Coachella Valley Mosquito and Vector Control District
Pesticide Discharge Management Plan
EPA NPDES Permit
2021

Background

The Coachella Valley Mosquito and Vector Control District (District or CVMVCD) is a special district in Riverside County, California. While the treatments made to waters of the U.S. are typically under the oversight of the California State Water Resources Control Board, the District also conducts vector surveillance and control work on tribal properties. Waters that drain into the Whitewater River, the Coachella Valley Storm Channel, or the Salton Sea, the waters of the U.S. within the District boundary, cross between California and tribal property multiple times, requiring an Integrated Vector Management program to best meet the vector control needs of the residents of Coachella Valley. This Pesticide Discharge Management Plan is a review of the processes used by the District to control mosquitoes and is intended to fulfill the requirements of the US Environmental Protection Agency's requirements for a National Pollutant Discharge Elimination System (NPDES) Pesticide General Permit (PGP) for applications that may be made on tribal property to or adjacent to waters of the U.S.

Pesticide Discharge Management Team

The Operations Manager is responsible for managing pests in the District boundary. This position oversees the Operations Department. The Surveillance and Quality Control Department is led by the Laboratory Manager who sets the action thresholds for treatments, oversees the adult mosquito and arbovirus surveillance programs, reviews the environmental regulations, and reports on compliance with those regulations. These two positions meet with representatives from the five tribes in the Coachella Valley who have property within the service area of the District: Agua Caliente Band of Mission Indians, Augustine Band of Cahuilla Indians, Cabazon Band of Mission Indians, Torres Martinez Desert Cahuilla Indians Twenty-Nine Palms Band of Mission Indians. The General Manager is the signatory on this permit.

- Responsible for managing pests – the District Operations Manager
- Responsible for PDMP – the District Laboratory Manager
- Responsible for developing, revising, and implementing corrective action – the District Operations and Laboratory Managers

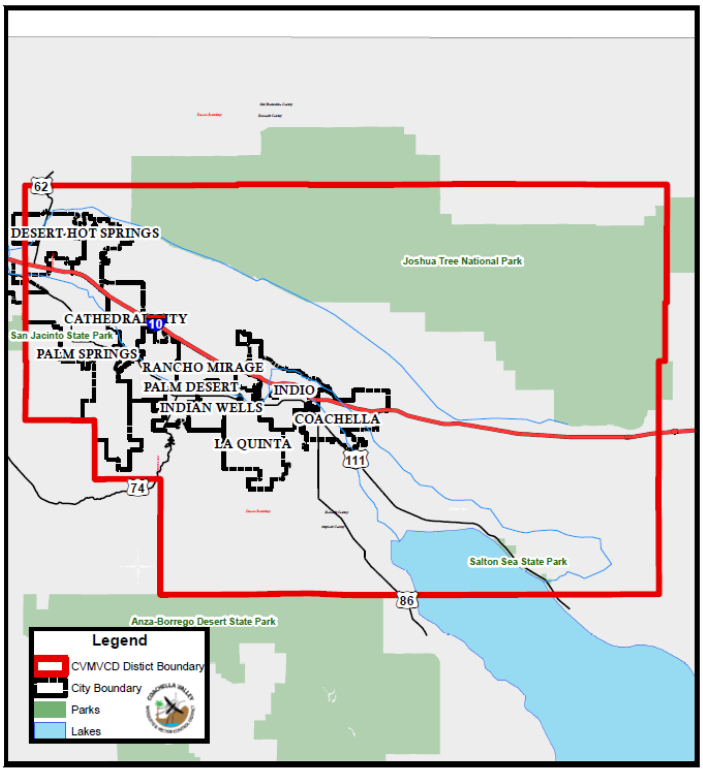
Problem Identification

The District conducts control activities for mosquitoes and other flying insects. As the work for other flying insects (primarily eye gnats and house flies) is not conducted in or near waters of the U.S., only the work for mosquitoes will be described.

There are five main mosquito species that are the focus of the District's activities. ***Culex tarsalis***, the encephalitis mosquito, is a vector of West Nile virus, western equine encephalomyelitis, and St. Louis encephalitis. It is found throughout the Coachella Valley and is the dominant species in the eastern Valley. ***Culex quinquefasciatus***, the southern house mosquito, is a secondary vector of West Nile virus and St. Louis encephalitis. It is also common throughout the Valley, but it is more common in the western, urban Valley. Two mosquito species are floodwater species which are primarily a nuisance to people and wildlife: *Psorophora columbiae* and *Aedes vexans*, the inland floodwater mosquito. These mosquitoes breed in floodwater, often associated with agriculture in the eastern Coachella Valley. ***Aedes aegypti*****,** the yellow fever mosquito, typically lives in close proximity to people. Applications to control this vector of the causative agents of yellow fever, dengue, chikungunya, and Zika are typically made to residences and not to permanent bodies of water. The products used are the same as those listed for control of the other four species.

The District has a Standard Operating Procedure for Larval Sampling to determine if enough mosquitoes are present to treat (Appendix A). Typically, the threshold is one larva per dip, but in periods when the risk of virus transmission is increased, the threshold may be lowered to one-half larva per dip.

For determining virus transmission risk and the need to control adult mosquitoes, the District calculates the risk of mosquito-borne disease epidemics and emergencies. This risk is based on adult surveillance, environmental factors, and disease presence in vectors and hosts. The CVMVCD Mosquito-Borne Virus Surveillance and Emergency Response Plan (Appendix B) and the CVMVCD Invasive Mosquito Species Response Plan (Appendix C) outline the activities and the response the District takes when elevated risk to public health from mosquito borne disease occurs.



There are no Outstanding National Resource Waters within the District boundary. The waters within the boundary are not listed as being impaired by any substances that are used by the District for mosquito control. The District service area is in the Whitewater River watershed and the Salton Sea watershed.

Pest Management Options Evaluation

The District controls vectors using an Integrated Vector Management Program. This IVM Program requires that the Vector Control Technician implement a variety of options depending on the amount of mosquitoes and virus present as well as the abiotic factors such as weather.

<u>No action</u>

Conducting no control activity is sometimes the best option. Many breeding sources are dry for much of the year, and no control activity is needed then. Such activities, when they would not be negligent of the District's mission, have no impact on water quality or non-targets. Such activities are feasible and cost effective. The ability to conduct no action is reliant on maintenance of storm water structures, proper water use in irrigation, and no precipitation.

<u>Prevention</u>

Preventing vectors is typically done in two ways. One is to limit access to standing water from mosquitoes while the other is to reduce the amount of standing, stagnant water. The District funds research to examine methods of limiting access to water. For reducing standing water, the District encourages residents to check their sprinklers to ensure that overwatering is not occurring, allowing water to stand in storm water structures in neighborhoods. Such activities could result in improved or degraded water quality depending on how the reduction impacts the amount of trash and organic matter that is washed into the storm water structures. Prevention may reduce non-targets as less water would be available in general. Feasibility is variable as it is dependent on the set up of the storm water structures and on the willingness of others to participate. Over the course of many years, this is a more cost effective solution, but requires long-term investments.

Mechanical and Physical Methods

The District routinely participates in mechanical and physical methods to control mosquitoes. Agricultural channels carry water to the Salton Sea, and as the sea has receded, the channels no longer reach the sea. These channels then empty freshwater onto sandy soils creating meandering marshes where tamarisk and bulrush hamper the efficiency and efficacy of mosquito control measures. The Coachella Valley Water District (CVWD) has cleared these agricultural drainage channels in the past, and the District works with CVWD to prioritize which areas are causing mosquito breeding to occur. The District and CVWD also work with California Fish and Wildlife to ensure that the desert pupfish, an endangered species which lives in some of the channels, is protected. Removing vegetation can cause short-term negative impacts to water quality as increased amounts of soil may cause the water to be turbid directly following the removal. However, this impact is temporary. Removing vegetation to create open spaces within stands of bulrush is beneficial to the desert pupfish, as it converts unsuitable habitat to preferred habitat. Removing all of the vegetation is undesirable for the desert pupfish as they do need some cover. The removal of some but not all vegetation can promote the use of the area by other aquatic invertebrates, while complete removal can have negative impacts. Vegetation management within agricultural channels is not always feasible as the soft soils require the investment of time and financial resources to build berms to provide access for the equipment. Over the long term, the preference is for channels to flow freely into the Salton Sea rather than allowing for stagnant water to pool.

The District has also worked with local city governments to correct sites of standing water in the urban environments. Pilot projects in areas away from waters of the

U.S. have included the installation of trash gates and pervious pavers to prevent trash and debris from entering into storm water structures. The pervious pavers also block mosquitoes from accessing the water below the pavers. The trash gates may not reduce the mosquito breeding, but they do allow for the chemical treatments made to be more effective, resulting in fewer treatments needed. Both types of installation could benefit water quality by reducing the need for chemical treatments for mosquitoes as well as by removing trash from the water. Non-targets are likely to have decreased access to the water as well, but the primary purpose of storm water structures is to mitigate the impact of urban run-off to natural water bodies during storm events, not to provide habitat or resources to non-target organisms. Whether installation is feasible depends on the initial design of the storm water structure as well as whether the area tends to breed large numbers of mosquitoes. Both types of installation will take a long time for the District to recover its outlay, but the savings to other agencies will likely lead to these being used more for trash prevention.

Cultural (Educational) Methods

The District regularly engages in Public Education to prevent and reduce the amount of standing water present on private and public property. Such activity is designed to reduce irrigation runoff into storm water structures, and as such, it may lead to improved or degraded water quality depending on what constituents are normally carried by the runoff. Removing the standing water would reduce the need for chemical control measures for mosquitoes. Reducing the amount of water present could have a negative impact on non-target organisms. While education is feasible and can be cost effective, it is a long-term strategy that does not bring immediate relief to a disease outbreak.

Biological Control

The District stocks mosquitofish in private waters within its boundary, in accordance with California Code of Regulations Title 14 CCR §238.5 f.

> *Except for Inyo, Mono, San Bernardino, Riverside, and Imperial counties, mosquitofish (*Gambusia affinis*) may be planted for purposes of mosquito control without obtaining a permit otherwise required by these regulations. In Inyo and Mono counties and in public waters of San Bernardino, Riverside, and Imperial counties, mosquitofish may not be planted without the written concurrence of the department.*

The District does stock fish upstream of waters of the U.S. As mosquitofish are already found in the Coachella Valley Storm Water Channel and the Salton Sea, impacts to water quality and to non-targets by any fish that may escape their placement in private waters upstream should be negligible. Using mosquitofish is feasible, and because the District has its own rearing program, the use of fish is a cost effective alternative in private waters.

Pesticides

Upon determining that the larval action threshold has been reached, Vector Control Technicians choose from four types of products depending on the time of year, the previous active ingredient used, and knowledge of organic farming requirements. Depending on the amount of organic material at the site and the number of larval mosquitoes found, the rate will be adjusted such that those sites heavily enriched will receive higher doses to ensure that enough active ingredient is available to control the target population.

LARVAL MOSQUITOES

Microbial products

Bacillus thuringiensis israelensis (Bti) and *Lycinibacillus sphaericus* (formerly *Bacillus sphaericus*) are commonly used for larval mosquito control. Both active ingredients must be ingested by the mosquito larva, and proteins cut holes into the gut wall of the larva. The proteins in these bacteria are activated by basic pH, making these strains effective against mosquitoes and black fly larvae but not against non-target organisms.

Insect growth regulators

Insect growth regulators are analogues of the insect growth hormone known as juvenile hormone. Methoprene exists in two chimeric rotations, and only the S form is active against mosquitoes. In normal mosquitoes, the level of juvenile hormone drops in third and fourth-instar larvae, allowing for adults to emerge from pupae. By adding methoprene or pyriproxyfen to the water, larval mosquitoes experience developmental delays, often resulting in death of larvae and pupae. Methoprene is known to have activity in many insect species, including true flies, moths and butterflies, and beetles. Pyriproxifen is used routinely for controlling fleas on pets such as cats and dogs. Both methoprene and pyriproxyfen are absorbed through the exoskeleton, thus the larvae do not need to be actively feeding for the product to work.

Spinosad

Spinosad is derived from a soil bacterium and works on the insect nervous system. It was first formulated for use against insects in 1988, and its activity is dependent on the formulation, with some formulations designed to target mosquitoes. Spinosad primarily works by the mosquitoes ingesting the product, but some may also be absorbed through the exoskeleton. The formulations used by the District are from Clarke, which earned the 2010 U.S. EPA Presidential Green Chemistry Challenge Award for these formulations.

PUPAL MOSQUITOES

Pupacides

Although the District endeavors to control mosquitoes as larvae, sometimes a source is found to have pupae. When larval sampling indicates that more than half of the larvae in the sample are late fourth instars or pupae, use of a pupacide is appropriate. The District currently uses two active ingredients. Monomolecular films reduce the surface tension of the water, making it difficult for mosquito larvae and pupae to attach and to breathe. Petroleum distillates (oils) have become highly refined to reduce the amount of active ingredient in them. Oils block the breathing tubes of mosquito larvae and pupae, causing them to suffocate. Because of the impacts on the surface tension and interference with the water's surface, both can have impacts on the adult mosquitoes which rest on the water surface or return to lay eggs.

ADULT MOSQUITOES

Adult mosquito control may become necessary when the number of adult mosquitoes exceeds the threshold, and the transmission of arboviruses to humans is deemed imminent. The District uses its CVMVCD Mosquito-borne Virus Surveillance and Emergency Response Plan (Appendix B) to determine if the number of adult mosquitoes, the number of mosquito samples positive for virus, the number of dead birds positive for virus, the number of human cases, and the weather conditions in the area forecast a likely risk for people to the arbovirus in question. Adult mosquito control products are applied in two major forms – barrier applications and ultra-low volume applications.

Barrier applications are treatments of control product to non-flowering vegetation or a vertical surface using a sprayer. Mosquitoes are likely to encounter the product as they fly or rest on the material sprayed. The District uses lambda-cyhalothrin, a pyrethroid that disrupts the nervous system. Although vegetation is sprayed with a pesticide mixture, run-off from barrier applications is not expected.

Ultra-low volume (ULV) applications are treatments of control products to the air targeted to the time when the mosquitoes are most likely to be active and in the location where control is needed. Product is applied such that a fog of small droplets (<80 µm diameter) exists so that a mosquito encountering a single droplet receives enough of a dose to be killed. The District conducts annual pre-season calibrations of adulticide application equipment and periodically evaluates its adulticide applications by measuring the amount of product in the application using slide spinners and setting out sentinel cages of adult mosquitoes during the application to ensure that the product is killing mosquitoes. ULV applications are made on the ground (using backpack sprayers or truck-mounted sprayers) or by air (using a helicopter-mounted or airplane-mounted sprayer). The District uses pyrethroids with piperonyl butoxide (PBO) and is planning to use malathion to control the development of resistance to pyrethroids found in some mosquito populations in the valley.

The District works to minimize potential impacts to water quality and non-target organisms in its application of chemical control products by being specific in time and location with its application. Applications are made when surveillance confirms the presence of the mosquito, and in the case of adult mosquitoes, an imminent risk of humans to contract an arbovirus is present. For adult mosquitoes, this risk is confirmed either that the virus is present within the area, or less routinely, that such a high population exists (greater than three times the five-year average) that there is an increased risk of virus transmission. Applications of adult control products are timed to be applied when adult mosquitoes are active (activity is confirmed using hourly trap counts) and when other insects, particularly beneficial pollinators, are least likely to be active. The majority of larval control product applications are made to non-natural water holding structures, such as catch basins, which hold irrigation runoff in neighborhoods. Sites are visually inspected at the time of treatment and in the follow-up visits to ensure that no adverse impacts to non-targets have occurred. Chemical control treatments are feasible in many locations. The major cost in these treatments is the labor involved. Chemical control is done in combination with the other control options listed above.

Response Procedures

Spill Response Procedures

Vector Control Technicians are trained annually on stopping, containing, and clearing up spills of chemical control products no matter where they occur. Spill kits

are in each vehicle and in pesticide storage areas. Spills that result in an improper or over treatment of a site are reported by the Operations Manager to the Riverside County Agricultural Commissioner. If a spill could have impacts on wildlife or water quality, the Laboratory Manager makes a report to the potentially impacted government agencies, including the Regional Water Quality Control Board, the State Water Resources Control Board, the California Department of Fish and Wildlife, the U.S. Fish and Wildlife, local tribes, and local government agencies.

Adverse Incident Response Procedures

If a Vector Control Technician observes a suspected adverse incident, they are to notify their Field Supervisor, Operations Manager, and the Laboratory Manager. The Laboratory Manager notifies potential affected external agencies such as the Regional Water Resources Control Board, California Fish and Wildlife, U.S. Fish and Wildlife, and the California Water Resources Control Board. If medical facilities are needed, District staff report to John F. Kennedy Memorial Hospital or to the nearest appropriate facility. If necessary, the Operations Manager contacts the Riverside County Environmental Health Department Division of Hazardous Materials.

Documentation of Potential Impacts to NMFS Listed Resource of Concern

The District has no coastal boundary. No water within the District drains to the ocean; as such, no species which are part of the NMFS Listed Resources of Concern are impacted by the District's activities.

Signature Requirements

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information contained therein. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information contained is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

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Jeremy Wittie, M.S.
General Manager