ORANGE COUNTY VECTOR CONTROL District

Integrated Vector Management & Response Plan

May 11, 2010

Integrated Vector Management & Response Plan
Preface

The purpose of the Integrated Vector Management and Response Plan is to provide guidelines to Orange County Vector Control District (District) staff and information to stakeholders regarding the various responses made to prevent and control disease vectors as well as introduced diseases and vectors in Orange County. A vector is any insect or arthropod, rodent or other animal of public health significance capable of harboring or transmitting the causative agents of human disease, or capable of causing human discomfort or injury. This document details the roles and responsibilities of Management, Administration, Public Information, Laboratory, and Operations staff in responding to vector-borne disease threats. The responses are organized by vector species that cause illnesses in humans, domestic animals, and wildlife. This Response Plan also includes contingencies for targeting control of newly introduced disease vectors that are nonnative in Orange County. The formation of this document is guided by the following principles: The application of professional knowledge and judgment for the protection of public health, the use of integrated vector management (IVM) concepts, partnerships with stakeholders, and continuous assessment and improvement.

Protection of Public Health
The mission of the Orange County Vector Control District is to provide the citizens of Orange County with the highest level of protection from vectors and vector-borne diseases. This mission is achieved by being proactive in response to current and future vector threats; responding effectively and courteously to the needs of the public; informing and educating the public about the shared responsibility of vector control; utilizing the most effective and safest methods available for the control of vectors; and providing vector control services in the most cost-effective manner.

Integrated Vector Management
The District's vector control activities are based solely on Integrated Vector Management principles. These principles serve as the foundation for developing vector control activities. Vector population and pathogen monitoring are integral to the control program and are used to generate criteria to implement mosquito management. The District recognizes that utilizing IVM principles will reduce the use of pesticides.

Professional Knowledge and Judgment
The District applies professional knowledge and judgment when necessary. Although this document represents the District's best efforts to delineate the District's response for reasonably foreseeable situations, it is recognized that management of vector populations and vector diseases is part of a natural process; and, therefore, very complex and not completely understood. In addition, site specific and incident specific conditions are highly variable and unpredictable. Therefore, District management and staff are allowed and expected to exercise professional knowledge and judgment in implementation of these policies and procedures. Deviation from these guidelines is, therefore, allowable when deemed necessary by District management or

authorized staff, based on available information and conditions, to meet the District's primary goal of protecting the public from vector-borne diseases.

Stakeholder Partnerships

The District works actively and cooperatively with stakeholder groups to help ensure that vector production is avoided or minimized; and, when necessary, controlled to protect both human and environmental health. The District aims to engage the public in the shared responsibility of vector control. The District identifies Federal Government agencies, State of California, Orange County, incorporated city and local government officials and agencies, agricultural producers, environmental groups, community groups and leaders, and citizens within the District's jurisdiction as stakeholders.

Continuous Improvement

The District regularly researches and tests new and innovative vector monitoring and management techniques. Staff is encouraged to investigate methods to improve vector and vector-borne disease management tools and incorporate them into activities as necessary. For this purpose, this document will be reviewed as necessary by District staff and approved by the Board of Trustees.

The effective cooperation and communication among collaborative agencies is critical to the success of these responses to prevent or stop the spread of vector-borne disease. Included in this response as an appendix is the "California Mosquito-Borne Virus Surveillance and Response Plan" prepared jointly by the California Department of Public Health, Mosquito and Vector Control Association of California, and the University of California.

Integrated Vector Management Response & Guidelines
Orange County Vector Control District

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List of Abbreviations

BMP	–	Best Management Practice for stormwater and urban runoff.
CAC	–	County Agricultural Commissioner Office.
CDC	–	Center for Disease Control and Prevention.
CDPH	–	California Department of Public Health.
CO_2	–	Carbon dioxide.
GIS	–	Geographical Information System.
HCPS	–	Hantavirus Cardiopulminary Symptom.
IVM	–	Integrated Vector Management.
OCHCA	–	Orange County Health Care Agency.
OCVCD	–	Orange County Vector Control District.
PCO	–	Pest Control Operator.
PHP	–	Public Health Pesticide.
RIFA	–	Red Imported Fire Ant.
SLE	–	St. Louis Encephalitis.
ULV	–	Ultra Low Volume.
USDS	–	Underground Storm Drain System.
WEE	–	Western Equine Encephalitis.
WNV	–	West Nile virus, On-Going Mosquito Control Activities.

Integrated Vector Management Response Plan

On-Going Mosquito Control Activities

Standard mosquito control activities follow the Immature Mosquito Management Guidelines and the Adult Mosquito Management Guidelines and generally consist of the components listed below. This level is equivalent to the "California Mosquito-Borne Virus Surveillance and Response Plan" Level 1 – Normal Season.

- Increase public education and awareness through the regular distribution of media releases, attendance at public events, public lectures, and other similar outreach mechanisms.

- Monitor mosquito, mosquito-borne disease, and public health pesticide efficacy surveillance activities using the following:
    a. Mosquito and insect identification.
    b. CDC/CO_2-baited traps.
    c. Gravid traps.
    d. Encephalitis virus testing in mosquitoes, dead birds, and wild birds.
    e. Sentinel chicken testing.
    f. Develop GIS maps.
    g. Monitor Public Health Pesticide Efficacy.

- Conduct routine immature mosquito identification and management (See Immature Mosquito Management Guidelines).
    a. Evaluate sites for immature mosquito threshold densities by species.
    b. Maintain continuous surveillance for potential mosquito development sites.
    c. Conduct aerial surveillance for residential green pools.
    d. Evaluate environmental and regulatory conditions and requirements.
    e. Determine the possibility of source reduction by drainage or modification of site.
    f. Introduce biological control measures (such as mosquito fish) if appropriate.
    g. Apply public health pesticides when necessary.
    h. Maintain larval treatment cycle time between 7-30 days.

- Routine adult mosquito management (See Adult Mosquito Management Guidelines).
    a. Control in urban areas will be on an as needed basis, as determined by the Director of Operations and resident requests.
    b. Initiate adult mosquito management when threshold criteria are met or exceeded.
    c. Utilize historical mosquito distribution and abundance data to make control decision.

Detection of a Dead Bird/Mosquito Pool/ Sentinel Chicken/Animal with a Mosquito-borne Virus

The following responses are initiated when the District's Scientific and Technical Services Laboratory detects a mosquito-borne virus (WNV, WEE, SLE) or when CDPH notifies the District of a mosquito-borne virus from dead bird(s), mosquito pool(s), sentinel chicken(s), or animal(s) within District boundaries. This level is equivalent to the "California Mosquito-Borne Virus Surveillance and Response Plans" Level 2 Normal Season and Emergency Planning Rating.

Management Responsibility Notify the District Board of Trustees. Evaluate District staffing and program needs.	**Communications Department Responsibility** Distribute a News Release.
Scientific and Technical Services Responsibility Notify County Public Health Officials. Notify County and City Animal Services. Provide additional localized disease surveillance to determine scope of virus activity. Continue to collect mosquito pools for isolation of virus as scheduled. Continue to bleed sentinel chickens as scheduled. Provide GIS maps.	**Control Operations Management Responsibility** Prepare for controlling adult mosquitoes when initiation criteria are met.
Control Operations Zone Responsibility Inspect and treat mosquito larval development sites. Investigate mosquito service requests from the public. Assess adult mosquito populations. Inspect known green pool locations in area.	**Control Operations Special Services Responsibility** Inspect flood channels in area. Inspect problem underground water storage devices and BMPs in the area. Inspect possible breeding sites (Canyon Drains\Marshes\Reservoirs) in area. Inspect historical breeding sites. Inspect other tracked sources in the area.

Locally Acquired Human Case of a Mosquito-borne Virus

The following responses are initiated when the OCHCA, or CDPH notifies the District that a human has acquired a mosquito-borne infection(s) within Orange County. This level is equivalent to the "California Mosquito-Borne Virus Surveillance and Response Plans" Level 3 Emergency Planning and Epidemic Rating.

Management Responsibility Notify the District Board of Trustees. Evaluate District staffing and program release needs.	**Communications Department Responsibility** Coordinate the distribution of a news with OCHCA.
Scientific and Technical Services Responsibility Coordinate with County Public Health USDS Officials. Determine scope of virus activity to support control efforts. Continue to collect mosquito pools for isolation of virus as scheduled. Continue to bleed sentinel chickens as scheduled. Provide GIS maps.	**Control Operations Management Responsibility** Consider reducing the spray route and cycle time to 8-10 days. Consider controlling adult mosquitoes when initiation criteria are met.
Control Operations Zone Responsibility Inspect and treat mosquito larval development sites. Investigate mosquito service requests from the public. Assess adult mosquito populations. Inspect known green pool locations in area.	**Control Operations Special Services Responsibility** Inspect flood channels in area. Inspect problem underground water storage devices and BMPs in the area. Inspect possible breeding sites (Canyon Drains\Marshes\Reservoirs) in area. Inspect historical breeding sites. Inspect other known sources in the area.

Epidemic Conditions of a Mosquito-borne Virus

The following responses are initiated when OCHCA or CDPH officials notify the District that multiple infections have occurred within a specific area, or there is evidence that an epidemic condition exists. The epidemic area is defined as the geographic region in which human cases are clustered (incorporated city, community, neighborhood, or Zip Code). This level is equivalent to the "California Mosquito-Borne Virus Surveillance and Response Plans" Level 2 Normal Season and Emergency Planning Rating.

Management Responsibility Consider holding a special Board of Trustee meeting. Shift District staffing and resources to meet program needs.	**Communications Department Responsibility** Distribute a News Release. If truck mounted ULV is necessary, include additional information in News Release.
Scientific and Technical Services Responsibility Coordinate with County Public Health Officials. Determine scope of virus activity to support control efforts. Continue to collect mosquito pools for isolation of virus as scheduled. Continue to bleed sentinel chickens as scheduled. If truck mounted ULV is appropriate, evaluate the control program. Provide GIS maps.	**Control Operations Management Responsibility** Consider reducing the treatment cycle time below 8-10 days. Consider controlling adult mosquitoes when initiation criteria are met. Delineate and map the treatment area. As necessary, contact and coordinate with other local agencies.
Control Operations Zone Responsibility Inspect and treat mosquito larval development sites. Investigate mosquito service requests from the public. Assess adult mosquito populations. Inspect known green pool locations in area. Provide educational materials to affected area. Distribute information to collaborating agencies and stakeholders in the area.	**Control Operations Special Services Responsibility** Inspect flood control channels in area. Inspect problematic underground water storage devices and BMPs in the area. Inspect possible breeding sites (Canyon Drains\Marshes\Reservoirs) in area. Inspect historical breeding sites. Inspect other known sources in the area.

Response to Imported Malaria Case

The following responses are initiated when OCHCA notifies the District of an imported malaria case(s) within the District boundaries. District response to a reported malaria case(s) is determined by the vector activity period, difference between the date of diagnosis and the current date, mosquito population, and the date of the reported case.

Scientific and Technical Services Responsibility Determine scope of activity. Identify adult mosquitoes collected. Determine if *Anopheles* spp.are infected with malaria parasites.	**Control Operations Management Responsibility** Determine if adult mosquito control is necessary if initiation criteria are met in area. Delineate treatment area, as necessary.
Control Operations Zone Responsibility Inspect *Anopheles* mosquito development sites in area. Assess adult mosquito population.	**Control Operations Special Services Responsibility** Inspect *Anopheles* breeding sites (Canyon Drains\Marshes\Reservoirs) in area. Inspect problem underground water storage devices and BMPs in the area. Inspect other known sources in the area.

Response to a Locally Acquired Malaria Case and/or Infected Mosquitoes

The following responses are initiated when Orange County Health Care Agency notifies the District of a locally acquired malaria case(s) and or when *Anopheles* spp. are found infected with malaria parasites within the District boundaries. District response is determined by the vector activity period, difference between the date of diagnosis and the current date, mosquito population, and the date of the reported case.

Management Responsibility Notify District Board of Trustees President. Evaluate District staffing and program needs.	**Communications Department Responsibility** Prepare educational materials. Coordinate the distribution of a news release with OCHCA. Consider a region-wide press conference.
Scientific and Technical Services Responsibility Determine scope of activity. Identify adult mosquitoes collected. Analyze climate and meteorological data to determine if conditions are favorable for Anopheline development. Determine if *Anopheles* are infected with malaria parasites. Provide GIS maps.	**Control Operations Management Responsibility** Contact County Agricultural Commissioner. Delineate and map the treated area. Coordinate response with other local vector control agencies.
Control Operations Zone Responsibility Inspect *Anopheles* mosquito development sites in area. Assess adult mosquito population. Conduct surveillance for *Anopheles* at local airports. Distribute educational materials.	**Control Operations Special Services Responsibility** Inspect *Anopheles* breeding sites (Canyon Drains\Marshes\Reservoirs) in area. Inspect problem underground water storage devices and BMPs in the area. Inspect historical breeding sites. Inspect other known sources in the area.

Critical Response to the Detection of an Introduced, Non-Native Disease or Disease Vector Within Orange County

The following response is initiated when the District detects an introduced, nonnative disease, or disease vector within Orange County. The District recognizes that a quick, efficacious response is necessary to prevent the vector or disease from becoming established in Orange County and Southern California.

Management Responsibility Notify District Board of Trustees. Contact and coordinate response with other stakeholders.	**Communications Department Responsibility** Conduct a press conference and distribute a news release. Prepare educational materials. If truck mounted ULV spraying is necessary, include additional information in news release.
Scientific and Technical Services Responsibility Notify County Public Health Officials. Train District staff about the disease or disease vector. Identify insect vectors and develop a surveillance strategy. Determine scope of infestation. Sample vectors for the presence of disease organism. If truck mounted ULV is necessary, evaluate the control program. Provide GIS maps.	**Control Operations Management Responsibility** Contact County Agricultural Commissioner. Determine a control strategy. Delineate and map the treatment area. Coordinate control of disease vector when initiation criteria are met. As necessary, contact and coordinate with other local agencies.
Control Operations Zone Responsibility Assess adult population. Conduct a thorough inspection for and treat mosquito development sites. Control adult mosquitoes. Distribute educational materials.	**Control Operations Special Services Responsibility** Inspect flood control channels in area. Inspect problem underground water storage devices and BMPs in the area. Inspect possible breeding sites (Canyon Drains\Marshes\Reservoirs) in area. Inspect other known sources in the area.

Black Fly Control Operations

Standard black fly activities follow Black Fly Management Guidelines and generally consist of the components listed below.

- Routine public education and awareness through the distribution of media releases, attendance at public events, public lectures, and other similar outreach mechanisms.

- Routine black fly and public health pesticide efficacy surveillance activities. Occurrence of black flies may also be noted by resident complaints.
    a. Black fly Identification.
    b. CDC/CO_2-baited traps.
    c. Prepare GIS maps.
    d. Conduct posttreatment surveillance.

- Routine immature black fly management.
    a. Evaluate the site for immature black fly habitat.
    b. Evaluate environmental and regulatory conditions and requirements.
    c. If appropriate, apply PHP.
    d. Apply PHP again, if needed, at time interval noted on PHP label.

Fly Control Operations

Fly control is initiated when the District is notified of an infestation occurring within District boundaries. The response follows Fly Control Guidelines. The District only uses pesticides to control fly infestations where source reduction is not possible, in situations that are deemed significant, and considered a threat to public health and safety.

- Fly control is instigated only after a thorough evaluation of the site is conducted and should include:
    a. Identification of pest fly species and estimation of population density.
    b. Identification of larval breeding source.
    c. Reduction of larval breeding source through habitat and source reduction, when possible.

- If reduction of larval breeding source is conducted, but a significant population of flies remains, the use of a public health pesticide may be necessary to control the population.

Scientific and Technical Services Responsibility Identify fly species and estimate population density. Determine scope of infestation. Conduct posttreatment evaluation of fly population. If necessary, provide GIS maps detailing surveillance and control activities.	**Control Operations Management Responsibility** Determine a control strategy. Delineate treatment area. As necessary, contact and coordinate with other local agencies.
Control Operations Zone Responsibility Distribute educational materials.	**Control Operations Special Services Responsibility** Distribute educational materials. Assist in source removal, if necessary. Apply pesticides to control flies, if necessary.

Response to a Flea-borne Typhus Case

The following responses are initiated when the District is notified of a human case of flea-borne typhus occurring within Orange County. The District recognizes that a quick response is necessary to instigate a reduction of the flea population in the area.

- A comprehensive flea-borne typhus risk evaluation of the area is warranted and should include:
    a. Notification of surrounding residents that a flea-borne typhus case has occurred in the area and what can be done to reduce the flea population in the area (use of flea control measures on pets).
    b. Live-trapping of opossums to determine the flea species and flea load per animal and the collection of whole blood for assessment of transmission activity.
    c. Assessing the flea abundance on backyard wildlife and pets.
    d. Assessing the potential for humans to be exposed to vector fleas.
    e. Reviewing the past history of flea-borne typhus activity and/or flea-borne typhus cases in the region.

Management Responsibility Notify District Board of Trustees. Contact and coordinate response with other stakeholders.	**Communications Department Responsibility** Conduct a press conference and distribute a news release.
Scientific and Technical Services Responsibility Notify County Public Health Officials. Conduct comprehensive flea-borne typhus risk assessment. Determine scope of infestation. Sample vectors for the presence of disease organism. Provide GIS maps detailing surveillance and control activities.	**Control Operations Management Responsibility** As necessary, contact and coordinate with other local agencies.
Control Operations Zone Responsibility Distribute educational materials and assist with surveillance activities. Assist with comprehensive flea-borne typhus risk assessment.	

Response to a Tick-borne Disease Case (Lyme Disease, Rocky Mountain Spotted Fever, Tularemia)

The following responses are initiated when the District is notified of a human case of tick-borne disease occurring within Orange County.

- A comprehensive tick-borne disease risk evaluation of the area is warranted and should include:
    a. Live-trapping (flagging) ticks to estimate tick density and the presence and/or prevalence of pathogens within the tick population.
    b. Assessing the potential for humans to be exposed to ticks.
    c. Reviewing the past history of tick populations and tick-borne disease in the area.
    d. Distribution of tick-borne disease educational materials to landholders and/or the affected population.

Ongoing RIFA Activities

Standard RIFA control activities follow Red Imported Fire Ant Guidelines and generally consist of the components listed below.

- Routine public education and awareness through the distribution of educational DVDs and flyers and attendance at public events. Education of maintenance staff at infested sites, such as schools, parks, golf courses, and nurseries. Distribution of educational material to residents in affected neighborhoods.

- Routine RIFA surveillance activities and public health pesticide efficacy.
    a. Insect identification.
    b. Inspection for mounds, foraging ants, and other signs of RIFA infestation around residential treatment sites and adjacent to large treatment sites.
    c. Placement of RIFA surveillance lures.
    d. Evaluation of new sites in Orange County for RIFA populations.
    e. Monitor pesticide efficacy.

- Routine RIFA Residential Site Management (Residential RIFA Treatment Cycle).
    a. Initial report is followed up by District staff who conduct RIFA surveillance and identification, and apply a pesticide ant bait.
    b. 2nd Residential treatment is conducted by a local Pest Control Operator (PCO) after 3 months of initial treatment.
    c. 3rd Residential treatment is conducted by the same PCO after 3 months of the 2nd treatment.
    d. Posttreatment survey is conducted at selected sites by the District. If RIFA are identified, the site begins the treatment cycle again.
    e. If a residence reports RIFA activity while on a RIFA treatment cycle, the District will respond and treat the site.

- Routine RIFA Large-Site Management (Large-Site RIFA Treatment Cycle)
    a. Specific guidelines are in place for large sites such as sites >1 acre, parks, schools, golf courses, and rights-of-way.
    b. Initial report is followed up on by District staff who conduct RIFA surveillance, identification, and apply a pesticide ant bait.
    c. 2nd, 3rd, and posttreatment surveys are conducted by District staff.
    d. If a large site reports RIFA activity while on a RIFA treatment cycle, the District will respond and treat the site.

RIFA Activities in Response to a Stinging Incident

The following response is instigated when the District is notified of a RIFA stinging incident within county boundaries. The District recognizes that a quick and efficacious response is necessary.

- RIFA treatment in response to a stinging incident.
    a. The District will respond to a stinging incident as quickly as possible.
    b. Advise persons to stay away from the area and post area conspicuously to keep others away.
    c. Staff will identify ant species and bring a sample to the District for confirmation.
    d. Staff will treat the mound.
    e. If ants are confirmed as RIFA, a residential or large site RIFA treatment cycle will be initiated.

Ongoing Rat Control Activities

Standard rat control activities (*Rattus* spp.) follow the Rat Management Guidelines and generally consist of the components listed below.

- Routine public education and awareness through the education of residents by responding to service requests, attendance at public events, public lectures, and other similar outreach mechanisms.

- Rat inspections and control.
    a. Inspections for rat activity around residences, businesses, parks, schools, city, county, state, and federal lands in Orange County.
    b. Recommendations to abate rat harborage, food sources, and modify rat entry points in homes and structures.
    c. Placement of rodenticide in tamper-resistant bait stations around exterior of residences.

Ongoing Rodent Surveillance Activities

Standard rodent surveillance activities generally consist of the components listed below.

- Routine rodent and rodent-borne disease surveillance and rodenticide efficacy.
    a. Rodent trapping and identification (rats, mice, and ground squirrels).
    b. Rodent parasite identification.
    c. Testing of rodents for rodent-borne diseases, such as bubonic plague, Hantaviruses, and additional diseases as needed.
    d. Testing of squirrels for WNV.
    e. Monitoring rodenticide efficacy.

Response to a Human or Animal Plague Case

The following response is initiated when the District is notified of a human or rodent plague case within county boundaries. The District recognizes that a quick and efficacious response is necessary to control rodents and their parasites that can further transmit the pathogen. This response is equivalent to recommendations set forth in the "California Department of Public Health 2008 Compendium for Plague Control."

- A comprehensive plague risk evaluation of the area is warranted and should include:
  a. Live-trapping rodents to estimate the population densities of known plague-amplifying species and the collection of serum specimens for assessment of plague transmission activity.
  b. Assessing the extent and phase of the outbreak.
  c. Evaluating the abundance and infectivity of known vector fleas (flea index and flea pools for plague testing).
  d. Assess the potential for humans to be exposed to vector fleas.
  e. Review the past history of plague activity and/or human plague cases in the region.
  f. Collaborate with CDPH and the County Agricultural Commissioner's Office.

- A decision to suppress vector fleas on rodents or rodents is based on:
  a. The presence and prevalence of susceptible rodents and vector fleas in areas of human activity.
  b. A high potential for humans to be exposed to vector fleas.
  c. Confirmation of plague activity among susceptible rodents and/or fleas in areas of human activity.
  d. A history of plague activity and/or human cases in the area.

Management Responsibility	**Communications Department Responsibility**
Notify District Board of Trustees. Contact and coordinate response with other stakeholders.	Conduct a press conference and distribute a news release. Prepare educational materials. If burrow dusting flea control is necessary, include additional information in news release.

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Response to a Human or Animal Plague Case - cont'd.

Scientific and Technical Services Responsibility Notify County Public Health Officials. Conduct comprehensive plague risk assessment. Train staff about the disease and disease vector. Identify fleas and develop a surveillance strategy. Determine scope of infestation. Sample vectors for the presence of disease organism. If burrow dusting flea control is necessary, conduct a posttreatment evaluation. Provide GIS maps detailing surveillance and control activities.	**Control Operations Management Responsibility** Contact County Agricultural Commissioner. Determine a control strategy with Scientific and Technical Services. Delineate and map the treatment area. Coordinate burrow dusting flea control as necessary. As necessary, contact and coordinate with other local agencies.
Control Operations Zone Responsibility Distribute educational materials. Assist with comprehensive plague risk assessment.	**Control Operations Special Services Responsibility** Distribute educational materials. Assist with burrow dusting flea control as necessary.

Response to a Human Hantavirus Cardiopulminary Symptom (HCPS) Case

The following response is initiated when the District is notified of a human HCPS case within county boundaries. The District recognizes that a quick response is necessary to educate the public and determine the prevalence of the virus in vector species. This response is equivalent to recommendations set forth in the "California Department of Public Health "Guidelines for conducting surveillance for hantavirus in rodents in California, 2004."

- A comprehensive HCPS risk evaluation of the area is warranted and should include:
  a. Live-trapping rodents to estimate the population densities of known HCPS amplifying species and the collection of specimens for assessment of HCPS prevalence.
  b. Assessing the extent and phase of the infestation.
  c. Assessing the potential for humans to be exposed to rodent vectors.
  d. Reviewing the past history of HCPS activity in the region.

- A decision to suppress rodents is based on:
  a. The presence and prevalence of susceptible rodents in areas of human activity.
  b. A high potential for humans to be exposed to rodents.
  c. Confirmation of HCPS activity among susceptible rodents in areas of human activity.
  d. A history of HCPS activity in the area.

Management Responsibility Notify District Board of Trustees. Contact and coordinate response with other stakeholders.	**Communications Department Responsibility** Conduct a press conference and distribute a news release. Prepare educational materials including transmission and prevention information. If rodent suppression is necessary, include additional information in news release.
Scientific and Technical Services Responsibility Notify County Public Health Officials. Conduct comprehensive HCPS assessment. Train staff about the disease and hosts. Determine scope of infestation. Sample hosts for the presence of disease organism. If rodent suppression is necessary, conduct a posttreatment evaluation. Provide GIS maps detailing surveillance and control activities.	**Control Operations Management Responsibility** Contact County Agricultural Commissioner. Determine a control strategy with Scientific and Technical Services. As necessary, contact and coordinate with other local agencies.
Control Operations Zone Responsibility Distribute educational materials. Assist with comprehensive HCPS risk assessment.	**Control Operations Special Services Responsibility** Distribute educational materials.

Integrated Vector Management
Immature Mosquito Guidelines

Definitions

Catch basin – Curbside opening that collects water runoff from streets and serves as an entry point to the storm drain system.
Endangered Species – This is a list of animals found within California or off the coast of the State that have been classified as Endangered or Threatened by the California Fish & Game Commission (State list) or by the U.S. Secretary of the Interior or the U.S. Secretary of Commerce (Federal list).
Environmentally sensitive habitats – Wetlands, riparian areas, organic producers, State, Federal, local wildlife area, or other areas posted as such.
Flood control channel - Open waterway that is designed to carry large amounts of rain water.
Freeway drain – A ditch or drain used to collect water from freeways.
Green pool – A pool that is not serviced, allowing for mosquito larvae development.
Gutter –The edge of a street (below the curb) designed to drain water runoff from streets, driveways, parking lots, etc., into catch basins. Area formed by the curb and the street to prevent flooding by channeling runoff to the storm drains.
Mosquito breeding site – A location where mosquitoes can complete their lifecycle.
Public Health Pesticide (PHP) – A pesticide registered by the Environmental Protection Agency and the California Department of Pesticide Regulation for use against insects of public health importance in California.
Underground Storm Drain System (USDS) – A network of conveyance systems that includes catch basins, grates, gutters, underground pipes, creeks, or open channels designed to transport rain from developed areas and discharged to a receiving body of water.
Larvicide - General term used to describe immature mosquito control.

Additional Technical Considerations

USDS, Flood Channels, and Freeway Drains

These sites have unique properties that make it impossible to conduct surveillance for immature mosquitoes prior to every treatment. During the breeding season, nighttime temperature, historical surveillance data, response to arboviral activity, and complaints by residents initiate larval treatment.

Larval Sampling

Due to the skittish nature of some larval species, such as *Cx. erythrothorax*, visual counts of larvae on the water surface, instead of collections, are considered acceptable to consider larvicide applications.

PHP Use and Resistance Management

The PHP's label must be consulted prior to every treatment. PHPs will be rotated at the Operations Director's discretion. If resistance is suspected in the field, laboratory and operations staff should be notified for follow-up.

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Immature Mosquito Guidelines - cont'd.

Factors or conditions that may modify the Immature Mosquito Management Guidelines

Human malaria or encephalitis occurrence.
Encephalitis or malaria mosquito pool isolation.
Sentinel chicken seroconversion.
Cluster of dead animals indicating arboviral activity.
Unforeseen biological or environmental conditions.
Introduction of an invasive disease vector.
Legislation, regulation or precedential legislation.
Availability of District funding, resources, or equipment.
Availability of suitable larvicides.
Susceptibility of immature mosquito populations to larvicides.
Environmental condition not listed in the program.
Continued occurrence of immatures in a development site.
Natural Disasters.

Integrated Vector Management
Immature Mosquito Guidelines

Site Assessment

Criteria	*Evaluation*	*Decision*
Is site a historical mosquito producer?	Yes→	Collect mosquito larvae samples. Consider **source reduction**.
No ↓		
Is site a mitigation wetland?	Yes→	Consult with Supervisor and District Biologist prior to treatment. Consider **larvae sampling criteria.**
No ↓		
Is breeding site an USDS, flood channel, or freeway drain?	Yes→	See technical considerations for **USDS, flood channels, and freeway drains**.
No ↓		
Environmentally sensitive habitat?	Yes→	Consult supervisor about habitat. Avoid damage to sensitive areas. Consider **larvae sampling criteria.**
No ↓		
Are their active bird nests?	Yes→	Do not disturb habitat. Consult with District Biologist.
No ↓		
Are endangered species present?	Yes→	Consult Supervisor about habitat. Avoid taking endangered species.
No ↓		
Vernal pool?	Yes→	Consult Supervisor about habitat. Avoid taking endangered species.
No ↓		
Will mosquitoes develop in the habitat?	No→	Consult Supervisor about habitat. Consider reducing site surveillance. Consider **source reduction**.
Yes ↓		
Sample mosquito breeding site and then consider **source reduction**.		

Integrated Vector Management
Immature Mosquito Guidelines

Source Reduction

Criteria	*Evaluation*	*Decision*
Can I eliminate the mosquito breeding site? Can I remove the water? Can I drain the mosquito breeding site?	Yes→	Institute necessary **source reduction.**
No ↓		
Can habitat be modified to reduce mosquito breeding?	Yes→	Consult with Special Services Institute necessary **source reduction.**
No ↓		
Consider **biorational control measures.**		

Integrated Vector Management
Immature Mosquito Guidelines

Biorational Control Measures

Criteria	*Evaluations*	*Decision*
Will habitat support immature mosquitoes?	No →	Do not apply biorationals. Set a return inspection date.
Yes ↓		
Time water will remain in breeding site?	< 96 hours →	Consider **larvae sampling critiera**.
Semi-permanent or permanent (> 96 hours)		
Yes ↓		
Environmentally sensitive habitat?	Yes→	Consult with supervisor before release of mosquitofish or **larvicide application**.
No ↓		
Water quality?	Highly organic →	Consider **larvae sampling criteria**. Consider stocking mosquito fish. Consider **larvicide application**.
Fresh ↓		
Swimming pool or backyard pond?	Yes→	Can stock mosquitofish. Add to pool list and set a return inspection date.
No ↓		
Can apply mosquito fish if applicable. Set a return inspection date. Consider **larvae sampling criteria.**		

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Integrated Vector Management
Immature Mosquito Guidelines

Larvae Sampling Criteria

Criteria	*Evaluation*	*Decision*
Mosquito stages present?	none→	Do not treat. Set a return inspection date.
eggs to pupa ↓		
Number of immature mosquitoes?	*Anopheles* spp. = 0 immature/40 dips→ *Culex* spp. = 0 immature/20 dips→ *Aedes* spp. or *Culiseta* spp. = 0 immature/10 dips→	Do not treat. Set a return inspection date.
Anopheles spp. ≥ 1 immature/40 dips *Culex* spp. ≥ 1 immature/20 dips *Aedes* spp. or *Culiseta* spp. ≥ 1 immature/10 dips ↓		
Mosquitofish present with immature mosquitoes?	*Anopheles* spp. ≤ 1 immature/40 dips→ *Culex* spp. ≤ 1 immature/20 dips→ *Aedes* spp. or *Culiseta* spp. ≤ 1 immature/10 dips→	Do not treat. Set a return inspection date.
Anopheles spp. ≥ 2 immatures/40 dips *Culex* spp. ≥ 2 immatures/20 dips *Aedes* spp. or *Culiseta* spp. ≥ 2 immatures/10 dips ↓		
Consider **larvicide application.**		

Integrated Vector Management
Immature Mosquito Guidelines

Larvicide Application

Criteria	*Evaluation*	*Decision*
Is development site an USDS, flood channel, or freeway drain?	Yes→	See technical considerations for **USDS, flood channels, and freeway drains**.
No ↓		
Mosquito development site size?	more than 1 acre→	Consult with **Special Services** for treatment.
less than 1 acre ↓		
Water quality	moderate to highly organic *Culex* spp.→	Apply appropriate larvicide and consider **treatment methods.**
Fresh ↓		
Majority of immature stages present?	late 4th to pupae stages→	Apply appropriate larvicide and consider **treatment methods.**
eggs to early 4th larval stages ↓		
Vernal pool?	Yes→	Consult supervisor and consider **treatment methods.**
No ↓		
Fairy shrimp present?	Yes→	Consult supervisor and consider **treatment methods.**
No ↓		
Apply appropriate larvicide and consider **treatment methods.**		

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Integrated Vector Management
Immature Mosquito Guidelines

Treatment Method

Criteria	*Evaluation*	*Decision*
Distribution of immatures?	Isolated locations→	Treat selective areas.
Throughout source ↓		
Treat entire mosquito development site.		

Integrated Vector Management
Immature Mosquito Guidelines

USDS, Catch Basin and Freeway Drain Treatment Criteria

Criteria	*Evaluation*	*Decision*
Historical mosquito breeding site?	Consult historical records, if yes →	Treat with appropriate larvicide every 10-14 days during mosquito season
No ↓		
Standing water present and/or water flowing into site?	Yes→	Treat with appropriate larvicide and schedule inspection in 10-14 days.
No ↓		
Adult mosquitoes seen leaving system.	Yes→	Adulticide storm drain and schedule additional treatment for 10-14 days.
No ↓		
Inspect channel every 10-14 days during mosquito breeding season and consider ecologic criteria.		

Flood Channel Treatment Criteria

Criteria	*Evaluation*	*Decision*
Historical mosquito breeding site?	Consult historical records, if yes →	Collect and identify larvae from site at beginning of mosquito season. Treat with appropriate larvicide every 10-14 days during mosquito season.
No ↓		
Standing water present?	Yes→	Consider ecologic criteria. Treat with appropriate larvicide and schedule inspection in 10-14 days.
No ↓		
Inspect channel every 10-14 days during mosquito breeding season and consider ecologic criteria.		

Integrated Vector Management
Adult Mosquito Guidelines

Definitions

Adult Mosquito Control

The management of adult mosquitoes may consist of application of a PHP by ultra low volume (ULV) application equipment or direct application (barrier treatments) to residences, outbuildings, other structures and mosquito resting sites.

Continuance Criteria

Criteria that trigger additional applications in an area that has previously attained an initiation criterion. These criteria are considered until a termination criterion is achieved for a treatment area.

Initiation Criteria

Criteria that when achieved trigger the initial adult mosquito application measures. At present, the District recognizes eight separate conditions to be adult mosquito control application triggers.

Termination Criteria

Criteria that conclude adult mosquito application measures in a treatment area until initiation criteria are again achieved.

Additional Technical Information

1. **Adult Mosquito Surveillance Devices**
   Each year, a surveillance device and/or method may be selected to measure the adult mosquito population. This device and/or method can be altered at the discretion of the Operations Manager and/or Laboratory Director.
2. **USDS, Catch basins, and Freeway Drains.**
   Adult mosquito control is initiated year round in these habitats when adult mosquitoes are seen flying from manhole covers upon inspection, and based on historical surveillance data.
3. **Evidence of a non-native, mosquito disease vector within District boundaries.**
   In the event a non-native, mosquito disease vector is introduced into Orange County the District will consider a single female specimen the trigger point for adult mosquito management.
4. **Delineate treatment area**
   The Operations Manager has the flexibility to delineate the treatment area for adult mosquito control when mosquito trigger points have been reached. Knowledge gained from surveillance and research can change the phased response recommendations. In the District treatment area, the primary goal of the adult mosquito management program is to maintain *Cx. tarsalis, Cx. quinquefasciatis, Cx. Stigmatostoma, and Cx. erythrothorax* populations below disease transmission levels. These species are the primary target for control because they vector mosquito-borne arboviruses like West Nile virus (WNV), western equine encephalitis (WEE), Saint Louis encephalitis (SLE), or California encephalitis (CE) in Southern California, and may play a role in other diseases, such as dog heartworm. *Anopheles freeborni* is targeted for management because it is a vector of malaria. These additional species are targeted because their biting habits also create a public nuisance. The boundaries of the area to be treated are determined by the mosquito species that achieved the

criterion, species biology and flight range, and the infested area. Defining a boundary does not imply that all or part of that area can or will be treated and that the mosquito species targeted will be eradicated within those boundaries.

Public Health Pesticide Use and Resistance Management

1. Consult Public Health Pesticide (PHP) label before treatment.
2. Apply PHPs within the same class or mode of activity on a rotational basis as determined by the Director of Operations.
3. If resistance is suspected in the field, laboratory and operations staff should be notified for follow-up.

Factors That May Influence the Implementation or Modify the Program

1. Availability of a suitable adulticiding material.
2. Susceptibility of mosquito populations to adulticiding materials.
3. Environmental conditions not listed in the program.
4. Availability of District funding or resources.
5. Legislation, regulation or precedential case authority.
6. Unforeseen biological conditions.
7. Presence or absence of mosquito-borne disease.
8. Introduction of an invasive disease vector of public health importance.

Integrated Vector Management
Adult Mosquito Guidelines

Meterological Conditions for Ground Applications

Temperature inversion?	Absent→	Delay Instituting **Adult Mosquito Management.**
Present ↓		
Wind Speed?	Exceeds PHP label recommendations→	Delay Instituting **Adult Mosquito Management.**
Less than maximum PHP label recommendations ↓		
Institute Adult Mosquito Management with Appropriate Public Health Pesticide.		

Integrated Vector Management
Adult Mosquito Guidelines

Delineate Treatment Area

Is the inititation or continuance criteria met?	Yes→	Define the boundaries of the **Treatment Area** and consider **Agricultural and Land Use Practices.**

Agricultural and Land Use Practices

Are endangered or threatened species present?	Yes→	Consider the presence of Endangered or Threatened Species, then consider **Meterological Conditions** within the **Delineated Treatment Area.**
No ↓		
Environmentally sensitive habitat?	Yes→	Consider treatments compatible with an environmentally sensitive habitat, then consider **Meteorological Conditions** within the **Delineated Treatment Area.**
No ↓		
Organically grown crops?	Yes→	Consider treatments that meet Organic Standards, then consider **Meteorolgical Conditions** within the **Delineated Treatment Area.**
No ↓		
Consider **Meterological Conditions** within the **Delineated Treatment Area.**		

Integrated Vector Management
Adult Mosquito Guidelines

USDS, Catch Basin and Freeway Drain Treatment Criteria

Criteria	*Evaluation*	*Decision*
Historical mosquito breeding site?	Consult historical records, if yes →	Treat with appropriate larvicide every 10-14 days during mosquito season
No ↓		
Standing water present and/or water flowing into site?	Yes→	Treat with appropriate larvicide and schedule inspection in 10-14 days.
No ↓		
Adult mosquitoes seen leaving system.	Yes→	Adulticide storm drain and schedule additional treatment for 10-14 days.
No ↓		
Inspect channel every 10-14 days during mosquito breeding season and consider ecologic criteria.		

Flood Channel Treatment Criteria

Criteria	*Evaluation*	*Decision*
Historical mosquito breeding site?	Consult historical records, if yes →	Collect and identify larvae from site at beginning of mosquito season. Treat with appropriate larvicide every 10-14 days during mosquito season.
No ↓		
Standing water present?	Yes→	Consider ecologic criteria. Treat with appropriate larvicide and schedule inspection in 10-14 days.
No ↓		
Inspect channel every 10-14 days during mosquito breeding season and consider ecologic criteria.		

Integrated Vector Management
Adult Mosquito Guidelines

Initiation Criteria

Criteria	*Evaluation*	*Decision*
#1 Human illness caused by a mosquito-borne pathogen within the District boundaries?	Yes→	Determine level of mosquito activity.
No ↓		
#2 Mosquito-borne pathogen detected in a dead or live bird or another animal within the District boundaries?	Yes→	Determine level of mosquito activity.
No ↓		
# 3 Evidence of a recent serological conversion by a mosquito-borne pathogen in a sentinel chicken or other animal within the District boundaries?	Yes→	Determine level of mosquito activity.
No ↓		
#4 Mosquito-borne pathogen isolated from a mosquito within the District boundaries.	Yes→	Determine level of mosquito activity.
No ↓		
#5 Evidence of a non-native, introduced mosquito species within Distict boundaries.	Yes→	Determine level of mosquito activity.
No ↓		
#6 CDC/CO_2 trap or Gravid Trap collection within the District boundaries of :	50 or more **female** *Cx. tarsalis*, and/or **75 female** *Cx. quinquefasciatus*, *Cx. stigmatastoma* *Cx. erythrothorax*, or *Anopheles* per collection **per trap nights**, and/or→ **5** or more **female** of any *Aedes or* 10 of a *Culiseta* species per collection **per trap nights**, and/or→ **100** or more total **female** mosquitoes per collection **per trap nights**→	Delineate treatment area and consider treatment method.
50 female *Cx. tarsalis,* and/or less than 7**5 female** *Cx. erythrothorax, Cx. stigmatastoma, Cx. quinquefasciatus* or *Anopheles* per collection **per trap nights**, and/or less than 5 **female** of any *Aedes* or 10 of a *Culiseta* species per collection **per trap nights**, and/or less than **100** or more total **female** mosquitoes per collection **per trap nights.** ↓		
#7 Presence of adult mosquitoes in an USDS, catch basin, or freeway drain.	**1** or more *Culex* species →	USDS Treatment Criteria.
↓		
#8 Mosquitoes creating a public health nuisance at a residence.	**1** or more **female** mosquito(s) collected by a homeowner or on a homeowner's property→	Delineate treatment area and consider treatment method.
↓		
Adult mosquito sample not collected.		
Do Not Initiate Adult Mosquito Management		

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Integrated Vector Management
Adult Mosquito Guidelines

Continuance Criteria

Criteria	*Evaluation*	*Decision*
CDC/CO_2 trap or Gravid Trap collection with	**25** or more **female** *Cx. tarsalis, Cx. erythorthorax, Cx. stigmatastoma Cx. quinquefasciatus*, or *Anopheles* per collection per **trap night,** and/or → **5** or more **female** of any *Aedes* or **10** *Culiseta* per collection per **trap night,** and/or → **25** or more total **female** mosquitoes per collection per **trap night** →	Consider Meterological Conditions in the Treatment Area.
less than **25 female** *Cx. tarsalis, Cx. erythorthorax, Cx. stigmatastoma, Cx. quinquefasciatus,* or *Anopheles* per collection per **trap night,** and/or less than **5 female** of any *Aedes* or **10** *Culiseta* per collection per **trap night,** and/or less than **25** total **female** mosquitoes per collection per **trap night** ↓		
Presence of adult mosquitoes in an USDS, catch drains	**1** or more *Culex* species →	USDS Treatment Criteria.
↓		
Do Not Institute Adult Mosquito Management		

Integrated Vector Management
Adult Mosquito Guidelines

Termination Criteria

Criteria	*Evaluation*	*Decision*
Date?	after December 1st →	Terminate Adult Mosquito Control Applications within the delineated treatment area.
before December 1st ↓		
CDC/CO_2 Light trap or Gravid Trap collection with	less than **15** or more **female** *Cx. tarsalis, Cx. quinquefasciatus, Cx. erythrothorax, or Cx. stigmatastoma, or Anopheles* per collection for per **trap night**, and/or→ less than **1 female** of any *Aedes* or **5** *Culiseta* species per collection for per **trap night**, and/or → less than **25** total **female** mosquitoes per collection for **per trap night** →	Terminate Adult Mosquito Control Applications within the delineated treatment area.
15 or more **female** *Cx. tarsalis, Cx. quinquefasciatus, Cx. erythrothorax, or Cx. stigmatastoma* per collection per **trap night**, and/or **1** or more **female** of any *Aedes or* **5** *Culiseta* species per collection per **trap night**, and/or **25** or more total **female** mosquitoes per collection per **trap night** ↓		
Environmental conditions?	10 consecutive nights unfavorable for ULV treatments →	Terminate Adult Mosquito Control Applications within the delineated treatment area.
Favorable for adult mosquito management ↓		
Continue to Consider Continuance Criteria		

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Integrated Vector Management
Adult Mosquito Guidelines

Determine Level of Mosquito Activity

Criteria	*Evaluation*	*Decision*
Malaria case? Mosquito Not Present ↓ Do Not Inititiate Adult Mosquito Management	*Anopheles freeborni* present in a trap within 1/4 mile radius of human case	Delineate Treatment Area.
WNV, WEE, SLE, or other mosquito-borne virus case? Mosquito Not Present ↓ Do Not Institute Adult Mosquito Management	*Cx. tarsalis, Cx. quinquefasciatus,* or another mosquito species that can vector a virus pathogen within a one mile radius of a human case.	Delineate Treatment Area.
Collection of an invasive disease vector within District boundaries.	1 specimen of a **female** invasive disease vector.	Delineate Treatment Area.

Integrated Vector Management

Surveillance Indicators

WNV, SLE or, WEE

Criteria	*Critical Value*
Positive mosquito pool	Ct value <30 for E Primer set or < 35 for NS1 Primer set
Positive dead bird (kidney)	Ct value <30 for E Primer set or < 37 for NS1 Primer set
Positive dead bird (BIC)	Ct value <30 for E Primer set or < 37 for NS1 Primer set
Wild bird seroconversion rate	> 5% of population sampled from a site
Human infection/blood donor	Determined by OCHCA and reported to OCVCD

Malaria

Criteria	*Critical Value*
Malaria parasite.	1 *Plasmodium* spp. as determined by appropriate analysis.

Mosquito Abundance

Criteria	*Definition*
Historical mosquito breeding site.	Consistant mosquito collections at a site in previous years.
Trap night	One trap set for one night. Ten trap nights equals one trap set for ten nights or ten traps set for one night.

Integrated Vector Management
Black fly Guidelines

Black Fly Site Assessment

Criteria	*Evaluation*	*Decision*
Have black flies been identified by laboratory staff?	No→	Do not treat.
Yes ↓		
Does development site contain black fly habitat (flowing water)?	No→	Do not treat.
Yes ↓		
Are their active bird nests?	Yes→	Do not disturb habitat. Consult with District Biologist.
No ↓		
Are endangered species present?	Yes→	Consult supervisor about habitat. Avoid taking endangered species. Sample development site.
No ↓		
Environmentally sensitive habitat?	Yes→	Consult supervisor about habitat. Avoid damage to sensitive areas. Sample development site.
No ↓		
Consider black fly treatment		

Integrated Vector Management
Black fly Guidelines

Black Fly Site Treatment

Criteria	*Evaluation*	*Decision*
Does development site contain black fly habitat (flowing water)?	No→	Do not treat.
Yes ↓		
Water quality		
Fresh ↓		
Apply appropriate **Public Health Pesticide.**		

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Integrated Vector Management
Fly Control Guidelines

Fly Site Assessment

Criteria	*Evaluation*	*Decision*
Have fly larvae been identified from source?	No→	Collect larvae at source for identification.
Yes ↓		
Can source be modified or reduced?	No→	Treat with PHP.
Yes ↓		
Modify or reduce fly source. Return to monitor fly production in 3-5 days.		

Integrated Vector Management
Red Imported Fire Ant Control Guidelines

Definitions

Large treatment site – A RIFA treatment site that is > 1 acre: school, park, golf course, rights-of-way, or multiple family housing such as apartments, duplexes, townhomes, condominiums, or mobile homes.

Mound treatment – A pesticide application of ant bait that eliminates a RIFA colony within 1-3 days.

Mound drench treatment – A pesticide application of a liquid residual insecticide that eliminates a RIFA colony immediately.

PCOs – A Pest Control Operator as licensed by the California Department of Consumer Affairs, Structural Pest Control Board.

Residential site – A single-family home RIFA treatment site.

Stinging incident – An incident where a person is stung multiple times by ants.

Additional Technical Considerations

RIFA Treatment Manual

The RIFA Treatment Manual contains more details and technical specifications for RIFA surveillance, site assessment and treatment. The Manual is provided to all technicians treating for RIFA and is available from the Operations Department on request.

RIFA Public Health Pesticide Use and Resistance Management

1. Consult pesticide label before treatment.
2. Apply pesticides on a rotational basis, as determined by the Director of Operations.
3. If resistance and/or bait aversion is suspected in the field, laboratory and operations staff should be notified for follow-up.

Factors That May Influence the Implementation or Modification of the Program

1. Availability of suitable pesticide bait.
2. Susceptibility of RIFA populations to pesticide bait.
3. Environmental conditions not listed in the guidelines.
4. Availability of District funding or resources.
5. Legislation, regulation, or precedential case authority.
6. Unforeseen biological conditions.
7. Presence or absence of swarming ants and/or a stinging incident.
8. Introduction of an invasive disease vector of public health importance.

Integrated Vector Management
Red Imported Fire Ant Control Guidelines

RIFA Site Assessment & Treatment

Criteria	*Evaluation*	*Decision*
Is property adjacent to waters of the United States?	Yes	Conduct surveillance for RIFA, refer to RIFA treatment manual, and consult management before treatment
No ↓		
Is property considered an environmentally sensitive site or adjacent to an environmentally sensitive site?	Yes	Conduct surveillance for RIFA, refer to RIFA treatment manual, and consult management before treatment
No ↓		
Are endangered species present?	Yes	Conduct surveillance for RIFA, confirm identification of RIFA, refer to RIFA treatment manual, and consult management before treatment.
No ↓		
Is property a single-family residence?	Yes	Conduct surveillance for RIFA, confirm identification of RIFA, refer to RIFA treatment manual, and apply PHPs according to residential treatment guidelines.
No ↓		
Is property a large treatment site (> 1 acre): park, golf course, apartment complex, or condominium complex?	Yes	Conduct surveillance for RIFA, confirm identification of RIFA, consult RIFA treatment manual, and apply PHPs according to large treatment site guidelines.
No ↓		
Is property a school?	Yes	Conduct surveillance for RIFA, confirm identification of RIFA, consult RIFA treatment manual, and apply PHPs according to school treatment site guidelines.
No ↓		
Conduct surveillance for RIFA and consult manager for site treatment protocol.		

Integrated Vector Management
Red Imported Fire Ant Control Guidelines

RIFA Surveillance

Criteria	*Evaluation*	*Decision*
Fire ant mounds visible at site	Yes	Collect a sample and submit to laboratory for identification.
No ↓		
Foraging ants visible at site	Yes	Collect a sample and submit to laboratory for identification.
No ↓		
Place RIFA surveillance lure to collect foraging ants.	Ants on lure	Collect a sample and submit to laboratory for identification.
No ants found on lure ↓		
Site considered free of RIFA		

Integrated Vector Management
Red Imported Fire Ant Control Guidelines

Residential Treatment

Criteria	*Evaluation*	*Decision*
Is site a single-family residence?	No	Refer to District RIFA program.
Yes ↓		
The District RIFA Program conducts initial inspection and treatment within 3 business days.		Conduct **site assessment**. Collect ant sample to confirm RIFA identification by the District. Broadcast treatment with RIFA pesticide ant bait in accordance with pesticide label.
↓		
Referral to PCO for 2nd treatment (month 3)		Broadcast treatment with RIFA pesticide ant bait in accordance with pesticide label.
↓		
RIFA complaint by resident	Yes	OCVCD conducts treatment in accordance with pesticide label.
No ↓		
3rd treatment by PCO (month 6)		Broadcast treatment with RIFA pesticide ant bait in accordance with pesticide label.
↓		
The District post-treatment survey (month 9-12).	RIFA Absent	Site is removed from the residential treatment cycle.
RIFA present ↓		
Begin Residential Treatment Cycle		

Integrated Vector Management
Red Imported Fire Ant Control Guidelines

Large Area RIFA Treatment

Criteria	*Evaluation*	*Decision*
Is site > 1 acre: school, golf course, park, apartment, condominium or rights-of-way?	No	The District RIFA staff will investigate site and determine treatment protocol.
Yes ↓		
Conduct site assessment & RIFA surveillance.	RIFA not present	Provide education to property owner.
RIFA present at site ↓		
Initial treatment		Collect sample to confirm identification. Apply RIFA pesticide bait according to label specifications.
↓		
2nd treatment		Apply RIFA pesticide bait according to label specifications.
↓		
3rd treatment		Apply RIFA pesticide bait according to label specifications.
↓		
The District posttreatment survey (month 9-12).	RIFA Absent	Site is removed from the RIFA Large Site Treatment Cycle.
RIFA present ↓		
Begin RIFA Large-Site Treatment Cycle.		

Additional Technical Considerations

Bait Station Placement – Generally, only two bait stations are placed on a property after the property owner has been instructed to abate rodent harborage and food sources, and signed a Release of Liability form (Appendix I). Bait stations should be placed outside of structures in areas accessible only to rodents. Bait stations should be appropriately labeled and tamper-proof in accordance with rodenticide label requirements. Bait stations should be serviced every six months.

Rat Control & Rodent Disease Surveillance – The District only provides control for rats (*Rattus* spp.) to residents in Orange County. The District conducts surveillance for rodent-borne diseases in Orange County.

Environmentally Sensitive Areas - When properties are adjacent to environmentally sensitive areas, traps should be used prior to bait station placement.

Rodenticide Use and Resistance Management

1. Consult rodenticide label before treatment.
2. Apply rodenticides on a rotational basis as determined by the Director of Operations.
3. If resistance is suspected in the field, laboratory and operations staff should be notified for follow-up.

Factors That May Influence the Implementation or Modify the Program

1. Availability of a suitable rodenticide.
2. Susceptibility of rodent populations to rodenticides.
3. Environmental conditions not listed in the guidelines.
4. Availability of District funding or resources.
5. Legislation, regulation, or precedential case authority.
6. Unforeseen biological conditions.
7. Presence or absence of rodent-borne disease.
8. Introduction of an invasive disease vector of public health importance.

Integrated Vector Management
Rat Control Guidelines

Rodent Control Site Assessment

Criteria	*Evaluation*	*Decision*
Is homeowner, or adult > 18 years old, available for consulation?	No	Reschedule inspection if possible.
Yes ↓		
Interview homeowner about rat activity on their property. ↓		
Conduct inspection of property looking specifically for rodent harborage, food sources, structural issues allowing rodents access to home, and rodent droppings.	Yes	Discuss findings with homeowner, provide educational materials, consider rodent **bait station placement**.
No ↓		
Do not install bait stations and/or remove bait stations and schedule an inspection for 6 months.		

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Integrated Vector Management
Rat Control Guidelines

Rodent Bait Station Placement

Criteria	*Evaluation*	*Decision*
Are rats entering the building?	Yes	Do not place bait station.
No ↓		
Signs of active rodent infestation	Yes	Distribute educational materials and encourage abatement of rodent harborage and food source. Consider rodent bait station placement only after abatement and Release of Liability Form is signed.
No ↓		
Does property have pets and/or small children?	Yes	Distribute educational materials and only place bait station out of reach of pets and small children after Release of Liability Form is signed.
No ↓		
Is adjacent property contributing to a rodent infestation?	Yes	Distribute educational materials and attempt contact of neighbor. Consider rodent bait station placement only after Release of Liability Form is signed.
No ↓		
Is the property adjacent to an environmentally sensitive habitat?	Yes	Distribute educational materials and encourage abatement of rodent harborage and food source. Consider rodent bait station placement only after abatement and after Release of Liability Form is signed.
No ↓		
Consider rodent bait station placement only after abatement and after Release of Liability Form is signed.		

Rat Control Release of Liability

K'WEST PRINTING (714) 997-9630

ORANGE COUNTY VECTOR CONTROL DISTRICT
13001 Garden Grove Blvd., Garden Grove, CA 92843-2102
Phone: (714) 971-2421 • (949) 654-2421
www.ocvcd.org

RELEASE OF LIABILITY

/ /
Date

ZONE NO.	MAP AREA

Thomas Bros. Guide

PAGE NO.	GRID

SERVICE REQUEST NUMBER

The undersigned does hereby RELEASE the ORANGE COUNTY VECTOR CONTROL DISTRICT and its officers, agents, and employees from any and all liability arising out of claims or damage pertaining to the placement of rodenticide on the property address listed below.

The undersigned acknowledges that the rodenticide is a poison that should be considered dangerous and may be lethal. Keep all children and pets away from this rodenticide bait.

X _____
Occupant's Signature

WARNING AND AGREEMENT

THE RODENTICIDE BAITS USED IN ROOF RAT EXTERMINATION CONTAIN POISONS AND SHOULD BE CONSIDERED DANGEROUS AND CAN BE LETHAL IF INGESTED. KEEP ALL CHILDREN AND PETS AWAY FROM PLACED RODENTICIDE BAIT.

If accidentally swallowed by humans, domestic animals, or pets, rodenticides used in roof rat control can reduce the clotting ability of blood and cause internal hemorrhaging. In such cases, immediate medical help should be sought. The antidote recommended for this type of anticoagulant rodenticide is intravenous and oral administrations of Vitamin K combined with blood transfusions. This is the indicated treatment for hemorrhage caused by accidental ingestion of anticoagulant rodenticides.

☐ Dog(s) and/or other domestic pet(s) presently reside on this property. I have been warned of the dangers of this rodenticide being ingested by dog(s) and other domestic pet(s). I will keep my pets away from the rodenticide bait and containers. **X** _____ Occupant's Signature	☐ No dogs reside on property.

I request that the ORANGE COUNTY VECTOR CONTROL DISTRICT take such steps as are necessary to control roof rat infestation and give my permission for the use of rodenticide bait on my property. I have read the warnings as to the dangers inherent with the use of rodenticide bait and hereby release the ORANGE COUNTY VECTOR CONTROL DISTRICT from any liability for injury, death, and/or damage that may arise from such use.

I agree to warn all persons coming on to my property of the presence of rodenticide thereon, and also agree to indemnify, defend, and hold ORANGE COUNTY VECTOR CONTROL DISTRICT harmless from any claim, liability, injury, death, and/or damage resulting from or caused by the use of said rodenticide.

I further agree to follow the recommendations made by the VECTOR CONTROL INSPECTOR in regard to roof rat control and prevention. In the event that I sell or vacate this property, or feel that the rat problem has abated, I will notify the ORANGE COUNTY VECTOR CONTROL DISTRICT for proper disposal of any existing rodenticide placed on my property.

I understand that in the event that the recommendations presented by the VECTOR CONTROL INSPECTOR are not followed, that no further rat control measures will be taken by the ORANGE COUNTY VECTOR CONTROL DISTRICT.

I have been advised to rat-proof the structures on my property and agree that the ORANGE COUNTY VECTOR CONTROL DISTRICT has no obligation to remove any carcasses from my property.

X _____
Occupant's Signature

_____
Occupant's Name (Please Print)

_____
Street Address Apt. No.

_____
City Zip Code

_____
Telephone Number

_____
Inspector's Name Phone Ext. No.

/ / Date Replaced / / Date Removed

DO NOT RELOCATE BAIT BLOCKS OR BAIT STATIONS.

BAIT PLACEMENT DIAGRAM

(FRONT)

Number of Bait Blocks Placed: Chlorophacinone_____Bromadiolone_____

Number of Bait Stations Placed: ☐ Number of Bait Stations Replaced: ☐ Number of Bait Stations Removed: ☐

White Copy - Administrative Yellow Copy - Occupant Pink Copy - Inspector

Appendix II

California Mosquito-Borne Virus Surveillance and Response Plan

Separate Document