

## 4 Biological Resources – Aquatic

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This chapter evaluates the potential impacts of the Program components on aquatic resources. These results are provided at a programmatic level. Section 4.1, Environmental Setting, presents an overview of the aquatic resources in the Program Area and vicinity.

Section 4.2, Environmental Impacts and Mitigation Measures, presents the following:

- > Environmental concerns and evaluation criteria to determine whether the Program components would cause significant impacts to aquatic resources
- > Evaluation methods and assumptions
- > Discussion of the impacts from the existing and future activities within the Program components, and recommendations for mitigation, if required, for those impacts
- > A summary of aquatic biological resources impacts

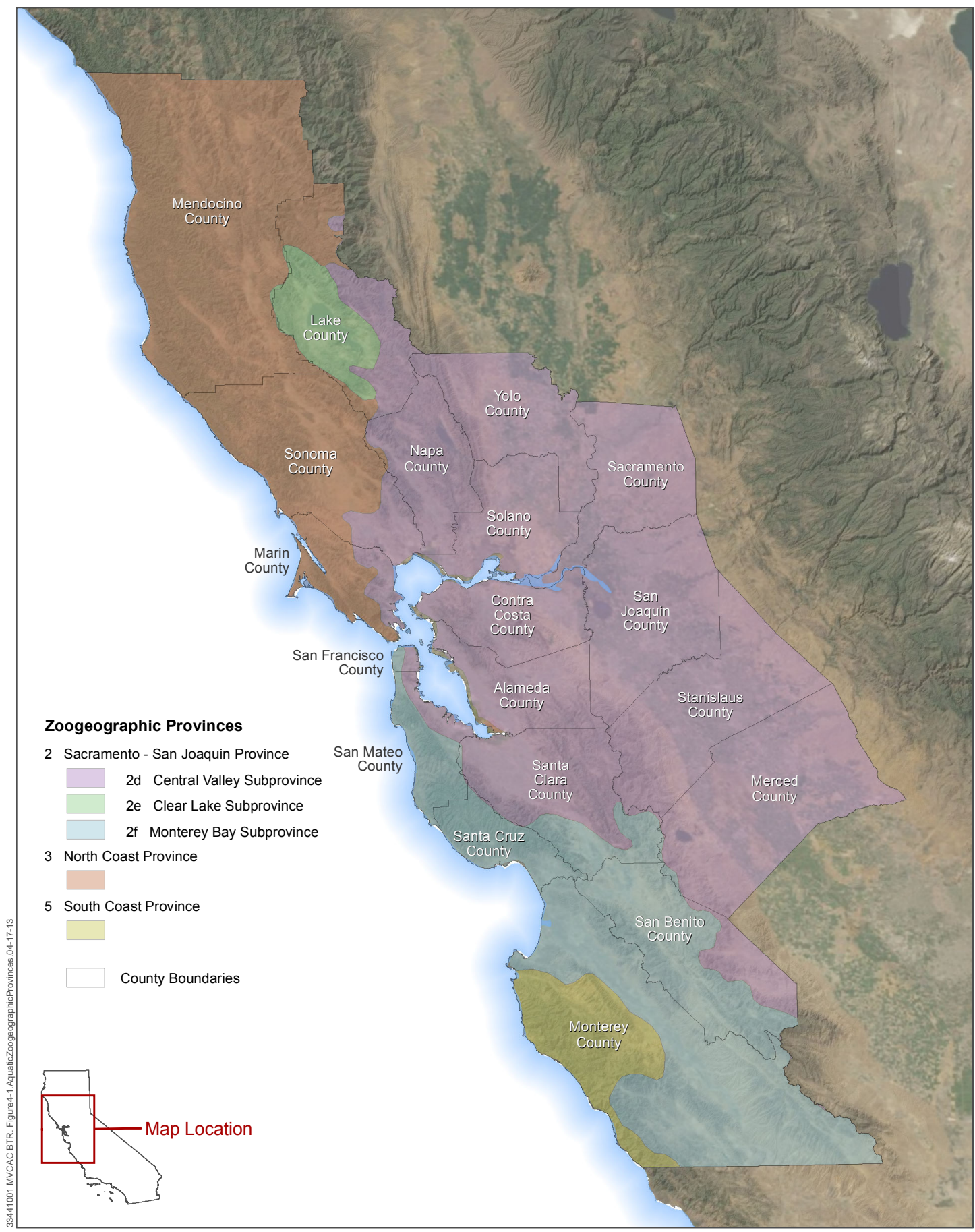
This chapter depends heavily on the information provided in Appendix A, Biological Resources Technical Report, Appendix B, Human and Ecological Health Assessment Report, and Chapter 6, Ecological Health. Terrestrial resources are addressed in Chapter 5. The cumulative impact analysis is contained in Chapter 13, Section 13.2 and focuses on the potential for effects on regional fisheries population trends and Program components that could contribute to cumulative impacts to aquatic habitats and resources.

### 4.1 Environmental Setting

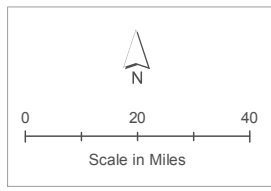
Section 4.1.1 identifies the zoogeographic provinces in the District's Program Area, Section 4.1.2 describes the special-status aquatic species that have the potential to occur within the Program Area, and Section 4.1.3 provides an overview of federal, state, and local ordinances and regulations pertinent to these resources that are applicable to the Program. Section 4.1.4 identifies the Habitat Conservation Plans (HCPs) and Natural Community Conservation Plans (NCCPs) in the Program Area. Special-status species are those that are listed as endangered, threatened, or candidate species under the federal Endangered Species Act, endangered or threatened under the California Endangered Species Act, or listed as species of special concern by the State of California.

#### 4.1.1 Aquatic Resources within the Program Area

The Program Area is defined as the San Mateo County Mosquito and Vector Control District (SMCMVCD) Service Area (San Mateo County) and the adjacent counties of San Francisco, Santa Cruz, and Santa Clara, where control activities may be provided upon request of, and under the auspice of, the county's vector control or public health agencies. This area encompasses a range of aquatic habitats and a diverse array of fish, amphibians, and other species that live a substantial portion of their lives in the water and breed in aquatic environments. Plants, reptiles, birds, and mammals are terrestrial species that are discussed in Chapter 5. The zoogeographic provinces and species assemblages presented in Moyle (2002) have been used to describe the areas where the Program activities and treatments would be implemented and are shown on Figure 4-1. The zoogeographic provinces are described in Appendix A.



33441001 MVCAC BTR, Figure 4-1, Aquatic Zoogeographic Provinces, 04-17-13



Source: Chris Mari van Dyck, 2000

INTEGRATED MOSQUITO & VECTOR MANAGEMENT PROGRAMS

**Aquatic Zoogeographic Provinces**

Figure 4-1

To facilitate the evaluation of impacts and impact avoidance measures by habitat type, a consistent set of habitat types was developed for wetland areas (Table 4-1). Wetland habitat types were based on those developed as part of the Bayland Ecosystem Habitat Goals Project (Goals Project 1999). To better capture the habitats potentially affected by the Program components, habitat types from both the Goals Project and the San Francisco Estuary Project are used, as reflected in the Goals Project document (1999). Marine/Brackish Open Water and Tidal Flat habitat types defined in the San Francisco Bay system would not be treated under the Program and are not discussed further in this document. The last two categories in the table are artificial habitats that were not addressed in the Goals Project but are important for consideration in the PEIR impact evaluations. In the case of Artificial Containers, Temporary Standing Waters, and Ornamental Ponds, these habitats would not be expected to support special-status species. Within the Water and Wastewater Management category, water treatment facilities and onsite wastewater treatment (septic) systems would not be expected to support substantial populations of special-status species, but water discharged from these facilities may support special-status species in downstream or downgradient areas. These species may move into these facilities from adjacent wetlands and waterways. Flood channels and ditches may provide seasonal habitat for special-status species depending on the length of time these channels carry water and the characteristics of these channels.

**Table 4-1 Aquatic and Wetland Habitat Types**

<b>Creeks and Rivers</b>	Areas of flowing freshwater, although most downstream reaches may be influenced by tides.
<b>Riparian Corridor</b>	The trees, shrubs and other vegetation that grow along the edges of creeks and rivers. This vegetation is typically dependent on water from the river and forms an ecotone between the river and the surrounding uplands. May extend to broader riparian forest, where such exist.
<b>Ponds and Lakes (includes stock and golf ponds that have natural bottoms)</b>	Areas of still water that typically remain wet throughout the year.
<b>Freshwater Marsh/Seeps</b>	Freshwater areas that support reeds, rushes and other vegetation typical of wetlands.
<b>Seasonal Wetlands (includes Vernal Pools)</b>	Areas that support standing water for part of the year, but dry out during the summer months.
<b>Lagoon</b>	Area behind the mouth of a river or stream that has been closed off by sand or other material, but is at least sporadically subject to tidal action.
<b>Tidal Marsh and channels</b>	Vegetated wetland area subject to tidal action. Occurs along San Francisco Bay. Includes both salt and brackish marshes. Includes tidal channels that carry water into and away from the marsh during the tidal cycle.
<b>Tidal Flats</b>	Mud flats exposed during low tide that do not hold water throughout the day and do not support substantial vegetation. Occurs between Mean Lower Low Water (MLLW) and Mean Tide Level (MTL).
<b>Open Water (Marine/Brackish)</b>	Continuously inundated areas of San Francisco Bay. Exposed to current and wave action. Occurs below MLLW.
<b>Water and Wastewater Management Facilities</b>	Constructed channels, ponds and other facilities designed for the management of water or wastewater. May include natural or artificial bottoms. Includes flood control channels, agricultural and roadside ditches, retention basins, treatment ponds, winery waste ponds, wastewater treatment facilities, septic systems and all associated facilities.
<b>Artificial Containers, Temporary Standing Waters, and Ornamental Ponds</b>	Artificial habitats that have little likelihood of supporting native plants and wildlife, including pots, ornamental ponds, tires, stormwater retention basins.

Source: Goals Project 1999

Each of these habitat types represent an existing condition that may be affected by one or more of the Program components, as indicated in Table 4-2. The Program components are described in Chapter 2 and the BMPs regulating District activities are provided in Table 2-8 (and repeated herein in Section 4.2.2.1, Table 4-5 by habitat type).

**Table 4-2 Wetland and Aquatic Habitat Types Potentially Affected by Each Program Technical Component**

	Surveillance	Physical Control	Vegetation Management	Biological Control	Chemical Control	Other Nonchemical Control / Trapping
Creeks and Rivers	X	X	X		X	
Riparian Corridor	X		X		X	X
Ponds and Lakes	X		X		X	
Freshwater Marsh/Seeps	X	X	X		X	X
Seasonal Wetlands (includes Vernal Pools)	X	X	X		X	X
Lagoon	X	X	X			
Tidal Marsh and channels	X	X	X		X	
Water and Wastewater Management Facilities	X	X	X	X <sup>1</sup>	X	X
Artificial Containers, Temporary Standing Waters and Artificial Ponds	X	X	X	X <sup>1</sup>	X	

<sup>1</sup> Biological controls would not be applied in natural or artificial waterbodies capable of supporting the breeding or aquatic rearing of California red-legged frog (CRLF) or California tiger salamander (CTS). CRLF prefer still water, more than 0.7 meter deep, bounded by dense shrubby vegetation (will, cattails and bulrush; Jennings and Haynes 1994). CTS are a lowland species (<200 feet mean sea level) that breed in rain pools or vernal pools (lasting more than 10 weeks), that lack fish or bullfrog predators. Although CTS' historical breeding habitat is natural vernal pools and ponds, they also use modified ephemeral or permanent ponds and manmade features such as constructed ponds or livestock ponds and have been reported in roadside ditches containing areas of seasonal wetlands. (USFWS 2014). Typically, breeding pools have moderate to high levels of turbidity. CTS rarely use ponds with clear water. These locations must be within 1.6 kilometers (1 mile) of suitable upland habitat, which consists of small mammal burrows, where juveniles and adults live and grow. If doubt exists whether a specific area would support breeding or aquatic rearing of these species, the District would contact the regulatory agencies prior to employing this component.

**4.1.2 Special-Status Species**

A number of special-status species are found in the Program Area and vicinity. Special-status species are those that are listed as endangered, threatened or candidate species under the federal Endangered Species Act, endangered or threatened under the California Endangered Species Act, or listed as species of special concern by the State of California. All special-status aquatic species are listed in Table 4-3, California Natural Diversity Database Occurrences of Fish and Amphibian Species in San Mateo County Mosquito and Vector Control District and its Adjacent Counties (Program Area). This table shows the habitat types these species are likely to use. Because some species occur in both wetland and upland habitat types, all habitat types are included in this table. Upland habitat types are described in Chapter 5.

**Table 4-3 California Natural Diversity Database Occurrences of Fish and Amphibian Species in San Mateo County Mosquito and Vector Control District and its Adjacent Counties (Program Area)**

Species Name	Status	Habitat Description	SMCMVCD (San Mateo County)	Adjacent Counties	Conifer Forest	Deciduous Forest	Shrublands	Grasslands	Serpentine	Coastal Dunes	Treeholes	Open Water (Marine/Brackish)	Tidal Flats	Tidal Marsh and Channels	Lagoon	Creeks and Rivers	Ponds and Lakes	Seasonal Wetlands (includes Vernal Pools)	Freshwater Marsh/Seeps	Riparian Corridor	Temporary Standing Waters and Artificial Ponds	Water and Wastewater Management Facilities
<b>Fish</b>																						
Coho salmon - central California coast evolutionarily significant unit (ESU) <i>Oncorhynchus kisutch</i>	FE, SE	Federal listing = pops between Punta Gorda and San Lorenzo River. State listing = pops south of Punta Gorda. Require beds of loose, silt-free, coarse gravel for spawning. Also need cover, cool water, and sufficient dissolved oxygen.		X								X				X						
eulachon <i>Thaleichthys pacificus</i>	FT, SSC	Found in Klamath River, Mad River, Redwood Creek and in small numbers in Smith River and Humboldt Bay tributaries. Spawn in lower reaches of coastal rivers w/moderate water velocities and bottom of pea-sized gravel, sand and woody debris		X												X						
hardhead <i>Mylopharodon conocephalus</i>	SSC	Low to mid-elevation streams in the Sacramento-San Joaquin drainage. Also present in the Russian River. Clear, deep pools with sand-gravel-boulder bottoms and slow water velocity. Not found where exotic centrarchids predominate	X	X												X						
longfin smelt <i>Spirinchus thaleichthys</i>	FC, ST, SSC	Euryhaline, nektonic and anadromous. Found in open waters of estuaries, mostly in middle or bottom of water column. Prefer salinities of 15-30 ppt, but can be found in completely freshwater to almost pure seawater.	X	X								X		X	X	X						
steelhead - central California coast Distinct Population Segment (DPS) <i>Oncorhynchus mykiss irideus</i>	FT	From Russian River, south to Soquel Creek and to, but not including, Pajaro River. Also San Francisco and San Pablo Bay basins.	X	X								X		X	X	X						
steelhead - south/central California coast Distinct Population Segment (DPS) <i>Oncorhynchus mykiss irideus</i>	FT, SSC	Federal listing refers to runs in coastal basins from the Pajaro River south to, but not including, the Santa Maria River.		X								X		X	X	X						
tidewater goby <i>Eucyclogobius newberryi</i>	FE, SSC	Brackish water habitats along the California coast from Agua Hedionda Lagoon, San Diego County to the mouth of the Smith River. Found in shallow lagoons and lower stream reaches, they need fairly still but not stagnant water and high oxygen levels.	X	X								X		X	X	X						

**Table 4-3 California Natural Diversity Database Occurrences of Fish and Amphibian Species in San Mateo County Mosquito and Vector Control District and its Adjacent Counties (Program Area)**

Species Name	Status	Habitat Description	SMCMVCD (San Mateo County)	Adjacent Counties	Conifer Forest	Deciduous Forest	Shrublands	Grasslands	Serpentine	Coastal Dunes	Treeholes	Open Water (Marine/Brackish)	Tidal Flats	Tidal Marsh and Channels	Lagoon	Creeks and Rivers	Ponds and Lakes	Seasonal Wetlands (includes Vernal Pools)	Freshwater Marsh/Seeps	Riparian Corridor	Temporary Standing Waters and Artificial Ponds	Water and Wastewater Management Facilities
<b>Amphibians</b>																						
California red-legged frog <i>Rana draytonii</i>	FT, SSC	Lowlands and foothills in or near permanent sources of deep water with dense, shrubby, or emergent riparian vegetation. Requires 11-20 weeks of permanent water for larval development. Must have access to estivation habitat.	X	X			X	X								X	X	X	X	X	X	X
California tiger salamander <i>Ambystoma californiense</i>	FT, ST, SSC	Central Valley DPS federally listed as threatened. Santa Barbara and Sonoma counties DPS federally listed as endangered. Need underground refuges, especially ground squirrel burrows, and vernal pools or other seasonal water sources for breeding	X	X				X								X	X	X	X	X	X	X
foothill yellow-legged frog <i>Rana boylei</i>	SSC	Partly shaded, shallow streams and riffles with a rocky substrate in a variety of habitats. Need at least some cobble-sized substrate for egg laying. Need at least 15 weeks to attain metamorphosis.	X	X												X				X		
Santa Cruz long-toed salamander <i>Ambystoma macrodactylum croceum</i>	FE, SE, FP	Wet meadows near sea level in a few restricted locales in Santa Cruz and Monterey counties. Aquatic larvae prefer shallow (<12 inches) water, using clumps of vegetation or debris for cover. Adults use mammal burrows.		X				X										X	X			

FC = federal candidate species  
 FE = federally listed as endangered  
 FP = California Fully Protected species  
 FT = federally listed as threatened  
 SC = state candidate species  
 SE = listed by California as endangered  
 SSC = California species of special concern  
 ST = listed by California as threatened

### **4.1.3 Regulatory Setting**

The regulatory setting includes the federal, state, and local laws, statues, and regulations pertinent to the Program Area and vicinity and the aquatic resources residing therein. These laws include the following:

#### **4.1.3.1 Federal**

##### **4.1.3.1.1 Endangered Species Act of 1973 (16 United States Code [USC] Section 1531 et seq.; 50 CFR Parts 17 and 222)**

This law includes provisions for protection and management of species that are federally listed as threatened or endangered and designated critical habitat for these species. This law prohibits “take” of federally listed species, except as authorized under an incidental take permit or incidental take statement. The term “take” means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct (<http://www.fws.gov/endangered/laws-policies/section-3.html>). The USFWS is the administering agency for this authority for freshwater species. The NMFS is the administering agency for anadromous species.

##### **4.1.3.1.2 Magnusson-Stevenson Fishery Conservation and Management Act 1996 (Public Law 94-265)**

This law provides for the conservation and management of all fish resources within the exclusive economic zone of the US and supports and encourages the implementation and enforcement of international fisheries agreements for conservation and management of highly migratory species. It calls for the establishment of Regional Fisheries Management Councils to develop, implement, monitor, and revise fish management plans to promote domestic commercial and recreational fishing. Specifically to this Program, it calls for the protection of essential fish habitat in review of projects conducted under federal permits, licenses, or other authorities that affect or have the potential to affect such habitat. The NMFS is responsible for the administration of this act.

##### **4.1.3.1.3 Clean Water Act of 1977 [33 USC Section(s) 1251-1376; 30 CFR Section(s) 330.5 (a)(26)]**

These sections provide for the protection of wetlands. The administering agency for the above authority is the USACE. Under CWA Sections 301 and 502, any discharge of dredged or fill materials into "waters of the United States," including wetlands, is forbidden unless authorized by a permit issued by the USACE pursuant to Section 404. These permits are an essential part of protecting streams and wetlands. Wetlands are vital to the ecosystem in filtering streams and rivers and providing habitat for wildlife.

The USEPA is the federal agency responsible for water quality management and administers the federal Water Pollution Control Act Amendments of 1972 and 1987, collectively known as the Clean Water Act (CWA). The CWA establishes the principal federal statutes for water quality protection. It was established with the intent “to restore and maintain the chemical, physical, and biological integrity of the nation’s water, to achieve a level of water quality which provides for recreation in and on the water, and for the propagation of fish and wildlife.” Also see Section 9.1.2.1 in Chapter 9, Water Resources.

##### **4.1.3.1.4 Executive Order 11990, Protection of Wetlands (May 24, 1977)**

This order provides for the protection of wetlands. The administering agency for the above authority is the USACE.

##### **4.1.3.1.5 Federal Insecticide, Fungicide, and Rodenticide Act**

FIFRA defines a pesticide as “any substance intended for preventing, destroying, repelling, or mitigating any pest.” FIFRA requires USEPA registration of pesticides prior to their distribution for use in the US, sets registration criteria (testing guidelines), and mandates that pesticides perform their intended

functions without causing unreasonable adverse effects on people and the environment when used according to USEPA-approved label directions. FIFRA defines an "unreasonable adverse effect on the environment" as "(1) any unreasonable risk to man or the environment, taking into account the economic, social, and environmental costs and benefits of the use of the pesticide, or (2) a human dietary risk from residues that result from a use of a pesticide in or on any food inconsistent with the standard under Section 408 of the Federal Food, Drug, and Cosmetic Act (21 USC 346a)."

FIFRA regulates only the active ingredients of pesticides, not inert ingredients, which manufacturers are not required to reveal. However, toxicity studies conducted under FIFRA are required to evaluate the active ingredient and the entire product formulation, through which any potential additive or synergistic effects of inert ingredients are established.

#### **4.1.3.1.6 Stipulated Injunction and Order, Protection of California Red-Legged Frog and 11 Other Threatened or Endangered Species from Pesticides**

On October 20, 2006, the US District Court for the Northern District of California imposed no-use buffer zones around CRLF upland and aquatic habitats for certain pesticides and herbicides. This injunction and order will remain in effect for each pesticide listed in the injunction until the USEPA goes through formal 7(A)(2) consultation with the USFWS on each of the 66 active ingredients, and the USFWS issues a Biological Opinion including a "not likely to adversely affect" statement for the pesticides. Under the injunction and order, no-use buffer zones of 60 feet for ground applications and 200 feet for aerial applications apply from the edge of the following CRLF habitats as defined by the USFWS and the Center for Biological Diversity: Aquatic Feature, Aquatic Breeding Habitat, Nonbreeding Aquatic Habitat, and Upland Habitat. These habitats are found in 33 counties of California including San Mateo County and its neighboring counties.

Additionally, on May 17, 2010, the US District Court for the Northern District of California issued another Order and Stipulated Injunction that, among other things, established interim protective measures for 11 federally listed threatened or endangered species until such time as USEPA has completed its review and any necessary consultation with the United States Fish and Wildlife Service, regarding the potential effects of a pesticide active ingredient to the subject species which include the tidewater goby, delta smelt, Ridgway's rail, salt marsh harvest mouse, California tiger salamander, San Francisco garter snake, California freshwater shrimp, San Joaquin kit fox, Alameda whipsnake, valley elderberry longhorn beetle, and Bay checkerspot butterfly. Of these 11 species, 8 are found either in San Mateo or its surrounding counties (the delta smelt, California freshwater shrimp, and valley elderberry longhorn beetle do not occur in this area). (USEPA 2017)

The interim protective measures are no-use buffer zones adjacent to certain features within certain geographic areas in the eight counties. These buffer zones are different depending on the species at issue and the pesticide being used. However, both the CRLF and 11 species injunctions include specific exemptions from the imposed buffers for vector control applications. The 2006 CRLF stipulated injunction order states that the USEPA's authorization for the use of the pesticides covered in the injunction for the purpose of public health vector control is "not enjoined, vacated or set aside" (US District Court, Northern District of California, Center for Biodiversity vs. USEPA et al., Case No. 02-1580-JSW (JL)).

The 2010 stipulated injunction concerning the 11 additional species similarly specifies an exemption from the order when the pesticides are used for:

1. The purpose of public health vector control when such program is administered by public entities; or
2. Use by certified applicators for control of a vector pest when such control is necessary to respond to a federally or state declared public health emergency (US District Court, Northern District of California, Center for Biodiversity vs. USEPA, Case No. C07-02794 JCS).



Of the 66 pesticides listed in the original injunction, the District currently uses methoprene and permethrin, while naled and esfenvalerate are part of the Proposed Program for vector control. Esfenvalerate may be applied directly to yellow jacket and wasp nests in response to public complaints in the future if District surveillance indicated a public health risk. Methoprene is used for larval mosquito control, and permethrin is currently used for yellow jacket control and may be used in the future for adult mosquito and tick control. Naled is not currently used but may be used for adult mosquito control in the future. Best management practices related to the CRLF are laid out in Tables 2-8 and 4-5 (BMPs E1-E8). However, as described above, for applications of a pesticide for purposes of public health vector control under a program administered by a public entity, the injunction does not apply.

More recently, USEPA and the Center for Biological Diversity have agreed to a revised settlement agreement that amends a 2010 court order establishing a schedule to complete effects determinations for 75 chemicals on 11 endangered or threatened (listed) species in the San Francisco Bay Area. USEPA has already issued effects determinations for 59 of the 75 pesticides. Instead of completing determinations that are limited to the San Francisco Bay Area for the remaining 16 pesticides, USEPA and the Center for Biological Diversity agreed that it would be more efficient and environmentally significant to complete nationwide effects determinations on four pesticides: atrazine, simazine, propazine, and glyphosate.

The revised settlement agreement includes schedules for completion of effects determinations and initiation of consultation for the four pesticides by 2020. USEPA intends to use and build on assessment approaches that are consistent with the April 2013 National Academy of Sciences report recommendations.

The District proposes to use the following herbicides listed in the injunctions: oryzalin, DCPA (chlorthal dimethyl), and triclopyr, and uses glyphosate and imazapyr as part of its current Program. Where used for vegetation management for control of mosquito-breeding habitat, the injunction would not apply. If these herbicides were to be used for invasive species management to assist other agencies or landowners, then the injunction generally applies until such time that the material has been reviewed by USEPA and USFWS determines that it does not apply or the following “exceptions for invasive species and noxious weed programs” can be met:

- a. You are applying an herbicide for purposes of controlling state-designated invasive species and noxious weeds under a program administered by a public entity; and
- b. You do not apply the pesticide within 15 feet of aquatic breeding critical habitat or nonbreeding aquatic critical habitat within critical habitat areas, or within 15 feet of aquatic features within noncritical habitat sections subject to the injunction; and
- c. Application is limited to localized spot treatment using handheld devices; and
- d. Precipitation is not occurring or forecast to occur within 24 hours; and
- e. You are a certified applicator or working under the direct supervision of a certified applicator; and
- f. If using 2,4-D or triclopyr, you are using only the amine formulations. (USEPA 2014a)

Although the District is exempt from the use limitations in the stipulated injunctions when applying insecticides and herbicides for the purposes of public health mosquito control, several BMPs incorporated into the District’s IMVMP Plan also aim to protect CRLF and other species of concern and their habitats (see Chapter 2, Table 2-8, Categories E and F). The District’s chemical control and vegetation Management Components as described in the IMVMP Plan are expected to keep District activities within compliance of the stipulated injunctions through self-imposed restrictions except in extreme or unusual circumstances necessitated by public health considerations. These injunctions also affect the cumulative impact discussion.

#### **4.1.3.1.7 Marine Mammal Protection Act**

This law established a national policy to prevent marine mammal species and population stocks from declining beyond the point where they ceased to be significant functioning elements of the ecosystems of which they are a part. The MMPA established a moratorium on the taking of marine mammals in US waters. It defines “take” to mean “to hunt, harass, capture, or kill” any marine mammal or attempt to do so. The Department of Commerce through the National Marine Fisheries Service is charged with protecting whales, dolphins, porpoises, seals, and sea lions. Walrus, manatees, otters, and polar bears are protected by the Department of the Interior through the US Fish and Wildlife Service. The Animal and Plant Health Inspection Service, a part of the Department of Agriculture, is responsible for regulations managing marine mammals in captivity. (NMFS no date)

#### **4.1.3.2 State**

##### **4.1.3.2.1 Porter-Cologne Water Quality Control Act of 1970**

This law provides the California SWRCB and the nine RWQCBs with authority to establish Water Quality Control Plans (Basin Plans) that are reviewed and revised periodically. The SWRCB and the RWQCBs carry out the federal CWA, including the NPDES permitting process for point source discharges (Statewide General NPDES Vector Control Permit [SWRCB 2011a, 2012]) and the CWA Section 303 water quality standards program. The administering agencies are the SWRCB and the RWQCBs.

As discussed in Chapter 9 Water Resources, the District is a member of the Mosquito Vector Control Association of California (MVCAC) NPDES Permit Coalition, which is responsible for coordinating all physical measurements and conducting all chemical monitoring required under the Vector Control Permit. The MVCAC NPDES Permit Coalition annual report now includes all physical monitoring data and makes recommendations for modifications to the MRP, if appropriate. Based on the results of monitoring performed in 2011-2012 by the MVCAC Permit Coalition, the monitoring and reporting program for the Vector Control Permit was amended in March 2014 to limit the required monitoring to visual observations, monitoring and reporting of pesticide application rates, and reporting of noncompliant applications. Further chemical monitoring was determined to not be necessary. This decision was based on the physical and chemical monitoring results contained in the 2012 Annual Report (MVCAC 2013), which indicates that the pesticide active ingredients were rarely present in the waterway. In cases where the material was detected, its presence in the waterway was of extremely short duration after pesticide application.

##### **4.1.3.2.2 California Fish and Wildlife Code Section 1600 et seq.**

This law provides for protection and conservation of fish and wildlife resources with respect to any project that may substantially divert or obstruct the natural flow of, or substantially change or use any material from the bed, channel, or bank of any river, stream, or lake. The administering agency is the CDFW.

##### **4.1.3.2.3 California Endangered Species Act of 1984 (California Fish and Wildlife Code Sections 2050 2098)**

This law provides for the protection and management of species and subspecies listed by the State of California as endangered or threatened, or designated as candidates for such listing. They are listed at 14 California Code of Regulations (CCR) Section 670.5. This law prohibits “take” of state-listed or candidate species, except as otherwise authorized by the Fish and Wildlife Code. The term “take” is defined by Section 86 of the Fish and Wildlife Code as “hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill.” This definition is different in some respects from the definition of “take” under the federal Endangered Species Act. The administering agency is the CDFW.

**4.1.3.2.4 California Fish and Wildlife Code §3503**

This law prohibits take, possession, or needless destruction of any bird egg or nest, except as otherwise provided by the Fish and Wildlife Code or regulation made pursuant thereto. The administering agency is the CDFW.

**4.1.3.2.5 California Fish and Wildlife Code §3503.5**

This law prohibits take, possession, or destruction of any bird of prey (birds in the order of Falconiformes or Strigiformes), except as otherwise provided by the Fish and Wildlife Code or regulation adopted pursuant thereto. The administering agency is the CDFW.

**4.1.3.2.6 California Fish and Wildlife Code §3511, 4700, and 5050**

These laws prohibit take or possession of birds, mammals, and reptiles listed as “fully protected,” except as provided by the Fish and Wildlife Code. The administering agency is the CDFW.

**4.1.3.2.7 California Fish and Wildlife Code §5650**

This law protects water quality from substances or materials deleterious to fish, plant life, or bird life. It prohibits such substances or materials from being placed in waters or places where they can pass into waters of the state, except as authorized pursuant to, and in compliance with, the terms and conditions of permits or authorizations of the SWRCB or a RWQCB such as a waste discharge requirement issued pursuant to California Water Code Section 13263, a waiver issued pursuant to Water Code Section 13269(a), or permit pursuant to Water Code Section 13160. The administering agency for Fish and Wildlife Code Section 5650 is the CDFW.

**4.1.3.2.8 Native Plant Protection Act  
(California Fish and Wildlife Code §1900 et seq.)**

This law provides for the preservation, protection, and enhancement of endangered or rare native plants of the state. The Native Plant Protection Act allows for the designation of endangered and rare native plant species and states that no person shall take any native plant, or any part or product thereof that the commission has determined to be an endangered native plant or rare native plant, except as otherwise provided in the act. The administering agency is the CDFW.

**4.1.3.2.9 Natural Community Conservation Planning Act  
(California Fish and Wildlife Code §2800 to 2835)**

This law provides for the development of Natural Community Conservation Plans (NCCPs) to provide for regional or areawide protection and perpetuation of natural wildlife diversity, while allowing compatible and appropriate development and growth. The administering agency is the CDFW.

**4.1.3.2.10 California Health and Safety Code**

The SMCMVCD operates under the California Health and Safety Code and the California Government Code (reference Division 1, Administration of Public Health, Chapter 2, Powers and Duties; also Part 2, Local Administration, Chapter 8, State Aid for Local Health Administration; Division 3, Pest Abatement, Chapter 5, Mosquito Abatement Districts or Vector Control Districts, Sections 2200 - 2910).

**4.1.3.2.11 California Food and Agricultural Code, Section(s) 12976 and Section(s) 12981**

This code states that no pesticide application should be made or continued when a reasonable possibility exists of damage to nontarget crops, animals, or other public or private property. The administering agency for the above authority is the CDPR.

#### 4.1.3.2.12 California Pesticide Regulatory Program

CDPR regulates the sale and use of pesticides in California. CDPR is responsible for reviewing the toxic effects of pesticide formulations and determining whether a pesticide is suitable for use in California through a registration process. Although CDPR cannot require manufacturers to make changes in labels, it can refuse to register products in California unless manufacturers address unmitigated hazards by amending the pesticide label. Consequently, many pesticide labels that are already approved by the USEPA also contain California-specific requirements. The CDPR is the state agency within California that has the authority to refuse, revoke, or suspend the license of any pesticide that harms or is likely to harm endangered species. CDPR has drafted the California State Plan for Protection of Endangered Species from Pesticide Exposure (CDPR 1995) to protect threatened and endangered species in California from effects of pesticides. Pesticide labels defining the registered applications and uses of a chemical are mandated by USEPA as a condition of registration. The label includes instructions telling users how to make sure the product is applied only to intended target pests, and includes precautions the applicator should take to protect human health and the environment. For example, product labels may contain such measures as restrictions in certain land uses and weather (i.e., wind speed) parameters. Pesticide product labels provide critical information about how to safely and legally handle and use pesticide products. District use of all pesticides shall be in strict accordance with the manufacturer's label instructions and all applicable federal, state, and local laws.

In addition to the label instructions, pesticide risks to endangered species within California are evaluated by an interagency network that includes CDPR, the CDFG Pesticide Investigation Unit, California Department of Food and Agriculture (CDFA), the Pesticide Registration and Evaluation Committee, and the County Agricultural Commissioners as well as the USEPA and USFWS. Under the California State Plan for Protection of Endangered Species from Pesticide Exposure, protection strategies and local plans that resolve pesticide use conflicts are developed using information on pesticide use distribution, endangered species distributions and life history information, and USFWS biological opinions relating to pesticide use effects on endangered species. The State Plan is implemented through the USEPA County Bulletins (Bulletins Live!) that incorporate the local plans as needed. Interim Measures Bulletins for California counties are listed under the Endangered Species Project of the CDPR website (<http://www.cdpr.ca.gov/docs/endspec/index.htm>) and also provide information on pesticide use limitations via the Pesticide Regulation's Endangered Species Custom Realtime Internet Bulletin Engine (PRESCRIBE). The PRESCRIBE database is also accessible through the CDPR's California Pesticide Information Portal (CALPIP) available at <http://calpip.cdpr.ca.gov>. Pesticide use limitations implement limitations specified in USFWS biological opinions, limitations determined by USEPA to preclude a "may affect" determination for pesticide effects on listed species, and limitations developed within local plans as alternatives to USEPA and USFWS use limitations (CDPR 1995).

Pesticide use limitations have been developed by CDPR to protect 57 listed species including 25 threatened or endangered species within the Program Area. Use limitations apply on Township, Range and Section basis and vary with chemical product and active ingredient. For example, limitations may require buffers for chemical application, additional drift precautions be observed, or that use of the chemical be prohibited within occupied habitat of listed species.

#### 4.1.3.3 Local

Local governing bodies may pass ordinances that regulate or restrict pesticide use within their jurisdictional areas. However, these restrictions do not apply to state operations and would not be applicable to treatments proposed by the District under the Program (including those conducted under the authority of the state, specifically CDPH for the District's vector control activities) because California state law preempts local regulation and restriction of pesticide use. See Sections 1.3.3 and 3.1.3.3 for a discussion of this issue. However, a school district board can decree that certain pesticides cannot be used in schools under the Healthy Schools Act. The District works collaboratively with schools and school

district administration to minimize mosquito and vector production and control populations, when necessary. The District will work with the local entities and property owners to protect public health.

San Mateo County comprises 20 cities and unincorporated areas covering 455 square miles of land and 292 square miles of water (US Census 2015). Central San Mateo County includes three reservoirs operated by the San Francisco Public Utilities Commission. San Andreas and Crystal Springs are adjacent to Highway 280 in the east and Pilarcitos is to the northwest. For additional land use information for San Mateo and the adjacent counties in the Program Area, see Section 3.1.2.

Concerning local ordinances and policies to protect biological resources, San Mateo County and its cities and towns (cities of Belmont, Brisbane, Burlingame, Colma, Daly City, East Palo Alto, Foster City, Half Moon Bay, Menlo Park, Pacifica, Redwood City, San Carlos, San Bruno, San Mateo, and South San Francisco, and the towns of Atherton, Hillsborough, Portola Valley, and Woodside) maintain general plans for development and protection of lands within their jurisdictions. The adjacent counties and the incorporated cities therein also maintain general plans. The general plans address the protection and enhancement of natural resources including plant, wildlife, and fish habitat and special-status species with broad goals and more specific policies to implement those goals. The discussions below for San Mateo County's countywide general plan are examples of the local policies affecting biological resources (San Mateo County 1986).

### **San Mateo County General Plan**

The San Mateo County General Plan (1986) is comprised of multiple documents. The Overview provides a discussion of the function and organization of the General Plan, and a description of the physical, political, social, and economic settings of San Mateo County. Background and Issues present factual descriptions of existing conditions and assessments of current and future problems and needs, while the Policies set forth prescribed actions the County will take to achieve the goals and objectives of the General Plan. The maps provide a graphic representation of factual information and County land use policy. The Policy document contains vegetative, water, fish, and wildlife resources policies in Chapter 1. Key policies are presented here relative to the mosquito and vector control activities of the District. The following goals and objectives are taken directly from the 1986 General Plan.

- 1.1 Conserve, Enhance, Protect, Maintain and Manage Vegetative, Water, Fish and Wildlife Resources  
*Promote the conservation, enhancement, protection, maintenance and managed use of the County's Vegetative, Water, Fish and Wildlife Resources.*
- 1.2 Protect Sensitive Habitats  
*Protect sensitive habitats from reduction in size or degradation of the conditions necessary for their maintenance.*
- 1.3 Protection and Productive Use of Economically Valuable Vegetative, Water, Fish and Wildlife Resources  
*Protect the availability and encourage the productive use of the County's economically valuable vegetative, water, fish and wildlife resources in a manner which minimizes adverse environmental impacts.*
- 1.4 Access to Vegetative, Water, Fish and Wildlife Resources  
*Protect and promote existing rights of public access to vegetative, water, fish and wildlife resources for purposes of study and recreation consistent with the need to protect public rights, rights of private property owners and protection and preservation of such resources.*

San Mateo County defines a sensitive habitat as any area where the vegetative, water, fish, and wildlife resources provide especially valuable and rare plant and animal habitats that can be easily disturbed or degraded. These areas include but are not limited to: (1) habitats containing or supporting rare or unique species; (2) riparian corridors; (3) marine and estuarine habitats; (4) wetlands; (5) sand dunes; (6) wildlife refuges, reserves, and scientific study areas; and (7) important nesting, feeding, breeding or spawning areas. It designates as sensitive habitats those areas which meet the definition of sensitive habitats. It recognizes the Sensitive Habitats Map (dated December 1984) or subsequent updates or refinements as indicative of the distribution of sensitive habitats within San Mateo County, based upon the best and most current information available.

General policies include the following:

**1.20 Importance of Sensitive Habitats**

*Consider areas designated as sensitive habitats as a priority resource requiring protection.*

**1.21 Importance of Economically Valuable Vegetative, Water, Fish and Wildlife Resources**

*Consider Vegetative, Water, Fish and Wildlife Resources which are economically valuable as a priority resource to be enhanced, utilized, managed and maintained for the needs of present and future generations.*

Furthermore, the General Plan contains the specific policy 1.38 Control Incompatible Vegetation, Fish and Wildlife: Encourage and support the control of vegetation, fish, and wildlife resources which are harmful to the surrounding environment or pose a threat to public health, safety, and welfare.

The San Mateo County Planning and Building Department regulates tree removal by permit based on Sections 11,000 et seq. and 12,000 et seq. of the San Mateo County Ordinance Code. The County identifies several tree species as potential heritage tree species; and the Significant Tree Ordinance protects any species with a diameter of 38 inches or greater. All tree removals shall comply with the San Mateo County Heritage Tree Ordinance and Significant Tree Ordinance, requiring replacement at a 1:1 ratio of any native trees greater than 38 inches in circumference.

The San Mateo County General Plan does not contain policy specific to mosquito and vector control activities because the District was formed under the Mosquito Abatement Act and has since remained an Independent special district, separate from other county services. However, policies above are considered when implementing the IMVMP Plan, especially the Physical Control and Vegetation Management Components.

**4.1.4 Habitat Conservation Plans and Natural Community Conservation Plans**

HCPs are planning documents required as part of an application by a nonfederal entity for incidental take of a species listed under the federal Endangered Species Act as part of their proposed activities. An HCP describes the proposed action(s), and its anticipated effects on the individuals and populations of listed species. It also will describe how impacts will be minimized and mitigated. An HCP also can include protections for species that are candidates for listing or are proposed for listing. The HCP is reviewed by USFWS or NOAA Fisheries, when reviewing a project. If a project is approved by the USFWS or NOAA Fisheries, they will issue an incidental take permit for the project actions, which provides for take of these species based on the actions provided for in the HCP, as well as additional measures that the USFWS or NOAA Fisheries might include.

The California Natural Community Conservation Planning Act was first passed by the state legislature in 1991, and was updated and superseded in 2003. The primary objective of the NCCP program is to conserve natural communities at the ecosystem level, while accommodating compatible land use. It focuses on the long-term stability of wildlife and habitat and seeks to avoid controversy and delays associated with species listings.

Twelve HCPs and NCCPs are in effect or under development within the Program Area. Table 4-4 was developed through review of information available on the USFWS and CDFW's websites. The District is not signatory to these HCPs or NCCPs but will consult with HCP managers and agency biologists when their activities occur within the boundaries of an existing HCP or NCCP or those that may be developed during the Program lifetime, to ensure that their activities are not inconsistent with the provisions of those plans while protecting public health. Coordination with the District by the HCP/NCCP-implementing agency may be needed to ensure that habitats preserved in the plans do not create vector control problems.

#### **4.1.4.1 Donald Von Raesfeld Power Plant (formerly Pico Power Plant) Low-Effect (LE) HCP**

Donald Von Raesfeld Power Plant (formerly Pico Power Plant) (DVR) LE HCP was prepared for Silicon Valley Power by Tetra Tech FW, Inc., and Creekside Center for Earth Observation (2014) to cover the potential impacts of an increase in nitrogen deposition from this power plant. This HCP addresses potential impacts to Bay checkerspot butterfly, coyote ceanothus, Metcalf Canyon jewelflower, Santa Clara Valley dudleya, and Tiburon paintbrush over 9,926 acres for a 40-year period. DVR construction will not result in direct effects to Bay checkerspot butterfly or serpentine bunchgrass ecosystems, but will have indirect effects through operations and maintenance. Cumulative effects associated with atmospheric nitrogen deposition to Bay checkerspot butterfly are conservatively estimated as the equivalent of 40 acres of serpentine bunchgrass habitat. To reduce potential cumulative effects to Bay checkerspot butterfly and federally -listed serpentine plants from the DVR to less-than-significant levels the DVR LE HCP goals are to acquire, establish, and manage a 40-acre property as a permanent conservation area called the DVR Ecological Preserve for Bay checkerspot butterfly and federally listed serpentine plants.

Mitigation measures to be implemented as part of this HCP include:

- > Acquisition of the DVR Ecological Preserve for the serpentine endemic species.
- > Purchase of Bay Area Air Quality Management District air pollution credits for nitrogen oxides (NO<sub>x</sub>). Prior to the DVR's initial operation of DVR, Silicon Valley Power purchased emission reduction credit certificates in the amount of 43.3 tons of NO<sub>x</sub>. These credits will help offset and reduce the effects of nitrogen deposition on serpentine plant species not found on the 40-acre conservation site.
- > A qualified biologist (USFWS-approved) will conduct the monitoring and management of the DVR Ecological Preserve.

As this HCP is located near Morgan Hill, California, more than 26 miles from the San Mateo County line, it is unlikely that the District's activities would occur within this HCP's boundaries.

**Table 4-4 Habitat Conservation Plans and Natural Community Conservation Plans in the San Mateo County Mosquito and Vector Control District Program Area**

Plan Title	Location	Covered Species Listed and Nonlisted	Date Permit Issued	Size (acres)	Duration
1. Donald Von Raesfeld Power Plant LE (formerly Pico Power Plant)	Santa Clara County	5 species, No nonlisted species Bay checkerspot butterfly, coyote ceanothus, Metcalf Canyon jewelflower, Santa Clara Valley dudleya, and Tiburon paintbrush	09/25/2014	9,926 acres (California) The 2.86-acre power plant site itself is not in an area with habitat. As a result of its emissions, however, a fractional increase in nitrogen deposition could affect up to 9,926 acres of serpentine habitat in Santa Clara County, resulting in the net loss of approximately 40 acres	40 years, Anticipated life of the power plant
2. Los Esteros LE	Santa Clara County	5 species No nonlisted species Bay checkerspot butterfly, coyote ceanothus, Metcalf Canyon jewelflower, Santa Clara Valley dudleya, and Tiburon paintbrush	03/11/2011	9,926 acres (California) The 21-acre power plant itself is not in an area with habitat. As a result of its emissions, however, the increase in nitrogen deposition could indirectly affect the covered species within 9,926 acres of serpentine habitat in Santa Clara County, resulting in the net loss of approximately 40 acres	50 years, Estimated project life of power plant
3. San Bruno Mountain	San Mateo County	4 species No nonlisted species San Bruno elfin butterfly, mission blue butterfly, Callippe silverspot, and San Francisco garter snake	03/04/1983 Renewed 03/2013	3,500 acres	30 years
4. Santa Clara Valley HCP/NCCP	Santa Clara County	9 species 9 Nonlisted species	07/30/2013	508,669 acres	50 years



**Table 4-4 Habitat Conservation Plans and Natural Community Conservation Plans in the San Mateo County Mosquito and Vector Control District Program Area**

Plan Title	Location	Covered Species Listed and Nonlisted	Date Permit Issued	Size (acres)	Duration
5. Santa Cruz Gardens Unit 12	Near Soquel, Santa Cruz County	Ohlone tiger beetle, Santa Cruz tarplant, and Gairdner's yampah	08/26/2009	58.5 acres	10 years
6. Seascape Uplands	Aptos, Santa Cruz County	salamander, Santa Cruz long-toed (Entire), No nonlisted species	08/18/1997	192 acres	30 years
7. Stanford University HCP	City of Palo Alto, Santa Clara County	3 species No nonlisted species California red-legged frog, California tiger salamander, San Francisco garter snake	08/13/2013	8,000 acres 4,300 acres covered under HCP	50 years
8. Tucker	Aptos, Santa Cruz County	2 species No nonlisted species Santa Cruz long-toed salamander and California red-legged frog	03/02/2007	55 acres, including a 38.8-acre preserve	10 years
9. University of California, Santa Cruz – Ranch View Terrace HCP	UC Santa Cruz Campus, Santa Cruz County	2 species No nonlisted species California red-legged frog and Ohlone tiger beetle	10/27/2005	38.8 acres	60 years
10. Wilder Quarry (Granite Rock)	Santa Cruz	California red-legged frog (Entire), No nonlisted species	06/19/1998	125 acres	30 years

**Table 4-4 Habitat Conservation Plans and Natural Community Conservation Plans in the San Mateo County Mosquito and Vector Control District Program Area**

Plan Title	Location	Covered Species Listed and Nonlisted	Date Permit Issued	Size (acres)	Duration
11. Hochler HCP	Scotts Valley, Santa Cruz County	Beetle, Mount Hermon June (Entire), No nonlisted species	Data not available	1.758 acres)	5 years
12. Interim Programmatic HCP for the Zayante Sandhills (Mt. Hermon June Beetle and Ben Lomond Spineflower)	City of Scotts Valley and communities of Ben Lomond, Felton, Mt. Hermon, and Olympia, Santa Cruz County	2 species No nonlisted species Mt. Hermon June beetle and Ben Lomond spineflower	November 2011	139 acres	5 years

Sources:

<sup>1</sup> USFWS ECOS website ([http://ecos.fws.gov/conserv\\_plans/PlanReport?region=8andtype=HCPandtype=2andhcpUser=andview=report](http://ecos.fws.gov/conserv_plans/PlanReport?region=8andtype=HCPandtype=2andhcpUser=andview=report)) accessed September 22, 2015

<sup>2</sup> CDFW NCCP website (<https://www.wildlife.ca.gov/Conservation/Planning>) accessed September 22, 2015 (CDFW 2015b)

<sup>3</sup> Sacramento USFWS Office website ([http://www.fws.gov/sacramento/es/Habitat-Conservation-Plans/es\\_hcp.htm](http://www.fws.gov/sacramento/es/Habitat-Conservation-Plans/es_hcp.htm)) accessed September 22, 2015 (USFWS 2015b)

Note: The District will review these websites periodically to determine if new HCP/NCCPs are being considered for or have been implemented in their area.

LE = low-effect

#### **4.1.4.2 Los Esteros Low-Effect HCP**

This Low-Effect Habitat Conservation Plan for Bay Checkerspot Butterfly and Serpentine Endemic Plant Species in Santa Clara County, California, was prepared for Los Esteros Critical Energy Facility (LECEF), San Jose, California, in February 2010 by CH2MHill. This HCP covers the possible impacts of nitrogen deposition from this power plant, which has the possibility to adversely affect serpentine endemic wildlife and plant species, including Bay checkerspot butterfly, coyote ceanothus, Metcalf Canyon jewelflower, Santa Clara Valley dudleya, and Tiburon paintbrush over 9,926 acres for a 50-year period. Construction and operation will not result in direct impacts to Bay checkerspot butterfly or serpentine bunchgrass ecosystems. However, cumulative impacts associated with atmospheric nitrogen deposition to Bay checkerspot butterfly may represent a possible indirect impact to these resources and have been conservatively estimated as the equivalent of 40 acres of serpentine bunchgrass habitat. A conservation area of this size, designated as the LECEF Ecological Preserve, was created during the previous licensing of the LECEF simple-cycle facility. This HCP has been developed to quantify the maximum potential for nitrogen deposition resulting from the LECEF and to develop appropriate preservation measures to offset possible adverse impacts for 50 years, the facility's estimated useful life. The primary management strategy to meet the HCP's goals and objectives is to use cattle grazing to control annual grassland vigor and expansion so as to maintain habitat for the Bay checkerspot butterfly host and nectar plants. This approach will also favor conservation of federally listed endemic serpentine plants that may be present on the LECEF Ecological Preserve. As this HCP is located near Morgan Hill, California, more than 26 miles from San Mateo County's boundary, it is unlikely that the District's activities would occur within this HCP's boundaries.

#### **4.1.4.3 San Bruno Mountain HCP**

Located within the District's Service Area, this HCP has been created under the direction of the San Bruno Mountain HCP Drafting Committee to address potential impacts caused by a private landowner's desire to develop their land, the spread of brush and exotic species, and sensitive habitat destruction due to trespassing illegal offroad vehicle use. This HCP addresses impacts to three endangered species: San Bruno elfin butterfly, mission blue butterfly, and San Francisco garter snake (SFGS) over 3,500 acres on San Bruno Mountain in San Mateo County for a duration of 30 years. The butterflies are in danger of extinction and to increase their chances of survival, their existing habitat must be preserved and improved. Necessary improvements include increasing the number of butterfly food plants on the mountain and preventing destruction of the habitat by development and unauthorized offroad vehicles.

The San Bruno HCP has since been amended on four occasions (although the number of species listed on the permit has remained constant). The Permittees intend to request that the amended permit include those species covered in the original incidental take permit, as well as the endangered Callippe silverspot (*Speyeria callippe callippe*) butterfly and San Francisco lessingia, the threatened Bay checkerspot butterfly, and the unlisted San Bruno Mountain manzanita. The 30-year permit was renewed in March 2013 for an additional 30 years. While addressed in the San Bruno Activities Report (MIG TRA 2014), Bay checkerspot butterfly has not been seen in 30 years, and SFGS and CRLF have never been seen on San Bruno Mountain as almost no aquatic habitat exists to support these two species. The federal ESA Section 10(a)(1)(B) incidental take permit was expanded in 2013 to include the Callippe silverspot (USFWS 2013).

This HCP is located in San Mateo County on San Bruno Mountain, which has very little aquatic habitat, and it is unlikely that the District's adult mosquito control activities would occur within this HCP's boundaries. However, surveillance for ticks, yellow jackets, wasps, and rodents in adjoining residential neighborhoods may involve accessing portions of the mountain in close proximity to adjacent hiking trails and residences. The District does surveillance for diseases transmitted by rodents and ticks on San Bruno Mountain. San Bruno Mountain is a known historical focus of plague and hantavirus. Surveys for plague have been conducted at this site since the 1940s, and plague continues to be detected there among wild rodents. The District is familiar with the restrictions contained in the San Bruno Mountain HCP and works with the San Mateo County Parks Department staff which administers the HCP, so as to not be in

conflict with the HCP's requirements. The HCP does not cover pesticide use, although it does provide minimization measures for pesticide use.

#### **4.1.4.4 Santa Clara Valley HCP/NCCP**

The Santa Clara Valley HCP/NCCP was prepared for Santa Clara County; Santa Clara Valley Transportation Authority; Santa Clara Valley Water District; and the cities of San Jose, Gilroy, and Morgan Hill by ICF (August 2012) and is a regional partnership between the County of Santa Clara; Santa Clara Valley Transportation Authority; Santa Clara Valley Water District; the cities of San Jose, Gilroy, and Morgan Hill; the CDFW; and the USFWS. This HCP/NCCP will cover approximately 520,000 acres in southern Santa Clara County and will address 18 species, including CTS, CRLF, western pond turtle, western burrowing owl, Bay checkerspot butterfly, and other plant and animal species. This HCP/NCCP identifies a broad range of activities, including urban development, major capital improvements, and instream operations, maintenance, and projects. This HCP/NCCP finds that the Covered Activities will result in the take of the Covered Species and in habitat loss and degradation. However, this HCP/NCCP also includes a conservation strategy that recommends preserving approximately 45,000 acres of habitat within a reserve system. Thus, the Santa Clara Valley HCP/NCCP in conjunction with the Stanford HCP should provide regional protection for the covered species.

The Santa Clara Valley Habitat Agency leads the implementation of the Santa Clara Valley Habitat Plan (Habitat Plan). The Habitat Plan is a 50-year regional plan to protect endangered species and natural resources while allowing for future development in Santa Clara County. In 2013, the Habitat Plan was adopted by all local participating agencies and permits were issued from the USFWS and CDFW. It is both a HCP and NCCP. This Habitat Plan:

- > Helps private and public entities plan and conduct projects and activities in ways that lessen impacts on natural resources, including specific threatened and endangered species.
- > Identifies regional lands—called reserves—to be preserved or restored to benefit those species.
- > Describes how reserves will be managed and monitored to ensure that they benefit those species.

In providing a long-term, coordinated program for habitat restoration and conservation, the Habitat Plan aims to enhance the viability of threatened and endangered species throughout Santa Clara Valley. The Habitat Agency implements the Habitat Plan and reports compliance to the USFWS and CDFW.

As this HCP/NCCP is located adjacent to San Mateo County's border, it is possible that the District's activities could occur within this HCP/NCCP's boundaries. The District would need to coordinate with the Habitat Agency on the Santa Clara Valley HCP/NCCP coverage requirements, its applicability to vector surveillance and control, and potential for conflicts with vector control activities.

#### **4.1.4.5 Santa Cruz Gardens Unit 12 HCP**

This HCP was prepared for Porter-Livingston Development, Inc., and O'Hara-Balfour LP by Richard A. Arnold, PhD Entomological Consulting Services, Ltd and Kathleen Lyons Biotic Resources Group (2008) to cover the potential impacts of development of nine new single-family residences at the undeveloped 58.6-acre project site of Santa Cruz Gardens Unit 12 in Soquel, California. This HCP covers impacts to Ohlone tiger beetle (OTB), Santa Cruz tarplant, and Gairdner's yampah over a 58.5-acre area for a 10-year period.

Minimization measures during construction include construction monitoring, delineation of impact area, contractor and employee environmental orientation, fence installation round the residential site to contain construction operations to the project site and away from the mitigation site, and date restrictions for construction.

Mitigation Measures: The intent of the mitigation program is to establish native plant communities that will be self-perpetuating and support OTB, Santa Cruz tarplant, and Gairdner's yampah. Extensive mitigation measures will occur within the 9.3-acre prairie/grassland management within the 55.64-acre conservation parcel that will include continued monitoring of the covered species and habitat in perpetuity.

As this HCP is located near Soquel, California, more than 22 miles from the San Mateo County line, it is unlikely that the District's activities would occur within this HCP's boundaries. The specific area of concern is the conservation area which could harbor vectors of concern in close proximity to residences.

#### **4.1.4.6 Seascape Uplands HCP**

This HCP was prepared for the Holcomb Corporation by Thomas Reid Associates (1994) to cover potential impacts of the development of a maximum of 107 single-family homes of Seascape Uplands in Aptos, California. This project covers impacts to the Santa Cruz long-toed salamander (SCLTS) over a 192-acre area for a 30-year period. The proposed project guarantees that at least 147 acres of the site containing the most important habitat would be set aside as a salamander preserve and protected and managed in perpetuity. Avoidance and minimization measures (AMMs) include improvement of the existing breeding pond and creation of additional breeding ponds for SCLTS, construction of permanent fences and walls with gaps at ground level to allow movement of SCLTS, guard rails to minimize trespassing, rounded curbs to minimize road barriers to SCLTS, migration tunnels, lighting restrictions, burrowing animal protection since abandoned burrows are important refuges for SCLTS, vegetation enhancement and specific requirements for the use of pesticides and mosquito abatement in breeding ponds, and migration routes as indicated below:

- > Pesticides. Large-scale use of pesticides will be prohibited unless it is essential for public health and then only under the supervision of the preserve manager.
- > Mosquito Abatement. If mosquitoes become a public health problem at the breeding ponds, control measures will be restricted to the use of mosquito-specific bacteria toxins rather than the use of pesticides or introduction of mosquitofish (*Gambusia*). Mosquitofish have been known to eat amphibian larvae.

As this HCP is located near Scotts Valley, more than 25 miles from the San Mateo County line, it is unlikely that the District's activities would occur within this HCP's boundaries.

#### **4.1.4.7 Stanford University HCP**

Stanford University owns 8,180 acres of land in Santa Clara and San Mateo counties. The Stanford University HCP seeks coverage for CRLF, CTS, and SFGS with a 50-year incidental take permit to cover potential impacts to the Covered Species over 4,372 acres within Santa Clara County and the City of Palo Alto (Stanford University 2013). The strategy the HCP employs will begin benefiting the Covered Species as soon as the HCP is approved and will continue to benefit the Covered Species throughout this HCP's 50-year life. This HCP will establish a pay-up-front conservation program that rewards early conservation efforts. Many HCPs, such as one designed for a single development project, authorize incidental take early in the project period while spreading out mitigation throughout the project. In its HCP, Stanford has the opportunity to immediately contribute to the Covered Species through early preservation of existing habitat and creating new habitat. The pay-up-front approach means that early habitat conservation measures will compensate for or exceed any take associated with the HCP and ensure adequate species conservation throughout the life of the incidental take permit.

Covered Activities are those activities for which incidental take is permitted under an incidental take permit. Stanford is an academic institution that engages in a variety of activities, some of which could

present a risk to one or more of the Covered Species. The following categories of activities are addressed by this HCP and will be covered by the resulting incidental take permit:

- > Ongoing University operations, including maintaining, renewing, and necessary development of the campus (e.g., landscape; facility maintenance; civil, energy, and communications infrastructure; fire suppression)
- > Academic activities as mandated by the University's Founding Grant
- > Recreational activities
- > Future development associated with the Santa Clara County 2000 General Use Permit and other development that may occur under future permits from Santa Clara County and the City of Palo Alto.

In addition, the incidental take permit will cover the following activities carried out by Stanford lessees under Certificates of Inclusion:

- > Equestrian facilities
- > Agricultural activities
- > Commercial and institutional activities
- > Operation of civil, energy, and communications infrastructure

This HCP's Biological Goals are:

- > *Biological Goal #1:* Maintain and enhance natural communities so that they benefit the Covered Species.
- > *Biological Goal #2:* Stabilize the local CTS population and increase its chance of long-term persistence at Stanford.
- > *Biological Goal #3:* Maintain ponds to promote CTS reproduction in the foothills.
- > *Biological Goal #4:* Increase the local CRLF population and increase its chance of long-term persistence at Stanford.
- > *Biological Goal #5:* Maintain or improve habitat that could support SFGS and continue to contribute to the body of information about garter snakes at Stanford.

All Stanford lands have been divided into management zones, based on their intrinsic value to the Covered Species. Additionally, the potential habitat areas for the Covered Species have been divided into two geographical areas: the Matadero/Deer Creek Basin and the California Tiger Salamander Basin. Stanford will establish two corresponding Preserved Areas to preserve large areas of biologically sensitive habitat within each of these basins. This HCP also describes the Monitoring and Management Plans that will be implemented for each of the Preserved Areas, as well as minimization measures that will be used to reduce impacts.

To address impacts to Covered Species in riparian zones, Stanford will create the Matadero/Deer Riparian Account, which will be funded at the outset of HCP implementation by recording a permanent conservation easement over large areas CRLF and SFGS habitat. These lands will be managed in accordance with a habitat Monitoring and Management Plan described in more detail in Section 4.3.1.2 of this HCP. Each acre of preserved habitat will constitute 1 credit for mitigation accounting purposes.

To address impacts to CTS and SFGS, Stanford will create a CTS Account. At the outset of HCP implementation, Stanford will establish a large CTS Reserve and will manage it in accordance with a habitat Monitoring and Management Plan, as described in Section 4.3.2.2 of this HCP. Stanford will not earn any mitigation credits for these Reserve lands at the outset of the HCP, but will earn credits later

when it permanently preserves Reserve lands through recordation of conservation easements. In addition, Stanford will manage an area of the central campus for the benefit of CTS and SFGS, as described in Section 4.3.2.4 of this HCP.

As this HCP is located in Santa Clara County and closely adjacent to San Mateo County's border, it is possible that the District's activities could occur within this HCP's boundaries. The District would likely be required to work closely with Stanford University to not adversely affect the Stanford HCP's requirements. The HCP also does not cover pesticide use, although it does provide minimization measures for pesticide use.

#### **4.1.4.8 Tucker Low-Effect HCP**

The Tucker LE HCP was prepared for Douglas Ross by Thomas Reid Associates and Biosearch Associates (2006) to cover the potential impacts of development of a single-family residence, caretaker house, barn, vineyard, winemaking/storage facility, and assorted landscaping and related features on up to 15 acres of the site, and the establishment of a 38.8-acre Conservation Easement. It also addresses the future development of a single-family residence on the 7-acre parcel at the northwest of the property, which would cover 1.5 acres. The HCP covers impacts to SCLTS and CRLF over 55-acre area for a 10-year period.

The Applicants propose to implement the following measures to minimize and mitigate take of the SCLTS and CRLF: Establish (with a conservation easement) and monitor a 38.8-acre preserve for the benefit of the SCLTS and CRLF; hire a USFWS-approved monitor and biologist; implement a construction worker education program; ensure monitoring of all grading, clearing, and other ground-disturbing activities; mark construction area boundaries; construct drift fencing around construction area; control trash accumulation and install covered trash receptacles; install screens on irrigation, electrical, and other equipment to exclude SCLTS; surround the swimming pool with curbs to exclude SCLTS; remove nonnative plants; control bullfrogs; construct signs; use BMPs; and implement other minimization measures. The conservation easement would be held by the Center for Natural Lands Management, a nonprofit conservation organization located in Fallbrook, California.

As this HCP is located in Aptos, Santa Cruz County, more than 25 miles from San Mateo County's boundary, it is unlikely that the District's activities would occur within this HCP's boundaries.

#### **4.1.4.9 University of California, Santa Cruz – Ranch View Terrace HCP**

This HCP was prepared for University of California, Santa Cruz Physical Planning and Construction Campus Planning Office by Jones and Stokes (2005) to address the effects of the construction, occupation, and operation of the Ranch View Terrace 13-acre faculty housing development (24 units) and a 0.2-acre equipment storage site and building to support the Emergency Response Center. The HCP addresses impacts to CRLF and OTB over a 38.8-acre area for a 60-year period. AMMs include USFWS-approved biological monitoring for CRLF and OTB, worker education program for CRLF and OTB, Environmental Sensitive Area fencing installation, use restrictions, and ongoing compliance monitoring. The primary conservation measure intended to mitigate unavoidable permanent project impacts on CRLF will be the preservation of 13 acres of grassland and forest habitat on UC land adjacent to Wilder Creek. Conservation measures for OTB involve avoidance and impact minimization, and habitat preservation, enhancement, and management of upland grassland habitat on and off site. The UC Regents will manage 5.7 acres of upland grassland habitat within an Ohlone Tiger Beetle Management Area.

As this HCP is located in Santa Cruz, more than 15 miles from the San Mateo County line, it is unlikely that the District's activities would occur within this HCP's boundaries of this HCP.

#### **4.1.4.10 Wilder Quarry (Granite Rock) HCP**

This HCP was prepared to address the effects of Wilder Quarry (Granite Rock) sand quarry operations in Santa Cruz, CA on CRLF (Santa Cruz County 2005). This HCP provides measures to minimize and mitigate the adverse effects of the project relating to 125 acres of permanent impacts associated with sand quarry operations over 30 years. Minimization measures include biological monitoring for CRLF, worker education program for CRLF, prohibition of chemical weed control use in aquatic habitats, water quality monitoring requirements and ESA fencing installation. Project impacts could be offset through the purchase of habitat credits in a USFWS-approved mitigation bank for CRLF.

As this HCP is located near Santa Cruz, more than 18 miles from the San Mateo County line, it is unlikely that the District's activities would occur within this HCP's boundaries.

#### **4.1.4.11 Hochler HCP**

This proposed LE HCP was developed for Mr. Rick Hochler, Hochler Construction, by Entomological Consulting Services, Ltd., to cover the potential impacts for the proposed construction of six new, single-family residences at two properties located one block apart in the Whispering Pines residential neighborhood of Santa Cruz County near Scotts Valley, California. This HCP addresses impacts to Mount Hermon June beetle (MHJB) over a 1.78-acre area for a 5-year period. Minimization and mitigation measures will be implemented to minimize potential take of MHJB and include biological monitoring, environmental orientation presentation on the MHJB biology for all contractors and employees, temporary fencing to delineate sensitive habitat areas, and purchase of mitigation credits at MHJB conservation credits from the Ben Lomond Sandhills Preserve of the Zayante Sandhills Conservation Bank, a USFWS-approved MHJB conservation bank.

As this HCP is located near Scotts Valley, more than 20 miles from the San Mateo County line, it is unlikely that the District's activities would occur within this HCP's boundaries.

#### **4.1.4.12 The Interim Programmatic HCP**

This HCP for small development projects in dense residential areas of Santa Cruz County, California, was prepared to cover the potential impacts of small construction projects (single-family dwellings, add-on garages, or other small projects) to the federally endangered Mount Hermon June beetle and Ben Lomond spineflower over a 139-acre area for a 5-year period from the incidental take permit issuance of November 1, 2011.

Protective measures in this HCP include minimizing construction-related ground disturbance from May 15 to August 15, which is the growing season of the Ben Lomond spineflower and the time period when adult Mount Hermon June beetles are in flight, minimizing exterior night lighting during that same period, avoiding impacts to native Sandhills plants, and minimizing landscaping that degrades habitat. For mitigation, landowners may also purchase conservation credits at approved conservation banks such as the Zayante Sandhills Conservation Bank.

As this HCP is located near Scotts Valley, more than 20 miles from the San Mateo County line, it is unlikely that the District's activities would occur within this HCP's boundaries.

## **4.2 Environmental Impacts and Mitigation Measures**

This section presents the environmental issues and concerns associated with the Program components and presents significance criteria used to evaluate the potential impacts of the Program components under CEQA. The significance criteria establish thresholds for determining whether an impact rises to a level that is biologically significant. The environmental issues describe the mechanisms by which such impacts might occur.



#### 4.2.1 **Evaluation Concerns and Criteria**

The Program components are implemented as part of an IMVMP Plan as described in Section 2.3. The IMVMP Plan uses surveillance and alternative nonchemical and chemical treatments in sequential manner to minimize potential environmental impacts; evaluating each treatment site and situation and implementing the least harmful technique that is applicable for that situation. Treatments with higher potential risk to the environment are only implemented when treatments with lower potential risk are ineffective or cannot be applied to that site. This approach minimizes the overall Program risk to the environment, but environmental concerns relating to different components remain.

##### 4.2.1.1 ***Environmental Concerns***

Some Program components have the potential to affect aquatic resources directly by affecting physical habitat and through direct toxicity to nontarget organisms. The Program components may also affect aquatic resources indirectly through effects on nontarget organisms that may affect food webs, making food less available.

Direct impacts would include habitat modifications, such as draining or changing the hydrology of waterways through removal of or placement of sediment and fill, removal of debris and weeds, and trimming or removal of emergent and riparian vegetation. The District may also request or require other landowners to perform similar activities. These activities may be undertaken in a variety of aquatic or wetland habitats including creeks and rivers, riparian corridors, ponds and lakes, freshwater marsh and seeps, seasonal wetlands, lagoons, tidal marsh and channels, as well as wastewater treatment and septic systems, temporary standing waters, and artificial ponds.

Introduction of mosquito predators, specifically mosquitofish, into natural, and some artificial, environments could adversely affect nontarget organisms including insects, amphibians, and fish. These organisms may prey upon these nontarget species directly or may compete with them for food resources.

Chemical control alternatives, including larvicides, adulticides, herbicides (under the Vegetation Management Component), and the biological agents Bs, Bti, and *Saccopolyspora spinosa* have the potential to affect nontarget organisms, either through direct toxicity or through effects on nontarget organisms, which could affect the food web. Similar types of effects could occur through the use of surfactants and adjuvants. The Program's potential to affect ecological health through impacts to nontarget ecological receptors is evaluated separately in Section 6.2 with an emphasis there on chemicals used or proposed for future use as part of the District's IMVMP Plan. Material herein is summarized from the more detailed discussion in Section 6.2.

Concerns identified during public scoping and from other activities include the following which are addressed as elements of the broader issues explained above:

- > Employ techniques associated with the physical control of vectors and their habitat that conform to Habitat Conservation Plan (HCP) avoidance, minimization, and mitigation measures.
- > Ensure mosquito abatement staff minimize impact to tidal marsh habitats (especially during breeding season). Restrict operation of vehicles to levees and existing roads.
- > Consider direct/indirect effects of using mosquitofish as control. Do not stock mosquitofish (*Gambusia affinis*) in ponds, creeks, or reservoirs. As the mosquitofish used (*Gambusia affinis*) are nonnative predatory fish, describe how their impact on native fish populations is considered.
- > The PEIR should include a detailed description and complete assessment of surveillance impacts (current and future, direct and indirect) on habitats (including endangered, threatened, and locally unique species and sensitive habitats) and on species (special-status fish, wildlife, or plants).

- > The PEIR should include a detailed description and complete assessment of the biological control impacts (current and future, direct and indirect) on habitats (including endangered, threatened, and locally unique species and sensitive habitats) and on species (special-status fish, wildlife, or plants).
- > The PEIR should include a detailed description and complete assessment of the chemical control impacts (current and future, direct and indirect) on habitats (including endangered, threatened, and locally unique species and sensitive habitats) and on species (special-status fish, wildlife, or plants).

#### **4.2.1.2 Significance Criteria**

Significance criteria were developed based on applicable regulations and management policies, a review of the available information, and the professional judgment of the authors.

The CEQA Guidelines include several criteria for determining whether there is a potentially significant impact to biological resources in the CEQA Appendix G, Environmental Checklist Form, Section IV. Those that could apply to the Proposed Program as thresholds of significance for biological resources have been used in the following evaluation with the analysis organized according to these criteria as environmental topics. Impacts were considered potentially significant if they would:

- a. Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the CDFW or USFWS.
- b. Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by the CDFW or USFWS.
- c. Have a substantial adverse effect on federally protected wetlands as defined by CWA Section 404, (including, but not limited to, marsh, vernal pool, coastal) through direct removal, filling, hydrological interruption, or other means.
- d. Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors or impede the use of native wildlife nursery sites.
- e. Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.
- f. Conflict with the provisions of an adopted HCP, NCPP, or other approved local, regional, or state habitat conservation plan.

The specific criteria below are for determining that an effect is considered significant to nontarget species within an appropriate time-frame, the likely exposure, and ecological context (Coastal Conservancy and USFWS 2003). If the effects caused relatively high magnitude, persistent, or permanent changes compared with an environmental baseline (which here means rooted in the existing condition) as assessed by the best professional judgment of the PEIR author, then the effect would be considered “substantial” and the impact of the given program component could be considered significant. These determinations are best when based on risk assessment studies addressing a variety of habitats; but in lieu of a risk assessment, prior understanding of similar adverse effects/impacts by a technical expert can be utilized.

- > Substantially reduce the population size, distribution, viability, or recovery potential of a rare, threatened, or endangered species, or species of concern;
- > Result in changes in the population size, distribution, viability, or resilience of a native fish, wildlife, or plant species;

- > Result in changes in the range, patterns, or fluctuation (dynamics) of physical or chemical attributes of physical estuarine habitats (tidal waters or substrates) or other aquatic habitats; and
- > Result in changes in stability or structure of estuarine or other aquatic habitats.

The thresholds for each chemical are based on the estimated exposures and documented toxicity contrasted in a simple risk paradigm where practical and estimates of likelihood of impact where a complete risk assessment is not practical. The USEPA and state thresholds for effects are the basis for the information in Appendix B, Table 6.3.

For determination of a significant impact for this PEIR, the baseline is the existing San Mateo County and neighboring counties' aquatic ecosystem (approximately in place from 2012 to 2018 or as described in recent source material cited). The existing conditions of an ecosystem are not static but involve dynamic changes in the status and trends that are reasonably foreseeable over an ecologically meaningful timeframe. For the purposes of aquatic systems, this may range from a 1- to 2-year "short-term" timeframe to a 50-year "long-term" timeframe. An adverse effect or impact would be considered significant or substantial if it caused relatively high magnitude, persistent, or permanent changes in the above listed factors, compared with a dynamic environmental baseline established in existing conditions.

## **4.2.2 Evaluation Methods and Assumptions**

### **4.2.2.1 Evaluation Methods**

Impacts are evaluated with regard to desired aquatic species (e.g., native and listed species), macroinvertebrate communities, and effects on food supply for aquatic species, using the criteria described above. Potential impacts were assessed using available information on the types of control and treatment and the toxicity of the various chemicals used, the treatment descriptions, and assuming that all applicable BMPs as described in Chapter 2, Program Description, CDPH's Best Management Practices for Mosquito Control in California, the Statewide General NPDES Vector Control Permit (SWRCB 2011a and 2012) described in Section 2.6.1.2, and District-specific BMPs in Table 2-8 are implemented. This assessment also considers the physical and biological connections between treatment areas and aquatic ecosystems. This information was evaluated in the context of the treatment and control activities and the existing environment under baseline conditions in the Program Area as described in Section 4.1.1.

The detailed BMPs listed in Table 2-8 and repeated herein by habitat type in Table 4-5 can be summarized and placed into several categories. These categories include:

1. Agency communication includes periodic discussion with resource agencies, refuge managers, and other land managers on topics such as planning, specific site issues, special-status species occurrence, opportunities for source reduction, observations made by District staff (e.g., wildlife, trespass/unauthorized equipment use), and about activities to be implemented. This category will include obtaining any required permits and reporting regarding existing permits, periodic check-in calls, and communication as needed, when unanticipated circumstances arise.
2. Environmental training includes environmental awareness training provided to all field staff regarding environmental resource issues, recognition, and documentation of sensitive environmental resources in the field, and BMPs to avoid or minimize impacts to those resources. This category includes both general training, training to avoid or eliminate the spread of weeds, and special-status species or habitat specific training provided to District staff by USFWS, CDFW, or other appropriately trained individuals approved by these agencies.
3. Pretreatment screening involves a pretreatment, in-office assessment of treatment locations for environmentally sensitive resources to determine appropriate treatment, access routes, and other BMPs to be applied for that location. This category may include a pretreatment site visit to confirm information used in the screening.

4. Disturbance minimization includes:
  - a. avoiding environmentally sensitive areas as much as practical
  - b. using existing access routes where ever possible, whether on foot or in a vehicle
  - c. minimizing use of offroad vehicles as much as possible, and driving slowly when they are used
  - d. being observant and working carefully to avoid or minimize disturbance
  - e. using hand tools rather than mechanized tools as much as practical for all vegetation clearing (including clearing of access ways) or physical control treatments
5. Habitat or species-specific BMPs include BMPs targeted to a specific habitat type or species (e.g., tidal marshes or salt marsh harvest mouse). These BMPs include measures specific to those habitat types or species including diurnal or seasonal limitations on specific project activities, specific controls on the types of activities or how they are carried out, Specific measures are those documented in Table 4-5.
6. Component-specific BMPs relate specifically to the implementation of a particular treatment (Physical Control, Vegetation Management, Chemical Control). They may overlap many of the BMPs described above, but also include component-specific measures to protect environmental resources, based on the type of activity to be conducted (e.g., protection of soil surface, minimization of turbidity under the Physical Control Component or adherence to label directions, treating only during periods with acceptable weather conditions, and employing appropriate buffers for Chemical Control).

These categories are not inclusive of all the BMPs in Chapter 2 or Table 2-8, nor are they intended to replace those more specific BMPs. These categories are provided to facilitate the discussion of the impact evaluation through the end of this chapter. Table 4-5 lists all of the BMPs for Program implementation by Program component and habitat types that are relevant to biological resources and determinations of impact significance.

**Table 4-5 San Mateo County Mosquito and Vector Control District BMPs by Technical Component**

Best Management Practice (BMP)	Component						Upland Habitats							Aquatic and Wetland Habitats								
	Surveillance	Physical Control	Vegetation Management	Bio Control	Chemical Control	Other Nonchemical / Trapping	Coniferous Forest	Deciduous Forest	Shrublands	Grasslands	Serpentine	Coastal Dunes	Treeholes	Creeks and Rivers	Riparian Corridor	Ponds and Lakes (includes stock and golf ponds that have natural bottoms)	Freshwater Marsh/Seeps	Seasonal Wetlands (includes Vernal Pools)	Lagoon	Tidal Marsh and channels	Water and Wastewater Management Facilities	Artificial Containers, Temporary Standing Waters, and Ornamental Ponds
<b>A. General BMPs</b>																						
1. District staff has had long standing and continues to have cooperative, collaborative relationships with federal, state, and local agencies. The District regularly communicates with agencies regarding the District's operations and/or the necessity and opportunity for increased access for surveillance, source reduction, habitat enhancement, and the presence of special-status species and wildlife. The District often participates in and contributes to interagency projects. The District will continue to foster these relationships, communication, and collaboration.	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
2. In particular, District staff will regularly communicate with resource agency staff regarding vector management operations, habitat, and flora and fauna in sensitive habitats. Such communications will include wildlife studies and occurrences of sensitive species in areas that may be subject to vector management activities.	X	X	X	*	X	X	X	X	X	X	X	X	X	X	X	X			X	X	X	X
3. When walking or using small equipment in marshes, riparian corridors, or other sensitive habitats, existing trails, levees and access roads will be used whenever feasible to minimize or avoid impacts to species of concern and sensitive habitats. Specific care will be taken when walking and performing surveillance in the vicinity of natural and man-made ditches or sloughs or in the vicinity of tidal marsh habitat.	X	X	X	*	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
4. District staff has received training from USFWS and CDFW biologists regarding endangered species, endangered species habitat, and wildlife/wildlife habitat recognition and avoidance measures. District supervisory staff frequently engages staff on these subjects. For example, District staff has become familiar with Ridgway's rail (RIRA) call recordings to invoke avoidance measures if these calls are heard in the field. District staff is trained to be observant, proceed carefully, and practice avoidance measures if needed when accessing areas that may serve as bird nesting habitat (e.g., watch for flushing birds that may indicate a nest is nearby). Emphasis will be placed on species and habitats of concern where vector management activities might occur (e.g., SMHM, RIRA, special-status plants, vernal pools, tidal marsh, etc.). These training sessions will be included as a part of the required safety training records that are kept by vector control agencies.	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

(\* ) Means not available at this time. Should a viable biocontrol agent become available, evaluation of BMP measures would occur and be implemented.

Best Management Practice (BMP)	Component						Upland Habitats							Aquatic and Wetland Habitats									
	Surveillance	Physical Control	Vegetation Management	Bio Control	Chemical Control	Other Nonchemical / Trapping	Coniferous Forest	Deciduous Forest	Shrublands	Grasslands	Serpentine	Coastal Dunes	Treeholes	Creeks and Rivers	Riparian Corridor	Ponds and Lakes (includes stock and golf ponds that have natural bottoms)	Freshwater Marsh/Seeps	Seasonal Wetlands (includes Vernal Pools)	Lagoon	Tidal Marsh and channels	Water and Wastewater Management Facilities	Artificial Containers, Temporary Standing Waters, and Ornamental Ponds	
5. Conduct worker environmental awareness training for all treatment field crews and contractors for special-status species and sensitive natural communities that a qualified person (e.g., District biologist) determines to have the potential to occur on the treatment site. Conduct the education training prior to starting work at the treatment site and upon the arrival of any new worker onto sites with the potential for special-status species or sensitive natural communities.	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
6. District staff will work with care and caution to minimize potential disturbance to wildlife while performing surveillance and vector treatment/population management activities (see 1 through 5 above).	X	X	X	*	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
7. Identify probable (based on historical experience) treatment sites that may contain habitat for special-status species every year prior to work to determine the potential presence of special-status flora and fauna using the CNDDDB, relevant Habitat Conservation Plans (HCPs), NOAA Fisheries and USFWS websites, Calfish.org, and other biological information developed for other permits. Establish a predetermined buffer of reasonable distance, when feasible, from known special-status species locations and do not allow application of pesticides/herbicides within this buffer without further agency consultations. Nonchemical methods are acceptable within the buffer zone when designed to avoid damage to any identified and documented rare flora and fauna.	X	X	X	*	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
8. Vehicles driving on levees to travel through tidal marsh or to access sloughs or channels for surveillance or treatment activities will travel at speeds no greater than 10 miles per hour to minimize noise and dust disturbance.	X	X	X		X	X														X			
9. District staff will implement site access selection guidelines to minimize equipment use in sensitive habitats including active nesting areas and to use the proper vehicles for on-road and offroad conditions.	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
10. Properly train all staff, contractors, and volunteer help to prevent spreading weeds and invasive animal species (e.g., New Zealand mud snails) or pathogens (e.g., the fungus that causes chytridiomycosis in amphibians) to other sites. The District headquarters contains wash rack facilities (including high-pressure washers) to regularly (in many cases daily) and thoroughly clean equipment to prevent the spread of weeds. Decontamination methods to clean equipment and personnel clothes, such as boots, of invasive species and pathogens will be included in worker training and be implemented when working in wetlands in different watersheds.	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			

(\*) Means not available at this time. Should a viable biocontrol agent become available, evaluation of BMP measures would occur and be implemented.

Best Management Practice (BMP)	Component						Upland Habitats							Aquatic and Wetland Habitats									
	Surveillance	Physical Control	Vegetation Management	Bio Control	Chemical Control	Other Nonchemical / Trapping	Coniferous Forest	Deciduous Forest	Shrublands	Grasslands	Serpentine	Coastal Dunes	Treeholes	Creeks and Rivers	Riparian Corridor	Ponds and Lakes (includes stock and golf ponds that have natural bottoms)	Freshwater Marsh/Seeps	Seasonal Wetlands (includes Vernal Pools)	Lagoon	Tidal Marsh and channels	Water and Wastewater Management Facilities	Artificial Containers, Temporary Standing Waters, and Ornamental Ponds	
11. Operation of noise-generating equipment (e.g., chainsaws, wood chippers, brush-cutters, pickup trucks) will abide by the time-of-day restrictions established by the applicable local jurisdiction (i.e., City and/or County) if such noise activities would be audible to receptors (e.g., residential land uses, schools, hospitals, places of worship) located in the applicable local jurisdiction. Shut down all motorized equipment when not in use.	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
12. For operations that generate noise expected to be of concern to the public, the following measures will be implemented: <ul style="list-style-type: none"> <li>- <u>Measure 1: Provide Advance Notices.</u> A variety of measures are implemented depending on the nature and magnitude of the activities, including press releases, social media, District website, hand-delivered flyers, posted signs, and/or emails. Public agencies and elected officials also may be notified of the nature and duration of the activities, including the local Board of Supervisors or City Council, environmental health and agricultural agencies, emergency service providers, and airports.</li> <li>- <u>Measure 2: Provide Mechanism to Address Complaints.</u> The District staff is available during regular business hours to respond to service calls and may staff phone lines to address concerns during nighttime operations.</li> </ul>	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
13. The District will perform public education and outreach activities.	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
14. Engine idling times will be minimized either by shutting equipment and vehicles off when not in use or reducing the maximum idling time to 5 minutes. Clear signage will be provided for workers at all access points. Correct tire inflation will be maintained in accordance with manufacturer's specifications on wheeled equipment and vehicles to prevent excessive rolling resistance. All equipment and vehicles will be maintained and properly tuned in accordance with manufacturer's specifications. All equipment will be checked by a certified visible emissions evaluator if visible emissions are apparent to onsite staff.	X	X	X	X	X	X																	

(\*) Means not available at this time. Should a viable biocontrol agent become available, evaluation of BMP measures would occur and be implemented.

Best Management Practice (BMP)	Component						Upland Habitats							Aquatic and Wetland Habitats								
	Surveillance	Physical Control	Vegetation Management	Bio Control	Chemical Control	Other Nonchemical / Trapping	Coniferous Forest	Deciduous Forest	Shrublands	Grasslands	Serpentine	Coastal Dunes	Treeholes	Creeks and Rivers	Riparian Corridor	Ponds and Lakes (includes stock and golf ponds that have natural bottoms)	Freshwater Marsh/Seeps	Seasonal Wetlands (includes Vernal Pools)	Lagoon	Tidal Marsh and channels	Water and Wastewater Management Facilities	Artificial Containers, Temporary Standing Waters, and Ornamental Ponds
<b>B. Tidal Marsh-Specific BMPs</b>																						
1. District staff will continue to implement the measures in the USFWS's "Walking in the Marsh: Methods to Increase Safety and Reduce Impacts to Wildlife/Plants." District staff will receive annual training and review of this document to remain up to date and current on this document and its methodologies for protecting sensitive species and the marsh habitat.	X	X	X	*	X														X	X		
2. District will minimize the use of equipment (e.g., ARGOS) in tidal marshes and wetlands. When feasible and appropriate, surveillance and control work will be performed on-foot with handheld equipment. Aerial treatment (helicopter and fixed-wing) treatments will be utilized when feasible and appropriate to minimize the disturbance of the marsh during pesticide applications. When ATVs (e.g., ARGOS) are utilized techniques will be employed that limit impacts to the marsh, including slow speeds; slow, several point turns; using existing levees or upland to travel through sites when feasible; use existing pathways or limit the number of travel pathways used.	X	X	X	*	X	X													X	X		
3. District will minimize travel along tidal channels and sloughs in order to reduce impacts to vegetation used as habitat (e.g., RIRA nesting and escape habitat).	X	X	X		X														X	X		
4. District staff will minimize the potential for the introduction and spread of Spartina, perennial pepperweed and other invasive plant species by cleaning all equipment, vehicles, personal gear, clothing, and boots of soil, seeds, and plant material prior to entering the marsh, and avoiding walking and driving through patches of perennial pepperweed to the maximum extent feasible.	X	X	X	*	X	X								X <sup>1</sup>		X <sup>1</sup>	X <sup>1</sup>	X <sup>1</sup>	X	X		
5. When feasible, boats will be used to access marsh areas for surveillance and treatment of vectors to further reduce the risk of potential impacts that may occur when using ATVs to conduct vector management activities.	X	X	X	*	X														X	X		

(\*) Means not available at this time. Should a viable biocontrol agent become available, evaluation of BMP measures would occur and be implemented.



Best Management Practice (BMP)	Component						Upland Habitats							Aquatic and Wetland Habitats								
	Surveillance	Physical Control	Vegetation Management	Bio Control	Chemical Control	Other Nonchemical / Trapping	Coniferous Forest	Deciduous Forest	Shrublands	Grasslands	Serpentine	Coastal Dunes	Treeholes	Creeks and Rivers	Riparian Corridor	Ponds and Lakes (includes stock and golf ponds that have natural bottoms)	Freshwater Marsh/Seeps	Seasonal Wetlands (includes Vernal Pools)	Lagoon	Tidal Marsh and channels	Water and Wastewater Management Facilities	Artificial Containers, Temporary Standing Waters, and Ornamental Ponds
6. The District currently references and provides staff training relevant to the USFWS "Walking in the Marsh: Methods to Increase Safety and Reduce Impacts to Wildlife/Plants" guidelines (USFWS undated). <ul style="list-style-type: none"> <li>- District staff is trained to walk carefully in the marsh and to continuously look ahead of themselves to avoid potential wildlife disturbance (e.g., carefully make observations in their surroundings to detect flushing birds and nests). Specific care is taken when walking and performing surveillance in the vicinity of natural and man-made ditches or sloughs or in vicinity of cord grass habitat (e.g., rack line).</li> <li>- When walking in marshes District staff utilizes existing trails when feasible (i.e., deer trails and other preexisting trails).</li> </ul>	X	X	X	X	X	X	X <sup>2</sup>	X <sup>2</sup>	X <sup>2</sup>	X <sup>2</sup>	X <sup>2</sup>	X <sup>2</sup>		X <sup>2</sup>			X <sup>2</sup>	X <sup>2</sup>	X	X		
<b>C. Salt Marsh Harvest Mouse (SMHM)</b>																						
1. Activities (surveillance, treatment, source reduction) within or adjacent to harvest mouse habitat will not occur within two hours before or after extreme high tides of 6.5 feet National Geodetic Vertical Datum (NGVD) or above as measured at the Golden Gate Bridge (corrected for time and tide height for the site) or when the marsh plain is completely inundated because suitable upland refugia cover is limited and potentially disturbance-creating activities could prevent mice from reaching available cover.	X	X	X	*	X	X														X	X	
2. Vegetation removal is limited to the minimum amount necessary to allow for surveillance, treatment, and vector habitat reduction (vegetation management) to minimize or avoid loss of SMHM. Similarly, excavation, fill, or construction activities will also be limited to the minimum amount necessary to minimize/avoid loss of SMHM.	X	X	X		X															X	X	
3. Vegetation clearing will be conducted systematically within the project area to ensure that SMHM are encouraged to move toward remaining vegetation and are not trapped in islands of vegetation subject to removal and far from suitable cover.		X	X																	X	X	
4. Each day, 30 minutes before commencement of vector habitat management (physical control, vegetation management), observations will be conducted for the presence of SMHM in the work area by staff trained by USFWS personnel in the safe and effective methods for observing SMHM.		X	X	*	X															X	X	

(\* ) Means not available at this time. Should a viable biocontrol agent become available, evaluation of BMP measures would occur and be implemented.

Best Management Practice (BMP)	Component						Upland Habitats							Aquatic and Wetland Habitats								
	Surveillance	Physical Control	Vegetation Management	Bio Control	Chemical Control	Other Nonchemical / Trapping	Coniferous Forest	Deciduous Forest	Shrublands	Grasslands	Serpentine	Coastal Dunes	Treeholes	Creeks and Rivers	Riparian Corridor	Ponds and Lakes (includes stock and golf ponds that have natural bottoms)	Freshwater Marsh/Seeps	Seasonal Wetlands (includes Vernal Pools)	Lagoon	Tidal Marsh and channels	Water and Wastewater Management Facilities	Artificial Containers, Temporary Standing Waters, and Ornamental Ponds
5. To the extent feasible, physical control, vegetation management and other vector habitat reduction activities will be conducted between December 1 and February 28 (outside of the SMHM breeding season). Surveillance, chemical control, biological control, and public education activities occur year-round and are, therefore, carefully coordinated with resource agencies to minimize potential impacts to SMHMs and their habitats.		X	X		X														X	X		
6. When walking in the marsh, existing trails will be used whenever feasible. Specific care will be taken when walking and performing surveillance in the vicinity of natural and man-made ditches or sloughs or in the vicinity of tidal marsh habitat to avoid potential disturbance of SMHM.	X	X	X	*	X	X													X	X		
7. District staff will receive training on measures to avoid impacts to SMHM.	X	X	X	*	X	X													X	X		
8. If SMHM nests or adults are encountered during vector management activities, avoidance measures will be immediately implemented and findings will be reported to the appropriate resource agency.	X	X	X	*	X	X													X	X		
<b>D. Ridgway's Rail (formerly California Clapper Rail) (RIRA)</b>																						
1. Activities (surveillance, treatment, source reduction) within or adjacent to RIRA habitat will not occur within two hours before or after extreme high tides of 6.5 feet National Geodetic Vertical Datum (NGVD) or above as measured at the Golden Gate Bridge (corrected for time and tide height for the site) or when the marsh plain is completely inundated because suitable upland refugia cover is limited and potentially disturbance-creating activities could prevent RIRA from reaching available cover.	X	X	X	*	X	X													X	X		
2. Vegetation removal is limited to the minimum amount necessary to allow for surveillance, treatment, and vector habitat reduction (vegetation management) to minimize or avoid loss of RIRA. Similarly, excavation, fill, or construction activities will also be limited to the minimum amount necessary to minimize/avoid loss of RIRA.	X	X	X		X														X	X		
3. To the extent feasible, physical control, vegetation management and other vector habitat reduction activities will be conducted between September 1 and January 31 (outside of the RIRA breeding season). Surveillance, chemical control, biological control, and public education activities occur year-round and are, therefore, carefully coordinated with resource agencies to minimize potential impacts to RIRAs and their habitats.		X	X		X														X	X		

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Best Management Practice (BMP)	Component						Upland Habitats							Aquatic and Wetland Habitats								
	Surveillance	Physical Control	Vegetation Management	Bio Control	Chemical Control	Other Nonchemical / Trapping	Coniferous Forest	Deciduous Forest	Shrublands	Grasslands	Serpentine	Coastal Dunes	Treeholes	Creeks and Rivers	Riparian Corridor	Ponds and Lakes (includes stock and golf ponds that have natural bottoms)	Freshwater Marsh/Seeps	Seasonal Wetlands (includes Vernal Pools)	Lagoon	Tidal Marsh and channels	Water and Wastewater Management Facilities	Artificial Containers, Temporary Standing Waters, and Ornamental Ponds
4. District staff will notify the appropriate resource agency prior to entering potential RIRA habitats and will regularly coordinate with the resource agency(ies) on the locations of breeding RIRAs and avoid breeding RIRAs to the extent feasible. Any observations of adverse effects to RIRAs will be reported by District staff.	X	X	X	X	X														X	X		
5. When walking in the marsh District staff will use existing trails whenever feasible. Specific care will be taken when walking and performing surveillance in the vicinity of natural and man-made ditches or sloughs or in the vicinity of tidal marsh habitat to avoid potential disturbance of RIRAs.	X	X	X	*	X	X													X	X		
6. Entry into suitable breeding habitat for RIRAs will be minimized. When entry is required, the preferred method will be by foot. Other entry methods will be based on consultation with the appropriate resource agency.	X	X	X	*	X	X													X	X		
7. District staff will receive training on measures to avoid impacts to RIRAs	X	X	X	*	X	X													X	X		
8. If RIRA nests or adults are encountered during vector management activities, avoidance measures, as provided during training from the resource agencies, will be immediately implemented and findings will be reported to the appropriate resource agency.	X	X	X	*	X	X													X	X		
<b>E. California Red-Legged Frog (CRLF), Western Snowy Plover, California Tiger Salamander (CTS), San Francisco Garter Snake (SFGS) and Steelhead – Central California Coast</b>																						
1. District staff receive training on the identification, biology and preferred habitat of California red-legged frog, western snowy plover, California tiger salamander, San Francisco garter snake and steelhead - central California coast prior to accessing potential habitat for these species along with avoidance measures.	X	X	X	*	X	X								X	X	X	X	X				X
2. If suitable habitat is found in or adjacent to the nearby waterways for the California red-legged frog, California tiger salamander, western snowy plover, San Francisco garter snake, and steelhead - central California coast, the District shall conduct training prior to entering these areas and periodically throughout the season.	X	X	X	*	X	X								X	X	X	X	X				X

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Best Management Practice (BMP)	Component						Upland Habitats							Aquatic and Wetland Habitats								
	Surveillance	Physical Control	Vegetation Management	Bio Control	Chemical Control	Other Nonchemical / Trapping	Coniferous Forest	Deciduous Forest	Shrublands	Grasslands	Serpentine	Coastal Dunes	Treeholes	Creeks and Rivers	Riparian Corridor	Ponds and Lakes (includes stock and golf ponds that have natural bottoms)	Freshwater Marsh/Seeps	Seasonal Wetlands (includes Vernal Pools)	Lagoon	Tidal Marsh and channels	Water and Wastewater Management Facilities	Artificial Containers, Temporary Standing Waters, and Ornamental Ponds
3. Prior to the initiation of vegetation maintenance, water manipulation, channel excavation, or vehicle operation, the project work site and adjacent area will be surveyed by a designated District biologist trained in identification and ecology of the five special-status species to ensure that none are present. This survey is not intended to be a protocol-level survey, but rather one designed to verify that no special-status species are actually on site or in the adjacent waterway. For CRLF, vegetation maintenance and water manipulation shall not occur from November through March to avoid their breeding season (egg laying and hatching). This work will be further delayed if tadpoles are present in the work area. Mosquitofish ( <i>Gambusia affinis</i> ) will not be introduced into any site containing CRLF or CTS. If channel excavation occurs on County Parks property, their staff will be consulted on the appropriate level of survey.	X	X	X	*	X	X								X	X	X	X	X				X
4. All on site workers will attend an information session (tailboard) conducted by the designated onsite District biologist. This session shall cover identification of the five species and various life stages (such as CRLF tadpoles) and procedures to be followed if an individual is found on site or in the adjacent waterway.	X	X	X	*	X	X								X	X	X	X	X				X
5. All treatment areas will be inspected each morning by the designated onsite biological monitor to ensure that none of the five species are present. All construction activities that take place on the ground shall be performed in daylight hours. Construction materials, soil, construction debris, or other material shall be deposited only on areas where vegetation has been mowed and any snakes or frogs present would be readily visible.	X	X	X		X	X								X	X	X	X	X				X
6. Vehicle speed on site will not exceed 15 miles per hour on dirt roads and 5 miles per hour on the two track vegetated access roads to work locations. All vehicles will be escorted on the two track road by the District biologist to avoid any adverse effects on California red-legged frogs and San Francisco garter snakes.	X	X	X		X	X								X	X	X	X	X				X
7. Work activities at this site should be avoided for 24 hours after a significant rain, if feasible.	X	X	X		X	X								X	X	X	X	X				X
8. When possible, vector management activities will be conducted on foot using handheld equipment.	X	X	X		X	X								X	X	X	X	X				X

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Best Management Practice (BMP)	Component						Upland Habitats						Aquatic and Wetland Habitats									
	Surveillance	Physical Control	Vegetation Management	Bio Control	Chemical Control	Other Nonchemical / Trapping	Coniferous Forest	Deciduous Forest	Shrublands	Grasslands	Serpentine	Coastal Dunes	Treeholes	Creeks and Rivers	Riparian Corridor	Ponds and Lakes (includes stock and golf ponds that have natural bottoms)	Freshwater Marsh/Seeps	Seasonal Wetlands (includes Vernal Pools)	Lagoon	Tidal Marsh and channels	Water and Wastewater Management Facilities	Artificial Containers, Temporary Standing Waters, and Ornamental Ponds
<b>F. Vegetation Management</b>																						
1. Consultations will be made with the appropriate resource agency to discuss proposed vegetation management work, determine potential presence of sensitive species and areas of concern, and any required permits.		X	X											X	X	X	X	X	X	X		
2. Vegetation management work performed will typically be by hand, using handheld tools, to provide access to vector habitat for surveillance, and when needed control activities. Tools used include machetes, small garden-variety chainsaws, hedge trimmers, and "weed-eaters."		X	X											X	X	X	X	X	X	X		
3. District will consult and coordinate with resource agencies as well as have all necessary permits prior to the commencement of work using heavy equipment (e.g., larger than handheld/garden variety tools such as small excavators with rotary mowers) in riparian areas.		X	X											X	X	X	X	X	X	X		
4. Minor trimming of vegetation (e.g., willow branches approximately 3 inches in diameter or less, blackberry bushes, and poison oak) to the minimum extent necessary will occur to maintain existing paths or create access points through dense riparian vegetation into vector habitat. This may include minor trimming of overhanging limbs, brush and blackberry thickets that obstruct the ability to walk within creek channels. Paths to be maintained will not be a cut, defined corridor but rather a path maintained by selective trimming of overhanging or intrusive vegetation. Paths to be maintained will range in width from 3 to 6 feet across.		X	X												X							
5. Downed trees and large limbs that have fallen due to storm events or disease will be cut only to the extent necessary to maintain existing access points or to allow access to vector habitats.		X	X												X							
6. When work is expected to occur between February 1 and August 31 in areas known to harbor special-status species, consultations will occur with appropriate resource agencies to help identify locations of active nests of raptors or migratory birds as well as any additional protection measures that will need to be implemented prior to commencement of work.		X	X												X	X	X	X	X	X		
7. Every effort will be made to complete vegetation management in riparian corridors prior to the onset of heavy rains. Maintenance work to be done in early spring will be limited to trimming of access routes to new willow shoots, poison oak, blackberries, and downed trees that block these paths.		X	X												X							
8. District staff will work with care and caution to minimize potential disturbance to wildlife, while performing vegetation management activities within or near riparian corridors.		X	X											X	X	X	X	X	X	X		

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Best Management Practice (BMP)	Component						Upland Habitats							Aquatic and Wetland Habitats								
	Surveillance	Physical Control	Vegetation Management	Bio Control	Chemical Control	Other Nonchemical / Trapping	Coniferous Forest	Deciduous Forest	Shrublands	Grasslands	Serpentine	Coastal Dunes	Treeholes	Creeks and Rivers	Riparian Corridor	Ponds and Lakes (includes stock and golf ponds that have natural bottoms)	Freshwater Marsh/Seeps	Seasonal Wetlands (includes Vernal Pools)	Lagoon	Tidal Marsh and channels	Water and Wastewater Management Facilities	Artificial Containers, Temporary Standing Waters, and Ornamental Ponds
9. If suitable habitat for special-status species is found, including vernal pools, and if nonchemical physical and vegetation management control methods have the potential for affecting special-status species, then the District will coordinate with the CDFW, USFWS, NMFS, and/or County Parks as appropriate, before conducting control activities within this boundary or cancel activities in this area. If the District determines no suitable habitat is present, control activities may occur without further agency consultations.		X	X											X	X	X	X	X	X	X		
10. When using heavy equipment for vegetation management, District staff (and contractors) will minimize the area that is affected by the activity and employ all appropriate measures to minimize and contain turbidity. Heavy equipment will not be operated in the water and appropriate containment and cleanup systems will be in place on site to avoid, contain, and clean up any leakage of toxic chemicals.		X	X											X	X	X	X	X	X	X		
<b>G. Maintenance / Construction and Repair of Channels, Tide Gates, and Water Structures in Waters of the US and State</b>																						
1. District staff will consult with appropriate resource agencies (USACE, USFWS, CDFW, NMFS, BCDC, RWQCB) and obtain all required permits prior to the commencement of ditch maintenance or construction within tidal marshes.		X												X		X	X	X	X	X	X	
2. Work plans for the upcoming season proposed work as well as a summary of the last season's completed work will be submitted for review and comment to USACE, USFWS, NMFS, CDFW, BCDC, and RWQCB no later than July 1 of each year for which work is being proposed. The work plan will include a delineation of all proposed ditching overlain on topographic maps at a minimum of 1" = 1000' scale, with accompanying vicinity maps. The plan will also indicate the dominant vegetation of the site, based on subjective estimates, the length and width of the ditches to be maintained, cleared or filled, and the estimated date the work will be carried out.		X												X		X	X	X	X	X	X	
3. All maintenance work will be done at times that minimize adverse impacts to nesting birds, anadromous fish, and other species of concern, in consultation with USFWS, NMFS, and CDFW. Work conducted will, whenever feasible, be conducted during approved in water work periods for that habitat, considering the species likely to be present. For example, tidal marsh work will be conducted between September 1 and January 31, where feasible and not contraindicated by the presence of other sensitive species. <sup>1</sup>		X												X		X	X	X	X	X	X	

<sup>1</sup> Dates are from District's USACE Regional Permit 4, November 21, 2016.

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	Surveillance	Physical Control	Vegetation Management	Bio Control	Chemical Control	Other Nonchemical / Trapping	Coniferous Forest	Deciduous Forest	Shrublands	Grasslands	Serpentine	Coastal Dunes	Treeholes	Creeks and Rivers	Riparian Corridor	Ponds and Lakes (includes stock and golf ponds that have natural bottoms)	Freshwater Marsh/Seeps	Seasonal Wetlands (includes Vernal Pools)	Lagoon	Tidal Marsh and channels	Water and Wastewater Management Facilities	Artificial Containers, Temporary Standing Waters, and Ornamental Ponds
4. Care will be taken to minimize the risk of potential disruption to the indigenous aquatic life of a waterbody in which ditch maintenance is to take place, including those aquatic organisms that migrate through the area.		X												X		X	X	X	X	X	X	
5. Staging of equipment will occur on upland sites.		X												X		X	X	X	X	X	X	
6. Mats or other measures taken to minimize soil disturbance (e.g., use of low ground pressure equipment) when heavy equipment is used.		X												X		X	X	X	X	X	X	
7. All projects will be evaluated prior to bringing mechanical equipment on site, in order to identify and flag sensitive sites, select the best access route to the work site consistent with protection of sensitive areas, and clearly demarcate work areas.		X												X		X	X	X	X	X	X	
8. Measures will be taken to minimize impacts from mechanical equipment, such as hand ditching as much as possible; reducing turns by track-type vehicles, taking a minimum number of passes with equipment, varying points of entry, driving vehicles at low speed, and not driving on open mud and other soft areas.		X												X		X	X	X	X	X	X	
9. Discharges of dredged or fill material into tidal waters will be minimized or avoided to the maximum extent possible at the project site and will be consistent with all permit requirements for such activity. No discharge of unsuitable material (e.g., trash) will be made into waters of the United States or State of California, and material that is discharged will be free of toxic pollutants in toxic amounts (see Section 307 of the Clean Water Act). Measures will be taken to avoid disruption of the natural drainage patterns in wetland areas.		X												X		X	X	X	X	X	X	
10. Discovery of historic or archeological remains will be reported to USACE and all work stopped until authorized to proceed by the appropriate regulatory authorities/resource agencies.		X												X		X	X	X	X	X	X	
11. Ditching that drains high marsh ponds will be minimized to the extent possible in order to protect the habitat of native salt pan species.		X																	X	X		

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12. No spoils sidecast adjacent to circulation ditches will exceed 8 inches above the marsh plain to minimize risk of colonization of spoils by invasive, nonnative plants and/or the spoils lines from becoming access corridors for unwanted predators (e.g., dogs, cats, red fox). Sidecast spoil lines exceeding 4 inches in height above the marsh plain will extend no more than 6 feet from the nearest ditch margin. Any spoils in excess of these dimensions will be hydraulically redispersed on site (e.g., by rotary ditcher), or removed to designated upland sites (per conditions of resource agency issued permits). Sidecast spoil lines will be breached at appropriate intervals to prevent local impediments to water circulation.		X																	X	X		
13. If review of the proposed work plan by USACE, USFWS, or CDFW determines the proposed maintenance is likely to destroy or damage substantial amounts of shrubby or sub-shrubby vegetation (e.g., coyote brush, gumplant) on old sidecast spoils, the District will provide a quantitative estimate of the extent and quality of the vegetation, and provide a revegetation plan for the impacted species prepared by a biologist/botanist with expertise in marsh vegetation. The USACE- approved revegetation plan will be implemented prior to April 1 of the year following the impacts.		X																	X	X		
14. Small ditch maintenance work will be performed by hand, whenever possible, using handheld shovels, pitch forks, etc., and small trimmers such as "weed-eaters." (Note: the majority of small ditch work performed by the District is by hand.)		X														X	X	X	X	X	X	
15. Work will be done at low tide (for tidal areas), and times of entry will be planned to minimize disruption to wildlife.		X												X	X	X	X	X	X	X	X	
16. In marshes which contain populations of invasive nonnative vegetation such as pepperweed or introduced Spartina, sidecast spoils will be surveyed for the frequency of establishment of these species during the first growing season following deposition of the spoils. The results of the surveys will be reported to the USACE, USFWS, and CDFW. If it is determined the sidecasting of spoils resulted in a substantial increase in the distribution or abundance of the nonnative vegetation which is detrimental to the marsh, the District will implement appropriate abatement measures after consultation with the USACE, USFWS, and CDFW.		X																	X	X		
17. When feasible (i.e., with existing labor and vehicles), refuse such as tires, plastic, and man-made containers found at the work site will be removed and properly discarded.		X	X											X		X	X	X	X	X	X	

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<b>H. Applications of Pesticides, Surfactants, and/or Herbicides</b>																						
1. District staff will conduct applications with strict adherence to product label directions that include approved application rates and methods, storage, transportation, mixing, and container disposal. Applicators will complete training on an annual basis.			X	*	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
2. District will avoid use of surfactants when feasible in sites with aquatic nontargets or natural enemies of mosquitoes present such as nymphal damselflies and dragonflies, dytiscids, hydrophilids, corixids, notonectids, ephydriids, etc. Surfactants are a least preferred method but must be used with pupae. Use a microbial larvicide (Bti, Bs) or IGR (e.g., methoprene) instead or another component if necessary.			X		X							X	X	X	X	X	X	X	X	X	X	X
3. Materials will be applied at the lowest effective concentration for a specific set of vectors and environmental conditions. Application rates will never exceed the maximum label application rate. Truck, hand larviciding, and fogging equipment will be calibrated and inspected semiannually.			X	*	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
4. To minimize application of pesticides, application of pesticides will be informed by surveillance and monitoring of vector populations.			X		X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
5. District staff will follow label requirements for storage, loading, and mixing of pesticides and herbicides. Handle all mixing and transferring of herbicides within a contained area.			X		X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
6. Postpone or cease application when predetermined weather parameters exceed product label specifications, when wind speeds exceed the velocity as stated on the product label, or when a high chance of rain is predicted and rain is determining factor on the label of the material to be applied.			X	*	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
7. Applicators will remain aware of wind conditions prior to and during application events to minimize any possible unwanted drift to waterbodies, and other areas adjacent to the application areas.			X	*	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
8. Spray nozzles for the application of larvicides or herbicides will be adjusted to produce larger droplet size rather than smaller droplet size. Use low nozzle pressures where feasible (e.g., 30 to 70 pounds per square inch). Keep spray nozzles within a predetermined maximum distance of target weeds or pests (e.g., within 24 inches of vegetation during spraying). For application of adulticides, use ULV sprays that are calibrated to be effective and environmentally compatible at the proper droplet size (about 10-30 microns).			X	*	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

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9. Clean containers at an approved site and dispose of at a legal dumpsite or recycle in accordance with manufacturer's instructions if available.			X	*	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
10. Special-Status Aquatic Wildlife Species: <ul style="list-style-type: none"> <li>- A CNDDB search was conducted in 2012, updated in 2015, and the results incorporated into this PEIR. District staff communicates with state, federal, and county agencies regarding sites that have potential to support special-status species. Many sites where the District performs surveillance and control work have been visited by staff for many years and staff is highly knowledgeable about the sites and habitat present. If new sites or site features are discovered that have potential to be habitat for special-status species, the appropriate agency or landowner is contacted and communication initiated.</li> <li>- The District Uses only pesticides, herbicides, and adjuvants approved for aquatic areas or manual treatments within a predetermined distance from aquatic features (e.g., within 15 feet of aquatic features). Aquatic features are defined as any natural or man-made lake, pond, river, creek, drainage way, ditch, spring, saturated soils, or similar feature that holds water at the time of treatment or typically becomes inundated during winter rains.</li> <li>- If suitable habitat for special-status species is found, including vernal pools, and if aquatic-approved pesticide, herbicide, and adjuvant treatment methods have the potential for affecting the potential species, then the District will coordinate with the CDFW, USFWS, and/or NMFS before conducting treatment activities within this boundary or cancel activities in this area. If the District determines no suitable habitat is present, treatment activities may occur.</li> </ul>			X	*	X							X		X	X	X	X	X	X	X		
11. District staff will monitor sites post-treatment to determine if the target vector or weeds were effectively controlled with minimum effect on the environment and nontarget organisms. This information will be used to help design future treatment methods in the same season or future years to respond to changes in site conditions.			X	*	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

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12. Do not apply adulticides in spray/fog forms over large areas (more than 0.25 acre) during the day when honeybees and other pollinators are present and active. Preferred applications of these specific pesticides are to occur in areas with little or no honeybee or pollinator activity or after dark. These treatments may be applied over smaller areas (with handheld equipment), but the technician will first inspect the area for the presence of bees and other pollinators. If bees and other pollinators are present in substantial numbers, the treatment will be made at an alternative time when these pollinators are inactive or absent. Liquid larvicides are applied only to waterbodies.			X		X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
13. The District will provide notification to the public (24 – 48 hours in advance if possible) and/or appropriate agency(ies) when applying pesticides or herbicides for large-scale treatments that will occur in close proximity to homes, heavily populated, high traffic, and sensitive areas. The District applies or participates in the application of herbicides in areas when a joint effort is most effective and/or efficient.			X	*	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
14. Provide for buffer zones between herbicide application sites and surface and usable groundwater supplies.			X											X	X	X	X	X	X	X	X	X
15. For rodenticides in sewer systems, deploy bait blocks by suspension to reduce potential dietary exposure to nontarget animals. Apply bait block attachments to the wall just under the manhole cover so that rodents are more likely to perish while still in the sewer and away from predators to reduce secondary exposure.					X																X	
16. For rodenticides in aboveground sites, use tamper-proof bait stations firmly attached to embedded stakes or duckbill anchors so that bait cannot be accessed or dragged away by nontarget animals.					X									X	X						X	
<b>I. Hazardous Materials and Spill Management</b>																						
1. Exercise adequate caution to prevent spillage of pesticides during storage, transportation, mixing or application of pesticides. Report all pesticide spills and cleanups (excepting cases where dry materials may be returned to the container or application equipment). Monitor application equipment on a daily basis.			X	*	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
2. Maintain a pesticide spill cleanup kit and proper protective equipment at the District's Service Yard and in each vehicle used for pesticide application or transport.			X	*	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

(\*) Means not available at this time. Should a viable biocontrol agent become available, evaluation of BMP measures would occur and be implemented.

Best Management Practice (BMP)	Component						Upland Habitats							Aquatic and Wetland Habitats								
	Surveillance	Physical Control	Vegetation Management	Bio Control	Chemical Control	Other Nonchemical / Trapping	Coniferous Forest	Deciduous Forest	Shrublands	Grasslands	Serpentine	Coastal Dunes	Treeholes	Creeks and Rivers	Riparian Corridor	Ponds and Lakes (includes stock and golf ponds that have natural bottoms)	Freshwater Marsh/Seeps	Seasonal Wetlands (includes Vernal Pools)	Lagoon	Tidal Marsh and channels	Water and Wastewater Management Facilities	Artificial Containers, Temporary Standing Waters, and Ornamental Ponds
3. Manage the spill site to prevent entry by unauthorized personnel. Contain and control the spill by stopping it from leaking or spreading to surrounding areas, cover dry spills with polyethylene or plastic tarpaulin, and absorb liquid spills with appropriate absorbent materials.			X	*	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
4. Properly secure the spilled material, label the bags with service container labels identifying the pesticide, and deliver them to a District/Field Supervisor for disposal.			X	*	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
5. A hazardous spill plan will be developed, maintained, made available, and staff trained on implementation and notification for petroleum-based or other chemical-based materials prior to commencement of vector treatment activities.	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
6. Field-based mixing and loading operations will occur in such a manner as to minimize the risk of accidental spill or release of pesticides.			X		X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

(\*) Means not available at this time. Should a viable biocontrol agent become available, evaluation of BMP measures would occur and be implemented.

Impact determinations follow the analysis for each Program component and cover the following issues derived from the CEQA significance criteria (Section 4.2.1.2):

- a. Impacts to special-status species
- b. Impacts to riparian habitats or other sensitive natural communities
- c. Impacts to federally protected wetlands
- d. Impacts to movement of native resident or migratory fish or wildlife species.
- e. Conflicts with local policies
- f. Conflicts with provisions of any adopted HCP, NCCP, or other approved habitat conservation plan

The potential effects of the treatment alternatives will vary depending on the specific treatment applied, the size and location of the treated area, the type of habitat treated, and the timing and frequency of treatment. Small treatment areas or less frequent applications of a treatment would generally be expected to result in lesser effects than the same treatment applied over a larger area or more frequently.

The potential impacts of the nonchemical components are based on the type and location of habitats treated and the magnitude and frequency of treatment. The potential impacts of the chemical components were evaluated based on the magnitude and duration of the treatments and the toxicity and application information presented in Chapter 6, Ecological Health, and Appendix B, Ecological and Human and Health Assessment Report. The evaluation of all components considered the life histories of the different listed aquatic species and ecological interactions including impacts to the aquatic food chain.

The pesticide application scenarios that result in reasonable efficacy with minimal unwanted estimated risk are preferred and are the basis of IPM approaches and BMPs the District employs. BMPs are contained in Chapter 2, Section 2.9 and associated here with habitat types in which they would be applied in Table 4-5. Each of the pesticides and herbicides identified as warranting further evaluation in Appendix B (as a subset of all pesticides and herbicides in use) are known to exhibit at least one parameter that appears to have a significant role in the resulting potential or perceived risk. Toxicity levels are helpful in making significance determinations under CEQA. Toxicity thresholds are presented in the Vegetation Management Component for herbicides (Section 4.2.5, Table 4-6) and for the other pesticides in the Chemical Control Component (Section 4.2.7, Table 4-7).

#### **4.2.2.2 Assumptions**

The following assumptions were used in the assessment of potential aquatic resource impacts from the Program components:

- > Site-specific evaluation of aquatic resource impacts is not within the scope of this programmatic evaluation. Rather, the analysis uses habitat types likely to be affected by any of the components as the basis for evaluation.
- > District staff will implement the BMPs listed in Table 4-5 as appropriate to the type of activity under the Program components.
- > All chemical treatments would be made in accordance with label instructions and guidance provided by the USEPA and CDPR (and in consideration of the local context for that area, i.e., nearby area land uses and habitats).
- > This aquatic resources evaluation does not incorporate any assumptions about which component treatment strategy or strategies (options) would be applied in any given area. Therefore, each treatment component is considered as a stand-alone option, although the Program may include multiple component treatments within a given area (e.g., physical controls followed by larvicide application).

Guidelines used to trigger a particular component based on vector abundance and other variables are included in District-specific operating procedures contained in the IMVMP Plan and its appendices.

The USEPA requires mandatory statements on pesticide product labels that include directions for use; precautions for avoiding certain dangerous actions; and where, when, and how the pesticide should be applied. This guidance is designed to ensure proper use of the pesticide and prevent unreasonable adverse effects to humans and the environment. All pesticide labels are required to include the name and percentage by weight of each active ingredient in the product/formulation. Toxicity categories for product hazards and appropriate first-aid measures must be properly and prominently displayed. Pesticide labels also outline proper use, storage, and disposal procedures, as well as precautions to protect applicators. The directions for use specify the target organism, appropriate application sites, application rates or dosages, contact times, and required application equipment for the pesticide. Warnings regarding appropriate wind speeds, droplet sizes, or habitats to avoid during application are also prominently displayed.

Concerning the application of multiple chemical treatments in the same area, such as larvicides followed by adulticides (which is not likely to occur under normal circumstances), or the application of multiple pesticides at the same time in a specific area (e.g., usually multiple active ingredients in the formulation such as VectoMax CG, which combines Bti and Bs), the following information applies:

Products sold as herbicides and pesticides are evaluated herein both for the active ingredient and for the adjuvants and surfactants used to make the product more useful. When multiple products are used in a vector control application, the impacts are weighed against the proximity and timing of each application. Some commercial products actually contain more than one active ingredient (e.g., FourStar Briquets contain Bs and Bti), and these products are evaluated for toxicity. If products with similar or even different active ingredients are applied simultaneously, the potential toxicity of each is summed to estimate potential adverse effects. This scenario is not typical unless the potential adverse effects of the vector are potentially extreme. The need for reapplication of mosquito larvicides or adulticides is surveillance driven and performed according to the label directions. The District can apply larvicide materials with different active ingredients during a single timeframe if multiple hatches of mosquito larvae occur and results in mosquito populations occurring at different stages of the life cycle. An example of this occurs when liquid Bti and methoprene are applied simultaneously. The combination of the materials is a product called Duplex, and the mixture of the materials and active ingredients is provided for on the product label. Another example includes a preapplication of a liquid trans allethrin and phenothrin spray product which may be used to minimize the hazard of approaching a yellow jacket nest. Situations that would produce a residual exposure adequate to cause harm to nontarget wildlife would not occur unless the application(s) were inappropriate or the timing of applications is inappropriately close. Actual applications do not generally occur close together unless a problem exists with treatment effectiveness. After a material is applied, post-treatment inspection is performed to determine effectiveness. Only if the vectors (mosquitoes) have not been sufficiently killed would the District reapply a pesticide to the same area.

Assumptions and/or background material related to the analysis of hazards, toxicity, and exposure for chemical treatment methods are explained below, including the definition of key terms. The ecological food web concept is explained as well and is addressed primarily in Section 6.2.2.2.

#### **4.2.2.3 Hazardous Material**

A “hazardous material” is defined in California Health and Safety Code Section 25501 (p): as “any material that, because of its quantity, concentration, or physical or chemical characteristics, poses a significant present or potential hazard to human health and safety or to the environment if released into the workplace or the environment. “Hazardous materials” include, but are not limited to, “hazardous substances, hazardous waste, and any material that a handler or the administering agency has a reasonable basis for believing that it would be injurious to the health and safety of persons or harmful to the environment if released into the workplace or the environment.” Any liquid, solid, gas, sludge, synthetic product, or commodity that exhibits characteristics of toxicity, ignitability, corrosiveness, or reactivity has the potential to be considered a “hazardous material.”

#### **4.2.2.4 Toxicity and Exposure**

Toxicology is the study of a compound’s potential to elicit an adverse effect in an organism. The toxicity of a compound is dependent upon exposure, including the specific amount of the compound that reaches an organism’s tissues (i.e., the dose), the duration of time over which a dose is received, the potency of the chemical for eliciting a toxic effect (i.e., the response), and the sensitivity of the organism receiving the dose of the chemical. Toxicity effects are measured in controlled laboratory tests on a dose/response scale, whereby the probability of a toxic response increases as dose increases. Exposure to a compound is necessary for potential toxic effects to occur. However, exposure does not, in itself, imply that toxicity will occur. Thus, toxic hazards can be mitigated by limiting potential exposure to ensure that doses are less than the amount that may result in adverse health effects.

The toxicity data included in the numerous tables and charts in this document are generally derived from rigidly controlled laboratory animal studies designed to determine the potential adverse effects of the chemical under several possible routes of exposure. In these studies, the species of interest is exposed to 100 percent chemical at several doses to determine useful information such as the lowest concentration resulting in a predetermined adverse effect (LOAEL) on numerous selected physiological and behavioral systems. The second component of these tests is to determine the highest concentration of chemical that results in no measurable adverse effect (NOAEL).

However, these, and other, coordinated and focused laboratory tests are designed to document the effects of the chemical using a continuous, controlled laboratory exposure that does not realistically reflect the likely patchy exposures typical of the District field application scenarios. As such, the toxicity information generated using laboratory tests (and some limited field tests) is intended as an overview of potential issues that might be associated with maximum direct exposures to develop and recommend guidance for use that should provide maximum exposure levels of applications that are protective of ecological health. These guidelines include numerous “safety margins” in the toxicity calculations that are intended to provide adequate efficacy to target organisms while not adversely impacting humans or nontarget plant and animal species. In some instances, the regulatory guidance may include additional suggestions for protective application to assure no significant adverse effect on nontarget species and humans.

The regulatory community uses this basic information to provide a relative comparison of the potential for a chemical to result in unwanted adverse effects and this information is reflected in the approved usage labels and material safety data sheets (MSDSs),<sup>2</sup> in actual practice, the amounts actually applied by the District within the District’s Program Area for vector control are often substantially less than the amounts used in the laboratory toxicity studies. Because of the large safety factors used to develop recommended product label application rates, the amount of chemical resulting in demonstrated toxicity in the laboratory is much higher than the low exposure levels associated with an actual application for vector control. The application concentrations consistent with the labels or MSDSs are designed to be protective of the health

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<sup>2</sup> Although the MSDS format is referenced in this document, note that under the international Globally Harmonized System, the MSDS format has been substantially revised and is now largely replaced by standardized Safety Data Sheets (SDSs).

of humans and other nontarget species (i.e., low enough to not kill them, weaken them, or cause them to fail to reproduce). Impacts may occur to some nontarget organisms. Although numerous precautions (BMPs) and use of recommended application guidance are intended to provide efficacy without adverse effects to nontarget organisms, misapplication or unexpected weather conditions may still result in effects on some nontarget organisms in the exposure area. This potential impact is ameliorated/mitigated by having the application concentrations consistent with the labels or MSDSs (now SDSs). These documents are designed to protect the health of humans and other nontarget species. The careful use of pesticide application BMP's and advance planning by the District further avoids substantial impacts (see Sections 6.2.5 and 6.2.7 where the potential impact analyses are provided).

Although laboratory toxicity testing focuses on tiered concentrations of chemical exposure, the results of these tests produce a series of toxicity estimates of concentrations less than those that produce mortality. Extrapolation of these data is used to generate estimates of chronic toxicity or possible effects of lower doses that may result in sublethal effects such as reproduction or metabolic changes. In reality, these low-dose exposures need to be sustained over longer periods than are relevant to typical application scenarios for vector control. As part of the District's IMVMP Plan, targeted chemical control is applied only when inspections reveal that mosquitoes or other vector populations are present at threshold levels – based on the vector's abundance, density, species composition, proximity to human settlements, water temperature, presence of predators, and other factors –and when other control options are unavailable or inappropriate. District staff will then apply pesticides to the site in strict accordance with the pesticide label instructions and District BMPs. This approach results in chemical treatments using the least amount of product to be effective with minimal repeated applications. Additionally, the District employs techniques to ensure applications do not generally occur that close together. Measures include following label instruction, education of state-certified field personnel, real-time application recording equipment and the use of color-coded data management tools that alert personnel of estimated active ingredient remaining at application sites.

#### **4.2.2.5 Chemistry, Fate, and Transport**

The toxicity of a chemical is also affected by various biological, chemical, and physical parameters that affect the behavior of a compound in the environment and its potential toxicity. The chemistry, fate, and transport of a compound must be analyzed to fully estimate potential exposure to a given receptor. The fate and transport of a compound is determined by the physical and chemical properties of the compound itself and the environment in which it is released. Thus, the following characteristics of a compound must be evaluated: its half-life in various environmental media (e.g., sediment, water, air); photolytic half-life; lipid and water solubility; adsorption to sediments and plants; and volatilization. Environmental factors that affect fate and transport processes include temperature, rainfall, wind, sunlight, water turbidity, dissolved oxygen concentrations, and water and soil pH. Information pertaining to these parameters allows evaluation of how compounds may be transported between environmental media (e.g., from sediments to biota), how a compound may be degraded into various breakdown products, and how long a compound or its breakdown products may persist in different environmental media. In general, when a compound or its breakdown products decomposes rapidly in the environment and does not persist for extended periods, then the compound or product poses a lower risk to nontarget species and a lower potential for environmental pollution. Appendix B, Ecological and Human Health Assessment Report, provides a discussion of the environmental fate of the pesticide active ingredients and other chemicals associated with specific pesticide formulations used in the Vegetation Management and Chemical Control Components.

#### **4.2.2.6 Ecological Food Web**

While it is important to evaluate the potential adverse impacts of a pesticide application to potentially affected nontarget species, it is not practical to evaluate those potential impacts to all of the food webs present in the various ecosystems under consideration. An ecological food web is represented in the



illustration representing some of the multitude of possible biotic and food uptake interactions in an ecosystem. Figure 4-2 depicts a highly simplified food web. In an ecological system, each level in the food web is occupied by dozens or hundreds of species, with consumers using those resources (in this case species from a lower trophic level) in different ways depending on availability and competition for those resources. Their utilization of these resources shifts by time of day and season, and multiple resources being used simultaneously or componently. If the availability of one resource decreases, the consumer can generally replace that with another resource. Each of the possible connections between species is also associated with other interactions, such as competitive release, where the abundance of a species increases in response to the decline in a competitor's abundance, or competitive interactions between consumers where one consumer can use a particular resource better than its competitor.

Although ecological food webs could be used to describe the complex system interactions that might be associated with District application scenarios, it is neither feasible nor practical to evaluate those potential impacts using a food-web approach. The numerous, interactions in typical food webs are highly complex and would be subject to substantial uncertainty. This would make it exceedingly difficult to confidently assess relevant impacts. Because of these constraints and complexity, it is neither practical nor productive to attempt to predict food-web interactions for each of the numerous application scenarios the District uses. It is appropriate, however, to use a food-web analysis to identify and consider the first level of potentially adverse effects to nontarget species that might result from a pesticide application. This information is used to assure a minimal impact to nontarget species and is typically a part of the MSDS and Toxicology profiles, providing the basis for the more reasonable, technically feasible approach to consider the possible nontarget impacts prior to use and the compatibility of each proposed pesticide in the overall approach to the typical vector control chemical application performed by the District.

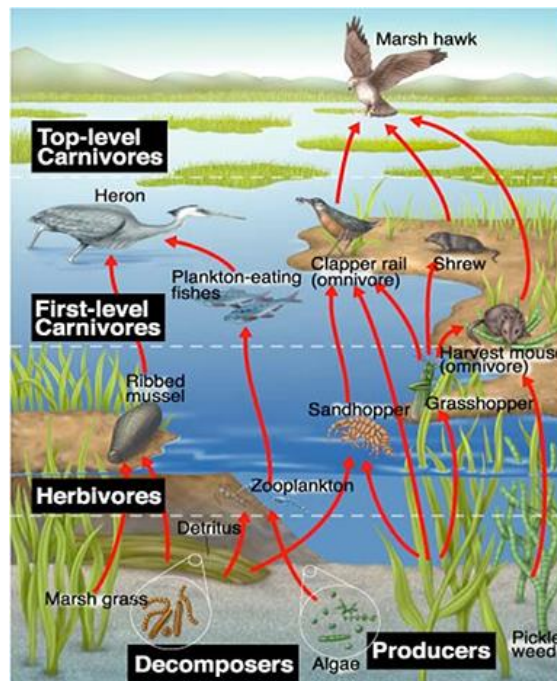


Figure 4-2 Ecological Food Web Concept

Pesticides can kill natural predators of mosquitoes. The District's activities associated with the Physical Control and Vegetation Management Components would help allow these predators to access habitats where mosquito larvae are present. When chemical control is used to manage mosquitoes it generally is used at levels that are below the effects thresholds for other insects and invertebrate predators, as described above. Although mosquito pesticides may also affect invertebrate predators (e.g., dragonflies), recovery of predator populations is usually rapid as the predator populations extend beyond the application areas and will rapidly replace any lost individuals. In general, the pesticides used for mosquito control exhibit low or no toxicity to birds or mammals. Limited information is available regarding toxic effects to reptile or terrestrial amphibian mosquito predators.

Mosquitoes are part of the food web and their loss may reduce the food base for some predators. Although mosquitoes serve a role as one of many types of prey items for some fish, avian insectivores, bats, and small reptiles and amphibians, the reduction of mosquito abundance over a small area will not affect the predator populations overall, because these species generally have large foraging ranges and can find other prey sources within the range of their habitat use (Williams et al. 1994). (See Section 2.8, Biological Control Predators, of Appendix E, Alternatives Analysis Report, for references on studies of gut contents of mosquito predators.)

### **4.2.3 Surveillance Component**

Surveillance activities involve monitoring the abundance of adult and larval mosquitoes, field inspection of mosquito habitat, testing for the presence of antibodies specific to encephalitis virus in domestic and wild fowl, collection, and testing of ticks, small rodent trapping and disease testing, and/or response to public service requests regarding vectors such as mosquitoes and yellow jackets.

Mosquito populations are monitored through the use of traps, inspections, and sampling in mosquito habitats. Known and suspected habitats are anywhere that water can collect, be stored, or remain standing for more than a few days, including, but not limited to, catch basins, stormwater detention systems, residential communities, parks, ornamental ponds, unmaintained swimming pools, seeps, seasonal wetlands, tidal and diked marshes, wastewater ponds, sewer plants, winery waste/agricultural ponds, managed waterfowl ponds, canals, creeks, treeholes, and flooded basements. If preexisting roads and trails are not available, low ground pressure ATVs may be used to access sites. Off-road access is minimized and used only when roads and trails are not available. Ticks are collected along trails and sampled for disease. Rodents may be collected as part of disease surveys.

#### **4.2.3.1 Impacts to Special-Status Species**

The Surveillance Component would affect small areas with the intent of monitoring vector populations to determine where control components are required. Small numbers of vector and nontarget organisms are trapped through this Program strategy at sites with the potential to support substantial vector populations. These sites are dispersed throughout the District. Chemicals may be used within adult mosquito traps (some adult mosquito traps use a Vapona strip infused with dichlorvos), but these chemicals are confined to the traps and do not enter the environment. Surveillance activities would occur in all wetland and aquatic habitat types, except open water and tidal flats (see Table 4-2 in Section 4.1.1). Surveillance activities would be conducted in accordance with the BMPs relating to agency communication, pretreatment screening, environmental training, and disturbance minimization as detailed in Table 4-5. The potential impacts of the Surveillance Component would be similar for all habitat types, although the species potentially affected would differ, as indicated in Table 4-3.

Minor impacts to riparian habitats in the vicinity of aquatic ecosystems may occur when the District is required to maintain paths and clearings through it to access surveillance sites and facilitate sampling. Such maintenance may include clearing small amounts of vegetation to retain footpaths up to 3 feet wide, or ATV/ARGO paths up to 6 feet wide. However, the vast majority of access routes are via preexisting roads, trails, and walkways, and do not require clearing by the District. Some trails do require periodic clearing by the District. Occasionally new access routes may be required to assess a vector source. This access will often consist of personnel picking their way through natural openings in the vegetation to the source, but in some cases (i.e., heavy growth of blackberries or poison oak) a trail may need to be created. Where such clearing is required, it is generally done with hand tools. No trimming of vegetation greater than approximately 3--inches in diameter would be conducted. Most heavier trail maintenance activities, especially those using weed trimmers, small chainsaws, or other motorized equipment, when potential impacts associated with disturbance of breeding habitat would be minimized (BMPs F1-10). However, lighter trail maintenance activities (trimming back small branches or fronds hanging over the access route) may occasionally occur during other times of year. When necessary the District will consult and coordinate with resource agencies as well as have all necessary permits prior to the commencement of work as outlined in BMP F3.

It is District policy that staff use preexisting roads, trails, walkways, and open areas to conduct routine and essential surveillance activities with the least impact on the environment. Surveillance may be conducted using ATVs, but offroad access is minimized and used only when roads and trails are not available. These activities are not anticipated to directly impact aquatic habitats and are of small size, so indirect impacts to aquatic habitats are inconsequential.

The presence of District personnel and equipment implementing the Surveillance Component and associated noise could result in disturbance to special-status aquatic species. Such disturbance is most likely to occur during the breeding season for fish, amphibians, and aquatic reptiles. Should the animals abandon suitable habitat as a result of such disturbance, it would be very minor and of short duration (typically less than 1 hour), so would likely not cause these animals to abandon the area, but rather move away from the activity while it is occurring.

The Surveillance Component may also result in disturbance to species as District personnel are traveling to and from surveillance sites. These access-related impacts would be minimized by adherence to the BMPs previously cited, but in particular discussing activities regularly with regulatory agencies or wildlife refuge managers, staying on existing access routes wherever possible, maintaining and implementing training from USFWS and CDFW personnel regarding special-status species, and being aware of the environment and minimizing noise and disturbance when working in the field.

In addition, when working in tidal marshes, the District will follow all Tidal Marsh-Specific BMPs, as well as those for salt marsh harvest mouse and Ridgway's rail, where these species are potentially present, as determined through discussion with refuge managers, CDFW, or USFWS personnel. They will include continuing to follow the measures provided in the USFWS' "Walking in the Marsh;" employing seasonal and daily activity restriction periods, wherever practical; minimizing travel along tidal channels and sloughs; limiting vegetation removal to the minimum necessary; and other BMPs as indicated in Table 4-5. Through the implementation of these BMPs, substantive impacts to habitat would be avoided and no impact to special-status animals would occur.

The only potential for the Surveillance Component to directly impact special-status fish, amphibians, or special-status aquatic reptiles would be when dipping to collect samples. Prior to collection of a sample, the technician would visually inspect the area to be sampled for nontarget organisms and avoid areas where special-status species were potentially present. Samples consist of collection of approximately 1 pint of water from the immediate surface of the waterbody, where mosquito larvae live, an area special-status fish and amphibians are unlikely to occupy, as their risk of predation is increased in these areas. The sample would be inspected for special-status vertebrates and in the unlikely event that such are captured, these animals would be returned immediately to the source water. Under these circumstances it is not reasonably foreseeable that the organism would be harmed. Technician experience confirms that, in practice, special-status vertebrate species are virtually never encountered under these circumstances.

Surveillance activities might result in some physical damage to habitat or associated vegetation from foot traffic in areas without marked trails to access areas for potential vector inspection. Special-status species could be directly impacted by these activities. The District investigates sites for the presence of special-status species prior to initiating any further surveillance measures in natural habitat areas, and only small areas would be disrupted briefly by access activities. As explained above, most surveillance occurs along access routes that are already established, and would only be cleared periodically to maintain access, as necessary. Where new access routes are required they would have only a very small effect on habitat in areas where surveillance occurs. Therefore, minimal impacts would occur to aquatic species as individuals with no impacts to populations.

**Impact AR-1.** The Surveillance Component would have a **less-than-significant** impact, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species. No mitigation is required.

#### **4.2.3.2 Impacts to Habitat**

This component would not affect the quantity or distribution of habitats, such as riparian areas, marshes, lakes or ponds, seasonal wetlands, or other habitat types identified as sensitive natural communities in local or regional plans, policies, regulations, or by the CDFW or USFWS. This component would not affect the composition of their vegetative communities, as very limited numbers of plants would be pruned or removed

over a very small area. Surveillance would not result in any significant ground-disturbing activity and, therefore, would not result in any removal, filling or hydrologic interruption of federally protected wetlands as defined by CWA Section 404, (including but not limited to, marsh, vernal pool, coastal, etc.). Most surveillance occurs along access routes that are already established, and would only be cleared periodically, during the fall to minimize impacts, to maintain access, as necessary. Where new access routes are required they would have only a very small effect on habitat in areas where surveillance occurs.

The District has long-standing cooperative and collaborative relationships with USFWS at Bair Island, CDFW, professional biologists, and property owners with regard to access, mosquito surveillance, and control in association with vernal pools which are not extensive in the District's Service Area. District staff have received information and training from CDFW and professional biologists with respect to minimizing the potential for impacts to vernal pool habitat and specifically CTS, Hickman's cinquefoil, and Point Reyes meadowfoam (see Table 5-3). All surveillance in the proximity of vernal pools will be done on foot. ATV's will not be used in the proximity of vernal pools, District staff stay outside of the margin of the vernal pools (delineated by the change from wetland to upland vegetation types). The District may cross hydrological connections, i.e., swales, between vernal pools when necessary and with permission from regulatory agencies. When possible, District staff performs mosquito surveillance on foot with hand equipment.

**Impact AR-2.** The Surveillance Component would have a **less-than-significant** impact on any riparian habitat or other sensitive natural community. No mitigation is required.

**Impact AR-3.** The Surveillance Component would have a **less-than-significant** impact on federally protected wetlands as defined by CWA Section 404. No mitigation is required.

#### **4.2.3.3 Impacts to Migration and Movement**

Any disruption of migration patterns would be due to the presence of personnel and machinery in the environment. In all cases this occurrence would be very short term, generally not more than a few hours in any given location and, therefore, this effect would be minimal and would have no effect on the movement of wildlife and would not affect wildlife migration corridors or nursery areas, as no physical disturbance would occur.

**Impact AR-4.** The Surveillance Component would have **no impact** on the movement of any native resident or migratory fish or wildlife species. Nor would it impact any native resident or migratory wildlife corridors or impede the use of native wildlife nursery sites.

#### **4.2.3.4 Conflict with Local Ordinances**

The county and city general plans and their goals and policies pertaining to natural resources are protective of aquatic resources and focused on conservation of existing resources including riparian, wetland, and bayland communities. Surveillance activities would not result in the conversion of natural habitats to other land uses or in the long-term or permanent dislocation of plant and animal species from natural areas except indirectly for mosquitoes and vectors of disease and discomfort. Surveillance activities would not affect trees more than 4 inches diameter at breast height and, therefore, would not conflict with local tree ordinances.

**Impact AR-5.** The Surveillance Component would have **no impact** on local policies or ordinances protecting biological resources.

#### **4.2.3.5 Conflict with Conservation Plans**

One conservation plan, the San Bruno Mountain HCP located in San Mateo County, was identified whose action area is within the District's primary Service Area. This HCP addresses impacts to three endangered species: San Bruno elfin butterfly, mission blue butterfly, and SFGS over 3,500 acres on San Bruno Mountain in San Mateo County for a duration of 30 years.

The District conducts limited surveillance operations within the area covered by this HCP on San Bruno Mountain, which has no aquatic habitat, and it is unlikely that the District's mosquito control activities would occur within this HCP's boundaries. The District conducts surveillance for plague, hantavirus, tularemia on San Bruno Mountain because this is a known focus of these diseases. Plague and tularemia have been documented among the rodent populations here since 1942. Surveys were originally conducted by the US Public Health Service. Regular surveys are continued by the County Department of Environmental Health and have been continued by the District since 1999 at the request of the county. Surveys consist of trapping rodents at various locations on the mountain 1 to 4 times per year. The District coordinates survey activities with the County Parks Department. All work is done on foot.

While District activities may occur within the boundaries of conservation areas, these activities are coordinated with the plan managers. The District regularly communicates with and works collaboratively with representatives from agencies such as RWQCB, USEPA, USACE, CDFW, and USFWS. The District receives training from agency staff and independent biologists (e.g., CDFW, USACE) to minimize impacts and conducts annual field training for field staff regarding precautionary and avoidance measures related to vernal pool habitat, but this habitat is not present on San Bruno Mountain.

Eleven conservation plans affect portions of adjacent counties as identified in Table 4-4. District surveillance activities are typically not among those covered by these HCPs. If called into these adjacent counties to perform work where access to the HCP/NCCPs may be restricted, the District would operate under the auspices of that county's mosquito and vector control district and in compliance with their practices and permits, or with the county, if there is no vector control district. The District would operate in compliance with all active HCP/NCCPs. Therefore, the District activities would not be in conflict with the provisions of any adopted HCP, NCCP, or other approved local, regional, or state-approved conservation plan.

**Impact AR-6.** The Surveillance Component has a **less-than-significant** impact on any adopted HCPs or NCCPs. No mitigation is required.

#### **4.2.4 Physical Control Component**

The Physical Control Component would be a continuation of existing activities using applicable techniques, equipment, vehicles, and watercraft. In the future, some additional ditching may occur and utilize heavy equipment. Physical control for mosquitoes consists of the management of aquatic areas that provide mosquito-producing habitat (including freshwater marshes, saltwater marshes, temporary standing water, and wastewater treatment facilities) especially through water control and maintenance or improvement of channels, tide gates, levees, and other water control facilities.

The potential effects of this component on these habitats are described below. The District may also advise landowners and homeowners about the importance of dumping/inverting of containers holding water, controlling vegetation against structures, avoiding stagnant ponds, and conducting the work in a manner consistent with applicable regulations and permitting requirements. In situations where any potential exists for sensitive habitats or special-status species to be present, the District includes information and contact data for resource agencies and potential permits.

##### **4.2.4.1 *Impacts to Special-Status Species and Habitats***

Mosquitoes typically breed in shallow areas, with emergent vegetation, little to no current, and where fish are excluded. The Physical Control Component modifies habitats that support mosquito larva to make these habitats less suitable for mosquitoes and/or more suitable for their predators. This component includes maintenance of ditches and water control structures, removal of debris and weeds, and clearance of brush for access to areas to be treated. It may also include reconnecting backwaters or isolated pools on the floodplains of streams and rivers, and increased water circulation in managed wetlands. These activities are conducted in accordance with all appropriate environmental regulations.

This work in creeks, rivers, ponds, lakes, marshes, and other wetlands may require permits from the USACE, RWQCB, CDFW, USFWS, NOAA Fisheries, and others. Federally protected wetlands are defined by CWA Section 404, (including but not limited to, marsh, vernal pool, coastal, etc.) where adverse effects could occur through direct removal, filling, hydrological interruption, or other means. The Physical Control Component would not reduce the quantity of this habitat, but simply improve circulation within the marsh. Work would not begin until all required permits are obtained and any necessary subsequent environmental review is prepared. The National Marine Fisheries Service (NMFS) reviewed the USACE's proposed Regional General Permit (RGP) 4 for mosquito abatement activities in the 5 San Francisco Bay Area counties (including San Mateo County) and provided written concurrence on June 3, 2016, that the proposed action is not likely to adversely affect the subject listed species and designated critical habitats. The District may also advise landowners and homeowners about the importance of dumping/inverting of containers holding water, controlling vegetation against structures, avoiding stagnant ponds, and conducting the work in a manner consistent with applicable regulations and permitting requirements. In situations where there is any potential for sensitive habitats or species to be present, the District includes information and contact data for resource agencies and potential permits.

District activities largely involve maintaining existing facilities to operate in the same manner as they do under baseline conditions. The District is rarely involved in new drainage projects, and when they are, they consult with the appropriate agencies, conduct applicable environmental review, and acquire all required permits for implementing that work, which provides protection for native and special-status fish species. The District's annual work plans are submitted for review by other responsible agencies prior to implementation. Completed work is available for inspection by the USACE, USFWS, and CDFW upon request.

Physical control activities occur in most aquatic and wetland habitats, with the exception of open water and tidal mudflat habitats, as these do not provide suitable habitat for mosquitoes, due to their circulation patterns. No physical control is done in vernal pools. Impacts are evaluated based on the types and locations of habitats where physical control activities would be performed. Impact determinations of significance follow the analyses by habitat type. These activities would generally occur over a period of a few days in any specific location, and so the physical disturbance would be very short term. The impacts could include short-term increases in dust and sedimentation, but BMPs (see Category G in Table 4-5) would be implemented to avoid impacts and make these impacts less than significant. Short-term increases in noise could also result. This would be expected to have the largest effect on adult amphibians when they are out of the water, or terrestrial animals. Most of this work will be conducted when the area is dry or otherwise isolated from active waterways, so impacts to purely aquatic organisms from noise and vibration are not expected to occur.

Mosquitoes are part of the food web and their loss may reduce the food base for some predators. Although mosquitoes serve a role as one of many types of prey items for some fish, avian insectivores, bats, and small reptiles and amphibians, the reduction of mosquito abundance over a small area will not affect the predator populations overall, because these species generally have large foraging ranges and can find other prey sources within the range of their habitat use (Williams et al. 1994). (See Section 2.8, Biological Control Predators, of Appendix E, Components Analysis Report, for references on studies of gut contents of mosquito predators.)

Physical control measures for rodents and other nuisance wildlife would be limited to providing advice for restricting ingress of rodents into structures or decreasing habitat for them near residences. These measures would not affect aquatic habitats and would have no effect on aquatic resources. Physical controls are not implemented for yellow jackets or ticks.

#### **4.2.4.1.1 Creeks and Rivers and Riparian Corridors**

Because their rapid currents do not provide suitable habitat for mosquitoes, creeks and rivers generally do not support substantial numbers of mosquitoes, although, some mosquitoes can be found in slow eddies and back channels, or in pools isolated on the banks as flows recede. Creeks and rivers may

support special-status fish species including tidewater goby, Coho Salmon<sup>3</sup>, steelhead and hardhead as well as California red-legged frog, CTS, foothill yellow-legged frog, SFGS, western pond turtle, and other species, as indicated in Table 4-3 and Table 5-3. Isolated ponds and back channels may provide habitat for mosquito larva, but these areas may also provide excellent rearing habitat for young fish and amphibians, as they provide warmer water temperatures, higher primary productivity, and protection from predaceous fish. Draining areas of shallow freshwater habitat to reduce the amount of standing water or reduce the amount of time such water remains standing could result in adverse effects to young fish or amphibians using those habitats, leaving organisms that cannot vacate the area without water, or requiring organisms that can leave the area to move to new locations, and reducing the amount of larval rearing habitat present. Where native or special-status fish species are not present, these impacts would be negligible. Where native or special-status species are present, these areas could be important nursery areas, depending on location, season, species present, and amount of other habitat available to the species. Habitat alterations to drain such areas will be avoided to the maximum extent possible. This type of activity is not conducted by the District, but the District may provide technical assistance to landowners to develop effective water management systems in accordance with applicable environmental laws and mosquito reduction BMPs. Mosquito control work in creeks is restricted to sections of creek that run through or directly next to, homes or businesses in urban or suburban areas.

The physical control component of the District's Program as described, which includes implementation of the BMPs in Table 4-5 relating to agency communication, environmental training, and pretreatment screening (see BMP A7) would minimally affect special-status species in these habitats. The habitat- and species-specific BMPs in Table 4-5 may also be applied, including seasonal avoidance measures. Furthermore, BMP G3 requires that all maintenance work will be done at times that minimize adverse impacts to nesting birds, anadromous fish, and other species of concern. Consultation with USFWS, NMFS, and CDFW regarding these activities will occur when required. When carried out as proposed, the effects of this component would be less than significant.

#### **4.2.4.1.2 Ponds and Lakes**

The freshwater habitats that could be treated include the margin of reservoirs and ponds (including artificial ponds such as golf course ponds or stock ponds with natural bottoms). These areas are generally man-made habitats, and if they support fish, these fish will largely consist of introduced species, or stocked native species such as rainbow trout. While rainbow trout are native to the region, these stocked fish (if present) are not considered to be natural populations, and are treated as introduced fish. Special-status Amphibians including CRLF and CTS may also use these reservoirs and ponds, particularly if these areas do not support larger fish or introduced bullfrogs. SFGS and western pond turtle often forage in these habitats as well.

Treatment of stagnant areas where mosquito larvae eggs and larvae occur would be accomplished by increasing circulation (water flow) to these areas. This increases the accessibility of these areas to young fish, which then eat the mosquito larvae. This access provides these fish with a previously inaccessible food source. Additionally, these areas can be important for young fish, as they provide protection from predation by larger fish and tend to be warmer, with higher primary productivity, providing good conditions for the growth of young fish. Most young fish eat insect larvae during at least the first few months of their lives, and some species eat insect larvae throughout their lives. Special-status fish species would not be impacted in reservoirs and ponds, and ditches, as these species do not occur in these habitats.

This type of treatment could affect breeding and rearing areas for amphibians, as they tend to avoid areas where fish are present. This would increase the risk of predation on eggs and tadpoles. This potential effect would be avoided and minimized by the District's physical control practices as described, which includes BMPs in Table 4-5 relating to agency communication, environmental training, and pretreatment screening. The habitat- and species-specific BMPs in Table 4-5 may also be applied, including seasonal

<sup>3</sup> Documented in Appendix F, comment O-VOL-12, footnote 7.

avoidance measures. Furthermore, BMP G3 requires that all maintenance work will be done at times that minimize adverse impacts to nesting birds, anadromous fish, and other species of concern, in consultation with USFWS, NMFS, and CDFW. When carried out as proposed, the effects of this component would be less than significant.

#### **4.2.4.1.3 Freshwater Marsh/Seeps**

Freshwater marsh and seeps may provide ideal habitat for mosquito breeding due to their substantial areas of shallow water, limited circulation, and emergent vegetation. These areas may potentially support a number of native and nonnative fish, special-status amphibians (CTS and CRLF), and special-status aquatic reptiles (SFGS and western pond turtle), as indicated in Table 4-1. Physical control in these areas would have the same potential effects as described for lake and pond habitats and would be avoided or minimized by the BMPs in Table 4-5 relating to agency communication, environmental training, and pretreatment screening. The habitat- and species-specific BMPs may also be applied, including seasonal avoidance measures. Furthermore, BMP G3 requires that all maintenance work will be done at times that minimize adverse impacts to nesting birds, anadromous fish, and other species of concern, in consultation with USFWS, NMFS, and CDFW. When carried out as proposed, the effects of this action would be less than significant.

#### **4.2.4.1.4 Seasonal Wetlands (includes Vernal Pools)**

The USACE defines wetlands as “*those areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas. (33 [Code of Federal Regulations] CFR 328.3(b); 40 CFR 230.3(t)).*” For the purposes of this document, seasonal wetlands are areas that are flooded for 1 week or more during the year, generally during the rainy season. Impacts to vernal pools, a subclass of seasonal wetlands underlain by impermeable substrates, are discussed in Chapter 5, Biological Resources – Terrestrial. The District does not perform physical control in vernal pools. Seasonal wetlands may be flooded by increased runoff, rainfall, or unusually high tides. Fish may use these areas for spawning and rearing. Young salmonids using these seasonally flooded wetlands have higher growth rates than the fish that remain in the mainstem rivers (Sommer et al. 2003; Swenson et al. 2003; Moyle et al. 2007). Coho salmon also may use backwater channels and ponds during the winter months to shelter from the higher currents in the main channel of river or stream habitats (Moyle 2002). The availability of such habitats has been substantially reduced by human land use practices and flood control measures. Reducing the frequency or duration with which such habitats are flooded would adversely affect habitat and aquatic resources, but the District seeks to increase the frequency of flooding. The Physical Control Component would not reduce the quantity of this habitat, but simply improve circulation within the marsh. Only inactive channels would be filled to eliminate ponding. All work in wetlands would be subject to additional permitting and environmental review by the USACE, CDFW, BCDC, and RWQCB.

Vernal pools,<sup>4</sup> a specific type of seasonal wetland, sometimes support a unique assemblage of endemic plant and animal species, many of which have been identified as special-status species by federal and state agencies (see Table 4-1). The District receives environmental awareness training from agency staff (e.g., CDFW, USACE) and independent biologists to minimize impacts and conducts annual field training for field staff regarding precautionary and avoidance measures related to vernal pool habitat. This training addresses CTS, Hickman’s cinquefoil, and Point Reyes meadowfoam. Mosquito control work in or near vernal pools is conducted on foot.

<sup>4</sup> “Vernal pool,” whether by transfer or by independent invention, is now applied to small wetlands that are present primarily or exclusively in the early part of the growing season and that typically “dry” completely or “substantially” at some point during the growing season. (Zedler 2003 [<http://users.ipfw.edu/isiorho/wetvernalisolatedwetlands2003.pdf> ])



Because of the sensitive nature of these habitat types, the District generally would not undertake Physical Control measures in these areas. In the event that Physical Control in a vernal pool was required, the District would not implement such actions without previously discussing their need with the relevant regulatory agencies to verify that no other option exists to control the mosquito problem and to make sure that any such activity would be done in such a way as to minimize its impacts. As a result, this “consultation prior to implementation” BMP and the practices described above will result in a less-than-significant impact to seasonal wetland resources.

Impacts to other plants and animals utilizing vernal pools are provided in Chapter 5.

#### **4.2.4.1.5 Lagoon**

Lagoons, located at the mouths of creeks or rivers where they enter the ocean or bay, but isolated from the receiving waterbody by a berm, are indirectly influenced by the tide, which may cause freshwater to back up within the lagoon, and may also allow water to percolate through the berm, with the direction of such movement depending on water levels on either side of the berm. As a result, lagoons often contain a lens of freshwater at the surface and brackish water at the bottom. Lagoons may therefore contain species from both creeks and rivers, and from the receiving waterbodies. Amphibians are not likely to occur in lagoons due to elevated salt content, but could occur at the upstream end of the lagoon, within the backwater, but above the reach of the saline influence. Lagoons would support mosquitoes in areas of reduced circulation, often associated with emergent vegetation. Physical control in lagoons would include reconnecting isolated areas to the main lagoon. The BMPs in Table 4-5 have been and would continue to be applied to protect environmental resources by design. BMP G3 requires that all maintenance work will be done at times that minimize adverse impacts to nesting birds, anadromous fish, and other species of concern, in consultation with USFWS, NMFS, and CDFW. By implementing the Program as proposed, the effects of the Physical Control Component on resources within the lagoon would be less than significant.

#### **4.2.4.1.6 Tidal Marsh and Channels**

Tidal marsh and tidal channel habitats occur along the margins of San Francisco Bay in San Mateo County and are subject to tidal action. They are typically bounded by levees and water control structures. The San Francisco Bay-Delta once supported vast tracts of freshwater, brackish, and saline marsh habitat. The vast majority of these marsh habitats have been converted to human uses such as farming, industrial uses, and urban development. Some of the remaining marsh lands along the Highway 101 corridor are maintained and operated to provide habitat for wildlife. A few of these refuges include Bair Island in Redwood City, which is part of Don Edwards San Francisco Bay NWR (see Section 3.1.2), Bedwell Bayfront Park in Menlo Park, and Ravenswood Open Space Preserve/Pond SF2 and Ravenswood Open Space Preserve/Cooley Landing, both located in East Palo Alto. These wetlands can be important sources of mosquitoes seasonally. Special-status fish species including steelhead and longfin smelt could use these marshes. These tidal marshes, however, do not provide primary habitat for these species. No special-status amphibians or aquatic reptiles occupy these habitats.

Physical measures to control mosquitoes in these areas include maintenance of ditches and water control structures, removal of debris and weeds from existing channels, clearance of brush for access to areas to be treated, and filling small areas or improving drainage, as described in Chapter 2. Other measures include retaining water on the surface of the area, and rotational impoundment monitoring (RIM), which reduces mosquito populations by increasing the frequency with which suitable habitats are inundated and drained. The District works with landowners and property managers to accomplish these actions on an as needed basis. The District advises the landowner and property managers that these actions may require discussion with CDFW, NOAA Fisheries, or the USFWS and that these agencies should be contacted before work is initiated.

These activities have historically been conducted and would continue to be subject to the BMPs described in Table 4-5, relating to agency communication, environmental training, and pretreatment

screening, and the tidal marsh-specific BMPs would also be employed including conducting this work during appropriate seasons and times of day (when the tide is out and when Ridgway's rail and salt marsh harvest mouse are not nesting), making sure staff have appropriate training when working in the marsh, minimizing the use of mechanical equipment where practical. Channels that have substantial tidal flow and inundation would not support mosquitoes and thus would not need to be maintained. Fish would be absent from the channels during low tides, when the work would be conducted. Thus, fish would not be directly affected. Increasing circulation of water in low lying areas would not substantially affect fish populations. Improving drainage of low-lying areas within these managed areas, could decrease the likelihood that fish become trapped or stranded. Construction of channels could result in temporary increases in turbidity, which could adversely affect fish. BMPs to avoid discharge of unsuitable material and spoils would be implemented to control and localize this turbidity. They may include constructing new channels during periods when the marsh is dry or isolating areas where new channels are being constructed from the surrounding environment and other BMPs associated with the USACE 404 and other permits required for such work. Any increases in turbidity would be short term and temporary and, thus, would not substantially affect aquatic species.

#### **4.2.4.1.7 Temporary Standing Waters and Artificial Ponds**

Temporary standing waters refers to water ponding on an upland habitat because of rainfall or irrigation. Artificial ponds include stock ponds, golf course water hazards, or ornamental ponds. These habitats do not provide habitat for special-status fish species but may provide habitat for special-status amphibians and aquatic reptiles. While native fish species may occur in some artificial ponds, these ponds are not primary habitats for these species and do not contribute to the survival of the species. Furthermore, the District does not conduct physical control in stock ponds unless they are close to homes.

#### **4.2.4.1.8 Water and Wastewater Treatment Facilities**

Wastewater treatment facilities do not provide habitat for native or special-status fish species, although such facilities may lie close to suitable habitats in streams or the San Francisco Bay and connectivity may exist between the facility and the natural environment that could allow aquatic resources to enter the facility. The extent to which these species may enter these facilities is unknown. Because of the limited number of such facilities and the very limited use of such facilities by fish, amphibians, or aquatic reptiles, physical control measures are not anticipated to substantially affect these species.

Septic/onsite wastewater treatment systems and their associated leach fields do not provide habitat for native fish or special-status fish, amphibian, aquatic reptile or invertebrate species. This type of facility would only affect fish if they drained into a waterbody supporting fish, in which case the physical control measures for freshwater habitats would apply; however, these systems do not drain to other waterbodies within the District's Service Area.

Flood control channels and ditches may support special-status species where they have standing water for sufficient periods of time and have suitable physical and vegetative structure. Physical management activities would be designed to reduce ponding of water within these areas. The application of the BMPs in Table 4-5, particularly those pertaining to agency communication, pretreatment screening, and environmental training, would continue to be implemented as part of the Proposed Program and are designed to avoid impacts to any special-status species that might occur in these habitats.

#### **4.2.4.1.9 Artificial Containers, Temporary Standing Waters, and Ornamental Ponds**

Artificial containers do not provide habitat for fish or support populations of native or special-status fish, amphibians, or aquatic reptiles. Thus, physical control of artificial containers (ensuring that these containers do not hold water for a sufficient period to support mosquito larvae) would have no impact on these species or their habitat.

Temporary standing waters refers to water ponding on an upland habitat because of rainfall or irrigation. The District rarely performs physical control activity in these waters. Ornamental ponds are small ponds with artificial bottoms. These habitats do not provide habitat for special-status aquatic species.

#### 4.2.4.1.10 Impact Determinations for Special-Status Species and Habitats

**Impact AR-7.** The Physical Control Component, would have a **less-than-significant** impact, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species. No mitigation is required.

**Impact AR-8.** The Physical Control Component would have a **less-than-significant** impact on any riparian habitat or other sensitive natural community. No mitigation is required.

**Impact AR-9.** The Physical Control Component would have a **less-than-significant** impact on federally protected wetlands as defined by CWA Section 404. No mitigation is required.

#### 4.2.4.2 Effects on Movement and Migration

Physical changes in the habitat would have the potential to affect fish migration. However, these changes would tend to enhance migration, opening routes, not closing them. This component would likely benefit the movement of fish and other aquatic species, as it would deepen channels and improve flow. This effect would occur within restricted areas and would not substantially alter migratory pathways or success. Additional disruption of migration patterns may occur due to the presence of personnel and machinery in the environment. In all cases this would be a short-term occurrence, generally not more than a few days in any given location and, therefore, this effect would be minimal and would have little effect on the movement of fish and other aquatic species. Nor would it impact any native resident or migratory wildlife corridors or impede the use of native wildlife nursery sites.

**Impact AR-10.** The Physical Control Component would have a **less-than-significant** impact on the movement of any native resident or migratory fish or wildlife species. No mitigation is required.

#### 4.2.4.3 Conflict with Local Ordinances

The county and city general plans and their goals pertaining to natural resources are protective of terrestrial resources and focused on conservation of existing resources including mature trees and important woodland communities. Physical control activities would not result in the conversion of natural habitats to other land uses or in the long-term or permanent dislocation of plant and animal species from natural areas except for mosquitoes and vectors of disease and discomfort. The Physical Control Component would not affect trees more than 4 inches diameter breast height and, therefore, would not conflict with local tree ordinances.

**Impact AR-11.** The Physical Control Component would have **no impact** on local policies or ordinances protecting aquatic resources.

#### 4.2.4.4 Conflict with Conservation Plans

One conservation plan, the San Bruno Mountain HCP located in San Mateo County, was identified whose action area is within the District's primary Service Area. This HCP addresses impacts to three endangered species: San Bruno elfin butterfly, mission blue butterfly, and SFGS over 3,500 acres on San Bruno Mountain in San Mateo County for a duration of 30 years.

The District conducts limited physical control operations within the area covered by this HCP on San Bruno Mountain, which has no aquatic habitat, and it is unlikely that the District's mosquito control activities would occur within this HCP's boundaries. However, control for ticks, yellow jackets, wasps, and rodents may involve accessing portions of the mountain in close proximity to roads and adjacent hiking trails and residences. ATV use for control (trapping) would be avoided. While District activities may occur

within the boundaries of conservation areas, these activities are coordinated with the plan managers and would not conflict with the provisions of any adopted HCP, NCCP, or other approved local, regional, or state habitat conservation plan.

The District regularly communicates with and works collaboratively with representatives from agencies such as RWQCB, USEPA, USACE, CDFW, and USFWS. The District receives training from agency staff and independent biologists (e.g., CDFW, USACE) to minimize impacts and conducts annual field training for field staff regarding precautionary and avoidance measures related to vernal pool habitat and other seasonal wetland and wetland habitats, but this habitat is not present on San Bruno Mountain. While District activities may occur within the boundaries of conservation areas, these activities are coordinated with the plan managers and would not conflict with the provisions of any adopted HCP, NCCP, or other approved local, regional, or state habitat conservation plan.

Eleven conservation plans affect portions of adjacent counties. District activities are typically not among those covered by these HCPs. When called into these adjacent counties to perform work, the District would operate under the auspices of the affected county or that county's mosquito and vector control district and in compliance with their practices and permits, including compliance with all active HCP/NCCPs. Therefore, the District activities would not be in conflict with the provisions of any adopted HCP, NCCP, or other approved local, regional, or state-approved conservation plan.

**Impact AR-12.** The Physical Control Component would have a **less-than-significant** impact on adopted HCPs or NCCPs. No mitigation is required.

#### **4.2.5 Vegetation Management Component**

The vegetation within and surrounding aquatic habitats is an important component of the aquatic ecosystem. This vegetation provides shade, helping to keep the water cool; increases structure and habitat complexity; and contributes organic material and insect drop, subsidizing the food web. It provides fish and other aquatic organisms with cover from aquatic and terrestrial predators and provides visual separation that increases the density of territorial species. Vegetation also helps slow runoff from the surrounding land surface, protecting the aquatic environment from sediments and toxins that may wash in from upland areas.

Vegetation management involves the trimming or removal of vegetation to improve access, and to improve water circulation to areas that support mosquito breeding and improve access to natural predators, so that chemical treatments are not required. All such work is done in coordination with the landowner or land manager and the resource agencies, as required. Permits are generally required for this type of activity, and this work would only be initiated after all necessary permits and applicable subsequent environmental review clearances are obtained. All areas are prescreened to determine the potential presence of special-status species and to develop appropriate measures to avoid or minimize effects to these species. The vast majority of this vegetation management work is conducted manually and encompasses only a small area. Occasionally, larger areas of vegetation may be removed using equipment, such as a tractor with mower attachment that the District may acquire in the future. This type of equipment is typically used at a small number of sites to mow access paths in dense stands of cattails in seasonal wetlands and retention basins and infrequently in riparian habitat to mow access paths through dense stands of blackberry and poison oak to facilitate surveillance and the application of larvicides. This vegetation management work is typically done in the fall to avoid the breeding season for birds and other species. The District is in communication with resource agencies prior to performing this type of work. "Mechanized" vegetation management using equipment is typically restricted to ditches, wastewater ponds and stormwater retention basins or areas. The District will ensure that all required permits are in place before vegetation management activities are undertaken. Short-term (a few days to a week) increases in noise could result from the operation of heavy equipment under this component. This would be expected to have the largest effect on adult amphibians and aquatic reptiles when they are out of the water (or terrestrial animals, discussed in Chapter 5), and would cause them to move away from the work area. Most of this work will be conducted when the area is

dry or otherwise isolated from active waterways, so impacts to purely aquatic organisms from noise and vibration are not expected to occur.

The District preferentially uses physical control methods for vegetation management and uses herbicides (and some adjuvants) in limited areas (primarily as spot treatment) for vegetation management in natural environments. The District may use herbicides in artificial or urban environments (i.e., flood control channels, stormwater retention basins, and roadside ditches). These chemicals would be used in strict compliance with label requirements and District BMPs. As indicated in Table 4-6 below, a number of herbicides have low toxicity to fish and other aquatic organisms. These herbicides would be used in areas near aquatic environments potentially supporting native or special-status fish species and other aquatic organisms.

**Table 4-6 Herbicide Toxicity<sup>1,2</sup> to Fish and Aquatic Invertebrates**

Chemical	Toxicity to	
	Fish	Aquatic Invertebrates
Imazapyr, glyphosate, sulfometuron methyl, DCPA (chlorthal dimethyl), modified vegetable/plant oils, lecithin	Low	Low
Oryzalin, triclopyr (triclopyr acid, TEA)	Moderate	Moderate
Benfluralin, alkylphenol ethoxylates (APEs)	High	High
Dithiopyr	Unknown	Unknown

<sup>1</sup> Toxicity information is summarized from the information provided in Appendix B (Table 6-1).

<sup>2</sup> The toxicity data are derived from rigidly controlled laboratory animal studies designed to determine the potential adverse effects of the chemical under several possible routes of exposure (see Appendix B for further information). In these studies, the species of interest is continuously exposed to 100 percent chemical at several doses. In actual practice, the amounts applied in the District’s Program Area are substantially less than the amounts used in the toxicity studies, and organisms are not continuously exposed to the chemical. Furthermore, actual application rates by the District may be less than label requirements. Thus, the laboratory test results do not provide a realistic assessment of field exposure.

Herbicides with moderate to high toxicity to fish and other aquatic organisms that would have potentially significant impacts to fish and aquatic invertebrates (because of their moderate to high toxicity characterizations based on laboratory studies) would not be used in these areas, but may be used in less sensitive areas where needed. Table 2-1 lists the types of sites for their use which include noncroplands, industrial sites, ditches, and wastewater and waste ponds tops and exterior slopes. One formulation of triclopyr TEA (Renovate 3) has been approved now for use in aquatic habitats and would not pose a significant impact under label restrictions and District application BMPs. Additionally, limited information is available regarding the toxicity of dithiopyr on aquatic organisms. The use of this herbicide in and around aquatic environments will be avoided until the product is shown to be nonhazardous to aquatic organisms.

The District may use glyphosate on a limited, infrequent basis to reduce vegetation at sites for mosquito source control. Although some recent concerns have been expressed about possible sublethal effects of glyphosate products (e.g., endocrine disruption in humans, see Section 7.2.5.1.), it is virtually nontoxic to mammals and practically nontoxic to birds, fish, and invertebrates on an acute basis (USEPA 1993). Claims that glyphosate is destroying bee and butterfly populations have not been substantiated (USEPA 1993). The use of glyphosate to control milkweed, which is a severe problem for farmers, may be connected to loss of foraging vegetation and, thereby, indirectly impacting butterfly populations. However, this effect is an indirect effect and not actually toxicity to the butterflies from glyphosate (Keim 2014). The District is not removing milkweed. When used as proposed as part of the District’s Program, which incorporates BMPs and targeted application techniques, glyphosate can be used without risk to environmental health. The proposed use ensures an adequate buffer (>15 feet) to water sources will be maintained for terrestrial use products that pose a risk to aquatic species (i.e., glyphosate is much more toxic to fish and aquatic invertebrates than to

mammals, birds, or terrestrial invertebrates (USEPA 1993)), and a formulation specifically designed for use in aquatic environments (AquaMaster) will be used if needed in the future..

See Section 6.2.5 for further analysis of the herbicides and adjuvants that could be used on a limited basis for vegetation management. The herbicides the District would potentially use are discussed in detail in Appendix B (Section 4.6) and are listed in Table 2-1 with the active ingredients listed in Table 6-2. An adjuvant is any compound that is added to an herbicide (or pesticide) formulation or tank mix to facilitate the mixing, application, or effectiveness of that herbicide. Adjuvants can either enhance activity of an herbicide's active ingredient (activator adjuvant) or offset any problems associated with spray application, such as adverse water quality or wind (special purpose or utility modifiers). Activator adjuvants include surfactants, wetting agents, sticker-spreaders, and penetrants. The environmental fate and toxicity of adjuvants the District may use are described in detail in Appendix B (Section 4.7) and listed in Table 6-3.

#### **4.2.5.1 Impacts to Special-Status Species and Habitats**

The District would conduct vegetation management work infrequently in or adjacent to creeks, rivers, ponds, lakes, marshes, and other wetlands that may require permits from the USACE, RWQCB, CDFW, USFWS, NOAA Fisheries, and others. Work would not begin until all required permits are obtained. The potential effects of this component on these aquatic habitats are described below.

Mosquitoes are part of the food web and their loss may reduce the food base for some predators. Although mosquitoes serve a role as one of many types of prey items for some fish, avian insectivores, bats, and small reptiles and amphibians, the reduction of mosquito abundance over a small area will not affect the predator populations overall, because these species generally have large foraging ranges and can find other prey sources within the range of their habitat use (Williams et al. 1994). (See Section 2.8, Biological Control Predators, of Appendix E, Alternatives Analysis Report, for references on studies of gut contents of mosquito predators.)

##### **4.2.5.1.1 Creeks and Rivers and Riparian Corridors**

Because their rapid currents do not provide suitable habitat for mosquitoes, creeks and rivers generally do not support substantial numbers of mosquitoes, although, some mosquitoes can be found in slow eddies and back channels, or in pools isolated on the banks as flows recede. Creeks and rivers may support special-status species including tidewater goby, steelhead, Coho salmon, California red-legged frog, foothill yellow-legged frog, CTS, aquatic reptiles, and other species, as indicated in Table 4-3, Table 5-3, and Table 5-4. Isolated ponds and back channels may provide habitat for mosquito larva, but these areas may also provide excellent rearing habitat for young fish and amphibians, as they provide warmer water temperatures, higher primary productivity, and protection from predaceous fish.

Mosquito control work in creeks is restricted to sections of creek that run through, or directly next to, homes or businesses in urban or suburban areas. Work is confined to making paths so that technicians can travel through creeks to do inspections and control. Vegetation that requires management would typically be confined to channel margins and backwaters with slow currents. This activity would be done in coordination with landowners or land managers and resource agencies, as well as following the BMPs described in Table 4-5 relating to environmental training, pretreatment screening, disturbance minimization, habitat- and species-specific BMPs, and vegetation management-specific BMPs. This would result in less-than-significant impacts to fish, amphibians, and aquatic reptiles associated with creeks and streams.

##### **4.2.5.1.2 Ponds and Lakes**

The freshwater habitats that could be treated include the margin of reservoirs and ponds (including artificial ponds such as golf course ponds or stock ponds with natural bottoms). These areas are generally man-made habitats, and if they support fish, these fish will largely consist of introduced species, or stocked native species such as rainbow trout. While rainbow trout are native to the region, these stocked fish are not

considered to be natural populations, and are treated as introduced fish. Amphibians (i.e., California red-legged frog and CTS) and aquatic reptiles (SFGS and western pond turtles) may also use these reservoirs and ponds, particularly if these areas do not support large fish that may prey on juveniles.

Vegetation management would be limited in this habitat type, except in smaller ponds, as the depth and size of these areas would typically preclude emergent vegetation from exceeding 30 percent of the surface area. Where necessary, vegetation management activities (including control of cattails) would be implemented in stagnant areas along the edges of these habitats where mosquito larvae eggs and larvae occur, as described in Section 2.3.3. Special-status fish species would not be impacted in reservoirs and ponds, and ditches, as these species do not occur in these habitats. Amphibians would likely not be present in lakes or ponds supporting fish, but may be present in some areas. Vegetation management could reduce cover for these species and increase their vulnerability to predation, but substantial areas of similar habitat would remain.

The scope of the District's vegetation management work in these areas would be dictated by the BMPs in Table 4-5 relating to agency communication, environmental training, and pretreatment screening. Vegetation management -specific BMPs would be applied. The species-specific BMPs in Table 4-5 may also be applied, including seasonal avoidance measures. When carried out as proposed, the effects of vegetation control activities would be less than significant.

#### **4.2.5.1.3 Freshwater Marsh/Seeps**

Freshwater marsh and seeps may provide ideal habitat for mosquito breeding due to their substantial areas of shallow water, limited circulation, and emergent vegetation. These areas may potentially support a number of native and nonnative fish, amphibians (CRLF and CTS), and reptiles (SFGS), as indicated in Table 4-3 and Table 5-4. Vegetation management in these areas would have the same potential effects as described for lake and pond habitats and would be avoided or minimized by the BMPs in Table 4-5 relating to agency communication, environmental training, and pretreatment screening. The vegetation management and species-specific BMPs in Table 4-5 may also be applied, including seasonal avoidance measures. When carried out as proposed, the effects of this activity would be less than significant.

#### **4.2.5.1.4 Seasonal Wetlands (includes Vernal Pools)**

Seasonal wetlands, including vernal pools, may also support substantial stands of emergent vegetation, although these areas are typically not inundated for long enough periods to support dense stands of vegetation preferred by mosquitoes. As a result, these areas are unlikely to be subject to vegetation management actions. Mosquito control work in or near vernal pools is conducted on foot. If vegetation management activities were required, the BMPs in Table 4-5 relating to agency communication, environmental training, and pretreatment screening would be applicable and restrict the scope of the District's implementation.

The District has no plans to conduct vegetation management control operations within the area covered by the San Bruno Mountain HCP. The District regularly communicates with and works collaboratively with agencies such as RWQCB, USEPA, USACE, CDFW, and USFWS. The District receives training from agency staff and independent biologists (e.g., CDFW, USACE) to minimize impacts and conducts annual field training for field staff regarding precautionary and avoidance measures related to wetland habitat, although this habitat is not present on San Bruno Mountain.

From Table 4-5, the vegetation management-specific BMPs would be incorporated. The species-specific BMPs may also be triggered, including seasonal avoidance measures. When carried out as proposed, the effects of this action would be less than significant.

#### **4.2.5.1.5 Lagoon**

Lagoons would support mosquitoes in areas of reduced circulation, often associated with emergent vegetation. Vegetation management in lagoons would be subject to the BMPs in Table 4-5 to avoid or minimize impacts to environmental resources. When carried out as proposed, the effects of the Vegetation Management Component on biological resources within lagoons would be less than significant.

#### **4.2.5.1.6 Tidal Marsh and Channels**

Vegetation management activities are conducted in coordination with the Coastal Conservancy at their request and generally focuses on the removal of cordgrass, a nondesired species. Otherwise the District does not conduct vegetation management activity in tidal marshes. This work is done using hand tools and in accordance with the BMPs identified in Table 4-5, relating to agency coordination, environmental training, pretreatment screening, disturbance minimization, tidal marsh and species-specific BMPs, and vegetation management-specific BMPs. With limited activity and when carried out as proposed, the effects of the Vegetation Management Component on biological resources within tidal marshes would be less than significant.

#### **4.2.5.1.7 Water and Wastewater Treatment Facilities**

Vegetation management activities may occur in coordination with the owners or operators of wastewater treatment facilities or septic systems. These facilities do not provide habitat for native or special-status fish or other aquatic species, although such facilities may lie close to suitable habitats in streams or the San Francisco Bay Delta system and connectivity may exist between the system and the natural environment that could allow aquatic resources to enter the system. The extent to which these species may enter these facilities is unknown. Because of the limited number of such facilities and the very limited use of such facilities by fish, amphibians, or aquatic reptiles, vegetation management measures would have a less-than-significant impact on aquatic resources.

Winery waste ponds generally contain waste from grape pressings and wash water from cleaning winery equipment. These ponds generally do not provide suitable habitat for special-status species, as they are highly managed and often suffer from low water quality. Vegetation within the waste ponds and septic system drain fields must be managed to prevent the creation of risks to public health when the ponds are in close proximity to residences. The District provides input to landowners/facility managers relating to controlling mosquitoes and other vectors associated with the ponds and winery operations. The District may ask the landowner to implement vegetation management measures where appropriate. Because of the poor quality habitat provided and because physical control activities would rarely be conducted in these waste ponds, there is little likelihood of impacts to special-status species.

Flood control channels and ditches may support special-status species where they have standing water for sufficient periods of time and have suitable physical and vegetative structure. When carrying out these activities the BMPs in Table 4-5 would apply, particularly those pertaining to agency communication, pretreatment screening, and environmental training, which would avoid impacts to any special-status species that might occur in these habitats by design.

#### **4.2.5.1.8 Artificial Containers, Temporary Standing Waters, and Ornamental Ponds**

Temporary standing waters refers to water ponding on an upland habitat because of rainfall or irrigation. Artificial ponds include stock ponds, golf course water hazards, or ornamental ponds. Vegetation management would not be performed for artificial containers, temporary standing waters or ornamental ponds, as these areas would not support substantial stands of vegetation, unless such waters are in close proximity to homes.



#### 4.2.5.1.9 Impact Determinations for Special-Status Species and Habitats

**Impact AR-13.** The Vegetation Management Component would have a **less-than-significant** impact, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species. No mitigation is required.

**Impact AR-14.** The Vegetation Management Component would have a **less-than-significant** impact on any riparian habitat or other sensitive natural community. No mitigation is required.

**Impact AR-15.** The Vegetation Management Component would not result in the direct removal, filling, or hydrological interruption of federally protected wetlands as defined by CWA Section 404. As such, this component would have a **less-than-significant** impact on these resources. No mitigation is required.

#### 4.2.5.2 Effects on Movement and Migration

This component could have a small effect on the migration of wildlife and movement and migration corridors. The removal of small areas of vegetation would not substantially affect movement corridors, but the presence of personnel and machinery may result in short-term avoidance of active work areas. In all cases this would be a short-term occurrence, generally not more than a few days in any given location and, therefore, this effect would be minimal and would have little impact on the movement of any native resident or migratory fish or wildlife and would not impact wildlife migration corridors or nursery areas, as little to no physical disturbance would occur.

**Impact AR-16.** The Vegetation Management Component would have a **less-than-significant** impact on the movement of any native resident or migratory fish or wildlife species. No mitigation is required.

#### 4.2.5.3 Conflict with Local Ordinances

The county and city general plans and their goals and policies pertaining to natural resources are protective of aquatic resources and focused on conservation of existing resources. Vegetation management activities would not result in the conversion of natural habitats to other land uses or in the long-term or permanent dislocation of plant and animal species from natural areas except indirectly for mosquitoes and vectors of disease and discomfort. Vegetation removal would not affect trees more than 4 inches diameter at breast height and, therefore, would not conflict with local tree ordinances.

**Impact AR-17.** The Vegetation Management Component would have **no impact** on local policies or ordinances protecting biological resources.

#### 4.2.5.4 Conflict with Conservation Plans

One conservation plan, the San Bruno Mountain HCP located in San Mateo County, was identified whose action area is within the District's primary Service Area. This HCP addresses impacts to three endangered species: San Bruno elfin butterfly, mission blue butterfly, and SFGS (SFGS) over 3,500 acres on San Bruno Mountain for a duration of 30 years.

The District conducts limited control operations within the area covered by this HCP on San Bruno Mountain, which has no aquatic habitat; and it is unlikely that the District's mosquito control activities would occur within this HCP's boundaries. However, if control for ticks, yellow jackets, wasps, and rodents became necessary to protect public health, then vegetation management may involve accessing portions of the mountain in close proximity to roads and adjacent hiking trails and residences and in consultation with San Mateo County Department of Parks. ATV use for surveillance would be avoided.

The District regularly communicates with and works collaboratively with representatives from agencies such as RWQCB, USEPA, USACE, CDFW, and USFWS. The District receives training from agency staff and independent biologists (e.g., CDFW, USACE) to minimize impacts and conducts annual field training for field staff regarding precautionary and avoidance measures related to seasonal wetland and wetland habitats, but this habitat is not present on San Bruno Mountain. While District activities may occur within the boundaries of conservation areas, these activities are coordinated with the plan managers and would not conflict with the provisions of any adopted HCP, NCCP, or other approved local, regional, or state habitat conservation plan.

Eleven conservation plans affect portions of adjacent counties. District activities are typically not among those covered by these HCPs. When called into these adjacent counties to perform work, the District would operate under the auspices of the affected county or that county's mosquito and vector control district and in compliance with their practices and permits, including compliance with all active HCP/NCCPs. Therefore, the District activities would not be in conflict with the provisions of any adopted HCP, NCCP, or other approved local, regional, or state-approved conservation plan.

**Impact AR-18.** The Vegetation Management Component would have a **less-than-significant** impact on adopted HCPs or NCCPs. No mitigation is required.

#### **4.2.6 Biological Control Component**

This component consists of the introduction of mosquito predators, specifically mosquitofish (*Gambusia affinis*), into habitats occupied by mosquito larvae. These fish are ideal candidates for this use because they are highly tolerant of a wide range of temperature and water quality conditions, they can reproduce rapidly, and they are highly effective at locating and consuming mosquito larvae. Mosquito control agents such as Bs (a live bacteria) or Bti, and *Saccharopolyspora spinosa* (bacteria byproducts) may be considered biological controls, but are regulated by USEPA. Therefore, they are addressed in the Chemical Control Component. Currently, no commercial biological control agents or products are available for wasp and yellow jacket control, and the District does not employ predators (e.g., cats) for rodent control.

##### **4.2.6.1 *Impacts to Special-Status Species***

Mosquitofish are also opportunistic omnivores, eating other invertebrates when they are more abundant and feeding on algae during times when insects are not abundant. This species can affect aquatic food webs. They are known to feed on fish and amphibian eggs and larvae (Moyle 2002; Nico et al. 2013). Mosquitofish can compete with other small fish for food and can also prey on other fish and insect mosquito predators when those species are present.

The District's purchase and use of mosquitofish in a given situation is given careful consideration with regard to the potential ecological consequences of such introductions. District policy is to limit the use of mosquitofish to artificial aquatic habitats (e.g., ornamental fish ponds, water troughs, water gardens, fountains, waste and industrial ponds, and unmaintained swimming pools) that do not connect to natural waterbodies and, therefore, where they do not pose a threat to natural environments or native fish and amphibians. Other types of isolated man-made ponds that do not provide habitat that could support native species could be treated with mosquitofish. These artificial habitats are not included in HCP/NCCPs. Mosquitofish would not be introduced into any of the other habitat types.

**Impact AR-19.** The Biological Control Component would have **no impact**, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species.

#### **4.2.6.2 Impacts to Habitats**

The use of mosquitofish under the Biological Component would not affect any natural habitats or result in the presence of District personnel or equipment in natural habitats. Therefore, it would not affect the quantity or distribution of habitats, such as riparian areas, marshes, lakes or ponds, seasonal wetlands, or habitat types identified in local or regional plans, policies, regulations, or by the CDFW or USFWS. This component would not affect the composition of their vegetative community. This component would not result in any ground-disturbing activity and, therefore, would not result in any removal, filling or hydrologic interruption of federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.).

**Impact AR-20.** The Biological Control Component would have **no impact** on any riparian habitat or other sensitive natural community.

**Impact AR-21.** The Biological Control Component would have **no impact** on federally protected wetlands as defined by CWA Section 404.

#### **4.2.6.3 Effects on Movement and Migration**

This component would not occur in natural environments and would have no effect on the movement of wildlife and would not affect wildlife migration or movement corridors. Nor would it impact any native resident or migratory wildlife corridors or impede the use of native wildlife nursery sites.

**Impact AR-22.** The Biological Control Component would have **no impact** on the movement of any native resident or migratory fish or wildlife species.

#### **4.2.6.4 Conflict with Local Ordinances**

The county and city general plans and their goals pertaining to natural resources are protective of aquatic resources and focused on conservation of existing resources. Biological control activities with mosquitofish would not result in the conversion of natural habitats to other land uses or in the long-term or permanent dislocation of plant and animal species from natural areas except for mosquitoes and vectors of disease and discomfort. This component would not affect trees more than 4 inches diameter breast height and, therefore, would not conflict with local tree ordinances.

**Impact AR-23.** The Biological Control Component would have **no impact** on local policies or ordinances protecting biological resources.

#### **4.2.6.5 Conflict with Conservation Plans**

Biological control with mosquitofish would not be implemented within the boundaries of the San Bruno Mountain HCP or the other eleven conservations plans in adjacent counties, unless appropriate protocols as required by the USFWS demonstrated that special-status species did not occupy that habitat and such habitat did not connect to other waters that could support special-status species. When called into adjacent counties to perform work, the District would operate under the auspices of the county or that county's mosquito and vector control district and in compliance with their practices and permits, including compliance with all active HCP/NCCPs. Therefore, the District activities would not be in conflict with the provisions of any adopted HCP, NCCP, or other approved local, regional, or state-approved conservation plan.

**Impact AR-24.** The Biological Control Component would have **no impact** on approved HCPs, NCCPs, or local conservation plans.

#### **4.2.7 Chemical Control Component**

The Chemical Control Component would be primarily a continuation of existing activities using applicable techniques, equipment, vehicles, watercraft, and aircraft. A wide variety of chemicals and formulations are available for use to control mosquitoes and other vectors. These chemicals can be used as mosquito larvicides, adulticides, or both. Chemical control is also used to control nuisance populations of yellow jackets, ticks, and rodents.

Chemical control is a Program tool that consists of the application of nonpersistent insecticide products demonstrated to reduce populations of larval or adult mosquitoes and other vectors (e.g., yellow jacket wasps and ticks). Yellow jacket control is strictly at the request of the property owner and not on a large scale. It involves the removal, by chemical means, of individual nests that threaten human safety. The District has occasionally done demonstration projects with poison baits for yellow jackets, using small amounts of encapsulated insecticides in protein baits in tamper-resistant bait stations designed for yellow jackets. Tick control is conducted on a very limited basis at the request of parks, private landowners or schools and primarily as a demonstration project. In the case of rodents, it would involve bait in bait blocks (underground) and bait stations (aboveground).

If and when inspections reveal that mosquitoes or other vector populations are present at levels that trigger the District's guidelines for chemical control – based on the vector's abundance, density, species composition, proximity to human settlements, water temperature, presence of predators and other factors – staff will apply pesticides to the site in strict accordance with the pesticide label instructions and the BMPs summarized in Section 4.2.2 and listed in Table 4-5. The threshold criteria/guidelines for these response triggers are based on previous documentation and monitoring/current surveillance of likely vector outbreaks or population expansions. Additional response triggers are based on verified mosquito/vector populations, outbreaks, discomfort and irritation issues for humans and animals, and public concern about vectors. Refer to the District's IMVMP Plan for larval and adult mosquito treatment criteria.

The toxicity data included in the tables in this section are generally derived from rigidly controlled laboratory animal studies designed to determine the potential adverse effects of the chemical under several possible routes of exposure. In these studies, the species of interest is exposed to 100 percent chemical at several doses to determine useful information such as the lowest concentration resulting in a predetermined adverse effect (lowest observed adverse effect level [LOAEL]) on numerous selected physiological and behavioral systems. The second component of these tests is to determine the highest concentration of chemical that results in no measurable adverse effect (no observed adverse effect level [NOAEL]). However, these, and other, coordinated and focused laboratory tests are designed to document the effects of the chemical when a continuous, controlled, exposure exists and do not realistically reflect the likely exposures or toxicity in the District field application scenarios. As such, the toxicity information is intended as an overview of potential issues and guidance for understanding the completely "safe" maximum exposure levels of applications that would not adversely impact humans or nontarget plant and animal species.

Although the regulatory community uses this basic information to provide a relative comparison of the potential for a chemical to result in unwanted adverse effects and this information is reflected in the approved usage labels and MSDSs, in actual practice, the amounts applied in the District's Program Area are often substantially less than the amounts used in the laboratory toxicity studies. Because of the large safety factors used to develop recommended product label application rates, the amount of chemical resulting in demonstrated toxicity in the laboratory is much higher than the low exposure levels associated with an actual vector control application. The application concentrations consistent with the labels or MSDSs are designed to be protective of the health of humans and other nontarget species (i.e., low enough to not kill them, weaken them, or cause them to fail to reproduce). However, adverse effects may still occur to some nontarget organisms. This potential impact is ameliorated by having the application concentrations consistent with the labels or MSDSs (now SDSs). These documents are designed to protect the health of humans and other nontarget species. The careful use of the other pesticide

application BMPs, and advance planning by the District further mitigates impacts (see Sections 6.2.5 and 6.2.7 where the potential impact analyses are provided).

This assessment also considers the physical and biological connections between treatment areas and aquatic ecosystems. These chemicals are assessed by the vectors they are primarily used to control, and are grouped within these vectors into classes based on their composition, mechanism of action, and relative effect on aquatic resources (Table 4-7). This section focuses on the potential impacts of these chemicals on fish amphibians, aquatic reptiles, and nontarget aquatic invertebrates. These chemicals are discussed in greater detail in Chapter 6, Ecological Health, and Appendix B. Table 4-7 (Chemical Classes and their Toxicity to Fish and Nontarget Aquatic Invertebrates) represents an initial threshold for determination of potentially significant impacts. Chemicals with a moderate to high toxicity to fish and/or aquatic invertebrates may pose potentially significant impacts initially to aquatic organisms based on laboratory studies, and they are evaluated further based on the physical context of their proposed use (i.e., location of potential use, concentration, timing, and District application methods and practices) in order to make appropriate significance determinations for this PEIR. Note that in Table 4-7, the pesticide under consideration for future use are in addition to those that are currently in use.

These chemicals are used in accordance with all applicable BMPs as described in Section 2.9.1, CDPH's *Best Management Practices for Mosquito Control in California*, the Statewide General NPDES Vector Control Permit (SWRCB 2011a and 2012), and District-specific BMPs as indicated in the PAP. All of these measures are designed to minimize impacts to nontarget organisms. The chemicals would be applied in strict accordance with label directions, and BMPs contained in Table 4-5, including those relating to worker environmental awareness training, and disturbance minimization measures. The specific BMPs covering "Applications of Pesticides, Surfactants, and/or Herbicides" would be implemented, as would appropriate habitat- and species-specific BMPs. When implemented as proposed, the Chemical Control Component would not result in adverse effects to special-status species or their habitats. Furthermore, populations of other species would not be impacted as well.

**Table 4-7 Chemical Classes and their Toxicity<sup>1</sup> to Fish and Nontarget Aquatic Invertebrates**

Class	Chemical	Mechanism of Action	Toxicity to	
			Fish	Nontarget Invertebrates
<b>Mosquito Larvicides Currently in Use</b>				
Bacterial Larvicides	Bs, Bti, spinosad	Paralyzes gut	Low	Low
Bacterial Larvicides	Spinosad	Disrupts central nervous system	Low	Low to Moderate
Hydrocarbon esters	Methoprene and s-methoprene	Interferes with maturation process of insects	Moderate	High
Surfactants	Biodegradable alcohol ethoxylated surfactant	Drowns larvae	Very low	Affects Only Surface Breathing Insects
<b>Mosquito Adulticides Currently in Use</b>				
Pyrethroids	Pyrethrins, phenothrin, deltamethrin, resmethrin, etofenprox	Interferes with operation of sodium channels in insect neurons	High	High
Synergist	Piperonyl butoxide	Synergist. Enhances operation of other active ingredients by inhibiting their breakdown	Moderate to High	High
<b>Mosquito Adulticides Under Consideration for Future Use</b>				
Pyrethroids	Prallethrin, permethrin	Interferes with operation of sodium channels in insect neurons	High	High
Organophosphates	Naled	Cholinesterase inhibitor	Moderate	Moderate
<b>Yellow Jackets and/or Ticks chemicals Currently in Use</b>				
Pyrethroids	Lambda-cyhalothrin, pyrethrins, allethrins, phenothrin, prallethrin, deltamethrin, tetramethrin, permethrin	Interferes with operation of sodium channels in insect neurons	High	High
Synergist	Piperonyl butoxide	Synergist. Enhances operation of other active ingredients by inhibiting their breakdown	Moderate to High	High

**Table 4-7 Chemical Classes and their Toxicity<sup>1</sup> to Fish and Nontarget Aquatic Invertebrates**

Class	Chemical	Mechanism of Action	Toxicity to	
			Fish	Nontarget Invertebrates
<b>Yellow Jackets and/or Ticks Chemicals Under Consideration for Future Use</b>				
Pyrethroids	Etofenprox, esfenvalerate	Interferes with operation of sodium channels in insect neurons	High	High
Potassium salts	Potassium Salts of Fatty Acids	Disrupts cell membranes	Low	High
<b>Rodenticides Currently in Use</b>				
Anticoagulants	Diphacinone, brodifacoum, bromadiolone	Blocks vitamin K cycle, causing death by hypovolemic shock or severe anemia	Low to High	Moderate to High
Central nervous system toxicant	Bromethalin	Uncouples oxidative phosphorylation	Unknown	Unknown
<b>Rodenticides Under Consideration for Future Use</b>				
Anticoagulants	Chlorophacinone, difethialone	Blocks vitamin K cycle, causing death by hypovolemic shock or severe anemia	Low to High	Moderate to High
Fumigants	Sulphur, sodium nitrate	Cause asphyxiation	Nontoxic	Nontoxic
Miscellaneous	Cholecalciferol	Causes calcification of soft tissues	Low	Moderate

<sup>1</sup> Toxicity information is summarized for each group from the information provided in Appendix B (Table 6-1).

<sup>2</sup> The toxicity data are derived from rigidly controlled laboratory animal studies designed to determine the potential adverse effects of the chemical under several possible routes of exposure (see Appendix B for further information). In these studies, the species of interest is continuously exposed to 100 percent chemical at several doses. In actual practice, the amounts applied in the District's Program Area are substantially less than the amounts used in the toxicity studies and organisms are not continuously exposed to the chemical. Furthermore, actual application rates by the District may be less than label requirements. Thus, the laboratory test results do not provide a realistic assessment of field exposure.

Pesticides may be applied using motorized equipment including trucks, ARGOs, watercraft, and helicopters (or fixed-wing aircraft in the future if needed) operating at low altitudes. For example, mosquito larvicides are applied by helicopter over cattail ponds. Each application is expected to take less than a day (perhaps two days for larger areas), and thus the noise effects would be temporary. This would be expected to have the largest effect on adult amphibians when they are out of the water (or on terrestrial animals, discussed in Chapter 5), and would cause them to move away from the work area. Impacts to purely aquatic organisms from noise and vibration are not expected to occur.

#### **4.2.7.1 Impacts to Special-Status Species**

##### **4.2.7.1.1 Mosquito Larvicides**

Mosquito larvicides are applied to aquatic and wetland environments that surveillance has identified as having substantial concentrations of mosquito larvae. Larvicides may be applied in any of the aquatic and wetland habitat types previously listed. Special care is used when treating vernal pool habitats because of the number of special-status invertebrate species endemic to these habitats. Although there are limited areas with vernal pools in San Mateo County, the District may apply Bti and Bs products. If mosquitoes reach the late stages of development in the larval cycle, methoprene may be applied (e.g., methoprene liquid). Surfactants (i.e., oils or monomolecular films) are typically not applied to vernal pools; however an application of these materials to wetlands and aquatic habitats may be considered if an abundance of mosquitoes in the pupal stage are present and present a potential threat to public health. For a detailed chemical-by-chemical analysis, see Section 6.2.7.1.

##### **Bacterial Larvicides**

These larvicides are developed from bacteria that have natural insecticidal properties. Concentrates are prepared that include fermentation solids, bacterial spores, and insecticidal toxins. These larvicides act by paralyzing the gut when ingested, causing the larvae to starve. Bs may persist in the environment for 2 to 4 weeks; Bti generally persists for 1 to 4 days but may be effective for up to 180 days when applied in a long term briquette.

Neither Bs nor Bti are acutely toxic to nontarget species including fish and invertebrates, nor are they toxic to predators of mosquito larvae (Appendix B). Bti may affect some dipterans (chironomids, simuliids, ceratopogonids, and dixids), but only at concentrations 10 to 1,000 times higher than used for mosquito control (as cited in Appendix B: Mulla et al. 1990; Molloy 1992; Anderson et al. 1996).

Spinosad is a biologically derived insecticide produced from the fermentation of *Saccharopolyspora spinosa*, a naturally occurring soil organism. Spinosad activates the central nervous system of insects through interaction with neuroreceptors and causes continuous stimulation of the insect nervous system. In water, spinosad is degraded primarily through photolysis, which has a half-life of less than 1 day. It is slightly to moderately toxic to fish, amphibians, and most aquatic invertebrates. It may have slight impacts on some aquatic invertebrates with chronic exposure, but application for mosquitoes tends to be episodic, and given the rapid breakdown of spinosad in the environment, chronic exposure is unlikely. The District employs techniques to ensure applications do not generally occur that close together. Measures include following label instructions, education of state-certified field personnel, use of real-time application recording equipment and color-coded data management tools that alert personnel of estimated active ingredient remaining at application sites.

##### **Hydrocarbon Esters (Methoprene)**

Methoprene is an insect growth regulator and selective larvicide. Methoprene is used primarily against mosquitoes, but can also be used for flies, moths and butterflies, and beetles. Methoprene interferes with the development of larval insects, preventing them from becoming adults. Within the aquatic environment, methoprene has a half-life of a few hours to a couple of days, but is sometimes applied in an extended release format, which may persist for many days or even months in the environment. The District applies



methoprene at a maximum concentration of 0.5 µg/L. At this application rate, some effects may occur to some nontarget midges (*Chironomidae*) and blackflies (*Simuliidae*), but these populations recover quickly after treatment (Appendix B; Maffei, pers. comm., 2013). No other invertebrates have shown signs of toxicity at these concentrations. Methoprene can be toxic to fish or amphibians, but the lowest 50 percent lethal dose<sup>5</sup> (LD50 4.62 milligrams per liter [mg/L]) is several orders of magnitude greater than the dose used by the District to control mosquitoes.

### Surfactants

Biodegradable alcohol ethoxylated surfactants, aliphatic solvents, and plant-derived oils work by making it difficult for mosquito larvae and pupae to attach to the water's surface, causing them to drown. Surfactants affect only the uppermost layer of the water. They are nontoxic to most organisms at label application rates, but may impact other surface-breathing aquatic insects. The numbers of these nontarget surface-breathing insects were temporarily reduced following treatment, but recovered within a few days at Don Edwards Wildlife Area (Miles et al. 2002). These short-term impacts on a small portion of the food chain and in a limited area within a wetland are unlikely to result in substantive impacts to nontarget species in the aquatic environment.

**Impact AR-25:** The Chemical Control Alternative's mosquito larvicides would have a **less-than-significant** impact, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species. No mitigation is required.

#### 4.2.7.1.2 Mosquito Adulticides

In addition to chemical control of mosquito larvae, the District may use pesticides for control of adult mosquitoes as a component of the IMVMP Plan, for example, when other tools are not effective or appropriate, and adult mosquito control guidelines are met, including species composition, abundance (as measured by landing count or other quantitative method), proximity to human populations, and/or human disease risk. Adulticide materials are used only as needed to control adult mosquito populations and are used in accordance product label instructions and District BMP's. Adulticides are generally the last tool used, when mosquito populations cannot or have not been controlled at their source using physical control or larvicides. Adulticides are applied as an ultralow volume (ULV) application from the ground via truck, or by persons travelling on foot with handheld devices. Applications made using these methods are not applied directly to water, and material would only enter aquatic habitats through drift or runoff. As the Proposed Program incorporates safeguards to avoid these situations, the amount of mosquito adulticides entering these habitats is minimal.

Although not included in the District's current Program, aerial adulticiding could be used in the future to deal with a severe outbreak or risk of mosquito-borne disease transmission as part of the Proposed Program. Aerial applications would be made using ULV techniques. Aerial application of adulticide may be the only reliable means of obtaining effective control over a very large area quickly, in the case of a mosquito-borne disease epidemic. In making the decision to use this technique, the District would consider the potential effects on human health and the potential for environmental harm. For example, the maximum application rate of an adulticide that could be used is 0.87 ounce/acre, although maximum application rates are generally not required. The concentration of the active ingredient is 5 percent or less of this volume, which translates into a water concentration of 1.04 micrograms per liter (µg/L) if the water is 1 foot deep or 4.14 µg/L if the water is 3 inches deep. This "construct" assumes all of the product contacts the water when in reality, it does not. Aerial applications would be made over vegetated areas preferred by adult mosquitoes and would not be directly targeting waterbodies, so the amount of product theoretically encountering the water is generally a fraction of this. The chemicals used are selected for rapid breakdown and are typically present in surface waters for a few hours to a couple of days after

<sup>5</sup> LD50 refers to the lethal single dose of a chemical (amount of chemical regardless of the volume of liquid in which it is delivered) that that would kill 50 percent of a group of test animals treated with that dose.

application. Information on the environmental degradation of different mosquito adulticides is detailed in Appendix B, Section 4.1, environmental fate subsections.

### **Pyrethrins and Pyrethroids**

Pyrethrins are naturally occurring products distilled from the flowers of the *Chrysanthemum* species. Pyrethroid insecticides are synthetic compounds that are chemically similar to the pyrethrins that have been modified to increase stability and activity against insects. They are highly potent insecticides, but are highly toxic to fish and aquatic invertebrates as well, sometimes at environmental concentrations of less than 1 µg/L. The presence of these pesticides in aquatic environments can result in lethal and sublethal effects on fish, amphibians, and aquatic invertebrates. Where substantial numbers of such organisms are affected, food supplies can be diminished, resulting in indirect effects to secondary and tertiary consumers dependent on the aquatic food web, including aquatic invertebrates, fish, amphibians, and birds. Both sets of compounds tend to break down relatively quickly in the environment, often within hours, and usually within a few days. Of the pyrethroids that are applied adjacent to aquatic environments, phenothrin and permethrin are more persistent than the other chemicals in this group, with half lives of days to months in water under aerobic conditions.

Pyrethrins and pyrethroids applied in ULV applications by truck, ATV, or handheld foggers include pyrethrins, phenothrin, and permethrin. Numerous studies have found that these ULV applications result in concentrations in the aquatic environment of 0.23 to 3.77 µg/L and had little to no effect on fish or nontarget aquatic invertebrates (see Appendix B). As part of the Proposed Program these products would be applied by aircraft as outlined in the IMVMP Plan. Laboratory studies investigating aquatic toxicity following ULV applications of pyrethrins found little risk to aquatic organisms due to low toxicity and lack of long-term persistence (Appendix B, Section 4.1). For instance, one study found that laboratory testing of both treated water and sediment collected post-aerial ULV application of pyrethrins did not result in an increase in mortality to sensitive nontarget species exposed to the samples (Weston et al 2006). A thorough assessment of ecological toxicity associated with ULV applications of pyrethrins and pyrethroids for mosquito abatement is presented in Appendix B, Section 4.1.

### **Piperonyl Butoxide**

PBO is a synergist, a chemical applied with a pesticide to enhance the effectiveness of the pesticide (Appendix B). PBO works by interfering with an insect's ability to detoxify pyrethrins and pyrethroids. PBO is moderately toxic to fish (LD50=1.9 to 3.94 mg/L) and moderately to highly toxic (0.51 to 12.0 mg/L) to aquatic invertebrates. However, its toxicity is much lower than that of the pesticides with which it is used. PBO can break down relatively rapidly by photolysis (half-life of 8.4 hours), but has a half-life exceeding 30 days based on aerobic metabolism in water. Although it degrades rapidly, release of PBO to the environment may "activate" persistent pyrethroids that are already present in the sediment. Field tests indicate that PBO concentrations were very low (~2 µg/L) immediately after 3 consecutive nights of treatment, declined rapidly thereafter, and was undetectable 8 days after application (see Appendix B, Section 4.1.12). A number of studies indicate that PBO, when applied at the levels used for mosquito control, did not have any detectable effect on sentinel species (Appendix B). These studies also indicate that PBO does not persist in the environment very long after application; therefore, this information indicates that the use of PBO will not substantially affect aquatic organisms

### **Organophosphate Insecticide (Naled)**

OPs are a class of chemicals that kill insects by interfering with their production of the acetylcholinesterase enzyme, resulting in nervous and respiratory system damage. Naled is not currently used but might be considered for use in the future, under specified parameters outlined in the IMVMP Plan. Its use would be infrequent (i.e., one application every few years to prevent the development of resistance or if resistance is encountered). If it is used, naled would be used as a mosquito adulticide in rotation with pyrethrins or pyrethroids to avoid the development of pesticide resistance. Naled breaks

down rapidly in water (hours to a few days). It is moderately to highly toxic to fish (minimum 0.08 mg/L), and highly toxic to aquatic invertebrates (minimum of 0.35 µg/L). See Appendix B, Section 4.2.1.4 for a discussion of ecological toxicity associated with ULV application for mosquito abatement. As part of the Proposed Program, naled would be applied by aircraft, truck, ATV, or handheld foggers using the ULV method. This application method is designed to prevent environmental persistence and potential impacts to nontarget ecological receptors, including aquatic species (see Section 6.2.7.2 for additional details of ULV techniques). Naled tends to degrade quickly in surface waters, especially following ULV applications.

Dichlorvos, is a breakdown product of naled, and itself a registered pesticide. Dichlorvos may be present in toxic concentrations after naled is no longer detectable. Dichlorvos has a half-life of a few hours to 5 days, depending on medium. Naled has low water solubility. It has a similar toxicity to fish, but is more toxic to invertebrates. The District would use naled only when other adulticides were not effective. Because of the District's infrequent application of this product, its application by ULV techniques, and the relatively short half-life of naled and its breakdown product dichlorvos, the effect of the District's use of it on aquatic resources would be short term and temporary and without adverse effects on population size, distribution, viability, or recovery potential of any special-status species.

**Impact AR-26:** The Chemical Control Component's use of mosquito adulticides and PBO would have a **less-than-significant** impact, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species. No mitigation is required.

#### 4.2.7.1.3 Yellow Jacket Wasp and Tick Abatement

Chemical control for yellow jacket wasps (and occasionally paper wasps) is focused on treatment of nests in the ground and may involve the use of bait in traps. Baits work by luring the worker yellow jackets to carry a bit of poisoned food back to the nest, thereby getting the poison to those in the nest. These baits contain an encapsulated insecticide. Poisoned baits would only be used after about July 15, when nests have begun to expand rapidly. Use prior to this date may risk disrupting beneficial species. Nontoxic baits are also available. Traps may provide some temporary relief by drawing workers away from people, but they are not effective for area-wide nest control. (<http://extension.oregonstate.edu/gardening/node/467>)

Tick control is conducted on a limited basis as demonstration projects in areas with a high density of ticks or a high risk of a disease threat to the public.

#### Pyrethrin and Pyrethroids

The District uses pesticides (typically pyrethrin and pyrethroids) to control yellow jackets, wasps, and ticks that pose an imminent threat to people or pets, generally because of public requests for assistance. These pesticides are highly toxic to fish, amphibians, and aquatic invertebrates, as described in Section 4.2.7.2. For control of yellow jackets, paper wasps and ticks, these pesticides are applied in highly localized, upland areas.

A number of these pyrethroids are used primarily to control insects in residential or upland environments: prallethrin, deltamethrin, lambda-cyhalothrin, and tetramethrin. Products proposed for future use include esfenvalerate, resmethrin, and etofenprox. These compounds would only be expected to enter the aquatic environment through runoff. All degrade rapidly and bind readily to soil, so they are not anticipated to enter aquatic environments in sufficient quantities to result in adverse effects.

A few of the pyrethroids are bioaccumulative in fish, meaning that they can occur in organisms at higher concentrations than what occurs in the environment. These bioaccumulative pyrethroids include deltamethrin, esfenvalerate, and lambda-cyhalothrin. However considering nesting behavior and habitat location of the target pest, these products are not used near water. Additionally, these pyrethroids are applied directly into the underground nest which prevents drift and further reduces the potential for inadvertent exposure to aquatic environment. The proposed use of esfenvalerate would generally be

deployed in bait stations, which are readily isolated from aquatic environments. Therefore, these compounds are not expected to affect fish or other aquatic organisms.

Because of the small quantity of pesticide applied and because these chemicals are not applied directly to aquatic environments, this control method is not expected to have a significant impact on aquatic resources.

### **Potassium Salts**

The District is considering use of an insecticidal soap containing potassium salts to control certain stinging insects. Potassium salts of fatty acids are used as insecticides, acaricides, herbicides, and algacides. They penetrate an insect's body covering and disrupt the cell membranes, causing the insect to die of dehydration. They are slightly toxic to fish and highly toxic to aquatic invertebrates. However, they are applied directly to the stinging insect nest, are not applied to aquatic environments, are highly unlikely to enter the aquatic environment, and degrade quickly after application (USEPA 1992).

Potassium salts are of low toxicity to birds and mammals, but highly toxic to fish and aquatic nontarget invertebrates. The District would not apply potassium salts directly to water and, therefore, they pose little risk to sensitive aquatic invertebrates (USEPA 1992). Currently, the District does not use potassium salts. Potassium salts would be considered for future use by the District only if necessary for the control of Africanized honeybees. Under a California Department of Pesticide Regulation Section 24(c) special local need registration, a formulation of this active ingredient under the trade name M-Pede may be applied directly to bee swarms and exposed colonies by trained personnel in the state of California (CDPR 1994). As this product would be used only in extremely limited and targeted applications, Following product label requirements and District BMPs, potassium salts may be effective in a variety of terrestrial application sites without risk of impact to aquatic environments.

**Impact AR-27.** The Chemical Control Component's control of yellow jackets and ticks would have a **less-than-significant** impact, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species. No mitigation is required.

#### **4.2.7.1.4 Rodent Abatement**

Rodent abatement methods are applied at the request of cities based on historical data identifying high domestic rodent activity in urban areas. These methods focus primarily on the use of first and second generation rodenticides. These rodenticides are toxic to fish and aquatic invertebrates. However, they are not applied to water. They are applied as solid bait blocks in tamper proof bait stations or in sewers, which would not support special-status aquatic species identified in local or regional plans, policies, and regulations, or by the CDFW or USFWS. The tamper proof bait stations may also be placed aboveground during summer months along creek banks within 50 feet of a structure in residential and commercial areas. They are never placed at water level and are removed in early fall to prevent them from becoming submerged in storm events. Tamper-proof bait stations are used to reduce impacts to nontarget organisms. The USEPA has determined that many of these rodenticides pose little risk to the aquatic environment (see Appendix B, Section 4.5). The rodenticide is incorporated into a water-resistant, nonleaching bait block suspended or placed out of the water, which prevents the direct entry of the rodenticide into the water. The rodenticide could enter an aquatic environment if a rodent ingests the chemical and then dies in the water. The rodenticide could then be released into the water as the corpse decomposes. This potential mechanism for introduction of rodenticides is limited. Rats and mice are not aquatic organisms and do not forage or nest in aquatic environments. Waterways are used primarily for obtaining water, thus, it is unlikely that a rodent would die in the water. If a rodent's corpse did enter the aquatic environment, the rodenticide contained in that animal would be released over a period of days, as the corpse decomposed, and would be subject to dilution over that period of time. The chemical would also be deteriorating over this period of time, due to both the processes within the corpse (contact with digestive fluids and metabolites in the body of the animal) as well as in the environment once released.

This mechanism is highly unlikely to introduce rodenticides into the aquatic environment in sufficient quantity to affect aquatic organisms.

**Impact AR-28.** The Chemical Control Component's use of rodenticides would have a **less-than-significant** impact, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species. No mitigation is required.

#### **4.2.7.2 Impacts to Habitats**

The Chemical Control Component would not affect the quantity or distribution of habitats, such as riparian areas, marshes, lakes or ponds, seasonal wetlands, or habitat types identified in local or regional plans, policies, regulations, or by the CDFW or USFWS. This component would not affect the composition of their vegetative communities, as the pesticides used would not be expected to affect plants or their physical or hydrologic attributes. This component would not result in any ground-disturbing activity and, therefore, would not result in any removal, filling, or hydrologic interruption of federally protected wetlands (including but not limited to, marsh, vernal pool, coastal, etc.). The use of adulticides has not been required in direct association with mosquito production in vernal pools, and this is not anticipated to be an issue in the foreseeable future. If adulticide use were to become necessary within close proximity (relative to swath widths of ULV application equipment) to vernal pools, applications would be performed in strict accordance with the product label, using the appropriate BMPs as listed in Table 4-5, and in consultation with property owners.

**Impact AR-29.** The Chemical Control Component would have **no impact** on any riparian habitat or other sensitive natural community.

**Impact AR-30.** The Chemical Control Component would not result in the direct removal, filling, or hydrological interruption of federally protected wetlands as defined by CWA Section 404 and would have a **no impact** on these resources.

#### **4.2.7.3 Effects on Movement and Migration**

Any disruption of migration patterns would be due to the presence of personnel and machinery in the environment. In all cases this occurrence would be very short term, generally not more than a few hours in any given location and, therefore, this effect would be minimal and would have little effect on the movement of wildlife and would not affect any native resident or migratory wildlife migration corridors or impede the use of nursery areas, as no physical disturbance would occur.

**Impact AR-31.** The Chemical Control Component would have a **less-than-significant** impact on the movement of any native resident or migratory fish or wildlife species. No mitigation is required.

#### **4.2.7.4 Conflict with Local Ordinances**

The county and city general plans and their goals and policies pertaining to natural resources are protective of aquatic resources and focused on conservation of existing resources. Chemical control activities would not result in the conversion of natural habitats to other land uses or in the long-term or permanent dislocation of plant and animal aquatic species from natural areas except indirectly for mosquitoes and vectors of disease and discomfort. The Program would not affect trees more than 4 inches diameter breast height and, therefore, would not conflict with any tree ordinances.

**Impact AR-32.** The Chemical Control Component would have **no impact** on local policies or ordinances protecting biological resources.

#### **4.2.7.5 Conflict with Conservation Plans**

One conservation plan, the San Bruno Mountain HCP located in San Mateo County, was identified whose action area is within the District's primary Service Area. This HCP addresses impacts to three endangered species: San Bruno elfin butterfly, mission blue butterfly, and SFGS over 3,500 acres on San Bruno Mountain for a duration of 30 years.

The District conducts very limited control operations within the area covered by this HCP on San Bruno Mountain, which has no aquatic habitat; and it is unlikely that the District's mosquito control activities would occur within this HCP's boundaries. However, control for ticks, yellow jackets, wasps, and rodents could involve accessing portions of the mountain in close proximity to roads and adjacent hiking trails and residences if requested by the County Department of Parks. Residential areas adjacent to the mountain can be accessed for service calls without disturbing park property.

The District regularly communicates with and works collaboratively with representatives from agencies such as RWQCB, USEPA, USACE, CDFW, and USFWS. The District receives training from agency staff and independent biologists (e.g., CDFW, USACE) to minimize impacts and conducts annual field training for field staff regarding precautionary and avoidance measures related to seasonal wetland and wetland habitats, but this habitat is not present on San Bruno Mountain. While District activities may occur within the boundaries of conservation areas, these activities are coordinated with the plan managers and would not conflict with the provisions of any adopted HCP, NCCP, or other approved local, regional, or state habitat conservation plan.

Eleven conservation plans affect portions of adjacent counties. District activities are typically not among those covered by these HCPs. When called into these adjacent counties to perform work, the District would operate under the auspices of the affected county or that county's mosquito and vector control district and in compliance with their practices and permits, including compliance with all active HCP/NCCPs. Therefore, the District activities would not be in conflict with the provisions of any adopted HCP, NCCP, or other approved local, regional, or state-approved conservation plan.

**Impact AR-33.** The Chemical Control Component would have a **less-than-significant** impact on adopted HCPs or NCCPs. No mitigation is required.

#### **4.2.8 Other Nonchemical Control/Trapping Component**

The Other Nonchemical Control/Trapping Component is focused on rodents, yellow jackets, and other organisms not associated with aquatic environments. Trapping is used for the removal of rodents and yellow jacket removal or for nuisance wildlife when these animals (such as skunks, raccoons, and opossums) pose a threat to public health and safety. Rodent trapping is not and will not be performed routinely as a mass trapping control measure. This activity would not impact aquatic environments or the species that occupy these environments and, therefore, would not affect them.

##### **4.2.8.1 Impacts to Special-Status Species**

The Other Nonchemical Control/Trapping Component is focused on trapping rodents, yellow jackets, and other organisms not associated with aquatic environments. This activity would not impact aquatic environments or the species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the CDFW or USFWS that occupy these environments and, therefore, would not affect them.

**Impact AR-34.** The Other Nonchemical Control/Trapping Component would have **no impact**, either directly or through habitat modifications, on any aquatic species identified as a candidate, sensitive, or special-status species.

#### **4.2.8.2 Impacts to Habitats**

This component would not affect the quantity or distribution of habitats, such as riparian areas, marshes, lakes or ponds, seasonal wetlands, or other habitat types identified in local or regional plans, policies, regulations, or by the CDFW or USFWS. This component would not affect the composition of their vegetative communities as the placement of traps and baits would not affect plants. This component would not result in any ground-disturbing activity and, therefore, would not result in any removal, filling or hydrologic interruption of federally protected wetlands (including but not limited to, marsh, vernal pool, coastal, etc.).

**Impact AR-35.** The Other Nonchemical Control/Trapping Component would have **no impact** on any riparian habitat or other sensitive natural community.

**Impact AR-36.** The Other Nonchemical Control/Trapping Component would have **no impact** on federally protected wetlands as defined by CWA Section 404.

#### **4.2.8.3 Effects on Movement and Migration**

Any disruption of migration patterns would be due to the presence of personnel to set traps in the environment. In all cases this occurrence would be very short term, generally not more than a few hours in any given location and, therefore, would have no effect on the movement of wildlife and would not affect wildlife migration corridors or nursery areas, as no physical disturbance would occur.

**Impact AR-37.** The Other Nonchemical Control/Trapping Component would have **no impact** on the movement of any native resident or migratory fish or wildlife species. Nor would it impact any native resident or migratory wildlife corridors or impede the use of native wildlife nursery sites.

#### **4.2.8.4 Conflict with Local Ordinances**

The county and city general plans and their goals and policies pertaining to natural resources are protective of aquatic resources and focused on conservation of existing resources. Nonchemical control/trapping activities would not result in the conversion of natural habitats to other land uses or in the long-term or permanent dislocation of plant and animal species from natural areas. The Program would not affect trees more than 4 inches diameter breast height and, therefore, would not conflict with any tree ordinances.

**Impact AR-38.** The Other Nonchemical Control/Trapping Component would have **no impact** on local policies or ordinances protecting biological resources.

#### **4.2.8.5 Conflict with Conservation Plans**

One conservation plan, the San Bruno Mountain HCP located in San Mateo County, was identified whose action area is within the District's primary Service Area. This HCP addresses impacts to three endangered species: San Bruno elfin butterfly, mission blue butterfly, and SFGS (SFGS) over 3,500 acres on San Bruno Mountain for a duration of 30 years.

The District conducts very limited control operations within the area covered by this HCP on San Bruno Mountain, which has no aquatic habitat; and it is unlikely that the District's mosquito control activities would occur within this HCP's boundaries. However, control for ticks, yellow jackets, wasps, and rodents could involve accessing portions of the mountain in close proximity to roads and adjacent hiking trails and residences upon request of the County Department of Parks.

The District regularly communicates with and works collaboratively with representatives from agencies such as RWQCB, USEPA, USACE, CDFW, and USFWS. The District receives training from agency staff and independent biologists (e.g., CDFW, USACE) to minimize impacts and conducts annual field training for field staff regarding precautionary and avoidance measures related to vernal pool habitat and other

seasonal wetland and wetland habitats, but this habitat is not present on San Bruno Mountain. While District activities may occur within the boundaries of conservation areas, these activities are coordinated with the plan managers and would not conflict with the provisions of any adopted HCP, NCCP, or other approved local, regional, or state habitat conservation plan.

Eleven conservation plans affect portions of adjacent counties. District activities are typically not among those covered by these HCPs. When called into these adjacent counties to perform work, the District would operate under the auspices of the affected county or that county's mosquito and vector control district and in compliance with their practices and permits, including compliance with all active HCP/NCCPs. Therefore, the District activities would not be in conflict with the provisions of any adopted HCP, NCCP, or other approved local, regional, or state-approved conservation plan.

**Impact AR-39.** The Nonchemical Control/Trapping Component would have a **less-than-significant** impact on adopted HCPs or NCCPs. No mitigation is required.

#### **4.2.9 Public Education**

District activities to teach landowners how to avoid creating vector control problems primarily relate to the Physical Control and Vegetation Management Components. The District may advise landowners and homeowners about the importance of dumping/inverting of containers holding water, controlling vegetation against structures, and avoiding stagnant ponds by ensuring water drains correctly into storm sewers. In situations where any potential exists for sensitive habitats or special-status species to be present, the District includes information and contact data for resource agencies and potential permits. Therefore, public education activities would have no impact on the environment for aquatic resources.

#### **4.2.10 Environmental Impacts Summary**

Table 4-8 provides a summary of the environmental impacts of the Program technical components (including both existing and proposed future activities) on aquatic resources and, therefore, the overall Proposed Program of the components combined. Discussion of these impacts is provided in the preceding sections. The table is followed by a discussion of the impacts associated solely with the future activities under the Proposed Program. The impacts to aquatic resources associated with just the future activities are summarized below based on the analyses contained previously in all of the Sections 4.2.4 through 4.2.8.

Future activities under consideration do not add any significant impacts to aquatic resources, and all of the impacts associated with their use are less than significant.

- > Under the Vegetation Management Component, the District could expand the use of physical methods of controlling vegetation on land to minimize vector breeding habitat. This expansion of activity would have a less-than-significant impact, similar to the Existing Program.
- > Under the Vegetation Management Component, the following additional herbicide active ingredients are under consideration for future use: dithiopyr, glyphosate, imazapyr, oryzalin, triclopyr (TEA), dimethyl tetrachloroterephthalate (DCPA), polymeric colorant, modified vegetable oil, dithiopyr, benfen and oryzalin, sulfometuron methyl, alkyl phenol ethoxylate, isopropanol, and fatty acids. Just as for the Existing Program, all of the impacts to aquatic resources are either "no impact" or "less-than-significant" impact.
- > Under the Chemical Control Alternative, the types of chemicals (different formulations) under consideration for future use by active ingredient are:
  - Adulticides: permethrin and PBO, naled, pyrethrins and PBO, sumithrin and PBO, prallethrin and PBO, deltamethrin, and resmethrin and PBO
  - Yellow Jacket Wasp: potassium salts of fatty acids; esfenvalerate; resmethrin; lambda-cyhalothrin; etophenprox, tetramethrin, and PBO



- Tick: permethrin and pyrethrin
- Rat: cholecalciferol, bromadiolone, difethialone, sodium nitrate and sulfur fumigants, brodifacoum, chlorophacinone, sodium nitrate, bromadiolone, bromethalin, and cholecalciferol

The use of pesticides containing all active ingredients under consideration for future use by the District would have either no impact or a less-than-significant impact on aquatic resources, similar to the Existing Program.

The existing Program uses a variety of ground surveillance and application equipment, water surveillance and application equipment, and aerial application equipment using only helicopters to treat large source areas of 100 to 3,000 acres by contracting with an aerial application service. The future Program could add fixed-wing aircraft to aerial application equipment for adulticide applications in large areas if needed. The impact of fixed-wing aircraft use is similar to helicopter use, a less-than-significant impact to aquatic species and habitats. Also, the District could add the use of a piece of heavy equipment such as an excavator or a tractor for future use for ground-based physical control and vegetation management. Similar to existing equipment use, this new equipment would have a less-than-significant impact on aquatic resources.

**Table 4-8 Summary of Biological Aquatic Impacts by Technical Component**

Impact Statement	Surveillance	Physical Control	Vegetation Management	Biological Control	Chemical Control	Other Nonchemical/ Trapping
<b>Effects on Biological Resources – Aquatic</b>						
<b>Impact AR-1.</b> The Surveillance Component would have a <b>less-than-significant</b> impact, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species. No mitigation is required.	LS	na	na	na	na	na
<b>Impact AR-2.</b> The Surveillance Component would have a <b>less-than-significant</b> impact on any riparian habitat or other sensitive natural community No mitigation is required.	LS	na	na	na	na	na
<b>Impact AR-3.</b> The Surveillance Component would have a <b>less-than-significant</b> impact on federally protected wetlands as defined by CWA Section 404. No mitigation is required.	LS	na	na	na	na	na
<b>Impact AR-4.</b> The Surveillance Component would have <b>no impact</b> on the movement of any native resident or migratory fish or wildlife species. Nor would it impact any native resident or migratory wildlife corridors or impede the use of native wildlife nursery sites.	N	na	na	na	na	na
<b>Impact AR-5.</b> The Surveillance Component would have <b>no impact</b> on local policies or ordinances protecting biological resources.	N	na	na	na	na	na
<b>Impact AR-6.</b> The Surveillance Component has a <b>less-than-significant</b> impact on any adopted HCPs or NCCPs. No mitigation is required.	LS	na	na	na	na	na
<b>Impact AR-7.</b> The Physical Control Component, would have a <b>less-than-significant</b> impact, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species. No mitigation is required.	na	LS	na	na	na	na

**Table 4-8 Summary of Biological Aquatic Impacts by Technical Component**

<b>Impact Statement</b>	<b>Surveillance</b>	<b>Physical Control</b>	<b>Vegetation Management</b>	<b>Biological Control</b>	<b>Chemical Control</b>	<b>Other Nonchemical/ Trapping</b>
<b>Impact AR-8.</b> The Physical Control Component would have a <b>less-than-significant</b> impact on any riparian habitat or other sensitive natural community. No mitigation is required.	na	LS	na	na	na	na
<b>Impact AR-9.</b> The Physical Control Component would have a <b>less-than-significant</b> impact on federally protected wetlands as defined by CWA Section 404. No mitigation is required.	na	LS	na	na	na	na
<b>Impact AR-10.</b> The Physical Control Component would have a <b>less-than-significant</b> impact on the movement of any native resident or migratory fish or wildlife species. No mitigation is required.	na	LS	na	na	na	na
<b>Impact AR-11.</b> The Physical Control Component would have <b>no impact</b> on local policies or ordinances protecting aquatic resources.	na	N	na	na	na	na
<b>Impact AR-12.</b> The Physical Control Component would have a <b>less-than-significant</b> impact on adopted HCPs or NCCPs. No mitigation is required.	na	LS	na	na	na	na
<b>Impact AR-13.</b> The Vegetation Management Component would have a <b>less-than-significant</b> impact, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species. No mitigation is required.	na	na	LS	na	na	na
<b>Impact AR-14.</b> The Vegetation Management Component would have a <b>less-than-significant</b> impact on any riparian habitat or other sensitive natural community. No mitigation is required.	na	na	LS	na	na	na
<b>Impact AR-15.</b> The Vegetation Management Component would not result in the direct removal, filling, or hydrological interruption of federally protected wetlands as defined by CWA Section 404. As such, this component and would have a have a <b>less-than-significant</b> impact on these resources. No mitigation is required.	na	na	LS	na	na	na

**Table 4-8 Summary of Biological Aquatic Impacts by Technical Component**

<b>Impact Statement</b>	<b>Surveillance</b>	<b>Physical Control</b>	<b>Vegetation Management</b>	<b>Biological Control</b>	<b>Chemical Control</b>	<b>Other Nonchemical/ Trapping</b>
<b>Impact AR-16.</b> The Vegetation Management Component would have a <b>less-than-significant</b> impact on the movement of any native resident or migratory fish or wildlife species. No mitigation is required.	na	na	LS	na	na	na
<b>Impact AR-17.</b> The Vegetation Management Component would have <b>no impact</b> on local policies or ordinances protecting biological resources.	na	na	N	na	na	na
<b>Impact AR-18.</b> The Vegetation Management Component would have a <b>less-than-significant</b> impact on adopted HCPs or NCCPs. No mitigation is required.	na	na	LS	na	na	na
<b>Impact AR-19.</b> The Biological Control Component would have <b>no impact</b> , either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species.	na	na	na	N	na	na
<b>Impact AR-20.</b> The Biological Control Component would have <b>no impact</b> on any riparian habitat or other sensitive natural community.	na	na	na	N	na	na
<b>Impact AR-21.</b> The Biological Control Component would have <b>no impact</b> on federally protected wetlands as defined by CWA Section 404.	na	na	na	N	na	na
<b>Impact AR-22.</b> The Biological Control Component would have <b>no impact</b> on the movement of any native resident or migratory fish or wildlife species.	na	na	na	N	na	na
<b>Impact AR-23.</b> The Biological Control Component would have <b>no impact</b> on local policies or ordinances protecting biological resources.	na	na	na	N	na	na
<b>Impact AR-24.</b> The Biological Control Component would have <b>no impact</b> on approved HCPs, NCCPs, or local conservation plans.	na	na	na	N	na	na

**Table 4-8 Summary of Biological Aquatic Impacts by Technical Component**

Impact Statement	Surveillance	Physical Control	Vegetation Management	Biological Control	Chemical Control	Other Nonchemical/ Trapping
<b>Impact AR-25:</b> The Chemical Control Alternative’s mosquito larvicides would have a <b>less-than-significant</b> impact, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species. No mitigation is required.	na	na	na	na	LS	na
<b>Impact AR-26:</b> The Chemical Control Component’s use of mosquito adulticides and PBO would have a <b>less-than-significant</b> impact, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species. No mitigation is required.	na	na	na	na	LS	na
<b>Impact AR-27.</b> The Chemical Control Component’s control of yellow jackets and ticks would have a <b>less-than-significant</b> impact, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special- status species. No mitigation is required.	na	na	na	na	LS	na
<b>Impact AR-28.</b> The Chemical Control Component's use of rodenticides would have a <b>less-than-significant</b> impact, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species. No mitigation is required.	na	na	na	na	LS	na
<b>Impact AR-29.</b> The Chemical Control Component would have <b>no impact</b> on any riparian habitat or other sensitive natural community.	na	na	na	na	N	na
<b>Impact AR-30.</b> The Chemical Control Component would not result in the direct removal, filling, or hydrological interruption of federally protected wetlands as defined by CWA Section 404 and would have a have <b>no impact</b> on these resources.	na	na	na	na	N	N

**Table 4-8 Summary of Biological Aquatic Impacts by Technical Component**

<b>Impact Statement</b>	<b>Surveillance</b>	<b>Physical Control</b>	<b>Vegetation Management</b>	<b>Biological Control</b>	<b>Chemical Control</b>	<b>Other Nonchemical/ Trapping</b>
<b>Impact AR-31.</b> The Chemical Control Component would have a <b>less-than-significant</b> impact on the movement of any native resident or migratory fish or wildlife species. No mitigation is required.	na	na	na	na	LS	na
<b>Impact AR-32.</b> The Chemical Control Component would have <b>no impact</b> on local policies or ordinances protecting biological resources.	na	na	na	na	N	na
<b>Impact AR-33.</b> The Chemical Control Component would have a <b>less-than-significant</b> impact on adopted HCPs or NCCPs. No mitigation is required.	na	na	na	na	LS	na
<b>Impact AR-34.</b> The Other Nonchemical Control/Trapping Component would have <b>no impact</b> , either directly or through habitat modifications, on any aquatic species identified as a candidate, sensitive, or special-status species.	na	na	na	na	na	N
<b>Impact AR-35.</b> The Other Nonchemical Control/Trapping Component would have <b>no impact</b> on any riparian habitat or other sensitive natural community.	na	na	na	na	na	N
<b>Impact AR-36.</b> The Other Nonchemical Control/Trapping Component would have <b>no impact</b> on federally protected wetlands as defined by CWA Section 404.	na	na	na	na	na	N
<b>Impact AR-37.</b> The Other Nonchemical Control/Trapping Component would have <b>no impact</b> on the movement of any native resident or migratory fish or wildlife species. Nor would it impact any native resident or migratory wildlife corridors or impede the use of native wildlife nursery sites.	na	na	na	na	na	N

**Table 4-8 Summary of Biological Aquatic Impacts by Technical Component**

Impact Statement	Surveillance	Physical Control	Vegetation Management	Biological Control	Chemical Control	Other Nonchemical/ Trapping
<b>Impact AR-38.</b> The Other Nonchemical Control/Trapping Component would have <b>no impact</b> on local policies or ordinances protecting biological resources.	na	na	na	na	na	N
<b>Impact AR-39.</b> The Nonchemical Control/Trapping Component would have a <b>less-than-significant</b> impact on adopted HCPs or NCCPs. No mitigation is required.	na	na	na	na	na	LS

LS = Less-than-significant impact

N = No impact

na = Not applicable

SM = Potentially significant but mitigable impact

SU = Significant and unavoidable impact

#### **4.2.11 Mitigation and Monitoring**

The implementation of all of the components would not result in any significant impacts on aquatic or wetland resources. All impacts are either less-than-significant or none. Therefore, no mitigation is required.

The results of the pesticide applications are constantly under surveillance and are monitored for total pesticide use, use per acre, timing of applications, and parameters affecting application scenarios.