceous plants and/or urban obstructions, causing flow restrictions, or logged in the bed or bank shall be cutoff at the bed or bank invert, with hand tools in that portion of the stream identified as the stream bottom. Root structures are not disturbed, and debris is removed to a place where it cannot reenter state waters.

2. Removal of fallen trees, branches, associated debris, nonliving rubbish and litter from blocking flows of channels and banks. This activity may only occur by hand or by winch and cable or equivalent non-disruptive equipment from top of bank. No heavy equipment may be used in the streambed.

3. Removal, placement, or repair of, fencing, posts, gates, locks, signs and other related hardware.

4. Physical removal of soil, silt, debris, rubbish, algae, and other nonliving materials from concrete lined channels. These activities are to be conducted during periods of minimal flows, and following construction of effective sediment traps at the downstream end of the operation, or complete water diversion. Heavy equipment may be used from the top of bank to remove the above items in a dry concrete lined channel.

5. Cleaning, repairs and replacement of existing functioning flap gates or other existing water control devices such as dams and spillways. Heavy equipment may not be used in the streambed without prior approval and in accordance with conditions recommended by the Department.

6. Repair of concrete lined channels in kind, repair of natural channel bank minor washouts and erosion with non hardscape materials such as turf reinforcement mats, or other approved bio-engineering repair. Replenishment of rock riprap with clean, rock riprap, in previously rip rapped areas to maintain bank stability. Placement of material shall be accomplished without using heavy equipment in the streambed.

7. Repairs of culverts consisting of replacement of deteriorating or collapsed culverts, unplugging of culverts, and headwall reinforcement with compacted fill and loose clean riprap.

8. Control of weeds and grasses on channel banks and access roads or shoulders on channel banks, by mowing, or disking, between July 1 and October 1 of any year. Fire access roads and firebreaks along the top of the banks may be mowed, disked or sprayed after April 1. Nesting birds shall not be disturbed.

9. Control of herbaceous vegetation by chemical methods such as Rodeo, when used in accordance with the manufacturer's directions, as part of an overall Creek Management Plan, and in a manner which minimizes drip and drift into the water (adverse effects on non-target organisms) shall be authorized for use in the creek, however no chemical application is allowed for vegetation on the banks.

10. Maintenance of existing shoreline facilities (including but not limited to boat docks, boat houses, fishing docks, boat launches, debris booms, access restriction booms, and gauging stations) at San Pablo Reservoir, Briones Reservoir, Lafayette Reservoir, and Upper San Leandro Reservoir.

11. Removal of non-native, invasive vegetation (Giant Reed (*Arundo donax*), Pampas Grass (*Cortaderia selloana*), *Eucalyptus* sp., *Acacia* sp., Broom (*Cytisus* sp.). Eucalyptus up to 8 inches dbh may be removed from the riparian corridor, or pond or reservoir margins.

MOU REQUEST

For Department Use Only					
Notification Number:		Date Received:		Date Completed:	
Fees Enclosed?	~ Yes $ _____		~ No		
Action Taken/Notes:					

CK#220722
CK Amt $154
East Bay Municipal Utility District

R3.2002-0160
CK Rec'd 3-18-02
Kozicki/Christensen
Young
Atkinson

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF FISH AND GAME

NOTIFICATION OF LAKE OR STREAMBED ALTERATION

(See attachment/enclosure for instructions)

Notification Type

☑ 1601 (Public)	☐ Timber Harvest Plan	(No. _____)
☐ 1603 (Private)	☐ Commercial Gravel Extraction	(No. _____)
	☐ Water Application	(No. _____)

Applicant Information

	Name	Address	Telephone/FAX
Applicant:	East Bay Municipal Utility District Natural Resources Department Watershed and Recreation Division	500 San Pablo Dam Road Orinda, California 94563	Business: 510-287-0459 Fax: 925-254-8320
Operator:	Stephen Abbors, Manager of Watershed and Recreation	500 San Pablo Dam Road Orinda, California 94563	Business: Fax:
Contractor: *(if known)*	Determined yearly, on a project-by-project basis.	n/a	Business: n/a Fax:
Contact Person: *(if not applicant)*			Business: Fax:
Property Owner:	East Bay Municipal Utility District Natural Resources Department Watershed and Recreation Division	500 San Pablo Dam Road Orinda, California 94563	Business: 510-287-0459 Fax: 925-254-8320

Project Location

Location Description:	East Bay Municipal Utility District Watershed Lands				
County			Assessor's Parcel Number		
Alameda and Contra Costa Counties			See attachment A: Site Map		
USGS Map	Township	Range	Section	Latitude/Longitude	
See attachment A: Site Map					
Name of River, Stream, or Lake:	See attachment B and C: North and South Watershed Maps				
Tributary To?	Upper San Leandro, Pinole Creek, Lafayette and San Pablo watersheds.				