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Summary

This summary of the Contra Costa Mosquito and Vector Control District's Programmatic Environmental Impact Report (PEIR) on the continuation of their Integrated Mosquito and Vector Management Program (IMVMP or Program) presents an overview of the PEIR contents. It introduces key components of the Proposed Program and provides a summary of the potential environmental impacts of the Program alternatives. The text of the PEIR is supplemented by five technical reports included as appendices. The Contra Costa Mosquito and Vector Control District, as Lead Agency under the California Environmental Quality Act (CEQA), has prepared this PEIR for their ongoing program of surveillance and control of mosquitoes and other vectors of human and animal disease and discomfort.

S.1 Background

The District was established in 1927 to reduce the risk of vector-borne disease and discomfort to the residents of its Service Area. The District engages in activities and management practices to control mosquitoes and other vectors and to address the specific situations within its Service Area. These management practices emphasize the fundamentals of integrated pest management (IPM) wherein source reduction, habitat modification, and biological control are used when appropriate before using pesticides. When pesticides are used, they are applied in a manner that minimizes risk to human and ecological health. To avoid or manage the risk to human and animal health requires effective, proactive vector-borne disease surveillance and control strategies that may fluctuate temporally and regionally. Factors that influence the selected strategies include mosquito and pathogen biology, environmental factors, land use patterns, and resource availability to support production of the vectors in quantities that threaten human and animal health.

S.1.1 Vector-Borne Diseases in Program Areas

Certain vectors can transmit a number of diseases. A vector is defined by the State of California as "any animal capable of transmitting the causative agent of human disease or capable of producing human discomfort or injury, including, but not limited to, mosquitoes, flies, other insects, ticks, mites, and rats, but not including any domesticated animal…" [California Health and Safety Code Section 2200(f)]. The diseases of most concern in the Program Area are as follows, by the vector they are associated with:

> Mosquito-transmitted illnesses: West Nile virus, western equine encephalomyelitis, Saint Louis encephalitis, dog heartworm and malaria.

> Tick-transmitted illnesses: Lyme disease, babesiosis, ehrlichiosis, tularemia, spotted fever group rickettsia, anaplasmosis, tick-borne relapsing fever

> Rodent/rat-transmitted illnesses: hantavirus pulmonary syndrome (HPS), tularemia, plague

> Other vector-transmitted illnesses: rabies transmitted by skunks, plague and murine typhus transmitted by fleas (usually on rats), raccoon roundworm

Depending on the disease, both human and domestic animal health can be at risk of disability, illness, and/or death. Furthermore, potential exists for introduction and transmission of new diseases by current vectors and for new disease vectors to be introduced into the District's Service Area. An example of this is the recent discovery of Aedes albopictus (i.e., Asian tiger mosquito) and Aedes aegypti (i.e., yellow fever mosquito) mosquitoes in central and southern California. These mosquito species are known to be vectors of diseases such as Chickungunya virus, yellow fever, and Dengue fever.The Program Area includes counties adjacent to the District's Service Area where assistance may be provided upon request: Alameda, Sacramento, San Joaquin and Solano.

S.1.2 Authority to Implement Vector Control

A number of legislative and regulatory actions form the basis for the District's authority to engage in vector control. The District's principal authority is derived from the California Health and Safety Code. It is a regulatory agency formed pursuant to California Health and Safety Code Section 2000 et seq. State law charges the District with the authority and responsibility to take all necessary or proper steps for the control of mosquitoes and other vectors in the District.

In accordance with California Health and Safety Code Section 2053:

(a) A district may request an inspection and abatement warrant pursuant to Title 13 (commencing with Section 1822.50) of Part 3 of the Code of Civil Procedure. A warrant issued pursuant to this section shall apply only to the exterior of places, dwellings, structures, and premises. The warrant shall state the geographic area which it covers and shall state its purposes. A warrant may authorize district employees to enter property only to do the following:

  (1) Inspect to determine the presence of vectors or public nuisances.

  (2) Abate public nuisances, either directly or by giving notice to the property owner to abate the public nuisance.

  (3) Determine if a notice to abate a public nuisance has been complied with.

  (4) Control vectors and treat property with appropriate physical, chemical, or biological control measures.

(b) Subject to the limitations of the United States Constitution and the California Constitution, employees of a district may enter any property, either within the district or property that is located outside the district from which vectors may enter the district, without hindrance or notice for any of the following purposes:

  (1) Inspect the property to determine the presence of vectors or public nuisances.

  (2) Abate public nuisances pursuant to this chapter, either directly or by giving notice to the property owner to abate the public nuisance.

  (3) Determine if a notice to abate public nuisance has been complied with.

  (4) Control vectors and treat property with appropriate physical, chemical, or biological control measures.

The California Department of Pesticide Regulation's (CDPR's) Pesticide Regulatory Program provides special procedures for vector control agencies that operate under a Cooperative Agreement with the California Department of Public Health (CDPH). The application of pesticides by vector control agencies is regulated by a special and unique arrangement among the CDPH, CDPR, and County Agricultural Commissioners. CDPR does not directly regulate vector control agencies. CDPH provides regulatory oversight for vector control agencies that are signatory to the Cooperative Agreement. Signatories to the agreement use only pesticides listed by CDPH, maintain pesticide use reports, and ensure that pesticide use does not result in harmful residues on agricultural products.

The District maintains a cooperative agreement with CDPR. Its employees are certified by CDPH as vector control technicians, which helps to ensure that employees are adequately trained regarding safe and proper vector control techniques including the handling and use of pesticides and compliance with laws and regulations relating to vector control and environmental protection.

S.2 Program Objectives and Purpose

The District undertakes vector control activities through its Program to control the following vectors of disease and/ or discomfort in the Program Area: mosquitoes, rats, mice, ticks, yellowjacket wasps, Africanized honeybees, and skunks (rabies risk reduction).

The Proposed Program's specific objectives are as follows:

> Reduce the potential for human and animal disease caused by vectors

> Reduce the potential for human and animal discomfort or injury from vectors

> Accomplish effective and environmentally sound vector management by means of:

- Surveying for vector abundance/human contact
- Establishing treatment criteria
- Appropriately selecting from a wide range of Program tools or components

Most of the relevant vectors are quite mobile and cause the greatest hazard or discomfort at a distance from where they breed. Each potential vector has a unique life cycle, and most of them occupy several types of habitats. To effectively control them, an IVMP must be employed. District policy is to identify those species that are currently vectors, to recommend techniques for their prevention and control, and to anticipate and minimize any new interactions between vectors and humans.

S.3 Public Involvement Summary

Public involvement for this PEIR includes the following actions.

The Contra Costa Mosquito and Vector Control District (District) distributed a Notice of Preparation (NOP) of a Draft Programmatic Environmental Impact Report (PEIR) for the Integrated Mosquito and Vector Management Program (Program) pursuant to the California Environmental Quality Act (CEQA) Guidelines (Section 15082) on May 17, 2012. The NOP was sent to 72 agencies, organizations, and individuals, including the following state responsible and trustee agencies: California Department of Fish and Game; California Department of Public Health; California Department of Forestry and Fire Protection; California Department of Parks; California Department of Pesticide Regulation; California Department of Transportation; California State Lands Commission; San Francisco Bay Regional Water Quality Control Board; Central Valley Regional Water Quality Control Board and San Francisco Bay Conservation and Development Commission. The NOP provided a description of the Program, the location of Program activities, and the resources and environmental concerns planned for analysis in the PEIR. The notice announced a public scoping meeting and requested the comments on the content of the PEIR and the Program alternatives be submitted within 30 days of receipt. The public scoping meeting was held at the following location and time:

> Contra Costa Mosquito and Vector Control District – Board Room, Concord, on June 7, 2012, from 5:00 p.m. - 7:00 p.m.

Comments received during scoping on the content of the PEIR by this District and eight other bay area districts are addressed in the resource chapters.

The District released its Notice of Availability (NOA) of a Draft PEIR on September 4, 2015, to 72 agencies and organizations. A public hearing was held to receive agency and public oral comments on the Draft PEIR content on October 14, 2015, at 6:00 pm, at the CCMVCD office, 155 Mason Circle, Concord, CA 94520. One person appeared but did not provide oral or written comment. The public comment period closed on October 23, 2015. Written comments were received directly from the California State Parks, Bay Area District and the Contra Costa Flood Control District. The State Clearinghouse reported that submitted comments were received from the Central Valley Regional Water Quality Control

Board. Responses to written comments from these agencies are contained in a separate Responses to Comments document.

S.4 Areas of Known Public Concern

CEQA Guidelines Section 15123 requires that the Summary "shall identify areas of controversy known to the lead agency." The areas of greatest public concern and debate are based on comments from public scoping and comments made during other District activities:

> Use of Pesticides for Vector Control: Some members of the public are distrustful of pesticide use for vector control. They prefer other methods to eliminate suitable habitat to deal with mosquito problems rather than spraying pesticides. If adulticides must be used, ensure use is justified with documented, mosquito-borne disease activity or within flight range of the mosquito source. Concern exists about pesticide applications drifting into backyards where the property owner wants to ensure their area is pesticide-free. The concern is not only with impacts to humans and "sensitive populations" but also to domestic animals and wildlife including nontarget insects.

> Use of Herbicides for Vegetation Management: Request for specific vegetation management information about the proposed chemical vegetation control agents (herbicides), the types, amounts and locations of chemical stored, application methods and rates, and their effects on the environment.

> Use of Biological Control Agents: Controversy exists over the use of some proposed biological control agents, in particular the use of mosquitofish and potential for them to impact sensitive species such as the California red-legged frog.

> District's Authority to Enter Public and Private Property for Control Activities: Some public agencies want the District to obtain an Encroachment Permit with notification of Park Supervisors for activities such as surveillance, physical control, or vegetation management where access to parkland is needed. Water districts insist that mosquito abatement materials and practices proposed for use on watershed lands must be thoroughly vetted and approved by CDPH. New legislation in 2014 clarified CDFW's and the District's responsibilities to engage in mosquito abatement in CDFW-owned and/or -managed wildlife refuges.

S.5 Proposed Program Alternatives

S.5.1 Proposed Program

The District's Program is an ongoing series of related actions for the proactive management of mosquito, yellow jacket, rodent, and other vector populations to minimize human/vector interactions and the associated risks of disease and discomfort. The District's activities involve the identification of vector problems; responsive actions to control existing populations of vectors, prevent new sources of vectors from developing, and manage habitat to minimize vector production; education of landowners and others on measures to minimize vector production or interaction with vectors; and provision and administration of funding and institutional support necessary to accomplish District objectives.

The District has, since its inception, taken a proactive integrated systems approach to mosquito and vector control, utilizing a suite of tools that consist of public education, surveillance, and physical (e.g., source reduction, vegetation management, water management), biological, and chemical control. These Program "tools" or components are described in the subsequent subsection as "Program alternatives" for the CEQA process (except for public education, which is exempt from CEQA). Program implementation is weighted heavily towards physical and biological control, in part, to reduce the need for chemical control. To realize effective and environmentally sound vector management, vector control must be proactive and based on several factors:

> Carefully monitoring or surveying vector abundance and/or potential contact with people

> Carefully monitoring and surveying for vector-borne diseases and their antecedent factors that initiate and/or amplify disease

> Establishing treatment criteria

> Selecting appropriate tools from a wide range of control methods

This Program consists of a dynamic combination of surveillance, treatment criteria, and use of multiple control activities in a coordinated program with public education that is generally known as Integrated Pest Management (IPM) or Integrated Vector Management (IVM).

While these Program components or tools combined together encompass the District's Program, it is important to acknowledge that the specific tools District staff use vary from day to day and from site to site in response to the vector species that are active, their population size or density, their age structure, location, time of year, local climate and weather, potential for vector-borne disease, proximity to human populations, including (a) proximity to sensitive receptors, (b) District staff's access to vector habitat, (c) abundance of natural predators, (d) availability and cost of control methods, (e) effectiveness of previous control efforts at the site, (f) potential for development of larvicide or adulticide resistance in vector populations, (g) landowner policies or concerns, (h) proximity to special status species, and (i) applicability of Endangered Species Recovery Plans, HCPs, Natural Community Conservation Plans (NCCPs), and local community concerns, among other variables. Therefore, the specific actions taken in response to current or potential vector activity at a specific place and time depend on factors of vector and pathogen biology, physical and biotic environment, human settlement patterns, local standards, available control methods, and institutional and legal constraints. While some consistent vector sources are exposed to repeated control activity, many areas with minor vector activity are not routinely treated, and most of the land within the District's Service Area has never been directly treated for vectors.

The District has implemented a number of procedures and practices under current Program activities that would continue into the future for the Proposed Program. These BMPs represent measures to avoid, minimize, eliminate, rectify, or compensate for potential adverse effects on the human, biological, and physical environments and District Staff. Additional BMPs are part of the District's public education program and outreach to landowners and land managers. these represent measures to control mosquito and vector control used by public and private property owners within the District's Service Area. When the District recommends control measures to landowners and land managers, they are directed to contact and coordinate with resource agencies to address potential special status species concerns, sensitive habitats and potential permits prior to implementation of recommended vector control work. While similar to mitigation measures under CEQA, these District BMPs are already in use and would continue as part of the Proposed Program. Subsequent environmental impact assessments in this PEIR reflect the continued use of these measures, which are organized under the following categories:

> General BMPs

> Tidal Marsh-Specific BMPs

> Salt Marsh Harvest Mouse (SMHM)

> Ridgeway's Rail (RR)

> California Least Turn (CLT)

> Western Snowy Plover (WSnPl)

> California Tiger Salamander (CTS)

> Contra Costa Goldfields (CCG)

> Soft Bird's Beak (SBB)

> Vegetation Management

> Maintenance/Construction and Repair of Tide Gates and Water Structures in Waters of the U.S.

> Applications of Pesticides, Surfactants, and/or Herbicides

> Hazardous Materials and Spill Management

> Worker Illness and Injury Prevention Program and Emergency Response

The District will observe all state and federal regulations. The Districts will follow all appropriate laws and regulations pertaining to the use of pesticides and herbicides and safety standards for employees and the public, as governed by the USEPA, CDPR, and local jurisdictions (with some exceptions and where applicable). Although the products the District uses are all tested, registered, and approved for use by the USEPA and/or CDPR, the District provides additional margins of safety with the adherence to additional internal guidance based on their BMPs and the principles embodied in District IMVMP policies, where applicable.

> Ensure all District and contracted applicators are appropriately licensed or certified by the state.

> District staff or contractors will coordinate with the County Agricultural Commissioners, and obtain and verify all required licenses and permits as current prior to pesticide/herbicide application.

> All applicators and handlers will use proper personal protective equipment.

The No Program Alternative is defined as the District not engaging in any of the control strategies and tools for mosquito and/or vector control. Past practices would not continue into the future. The District would not continue to operate and would close. Key assumptions for the future No Program Alternative are:

> Current regulatory controls would continue and expand as needed; however, the District would not engage in implementing any of these regulations concerning public health and management of vectors carrying potential diseases. For all practical purposes, the District's office would close. Public education and other outreach activities would cease along with the control activities.

> Private landowners would manage mosquito and/or vector problems on private land without any state or federal oversight of pesticides approved for use. Households would use pesticides commonly available from retail outlets where permethrin and pyrethroids are common ingredients.

> In the absence of the District's IVMP, the responsibility for vector management could fall on CDPH (or some other agency), who would not provide mosquito and vector control support but rather only "oversight" to local jurisdictions given lack of personnel, equipment, or funding. Management at the state level would likely be only reactive rather than proactive. The District anticipates combining the following ongoing alternatives into its Proposed Program, a continuation of its existing Program with adaptations to meet future needs. The six alternatives evaluated in this PEIR are summarized below.

S.5.1.1 Surveillance

Vector surveillance, which is an integral part of the District's responsibility to protect public health and welfare, involves monitoring vector populations and habitat, their disease pathogens, and human/vector interactions. Vector surveillance provides the District with valuable information on what vector species are present or likely to occur, when they occur, where they occur, how many they are, and if they are carrying disease or otherwise affecting humans. Vector surveillance is critical to an IVMP because the information it provides is evaluated against treatment criteria to decide when and where to institute vector control measures. Information gained is used to help form action plans that can also assist in reducing the risk of contracting vector-borne disease. Equally important is the use of vector surveillance in evaluating the efficacy, cost effectiveness, and environmental impacts of specific vector control actions. Examples include field counting/sampling and trapping, arbovirus surveillance, field inspection of known or suspected habitats, maintenance or paths and clearings for access, and documenting public service inquiries and requests.

S.5.1.2 Physical Control

Managing vector habitat to reduce vector production or migration, either directly or through public education, is often the most cost-effective and environmentally benign element of an IVMP. This approach to the control of vectors and other pests is often called “physical control” to distinguish it from those vector management activities that directly rely on application of chemical pesticides (chemical control) or the introduction or relocation of living agents (biological control). Other terms that have been used for vector habitat management include “source reduction,” which emphasizes the significance of reducing the habitat value of an area for vectors, or “permanent control,” to contrast with the temporary effectiveness of pesticide applications. Vector habitat management is important because its use can virtually eliminate the need for pesticide use in and adjacent to the affected habitat and, in some situations, can virtually eliminate vector production from specific areas for long periods of time, reducing the potential disturbances associated with frequent biological or chemical control activities. The intent is to reduce the abundance of vectors produced or sheltered by an area while protecting or enhancing the habitat values of the area for desirable species. In many cases, physical control activities involve restoration and enhancement of natural ecological functioning, including production and dispersal of special status species and/or predators of vectors.

S.5.1.3 Vegetation Management

The species composition and density of vegetation are basic elements of the habitat value of any area for mosquitoes and other vectors, for predators of these vectors, and for protected flora and fauna. District staff periodically undertake vegetation management activities as a tool to reduce the habitat value of sites for mosquitoes and other vectors or to aid production or dispersal of vector predators, as well as to allow District staff’s access to vector habitat for surveillance and other control activities. District staff’s direct vegetation management generally consists of activities to reduce the mosquito habitat value of sites by improving water circulation or access by fish and other predators, reduce harborage, or to allow District staff’s access to standing water for inspections and treatment.

For vegetation management, the District uses hand tools or may potentially use other mechanical means (i.e., heavy equipment) for vegetation removal or thinning and sometimes applies herbicides (chemical pesticides with specific toxicity to plants) to improve surveillance or reduce vector habitats. Vegetation removal or thinning primarily occurs in aquatic habitats to assist with the control of mosquitoes and in terrestrial habitats to help with the control of other vectors. Vegetation management, when applicable to vector habitat management, may also be performed to assist other agencies and landowners with the management of invasive/nonnative weeds. These actions are typically performed under the direction of the concerned agency, which also maintains any required permits.

S.5.1.4 Biological Control

Pathogens

Biological control of mosquitoes and other vectors involves the intentional use of vector pathogens (diseases), parasites, and/or predators to reduce the population size of target vectors.

Mosquito pathogens are highly host-specific and usually infect mosquito larvae when they are ingested. Upon entering the host, these pathogens multiply rapidly, destroying internal organs and consuming nutrients. The pathogen can be spread to other mosquito larvae in some cases when larval tissue disintegrates and the pathogens are released into the water to be ingested by uninfected larvae. Examples of bacteria pathogenic to mosquitoes are *Bacillus sphaericus* (Bs), the several strains of *Bacillus thuringiensis israelensis* (Bti), and *Saacharopolyspora spinosa*. Two bacteria, Bs and Bti, produce proteins that are toxic to most mosquito larvae, while *Saacharopolyspora spinosa* produces compounds known as spinosysns, which effectively control all larval mosquitoes. Bs can reproduce in natural settings for some time following release. Bti materials the District applies do not contain live organisms, but only spores made up of specific protein molecules.

Parasites

The life cycles of mosquito parasites are biologically more complex than those of mosquito pathogens and involve intermediate hosts, organisms other than mosquitoes. Mosquito parasites are ingested by the feeding larva or actively penetrate the larval cuticle to gain access to the host interior. Once inside the host, parasites consume the internal organs and food reserves until the parasite's developmental process is complete. The host is killed when the parasite reaches maturity and leaves the host (*Romanomermis culicivorax*) or reproduces (*Lagenidium giganteum*). Once free of the host, the parasite can remain dormant in the environment until it can begin its developmental cycle in another host. Examples of mosquito parasites are the fungi *Coelomomyces* spp., *Lagenidium giganteum, Culicinomyces clavosporus*, and *Metarhizium anisopliae*; the protozoa *Nosema algerae, Hazardia milleh, Vavraia culicis, Helicosporidium* spp*., Amblyospora californica, Lambornella clarki*, and *Tetrahymena* spp.; and the nematode *Romanomermis culicivorax*. These parasites are not generally available commercially for mosquito control at present.

Predators

Mosquito predators are represented by highly complex organisms, such as insects, fish, birds, and bats that consume larval or adult mosquitoes as prey. Predators are opportunistic in their feeding habits and typically forage on a variety of prey types, which allows them to build and maintain populations at levels sufficient to control mosquitoes, even when mosquitoes are scarce. Examples of mosquito predators include representatives from a wide variety of taxa: coelenterates, *Hydra* spp.; platyhelminths, *Dugesia dorotocephala, Mesostoma lingua, and Planaria* spp.; insects, *Anisoptera, Zygoptera, Belostomatidae, Geridae, Notonectidae, Veliidae, Dytiscidae, and Hydrophilidae*; arachnids, *Pardosa* spp.; mosquito-eating fish, *Gambusia affinis*, *Gasterosteus aculeatus*; some species of bats; and birds, *anseriformes, apodiformes, charadriiformes, and passeriformes*. Only mosquitofish (*Gambusia affinis*) are commercially available to use at present, while the District supports the presence of the other species as practical. The District's rearing and stocking of mosquitofish in mosquito habitat is the most commonly used biological control agent for mosquitoes in the world.

S.5.1.5 Chemical Control

Chemical control is a Program tool that consists of the application of nonpersistent insecticides (and potentially herbicides) to directly reduce populations of larval or adult mosquitoes and other invertebrate threats to public health and the use of rodenticides to control rats and mice. If and when inspections reveal that mosquitoes or other vector populations are present at levels that trigger the District's criteria for chemical control – based on the vector's abundance, density, species composition, proximity to human settlements, water temperature, presence of predators, and other factors – District staff will apply pesticides to the site in strict accordance with the pesticide label instructions. All of the chemical tools the District uses are evaluated in Appendix B, Ecological and Human Health Assessment Report.

The vast majority of chemical control tools are used for mosquito abatement. The primary pesticides used can be divided between "larvicides," which are specifically toxic to mosquito and other insect larvae, and "adulticides," which are used to control adult mosquito populations. Larvicides are applied when the chemical control criteria for mosquito larvae are present and application rates vary according to time of year, water temperature, the level of organic content in the water, the type of mosquito species present, larval density, and other variables. Larvicide applications may be repeated at any site at recurrence intervals ranging from annually to weekly. In addition to chemical control of mosquito larvae, the District may use pesticides for control of adult mosquitoes if specific criteria are met, including species composition, population density (as measured by trapping, landing count or other quantitative method), proximity to human populations, and/or human disease risk. As with larvicides, adulticides are applied in strict conformance with label requirements. Adulticiding is the only known effective measure of reducing an adult mosquito population in a timely manner. All mosquito adulticiding activities follow reasonable guidelines to avoid affecting nontarget species including bees. Timing of applications (when mosquitoes

are most active), avoiding sensitive areas, working and coordinating efforts with California Department of Fish and Wildlife (CDFW) or United States Fish and Wildlife Service (USFWS), and following label instructions all result in effective mosquito control practices.

Besides using insecticides for mosquito populations, the District selectively applies them to control ground-nesting yellow jackets. This activity is generally triggered by public requests for District assistance or action rather than as a result of regular surveillance of their populations. 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 may be treated under special circumstances to protect public health and safety of the District's residents.

The District also has a rat program to serve residents in the Service Area. The District's limited use of rodenticides is based on surveillance of rat activity and in response to District resident complaints. District technicians assist residents by conducting property inspections and providing recommendations on exclusion, trapping or baiting as appropriate, The District may conduct rodent baiting in sewers, storm drains, catch basins, marinas, creekbeds, parks, and other public places with the use of secure bait stations.

S.5.1.6 Nonchemical Control/Trapping

This tool includes the trapping of rodents for population and disease surveillance purposes. Commensal rodents may be trapped to determine species and abundance. Non-commensal (wild) rodents may occasionally be trapped and tested for hantavirus, plague or other rodent borne diseases in cooperation with the California Department of Public Health, under a scientific collecting permit issued by the California Department of Fish and Wildlife. In general, when requests for rodent removal in or on structures occur, citizens are provided with recommendations for trapping, exclusion, and disease prevention or referred to local private pest control companies

Trapping is also used for the removal of skunks, when these animals pose a threat to public health and safety. Skunks are one of the primary reservoirs and vectors of rabies in California. They live in close proximity to humans and their pets as they have the ability to adapt to the urban/suburban environment. Residential landscapes provide them with an abundance of food and shelter options that have increased their numbers and the potential for direct contact with the human population, creating a potential threat of rabies transmission to humans and pets.

S.5.2 Alternatives Eliminated From Further Consideration

These alternatives are identified and evaluated in the District's Alternatives Analysis Report (Appendix E) and summarized in Section 15.2 of this PEIR. In summary, the District determined that of the 19 potential tools, the following 8 methods were not immediately available or viable for use in its IMVMP: biological control pathogens (viruses), biological control (parasites), biological control plants, mass trapping, attract and kill, inundative releases, regulatory control, and repellents.

> *Biological Control Pathogens (viruses)* is deemed infeasible for mosquito, yellow jacket wasp, tick, and rodent control at present. This method is not commercially available in California, and there are currently many efficacy related issues.

> *Biological Control (parasites)* is deemed infeasible, as this method is not commercially available in California. Research on the use of parasites for mosquito control has also shown several limitations related to efficacy. Although the use of parasites as a means for managing vector populations shows promise, much work concerning their biology, cultivation, mass production, transport, and release remains to be done.

> *Biological Control Plants,* or carnivorous plants, whether terrestrial or aquatic, use a wide range of invertebrate prey and are not specific predators of mosquitoes. What little data exist indicates that carnivorous plants, especially terrestrial species, are inefficient for the control of mosquitoes and other invertebrate vectors.

> *Mass Trapping* is not considered by the District to be a practical, effective, reliable method of controlling vector populations. Operational difficulties exist in placing out and retrieving large numbers of traps for most vectors, the least of which are the volume of traps required, numbers of staff, amount of staff time, access, and travel necessary for this tool to be effective. Mass trapping of mosquitoes has proven to be both costly and in most instances ineffective. Mass trapping of yellow jackets also has a limited effect on the abatement of yellow jackets, with the traps sometimes becoming an attractive nuisance.

> *Attract and Kill* is not considered by the District to be a practical, effective, reliable, method of controlling vector populations. The technology for both mosquitoes and yellow jackets is limited, and effectiveness is either not obtained or is inconsistent. Nontarget insects can be impacted. The District is aware of one commercially available ATSB product, Terminix® AllClear. The District still needs to operationally test this material, as well as other potential ATSBs, to determine those circumstances where their use may be effective while also having little or no nontarget species impacts.

> *Inundative Releases*, of either sterilized or genetically altered vectors, is not considered by the District to be a practical or a currently feasible method of controlling vector populations. Genetically modified vectors are still experimental. They are also not commercially available at this time. The use of any genetically altered organisms, even mosquitoes, may also not be acceptable to the public.

> *Regulatory Control* is not considered feasible because adoption of regulations is lengthy, time intensive, expensive and uncertain as to the regulatory outcome. This approach is not focused sufficiently on control of existing populations. Moreover, regulatory controls are dependent upon state and federal agencies to initiate and implement, and thus this approach cannot assure that any project objectives would be achieved. Additionally, regulatory actions have the potential to create as well as eliminate additional vector habitats.

> *Repellants*, although effective for small-scale use by humans and animals, are not part of the overall Program control strategy because they merely displace the problem and do not reduce the vector population in an area. Repellents also require proper application, timely use, and discipline concerning their use to achieve optimal effectiveness. Unfortunately, the use of repellents does not guarantee the elimination of human vector interactions and potential vector-borne disease transmission.

S.5.3 Environmentally Superior Alternative

Table S-1 presents a summary of all the impacts associated with each Program alternative and, therefore, the overall Program of all of the alternatives combined. It is based on Table 15-1 which presents a summary of all the statements of impact with significance determinations. For Surveillance, Physical Control, Vegetation Management, Chemical Control, and Nonchemical Control/Trapping Alternatives, the impacts are either “less than significant” (LS) or “no impact” (N) with two exceptions.

There are two potentially significant impacts. The Chemical Control Alternative could subject people to objectionable odors. Impacts even with BMPs implemented could be potentially significant but mitigable. Certain VOCs, sulfur compounds, and chlorine compounds found in some pesticides emit characteristic odors when they evaporate (volatilize) into air, even at very low concentrations well within safety limits. Pesticides currently used or proposed for future emit phenols (e.g., etofenprox, permethrin, or resmethrin). Materials such as Bti liquid and the adulticides pyrethrin and permethrin have an odor. Due to limited applicability, small quantities of these types of substances are typically used. The human sense of smell (olfactory system) is sensitive to these types of compounds as a warning mechanism, and some individuals are more sensitive than others. The Chemical Control Alternative would apply certain types of odorous treatments using hydraulic spraying and atomizing (fogging), which could result in drift of small droplets and gaseous vapors. Depending on atmospheric conditions (i.e., wind direction, wind speed, stability class), this drift could temporarily subject people to objectionable odors near a treatment area. The materials have been used in the current Program, and people have not complained about odors. However, it is possible that complaints could occur in the future despite public notification procedures about large-scale treatments.

The second potentially significant and unavoidable impact is associated with the Chemical Control Alternative related to the use of naled for control of adult mosquitoes. Impact WR-16 states that due to the

toxicity of its breakdown product but its importance in the District's IMVMP, the application of naled is considered a potentially significant and unavoidable impact to surface and groundwater resources. Naled is an organophosphate insecticide and may be used in rotation with pyrethrins or pyrethroids to avoid the development of pesticide resistance. Naled is the most commonly used material for this purpose, but it is not currently in use by the District and future use is reserved for situations where significant levels of resistance to other materials is detected. Naled has low water solubility but is mobile in soils with low organic matter content. It is moderately toxic to mammals, fish, and aquatic invertebrates but degrades readily in water, under sunlight, in soil under aerobic and anaerobic conditions, in air, and on plants. Dichlorvos, a breakdown product of naled, and itself a registered pesticide, may be present in toxic concentrations after naled is no longer detectable. However, naled and other organophosphates are important chemicals that help prevent or control resistance to alternative products such as pyrethrins and pyrethroids by providing an alternative chemistry/mode of action.

Section 15.4 describes two "Reduced Program Alternatives:" Reduced Chemical Control and No Chemical Control.

> **Reduced Chemical Control**: To the extent the District can modify elements of the Chemical Control Alternative to mitigate identified impacts by avoiding the potentially significant impacts associated with some pesticide products by using less of any of these products or by eliminating one or more them in favor of other, less odorous products, then the environmentally superior alternative would be a Program incorporating these modifications to this alternative as components of the overall IVMP as long as Program effectiveness is maintained. Excluding air quality and the odor issue, the impacts to all of the other resources would be the same as for the Proposed Program.

> **No Chemical Control**: This alternative would completely remove the chemical treatment options under the Vegetation Management and Chemical Control Alternatives. It would not have any of the less-than-significant impacts associated with herbicide and pesticide use. However, it was determined to be inconsistent with Program objectives and IVM principles, and it could lead to substantial impacts to human health due to the reduced effectiveness of the Program in controlling mosquito and other vector populations.

The No Program Alternative is not the environmentally superior alternative due to its potentially significant impacts to the following resources and concerns identified in Section 15.3: urban and rural land uses, aquatic and terrestrial biological resources, ecological health, human health, and public services and hazard response.

S.6 Summary of Environmental Impacts and Mitigation Measures

Table S-1 provides a summary of all of the environmental impacts and mitigation for the Program alternatives (to be combined into the overall Proposed Program) . The existing condition (2012) sets the baseline against which the alternatives are evaluated for CEQA. Impact statements are presented in their entirety in the resource sections. For Table S-1, impact areas or environmental concerns are merely listed using brief terms for ease of comparison. Symbols used in the table for CEQA determinations of impact are:

SU = Significant and Unavoidable Impact

SM = Potentially Significant but Mitigable Impact

LS = Less-than-Significant Impact

N = No Impact

Table S-2 presents only the potentially significant but mitigable impact for the Program alternatives, the mitigation required, and the significance following mitigation implementation.

The Program alternative with potentially significant but mitigable impacts is Chemical Control. Under the Chemical Control Alternative, AQ-25, a potentially significant impact to humans could occur from the use

of odorous chemicals proposed for use in the Proposed Program. Without site-specific information, it cannot be determined whether an objectionable odor may persist downwind of a particular treatment area; therefore, an application containing an odorous compound may impact an undefined number people for an undefined period of time including recreationists and residents. The materials have been used in the current Program, and people have not complained about odors. However, it is possible that complaints could occur in the future. Mitigation measures represent actions the District will take to reduce the air quality impact to a level of insignificance. If mitigation is not feasible or practical to implement, or simply not enough to reduce the impact to less than significant, then the impact would be "significant and unavoidable."

A potentially significant and unavoidable impact is associated with the Chemical Control Alternative related to the use of naled for control of adult mosquitoes. Impact WR-16 states that due to the toxicity of its breakdown product but its importance in the District's IMVMP, the application of naled is considered a potentially significant and unavoidable impact to surface and groundwater resources. Naled is an organophosphate insecticide and may be used in rotation with pyrethrins or pyrethroids to avoid the development of pesticide resistance. Naled is the most commonly used material for this purpose, but it is not currently in use by the District and future use is reserved for situations where significant levels of resistance to other materials is detected. Naled has low water solubility but is mobile in soils with low organic matter content. It is moderately toxic to mammals, fish, and aquatic invertebrates but degrades readily in water, under sunlight, in soil under aerobic and anaerobic conditions, in air, and on plants. Dichlorvos, a breakdown product of naled, and itself a registered pesticide, may be present in toxic concentrations after naled is no longer detectable. However, naled and other organophosphates are important chemicals that help prevent or control resistance to alternative products such as pyrethrins and pyrethroids by providing an alternative chemistry/mode of action. Table S-3 presents a comparison of the Reduced Chemical Control Program and the No Chemical Control Program with the Proposed Program.

Table S-1 Summary Comparison of Impacts of All Alternatives (Proposed Program)						
Environmental Concern	**Surveillance**	**Physical Control**	**Vegetation Management**	**Biological Control**	**Chemical Control**	**Other Nonchemical/ Trapping**
3. Urban and Rural Land Uses						
Quantity and/or quality of recreational opportunities	LS	LS	LS	N	LS	LS
Conflict with applicable land use regulations	N	N	N	N	N	N
4. Biological Resources – Aquatic						
Candidate, sensitive, or special-status species	LS	LS	LS	N	LS	N
Riparian habitat/sensitive natural community	LS	LS	LS	N	LS	N
Federally protected wetlands	LS	LS	LS	N	N	N
Movement of species or impacts to wildlife corridors or nursery sites	LS	LS	LS	LS	LS	LS
Conflict with local policies and ordinances	N	N	N	N	N	N
Conflict with appropriate HCPs/NCCPs	LS	LS	LS	N	LS	N
5. Biological Resources – Terrestrial						
Candidate, sensitive or special-status species	LS	LS	LS	N	LS	N
Riparian habitat/sensitive natural community	LS	LS	LS	N	N	N
Federally protected wetlands	LS	LS	LS	N	N	N
Movement of species or impacts to wildlife corridors or nursery sites	LS	LS	LS	LS	LS	LS
Conflict with local policies and ordinances	N	N	N	N	N	N
Conflict with appropriate HCPs/NCCPs	LS	LS	LS	N	LS	N
6. Ecological Health						
Impacts on nontarget ecological receptors	LS	LS	LS	LS	LS	LS

Table S-1 Summary Comparison of Impacts of All Alternatives (Proposed Program)						
Environmental Concern	**Surveillance**	**Physical Control**	**Vegetation Management**	**Biological Control**	**Chemical Control**	**Other Nonchemical/ Trapping**
7. Human Health						
Human health	N	LS	N for physical, LS for herbicides	N	N for some chemicals, LS for other chemicals (see Table 15-1)	N
8. Public Services and Hazard Response						
Increase demand for police, fire, or health-care services	N	N	N	N	N	N
Create a significant hazard to the public or the environment through routine transport, use, or disposal of hazardous materials or through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment	N	N	N	N	N	N
Expose people or structures to a significant risk of loss, injury, or death involving wildland fires	N	N	N	N	N	N
9. Water Resources						
Impacts on surface water resources	N	LS	LS	LS	LS except: SU for Naled	N
Impacts on groundwater resources	N	LS	N for physical, LS for herbicides	LS	LS except: SU for Naled	N
10. Air Quality						
SIP emission inventory and the compliance with applicable air regulations	LS	LS	LS	LS	LS	LS
Ambient air quality standard	LS	LS	LS	LS	LS	LS
Cumulatively considerable increase of nonattainment pollutants	LS	LS	LS	LS	LS	LS

Table S-1 Summary Comparison of Impacts of All Alternatives (Proposed Program)						
Environmental Concern	**Surveillance**	**Physical Control**	**Vegetation Management**	**Biological Control**	**Chemical Control**	**Other Nonchemical/ Trapping**
Expose sensitive receptors to substantial pollutant concentrations	LS	LS	LS	LS	LS	LS
Subject people to objectionable odors	N	N	N	N	SM	N
11. Greenhouse Gases and Climate Change						
Cumulatively considerable amount of GHGs	LS	LS	LS	LS	LS	LS
Conflict with applicable plans, policies, or regulations for reducing GHG emissions	LS	LS	LS	LS	LS	LS
12. Noise						
Exceed of noise standards	LS	LS	LS	LS	LS	LS
Substantial temporary increase in noise	LS	LS	LS	LS	LS	LS

Table S-2 Significant Impacts and Mitigation for Chemical Control Alternative

Affected Resource and Area of Potential Impact	Identified Impact	Mitigation Measures	Significance After Mitigation
10. Air Quality			
Objectionable Odors	**Impact AQ-25:** The Chemical Control Alternative could subject people to objectionable odors. Impacts could be **potentially significant but mitigable.**	To mitigate Impact AQ-25, the District and its contractors may implement any of the following measures as applicable to the specific application situation to reduce drift towards human populations/residences from the ground and aerial applications of odorous treatment compounds: deltamethrin, etofenprox, permethrin, resmethrin, Bti liquid, and pyrethrin, **Mitigation Measure AQ-25a**: Whenever possible and practicable, defer application of treatment compounds until such time that favorable wind conditions would reduce or avoid the risk of drift into populated areas. > Location: Areas to receive treatment with pesticides that are near residential and commercial land uses > Monitoring/Reporting Action: District staff to check current land use maps or aerial photos prior to treatments > Effectiveness Criteria: Document odor complaints from the public > Responsible Agency: District > Timing: Prior to chemical treatments **Mitigation Measure AQ-25b**: Utilize equipment such as wind meters and global positioning system (GPS) tracking when applicable that assist in documenting site-specific compliance with all label requirements for drift mitigation. > Location: Areas to receive treatment with pesticides that are near residential and commercial land uses > Monitoring/Reporting Action: District staff to check	Less than significant

Table S-2 Significant Impacts and Mitigation for Chemical Control Alternative

Affected Resource and Area of Potential Impact	Identified Impact	Mitigation Measures	Significance After Mitigation
		current land use maps or aerial photos prior to treatments > Effectiveness Criteria: Document odor complaints from the public > Responsible Agency: District > Timing: Prior to chemical treatments **Mitigation Measure AQ-25c:** Use precision application technology to reduce drift and the total amount of material applied. This measure can include (1) precision guidance systems that minimize ground or aerial spray overlap (e.g., GPS and Real Time Kinetics – GPS/RTK), and (2) computer-guided application systems that integrate real-time meteorological data and computer model guidance to reduce drift from aerial application (e.g., trade names "AIMMS," "Wingman™ GX," and "NextStar™ Flow Control"). > Location: Areas to receive treatment with pesticides that are near residential and commercial land uses > Monitoring/Reporting Action: District staff to check current land use maps or aerial photos prior to treatments > Effectiveness Criteria: Document odor complaints from the public > Responsible Agency: District > Timing: Prior to chemical treatments	

Table S-3 Comparison of Reduced Program Alternatives to Proposed Program

	Proposed Program	**Reduced Chemical Control Program**	**No Chemical Control Program**
Alternative Component			
Surveillance	Included	Included	Included
Physical Control	Included	Included	Included
Vegetation Management ➢ Physical Methods ➢ Herbicides/Adjuvants	All physical methods and chemical options included	All physical methods and chemical options included	Includes physical methods Only. ➢ Excludes all herbicides And adjuvants ➢ Less effective with greater reliance on physical and mosquitofish options
Biological Control	Mosquitofish	Mosquitofish	Mosquitofish
Chemical Control	Use any or all pesticides And adjuvants, surfactants, And synergists in Chapter 2	Use less of or eliminate One or more of the Following: ➢ Naled ➢ Deltamethrin ➢ Etofenprox ➢ Permethrin ➢ Resmethrin ➢ Pyrethrin ➢ Bti liquid ➢ Bromadiolone ➢ Diphacinone	Use none of the persticides Adjuvants, surfactants and synergists listed in Chapter 2
Nonchemical Control/Trapping	Included	Included	Included
Impacts			
Biological Resource Impacts (excluding ecological health)	No Impact or Less-than-Significant Impact	No Impact or Less-than-Significant Impact	No Impact or Less-than-Significant Impact
Physical Resource Impacts (excluding air quality odors)	No Impact or Less-than-Significant Impact	No Impact or Less-than-Significant Impact	No Impact or Less-than-Significant Impact
Air Quality - Odors	Potentially Significant but Mitigable Impact Less-than-Significant after Mitigation	Less-than Significant Impact	No Impact
Ecological Health Impacts	Less-than Significant Impact	Less-than Significant Impact	Potentially Significant Impacts
Human Health Impacts	No Impact or Less-than-Significant Impacts	No Impact or Less-than-Significant Impacts	Significant and Unavoidable Impacts