

5 Biological Resources – Terrestrial

Chapter 5 evaluates the potential impacts of the Program alternatives on terrestrial resources. Results of the evaluation are provided at the programmatic level. Section 5.1, Environmental Setting, presents an overview of the environmental settings and contains federal regulations, state regulations, and local ordinances and regulations that are applicable to the Program. Section 5.2, Environmental Impacts and Mitigation Measures, presents the following:

- > Environmental concerns and evaluation criteria: A discussion of whether the Program alternatives would cause any potentially significant impacts to terrestrial resources and addressing concerns from the public scoping
- > Discussion of methods and assumptions important to the environmental impact analysis, including findings from Appendix B, *Ecological and Human Health Assessment*, and best management practices (BMPs)
- > Discussion of the potential impacts of the Program alternatives, and recommendations for mitigation, if required, for those impacts
- > Cumulative impacts summary
- > A summary of environmental impacts to terrestrial resources

Aquatic resources are addressed in Chapter 4, *Biological Resources - Aquatic*. Impacts to ecological health with an emphasis on chemical use (including bioaccumulation/biomagnification) are addressed in Chapter 6, *Ecological Health*.

5.1 Environmental Setting

The Program Area is defined as the Marin/Sonoma Mosquito and Vector Control District's (MSMVCD or District) Program Area and adjacent counties (see Figure 2-1 in Chapter 2). The following section provides background information on the terrestrial resources that may be present and an overview of the regulatory setting with respect to management of terrestrial species.

Section 5.1.1 describes the habitat types used in evaluating Program impacts within the District's Program Area, Section 5.1.2 describes the special-status terrestrial species that have the potential to occur within the Program Area, Section 5.1.3 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. Background information on hazards, toxicity, and exposure is provided in Section 5.2.2.2.

5.1.1 Terrestrial Resources within the Program Area

The District Service Area is located in Marin and Sonoma counties, and the Program Area addressed in this report also includes the four surrounding counties: Mendocino, Lake, Napa, and Solano. This area encompasses a range of terrestrial habitats and a diverse array of wildlife and plants. Fish, amphibian and aquatic reptile species are included as aquatic species and discussed in Chapter 4.

To facilitate the evaluation of impacts and impact avoidance measures by habitat type, a consistent set of habitat types was developed for terrestrial areas (Table 5-1). Terrestrial habitat types were based on those developed as part of the San Francisco Bay Area Upland Habitat Goals Project (Bay Area Open Space Council 2011). The aquatic and wetland habitats defined in Section 4.1.1 are also discussed in this section to address potential impacts to terrestrial species found in association with those aquatic habitats.

Table 5-1 Terrestrial Habitat Types

Coniferous Forests	Forests dominated by cone-bearing trees with needles including pines, firs and redwoods
Deciduous Forest	Forests dominated by trees that drop leaves annually including buckeyes, oaks (including live oaks) and maples
Shrublands	Dense to moderate stands of coyote brush, ceanothus, poison oak, sage, sagebrush, chamise and diverse other shrubs with grassy openings
Grasslands	Grasslands dominated by annual grasses, with varying amounts of native perennials
Serpentine	Shrublands or grasslands on serpentine rock
Coastal Dunes	Sandy soils with some active sand movement supporting low stands of diverse native perennials and beach grass
Treeholes	Cavities in branches and trunks of live trees or snags that can provide habitat for a variety of species

Source: Goals Project 1999

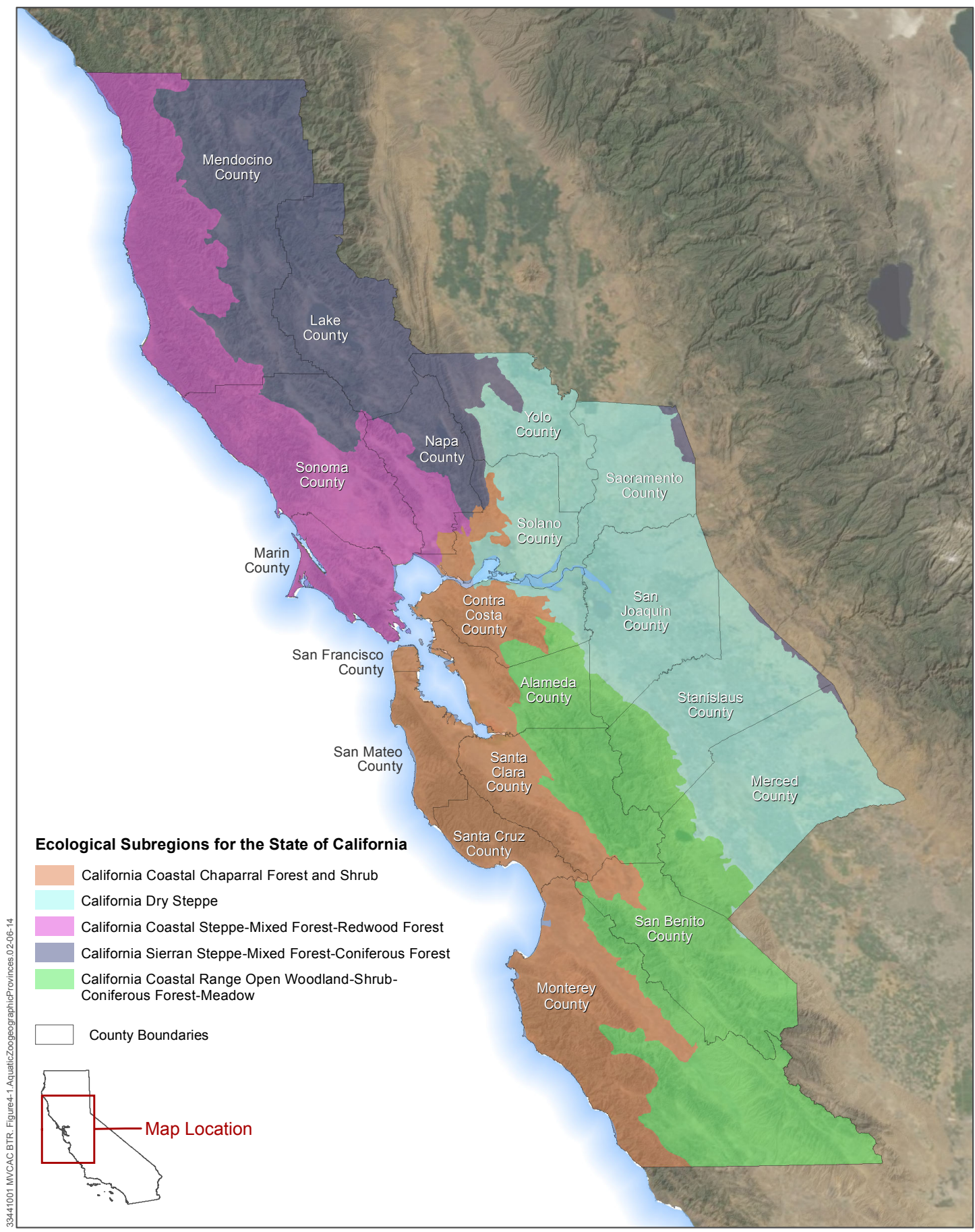
The ecoregion provinces (McNab and Avers 1996) have been used to describe the areas where the Program activities and treatments would be implemented and are shown on Figure 5-1. The ecoregion provinces are described in Appendix A, *Biological Resources Technical Report*.

Control activities may also be provided in areas adjacent to the District’s Service Area upon request of the adjacent jurisdictions to protect the health and safety of residents in adjacent jurisdictions. Actions that would be taken outside of the District’s Service Area are the same types of actions undertaken within the Service Area and in similar types of habitats or sites. Where activities are taken outside the District’s immediate Service Area, these activities would be taken in collaboration with the adjacent county or mosquito and vector control district.

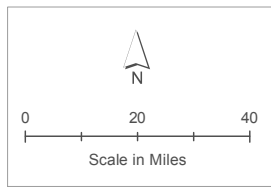
Each of these habitat types may be affected by one or more of the Program alternatives, as indicated in Table 5-2. The Program alternatives are described in Chapter 2, and the BMPs that will be applied to avoid and minimize potential impacts to these habitat types are provided in Table 5-3.

Table 5-2 Terrestrial Habitat Types Potentially Affected by Each Program Alternative

	Surveillance	Physical Control	Vegetation Management	Biological Control	Chemical Control	Other Nonchemical Control / Trapping
Coniferous Forest	X		X		X	X
Deciduous Forest	X		X		X	X
Shrublands	X		X		X	X
Grasslands	X		X		X	X
Serpentine	X		X		X	X
Coastal Dunes	X		X		X	X
Treeholes	X	X	X		X	X



33441001 MVCAC BTR, Figure 4-1, Aquatic Zoogeographic Provinces, 02-06-14



Source: US Forest Service, Pacific Southwest Region, Ecological Subregions for the State of California

Table 5-3 Marin/Sonoma Mosquito and Vector Control District BMPs to Avoid / Minimize Environmental Impacts by Alternative

Best Management Practice (BMP)	Alternative						Upland Habitats						Aquatic and Wetland Habitats									
	Surveillance	Physical Control	Vegetation Management	Biological Control	Chemical Control	Other	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)	FW 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
A. General BMPs																						
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 possible 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	*1	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 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 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

¹ (*) means not available at this time. Should a viable biocontrol agent become available, evaluation of BMP measures would occur and be implemented.

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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 treatment sites. Conduct the education training prior to starting work at the treatment site and upon 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 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 onroad 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 pests 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.	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			
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

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Best Management Practice (BMP)	Alternative						Upland Habitats							Aquatic and Wetland Habitats									
	Surveillance	Physical Control	Vegetation Management	Biological Control	Chemical Control	Other	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)	FW 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	
<p>12. For operations that generate noise expected to be of concern to the public, the following measures will be implemented:</p> <ul style="list-style-type: none"> - <u>Measure 1: Provide Advance Notices:</u> A variety of measures are implemented depending on the magnitude/nature of the activities undertaken by the District, and may include but are not limited to press releases, social media, District websites, emails, phone messages, hand-delivered flyers, and posted signs. Public agencies and elected officials also may be notified of the nature and duration of the activities, including the Board of Supervisors or City Council, environmental health and agricultural agencies, emergency service providers, and airports. - <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. 	X	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																	

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B. Tidal Marsh-Specific BMPs																						
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 possible; 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 to reduce impacts to vegetation used as habitat (e.g., Ridgway's rail 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 ¹		X ¹	X ¹	X ¹	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		

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Best Management Practice (BMP)																							
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). - 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). - When walking in marshes District staff utilizes existing trails when possible (i.e., deer trails and other preexisting trails).	X	X	X	X	X	X	X ²	X ²	X ²	X ²	X ²	X ²		X ²		X ²	X ²	X	X				
C. Salt Marsh Harvest Mouse (SMHM)																							
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 Program 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			

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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 possible. 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		
D. Ridgway's Rail (RIRA)																						
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 RIRAs 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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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 possible. 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		
E. Soft Bird's Beak																						
1. District staff will receive training on the identification, biology and preferred habitat of soft bird's beak.	X	X	X	*	X	X													X	X		
2. When possible, Program actions to be conducted in areas containing suitable habitat for this species will occur during the time period when soft bird's beak is in bloom and identifiable (July-November), so that any soft bird's beaks plants observed can be avoided and documented.	X	X	X	*	X	X													X	X		
3. District staff will coordinate with Napa-Sonoma Marshes Wildlife Area (CDFW) and San Pablo Bay National Wildlife Refuge regarding the locations of known soft bird's beak populations, so that these populations can be avoided. Flagging will be used to identify the boundaries of known soft bird's beak populations.	X	X	X	*	X	X													X	X		
4. When possible, vector management activities will be conducted on foot using hand equipment.	X	X	X	*	X	X													X	X		

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F. Vegetation Management																						
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 chainsaw, 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 three 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 three 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. Vegetation management work will be confined to October 1 to April 30 ² to minimize potential impacts to sensitive species, especially breeding birds. When work is expected to occur between February 1 and April 30, additional 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		

² Dates are from MSMVCD's Final LSAA permit with CDFW; Notification No. 1600-2010-2053-R3, Public Health/Mosquito Control Access Maintenance (October 6, 2010).

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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 new growth, 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			
9. Within suitable habitat for California Freshwater Shrimp (<i>Syncaris pacifica</i>), no in-channel vegetation will be removed, trimmed, or otherwise disturbed. District staff will work with resource agencies to determine locations of suitable habitat for California Freshwater Shrimp and receive written authorization to proceed prior to commencement of vegetation management activities.		X	X											X	X								
10. If suitable habitat necessary 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, and/or NMFS 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			
11. 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			

Table 5-3 Marin/Sonoma Mosquito and Vector Control District BMPs to Avoid / Minimize Environmental Impacts by Alternative

Best Management Practice (BMP)	Alternative						Upland Habitats						Aquatic and Wetland Habitats									
	Surveillance	Physical Control	Vegetation Management	Biological Control	Chemical Control	Other	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)	FW 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
G. Maintenance / Construction and Repair of Tide Gates and Water Structures in Waters of the U.S.																						
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 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 possible, 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 possible and not contraindicated by the presence of other sensitive species. Similarly, in water work in waterbodies that support anadromous fish, work will be conducted between July 1 and September 30 ³ .		X	X											X		X	X	X	X	X	X	
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	

³ Dates are from District's USACE. Regional Permit 4, July 31, 2007.

Table 5-3 Marin/Sonoma Mosquito and Vector Control District BMPs to Avoid / Minimize Environmental Impacts by Alternative

	Alternative						Upland Habitats						Aquatic and Wetland Habitats									
	Surveillance	Physical Control	Vegetation Management	Biological Control	Chemical Control	Other	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)	FW 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
Best Management Practice (BMP)																						
7. All projects will be evaluated prior to bringing mechanical equipment on site, 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, 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 to protect the habitat of native salt pan species.		X																	X	X		
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		

Table 5-3 Marin/Sonoma Mosquito and Vector Control District BMPs to Avoid / Minimize Environmental Impacts by Alternative

Best Management Practice (BMP)	Alternative						Upland Habitats						Aquatic and Wetland Habitats									
	Surveillance	Physical Control	Vegetation Management	Biological Control	Chemical Control	Other	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)	FW 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
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 Corps 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 possible (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	

Table 5-3 Marin/Sonoma Mosquito and Vector Control District BMPs to Avoid / Minimize Environmental Impacts by Alternative

Best Management Practice (BMP)	Alternative						Upland Habitats							Aquatic and Wetland Habitats								
	Surveillance	Physical Control	Vegetation Management	Biological Control	Chemical Control	Other	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)	FW 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
H. Applications of Pesticides, Surfactants, and/or Herbicides																						
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.			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 possible in sites with aquatic nontargets or natural enemies of mosquitoes present such as nymphal damsel flies and dragonflies, dytiscids, hydrophilids, corixids, notonectids, and ephydriids. Surfactants are the only tool that can be used with pupae to prevent adult mosquitos emergence, but generally the District will use a microbial larvicide (Bti, Bs) or insect growth regulator (e.g., methoprene) instead or another alternative when possible.			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.			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 will be adjusted to produce larger droplet size rather than smaller droplet size. Use low nozzle pressures where possible (e.g., 30 to 70 pounds per square inch). Keep spray nozzles within a predetermined maximum distance of target weeds (e.g., within 24 inches of vegetation for hand application) or vectors. Adjusting droplet size would only apply to larvicides, herbicides and non-ULV applications. Use ULV applications 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

Table 5-3 Marin/Sonoma Mosquito and Vector Control District BMPs to Avoid / Minimize Environmental Impacts by Alternative

Best Management Practice (BMP)	Alternative						Upland Habitats							Aquatic and Wetland Habitats								
	Surveillance	Physical Control	Vegetation Management	Biological Control	Chemical Control	Other	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)	FW 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. 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: - A CNDDDB search was conducted in 2012 and the results incorporated into Appendix A for this PEIR. An update was completed in November 2014 and the results incorporated into Section 4.1.2 of 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. - Use 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. - 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 National Marine Fisheries Service (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 without further agency consultation.			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 to 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

Table 5-3 Marin/Sonoma Mosquito and Vector Control District BMPs to Avoid / Minimize Environmental Impacts by Alternative

Best Management Practice (BMP)	Alternative						Upland Habitats							Aquatic and Wetland Habitats								
	Surveillance	Physical Control	Vegetation Management	Biological Control	Chemical Control	Other	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)	FW 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
12. Do not apply pesticides that could affect insect pollinators in liquid or spray/fog forms over large areas (more than 0.25 acres) during the day when honeybees are present and active or when other pollinators are 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 pollinators are present in substantial numbers, the treatment will be made at an alternative time when these pollinators are inactive or absent.			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 (e.g., fixed-wing aircraft or helicopters) that will occur in close proximity to homes, heavily populated, high traffic, and sensitive areas. The District infrequently applies or participates in the application of herbicides in areas other than District facilities.			X	*	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
I. Hazardous Materials and Spill Management																						
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).			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 District truck used for pesticide transport.			X	*	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
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

Table 5-3 Marin/Sonoma Mosquito and Vector Control District BMPs to Avoid / Minimize Environmental Impacts by Alternative

Best Management Practice (BMP)	Alternative						Upland Habitats							Aquatic and Wetland Habitats								
	Surveillance	Physical Control	Vegetation Management	Biological Control	Chemical Control	Other	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)	FW 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. 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

¹ This BMP will also be applied in aquatic habitats other than tidal marshes, although the weed species of concern would differ.

² This BMP will also be applied in all habitats.

5.1.2 **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. Special-status species' presence or absence within the Program Area are presented in (Table 4-3, California Natural Diversity Database Occurrences Plant Species in the Marin/Sonoma Mosquito and Vector Control District and its Adjacent Program Areas and in Table 4-4, California Natural Diversity Database Occurrences Animal Species in Marin/Sonoma Mosquito and Vector Control District and its Adjacent Program Areas) which also shows the habitat types these species are likely to use. All species were included in these tables in Chapter 4, to be comprehensive in one location and to avoid duplication herein, as a number of species occur in both wetland and upland habitat types.

5.1.3 **Regulatory Setting**

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

5.1.3.1 ***Federal***

5.1.3.1.1 **Endangered Species Act of 1973 (16 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.

5.1.3.1.2 **Migratory Bird Treaty Act (16 USC Section(s) 703-711; 50 CFR Subchapter B)**

This law includes provisions for protection of migratory birds, including basic prohibitions against any taking not authorized by federal regulation. The administering agency is the USFWS.

5.1.3.1.3 **Bald and Golden Eagles Protection Act (16 USC Section(s) 668; 50 CFR Part 22)**

This act makes it illegal to import, export, take (which includes molest or disturb⁴), sell, purchase, or barter any bald eagle or golden eagle or part thereof. The golden eagle, however, is accorded somewhat lighter protection under this act than the bald eagle. The administering agency is the USFWS.

⁴ "Disturb means to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, (1) injury to an eagle, (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior."

5.1.3.1.4 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*.

5.1.3.1.5 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.

5.1.3.1.6 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.

5.1.3.1.7 Stipulated Injunction and Order, Protection of California Red-Legged Frog from Pesticides

On October 20, 2006, the US District Court for the Northern District of California imposed no-use buffer zones around California red-legged frog upland and aquatic habitats for certain pesticides. 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 California red-legged frog 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 Marin and Sonoma counties.

Of the 66 pesticides listed in the injunction, the District may employ esfenvalerate, methoprene, and permethrin for vector control. Esfenvalerate may be used for yellow-jacket and wasp control in response to public complaints. Methoprene is used for larval mosquito control, and permethrin may be used for adult mosquito control. However, vector control programs are exempt. Specifically, 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. The District may use the following herbicides listed in the injunction: glyphosate, imazapyr, and triclopyr. 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 a pesticide 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 non-critical 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).

5.1.3.2 State

5.1.3.2.1 Porter-Cologne Water Quality Control Act of 1970

This law provides the 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 and the CWA Section 303 water quality standards program. The administering agencies are the SWRCB and the RWQCBs.

5.1.3.2.2 California Fish and Game 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.

5.1.3.2.3 California Endangered Species Act of 1984 (California Fish and Game 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 CCR Section 670.5. This law prohibits “take” of state-listed or candidate species, except as otherwise authorized by the Fish and Game Code. (The term “take” is defined by Section 86 of the Fish and Game 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.

5.1.3.2.4 California Fish and Game Code §3503

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

5.1.3.2.5 California Fish and Game 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 Game Code or regulation adopted pursuant thereto. The administering agency is the CDFW.

5.1.3.2.6 California Fish and Game 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 Game Code. The administering agency is the CDFW.

5.1.3.2.7 California Fish and Game Code Section 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 Game Code Section 5650 is the CDFW.

5.1.3.2.8 Natural Community Conservation Planning Act (California Fish and Game Code §2800 to 2835)

This law provides for the development of 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.

5.1.3.2.9 Native Plant Protection Act; California Fish and Game 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.

5.1.3.2.10 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.

5.1.3.2.11 California Food and Agricultural Code, Section(s) 29102

This code provides for the protection of bees from pesticide use through notification of beekeepers and the establishment of citrus bee protection areas. Prohibited applications to citrus within a citrus/bee protection area include any pesticide toxic to bees, except those exempted in a subsequent subsection during a citrus bloom period, unless the need for control of lepidoptera larvae or citrus thrips has been established by written recommendation of a representative of the University of California, Agricultural Extension Service, or a licensed agricultural pest control adviser. The recommendation should state either that the citrus planting does not meet the citrus bloom period criteria, or why alternatives less hazardous to bees would not be effective. The administering agency for the above authority is the CDPR.

5.1.3.3 *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 (including those conducted under the authority of the state, specifically CDPH in this case) and would not be applicable to treatments the District proposes 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. 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 other local entities and property owners to implement BMPs for the protection of public health.

Concerning local ordinances, plans, and policies to protect biological resources including trees, Marin County and its cities (Belvedere, Corte Madera, Fairfax, Larkspur, Mill Valley, Novato, Ross, San Anselmo, San Rafael, Sausalito, and Tiburon) and Sonoma County and its cities (Cloverdale, Cotati, Healdsburg, Petaluma, Rohnert Park, Santa Rosa, Sebastopol, Sonoma, and Windsor) maintain general plans for development and protection of lands within their jurisdictions. 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 are examples of the local general plan policies and tree ordinances affecting biological resources.

5.1.3.3.1 **Marin County General Plan**

The County of Marin's Countywide Plan, adopted in 2007 (Marin County 2007a), includes a Natural Systems and Agriculture Element that set county policies "to preserve native habitat and protect natural resources, and sets out programs to restore and enhance ailing habitat." The element describes goals relating to biological resources, water resources, environmental hazards, atmosphere and climate, open space, trails, and agriculture and food. Each of these goals policies and implementing programs are outlined. The goals most pertinent to the District's activities are listed below.

> Section 2.4 Biological Resources:

- BIO-1. Enhanced Native Habitat and Biodiversity. Effectively manage and enhance native habitat, maintain viable native plant and animal populations, and provide for improved biodiversity throughout the County.
- BIO-2. Protection of Sensitive Biological Resources. Require identification of sensitive biological resources and commitment to adequate protection and mitigation, and monitor development trends and resource preservation efforts.
- BIO-3. Wetland Conservation. Require all feasible measures to avoid and minimize potential adverse impacts on existing wetlands and to encourage programs for restoration and enhancement of degraded wetlands.
- BIO-4. Riparian Conservation. Protect and, where possible, restore the natural structure and function of riparian systems.
- BIO-5. Baylands Conservation. Preserve and enhance the diversity of the baylands ecosystem, including tidal marshes and adjacent uplands, seasonal marshes and wetlands, rocky shorelines, lagoons, agricultural lands, and low-lying grasslands overlying historical marshlands.

> Section 2.5 Water Resources.

- WR-2. Clean Water. Ensure that surface and groundwater supplies are sufficiently unpolluted to support local natural communities, the health of the human population, and the viability of agriculture and other commercial uses.

> Section 2.5 Open Space.

- OS-1. Sustainably Managed Open Space. Manage open space in a sustainable manner for environmental health and the long-term protection of resources.
- This goal includes Implementing Program OS-1.C. Utilize Integrated Pest Management. Minimize the use of pesticides and herbicides in open-space management. This Program is described below.

Integrated Pest Management Program

The Marin County Board of Supervisors adopted an Integrated Pest Management Ordinance (No. 3521) and IPM policy that governs and guides the control of pests on property the County of Marin owns, manages, and leases. The IPM program uses best practices and science to protect the health of the public and environment, manage their properties, minimize loss due to pests, and reduce pesticide use. The county's IPM is overseen by an IPM Commission (Marin County Parks & Open Space 2010). The IPM Policy outlines the program's purpose and intent, describes its components, and identifies the duties and responsibilities of those implementing the plan (County of Marin 2013).

5.1.3.3.2 Sonoma County General Plan

The Sonoma County Board of Supervisors approved the Sonoma County General Plan 2020 (Sonoma County 2008) on September 23, 2008. This plan provides goals, objectives, and policies that will guide decisions on future growth, development, and conservation of resources through 2020 in a manner consistent with the goals and quality of life desired by the county's residents. The Plan includes the following two elements pertinent to the District's activities: Open Space and Resource Conservation and Water Resources.

The Open Spaces and Resources Conservation Element includes policies addressing the protection of biotic habitats and riparian corridors. It also addresses air quality and energy resources, mineral and timber resources, and soil resources.

- > OSRC-7. Protect and enhance the County's natural habitats (special-status species habitat, marshes and wetlands, sensitive natural communities, and habitat connectivity corridors) and diverse plant and animal communities.
- > OSRC-8. Protect and enhance Riparian Corridors and functions along streams, balancing the need for agricultural production, urban development, timber and mining operations, and other land uses with the preservation of riparian vegetation, protection of water resources, flood control, bank stabilization, and other riparian functions and values.
- > OSRC-9. Protect and conserve the quality of ocean, marine, and estuarine environments for their scenic, economic and environmental values.

The Water Resources Element recognizes the importance of natural vegetation and wildlife habitat, both as beneficial water uses whose needs must be considered but also as factors in maintaining adequate water quality and quantity.

- > Goal WR-1. Protect, restore and enhance the quality of surface and groundwater resources to meet the needs of all reasonable beneficial uses.

5.1.3.3.3 Tree Ordinances

The cities and counties may also have ordinances to protect trees. For example, the Marin Countywide Plan, Natural Systems and Agriculture Element (Marin County 2007a) seeks to conserve native woodland habitat. It references the County Native Tree Preservation and Protection Ordinance that was adopted in 1999 to regulate the removal of native trees. The ordinance is intended to regulate sensitive biological resources on the local level by broadening the protection of native tree species not previously addressed by tree protection development standards and the discretionary permit review process, Trees that are

designated as “protected” include a number of species with diameters at breast height of 6 inches. Heritage trees have diameters of 18 inches or more at breast height. If the tree is a “Protected Tree” or “Heritage Tree” and is located in a Stream Conservation Area or a Wetland Conservation Area, then a tree removal permit is required. In Sonoma County, the tree protection ordinance can be found in Section 26-88-010(m) of the Zoning Code (Sonoma County undated). A list of protected tree species can be found in the Section 26-02-140. Per the ordinance “*projects shall be designed to minimize the destruction of protected trees. With development permits, a site plan shall be submitted that depicts the location of all protected trees greater than nine inches (9”) and their protected perimeters in areas that will be impacted by the proposed development, such as the building envelopes, access roads, leachfields, etc.*”

5.1.4 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 National Oceanic and Atmospheric Administration (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.

CEQA requires that an EIR consider whether a project would conflict with the provisions of an adopted HCP, NCCP, or other approved local, regional, or state habitat conservation plan. Listings of these documents on the USFWS and CDFW websites were reviewed (see Table 4-5), and four approved plans were identified, along with three plans that are currently in development. In addition, one regional plan, the Santa Rosa Plain Conservation Strategy (SRPCS) is also under preparation. Two of these conservation strategies, Turkey Road and SRPCS, lie within the District’s immediate Service Area. The remainder covers portions of the adjoining counties (Mendocino, Lake, Napa, and Solano). These plans are described below.

5.1.4.1 *Turkey Road Low Effects HCP*

This HCP was prepared by Wildlife Research Associates on behalf of Bradley Jacobs to address the effects of development of a residential property and vineyard on California red-legged frog. The HCP provides measures to minimize and mitigate the adverse effects of the project relating to 0.25 acre of permanent impacts associated with structures and roads, along with temporary disturbance of grasslands during construction, and the development of a 4.5-acre vineyard. Project impacts will be offset through purchase of 0.75 acre of habitat credits in a USFWS-approved mitigation bank.

5.1.4.2 *California Department of Corrections Statewide Electrified Fence Project*

This HCP was prepared by the California Department of Corrections for their Statewide Electrified Fence Project and addresses mortality or the potential for mortality of special-status species and native migratory birds at 25 prisons where lethal electrified fences are operational and 4 future sites where electrified fences are planned. The HCP provides for take of 62 species covered by the federal Endangered Species Act, California Endangered Species Act, or listed as California Species of Concern, along with an additional 57 species covered under the Migratory Bird Treaty Act, but not included in the preceding category. This

HCP would apply to the Solano State Prison within the District's Adjacent Project Area, although this facility is located in Vacaville, where the District would not be expected to conduct its activities. As the HCP is confined to the prison sites and specifically to mortality due to electrocution of covered species on those fences, this HCP does not apply to the District's activities.

5.1.4.3 Shiloh III

This HCP was prepared by enXco, Inc. to cover the potential impacts of construction of the Shiloh III Wind Project, near Rio Vista, California. The HCP addresses impacts to the central California (Distinct Population Segment (DPS) of California tiger salamander over an area of 4,600 acres for a period of 36 years. The activities covered under the HCP are the construction and installation of wind turbines and associated facilities, maintenance of these facilities, and decommissioning of these facilities in the future. These activities are anticipated to cause both permanent and temporary loss of California tiger salamander habitat. Avoidance and Minimization measures (AMMs) include minimizing impact area; avoiding injury to salamanders during implementation; avoiding erosion and sedimentation impacts to habitat; avoidance of toxic spills; restoration of temporarily disturbed habitat; and ensuring AMMs are implemented. Mitigation is to offset unavoidable permanent impacts at an approved conservation bank. As this HCP is located near Rio Vista, more than 20 miles from the Napa County line, it is unlikely that the District's activities would occur within the boundaries of this HCP.

5.1.4.4 Shiloh IV

This HCP was prepared by Shiloh IV Wind Project, LLC to cover the potential impacts of construction of the Shiloh IV Wind Project, near Rio Vista, California. The project covers impacts to the central California DPS of California tiger salamander over an area of 3,514 acres for a period of 36 years. The activities covered under the HCP are installation and operations of maintenance yards, a substation, wind turbines and associated facilities (including access roads) and decommissioning of these facilities in the future. These activities are anticipated to result in both permanent and temporary loss of California tiger salamander habitat. AMMs include minimizing impact area; avoiding injury to salamanders during implementation; avoiding erosion and sedimentation impacts to habitat; avoidance of toxic spills; restoration of temporarily disturbed habitat; and ensuring AMMs are implemented. Mitigation is to offset unavoidable permanent impacts at an approved conservation bank. As this HCP is located near Rio Vista, more than 20 miles from the Napa County line, it is unlikely that the District's activities would occur within the boundaries of this HCP.

5.1.4.5 Bay Delta Conservation Plan

The BDCP is an HCP being developed as part of California's overall water management portfolio. It is being developed as a 50-year habitat conservation plan with the goals of restoring the Sacramento-San Joaquin River Delta (Delta) ecosystem and securing California water supplies. The plan area encompasses the legal Delta and surrounding areas (Solano, Yolo, Contra Costa, San Joaquin, and Sacramento counties). It does not border Marin or Sonoma Counties, but does encompass parts of adjoining Solano County. The activities covered under the BDCP include improvements to water infrastructure facilities in and around the Delta and the protection of approximately 150,000 acres of habitat to address the Delta's environmental challenges. The BDCP includes 22 conservation measures aimed at improving water operations, protecting water supplies and water quality, and restoring the Delta ecosystem within a stable regulatory framework (BDCP 2014).

The BDCP seeks coverage for 56 species and identifies conservation measures designed to contribute to their protection and recovery. The plan includes 67 goals and 165 objectives that form the basis of the conservation strategy, which includes landscape scale, natural community and biological and species specific goals and objectives. The BDCP also includes 37 AMMs that are incorporated into covered activities to minimize the effects of these actions on various resources. Many of these AMMs focus on minimizing the general environmental effects of construction activities and many others are species specific AMMs.

AMM 33 Mosquito Management calls for management and control of mosquitoes during construction of project facilities. The HCP Implementation Office will accomplish this through consultation with appropriate mosquito and vector control districts and will carry out mosquito control activities as necessary and applicable. The types of mosquito control activities that may be carried out under this AMM include surveillance, biological controls, physical controls, vegetation management, and use of larvicides and adulticides, as necessary.

5.1.4.6 Solano Habitat Conservation Plan

The Solano Habitat Conservation Plan is being developed by the Solano County Water Agency (SCWA) and will cover activities over a plan area of 577,000 acres in Solano County and 8,000 acres in Yolo County. The purpose of the Solano HCP is to (a) promote the conservation of biological diversity and the preservation of endangered species and their habitats consistent with the recognition of private property rights; (b) provide for a healthy economic environment for the citizens, agriculture, and industries; and (c) allow for the ongoing maintenance and operation of public and private facilities in Solano County. The plan is intended to cover activities undertaken by or under the permitting authority/control of the plan participants. Coverage may also be extended to third parties who fall under the direct regulatory control of the plan parties. The plan covers a number of natural communities and 36 covered species (SCWA 2102).

The Solano HCP would set up a reserve system with measurable biological standards to measure the overall success of the HCP conservation program. The plan specifies specific acreages of habitat to be established within the reserve system for different natural habitat types and species. Plan goals and objectives would be accomplished through implementation AMMs and mitigation measures. To obtain coverage under the Solano HCP will require that baseline studies be conducted for any proposed projects, the plan AMMs are implemented, and that the mitigation measures of the plan are carried out, when impacts do occur. AMMs include general measures for operation, maintenance and construction activities; habitat and covered species-specific AMMS; and special management species AMMS, with corresponding mitigation requirements for each covered resource.

5.1.4.7 Mendocino Redwood Company

Mendocino Redwood Company, LLC (MRC) is in the process of developing a HCP with the federal agencies (USFWS and NMFS), a NCCP with the CDFW, and a Program Timberland Environmental Impact Report with the California Department of Forestry and Fire Protection.

Timber management is the primary activity in the plan area, occurring on approximately 213,000 acres. Management activities include timber harvest and regeneration, site preparation, planting, vegetation management, thinning, and fire suppression.

The HCP/NCCP is MRC's operational plan for managing 11 federal or state threatened or endangered wildlife species, 31 rare plants, and 4 sensitive natural communities on the approximately 213,000-acre property located in coastal Mendocino County, California.

The plan, based on the Humboldt Redwood Company, LLC HCP/NCCP, provides for conservation measures for many endangered and threatened species (including spotted owls, marbled murrelets, several salmonid species, rare mammals, amphibians, reptiles, and plants). The HCP requires large riparian buffers designed to provide tree canopy over streams for maintenance of cool water temperatures, filter strip properties, and abundant large wood for protection and enhancement of salmonid habitat. Management of these buffers over time should also increase the amount of old forest characteristics along these streams.

MRC's proposed 80-year term plan provides for the following outcomes: protect, enhance, and increase habitat for rare, threatened, or endangered species covered in the plan; mitigate the impact of land management on covered species; maintain and improve biodiversity in the covered area; contribute to the

recovery of threatened and endangered species, and; attain “regulatory certainty” for endangered species management (MRC 2014).

As this HCP/NCCP is located in Mendocino County adjacent to Sonoma County and within approximately 2 miles of the county border, it is possible that the District’s activities could occur within the HCP/NCCP boundaries.

5.1.4.8 Santa Rosa Plain Conservation Strategy (Regional)

The SRPCS is a long-term conservation program sufficient to mitigate potential adverse effects on five listed species (California tiger salamander, Burke’s goldfield, Sonoma sunshine, Sebastopol meadowfoam, and many-flowered navarretia) due to future development on the Santa Rosa Plain. The Santa Rosa Plain (Sonoma County) is about 20 miles long (encompassing Windsor and Rohnert Park) and 6 miles wide (extending from Santa Rosa to Sebastopol). The goals are to:

- > Develop a habitat conservation strategy that contributes to the recovery of California tiger salamander and listed plant species.
- > Identify proposed areas for conservation.
- > Develop an implementation framework for the conservation strategy which identifies short and long-term actions and milestones as needed.
- > Establish development process predictability.

The strategy identified eight conservation areas, one tiger salamander preserve system, one listed plant preserve system, and one listed plant conservation area. Although local governmental agencies have not yet been able to complete the implementing ordinances for the strategy (USFWS 2013), the strategy is being implemented under the authority of a programmatic biological opinion (USFWS 2007 cited in USFWS 2013) and the oversight of an Implementation Committee, including representatives from local jurisdictions, USFWS, CDFW, and private landowners and the environmental community. Three conservation banks have been approved by the USFWS to date, and they continue to work to approve additional banks. The programmatic biological opinion simplifies the process of consulting with USFWS and complying with the federal Endangered Species Act by using a template in many circumstances, significantly shortening the permitting timeline.

The conservation program will contribute to the recovery of the Sonoma County populations of the five listed species and the conservation of their habitat within the conservation areas described above in a manner that protects stakeholders’ (both public and private) land use interests, and supports issuance of an authorization for incidental take of California tiger salamander. Project impacts may be mitigated with the purchase of mitigation credits in one of the USFWS-approved mitigation banks located on the Plain.

5.2 Environmental Impacts and Mitigation Measures

This section identifies the environmental issues and concerns associated with the Program alternatives and presents the significance criteria used to evaluate the likely impacts of the various Program alternatives on terrestrial resources under CEQA. The significance criteria establish thresholds to determine whether an impact rises to a level that is biologically significant. The environmental issues describe the mechanisms by which such impacts might occur.

5.2.1 Evaluation Concerns and Criteria

The Program alternatives are implemented as part of an IVMP as described in Section 2.3. The IVMP uses nonchemical and chemical treatments in a 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 consistent with IPM principles. 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 the different alternatives remain.

5.2.1.1 *Environmental Concerns*

The Program alternatives have the potential to affect terrestrial resources directly by affecting physical habitat and through acute or chronic toxicity to special-status species or other nontarget organisms. Habitat alterations such as removal or reduction of habitat and vegetative cover may also indirectly result in impacts to the ranges and abundance of prey animals. Exposure of nontarget organisms to pesticides can result in acute or chronic toxicity, depending on the concentrations encountered. Additionally, indirect exposure may occur via ingestion of contaminated prey animals, bioaccumulation of chemicals, or biotransformation of pesticide active ingredients to different compounds. 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 use as part of the District's IVMP.

Concerns identified during public scoping include the following, which are addressed as elements of the broader issues explained above:

- > Discuss potential impacts on insect pollinators/bees from chemicals in treatment applications.
- > Describe the effects of all chemicals that are used and/or proposed for use on wildlife and natural ecosystems, including insect prey, birds, mammals, fish, vegetation and site topography. The loss of prey for birds is a particular concern. Also, consider unwanted effects of the "inactive" portion of the pesticides. What effects will the carrier portion of the chemicals have on the environment?
- > Discuss the potential impact of *Bacillus sphaericus* (Bs)/*Bacillus thuringiensis israelensis* (Bti) products on native species.
- > Describe the role of mosquitoes within the food chain, and subsequent impacts if they were removed in terms of amphibians, birds, reptiles, fish, and insects. This issue is also addressed in Section 6.2.
- > Pesticides can also kill the natural predators of mosquitoes, which can have difficulty in recovery from pesticides.
- > Pesticide efficacy attenuation and possible long-term resistance is an issue for all chemically based mosquito control programs. It is addressed by the use of different control methods and different agents over time where possible (BMP and IVM techniques are designed to identify these issues early and modify applications as appropriate and feasible).
- > Note that the Program Area includes potential habitat for several California and federally threatened and other sensitive plant and wildlife species and, as such, comprehensive biological studies should be implemented.
- > Coordinate with CDFW, CNDDDB (CDFW 2012), USFWS, and USFWS' Information, Planning, and Conservation planning tool to identify special-status plant and wildlife species. If impacts are found to be significant, the PEIR should identify adequate mitigation measures to reduce impacts to lower levels.
- > A primary concern is the environmental impact on natural resources in terms of vegetation removal, soil erosion, and possible wildlife impact.
- > Ensure mosquito abatement staff minimizes impact to tidal marsh and vernal pool habitats (especially during breeding season). Restrict operation of vehicles to levees and existing roads, and avoid vernal pool plants during blooming season (March–June).

- > Concern for spread of invasive weeds, erosion, and sedimentation.
- > The PEIR should include a detailed description and complete assessment of the surveillance, physical control, biological control, and chemical control impacts (current and future, direct and indirect) on habitats (including endangered, threatened, and locally unique species and sensitive habitats) and on species (sensitive fish, wildlife, or plants).

5.2.1.2 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 a potentially significant impact exists 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, etc.) 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 Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan.

5.2.2 Evaluation Methods and Assumptions

5.2.2.1 Evaluation Methods

In general, the methodology for determining impacts under CEQA focuses on types of habitat and special-status terrestrial species, and are evaluated using the criteria described above as environmental topics. Potential impacts were assessed using available information on the types of vector control and treatment as described in Chapter 2, Program Description, and assuming that all applicable BMPs as described in Chapter 2, Table 2-6, (based on *Best Management Practices for Mosquito Control in California* [CDPH and MVCAC 2012] contained in Appendix F), the Statewide General NPDES Permit for Biological and Residual Pesticide Discharges to Waters of the US from Spray Applications (SWRCB Water Quality Order No. 2011-0004-DWQ; NPDES No. CAG 990007; Spray Applications Permit) and District-specific BMPs, as indicated in the PAPs and Aquatic Weed Control Permits (APAPs). The BMPs most applicable to minimizing and/or avoiding impacts to terrestrial resources are repeated in Table 5-3, which also indicates the habitat types in which those BMPs will be applied. This assessment considers the physical and biological connections between treatment areas and terrestrial ecosystems. This information was evaluated in the context of the Program alternatives and the existing environment under baseline conditions in 2012 in the Program Area as described in Section 5.1.1.

The detailed BMPs described in Table 2-6 (and associated with the habitat types they would be applied to in Table 5-3 listed below) can be placed into several categories. These categories include:

1. Agency communication includes periodic discussion with resource agencies, refuge managers and other land managers about 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 activities to be implemented. It also includes the District obtaining any required permits and reporting regarding existing permits, periodic check-in calls, and other calls 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 persons approved by these agencies.
3. Pretreatment screening involves a pretreatment assessment of pesticide 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 includes 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 Tables 2-6 and 5-3.
6. Alternative-specific BMPs relate specifically to the implementation of a particular treatment (Physical Control, Vegetation Management, Chemical Control). These may overlap many of the BMPs described above, but also include alternative-specific measures to protect environmental resources, based the type of activity to be conducted (e.g., protection of soil surface, minimization of turbidity under the Physical Control Alternative 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 Table 5-3, **nor are they intended to replace those more specific BMPs**. These categories are provided to facilitate the discussion of the impact evaluations through the end of this chapter. Table 5-3 lists all of the BMPs for Program implementation by alternative and habitat types that are relevant to biological resources and determinations of impact significance. In practical terms, the District treats terrestrial areas with the same care and sensitivity to plants and wildlife that it does for aquatic and wetland habitats.

Impact determinations follow the analysis for each Program alternative 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. Impacts to local policies
- f. Conflicts with provisions of HCP, NCCP, or other approved habitat conservation plan

Impacts are evaluated with regard to desired terrestrial plant and animal (e.g., native and listed species) communities, and effects on food supply for wildlife, using the CEQA criteria described above (Section 5.2.1.2). 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 the physical and biological connections between treatment areas and terrestrial ecosystems. This information was evaluated in the context of the Program alternatives and the existing environment under baseline conditions in the Program Area as described in Section 5.1.1. Note that Chapter 6, *Ecological Health*, specifically addresses potential impacts to nontarget ecological receptors but is not focused on terrestrial habitat types.

The potential impacts of the nonchemical alternatives are based on the type and location of habitats treated and the magnitude and frequency of treatment. The potential impacts of the chemical alternatives 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 Health Assessment Report*. The evaluation of all alternatives considered the life histories of the different listed species and ecological interactions, including impacts to the terrestrial food chain.

Pesticides the District uses or proposes to use in the future were investigated to provide a preliminary assessment of the potential impacts to nontarget ecological receptors. Appendix B provides the results of review and evaluations of pesticide (insecticides, herbicides) active ingredients and adjuvants the District currently uses or proposes for use (along with others the District has not selected for use). A comprehensive literature review was conducted to evaluate environmental fate and general toxicity characteristics for the active ingredients and adjuvants. The results of the assessment were used to rank the potential for adverse effects to human health and the environment. Chemical and application characteristics such as the likelihood of exposure for nontarget species and habitats, the potential for drift, and the possible transport and fate of the chemical in various media (i.e., air, surface water/groundwater, soil) were considered in the assessment. Those active ingredients that appear to exhibit either a higher level of risk or have specific use patterns warranting further research are listed in Table 6-5 (in Section 6.2.7).

The pesticide application scenarios that result in reasonable efficacy with minimal unwanted risk are preferred and are the basis of IPM approaches and BMPs the District employs. Each of the pesticides and herbicides identified for further evaluation in Appendix B (as a subset of all pesticides and herbicides in use) is known to exhibit at least one parameter that appears to have an important role in the resulting potential or perceived risk.

5.2.2.2 Assumptions

The following assumptions were used in the assessment of potential terrestrial resource impacts from the Program alternatives:

- > Site-specific evaluation of terrestrial 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 alternatives as the basis for evaluation.

- > The programmatic evaluation is based on the current proposed control methods and is subject to change based on future needs (see Section 1.8).
- > The BMPs listed in Table 5-3 will be implemented by District staff as appropriate to the type of activity under the Program alternatives.

This terrestrial resources evaluation does not include assumptions about which alternative treatment strategy or strategies would be applied in any given area. Therefore, each Program alternative is considered as a stand-alone option, although the Program may include multiple alternative implementations within a given area (i.e., physical controls followed by larvicide application). Guidelines used to trigger a particular alternative based on mosquito abundance and other variables are included in District-specific operating procedures. This evaluation assumes that important parameters such as sediment half-life are dependent on the specific conditions at the time of pesticide application; therefore, the values listed herein serve as reference values.

This evaluation assumes that all pesticides are applied in accordance with product label instructions and USEPA and CDPR requirements (and in consideration of the local context for that area, i.e., nearby area land uses and habitats). 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 (pest), 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 (i.e., 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 which combines Bti and Bs), the following information applies:

Most 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. If products with similar or even different active ingredients are applied simultaneously, it is likely that the net effect could be the sum of the effects of the active ingredients to impact the vector. However, for vector control applications, materials with the same active ingredient are not applied to the same specific area or simultaneously at a given site. The need for reapplication of mosquito larvicides or adulticides is surveillance driven and performed per the label directions. The District can apply larvicide materials with different active ingredients during a single application. This type of application is necessary if multiple hatches of mosquito larvae occur and results in mosquito populations occurring at different stages of the life cycle. An example is when liquid Bti and methoprene are applied simultaneously. When occurring, the combination of the material is a product called Duplex, and the mixture of the materials and active ingredients is provided for on the product label. Another example for the District includes a pre-application of a liquid trans allethrin and phenothrin spray product that 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 humans would not occur unless the application(s) were inappropriate or the

timing of applications is inappropriately close. Actual applications do not generally occur that close together unless a problem with treatment effectiveness arises. A material is applied followed by post-treatment inspection to determine effectiveness. Only if the vectors (mosquitoes) have not been sufficiently killed would the District go back into the area and reapply a pesticide.

Assumptions and/or background information related to the analysis of hazards, toxicity, and exposure for chemical treatment methods are explained below, including the definition of key terms. The concept of ecological food web is explained as well, and it is addressed primarily in Section 6.2.2.2 Assumptions. Background information on bioaccumulation and biomagnification is provided in Section 6.1.1.3, and the analysis or potential for bioaccumulation is covered in Section 6.2.7.

5.2.2.2.1 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.”

5.2.2.2.2 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, in which the probability of a toxic response generally increases as the 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 in all circumstances. Thus, toxic and adverse effects can be mitigated by limiting potential exposure to a dose less than the amount that may result in adverse health effects.

The toxicity data included in the tables and charts in this PEIR 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 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). These two levels are used to describe the potential range of exposures that could result in adverse effects, including the highest dose with no observed effects.

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) are 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 MSDSs, in actual practice, the amounts actually applied by the District within the District's Program Area for vector control are substantially less than the amounts used in the toxicity studies. Because of these large inherent safety factors in recommended product application rates, the amount of chemical resulting in demonstrated toxicity in the laboratory is nowhere near the low exposure levels associated with an actual application for vector control. The application concentrations consistent with the labels or MSDSs⁵ 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). Impacts may occur to some nontarget organisms. Although numerous precautions (BMPs) and use of recommended application guidance is 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 careful use of BMPs and advance planning by the District.

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 including multiple applications in an area such as a wetland.

5.2.2.2.3 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 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 alternatives.

5.2.2.2.4 Ecological Food Webs

While it is important to evaluate the potential adverse impacts of a pesticide application to potentially affected nontarget species, it is neither feasible nor practical to evaluate those potential impacts to a representative food web. An ecological food web is represented in the illustration representing some of the multitude of possible biotic and food uptake interactions in an ecosystem. Each of the possible

⁵ Although the MSDS format is referenced in this document, it should be noted 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).

connections between species is also associated with other interactions. These interactions can be the result of higher levels of animal species organization (trophic) or paired interactions between individuals that result in added, positive associations (symbiotic) for both species.

Although ecological food webs could be used to describe the complex system interactions that might be associated with District pesticide application scenarios, it is neither feasible nor practical to evaluate those potential impacts using a food-web approach. The numerous, complex interactions in typical food webs

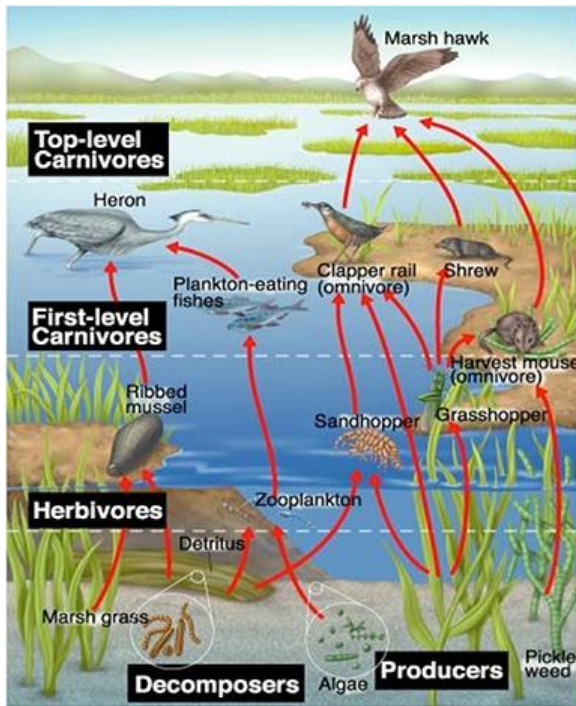


Figure 5-2 Ecological Food-Web Concept

would be subject to substantial uncertainty. Because of these constraints and complexity, it would be 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 by the District. Figure 5-2 illustrates the ecological food-web concept.

Pesticides can kill natural predators of mosquitoes. The District's activities associated with the Physical Control and Vegetation Management Alternatives 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, as other prey sources are available.

5.2.3 Surveillance Alternative

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. Ticks are collected along trails and sampled for disease. Rodents (roof rats and Norway rats) may be collected during inspections to respond to public service requests. If preexisting roads and trails are not available to access monitoring sites, low ground pressure ATVs may be used to access these sites. Offroad access is minimized and used only when roads and trails are not available.

5.2.3.1 Impacts to Special-Status Species

Small impacts to upland and wetland habitats in the vicinity of aquatic ecosystems may occur when the District is required to maintain paths and clearings to access surveillance sites and facilitate sampling. These impacts are kept to the minimum amount necessary to minimize potential ingress of predators into these habitats. 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 trimming or clearing by the District. Occasionally new access routes may be required to assess a vector source. This process 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. In those rare cases where especially dense vegetation is encountered, a skip loader with mower attachment may be used. No trimming of vegetation greater than 4 inches diameter at breast height would be conducted. Trail maintenance activities would be conducted in the fall, when potential impacts to special-status species would be minimized. However, lighter trail maintenance activities (trimming back small branches or fronds hanging over the access route) may occasionally occur during other times of year. These activities are of small size with limited duration and noise effects, and new access routes would be minimal; therefore, indirect impacts to terrestrial habitats would be inconsequential.

The presence of District personnel implementing the Surveillance Alternative could result in disturbance to special-status species. Such disturbance is most likely to occur during the nesting or breeding season, should the animals abandon suitable habitat as a result of such disturbance including equipment noise. However, these disturbances would be very minor and of short duration, so would likely not cause these animals to abandon the area, but rather move away from the activity while it is occurring. Special-status plants would not be disturbed by the presence of District personnel during surveillance activities.

The Surveillance Alternative 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 indicated in Table 5-3, but in particular those BMPs requiring discussing activities regularly with regulatory agencies or wildlife refuge managers, staying on existing access routes wherever possible, and maintaining and implementing training from USFWS and CDFW personnel regarding special-status species.

In addition, when working in tidal marshes, the District will implement all Tidal Marsh-Specific BMPs, as well as those for salt marsh harvest mouse, Ridgway's rail, and soft bird's beak, where these species are potentially present, as determined through discussion with refuge managers, CDFW, or USFWS personnel. This implementation 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 amount necessary; and other BMPs, as indicated in Table 5-3. Through the implementation of these BMPs, substantial impacts to habitat would be avoided, and little to no impact to special-status animals would occur.

Surveillance activities might result in some physical damage to habitat or associated vegetation from foot traffic and vehicle use 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 and sensitive species prior to initiating any further surveillance measures in

natural habitat areas, and only small areas would be disrupted briefly by access activities. 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 habitat or special-status species.

Impact TR-1. The Surveillance Alternative 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.

5.2.3.2 Impacts to Habitats

Surveillance activities 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 or listed by CDFW and USFWS. This alternative 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. Most surveillance occurs along access routes that are already established and would only be cleared periodically, during the fall, to maintain access, as necessary. Surveillance activities might result in some physical damage to habitat or associated vegetation from foot traffic and vehicle use in areas without marked trails to access areas for potential vector inspection. 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 CDFW, professional biologists and property owners with regard to access, mosquito surveillance and control in association with vernal pools. 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 California tiger salamander, Sebastopol meadowfoam, Burke's goldfields, and Sonoma sunshine. When using ATVs to perform mosquito surveillance in the proximity of vernal pools, District staff stay outside of the margin of the vernal pools (delineated by change from wetland to upland vegetation types), and never operate ATVs within wetland vegetation or the actual vernal pool. When possible, District staff performs mosquito surveillance on foot with hand equipment, or by operating ATVs in upland areas a considerable distance from the pools and walking from the ATV to the pools to perform mosquito control (e.g., using a long hose reel based on the ATV). When it is necessary to use an ATV for mosquito surveillance in proximity to vernal pools, the District utilizes low ground pressure vehicles. District staff operates ATVs at slow speeds on sites containing vernal pools, and remains observant while operating equipment and walking in and amongst vernal pool habitat. The District avoids performing mosquito surveillance on rainy days or during dawn and dusk to avoid peak movement periods for California tiger salamander. This alternative would not result in any 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).

Impact TR-2. The Surveillance Alternative would have a **less-than-significant** impact on riparian habitat or other sensitive natural communities. No mitigation is required.

Impact TR-3. The Surveillance Alternative would have a **less-than-significant** impact on federally protected wetlands as defined by Section 404 of the Clean Water Act. No mitigation is required.

5.2.3.3 Impacts to Migration and Movement

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

Impact TR-4. The Surveillance Alternative 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.

5.2.3.4 Conflict with Local Ordinances

The county and city general plans and their goals and policies pertaining to natural resources are protective of terrestrial resources and focused on conservation of existing resources including mature trees and important woodland 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 TR-5. The Surveillance Alternative would have **no impact** on local policies or ordinances protecting biological resources.

5.2.3.5 Conflict with Conservation Plans

Two conservation plans, Turkey Road and the SRPCS, were identified whose action areas are within the District's primary Service Area. The Turkey Road HCP provides for protection and mitigation of impacts to California red-legged frog associated with residential and vineyard development. The SRPCS provides for the protection and mitigation of impacts to California tiger salamander and four listed plant species from development on the Santa Rosa Plain in Sonoma County.

The District conducts surveillance operations within the area covered by the regional SRPCS. The District regularly communicates with and works collaboratively with the SRPCS Interagency Review Team (IRT), also referred to as the Implementation Committee), and with representatives from agencies such as SWQCB, USEPA, USACE, CDFW, and USFWS. The District receives environmental awareness training from agency staff (e.g., CDFW, USACE) and independent biologists on how to identify the species and their habitats to minimize impacts from accessing monitoring sites within the affected areas. In particular, the District conducts annual field training for field staff regarding precautionary and avoidance measures related to surveillance for mosquitoes in vernal pool habitat. The District uses specialized equipment to access vernal pool habitats.

Six conservation plans affect portions of adjacent counties as identified in Table 4-5. 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 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 inconsistent with the provisions of any adopted HCP, NCCP, or other approved local, regional, or state-approved conservation plan.

Impact TR-6. The Surveillance Alternative would have a **less-than-significant** impact on adopted HCPs or NCCPs. No mitigation is required.

5.2.4 Physical Control Alternative

The Physical Control Alternative would be a continuation of existing activities using applicable techniques, equipment, vehicles, and watercraft.

Physical control for mosquitoes consists of the management of aquatic areas that provide mosquito-producing habitat (including freshwater marshes and lakes, saltwater marshes, temporary standing water, vernal pools, and wastewater treatment facilities) especially through water control and maintenance or improvement of channels, tide gates, levees, and other water control facilities. For physical control measures used for onsite wastewater treatment systems, see Section 9.2.4.

The District may also advise landowners and homeowners about the importance of dumping/inverting of containers holding water, controlling vegetation against structures, and avoiding stagnant ponds. 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.

5.2.4.1 Impacts to Special-Status Species and Habitats

The District would not conduct physical control measures in upland habitat types, but may affect terrestrial species that occur in wetland habitat types. Mosquitoes typically breed in shallow areas, with emergent vegetation, little to no current, and where fish are excluded. This alternative modifies habitats that support mosquito larva to make these habitats less suitable for mosquitoes and/or more suitable for their predators. This alternative includes maintenance of ditches and water control structures, removal of debris and weeds, clearance of brush for access to areas to be treated, and filling of nonfunctional water circulation ditches. It may also include reconnecting backwaters or isolated pools on the floodplains of streams and rivers, and increased drainage rates and areas 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 Alternative would not reduce the quantity of this habitat, but simply improve circulation within the marsh. Only inactive channels would be filled to eliminate ponding. Work would not begin until all required permits are obtained. The potential effects of this alternative on these habitats are described below.

District activities largely involve maintenance of existing facilities in the same manner they do under baseline conditions. The District is rarely involved in new drainage projects, and when they are, they consult with the appropriate agencies 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.

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, as other prey sources are available.

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

5.2.4.1.1 Coniferous Forest

The general lack of surface water in coniferous forests (dominated by cone-bearing trees with needles, which include pines, firs and redwoods, and excluding treeholes) usually does not facilitate the appropriate habitat to support mosquitoes. This habitat does support a variety of special-status species including purple martin, raptors and other avian species (afforded protection under USFWS and CDFW), pallid bat, Sonoma tree vole, western red bat, fisher - West Coast DPS as well as special-status plants such as Pennell's bird's-beak. The Physical Control Alternative would have no impact on special-status species, since this alternative would not occur in this habitat.

5.2.4.1.2 Deciduous Forest

The general lack of standing surface water in deciduous forests (dominated by trees that drop leaves annually including buckeyes, some oaks and maples, and excluding treeholes) usually does not facilitate

the appropriate habitat to support mosquitoes. This habitat does support a variety of special-status species including white-tailed kite and other avian species (afforded protection under USFWS and CDFW), pallid bat, Townsend's big-eared bat, and American badger, as well as special-status plants such as Clara Hunt's milk-vetch, robust spineflower, and Calistoga popcornflower. The Physical Control Alternative would have no impact on special-status species or their habitat, since this alternative would not occur in this habitat.

5.2.4.1.3 Shrublands

The general lack of standing surface water in shrublands (dense to moderate stands of coyote brush, ceanothus, poison oak, sage, sagebrush, chamise and diverse other shrubs with grassy openings) usually does not facilitate the appropriate habitat to support mosquitoes. This habitat does support a variety of special-status species including burrowing owl, Swainson's hawk and other avian species (afforded protection under USFWS and CDFW), pallid bat, Townsend's big-eared bat, western red bat and American badger, as well as special-status plants such as Clara Hunt's milk-vetch, robust spineflower, Vine Hill clarkia, and Pennell's bird's-beak. The Physical Control Alternative would have no impact on special-status species or their habitat, since this alternative would not occur in this habitat.

5.2.4.1.4 Grasslands

The general lack of standing surface water in grasslands (grasslands dominated by annual grasses, with varying amounts of native perennials) usually does not facilitate the appropriate habitat to support mosquitoes. This habitat does support a variety of special-status species including burrowing owl, Swainson's hawk, white-tailed kite, northern harrier, and other avian species (afforded protection under USFWS and CDFW), and American badger, as well as special-status plants such as Clara Hunt's milk-vetch, Sonoma sunshine, Tiburon mariposa-lily, Tiburon paintbrush, and Vine Hill clarkia. The Physical Control Alternative would have no impact on special-status species or their habitat, since this alternative would not occur in this habitat.

5.2.4.1.5 Serpentine

The general lack of standing surface water in serpentine soils (shrublands and grasslands on serpentine soils and rock) usually does not facilitate the appropriate habitat to support mosquitoes. This habitat does support a variety of special-status species including burrowing owl, Swainson's hawk, white-tailed kite, northern harrier, and other avian species (afforded protection under USFWS and CDFW), as well as a number of special-status plants such as Tiburon mariposa-lily, Tiburon paintbrush, and Pennell's bird's-beak. The Physical Control Alternative would have no impact on special-status species or their habitat, since this alternative would not occur in this habitat.

5.2.4.1.6 Coastal Dunes

The general lack of standing surface water in coastal dunes (sandy soils with some active sand movement that supports low stands of diverse native perennials and beach grass) usually does not facilitate the appropriate habitat to support mosquitoes. This habitat does support a variety of special-status species including western snowy plover and other avian species (afforded protection under USFWS and CDFW), and Myrtle's silverspot butterfly as well as special-status plants such as beach layia, robust spineflower, and Tidestrom's lupine. The Physical Control Alternative would have no impact on special-status species or their habitat, since this alternative would not occur in this habitat.

5.2.4.1.7 Treeholes

Standing water in treeholes (cavities in branches and trunks of live trees or snags that may provide habitat for a variety of species) may facilitate the appropriate habitat to support mosquitoes. Treeholes support a variety of special-status species including purple martin and a variety of cavity nesting avian species including owls (afforded protection under USFWS and CDFW), and western red bat, pallid bat

and other bat species. Sometimes an absorbent material (e.g., Broadleaf P-4, a high-performance, long-lasting, hydrophilic polymer) may be used to reduce the quality of the habitats for treehole mosquitoes. This material absorbs the water as the treehole/rot cavity fills with rainwater. Use of this material is limited, as many treeholes are not readily accessible (too high off ground, steep slopes covered in poison oak, etc.). This physical control measure would be used in preference to adulticides. If physical controls are used, the treehole will be examined for potential use by special-status species before treatment is made. Sometimes the District will recommend the landowner/manager consult with an arborist or hire a crew to do this work. With implementation of these measures, the Physical Control Alternative would have a less-than-significant impact on special-status species or their habitat.

5.2.4.1.8 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 and the surrounding riparian forest may support special-status species including northern goshawk, Swainson's hawk, bank swallow, and additional avian species (afforded protection under USFWS and CDFW) and other species including special-status plants, as indicated in Tables 4-3 and 4-4. Accessing the site to complete the work during the avian nesting season would be avoided or minimized by implementation of the BMPs in Table 5-3. Habitat alterations to drain such areas will be avoided to the maximum extent possible due to instream special-status species addressed in Chapter 4. The District does not routinely conduct this type of activity, but it may be required in some circumstances. The potential effects of this alternative would be avoided or minimized through implementation of the BMPs in Table 5-3, including those relating to agency communication, environmental training, and pretreatment screening. 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. Work conducted will, whenever possible, 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 possible and not contraindicated by the presence of other sensitive species. With these BMPs, the effects of this alternative would be less than significant.

5.2.4.1.9 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, but they may support special-status species such as tricolored blackbird and additional avian species (afforded protection under USFWS and CDFW) as well as special-status plants on the margins. This potential effect would be avoided and minimized by the BMPs in Table 5-3 relating to agency communication, environmental training, pretreatment screening (BMP A7), and BMP G3 cited above. With these BMPs, the effects of this alternative would be less than significant.

5.2.4.1.10 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 special-status plants and animals such as Boggs Lake hedge-hyssop, Burke's goldfields, Baker's meadowfoam, pappose tarplant, a number of sedges, American peregrine falcon, California black rail, and others, as indicated in Tables 4-3 and 4-4. 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 5-3 relating to agency communication, environmental training, pretreatment screening, and BMP G3 cited above. With these BMPs, the effects of this alternative would be less than significant.

5.2.4.1.11 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, but do not retain water through the entire year. Seasonal wetlands may be flooded by increased runoff, rainfall, or unusually high tides. 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 terrestrial resources. The Physical Control Alternative 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 by the US ACE, CDFW, BCDC, and RWQCB.

Vernal pools⁶, a specific type of seasonal wetland, often 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. Terrestrial species that might occur here include tricolored blackbird, alkali milk-vetch, Sonoma sunshine, Mead’s owls-clover, and others as indicated in Tables 4-3 and 4-4.

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 California tiger salamander, Sebastopol meadowfoam, Burke’s goldfields, and Sonoma sunshine. When using ATVs to perform mosquito control in the proximity of vernal pools, District staff stay outside of the margin of the vernal pools (delineated by vegetation change from wetland to upland), and never operate ATVs within wetland vegetation or the actual vernal pool. When possible, District staff performs mosquito control on foot with hand equipment, or by operating ATVs in upland areas a considerable distance from the pools and walking from the ATV to the pools to perform mosquito control (e.g., using a long hose reel based on the ATV). When it is necessary to use an ATV for mosquito control in proximity to vernal pools, the District utilizes low ground pressure vehicles District staff operates ATVs at slow speeds on sites containing vernal pools, and remains observant while operating equipment and walking in and amongst vernal pool habitat. The District avoids performing mosquito control on rainy days or during dawn and dusk to avoid peak movement periods for California tiger salamander. Other specialized equipment that may be used to minimize impacts in vernal pools and other sensitive areas may include mist blowers/granulators, and extended reach spray systems/hose reels and aircraft if feasible.

Because of the sensitive nature of seasonal wetland habitat types, the District generally would not undertake physical control measures in these areas. In the event that physical control in seasonal wetlands or vernal pools was required, the District would not implement water management and vegetation removal actions without previously discussing them with the relevant regulatory agencies or refuge wildlife managers to verify that no other alternative or option is preferable to control the mosquito problem at that location 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 would result in a less-than-significant impact to terrestrial resources.

⁶ “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. (<http://users.ipfw.edu/isiorho/wetvernalisolatedwetlands2003.pdf>)

5.2.4.1.12 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. Thus, lagoons may support species from both creeks and rivers, and from the receiving waterbodies. Lagoons are an important feeding area for special-status birds including bald eagles. 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 5-3, in particular BMP G3, will be applied to avoid or minimize impacts to environmental resources. With implementation of these BMPs, the impact of the Physical Control Alternative on resources within the lagoon would be less than significant.

5.2.4.1.13 Tidal Marsh and Channels

Tidal marsh and tidal channel habitats occur along the margins of San Francisco, San Pablo, and Suisun bays 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 are maintained and operated to provide habitat for wildlife or as private or public duck clubs. Several examples of these types of habitats occur along the Highway 37 corridor and along Highways 29 and 101 in close proximity to the cities of American Canyon, Napa, Sonoma, Petaluma, and Novato. These wetlands can be important sources of mosquitoes seasonally. These marshes are seasonally flooded and drained to optimize habitat for ducks, geese, and other wildlife.

Physical measures to control mosquitoes in these areas include maintenance of ditches and water control structures, removal of debris and weeds, clearance of brush for access to areas to be treated, and filling of nonfunctional water circulation ditches, as described in Section 2.3.2. Other measures include retaining water on the surface of the area, and rotational impoundment monitoring, which reduces mosquito populations by increasing the frequency with which suitable habitats are inundated and drained. The District advises the landowner and property managers that these actions may require discussion with CDFW, USACE, BCDC, NOAA Fisheries, or the USFWS and that these agencies should be contacted before work is initiated.

These physical control activities would be subject to the BMPs described in Table 5-3, relating to agency communication, environmental training, and pretreatment screening. The Tidal Marsh-Specific BMPs will also be employed including conducting this work during appropriate seasons and times of day (when the tide is out and when Ridgway's rail, California black rail, San Pablo song sparrow, saltmarsh common yellow throat and salt marsh harvest mouse as well as other special-status species are not nesting), making sure staff have appropriate training when working in the marsh, and minimizing the use of mechanical equipment where practical. Tidal marshes may support a number of special-status plants, including pappose tarplant, soft bird's beak, and others (Table 4-3), and animals, including salt-marsh harvest mouse, Suisun shrew, Ridgway's rail, northern harrier, tricolored blackbird, and other passerine species (Table 4-4). Channels that have substantial tidal flow and inundation would not support mosquitoes and, thus, would not need to be maintained. The disturbance associated with the Physical Control Alternative would be short term and temporary; and with the implementation of the BMPs described above, physical control activities would not substantially affect special-status species.

5.2.4.1.14 Water and Wastewater Treatment Facilities

Wastewater treatment facilities may provide nesting habitat for special-status avian species such as northern harrier hawk since such facilities may lie close to suitable habitats in streams or the San Francisco Bay Delta system. The extent to which these species may enter these facilities is unknown. Because of the limited number of such facilities, the limited use of such facilities by special-status species, and the application of the BMPs described in Table 5-3, physical control measures are not anticipated to substantially affect avian species. Maintenance activities could result in the short term disturbance of special-status animals due to human presence and the noise associated with the activity. This disturbance is only anticipated to last a few hours. Animals may move away from the disturbance while it was ongoing, but to return to the area shortly after the activity ceases. Such work would be conducted outside of bird nesting season, wherever practical. If work needed to be done during the nesting season, nest surveys would be conducted prior to initiating work, and suitable buffers would be established around any active nests while performing the work.

Septic/onsite wastewater treatment systems with their associated leach fields may provide habitat for special-status avian species associated with riparian and emergent vegetation, such as song sparrows, yellow-breasted chat, yellow billed-cuckoo, and other passerine birds as indicated in Table 4-4, under freshwater marsh/seeps and riparian forest, although their presence would be dependent on suitable vegetation and other habitat conditions, generally not associated with septic systems.

Winery waste ponds generally contain waste from grape pressings and washwater 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. The Sonoma County Permit and Resource Management Department, Marin County Environmental Health Department, and, in some cases, the RWQCB controls the management of these ponds. The two county local permitting agencies deal with flows of up to 10,000 gallons per day and with subsurface disposal only. If the daily flow exceeds this value or surface disposal is used, then the RWQCB is the controlling agency. The District provides input relating to controlling mosquitoes and other vectors associated with the ponds and winery operations. Physical control is not typically undertaken in winery waste ponds, although it is possible that it could be required under unusual circumstances. Because of the poor quality habitat provided and because physical control activities would rarely be conducted in these waste ponds, little likelihood of impacts to special-status species exists.

Flood control channels and ditches may support special-status species where they 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 5-3, particularly those pertaining to agency communication, pretreatment screening, and environmental training, will avoid impacts to any special-status species that might occur in these habitats.

5.2.4.1.15 Artificial Containers, Temporary Standing Waters and Ornamental Ponds

Artificial containers do not provide habitat for special-status terrestrial species, i.e., those identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the CDFW or USFWS. 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. Ornamental ponds are small ponds with artificial bottoms. These habitats do not provide habitat for special-status aquatic or terrestrial species.

5.2.4.1.16 Impact Determinations for Special-Status Species and Habitats

Impact TR-7. The Physical Control Alternative, 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 TR-8. The Physical Control Alternative, would have a **less-than-significant** impact on any riparian habitat or other sensitive natural community. No mitigation is required.

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

5.2.4.2 Effects on Movement and Migration

Physical changes in habitat are unlikely to affect wildlife migration due to the restricted areas within which physical control activities would occur. Additional disruption of migration patterns may occur due to the presence of personnel and equipment in the environment. In all cases this occurrence would be short term, 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 wildlife.

Impact TR-10. The Physical Control Alternative would have a **less-than-significant** 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. No mitigation is required.

5.2.4.3 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 Alternative would not affect trees more than 4 inches diameter breast height and, therefore, would not conflict with local tree ordinances.

Impact TR-11. The Physical Control Alternative would have **no impact** on local policies or ordinances protecting terrestrial resources.

5.2.4.4 Conflict with Conservation Plans

Two conservation plans, Turkey Road and the SRPCS, were identified whose action areas are within the District's primary Service Area. The Turkey Road HCP provides for protection and mitigation of impacts to California red-legged frog associated with residential and vineyard development. The SRPCS provides for the protection and mitigation of impacts to California tiger salamander and four listed plant species from development on the Santa Rosa Plain.

The District's physical control work in the Santa Rosa Plain is infrequent and minimal. Work is not associated with vernal pools, rather the work is typically in conjunction with wastewater management irrigation (e.g., City of Santa Rosa) or with physical control in waste ponds (e.g., dairy).

The District regularly communicates with and works collaboratively with the SRPCS IRT and with representatives from agencies such as SWQCB, USEPA, USACE, CDFW, and USFWS. The District receives 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 and other seasonal wetland and wetland habitats. 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.

Six conservation plans affect portions of adjacent counties as identified in Table 4-5. District activities are typically not among those covered by these HCPs. When called into these adjacent counties to perform work, the District would work collaboratively with that county or its' mosquito and vector control district and in compliance with their practices and permits, including compliance with adopted HCP/NCCPs. Therefore, the District activities would not be inconsistent with the provisions of any adopted HCP, NCCP, or other approved local, regional, or state-approved conservation plan.

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

5.2.5 Vegetation Management Alternative

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 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 District preferentially uses physical control for vegetation management and rarely uses herbicides and adjuvants for vegetation management in natural environments. The District may use herbicides in artificial environments, winery waste ponds, wastewater treatment ponds, agricultural ditches. Whenever herbicides are used, they are applied in compliance with label requirements.

Vegetation management in upland habitats would be restricted to providing access to areas to treatment areas through patches of dense vegetation, or in those rare cases when larger equipment is needed for physical vegetation removal.

For projects that result in materials (including plant materials, soils or sediments, or herbicides) entering the water or occur in sensitive wetland habitat, permits may be required from the USACE, RWQCB, CDFW, USFWS, NOAA Fisheries, and others. Work would not begin until all required permits are obtained. The District may also perform vegetation management to assist other agencies and landowners with the management of invasive/nonnative vegetation. These actions are typically performed under the direction of the concerned agency, which also maintains any required permits.

5.2.5.1 *Physical Vegetation Removal*

Nonherbicide or physical vegetation removal actions may involve reducing standing vegetation using equipment. The use of weed-whackers, small chainsaws, pruners, or shovels may lead to physical injury of terrestrial plants and animals in the treatment area. Manual removal is the primary method of vegetation removal and would not be anticipated to affect substantial patches of vegetation in the affected area. Skid steers are 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 work is typically done in the fall to minimize potential impacts to special-status species by avoiding the breeding season for birds and other species. 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 alternative. The District is in communication with resource agencies prior to performing this type of work. The District applies BMP numbers F1 through F11, as well as many other BMPs, from Table 5-3 to reduce these impacts by (1) identifying sensitive species locations, if any, in the treatment area prior to commencing any

vegetation removal actions, and (2) limiting the extent of heavy equipment use to minimize the area affected (Section 2.9.2). If work is being conducted in tidal marshes, the BMPs specific to tidal marshes (B1 through B6), and those for salt marsh harvest mouse (C1 through C8), Ridgway's rail, and soft birds' beak (E1 through E4) would also be implemented. The potential impact on wildlife would be minimal, as the animals would return to their selected habitats within a few hours after the cessation of the noise sources for most of the physical application techniques the District currently uses.

5.2.5.2 *Herbicides and Adjuvants*

The District chooses to use physical removal of vegetation whenever possible, but rarely may need to use herbicides to control vegetation in and around mosquito-breeding habitats to improve surveillance and reduce suitable mosquito habitats. The herbicides the District would potentially use are discussed in detail in Appendix B and are listed in Table 2-1 with the active ingredients listed in Table 5-4.

Table 5-4 Herbicide Control Options for Vegetation Management

Active Ingredient	Appendix B
Imazapyr	Section 4.6.1
Glyphosate	Section 4.6.2
Triclopyr	Section 4.6.3

Herbicides included in the Program have diverse chemical structures, act through distinct modes of action, and exhibit varying levels of potential toxicity to humans and nontarget species. Certain herbicides are nonselective and broad-spectrum (e.g., imazapyr) and generally function by inhibiting growth. Herbicides used against annual broadleaf weeds are generally of the post-emergent variety, such as triclopyr. In addition, imazapyr, is a systematic, nonselective, pre- and post-emergent herbicide used for a broad range of terrestrial and aquatic weeds. Glyphosate represents a commonly used herbicide for the control and elimination of grass weeds and sedges. Most of the herbicides are moderately persistent in soil and water (for each herbicide's half-life in soil and water, please refer to Appendix B).

Almost all of the herbicides the District would use exhibit low or no toxicity to mammals, birds, and terrestrial invertebrates. For detailed toxicity information, see Appendix B. In addition, BMPs are applied to minimize the impact of herbicide use on nontarget terrestrial plants, including special-status plants. In particular, the District takes action to minimize drift of herbicides to nontarget areas by carefully considering weather variables such as wind velocity and direction and chance of precipitation. See BMPs H1 through H13 in Table 5-3. 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 herbicide glyphosate was identified for further evaluation in Appendix B and is discussed further below and in detail in Section 6.2.5.1.1.

The District may use glyphosate on occasion for site access. 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. Claims that glyphosate is destroying bee and butterfly populations have not been substantiated. The use of glyphosate to control milkweed, which is a severe problem for farmers, but a host plant for some species of butterfly, may be connected to loss of foraging vegetation and, thereby, indirectly impacting butterfly populations. However, this effect is an indirect effect and glyphosate is not actually toxic to the butterflies. With BMPs and targeted application techniques, glyphosate can be used safely when an adequate buffer (>15 feet) to water sources is maintained or when a formulation specifically designed for use in aquatic environments (Aquamaster) is used. In terrestrial systems, glyphosate is immobile and breaks down relatively quickly via microbial processes. When herbicide application BMPs

(including BMP H12) are applied, the potential impact of glyphosate on special-status species or other nontarget plants is greatly reduced. These BMPs include using targeted, small-scale treatments and taking actions to minimize drift and runoff post-application. Every effort is also made to minimize treatments that could affect milkweed, a plant important to Monarch butterfly populations

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 and listed in Table 5-5. A subset of the adjuvants available for District use was identified for further examination based upon historical use patterns and toxicity (Appendix B, Table 1-1).

Table 5-5 Adjuvants for Insect/Weed Abatement

Active Ingredient	Appendix B
APEs	Section 4.7.1
Modified Plant Oil and Methylated Seed Oil	Section 4.7.3
Lecithin (phosphatidylcholine)	Section 4.7.4
Aliphatic Polycarboxylate	Not included

Alkylphenol ethoxylates (APEs) include a broad range of chemicals that tend to bind strongly to particulates and persist in sediments. Current information about APEs is based on FDA evaluations; regardless, USEPA has speculated that they may pose risk to nontarget terrestrial organisms (USEPA 2010). However, this speculation has not been substantiated and given the limited use of herbicides by the District, in general, and their application of BMPs when using herbicides, the District's use of herbicides with APEs would not be expected to cause any substantive harm to the environment.

Modified plant oils and methylated seed oils are essentially nontoxic to most organisms, including plants. Although toxicity and environmental fate information for these oils is scarce, using current BMP application techniques to reduce the transfer of oils and APEs to nontarget areas post-application (i.e., targeted applications) and based on their other approved uses, these products should not result in unwanted adverse effects to nontarget terrestrial organisms.

Lecithins are naturally occurring phospholipids in biological cell membranes (Bakke 2007). Although toxicity and environmental fate information for these products is limited, using BMP application practices including application at the lowest effective concentration for a specific set of vectors and environmental conditions, use of lecithins should not result in unwanted adverse effects to nontarget terrestrial organisms.

Aliphatic polycarboxylates are another category of adjuvants that are essentially nontoxic to biota and are used as an additive to enhance the efficacy of several other products. They are listed as having no known toxicity or adverse biological impacts as a polymer additive with no hazard indications in any of the typical categories regulators use to define toxicity. (Kegley et al. 2014)

5.2.5.3 Impacts to Special-Status Species and Habitats

The District would conduct very limited vegetation management measures in upland habitat types. This would be associated with providing access to mosquito habitats for surveillance or treatment. Vegetation management activities may affect terrestrial species that occur in wetland habitat types. This work in creeks, rivers, ponds, lakes, marshes, and other wetlands 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 alternative on these 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, as other prey sources are available.

5.2.5.3.1 Coniferous Forest

The general lack of surface water in coniferous forests (dominated by cone-bearing trees with needles, which include pines, firs and redwoods) usually does not facilitate the appropriate habitat to support mosquitoes and, therefore, vegetation management would not be conducted in this habitat. However, access routes may be needed through this habitat to reach areas that do support mosquito breeding habitat. This access would generally be via existing access routes, but may require some vegetation removal along the route. This habitat does support a variety of special-status species including purple martin, raptors and other avian species (afforded protection under USFWS and CDFW), pallid bat, Sonoma tree vole, western red bat, fisher - West Coast DPS as well as special-status plants such as Pennell's bird's-beak. This access activity would be done in coordination with landowners or land managers and resource agencies, as well as following the BMPs described in Table 5-3 relating to environmental training, pretreatment screening, disturbance minimization, avian nesting season, habitat and species-specific BMPs, and applicable vegetation management-specific BMPs (F1 through F11). This activity would result in less-than-significant impacts to special-status species associated with coniferous forest habitat from the Vegetation Management Alternative.

5.2.5.3.2 Deciduous Forest

The general lack of standing surface water in deciduous forests (dominated by trees that drop leaves annually including buckeyes, some oaks and maples) usually does not facilitate the appropriate habitat to support mosquitoes and, therefore, vegetation management activity would not be conducted in this habitat. However, access routes may be needed through this habitat to reach areas that do support mosquito breeding habitat. This access would generally be via existing access routes, but may require some vegetation removal along the route. This habitat does support a variety of special-status species including white-tailed kite and other avian species), pallid bat, Townsend's big-eared bat, American badger as well as special-status plants such as Clara Hunt's milk-vetch, robust spineflower, and Calistoga popcornflower. This access activity would be done in coordination with landowners or land managers and resource agencies, as well as following the BMPs described in Table 5-3 relating to environmental training, pretreatment screening, disturbance minimization, avian nesting season, habitat and species-specific BMPs, and vegetation management-specific BMPs. This activity would result in less-than-significant impacts to special-status species associated with deciduous forest from the Vegetation Management Alternative.

5.2.5.3.3 Shrublands

The general lack of standing surface water in shrublands (dense to moderate stands of coyote brush, ceanothus, poison oak, sage, sagebrush, chamise and diverse other shrubs with grassy openings) usually does not facilitate the appropriate habitat to support mosquitoes and, therefore, vegetation management would not be conducted in this habitat. However, access routes may be needed through this habitat to reach areas that do support mosquito breeding habitat. This access would generally be via existing access routes, but may require some vegetation removal along the route. This habitat does support a variety of special-status species including burrowing owl, Swainson's hawk and other avian species (afforded protection under USFWS and CDFW), pallid bat, Townsend's big-eared bat, western red bat and American badger as well as special-status plants such as Clara Hunt's milk-vetch, robust spineflower, Vine Hill clarkia, and Pennell's bird's-beak. This access activity would be done in coordination with landowners or land managers and

resource agencies, as well as following the BMPs described in Table 5-3 relating to environmental training, pretreatment screening, disturbance minimization, avian nesting season, habitat and species-specific BMPs, and vegetation management-specific BMPs. This activity would result in less-than-significant impacts to special-status species associated with shrublands habitat from the Vegetation Management Alternative.

5.2.5.3.4 Grasslands

The general lack of standing surface water in grasslands (grasslands dominated by annual grasses, with varying amounts of native perennials) usually does not facilitate the appropriate habitat to support mosquitoes and, therefore, vegetation management would not be conducted in this habitat. However, access routes may be needed through this habitat to reach areas that do support mosquito breeding habitat. This access would generally be via existing access routes, but may require some vegetation removal along the route. This habitat does support a variety of special-status species including burrowing owl, Swainson's hawk, white-tailed kite, northern harrier, and other avian species (afforded protection under USFWS and CDFW), and American badger as well as special-status plants such as Clara Hunt's milk-vetch, Sonoma sunshine, Tiburon mariposa-lily, Tiburon paintbrush, and Vine Hill clarkia. This access activity would be done in coordination with landowners or land managers and resource agencies, as well as following the BMPs described in Table 5-3 relating to environmental training, pretreatment screening, disturbance minimization, avian nesting season, habitat and species-specific BMPs, and vegetation management-specific BMPs. This activity would result in less-than-significant impacts to special-status species associated with grassland habitat from the Vegetation Management Alternative.

5.2.5.3.5 Serpentine

The general lack of standing surface water in serpentine soils (shrublands and grasslands on serpentine soils and rock) usually does not facilitate the appropriate habitat to support mosquitoes and, therefore, vegetation management would not be conducted in this habitat. However, access routes may be needed through this habitat to reach areas that do support mosquito breeding habitat. This access would generally be via existing access routes, but may require some vegetation removal along the route. This habitat does support a variety of special-status species including burrowing owl, Swainson's hawk, white-tailed kite, northern harrier, and other avian species (afforded protection under USFWS and CDFW), as well as an abundance of special-status plants such as Tiburon mariposa-lily, Tiburon paintbrush and Pennell's bird's-beak. This access activity would be done in coordination with landowners or land managers and resource agencies, as well as following the BMPs described in Table 5-3 relating to environmental training, pretreatment screening, disturbance minimization, avian nesting season, habitat and species-specific BMPs, and vegetation management-specific BMPs. This activity would result in less-than-significant impacts to special-status species associated with serpentine soils and outcroppings habitat from the Vegetation Management Alternative.

5.2.5.3.6 Coastal Dunes

The general lack of standing surface water in coastal dunes (sandy soils with some active sand movement that supports low stands of diverse native perennials and beach grass) usually does not facilitate the appropriate habitat to support mosquitoes and, therefore, vegetation management would not be conducted in this habitat. However, access routes may be needed through this habitat to reach areas that do support mosquito breeding habitat. This access would generally be via existing access routes, but may require some vegetation removal along the route. This habitat does support a variety of special-status species including western snowy plover and other avian species (afforded protection under USFWS and CDFW), and Myrtle's silverspot butterfly as well as special-status plants such as beach layia, robust spineflower, and Tidestrom's lupine. This activity would be done in coordination with landowners or land managers and resource agencies, as well as following the BMPs described in Table 5-3 relating to environmental training, pretreatment screening, disturbance minimization, avian nesting season, habitat and species-specific BMPs, and vegetation management-specific BMPs. This activity would result in less-

than-significant impacts to special-status species associated with coastal dunes habitat from the vegetation management alternative.

5.2.5.3.7 Treeholes

Vegetation management activities would not be conducted in treehole habitat nor would vegetation management be used to access such habitats. Therefore, no impacts would occur to special-status species associated with treeholes from the Vegetation Management Alternative.

5.2.5.3.8 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 and the surrounding riparian forest may support special-status terrestrial species including northern goshawk, Swainson's hawk, bank swallow, and additional avian species (afforded protection under USFWS and CDFW) and other species including special-status plants, as indicated in Tables 4-3 and 4-4. Vegetation that requires management would typically be confined to channel margins and backwaters with slow currents. This management activity would be done in coordination with landowners or land managers and resource agencies, as well as following the BMPs described in Table 5-3 relating to environmental training, pretreatment screening, disturbance minimization, avian nesting season, habitat and species-specific BMPs, and vegetation management-specific BMPs. This activity would result in less-than-significant impacts to special-status species associated with creeks, rivers, streams and the associated riparian forests.

5.2.5.3.9 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 they may support special-status terrestrial species such as tricolored blackbird and additional avian species (afforded protection under USFWS and CDFW), as well as special-status plants on the margins.

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 would be implemented in stagnant areas along the edges of these habitats where mosquito eggs and larvae occur. Special-status avian species would likely not be impacted in reservoirs and ponds, as vegetation removal in these habitats is minimal. Special-status plants would likely not be present in lakes or ponds but may be present along the margins. Vegetation management could directly affect these plant species but substantial areas of similar habitat would remain undisturbed.

This potential impact would be avoided and/or minimized by the BMPs in Table 5-3 relating to agency communication, environmental training, and pretreatment screening. Vegetation management-specific BMPs will be applied. Furthermore, work conducted will, whenever possible, be conducted during approved in water work periods for that habitat, considering the species likely to be present. With these BMPs, the effects of vegetation management would be less than significant.

5.2.5.3.10 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 special-status terrestrial plants and animals as indicated in Tables 4-3 and 4-4, such as Boggs Lake hedge-hyssop, Burke's goldfields, Baker's meadowfoam, pappose tarplant, a number of sedges, American peregrine falcon, California black rail, and others. Vegetation management in these

areas would have the same potential effects as described for lake and pond habitats and would be avoided and/or minimized by the BMPs in Table 5-3 relating to agency communication, environmental training, pretreatment screening, and maintenance and in water work. With these BMPs implemented, the effects of this activity would be less than significant.

5.2.5.3.11 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. Terrestrial species that might occur here include tricolored blackbird, alkali milk-vetch, Sonoma sunshine, Mead's owls-clover, and others as indicated in Tables 4-3 and 4-4. If vegetation management activities were required, potential effects would be avoided and minimized by the BMPs in Table 5-3 relating to agency communication, environmental training, and pretreatment screening.

The District has long-standing cooperative and collaborative relationships with CDFW, professional biologists and property owners with regard to access, mosquito surveillance and control in association with vernal pools. 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 California tiger salamander, Sebastopol meadowfoam, Burke's goldfields, and Sonoma sunshine. When using ATVs to perform vegetation management in the proximity of vernal pools, District staff stay outside of the margin of the vernal pools (delineated by vegetation change from wetland to upland), and do not operate ATVs within wetland vegetation or the actual vernal pool. When possible, District staff performs vegetation management with hand equipment, with access on foot or by operating ATVs in upland areas a considerable distance from the pools. When it is necessary to use an ATV for vegetation management in proximity to vernal pools, the District utilizes low ground pressure vehicles. District staff operates ATVs at slow speeds on sites containing vernal pools, and remains observant while operating equipment and walking in and amongst vernal pool habitat. The District avoids performing vegetation management on rainy days or during dawn and dusk to avoid peak movement periods for California tiger salamander.

The Vegetation Management Alternative would not result in the direct removal, filling, or hydrological interruption of federally protected wetlands as defined by CWA Section 404 (including, but not limited to, marsh, vernal pool, coastal, etc.). It may result in the removal of minor amounts of vegetation in these areas. All work in wetlands would be subject to additional permitting by the USACE, CDFW, BCDC, and RWQCB. Vegetation management-specific BMPs will be applied if necessary (see Table 5-3). With these BMPs and the practices described above, the effects of vegetation management activities on seasonal wetlands would be less-than-significant.

5.2.5.3.12 Lagoon

Lagoons would support mosquitoes in areas of reduced circulation, often associated with emergent vegetation, supporting a number of special-status species as identified in Tables 4-3 and 4-4, including many of the marsh and riparian species listed previously. Vegetation management in lagoons would be subject to the BMPs in Table 5-3 to avoid or minimize impacts to environmental resources. With these BMPs, the effects of the Vegetation Management Alternative on biological resources within lagoons would be less-than-significant.

5.2.5.3.13 Tidal Marsh and Channels

Vegetation management activities are conducted in coordination with landowners or land managers and the resource agencies and generally focus on the removal of nondesired plant species. Tidal marshes may support a number of special-status plants, including pappose tarplant, soft bird's beak, and others (Table 4-3), and animals, including salt-marsh harvest mouse, Suisun shrew, Ridgway's rail, northern harrier, tricolored blackbird, and other passerine species (Table 4-4). Vegetation removal in tidal marshes

is done using hand tools and in accordance with the tidal marsh-specific BMPs identified in Table 5-3, and others relating to agency coordination, environmental training, pretreatment screening, disturbance minimization BMPs, as well as vegetation management and species-specific BMPs. With these BMPs, the effects of the Vegetation Management Alternative on biological resources within or dependent upon tidal marshes would be less-than-significant.

5.2.5.3.14 Water and Wastewater Treatment Facilities

Vegetation management activities may occur in coordination with the owners or operators of wastewater treatment facilities or septic/onsite wastewater treatment systems. These facilities may provide nesting habitat for special-status avian species such as northern harrier hawk since such facilities may lie close to suitable habitats in streams or the San Francisco Bay Delta system. The extent to which these species may enter these facilities is unknown. Septic systems and their associated leach fields may provide habitat for special-status avian species, particularly those that nest in riparian or emergent vegetation. Because of the limited number of such facilities and the very limited use of such facilities by special-status species, vegetation management measures would have a less-than-significant impact on terrestrial special-status species and will be minimized with the implementation of the BMPs in Table 5-3 particularly those pertaining to agency communication, pretreatment screening, and environmental training.

5.2.5.3.15 Artificial Containers, Temporary Standing Waters, and Ornamental Ponds

Vegetation management does not occur in artificial containers. Artificial containers do not provide habitat for nor support populations of native or special-status terrestrial species. Thus, this alternative would have no impact on these species or their habitat.

Temporary standing waters refer to water ponding on an upland habitat because of rainfall or irrigation. Ornamental ponds are small ponds with artificial bottoms. These habitats do not provide habitat for special-status aquatic or terrestrial species. Therefore, no impact would occur to special-status species from the vegetation management alternative in these habitats.

5.2.5.3.16 Impact Determinations for Special-Status Species and Habitats

Impact TR-13. The Vegetation Management Alternative 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 TR-14. The Vegetation Management Alternative would have a **less-than-significant** impact on any riparian habitat or other sensitive natural community. No mitigation is required.

Impact TR-15. The Vegetation Management Alternative would have a **less-than-significant** impact on federally protected wetlands as defined by CWA Section 404. No mitigation is required.

5.2.5.4 Effects on Movement and Migration

The Vegetation Management Alternative 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 by terrestrial animals. In all cases this occurrence would be short term, generally not more than a few hours to a few days in any given location. Therefore, this minimal effect would have little impact on the movement of wildlife. It would not affect wildlife migration corridors or nursery areas, as no physical disturbance to these areas would occur.

Impact TR-16. The Vegetation Management Alternative would have a **less-than-significant** 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. No mitigation is required.

5.2.5.5 Conflict with Local Ordinances

The county and city general plans and their goals and policies pertaining to natural resources are protective of terrestrial resources and focused on conservation of existing resources including mature trees and important woodland communities. 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 TR-17. The Vegetation Management Alternative would have **no impact** on local policies or ordinances protecting terrestrial resources.

5.2.5.6 Conflict with Conservation Plans

Two conservation plans, Turkey Road and the SRPCS, were identified whose action areas are within the District's primary Service Area. The Turkey Road HCP provides for protection and mitigation of impacts to California red-legged frog associated with residential and vineyard development. The SRPCS provides for the protection and mitigation of impacts to California tiger salamander and four listed plant species from development on the Santa Rosa Plain.

The District conducts limited vegetation control operations within the area covered by the regional SRPCS. The District regularly communicates with and works collaboratively with the SRPCS IRT and representatives from agencies such as SWQCB, USEPA, USACE, CDFW, and USFWS. The District receives 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. The District uses specialized equipment in conjunction with vernal pool habitats.

Six 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 that county or their 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 TR-18. The Vegetation Management Alternative has a **less-than-significant** impact on approved HCPs or NCCPs. No mitigation is required.

5.2.6 Biological Control Alternative

Biological control of mosquitoes involves the intentional use of vector pathogens, parasites, and predators to reduce the mosquito population. Its emphasis, as it currently exists in the District's IVMP, is on control of mosquitoes in their immature stages in artificial waterbodies that are not connected to natural waterbodies using a mosquito predator. 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.

As part of their Biological Control Alternative, the District employs bacterial larvicides that are highly specific to mosquitoes. These biological controls include Bs, a bacterial pathogen of mosquitoes, or Bti, which are nonliving by-products of bacteria that paralyze the gut of larval mosquitoes when ingested. (Because the potential environmental impacts of Bs or Bti application are generally similar to those of

chemical pesticide applications, these materials and spinosad are evaluated under Section 5.2.7.1.1, Chemical Control Alternative. The environmental fate and toxicity of these control agents are discussed further in Appendix B.

5.2.6.1 Impacts to Special-Status Species

Mosquitofish (*Gambusia affinis*) are presently the only commercially available mosquito predators. The District's purchase and use of these fish in mosquito habitats is the most commonly used biological control agent for mosquitoes in the world. Used correctly, this fish can provide effective, and persistent suppression in various mosquito sources. However, due to concerns that mosquitofish may potentially impact red-legged frog and tiger salamander populations in natural waterbodies, the District limits the use of mosquitofish to artificial waterbodies (such as ornamental fish ponds, water troughs, water gardens, fountains, and unmaintained swimming pools) and other types of isolated man-made ponds that do not provide habitat that could support native species. These artificial habitats are not included in HCPs/NCCPs. The Biological Control Alternative's use of mosquitofish would have no impact 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, as the use of this alternative would be confined to artificial environments that are not connected to natural environments where special-status species occur.

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

5.2.6.2 Impacts to Habitats

The use of mosquitofish for biological control of mosquitoes would not affect any natural habitats identified in local or regional plans, policies, or regulations, or by the CDFW or USFWS or result in the presence of District personnel or equipment in natural habitats. Mosquitofish would not be used in federally protected wetlands as defined by CWA Section 404 (including, but not limited to, marsh, vernal pool, coastal, etc.). Therefore, it would not affect the quantity or distribution of habitats, such as riparian areas, marshes, lakes or ponds, seasonal wetlands, or other natural habitat types. This alternative would not affect the composition of their vegetative communities. This alternative would not result in any ground-disturbing activity and, therefore, would not result in any removal, filling, or hydrologic interruption of federally protected wetlands.

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

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

5.2.6.3 Effects on Movement and Migration

Because mosquitofish would only be used in artificial bodies of water not connected to natural waterways or wetlands, this alternative 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 or impede the use of native wildlife nursery sites.

Impact TR-22. The Biological Control Alternative 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.

5.2.6.4 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. 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 alternative would not affect trees more than 4 inches diameter breast height and, therefore, would not conflict with local tree ordinances.

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

5.2.6.5 Conflict with Conservation Plans

Two conservation plans, Turkey Road and the SRPCS, were identified whose action areas are within the District's primary Service Area. The Turkey Road HCP provides for protection and mitigation of impacts to California red-legged frog associated with residential and vineyard development. The SRPCS provides for the protection and mitigation of impacts to California tiger salamander and four listed plant species from development on the Santa Rosa Plain in Sonoma County. The District regularly communicates with and works collaboratively with the SRPCS IRT and representatives from agencies such as SWQCB, USEPA, USACE, CDFW, and USFWS.

Biological control with mosquitofish would be implemented only in artificial habitats where these habitats do not connect to other waters that could support special-status species within the boundaries of these two conservations plans.

Six conservation plans affect portions of adjacent counties. The District would not implement biological control with mosquitofish within the boundaries of these plan areas. 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 that county or their 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 TR-24. The Biological Control Alternative would have **no impact** on approved HCPs, NCCPs, or local conservation plans.

5.2.7 Chemical Control Alternative

Chemical control consists of the application of pesticides to directly reduce populations of vectors that pose a risk to public health. The majority of chemical control tools are used for mosquito abatement. These chemicals (active ingredients) can be used as mosquito larvicides or adulticides. See Table 2-2 for mosquito larvicides and Table 2-3 for mosquito adulticides that are proposed for inclusion in the IVMP. Chemical control is also used to control nuisance populations of yellow jackets. The Chemical Control Alternative would be primarily a continuation of existing activities using applicable techniques, equipment, vehicles, watercraft, and aircraft. The District does not currently perform control work with respect to tick populations but may potentially do a limited amount of control work in the future. The District does not use chemical control for rodents.

As part of its IVMP, the District prioritizes the least toxic materials available for control of the larval stages, focusing on bacterial larvicides, growth regulators, and surface films rather than pyrethroids. Control of adult mosquitoes may become necessary under some circumstances, such as in the event of a disease outbreak (documented presence of infectious virus in active host-seeking adult mosquitoes), or lack of access to larval sources and habitats leading to the emergence of large numbers of biting adult mosquitoes. The active ingredients currently used for control of adult mosquitoes have been deliberately

selected for lack of persistence and minimal effects on nontarget organisms when applied at label rates allowed for ULV mosquito control.

The District also uses insecticides to control populations of ground-nesting yellow jackets. This activity is generally triggered by public requests rather than as a result of regular surveillance activities. The District does not treat yellow jacket nests that are located inside or on a structure; instead, the resident is encouraged to contact a private pest control company. Likewise, residents complaining of honeybee swarms or hives are referred to the County Agricultural Commissioner’s Office for a referral list of beekeepers. If District technicians deem it appropriate to treat stinging insects, they will apply the insecticide directly within the nest to avoid drift or harm to other organisms. Alternatively, they will place tamper-resistant traps or bait stations, selective for the target insect, in the immediate environment. Chemicals used in the traps are contained and do not interact with the environment.

All chemicals the District uses (Tables 2-2 through 2-4 in Chapter 2) are applied in strict conformance with label requirements, which have been approved by the USEPA and CDPR for use in California when applied with strict adherence to product label requirements, and with additional BMPs listed in Table 5-3 (in particular, BMPs H1 through H14). Pesticide labels are legal requirements and include instructions telling users how to apply the product and precautions the applicator should take to protect human health and the environment. In addition, chemicals are applied in conformance with the PAP as required by the NPDES Vector Control Permit. With the application of these requirements and District BMPs, these chemicals should not result in adverse effects to nontarget terrestrial organisms.

Detailed discussions of the environmental fate and toxicity of these active ingredients and potential for bioaccumulation are provided in Appendix B and in Section 6.2.7. A subset of the pesticides (Table 5-6) available for District use was identified for further examination based upon use patterns and toxicity (Appendix B, Table 1-1). The following discussion groups these chemicals based on their target organism or life stage and discusses these pesticides in reference to impacts to terrestrial nontarget organisms.

Table 5-6 Chemical Control Active Ingredients and Adjuvants Identified in Appendix B

Active Ingredient	Vector	Potential Issue
Methoprene	Mosquitoes	Prevalent use; toxicity to aquatic insects; potentially bioaccumulative
Etofenprox	Mosquitoes	Toxicity to aquatic organisms; no synergist required; potentially bioaccumulative
Bti	Mosquitoes	Prevalent use; public concerns
Pyrethrins	Mosquitoes/yellow jacket wasps	Prevalent use; requires synergist (PBO)
Resmethrin	Mosquitoes	Requires synergist (e.g., PBO); potential endocrine disruptor
Plant oils/ mineral oils	Mosquitoes (surfactant)	Percentage of petroleum distillate (if any)
Permethrin	Mosquitoes/ yellow jacket wasps	Toxicity to aquatic organisms; potential endocrine disruptor

See Appendix B, Table 1-1

The District would use a variety of techniques and equipment to apply mosquito larvicides and adulticides, including hand-held sprayers, backpack sprayers and blowers, truck- or ATV-mounted spray rigs, watercraft, and helicopters or other aircraft. Equipment used in ground applications of liquid formulations include hand-held sprayers (handcans or spray bottles), and backpack sprayers and blowers. Hand-held sprayers (handcans) are standard 1- or 2- or 3-gallon garden style pump-up sprayers used to treat very small isolated areas. Backpack sprayers are either hand pump-up for liquid applications and have a 2.5/3- to 5-gallon tank

or are gas powered. When large areas are simultaneously producing mosquito larvae at densities or in levels of abundance, exceeding District treatment guidelines, then the District may use helicopters or other aircraft to apply larvicides (and adulticides). Aerial application of larvicides is a relatively infrequent activity for the District with each application covering from approximately 20 to 600 acres. Aerial application by helicopter of liquid larvicides typically occurs during daylight hours and at an altitude above the treatment site of approximately 50 feet or less. Granular applications by helicopter would occur during daylight hours at a 50-foot altitude or less.

Aerial applications at larvicides and adulticides using helicopters and potentially fixed-wing aircraft are used to obtain effective control in areas bordered by extensive mosquito production sites or with small, narrow, or inaccessible network of roads. The flight parameters differ by program and technique. Some operations fly during hours of daylight so their applications begin either at morning's first light or before sunset and work into twilight. For adulticides, the aircraft can be flown at a less than 200-foot altitude, which may make it easier to hit the target area. Other operations may be conducted in the dark of the night, typically after twilight or early in the morning before dawn. The aircraft typically are flown between 200- and 300-foot altitudes. Swath widths vary from operation to operation but are normally set somewhere between 400 and 1,200 feet. Aerial applications may be conducted over, but are not limited to, the following land uses within the Program Area: salt marsh, diked marsh, seasonal wetlands; evaporation ponds and wastewater ponds; and agricultural, residential, commercial, industrial, and recreational areas.

5.2.7.1 Impacts to Special-Status Species

5.2.7.1.1 Mosquito Larvicides

As part of their Chemical Control Alternative, the District employs bacterial agents that are highly specific to mosquitoes. These controls include the active ingredients Bs (a live bacteria), and Bti and spinosad (bacterial by-products that are toxic to mosquitoes). Larvicides are used to manage immature life stages of mosquitoes (larvae) in aquatic and wetland habitats, as described previously. They are not applied in upland habitats, with the exception of temporary rainwater pools, seeps, and treeholes, although a small amount of spray drift may occur. These habitats may support special-status terrestrial species as indicated in Tables 4-3 and 4-4. The larvicides are applied using ground application equipment, fixed wing aircraft (in the future), and rotary aircraft, as described in Chapter 2 and listed in Table 2-5. District guidelines for selecting application methods are predicated upon access, efficiency and effectiveness of application, size of the area to be treated, and the density, abundance, and type of vegetation present at the application site (i.e., the likelihood of success in applying the material to the target area). The potential impact of equipment noise on wildlife would be minimal, as the animals would return to their selected habitats within a few hours at most for application techniques the District currently uses.

The toxicity of Bs, Bti, spinosad, methoprene, and surfactants are discussed in detail in Appendix B and listed in Table 5-7. The District employs BMPs to reduce the relative potential impacts of these chemical options to nontarget organisms as well as to applicators. Because Bs, Bti, and spinosad are applied to aquatic rather than terrestrial environments to control larval mosquitoes, the potential for exposure of terrestrial organisms is low. Drift of these chemicals to nontarget areas is minimized through application of BMPs, including observance of wind and weather conditions.

Table 5-7 Chemical Control Options for Larval Mosquito Abatement as Discussed in Appendix B

Chemical Classification	Active Ingredient	Appendix B
Bacterial larvicide	Bs	Section 4.3.1
Bacterial larvicide	Bti	Section 4.3.2
Bacterial larvicide	Spinosad	Section 4.3.3
Hydrocarbon ester	Methoprene and s-Methoprene	Section 4.3.4
Surfactant	Alcohol Ethoxylated Surfactant (monomolecular film)	Section 4.3.5
Surfactant	Aliphatic solvent (mineral oil, BVA-2, CoCoBear)	Section 4.3.6

Bacterial Larvicides (BS, Bti, Spinosad)

Bacterial larvicides such as Bti and Bs are highly selective microbial pesticides (for mosquitoes) that when ingested, produce gut toxins that cause destruction of the insect gut wall leading to paralysis and death. These microbial agents are delivered as endospores in granular, powder, or liquid concentrate formulations. Bs and Bti are applied directly to larval mosquito habitats (water) rather than to terrestrial environments. These products are applied in adherence to product labels, and all appropriate BMPs are applied when they are used. Bs and Bti are practically nontoxic to terrestrial organisms, including birds, bees, and mammals.

Spinosad is a natural insecticide derived from the fermentation of a common soil microorganism, *Saacharopolyspora spinosa*. Spinosad causes neurologic effects in insects consistent with the general activation of nicotinic acetylcholine receptors, but by a mechanism that is novel among known insecticides (Mayes et al. 2003). Exposure manifests as constant involuntary nervous system impacts ultimately leading to paralysis and death of the insect. Spinosad is highly effective against lepidopteron larvae (e.g., butterflies and moths), as well as some Diptera (mosquitoes and flies), Coleoptera (beetles), Thysanoptera (e.g., thrips), and Hymenoptera (e.g., bees, wasps) (Mayes et al. 2003). The effects of spinosad on beneficial pollinators such as honeybees are of concern. The District incorporates BMPs that are designed to minimize exposure of bees to spinosad, such as restricting applications to nighttime hours when bees are inactive, covering hives where possible with wet burlap and maintaining buffer zones. Bees and other nontarget insects may contact spinosad residues following applications; however, residues generally are below acute toxicity thresholds to honeybees. Field studies evaluating typical spinosad applications have demonstrated low risk to adult honeybees and little to no effect on hive activity and brood development, provided that the residue is allowed to dry for up to 3 hours (Mayes et al. 2003).

Spinosad is of low acute toxicity to birds and mammals. Generally, spinosad is applied directly to larval mosquito habitat, thereby reducing potential exposures of sensitive terrestrial insects including moths, butterflies, and honeybees. Application of spinosad follows strict product label descriptions.

Hydrocarbon Esters (Methoprene)

(S)-Methoprene is a hormone analogue that interferes with insect larval development (growth regulator). This chemical does not exhibit the nonspecific target effects of neurological toxins such as pyrethrin.

Methoprene is used as a larvicide and, as such, is not applied to terrestrial environments. Some drift into terrestrial environments may occur when it applied, but it is almost irrelevant for hand and aerial (e.g., helicopter) applications since treatments are restricted at moderate to high wind speeds. Methoprene is considered one of the most environmentally compatible of all larvicide options, and the District uses methoprene prevalently throughout the year. Methoprene is highly effective against mosquitoes at low concentrations (very low volume applications are used when possible) and degrades quickly in the

environment, thereby reducing the potential exposure and risk to nontarget organisms. The District infrequently apply(ies) methoprene to vernal pools. Methoprene may be applied when mosquito populations are abundant in the pools and when mosquitoes have reached the later stages of development. Methoprene may be applied when feasible when requested by a regulatory agency. The District typically uses Bti and Bs in these environments. Extended release methoprene products are typically not used in vernal pool habitats.

Methoprene has high toxicity to nontarget insects such as moths, butterflies, and beetles, but only at much higher concentrations than those used for mosquito control; however, moths, butterflies, and most species of beetles do not occupy aquatic habitats and so would have very limited exposure.

The District uses methoprene prevalently during each season of the year. Liquid and granular forms are used in residential and ornamental pond application scenarios. Treatments to wetlands including marshes, at times require the granular form (e.g., Altosid pellets) to penetrate dense aquatic vegetation including cattails and tules. See Section 9.2.7.1 for discussion of use of methoprene in malfunctioning onsite wastewater treatment systems due to improper lid seals, cracks, or missing vent screens and/or due to drain fields where water ponds on the surface.

Surfactants

Petroleum- (aliphatic solvents) and plant-based (ethoxylated isostearyl alcohols) oils are used as surface-active agents effective against larvae and pupae. These oils are effective against these immature life stages when inhaled at the water surface or by physically forming a surface film that drowns the mosquito. These treatments may also be effective against adult mosquitoes during adult emergence. They are specific to aquatic environments and are not applied to terrestrial environments, although some drift may occur.

Impact TR-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.

5.2.7.1.2 Mosquito Adulticides

In addition to chemical control of mosquito larvae, the District may use pesticides for control of adult mosquitoes when other tools are not available or applicable and if specific guidelines are met, including species composition, population abundance and/or density (as measured by landing count or other quantitative method), proximity to human populations, and/or human disease risk. Adulticides are can be used over vegetated areas preferred by adult mosquitoes (see Section 4.2.7.1.2). Treatment of adults is employed when physical controls and larviciding are not sufficiently effective, not possible, or applicable. As with larvicides, adulticides are applied in strict conformance with label requirements (Appendix B). Adulticides the District uses are listed in Table 5-8. 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. The District will use all available means to avoid use of adulticides over vernal pool habitats. If the use of adulticides over vernal pools were to become necessary within close proximity (relative to swath widths of ULV application equipment) to vernal pools, the District would notify the USFWS and CDFW of the need, and applications would be performed in strict accordance with the product label, using the appropriate BMPs as listed in Table 5-3, and in consultation with property owners. A detailed discussion of the environmental fate and toxicity of these pesticides is provided in Appendix B. The potential impact on wildlife from noise associated with equipment use would be minimal, as the animals would return to their selected habitats within a few hours at most for application techniques the District currently uses.

Table 5-8 Chemical Control Options for Adult Insect Abatement as Discussed in Appendix B

Chemical Classification	Active Ingredient	Vector	Appendix B
Pyrethrin	Pyrethrins	Mosquito; yellow jacket	Section 4.1.1
Synthetic Pyrethroid	Allethrin and d- <i>trans</i> allethrin	Yellow jacket ; tick	Section 4.1.2
Synthetic Pyrethroid	Phenothrin (sumithrin or d-phenothrin)	Mosquito; yellow jacket	Section 4.1.3
Synthetic Pyrethroid	Prallethrin	Mosquito	Section 4.1.4
Synthetic Pyrethroid	Deltamethrin	Tick; yellow jacket, tick	Section 4.1.5
Synthetic Pyrethroid	Esfenvalerate	Yellow jacket, tick	Section 4.1.6
Synthetic Pyrethroid	Resmethrin	Mosquito	Section 4.1.8
Synthetic Pyrethroid	Tetramethrin	Yellow jacket	Section 4.1.9
Synthetic Pyrethroid	Permethrin	Mosquito; yellow jacket	Section 4.1.10
Pyrethroid-like	Etofenprox	Mosquito; yellow jacket	Section 4.1.11
Synergist	PBO	Mosquito; yellow jacket	Section 4.1.12

Pyrethrins

The District uses pyrethrin for mosquito and/or yellow jacket wasp control. For yellow jacket control, pyrethrin is applied around parks, landscaping, and directly into ground nests. For adult mosquito control, pyrethrins may be applied over a wide range of land uses and habitat types. However, the District uses pyrethrins only when absolutely necessary due to mosquito abundance and density in an area; and, even then, minimal amounts are applied (via ULV application), thus reducing the potential for impacts to nontarget ecological receptors (BMPs H3, H4, H11). As an additional measure, pyrethrin applications are canceled during less than ideal wind and potential drift conditions (BMP H6). For wasp (yellow jacket and paper wasps) control, the District applies pyrethrins in minute volumes directly to ground nests and tree nests if necessary, which essentially negates any impact to nontarget species. The District ensures that all applications are made in accordance with label specifications and USEPA and CDPR recommendations for use with mosquitoes. Other practices that can alleviate risk to aquatic receptors include minimizing the amount, frequency, and area with which these pesticides are applied over waterbodies, especially those with the potential to contain special-status species. The District also minimizes the amount, frequency, and area with which these pesticides are applied over waters draining directly to the waters above. In addition, the risks to nontarget insects such as honeybees are reduced by restricting pyrethrin applications to nighttime, predawn, and dusk hours when bees and other pollinators are inactive (BMP H12).

Pyrethrins readily degrade in water and soil, but may persist under anoxic conditions. They tend to strongly adsorb to soil surfaces and, hence, have low potential to leach into groundwater. Pyrethrins may be highly toxic to fish (freshwater, estuarine, marine) and invertebrates, although exposures would likely be low during and following ULV applications, which are designed to prevent environmental persistence and potential impacts to nontarget ecological receptors.

Pyrethrins have low to moderate acute toxicity to mammals via the oral, dermal, and inhalation routes and are practically nontoxic to birds. When applying to areas larger than 0.25 acres, the risks to nontarget insects such as honeybees are reduced by only applying pyrethrins at night in the dark when bees and other pollinators are inactive (BMP H12). The District also coordinates their activities with local beekeepers (when known or discovered via notifications) to further minimize risk of exposure to bees. Beekeepers will cover or move their hives during applications of these chemicals, uncovering or returning them to the area within a few hours after spraying. This coordination has worked satisfactorily for both the beekeepers and

the District. Little risk to nontarget terrestrial organisms is expected when this and other BMPs to avoid unwanted drift are applied.

Pyrethroids and Pyrethroid-Like Compounds

Pyrethroid insecticides are synthetic compounds that are chemically similar to the pyrethrins but have been modified to increase stability and activity against insects. Some synthetic insecticides are similar to pyrethroids, such as etofenprox, but have a slightly different chemical composition. First generation or “Type I” photosensitive pyrethroids include d-allethrin, phenothrin (sumithrin), prallethrin, resmethrin, and tetramethrin. Typically, these pyrethroids are used indoors and around residential areas. The newer second-generation pyrethroids are mostly “Type II” pyrethroids. Type II pyrethroids are more toxic (than Type I pyrethroids) because they are less photosensitive and persist longer in the environment. The active ingredients that fall into this group include deltamethrin, esfenvalerate, and permethrin.

Pyrethroids affect insect neuroactivity by binding to a protein at the nerve fiber that regulates the voltage-gated sodium channel. This binding can delay the closing of sodium channels and/or cause a persistent activation of the sodium channels, which often results in repetitive activity (Type I pyrethroid) or blockage of nerve conduction (Type II pyrethroid). Most pyrethroids and pyrethroid-like compounds are of low toxicity to birds and mammals, but of high toxicity to honeybees. The risks to nontarget insects such as honeybees are reduced by restricting application of these compounds to night and predawn times, when bees and other pollinators are inactive. The District also coordinates their activities with local beekeepers (when known or discovered via notifications) to further minimize risk of exposure to bees. Beekeepers will cover or move their hives during applications of these chemicals, uncovering or returning them to the area within a few hours after spraying. The active ingredients that have been selected for further evaluation in Appendix B (resmethrin, permethrin, and etofenprox) are discussed individually below.

Resmethrin

The District rarely uses resmethrin, unless no other adulticides are applicable or effective. The District may apply(ies) resmethrin in situations such as, in association with adult tree hole mosquito populations, residential areas near reclaimed marshes, and industrial areas for mosquito control. ULV applications of resmethrin would be used, and this chemical is also reserved for use when circumstances are critical (e.g., an outbreak of infectious disease such as West Nile virus). Additionally, resmethrin use is declining in favor of nonresmethrin alternatives. Studies have shown rapid dissipation/low persistence following aerial ULV applications. Resmethrin is moderately toxic to birds and highly toxic to honeybees; however, little risk to nontarget terrestrial organisms is expected when BMPs such as spray nozzle adjustments (BMP H8) and insect pollinator protection (BMP 12) are applied.

Permethrin

The District may use permethrin for mosquito and/or yellow jacket wasp control during spring, summer, and fall. Permethrin products are used in reclaimed marshes, used around residences, and applied directly to ground nests. Permethrin has low toxicity to mammals and is practically nontoxic to birds. It is highly toxic to honeybees; however, this pesticide is generally used with careful and strict BMP techniques such as using very small, localized applications. When used appropriately, little risk to nontarget terrestrial organisms is expected.

Etofenprox

Etofenprox is a pyrethroid-like compound that does not tend to persist in the environment or appear to pose a risk to mammals as it is available to the general public for application to backyards and patios and is sometimes applied directly to domestic pets (for flea and tick control).

Etofenprox is generally applied during the nighttime hours when sensitive receptors such as honeybees are not active. Based on toxicity, environmental fate, and usage patterns, etofenprox, using BMPs, is not likely to result in adverse impacts to nontarget terrestrial organisms.

Impact TR-26: The Chemical Control Alternative's mosquito adulticides 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.

Synergist (Piperonyl Butoxide)

PBO was first registered in the 1950s and acts as a synergist. Synergists are chemicals that primarily enhance the pesticidal properties of other active ingredients, such as pyrethrins and synthetic pyrethroids. PBO is a registered active ingredient in products used to control many different types of flying and crawling insects and arthropods, although no products contain only PBO. It is registered for use in agricultural, residential, commercial, industrial, and sites of public health importance. PBO interferes with the insect's ability to detoxify pyrethrins and pyrethroids, by binding to microsomal enzymes in target organisms, thereby inhibiting the breakdown of other pesticides, including pyrethrins and pyrethroids (USEPA 2006a).

PBO degrades relatively rapidly in soil and water and, therefore, does not tend to persist in the environment. PBO may be highly toxic to some species of fish and aquatic invertebrates and is being evaluated as a possible endocrine disruptor. However, it is of low toxicity to terrestrial receptors such as mammals and honeybees. ULV applications of adulticides containing PBO are used whenever necessary and applicable and in conjunction with BMPs for the co-applied pesticides.

Impact TR-27: The Chemical Control Alternative's use of the synergist 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.

5.2.7.1.3 Yellow Jacket and Tick Abatement

Besides using insecticides for mosquito populations, the District selectively applies them (typically pyrethrin and some pyrethroids) to control ground-nesting yellow jacket and tick populations that pose an imminent threat to people or to pets. This activity is generally triggered by public requests for District assistance or action rather than as a result of regular surveillance of their populations. For control of yellow jackets and ticks, these pesticides are applied in highly localized, upland areas and residential areas.

The District excludes from its yellow jacket control program populations of this vector that are located in or on a structure. Yellow jacket nests that are off the ground would be treated under special circumstances to protect public health and safety of the District's residents. Whenever a District technician learns that a hive is situated inside or on a structure or is above ground, the resident(s) are encouraged to contact a private pest control company that is licensed to perform this work. Likewise, residents complaining of honeybee swarms or hives are referred to the County Agricultural Commissioner's Office for a referral list of beekeepers that can safely remove the bees. If District technicians deem it appropriate to treat stinging insects, they will apply the insecticide directly within the nest in accordance with the District's policies to avoid drift of the insecticide or harm to other organisms. Alternatively, they will place tamper-resistant traps or bait stations, selective for the target insect, in the immediate environment of the vector.

Pyrethrin and pyrethroid-based chemicals are typically used against ground-nesting yellow jackets. Examples of pesticides the District might employ to control yellow jackets and ticks in residential or upland environments are allethrin, deltamethrin, esfenvalerate, phenothrin, and tetramethrin. The potential environmental impacts of these materials are minimal due to the fact that they are applied directly to the underground nest and to vegetation supporting ticks in a localized area. This application method prevents drift and further reduces the potential for inadvertent exposure of nontarget and sensitive species to these

materials. These chemicals would be applied in strict accordance with label directions and District BMPs, including those relating to worker environmental awareness training, disturbance minimization measures, and “Applications of Pesticides, Surfactants, and/or Herbicides,” will be applied, as will appropriate habitat and species-specific BMPs for access to sites to conduct treatment from the ground. The pesticides the District uses to control yellow jacket populations are shown in Table 2-5 and Table 5-9, and those selected for further review in Appendix B have been discussed previously.

The District typically does not engage in tick control activities, but could in the event of a tick-borne disease outbreak. In such an event, the District would employ pyrethroid-based chemicals; allethrin, deltamethrin, and esfenvalerate are under consideration. These are discussed further below.

Pyrethrin

The District uses pyrethrin for mosquito and/or yellow jacket wasp control. For yellow jacket control, pyrethrin is applied directly into ground nests. The potential impacts to terrestrial habitats through reduction of the amount or quality of habitat available, to native terrestrial plant or animal populations through direct mortality, or to special-status species are discussed above under mosquito adulticides (Section 5.2.7.1.2).

Pyrethroids and Pyrethroid-like Compounds

Pyrethroid insecticides are synthetic compounds that are chemically similar to the pyrethrins but have been modified to increase stability and activity against insects. First generation or “Type I” photosensitive pyrethroids include d-allethrin, phenothrin (sumithrin), prallethrin, resmethrin, and tetramethrin. Typically, these pyrethroids are used indoors and around residential areas. The newer second-generation pyrethroids are mostly “Type II” pyrethroids. The active ingredients that fall into this group include deltamethrin, esfenvalerate, and permethrin. Permethrin use is restricted to situations when it is absolutely necessary and in ULV applications that are designed to degrade rapidly and, thus, reduce the potential for impacts to nontarget ecological receptors. Type II pyrethroids are more toxic (than Type I pyrethroids) because they are less photosensitive and persist longer in the environment. Most pyrethroids and pyrethroid-like compounds are of low toxicity to birds and mammals, but of high toxicity to honeybees. The potential impacts to terrestrial habitats through reduction of the amount or quality of habitat available, to native terrestrial plant or animal populations through direct mortality, or to special-status species are discussed above under mosquito adulticides (Section 5.2.7.1.2).

The potential environmental impacts of these materials is minimal due to two factors: (1) their active ingredients consist largely of pyrethrins (a photosensitive natural insecticide manufactured from a *Chrysanthemum* species), or allethrin, and phenothrin (first generation synthetic pyrethroids with similar photosensitive, nonpersistent characteristics as pyrethrin); and (2) the mode of their application for yellow jacket population control (i.e., directly into the underground nest), which prevents drift and further reduces the potential for inadvertent exposure to these materials. When used for yellow jackets, the use would be confined to a single nest, not over a large area, as discussed for mosquito adulticiding. Because of the small quantity of pesticide applied and because these chemicals are not applied directly to aquatic environments, this control method would have little impact on aquatic or terrestrial organisms.

Impact TR-28: The Chemical Control Alternative’s use of pyrethrin, pyrethroids, and pyrethroid-like pesticides for yellow jacket wasp and tick control 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.

5.2.7.2 *Impacts to Habitats*

The Chemical Control Alternative 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, or regulations, or by the CDFW or USFWS. This alternative 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 alternative would not result in 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 TR-29. The Chemical Control Alternative would have **no impact** on any riparian habitat or other sensitive natural community.

Impact TR-30. The Chemical Control Alternative would have **no impact** on federally protected wetlands as defined by CWA Section 404.

5.2.7.3 *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, would have little effect on the movement of wildlife, and would not affect wildlife migration corridors or nursery areas, as no physical disturbance would occur.

Impact TR-31. The Chemical Control Alternative would have a **less-than-significant** 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. No mitigation is required.

5.2.7.4 *Conflict with Local Ordinances*

The county and city general plans and their goals and policies pertaining to natural resources are protective of terrestrial resources and focused on conservation of existing resources including mature trees and important woodland communities. 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 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 TR-32. The Chemical Control Alternative would have **no impact** on local policies or ordinances protecting terrestrial resources.

5.2.7.5 *Conflict with Conservation Plans*

Two conservation plans, Turkey Road and the SRPCS, were identified whose action areas are within the District's primary Service Area. The Turkey Road HCP provides for protection and mitigation of impacts to California red-legged frog associated with residential and vineyard development. The SRPCS provides for the protection and mitigation of impacts to California tiger salamander and four listed plant species from development on the Santa Rosa Plain.

The District may conduct chemical control operations within the area covered by the regional SRPCS. However, the District regularly communicates with and works collaboratively with the SRPCS IRT and representatives from agencies such as SWQCB, USEPA, USACE, CDFW, and USFWS. District staff receive 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. The District uses specialized equipment in conjunction with vernal pool habitats. While District activities may occur within the boundaries of conservation areas, these activities are coordinated with the plan managers and would not be inconsistent with the provisions of any adopted HCP, NCCP, or other approved local, regional, or state habitat conservation plan.

Six 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 that county or their 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 TR-33. The Chemical Control Alternative would have a **less-than-significant** impact on approved HCPs, NCCPs, or local conservation plans. No mitigation is required.

5.2.8 Other Nonchemical Control/Trapping Alternative

The trapping of rodents is conducted as part of disease surveillance/testing programs and may be utilized for surveillance and egregious situations regarding commensal rodents (e.g., roof rats and Norway rats) in the future. Rodent trapping is not and will not be performed routinely as a mass trapping control measure. Trapping of yellow jackets is conducted when these organisms pose a threat to public health and welfare. For yellow jackets, District staff place the tamper-resistant or baited trap(s) primarily at the request of the property owner or manager, although they also advise the landowner that trapping is generally ineffective at population control and that it is better to seek out and treat the nest. The District does not remove rats or yellow jackets that are in or on structures. When these requests for service are made, residents are referred to the local animal control or to a directory of private pest control companies. While it is conceivable that nontarget wildlife could be inadvertently trapped, the District conducts limited trapping and employs mechanisms and baits specific to target vectors to reduce the potential impacts to nontarget ecological receptors.

This alternative would be undertaken under prescribed circumstances in and around developed/urban areas that do not provide good habitat for special-status species. Rodent trapping may also be performed in more rural settings to collect blood samples to test for disease. Trapping of yellow jackets would not be expected to have any effect on special-status species or their habitats, as these traps are highly localized, self-contained, and inaccessible to these species. Traps for rodents are designed for small mammals and baited to attract the target species. These traps are usually not deployed in areas where special-status mammals occur. When trapping is required, the District consults with the CDFW and USFWS and obtains all appropriate permits for trapping. All animals captured, have a blood sample taken for testing and are released. A report of animals captured and released is filed in accordance with permit requirements. These traps are highly unlikely to attract special-status birds, reptiles or amphibians, and even more unlikely to capture special-status species. The placement and operation of these traps would not change the amount or physical properties of any type of habitat or alter the hydrology in any way. They would not impair migration or alter migratory corridors or nursery sites.

5.2.8.1 *Impacts to Special-Status Species*

The Other Nonchemical Control/Trapping Alternative would have a less-than-significant impact on terrestrial wildlife including terrestrial species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the CDFW or USFWS. Trapping is limited in scope and performed only when vectors pose a threat to public health and welfare. It is implemented in areas unlikely to support special-status species, and traps are baited to attract the target vector species to avoid trapping other animals. General BMPs contained in Table 5-3 serve to minimize or avoid impacts associated with vehicle used to place and collect the traps.

Impact TR-34. The Other Nonchemical Control/Trapping Alternative would have a **less-than-significant** impact either directly or through habitat modifications, on any terrestrial species identified as a candidate, sensitive, or special-status species. No mitigation is required.

5.2.8.2 Impacts to Habitats

This alternative would not affect the quantity or distribution of habitats, such as riparian areas, marshes, lakes or ponds, seasonal wetlands, or other habitat types or sensitive natural communities identified in local or regional plans, policies, or regulations, or by the CDFW or USFWS. Trapping would not affect the composition of their vegetative communities, as the placement of traps and baits would not affect plants. This alternative would not result in 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 TR-35. The Other Nonchemical Control/Trapping Alternative would have **no impact** on any riparian habitat or other sensitive natural community.

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

5.2.8.3 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, this effect would be minimal, would have little effect on the movement of wildlife, and would not affect wildlife migration corridors or nursery areas, as no physical disturbance would occur.

Impact TR-37. The Other Nonchemical Control/Trapping Alternative 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.

5.2.8.4 Conflict with Local Ordinances

The county and city general plans and their goals and policies pertaining to natural resources are protective of terrestrial resources and focused on conservation of existing resources including mature trees and important woodland communities. 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 except indirectly for 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 TR-38. The Other Nonchemical Control/Trapping Alternative would have **no impact** on local policies or ordinances protecting terrestrial resources.

5.2.8.5 Conflict with Conservation Plans

Two conservation plans, Turkey Road and the SRPCS, were identified whose action areas are within the District's primary Service Area. The Turkey Road HCP provides for protection and mitigation of impacts to California red-legged frog associated with residential and vineyard development. The SRPCS provides for the protection and mitigation of impacts to California tiger salamander and four listed plant species from development on the Santa Rosa Plain.

The District may conduct nonchemical control/trapping operations within the area covered by the regional SRPCS. However, the District regularly communicates with and works collaboratively with the SRPCS IRT and representatives from agencies such as SWQCB, USEPA, USACE, CDFW, and USFWS. District staff receive 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. The District uses specialized equipment in conjunction with vernal pool habitats. While District trapping activities may occur within the boundaries of conservation areas, these

activities are coordinated with the plan managers and would not be inconsistent with the provisions of any adopted HCP, NCCP, or other approved local, regional, or state habitat conservation plan.

Six conservation plans affect portions of adjacent counties. District trapping 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 that county or their 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 TR-39. The Other Nonchemical Control/Trapping Alternative would have **no impact** on approved HCPs, NCCPs, or local conservation plans.

5.2.9 Cumulative Impacts

“Cumulative impacts” are defined as “two or more individual effects which, when considered together, are considerable or compound or increase other environmental impacts (CEQA Guidelines Section 15355). Cumulative impacts, as they relate to terrestrial resources, include past, present, and reasonably foreseeable actions that potentially impact terrestrial mammalian and avian wildlife, reptiles, aquatic organisms, nontarget invertebrates and pollinators, and botanical resources. Cumulative impacts can result from individually minor, but collectively significant, projects taking place over a period of time. The determination is whether a proposed project’s incremental contribution to a cumulative impact results in a potentially “considerable” (i.e., significant) cumulative impact, and, if so, whether that project’s incremental contribution can be mitigated to a less-than-significant level. The cumulative impacts analysis for terrestrial resources is contained in Section 1.3, and the determinations of cumulatively considerable impacts are summarized here.

The Surveillance, Physical Control, Vegetation Management, Chemical Control, and Other Nonchemical Control Alternatives’ impacts to terrestrial resources were determined to be less than significant or in some cases “no impact.” The Biological Control Alternative’s use of mosquitofish had no impact to terrestrial resources. The key issues for consideration herein are potential effects on beneficial insect pollinators from chemical applications and the potential cumulative impacts associated with the Vegetation Management and Chemical Control Alternatives’ less-than-significant impacts.

- > Effects on Pollinators: Colony collapse disorder (CCD) and the resulting decline in bee populations is an existing significant cumulative impact in the region. In general, while insect abatement activities may affect native pollinators near or adjacent to treatment areas, the District’s careful practice of BMPs greatly reduces the potential cumulative impacts to nontarget pollinators. The Program’s **less-than-significant impacts on insect pollinators related to mosquito and yellow jacket abatement activities would not be cumulatively considerable or significant.**
- > Vegetation Management Alternative: Vegetation control activities the District may perform would be cumulative with those which other entities perform within the Program Area. Vegetation control activities may affect native plants, as these species may lie within treatment areas, but the effects on individuals of native species are minimized, and the overall effect is likely beneficial, as native species will have less competition in treated areas and, thus, would be expected to be more successful. Based on this conclusion, the Program’s incremental **less-than-significant effects relating to weed abatement activities, when considered with other weed abatement activities in the Program Area, would not be cumulatively considerable or significant.**
- > Chemical Control Alternative: The uses of pesticides under the Chemical Control Alternative would be cumulative with uses of pesticides by agricultural, industrial, governmental, and residential users, an existing significant cumulative impact. The District’s relative contribution to the loads of such concentrations is small compared with other users. Applications of pesticides for vector control are most often at concentrations less than the maximum allowed on the product label, and nontarget species are

not substantially affected and acute toxicities are avoided. The amounts applied by the District 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 District preferentially uses nonchemical alternatives and when using chemical alternatives, uses chemicals most often that are not persistent in the environment when chemicals are applied. As such, the District's Chemical Control Alternative does not contribute substantially to pesticide and herbicide exposures in the terrestrial environment. The Chemical Control Alternative has a **less-than-significant cumulative impact on terrestrial resource exposures to herbicides and pesticides.**

5.2.10 Environmental Impacts Summary

The Surveillance, Physical Control, Vegetation Management (including herbicide use), Biological Control, and Other Nonchemical Control/Trapping alternatives are expected to have less-than-significant to no impact on terrestrial resources (Table 5-9). The Chemical Control Alternative (including the mosquito larvicide, mosquito, yellow jacket wasp, and tick adulticide application scenarios [under existing BMPs]) is expected to have only minimal impacts to nontarget terrestrial resources that would be less than significant.

Table 5-9 Summary of Biological Resources - Terrestrial Impacts by Alternative

Impact Statement	Surveillance	Physical Control	Vegetation Management	Biological Control	Chemical Control	Other Nonchemical/ Trapping
Biological Resources - Terrestrial						
Impact TR-1. The Surveillance Alternative 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.	LS	na	na	na	na	na
Impact TR-2. The Surveillance Alternative would have a less-than-significant impact on riparian habitat or other sensitive natural communities. No mitigation is required.	LS	na	na	na	na	na
Impact TR-3. The Surveillance Alternative would have a less-than-significant impact on federally protected wetlands as defined by Section 404 of the Clean Water Act. No mitigation is required.	LS	na	na	na	na	na
Impact TR-4. The Surveillance Alternative 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.	N	na	na	na	na	na
Impact TR-5. The Surveillance Alternative would have no impact on local policies or ordinances protecting biological resources.	N	na	na	na	na	na
Impact TR-6. The Surveillance Alternative would have a less-than-significant impact on adopted HCPs or NCCPs. No mitigation is required.	LS	na	na	na	na	na
Impact TR-7. The Physical Control Alternative, 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.	na	LS	na	na	na	na
Impact TR-8. The Physical Control Alternative, would have a less-than-significant impact on any riparian habitat or other sensitive natural community. No mitigation is required.	na	LS	na	na	na	na
Impact TR-9. The Physical Control Alternative would have a less-than-significant impact on federally protected wetlands as defined by CWA Section 404. No mitigation is required.	na	LS	na	na	na	na

Table 5-9 Summary of Biological Resources - Terrestrial Impacts by Alternative

Impact Statement	Surveillance	Physical Control	Vegetation Management	Biological Control	Chemical Control	Other Nonchemical/ Trapping
Impact TR-10. The Physical Control Alternative would have a less-than-significant 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. No mitigation is required.	na	LS	na	na	na	na
Impact TR-11. The Physical Control Alternative would have no impact on local policies or ordinances protecting terrestrial resources.	na	N	na	na	na	na
Impact TR-12. The Physical Control Alternative would have a less-than-significant impact on adopted HCPs or NCCPs. No mitigation is required.	na	LS	na	na	na	na
Impact TR-13. The Vegetation Management Alternative 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.	na	na	LS	na	na	na
Impact TR-14. The Vegetation Management Alternative would have a less-than-significant impact on any riparian habitat or other sensitive natural community. No mitigation is required.	na	na	LS	na	na	na
Impact TR-15. The Vegetation Management Alternative would have a less-than-significant impact on federally protected wetlands as defined by CWA Section 404. No mitigation is required.	na	na	LS	na	na	na
Impact TR-16. The Vegetation Management Alternative would have a less-than-significant 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. No mitigation is required.	na	na	LS	na	na	na
Impact TR-17. The Vegetation Management Alternative would have no impact on local policies or ordinances protecting terrestrial resources.	na	na	N	na	na	na
Impact TR-18. The Vegetation Management Alternative has a less-than-significant impact on approved HCPs or NCCPs. No mitigation is required.	na	na	LS	na	na	na

Table 5-9 Summary of Biological Resources - Terrestrial Impacts by Alternative

Impact Statement	Surveillance	Physical Control	Vegetation Management	Biological Control	Chemical Control	Other Nonchemical/ Trapping
Impact TR-19. The Biological Control Alternative would have no impact either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species.	na	na	na	N	na	na
Impact TR-20. The Biological Control Alternative would have no impact on any riparian habitat or other sensitive natural community.	na	na	na	N	na	na
Impact TR-21. The Biological Control Alternative would have no impact on federally protected wetlands as defined by CWA Section 404.	na	na	na	N	na	na
Impact TR-22. The Biological Control Alternative 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.	na	na	na	N	na	na
Impact TR-23. The Biological Control Alternative would have no impact on local policies or ordinances protecting biological resources.	na	na	na	N	na	na
Impact TR-24. The Biological Control Alternative would have no impact on approved HCPs, NCCPs, or local conservation plans.	na	na	na	N	na	na
Impact TR-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.	na	na	na	na	LS	na
Impact TR-26: The Chemical Control Alternative’s mosquito adulticides 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.	na	na	na	na	LS	na

Table 5-9 Summary of Biological Resources - Terrestrial Impacts by Alternative

Impact Statement	Surveillance	Physical Control	Vegetation Management	Biological Control	Chemical Control	Other Nonchemical/ Trapping
Impact TR-27: The Chemical Control Alternative’s use of the synergist 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.	na	na	na	na	LS	na
Impact TR-28: The Chemical Control Alternative’s use of pyrethrin, pyrethroids, and pyrethroid-like pesticides for yellow jacket wasp and tick control 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.	na	na	na	na	LS	na
Impact TR-29. The Chemical Control Alternative would have no impact on any riparian habitat or other sensitive natural community.	na	na	na	na	N	na
Impact TR-30. The Chemical Control Alternative would have no impact on federally protected wetlands as defined by CWA Section 404.	na	na	na	na	N	na
Impact TR-31. The Chemical Control Alternative would have a less-than-significant 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. No mitigation is required.	na	na	na	na	LS	na
Impact TR-32. The Chemical Control Alternative would have no impact on local policies or ordinances protecting terrestrial resources.	na	na	na	na	N	na
Impact TR-33. The Chemical Control Alternative would have a less-than-significant impact on approved HCPs, NCCPs, or local conservation plans. No mitigation is required.	na	na	na	na	LS	na
Impact TR-34. The Other Nonchemical Control/Trapping Alternative would have a less-than-significant impact either directly or through habitat modifications, on any terrestrial species identified as a candidate, sensitive, or special-status species. No mitigation is required.	na	na	na	na	na	LS

Table 5-9 Summary of Biological Resources - Terrestrial Impacts by Alternative

Impact Statement	Surveillance	Physical Control	Vegetation Management	Biological Control	Chemical Control	Other Nonchemical/ Trapping
Impact TR-35. The Other Nonchemical Control/Trapping Alternative would have no impact on any riparian habitat or other sensitive natural community.	na	na	na	na	na	N
Impact TR-36. The Other Nonchemical Control/Trapping Alternative would have no impact on federally protected wetlands as defined by CWA Section 404.	na	na	na	na	na	N
Impact TR-37. The Other Nonchemical Control/Trapping Alternative 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.	na	na	na	na	na	N
Impact TR-38. The Other Nonchemical Control/Trapping Alternative would have no impact on local policies or ordinances protecting terrestrial resources.	na	na	na	na	na	N
Impact TR-39. The Other Nonchemical Control/Trapping Alternative would have no impact on approved HCPs, NCCPs, or local conservation plans.	na	na	na	na	na	N

LS = Less-than-significant impact

N = No impact

na = Not applicable

SM = Potentially significant but mitigable impact

SU = Significant and unavoidable impact

5.2.11 Mitigation and Monitoring

The implementation of the alternatives would not result in any significant impacts on terrestrial resources. All impacts are either less than significant or none; most assume implementation of BMPs to avoid or minimize potential impacts. Therefore, no mitigation is required.