



Invasive Mosquito Species Response Plan 2016

Coachella Valley Mosquito and Vector Control District

Objective

The purpose of this document is to provide guidance to Coachella Valley Mosquito and Vector Control District staff on how to prepare for, conduct surveillance of, and respond to the detection of invasive *Aedes* mosquitoes in the Coachella Valley. Mosquito species of immediate concern are the container-breeding *Aedes aegypti* and *Aedes albopictus*, both of which have been detected in multiple areas of California, including western Riverside County. This document was developed based on the California Department of Public Health (CDPH) “**Guidance for Surveillance of and Response to Invasive *Aedes* Mosquitoes and Locally Acquired Exotic Mosquito-borne Infections Transmitted by These Mosquitoes in California**” published in June 2014 and revised March and August 2016.

<https://www.cdph.ca.gov/HealthInfo/discond/Documents/2016InvasiveAedesSurveillanceandResponseinCA.pdf>

Introduction

The discoveries of *Aedes albopictus* (Los Angeles area 2011), *Aedes aegypti* (Central Valley and Bay Area 2013), and *Aedes notoscriptus* (Los Angeles area 2014), demonstrated that California is vulnerable to colonization by these highly invasive mosquito species. In October of 2015, *Aedes aegypti* was discovered in Riverside and San Bernardino Counties. These discoveries alerted District staff that discovery of one of these invasive species may occur at any time within the Coachella Valley.

Aedes aegypti mosquitoes were detected in the Coachella Valley in May 2016 and in an effort to rid the Valley of the invasive mosquito species, the District plans to exercise its full abatement powers and exemptions for vector control as specified in the “**The Cooperative Agreement between the California Department of Public Health and Local Vector Control Agencies.**”

<https://www.cdph.ca.gov/programs/vbds/Documents/BenefitsCooperativeAgreement08.pdf>

Annual Training

In January and July of each year, the Vector Ecologist will coordinate invasive mosquito species training with all Surveillance and Quality Control department staff. The training should focus on all known invasive mosquito species currently established in California. Upon completion of training staff should be able to:

1. Identify all life stages of invasive mosquito species.
2. Have knowledge of the biology and ecology of the invasive mosquito species.
3. Be current on latest surveillance and control methods being used for invasive mosquitoes in California.

The Vector Ecologist will also work in collaboration with the Operations Manager and Public Information Manager to design and present training to all Operations Department and Clerical staff. The training should include:

1. Biology and ecology of invasive mosquito species in California.
2. Current surveillance and control methods used against relevant invasive mosquito species and the current distribution of invasive *Aedes* species in California.
3. Service Request procedures when responding to a potential report of an invasive mosquito species. Service Request procedures should include:
 - a. Questions to ask when Call Center receives mosquito complaint calls.
 - b. Methods of surveillance to be performed.
 - c. Recommended control methods.
 - d. Key messaging to be delivered to resident requesting service.

I. Pre-Detection Invasive *Aedes* Species Response Plan

Each January, the Vector Ecologist will review and update the invasive mosquito surveillance plan as needed, including identifying the types of traps to be used and trap locations, the frequency of deployment and inspection, and a reporting plan for surveillance information.

Pre-Detection Surveillance Plan

1. **Weekly *Aedes* Surveillance** – Ovicups are set at all routine trap sites. Ovicups are checked each week by lab staff and germination paper is replaced on a weekly basis. Germination paper is returned to the District's sorting lab and inspected for presence of *Aedes* eggs by Lab Assistants/Technicians. Results of ovicups are reported to the Vector Ecologist by 12 p.m. each Friday.
2. **Rotation *Aedes* Surveillance** – 40 locations that are likely introduction hotspots have been selected around the Valley. These include nurseries, cemeteries, and trailer parks with lots of potted plants, locations with people from areas with endemic *Aedes*, e.g., truck stops.
 - a. Use BG, GAT, and ovicups at 8 sites on a weekly basis. Use one ovicup and one of the other trap types on each visit.
 - b. All sites will be rotated over a 6-week period.
 - c. Results of weekly rotation *Aedes* surveillance will be reported to the District Vector Ecologist by 12 p.m. each Friday.
3. **Service Requests** – If a potential *Aedes* service request is received, the Field Supervisor responsible for that zone will contact both the Vector Control Technician responsible for the zone and the Vector Ecologist to coordinate trap placement at the suspect site. Traps to be set will be at least two of the following:
 - a. CO2 trap or B&G Sentinel or GAT trap
 - b. Ovitrap
4. **District Invasive *Aedes* Notifications** – Weekly invasive *Aedes* surveillance results (weekly ovicups, Rotation traps and Service Request results) will be reported to Department Managers by the Vector Ecologist or assigned biologist by the end of business each Friday.
5. **Confirmation of Invasive Mosquito Specimens** – The Vector Ecologist will be responsible for confirming the identification of an invasive mosquito species specimen(s). Once District confirmation is made, the Vector Ecologist will call for a special meeting immediately with the General Manager, Department Managers, and Field Supervisors. At this meeting an initial assessment will be made and a post detection response plan initiated. The Laboratory Manager will notify CDPH Vector-Borne Disease Section Biologists at the Ontario Field office.

Pre-Detection Public Outreach Plan

The Public Information Manager will develop and revise as necessary key messaging and informational materials regarding invasive *Aedes* mosquitoes and conduct prevention, protection, and reporting outreach, as follows:

1. Provide invasive *Aedes* outreach materials to cities for distribution in city offices, newsletters, websites, and social media.
2. Distribute invasive *Aedes* awareness materials at public events such as community, city, and school presentations, fairs, other community engagements, and one-on-one meetings with city, county, state, and federal officials.
3. Include invasive *Aedes* as a topic in standard presentations and other outreach effort.

4. Develop a pilot project for elementary and middle school children to learn about invasive *Aedes*, provide them with a sample collection kit, and have them check around their homes for water that might contain immature mosquitoes. The collected samples would then be reviewed by District Lab staff.
5. Provide Vector Control Technicians with informational materials to distribute during Service Requests with residents.
6. Post informational materials on District website page (www.cvmvcd.org) promoting awareness of invasive *Aedes* risk.
7. Promote awareness of invasive *Aedes* risk and encourage reporting of day-biting mosquitoes through social media channels.
8. Provide media with interviews and informational materials on the threat of invasive *Aedes*.
9. Develop the following materials to be ready for Post-Detection Response:
 - a. a media release template to notify media of an invasive species discovery, risk to public health, what the public should look for and do to prevent the invasive mosquito species, and background regarding the discovery and spread in CA.
 - b. List of Invasive species content experts at State and National level for media.
 - c. Draft District webpage with a section for *Aedes* location reporting.
 - d. Door hanger for *Aedes* Response Team (ART) distribution to be left day before inspection.
 - e. Treatment notification form to be given to resident or posted in back yard following inspection.

Surveillance/Control/Public Outreach Plan for Human Case of Invasive *Aedes*-Vectored Virus in Pre-Detection Zone

If the Public Health department notifies the District of a suspected or confirmed human case of an *Aedes*-transmitted disease, travel-related or locally acquired, invasive *Aedes* traps should be placed in the general vicinity of the human-case residence. If invasive *Aedes* adults or larvae are detected, the post-*Aedes* detection plan will be carried out. Enhanced door-to-door mosquito surveillance and control may be carried out in areas where invasive *Aedes* mosquitoes have not been detected if District leadership deems the strategy necessary to protect the public's health.

II. Post-Detection Invasive *Aedes* Species Response Plan

Post-Detection Surveillance Plan

1. **Post-Detection Coordination** – The Vector Ecologist will organize and finalize the post detection surveillance plan after assessing preliminary surveillance results.
2. **1/8 mile Surveillance Buffer**
 - a. Within 24 hours of invasive species confirmation by the Vector Ecologist, the District will increase the adult surveillance trap grid within a 1/8 mile buffer of the positive location. The following trap types will be placed within the 1/8 mile buffer of the residence:
 - i. B&G Sentinel Traps
 1. With lure and CO₂
 - ii. AGO or GAT traps
 - iii. Carbon Dioxide Traps
 - iv. Ovitrap
 - b. Expand coverage as new sites are found.
3. ***Aedes* Response Teams (ARTs)** - A focused door-to-door campaign by *Aedes* Response Teams (ARTs) will be conducted within the neighborhood of initial invasive *Aedes* discovery to determine level of infestation through property inspections, chemical applications, and additional *Aedes* trapping.

During the period from April to November, the area warrant will be executed on properties as necessary to ensure full coverage within the affected community. Once the scale of infestation is determined, District staff will inform the local community and implement control strategies as deemed necessary. Door-to-door campaign strategies will vary depending on the type of community and level of infestation.

4. **Trap Efficacy Assessment** - The Vector Ecologist will assess catch results between B&G and GAT trap and determine which trap is working best and proceed with ordering more for deployment as needed.
5. **Resistance Assays** – When authorized, the Vector Ecologist will organize the rearing of invasive *Aedes* in order to perform resistance assays:
 - a. Adulticides – 1st priority
 - i. prallethrin, sumithrin, permethrin, (S)-cyano (3-phenoxyphenyl) methyl –(S)-4-chloro-alpha-(1-methylethyl) benzeneacetate, lambda-cyhalothrin, malathion, naled
 - b. Larvicides – methoprene, spinosad
6. **District Invasive *Aedes* Notifications** – Weekly invasive *Aedes* surveillance results (weekly ovicups, Rotation traps, Service Request results, post detection surveillance data) will be reported Districtwide by the Vector Ecologist or assigned biologist by the end of business each Friday.

Post-Detection Control Plan

The Operations Department response will correlate with the level of infestation detected.

Leveled Responses

1. **Pre-Inspection Notifications by ARTs** - Neighborhoods to be inspected will be notified 24 hours prior to ARTs inspecting properties.
 - a. **Door Hangers** – to be placed on front door 24 hours prior to inspection which includes what was discovered in the area, why it is important, and the District’s intention to inspect and abate. The notice will also include a point of contact with a cellphone number to call and schedule an inspection. If a house is unoccupied and the door hanger is still on the door on the day of inspection, the inspection team will remove the door hanger.
 - b. **Post Inspection Form** – Following inspection, a form will be given to residents who are present or placed in the backyard of the property if residents are not present. The form will summarize what was found and done during inspection, as well as what the resident can do proactively to prevent mosquito breeding in the yard.
 - c. **Invasive *Aedes* Detection and Inspection Signs** – to be placed at major intersections of the neighborhood, if deemed necessary. These signs should include similar information the door hangers.
2. **Small infestation Procedure**
 - a. A small infestation is thought to be one house or a small cluster of houses that are adjoining (no more than 10 adjoining houses). Teams will inspect properties that intersect with a 450 foot linear radius from a central point of a property where *Aedes* mosquitoes have been found. Initially, four *Aedes* Response Teams (ARTs) will be assembled from certified and trained personnel from the following departments:
 - Operations – 3 Field and Lead Technicians
 - Lab and Biocontrol – 2 Certified Staff
 - Shop – 1 Certified Staff
 - Maintenance – 1 Certified Staff
 - Supervisory/Management – 1 Certified Staff

- b. Each team (2 staff) will be assigned individual properties within the active area. Each team should be able to complete the investigation of 5 properties per day (20 properties if all teams are deployed on a given day).
- c. During the area warrant period, the area warrant will be used on properties to aid in uniform and timely neighborhood inspections. Local law enforcement will be notified 24 hours prior and the same day of properties inspections. Law enforcement should be used for any perceived dangerous situations.
- d. Teams will be asked to conduct the following at each site:
 - Inspect the entire property for presence of adults or potential breeding (eggs or larvae) and mitigate suitable resting and breeding habitat.
 - Instruct the property owner to dump all container water and to wash the containers with soap or bleach to get rid of eggs.
 - Fog all property areas using Longray electric backpack sprayer containing an appropriate mix of a contact pesticide (permethrin or other as defined by resistance assays by laboratory staff) to kill active adults.
 - Spray all potential standing water areas with a solution of 12 ml. of Nyguard IGR Concentrate diluted in 1 gallon of water to treat up to 1500 square feet using a backpack or hand can sprayer.
 - Perform barrier treatments on all structural and vegetation with a solution containing 1 fl. oz., (30 ml.) of Onslaught Microencapsulated Insecticide per gallon of water. Using a backpack sprayer or Maruyama equipped for liquid application, wet all surfaces thoroughly but not to point of run-off.
 - Document all treatments and findings in mobile application.
 - Provide resident with treatment information, outreach materials, warrant, and answer any and all questions.
 - Set trap/surveillance devices as directed.
 - Maintain close communications with Field Team members and the Operations Manager.
 - Teams will be supplied with:
 - 16 fl. Oz. Aqua-Reslin insecticide concentrate
 - 16 fl. Oz. Onslaught insecticide concentrate
 - 80 ml. Nyguard IGR concentrate
 - 1 - LongRay electric backpack sprayer w/extra battery
 - 2 – 1 gal. hand can sprayer
 - 2 – 4 gal. backpack sprayer or liquid equipped Maruyama
 - 2 rolls paper towels
 - 30 gal. garbage bags
 - Personal respirators and required PPE
 - Sample containers and bags
 - 2 -Turkey basters
 - 2 - Magnifying glasses
 - Permanent markers
 - Outreach materials
 - Post application information to be posted with warrant
 - Gate locks to replace cut locks as needed
 - Drills
 - Aspirator
- e. One member of the team will schedule a follow-up to check on the activity of the mosquitoes and the ability of the resident to comply with the directions to remove standing water. The team

member will return in one week if mosquitoes or suitable mosquito habitat was found, and in two weeks if neither was found at the visit.

3. Medium but Localized Infestation Procedure

- a. In the event that 3 non-adjacent properties within 450 foot radius are found to have *Aedes*, Operations will deploy ground ULV on a 1 square mile plot with the center being the center of the infestation area. The ground ULV route may expand up to 3 square miles if areas of high risk are found near the plot (e.g., day cares, nursing homes, schools, etc.)
- b. Within 4 weeks of positive *Aedes* detections in a neighborhood, ART will return to inspect a subset of homes for the presence of immature and adult mosquitoes. In conjunction with lab staff, additional traps will be set at homes and at supplemental trap sites in the area.

4. Large infestation Procedure

- a. If a large number of properties are found to be positive with *Aedes* and eradication is still thought to be achievable, aerial ULV applications will be made in 1 square mile blocks around each home found to be positive.
- b. Within 4 weeks of positive *Aedes* detections in a neighborhood, ART will return to inspect a subset of homes for the presence of immature and adult mosquitoes. In conjunction with lab staff, additional traps will be set at homes and the supplemental trap sites in the area.

5. Established *Aedes* Procedure

- a. If the District determines that invasive *Aedes* are established in the Coachella Valley and that eradication is no longer achievable, the District will develop and implement a sustainable program to control the invasive species as part of ongoing vector control activities.

Post-Detection Public Outreach Plan

1. The Public Information Manager will update the invasive species media release in collaboration with the Laboratory, Operations, and General Managers.
2. When distributing the release, media will be provided a list of local, state, and national invasive species experts, which will include Riverside County Public Health, CDPH, and the CDC.
3. The Public Information Manager will work with the General Manager to finalize messages to be delivered to District staff, Trustees, and key community stakeholders.
4. Notification of discovery of an invasive mosquito species will occur once Surveillance and Operations staff have finalized the specifics of the response plan. The Public Outreach Team will make all notifications on the same day and according to the following list:
 - a. District Staff will be informed by the Laboratory Manager by email.
 - b. Board Member from community where invasive species discovered by phone call and followed up by email.
 - c. City Manager or County Board of Supervisors office from community where invasive mosquito species discovered by phone call and followed up by email.
 - d. Entire Board of Trustees by email.
 - e. Riverside County Health Department, CDPH, and MVCAC Southern California Region Public Information Officers and General Managers, and MVCAC administrative staff by email.
 - f. Media and community stakeholders via Constant Contact and email.
 - g. Public Outreach team uploads media release to the District website.

- h. IT team updates location map of detections to the District website.
 - i. Public Outreach Team posts notification to District Facebook page.
5. Working with the General Manager, Operations Manager, and Laboratory Manager, the Public Outreach Team explores avenues to reach neighborhoods of affected city, such as:
- a. Town hall, community, city, and school meetings
 - b. Fairs and other community engagements
 - c. One-on-one meetings with city, county, state, and federal officials
 - d. Vector Control Technicians during Service Requests with residents
 - e. Media interviews
 - f. ART inspections
 - g. Neighborhood listservs
 - h. Homeowner Associations (HOA) outreach
 - **Gated Community** – Notification of HOA/Property Management/Golf Course Management.
 - **Older Neighborhoods with walled courtyards** (e.g., Palm Springs area) – Notification of HOA if known and potentially postcard mail campaign and posting.
 - **Non-gated neighborhoods** – Notification and communication with HOA if exists or is known.
 - i. Explore the use of the following community groups to help inform the public:
 - Community Emergency Response Teams (CERT)
 - Urban Corp

Weekly Post-Detection Debrief Meetings

Initially weekly meetings will be held Wednesday at 11 a.m. to discuss invasive *Aedes* response work for the week. Meeting frequency will be evaluated after the first month since detection. Staff present at this meeting should be:

- General Manager
- Laboratory Manager
- Operations Manager – Response summary report
- Public Information Manager
- Information Technology Manager
- Administrative Finance Manager (as necessary)
- Vector Ecologist – Surveillance summary report
- Field Supervisors
- ARTs or Lead Technician representatives when possible – specifics of inspections, issues setback, discoveries, needs
- Public Outreach Coordinator

Surveillance/Control/Public Outreach Plan for Human Case of Invasive Aedes-Vectored Virus in Post-Detection Zone

1. **Human Suspect or Confirmed Case of Travel-Acquired Invasive Aedes-Vectored Disease**
 - a. Pre-Riverside County Public Health Press Release
 - b. Riverside County Department of Public Health or California Department of Public Health notifies Laboratory Manager of suspected, probable, or confirmed travel-acquired invasive *Aedes*-vectored disease case.
 - c. Laboratory Manager informs General Manager and calls a meeting to include Operations, Laboratory, IT, Public Information Managers.

- d. Laboratory staff initiates enhanced adult surveillance with a mix of surveillance traps distributed throughout 450 foot radius around the suspect-case residence and any suspected exposure sites, monitored weekly for 4 weeks.
- e. Laboratory staff sends any adult invasive *Aedes* and *Culex* samples detected to the DART laboratory at UC Davis for arboviral testing.
- f. Control staff conducts larval surveillance and control of known sites within and around the 450 foot radius. Door-to-door inspections are not initiated until public confirmation by County by press release, website posting, or written confirmation to the District that the information is now public.
- g. Detections of any invasive *Aedes* specimens collected during enhanced larval mosquito surveillance will be reported to the *Aedes* response group.
- h. When County publicly confirms invasive *Aedes*-vectored disease human case in the area, Public Information Manager contacts city manager or alternate contact and law enforcement in affected city or cities to inform them that a human case of an invasive *Aedes*-transmitted disease has been detected and a door-to-door inspection operation will begin. The Public Information Manager proceeds with "Post-Detection" stakeholder notification steps.
- i. Public Information Manager will use the most appropriate channels below to reach affected neighborhood regarding door-to-door campaign:
 - One-on-one meetings with city, county, state, and federal officials
 - Media Release/media interviews
 - Town hall, community, city, and school meetings
 - Fairs and other community engagements
 - Vector Control Technicians during Service Requests with residents
 - Neighborhood listservs/Nextdoor.com
 - Homeowner Associations listservs
 - Postcard mail campaign
 - Door Hangers
- j. After notification of all residential and business properties within the buffered area, Operations staff initiates larval mosquito surveillance and control throughout 450 foot radius around the suspect-case residence, monitored for 4 weeks.
- k. If invasive *Aedes* are discovered, Operations staff will conduct mandatory door-to-door inspections of each property within 450 foot radius area following post-detection Invasive *Aedes* control protocol.

2. **Confirmed Case of Locally-Acquired Invasive *Aedes*-Vectored Disease**

- a. Riverside County Department of Public Health or California Department of Public Health notifies Laboratory Manager of suspected, probable, or confirmed locally-acquired invasive *Aedes*-vectored disease case.
- b. Laboratory Manager informs General Manager and calls a meeting to include Operations, Laboratory, IT, Public Information Managers.
- c. Laboratory Manager designates a surveillance area consisting of a 450 foot radius around the residence of the patient and any suspected exposure sites and creates map of surveillance area.
- d. Laboratory staff initiates enhanced adult and larval mosquito surveillance with a mix of traps around the residence of the patient and any suspected exposure sites, monitored weekly for 4 weeks.
- e. Laboratory staff identifies any invasive *Aedes* larval specimens collected during enhanced larval mosquito surveillance, reporting any invasive *Aedes* detections to *Aedes* response group.
- f. Laboratory staff sends adult invasive *Aedes* and *Culex* samples to the DART laboratory at UC Davis for arboviral testing.

- g. When County publicly confirms invasive *Aedes*-vectored disease human case in the area, Public Information Manager contacts city manager or alternate contact and law enforcement in affected city or cities to inform them that a human case of an invasive *Aedes*-transmitted disease has been detected and a door-to-door inspection operation will begin. The Public Information Manager proceeds with “Post-Detection” stakeholder notification steps.
- h. Operations department posts disease transmission signage in area.
- i. Public Information Manager will use the most appropriate channels below to reach affected neighborhood regarding disease notification and door-to-door campaign:
 - One-on-one meetings with city, county, state, and federal officials
 - Media Release/media interviews
 - Town hall, community, city, and school meetings
 - Fairs and other community engagements
 - Vector Control Technicians during Service Requests with residents
 - Neighborhood listservs/Nextdoor.com
 - Homeowner Associations listservs
 - Postcard mail campaign
 - Door Hangers
- j. Operations staff inspects each property within the detection area and any suspected exposure sites following post-detection control plan protocol.
- k. Sites with mosquito breeding sources are inspected every 4-12 weeks, depending on season and treatment, until the potential mosquito breeding issue is permanently resolved.
- l. Laboratory identifies egg, larval, and adult specimens collected during inspections and surveillance, reporting any invasive *Aedes* detections to *Aedes* response group.
 - Egg specimens will be sent to DART laboratory for genetic testing.
 - Larvae, pupae, and adults will be identified in District laboratory.
- m. Operations staff conducts immature and adult mosquito control based on data from enhanced surveillance activities that provide reliable information on presence, relative abundance, and distribution within the urban environment, and could include:
 - **Physical control** – disposing of and dumping containers, drilling holes in anything that holds water with resident approval and increasing water flow to any potential breeding habitat.
 - **Larval Control** – applying larvicides (by ground or air) to any standing water or potential breeding site. These could include Bti, Spinosad and methoprene.
 - **Adult Control** – Pyrethrin/pyrethroids would be applied in localized areas as necessary. Compliance with all residents to access properties would be crucial. Application by handheld equipment, backpack, truck-mounted spray, or aerial spray (Organophosphates may be considered if resistance is identified).
 - **Sterile male and male disseminated methods.**
 - **Experimental methods.**

Summary of Post Invasive *Aedes* Confirmation Actions and Notifications

