

# Coachella Valley Mosquito and Vector Control District



## Trustee Manual



## Trustee Manual Overview

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### **INTENT:**

The purpose of this manual is to define the responsibilities of the appointed Board of Trustees ("Trustee") so they can effectively administer and represent the business and affairs of the Coachella Valley Mosquito and Vector Control District.

### **PRIMARY ROLES AND RESPONSIBILITIES:**

One of the most important responsibilities of a Trustee is to understand that the Board of Trustees is a team that needs to work together to support the District's mission. The united approach will help strengthen the District and provide the grounds for maintaining a clear vision of the future, a unity of purpose, and a cohesive board. The Board of Trustees is the governing body of the District. Trustees govern knowledgeably and effectively, by actively participating in Board meetings, Committee meetings, and other Special District meetings and events.

The primary function of the Board is to establish policies and define guidelines for the District. The General Manager and the District's Counsel report directly to the Board of Trustees. The Board delegates the authority to the General Manager to administer all such policies and guidelines daily. The General Manager communicates directly with the Board and provides the Board with the information necessary to make well-informed decisions regarding all matters before the Board. Trustees need to recognize and respect the separation of the functions of the administrator (the General Manager) and the policymakers (the Board of Trustees).

### **HEALTH & SAFETY CODE:**

Vector Control Districts are governed by the California Health and Safety Code, Division 3, sections 2000-2910.

[https://leginfo.legislature.ca.gov/faces/codes\\_displayexpandedbranch.xhtml?tocCode=HSC&division=3.&title=&part=&chapter=&article=](https://leginfo.legislature.ca.gov/faces/codes_displayexpandedbranch.xhtml?tocCode=HSC&division=3.&title=&part=&chapter=&article=)

- **Section 2022 of the Health & Safety Code:** *"All trustees shall exercise their independent judgment on behalf of the interests of the residents, property owners, and the public as a whole in furthering the purposes and intent of this chapter. **The***

***trustees shall represent the interests of the public as a whole and not solely the interest of the board of supervisors or the city council that appointed them.***

This means trustees are prohibited from putting the priorities of the jurisdictions they live in above those of the District as a whole.

## **BOARD ORGANIZATION:**

The Board of Trustees shall consist of a single representative of each incorporated nine (9) cities within the District's boundaries and two (2) representatives of the County of Riverside.

**For more information on the organization of the Board of Trustees refer to the Trustee By-Laws.** <https://www.cvmosquito.org/sites/g/files/vyhlf4551/f/pages/res.21-05.pdf>

## **MEETINGS:**

- Board of Trustees meetings are governed by the Ralph M. Brown Act.

### [BROWN ACT](#)

**Time and Place:** The regular meetings of the Board of Trustees shall be held on the second Tuesday of each month. The regular meetings shall commence at 6:00 p.m. at the Coachella Valley Mosquito and Vector Control District's office. The Board is typically dark in April, August, and December.

- **Admittance:** All regular meetings of the Board of Trustees, including the Executive Committee and Finance Committee, are open to the public. Closed Sessions are not open to the public,
- **Special Meetings:** Special Meetings of the Board of Trustees may be called and are open to the public.

## **Rules of Decorum:**

- **Trustees** - While the Board is in session, Trustees must preserve order and decorum. A Trustee will neither by conversation nor action delay or interrupt the proceedings or the peace of the Board and will obey orders of the presiding officer.
- **Use of Electronic Devices** - While the Board is in session, Trustees, shall give their sole attention to the proceedings and will refrain from using electronic devices such as computers, cell phones, and other electronic devices to send or receive external communication. Trustees are permitted to use laptop computers or other devices to access electronic agenda packets while in session.

## **Rules of Debate**

- **Getting the Floor** - Every Trustee desiring to speak will first address the presiding officer, gain recognition by the presiding officer, and confine themselves to the question under debate, avoiding personalities and inappropriate language.

- **Questions to Staff** - Every Trustee desiring to question the staff will, after recognizing them the presiding officer, address their questions to the General Manager, who will either answer the inquiry or designate a member of their staff for that purpose. If a Trustee has a legal question, that question should be directed to the General Counsel.
- **Interruptions** - A Trustee, once recognized, will not be interrupted when speaking unless called to order by the presiding officer, unless a point of order or personal privilege is raised by another Trustee, or unless the speaker chooses to yield to a question by another Trustee. If a Trustee, while speaking, is called to order, they will cease speaking until the question of order is determined and, if determined to be in order, they may proceed. Staff after recognition by the presiding officer will hold the floor until completion of their remarks or until recognition is withdrawn by the presiding officer.
- **Point of Order** - The presiding officer will determine all points of order subject to the right of any Trustee to appeal to the Board.
- **Point of Personal Privilege** - The right of a Trustee to address the Board on a question of personal privilege is limited to cases in which their integrity, character, or motives are questioned or where the welfare of the Board is concerned. A Trustee raising a point of personal privilege may interrupt another Trustee who has the floor only if the presiding officer recognizes the privilege.
- **Limitation to Debate** - No Trustee will be allowed to speak more than once upon a particular subject until every other Trustee desiring to do so has spoken.
- **Motions** – Second Required - A motion by a Trustee, including the presiding officer, may not be discussed or acted on without receiving a second.
- **Disqualification for Conflict of Interest** - Any Trustee who is disqualified from voting on a particular matter because of a conflict of interest must publicly state or have the presiding officer state the nature of the disqualification in an open meeting. Unless the matter is a consent item, a Trustee who is disqualified because of a conflict of interest in any matter may not remain in their seat during the debate and vote on the matter but shall request and be given the permission of the presiding officer to step down from the dais and leave the Board Room during discussion and action on the matter. A Trustee stating disqualification will not be counted as a part of a quorum and will be considered absent to determine the outcome of a vote on the matter.

## Voting

- **Failure to Vote** - Every Trustee should vote unless disqualified because of a conflict of interest. A Trustee who abstains from voting in effect consents that a majority of the quorum may decide the question voted upon.
- **Tie Vote** - Tie votes will be lost motions and may be reconsidered at a subsequent meeting upon a motion passed by the Board to reconsider the item at a subsequent meeting.
- **Changing Vote** - A Trustee may change their vote only if they make a timely request to do so immediately following the announcement of the vote by the presiding officer and before the time that the next item is in the order of business is taken up.
- **Recording of Votes** - Where a split vote appears imminent, any Trustee may request a vote by roll call, and the vote of each Trustee shall be recorded by the Clerk. The presiding officer or the Clerk shall announce the tally of the votes on each item, indicating which Trustee voted for and against the item. Items that pass unanimously can be referenced.
- **Rule of Necessity** - The Board may allow a Trustee or Trustees with a potential conflict of interest to participate in the decision (including discussion, debate, deliberation, and voting) which is the basis of the subject Trustee's or Trustees' conflict if there is a lack of a quorum caused solely by a majority of the Board having a potential conflict of interest concerning the subject decision. Under such circumstances, the Board may select by random lot which Trustee or Trustees may participate in the subject decision or the alternative, however, the Board may select the Trustee or Trustees with the lowest level of conflict to participate in the decision, to establish a quorum.

## BROWN ACT:

The Brown Act ("Open Meetings Law") was enacted to create transparency regarding the business activities of public agencies. Under the Brown Act certain matters, however, may be discussed in closed sessions; those include land negotiations, pending and potential litigation, security, certain employee matters, etc.

- **Emails and other informal communications:** Trustees should refrain from asking or directing staff to solicit input from other Trustees regarding matters within the subject matter jurisdiction of the Board to avoid potential violations of the Brown Act. Trustees are prohibited from engaging in email conversations or

other communications outside of Board meetings with a majority of Trustees regarding any matter within the Board's subject matter jurisdiction.

- **Closed Session:** The Board may hold closed sessions only to discuss the following items: potential and pending litigation, real property negotiations, labor negotiations, liability claims, security of public buildings and services, threats to public services or facilities, etc. The Brown Act prohibits Trustees from disclosing or discussing anything disclosed, discussed, or produced in Closed Session with anyone other than the General Manager or General Counsel unless otherwise directed by the Board. Violation of this could result in criminal penalties.

### **CALIFORNIA GOVERNMENT CODES:**

- **Ethics** - All Trustees are required to attend AB1234 Ethics Training every two years. The training is available at various conferences, training sessions, and online. The Clerk of the Board can assist you with finding available training and will remind you when you need to renew your certification.
- **Sexual Harassment** - All Trustees must receive at least two hours of sexual harassment prevention training and education within the first six months of taking office. Moreover, local agency officials must receive this training at least once every two years. "Local agency officials" includes any member of a legislative body and any elected officials of cities, counties, and special districts.
- **Form 700 Statement of Economic Interests:** To avoid any financial Conflicts of Interest, all Trustees must file the Form 700 Statement of Economic Interests annually by March. The Clerk of the Board facilitates this process with all Trustees
- **Public Records Act:** All Trustees should be aware that their written communications relating to District business are generally subject to disclosure under the Public Records Act. This would include correspondence, e-mail communications, and text messages, even if those communications are maintained on a Trustee's privately owned devices.

### **DISTRICT POLICIES:**

- **Press:** Any inquiries presented to a Trustee from any media outlet should be referred to the District's General Manager or Legal Counsel, depending on the issue.
- **Requests for Information and/or Special Assignments:** If a Trustee requires information that cannot be easily obtained by the General Manager or department manager, the Trustee must bring the request to the full Board of

Trustees. The request can be made during the “Trustee Comments” portion of the Board Meeting. The General Manager should be made aware of any requests made to a subordinate. If the inquiry relates to a legal matter, a Trustee may request information from the General Counsel.

- **Trustee Health Benefits:** Trustees may purchase, at their sole expense, health benefits through the District during open enrollment (September-October), or Trustees may enroll outside of the window above provided they have a qualifying event. The District is enrolled for medical benefits through the CalPERS health benefits, which sometimes offers better rates than what is offered by other providers. ***Interested Trustees are invited to speak with the District’s Human Resources Manager for more information.***
- **Trustee Travel and Expense Policy:** All Trustees are encouraged to attend training and conferences, consistent with this policy, which can broaden their knowledge and assist them in governing the District. The Policy discusses what expenses can be reimbursed and other guidelines that should be adhered to when doing District travel. ***Interested Trustees are invited to speak with the District’s Clerk of the Board for more information.*** [TRUSTEE TRAVEL POLICY](#)
- **Credit Card Policy:** The District provides District-issued credit cards to trustees who attend conferences or training that require an overnight stay. The travel must have been previously approved by the Board and proper paperwork must be filed with the Finance Department before a credit card can be signed out for use. Once travel has been completed, the Trustee must return the credit card along with a Travel Expense voucher form and receipts from all purchases made with the credit card. ***Travel Expenses must be returned to the District’s Clerk of the Board within 30 days of returning from travel.***
- **Travel:** As required by Section III of the Policy, upon returning from seminars, workshops, conferences, etc., where expenses are reimbursed by the District, Trustees must either prepare a written report for distribution to the Board or make a verbal report during the next regular meeting of the Board. Said report shall detail what was learned at the session(s) that will be of benefit to the District.



## GENERAL DESCRIPTION OF DISTRICT PROGRAMS AND SERVICES

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### MISSION

We are dedicated to enhancing the quality of life for our community by providing effective and environmentally sound vector control and disease prevention programs through research, development, and awareness.

### VISION

To progress towards a future free of vector-borne disease using proven scientific, technical, and educational strategies, which are financially and environmentally sound.

### VALUES

In our actions and decisions, we prioritize:

- *Public Health* – protect the public from vectors and vector-borne diseases.
- *Financial Sustainability* – provide stability through the responsible use of public resources.
- *Ethics* – maintain high ethical standards.
- *Innovation* – develop programs and services based on research and supporting data.
- *Professionalism* – Ensure work and services are performed professionally, safely, and to a high standard.
- *Environmental Stewardship* – Carry out work in an environmentally conscientious manner.
- *Communication* – Inspire public trust and action through proactive and transparent communication.
- *Collaboration* – Work with individuals, communities, and institutions to further our mission.

### ABOUT THE DISTRICT

The Coachella Valley Mosquito and Vector Control District is a non-enterprise special district accountable to the residents of the Coachella Valley and charged with protecting the public health within its boundaries through the control of vectors (such as mosquitoes) and vector-borne diseases.



The District boundary encompasses 2400 square miles, including Cathedral City, Coachella, Desert Hot Springs, Indian Wells, Indio, La Quinta, Palm Desert, Palm Springs, Rancho Mirage, and unincorporated sections of Riverside County.

<https://www.arcgis.com/home/webmap/viewer.html?webmap=58c9e4ad6d3b48278eb14dcaee50f39f&extent=-116.8568%2C33.2386%2C-115.4368%2C34.1913>

The District operates under the California Health and Safety Code, Division 3, Sections 2000-2910, and is governed by an 11-member Board of Trustees. There are 58 full-time employees and 3-10 seasonal staff from April to November.

## **HISTORY**

During the mid-1920s, eye gnats (Hippelates) had become a significant public health problem in the Coachella Valley. Mass meetings were held resulting in petitions sent to the University of California, the State and County Boards of Health, and the Federal Government asking for immediate assistance. The concern was, not just the nuisance that eye gnats were causing, but that eye gnats are potential mechanical vectors of conjunctivitis (“pink eye”).

In 1927, “pink eye” had become so prevalent that schools in the Coachella Valley were closed for two months during the eye gnat season. To address the problem, Dr. William B. Herms of the University of California, Berkley sent researchers to the Valley and the Federal Government appropriated \$12,000 for the study of eye gnats. The Bureau of Entomology established a Gnat Research Laboratory with four entomologists, D.C. Parman as head, David G. Hall, Gaylon W. Robertson, and Robert W. Burgess. The Coachella Valley Mosquito Abatement District (District), was formed under the California Mosquito Abatement Act by the Riverside County Board of Supervisors on March 12, 1928, to control eye gnats. At the time, seven trustees were appointed by the Riverside County Board of Supervisors to create and oversee the District’s policies.

In October of 1948, the first District entomologist, Dr. Ernest R. Tinkham, began his intensive research into eye gnat control. Dr. Tinkham confirmed that eye gnats could be controlled by the application of insecticide to the soil where eye gnat larvae breed. The District employed this practice for many years until insect resistance, environmental concerns, and budgetary constraints made it no longer feasible. In 1956, Dr. Mir Mulla from the University of California, Riverside collaborated with the District in extensive research on eye gnats, including their habitats and control techniques, introducing a method termed “trapping out” using non-pesticide attractant to draw the flies in the traps and deplete them locally.

In 1949 the Coachella Valley Canal was completed bringing an abundance of water to the valley, which resulted in the formation of mosquito breeding sites from irrigation runoff.

The abundance of mosquitoes created a nuisance as well as a health threat in the form of mosquito-borne virus transmission.

In January 1951, the Board of Trustees of the District formed a Mosquito Control Department in addition to the eye gnat control. Forty-four years later, in 1995, the Board of Trustees expanded the District to a full vector control agency and changed the name to the CV Mosquito and Vector Control District. With this expansion in programs came the need for a larger, modern headquarters to meet work and safety requirements. The District moved from its Thermal headquarters, where it had been located for 73 years, to the new headquarters in Indio in April 2001.

In 2005, the District added the Red Imported Fire Ant (RIFA) Program. Valley residents suffering from RIFA infestations could now call the District for property inspections and treatment of this pest.

The District's Laboratory was expanded and upgraded in 2014 to include a Biological Safety Laboratory-3; this upgraded facility allows the District to conduct testing of arbovirus samples on-site. By conducting those tests at the District, positive virus samples trigger responses within 1 day instead of waiting for results from mailing samples to Davis, California, allowing for treatments to occur quickly and providing better protection for the residents of the Coachella Valley.

The District has a well-established Integrated Vector Management (IVM) program. The three parts of the IVM program include Surveillance, Control, Public Outreach, and Education. The District's goal is to keep this program stable through the efforts of dedicated and professional staff, fiscal security, and administrative guidance from the Board of Trustees.

## **SUMMARY OF SERVICES**

The main services provided by the District include:

1. *Mosquito Surveillance and Control* - The District maintains a comprehensive, year-round, mosquito-borne disease surveillance and control program to suppress mosquito populations. The program consists of:
  - Surveillance of immature (larval) stages of mosquitoes in different breeding sources including urban, suburban, and rural areas.
  - Surveillance of adult populations of mosquitoes in urban, suburban, and rural areas using different types of traps.
  - Mosquito PCR testing of mosquito-borne viruses that can infect people, such as West Nile virus, St. Louis encephalitis virus, and western equine encephalomyelitis virus.

- Operational control program that uses different methods, control products, and tools to suppress mosquito population.
- Use of biological control agents, such as stocking mosquitofish in mosquito breeding habitats, where applicable.

2. *Red Imported Fire Ant Surveillance Ant Control* – year-round service that provides surveillance and control efforts of Red Imported Fire Ants of irrigated turf and landscape of the Valley.

3. *Eye Gnat and Fly Surveillance and Suppression* – To control eye gnats, plastic traps containing egg bait (a mixture of water and liquid egg) are used to attract and kill the eye gnats. By this unique “trap-out method” the eye gnat population is suppressed. To suppress flies, the District primarily uses public education and advises farmers and homeowners on the removal of fly breeding habitats, since good sanitation is the answer to fly suppression. In addition, the District uses disposable traps and a “trap-out” method to lower fly populations, in areas requiring control.

4. *Public Education* - The District informs, educates, and promotes public awareness of the District and its programs, services, and activities by using media contact and community interactions that involve presentations at local venues, such as senior centers, health fairs, homeowner’s associations, other cities, and government and community-based associations. District Outreach staff also facilitate educational programs in the Valley’s three school districts and other after-school programs.

## **VECTORS AND VECTOR-BORNE DISEASES IN THE COACHELLA VALLEY**

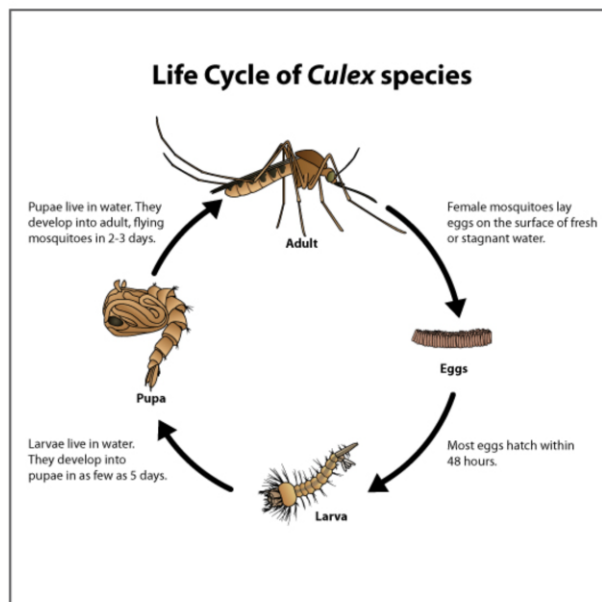
### **MOSQUITOES**

Mosquitoes and their habitats have long been associated with human disease. In 1878, the mosquito became the first arthropod to be definitively identified as a host of a human pathogen. Research since then has gone on to show that mosquitoes are the most important arthropods affecting human health. Mosquitoes are vectors of many important diseases including malaria, dengue, yellow fever, encephalitis, and filariasis. Most of these diseases are still major problems in many parts of the world and used to be important to public health in the US. In California, the encephalitis viruses are the only major pathogens of concern currently transmitted by mosquitoes. However, there is growing concern that viruses transmitted by invasive *Aedes* mosquitoes will be transmitted as movement of people and goods increases and the population of *Aedes* mosquitoes becomes established in California.

Mosquitoes generally are most abundant where there is adequate vegetation for harborage and where water is standing or stagnant; however, they occur in nearly every region of every continent except Antarctica. Worldwide there are approximately 3,500 described mosquitoes, of which about 57 species reside in California. There are about a dozen species that live in the Coachella Valley. Although mosquitoes have seasonal cycles with periods of dormancy throughout most of the state, the Coachella Valley's warm climate allows mosquitoes and other vectors to be active year-round.

Mosquitoes begin their life in an aquatic environment when they hatch out of their eggs. They go through two life stages, called larvae and pupae, in the water before emerging as adults. Mosquitoes breed in almost every known aquatic environment except very swift currents and open bodies of water. The mosquito breeding habitats in the Coachella Valley range from the marshes around the Salton Sea to irrigated lands, stormwater basins, neglected pools, ponds, bird baths, or any artificial containers found in backyards.






## BASIC MOSQUITO LIFE CYCLE



Pathogens are spread by mosquitoes when a female mosquito bites an infected host to obtain a blood meal. A pathogen that is present in the blood of the host can then be picked up by the mosquito. After the female has digested the blood and laid eggs she will seek out another host to feed upon. If the pathogen can survive and migrate to the salivary glands of the mosquito, then when the second host is bitten the microbe can be transmitted to the organism through the saliva of the feeding mosquito. Most mosquitoes are not able to transmit harmful pathogens as each mosquito-borne disease-causing organism can only survive in a few specific mosquito species. These same pathogens are also only capable of surviving and multiplying in select hosts,

making the transmission of arboviruses dependent on the right vectors with the right pathogens feeding on the right hosts.

**The following mosquito species are of concern in the Coachella Valley:**

<b>SPECIES</b>	<b>HABITAT</b>	<b>ABUNDANCE</b>	<b>SEASON</b>	<b>DISEASE ASSOCIATIONS</b>
<i>Culex tarsalis</i> 	Many	Great	Year Round; Peaks in spring and fall	West Nile virus, St. Louis encephalitis, Western equine encephalitis
<i>Culex quinquefasciatus</i> 	Many	Great	Year Round; Peaks in spring and fall	West Nile virus, St. Louis encephalitis
<i>Aedes aegypti</i> 	Container breeder: plant saucers, birdbaths, toys	Low but increasing	Year Round; peak late summer and early fall	Yellow fever virus, dengue virus, chikungunya virus, Zika virus, Mayaro virus
<i>Aedes vexans</i> 	Many	Great	Summer	None; nuisance
<i>Psorophora columbiae</i> 	Irrigated fields	Great	Summer	None; nuisance

*Culex tarsalis* (Western Encephalitis Mosquito) is the primary vector of West Nile virus (WNV), Saint Louis encephalitis (SLE), and the Western equine encephalomyelitis (WEE) viruses. *Cx. tarsalis* is also the most abundant mosquito species found in the Coachella Valley. This mosquito lives in a variety of aquatic sources ranging from clean to polluted waters and is also able to tolerate high salinity levels such as some of the water bodies around the Salton Sea. While found in urban and suburban habitats, *Cx. tarsalis* is most commonly associated with agricultural sources. Although host-seeking shows a preference for feeding on birds, they will also target cattle, horses, and humans. Another important consideration of *Cx. tarsalis* is that they will fly long distances to find a blood meal (up to 16 miles), which is important in the distribution and transmission of arboviruses.

*Culex quinquefasciatus* (Southern House Mosquito) is the primary vector of WNV and SLE in urban and suburban areas. The larvae live in foul or highly polluted waters, artificial containers, septic tanks, catch basins, waste treatment ponds, and neglected swimming pools. Birds are the principal blood meal source; however, they will attack humans and invade homes.

*Aedes vexans* (Inland Floodwater Mosquito) while not a main vector of disease; this species tends to be quite pestiferous and are aggressive day and night biters. Large mammals including humans are the usual blood sources, but birds are also targeted occasionally.

*Psorophora columbiae* is a highly pestiferous floodwater mosquito that breeds in irrigated fields and pastures and can develop from egg to adult in just 4 days. Adult *Ps. columbiae* are found from April to November with peak abundance occurring in July and August. The females are fierce day or night biters. In California, this species has little vector potential for the transmission of human diseases, but it is a major pest species in the agricultural areas of the southern desert.

*Aedes aegypti* (Yellow Fever Mosquito) is an invasive species that was originally located in Africa but is now found throughout the tropical and subtropical regions of the world. The females are day biters, and the mosquito can vector yellow fever, dengue, chikungunya, Zika, and Mayaro viruses, as well as other diseases. It differs from other mosquitoes in that eggs are laid singly above the water line and then hatching when wetted. Eggs can remain dormant for extended periods. This, along with the mosquitoes' proclivity for biting mammals and laying eggs near very small amounts of water, makes them an especially difficult species to control.

## RED IMPORTED FIRE ANTS – RIFA



In the late 1930s, the Red Imported Fire Ant (RIFA), *Solenopsis invicta* Buren was introduced to the United States from South America, at the port of Mobile, Alabama. Natural dispersal of RIFA (approximately five miles a year) is by means of nuptial flights. However, the long-distance spread of the RIFA has largely been due to the movement of RIFA-infested grass sod, ornamental plants, farm machinery, hay bales, and even beehives.

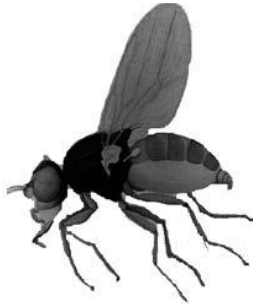
RIFA, within its natural habitat in South America, and in its recently adopted home range in the southern and southeastern North America in the past 50 years, exhibits a preference for moist soil environments and mild winters. RIFA Colonies were discovered in California, in October 1998, in the Trabuco Canyon area in Orange County. A further survey has also found infestations of RIFA in many locations in Orange, Los Angeles, Riverside, San Diego, and San Bernardino counties.

The Coachella Valley is an arid desert that is not naturally suitable for RIFA survival. Due to the long and extremely hot summers and dry conditions, highly irrigated turf of golf courses, manicured lawns, flower beds, and other horticultural landscapes, the Valley provides conditions and habitat conducive to RIFA survival. RIFA colonies were first identified in Palm Springs in 1998. Their exact origin and time of introduction into the Valley remain obscure.

RIFA responds rapidly and in great numbers to any disturbance of their nest or food resource and begins stinging long before you or your pet even realize you have stepped on them. RIFA stings by grasping its victim with its mandibles (jaws) and repeatedly jabs the stinger into the skin while pivoting around in a tiny circle. The result is a small, acutely painful, itchy welt on the skin that develops into a pustule (small, firm blister-like sore) in 24 to 48 hours. RIFA colonies are often found near edges of properties (against sidewalks and driveways), in trees, and in electric boxes and sprinkler systems.

The RIFA program objective is to reduce the abundance and distribution of ants within the Coachella Valley and to maintain and suppress the RIFA infestation to a level where they no longer represent a serious nuisance to the residents of the Valley. The funding for the program is provided by the benefit assessment, established in 2005, which resulted in expanded services to monitor and control RIFA within the jurisdiction of the District.

## Eye Gnats



Since agriculture was first introduced in the Coachella Valley, eye gnats have been a problem. The magnitude of the eye gnat problem prompted the authorities to form the Coachella Valley Mosquito Abatement District in 1928.

Eye gnats (*Hippelates collusor*) are prevalent in the warm dry regions of the southern United States, primarily in parts of California and Arizona. They are small, non-biting flies, measuring approximately 1.5 to 2.5 millimeters in length, and are attracted to sebaceous secretions, pus, and blood becoming mechanical vectors of the bacterial eye disease conjunctivitis, commonly known as “pink eye”.

The majority of eye gnats develop in light, well-drained, sandy soils that are freshly plowed and contain abundant humus or vegetable matter and sufficient moisture. The ideal temperature for eye gnat activity is 90°F to 100°F. Temperatures below 70°F result in a decrease in eye gnat activity, however, they can survive freezing temperatures.

The control methods in the past included different types of attractant baits mixed with pesticides that were placed mostly in agricultural fields. Currently, the District provides traps, supplied with non-toxic liquid egg bait to attract and remove eye gnats from agricultural areas and country clubs (“trap-out method”). Changes to agricultural practices, specifically the introduction of drip irrigation instead of flood irrigation, have been a great help in eye gnat prevention.

In addition to the spread of disease, their annoying and persistent buzzing around human eyes, mouth, nose, or wounds classify them as nuisance insects that can cause



economic losses by lowering the productivity of exposed workers and reducing outdoor recreational activities.

## FILTH FLIES



Filth flies consist of several families of non-biting flies that live in close association with humans and that thrive by taking advantage of domestic and agricultural wastes. The flies are attracted to foul odors and filth such as garbage, sewage, piles of grass clippings, rotting fruits and vegetables, animal droppings, and other moist, decaying, organic matter in which they live, feed, and lay their eggs.

The life cycle of a fly consists of four life stages - egg, larvae (maggot), pupae, and adult. Adults can live up to twenty-five days and reproduce quickly and frequently. Each female can lay approximately one thousand eggs during her lifetime. Eggs develop into adults in as few as four days and these adults can reproduce again at three days old. The rapid turnover of reproduction means that flies can produce thirty to thirty-five generations per year, more in warmer climates like in the Coachella Valley.

The flies most commonly found in the Coachella Valley can be divided into three groups: *house flies*, *flesh flies*, and *blow flies*. *House flies* (of the *Muscidae* family) are found throughout the Coachella Valley and are true opportunists. *Flesh flies* (of the *Sarcophagidae* family), prefer food sources that are of animal origin. They feed and breed on pet droppings, food waste in the garbage, and dead animals. *Blow flies* (of the *Calliphoridae* family) are large metallic-colored flies that utilize animal-based materials to feed on and reproduce in. In the urban sections of the valley, they are the fly most commonly found in connection with pet droppings and trash cans. In the rural sections of the valley, blow flies are found with culled fish and dead animals.

Filth flies are mostly considered nuisances, but also are capable of transferring pathogens as mechanical vectors. Flies have been found to be effective vectors of hundreds of pathogens including *E. coli* and *Salmonella*.

The District takes action when necessary against filth flies by placing fly bottle traps throughout the agricultural locations of the Valley to remove flies from the environment

("trap-out method"). Traps are baited with non-toxic, environmentally safe liquid egg bait. The District also actively encourages the prevention of flies through community education which emphasizes the importance of proper *sanitation* to eliminate filth fly feeding and breeding sources.

## RODENTS



The rodents of the Coachella Valley are categorized into two divisions;

- commensal ( Latin – *cum mensa* - “sharing table”)
- native rodents

*Commensal rodents* live in close association with humans and are very adaptable to their environment. They are not indigenous to North America but accompanied humans as stowaways on immigration and trade ships. The native rodent species of the valley are indigenous to the natural desert environment and tend to live in areas of sparse human habitation. The roof rat (*Rattus rattus*) is a common commensal rodent in the Coachella Valley neighborhoods, originated in India and Southeast Asia, and is largely confined in warmer areas in distribution. Roof rats are moderate-sized rodents that are generally dark in color. They are *nocturnal* and *omnivores*, with preferences for grains, fruits, and vegetables. The close association of commensal rodents with humans can be the source of a variety of pathogens, including *Salmonella*.

Sanitation is the backbone of a successful rodent control program. The elimination of rodent *shelters*, *food*, and *water* can mean the difference between success and failure in controlling rodents. Rodent proofing is also an essential step to having a successful control program.

On request, the District conducts home surveys to evaluate possible rodent habitation, sources of food, water, harborage, and entry points to the home. The purpose of the outreach program is to provide guidance to the public on cost-effective rodent *prevention*, *exclusion*, and *control*. The District staff generates educational material, to educate the public about the rodent problem and guide them to prevent, suppress, and

control rodents on their properties.

The Coachella Valley is home to several *native rodent species*. For the most part, these species do not have regular human interactions and consequently are not a concern to Valley residents. There are a few that pose possible public health risks and are therefore monitored by the District staff. The Deer Mouse (*Peromyscus maniculatus*) is one of them. It is a small rodent that is a host for *Sin Nombre* virus, a pathogen that causes Hantavirus pulmonary syndrome. The virus is shed in the rodent's urine, feces, and possibly saliva. It is generally not found in elevations of less than 1500 feet. Humans are most susceptible to infection when they disturb enclosed, poorly ventilated areas contaminated with rodent excreta.

## **INTEGRATED VECTOR MANAGEMENT**

As noted, the District's services address several types of vectors and share general principles and policies. These include the identification of vector problems, responsive actions to control existing populations of vectors, prevention of new sources of vectors from developing, and the management of habitats in order to minimize vector production. It also includes the education of landowners and residents in general on measures to minimize vector production or interaction with vectors and the provision and administration of funding and institutional support necessary to accomplish these goals.

In order to accomplish effective and environmentally sound vector management, the manipulation and control of vectors must be based on careful surveillance of their abundance, habitat (potential abundance), pathogen load, and/or potential contact with people; the establishment of treatment criteria (thresholds); and appropriate selection from a wide range of control methods. This dynamic combination of surveillance, treatment criteria, and use of multiple control activities in a coordinated program is generally known as Integrated Pest Management or IPM. When applied to specific control of disease vectors the same principles of IPM are used but the process is referred to as Integrated Vector Management or IVM which differentiates the District, whose primary purpose is vector control, from organizations whose sole purpose is control of nuisance or pest organisms.

The CVMVCD Vector Management Program, like any other IVM program, by definition, involves procedures for minimizing potential environmental impacts. The District employs IVM principles by first determining the species and abundance of vectors through evaluation of public service requests and field surveys of immature and adult vector populations, and then, if the populations exceed predetermined criteria, using the most efficient, effective, and environmentally friendly means of control. For all vector species, public education is a vital part of the control strategy, and for some vectors

(such as rodents and ticks), it is the District's primary control method. In some situations, water management or other physical control activities (historically known as "source reduction" or "permanent control") are instituted to reduce vector-breeding sites. The District also uses biological control such as the planting of mosquitofish in ornamental ponds, unused swimming pools, and other standing water bodies. In conjunction with these methods of control, environmentally safe control products are used to treat specific pest-producing or pest-harboring areas.

The District is organized into three principal sections to accomplish IVM. First, Surveillance determines where the risk of vector and vector-borne diseases is greatest in the Valley and conducts applied research to ensure District surveillance and control practices are effective.

Second, the operations program of the District includes technicians who perform IVM operations in the field. Each technician is assigned an area of operation, with the technician responsible for control activities in their area. The technician has considerable autonomy in performing duties and, therefore, benefits from information on risk assessment through continuing education and direct communication from the District's professional staff. Technicians also perform surveillance by responding to resident complaints and by extensive examination of aquatic sites for mosquito larvae. Technicians also monitor their areas to be sure that their control efforts have been successful.

Finally, Public Outreach staff attend public functions, engage other local agencies and organizations, and educate students on how to protect themselves from mosquito and vector-borne diseases and how to eliminate vector sources on their properties and within their communities. While our surveillance and control efforts provide immediate control and reduce risk to our public, educating our public and empowering them to take action is part of the District's long-term solution to the management of vectors in the Coachella Valley,

The following is a summary of the District's efforts to apply IVM to the vectors and issues outlined above.

## **SURVEILLANCE**

Surveillance is one of the key components of an effective Integrated Vector Management (IVM) program. Surveillance includes monitoring and analyzing environmental data, mosquito abundance, mosquito infections, and avian infections to interrupt mosquito virus transmission before human disease occurs. In addition, surveillance is also used to determine the effectiveness of operational control efforts at reducing mosquito numbers, prioritizing District resources in control, and monitoring resistance in local

mosquito populations. The District's surveillance plan is available on the District's website: <https://www.cvmosquito.org/vector-control-publications/pages/response-plans> () and is based on a document titled "California Mosquito-borne Virus Surveillance and Response Plan" that is written and published as a collaboration between the California Department of Public Health (CDPH), the University of California (UC), and the Mosquito and Vector Control Association of California (MVCAC). This document is available as a PDF on the website: <http://westnile.ca.gov>.

## **EFFICACY AND QUALITY CONTROL**

Vector control has been seriously challenged by the threat of new vector-borne diseases, limited availability of control tools, resistance concerns, public perceptions, and environmental and regulatory concerns. The District's *Integrated Vector Management* (IVM) program is designed to address listed issues and is charged with the responsibility of developing, evaluating, and encouraging compliance with the *Best Management Practices* (BMP), both employed by the District as well as by the community organizations.

The *Best Management Practices* (BMPs) are recommended land and water management practices that can provide a reduction in mosquito populations through prevention, reduction, or elimination of breeding habitats, increasing the efficacy of biological controls and chemical controls, and improving access for control operations. The program also includes methodologies of developing, evaluating, and encouraging compliance with best management practices employed by the District, as well as by community organizations such as, but not limited to, Cities, Homeowners' Associations, and golf courses.

The full *Best Management Practices* (BMPs) document can be found on the District website at: <https://www.cvmosquito.org/vector-control-publications>.

In support of the development of the District's IVM program, the District developed the *Efficacy and Quality Control Program* (EQCP) which evaluates the efficacy of control methods and strategies that are utilized by the Operations Department.

The District objective of the EQCP is to ensure that the *level* of quality of *products* used, *activities*, and *services* provided will meet specific requirements and that they are dependable, acceptable, environmentally friendly, and fiscally sound.

The EQCP includes efficacy trials for the evaluation of chemical, physical, and biological methodologies that are used by the Operations Department for mosquito control in specific habitats. Efficacy trials can be performed in the field, in the laboratory, or in microcosm test ponds at the District. The trials are designed to:

- Detect potential control product *resistance*,
- Determine the correct *application rate* of each product for the specific habitats for the desert climate,
- Establish *standards* of application for products used for the control of vector and nuisance species

The purpose of the trials and assessments is to *enhance* District control operations and provide the best and financially sound solution without compromising the final outcome of control measures.

## **BIOLOGICAL CONTROL**

Important components of the District's integrated vector control measures are the use of cost-effective and environmentally favorable long-term measures and commitment to applying the latest integrated methods, to manage vectors and suppress disease distribution in the area. In an effort to control mosquitoes, with less reliance on the use of pesticides, the District promotes the research and application of potential biological control agents that are suitable for the desert habitat.

Biological control is defined as the reduction of vectors or nuisance populations by natural enemies and typically involves an active human role. Biological control agents include *predators*, *parasites*, and *pathogens*.

## **MOSQUITOFISH**



- The most successful biological agent for mosquito control is the mosquitofish, *Gambusia affinis*, (Baird and Girard). The widespread use of mosquitofish in control programs resulted in its worldwide distribution. Initially introduced into California in 1922, the fish has become one of the most efficient natural methods for controlling mosquito populations. Mosquitofish are an ideal predatory control organism in habitats such as backyard sources, neglected pools, reservoirs, retention/detention basins, and other bodies of water that do not drain into natural waterways.

## **RESEARCH**

The District performs applied research projects in collaboration with universities, government agencies, and private companies. Historically, the District has worked extensively with UC Riverside and UC Davis in mosquito research. Examples of this research include measurement of the flight range of *Culex tarsalis*, optimizing adult mosquito control using ULV ground and aerial control, distribution of tadpole shrimp, a biocontrol agent, use of mosquitofish in mosquito control, location of *Culex* egg rafts in a West Nile virus focus, the influence of water quality and wetland management on mosquito production in treatment wetlands. Research in recent years has maintained collaborations with UC Davis and UC Riverside and expanded to include the University of Texas A&M, University of Miami, and USDA to meet the changing needs of the District. Research through Texas A&M consists of optimizing Red Imported Fire Ants (RIFA) surveillance techniques, developing ant bait treatment, and determining the population structure of RIFA in Coachella Valley.

The USDA and the US Navy have jointly conducted research within the Valley, with the assistance of District staff, to study effective methods of applying adulticides, testing the longevity of product efficacy in a hot dry environment and testing products for mosquito and filth fly control in the desert.

Private companies have also performed research with the District on new mosquito control products. These research opportunities allow the District to learn from some of the best scientists in vector control as well as to be at the forefront of Integrated Vector Management (IVM) practices.

## **IT/GIS PROGRAM**

The District's Mobile Inspection Application is a Geographical Information System (GIS), which integrates the use of hardware, software, and data for capturing, managing, analyzing, and displaying geographic features. GIS uses the Global Positioning System (GPS), a satellite-based navigation system developed by the U.S. Department of Defense, which allows mobile devices equipped with GPS receivers, to associate location (latitude, longitude, altitude, etc...) information to data. These systems allow the District to model features on the earth's surface as points, lines, or polygons. For example, in vector control, a green pool may be modeled as a point and a duck club or golf course may be modeled as a polygon.

Incorporating GIS into the District's inspections, chemical applications, and larvae samples assists the District in generating more accurate records, increases efficiency, and enables the complete automation of many data entry tasks.

GIS data is provided to vector control technicians in the field utilizing a web service published on the Internet. A locally installed GIS application synchronizes data directly with the District's internal database server. This allows both office staff and vector control technicians to instantly send/receive service requests and view updates made in the field regardless of their location. The application has the ability to operate in a disconnected mode, allowing the information to be cached locally and updating the database server when an Internet connection is re-established.

## **PUBLIC OUTREACH**

Public Outreach is a key component of an effective Integrated Vector Management program. It is critical that our stakeholders, including the public, understand the District's mission, its importance to community health, and the role each person or entity plays in controlling and reducing mosquito and vector populations in the Coachella Valley.

The District's Public Outreach program has three main goals:

1. Raise awareness about the services the District provides, local vectors that pose a health threat to the public, and protection and prevention measures to reduce the risk of vector-borne disease transmission.
2. Encourage behavior change to reduce the creation of vector habitats or exposure to vector dangers.
3. Enhance the reputation of and public trust in the District.

In an effort to achieve these goals, the Public Outreach department uses a variety of channels to disseminate vector control and disease prevention information to Valley residents and partner agencies including:

- Clear and simple awareness materials
- Community events
- Student Education programs
- Media outreach
- Training
- Advertising
- Social media
- Website
- Call Center communication