

RECEIVED

MAR 07 2011

ATTACHMENT G – NOTICE OF INTENT

WATER QUALITY ORDER NO. 2011-XXXX-DWQ
GENERAL PERMIT NO. CAG XXXXXX

DIVISION OF WATER QUALITY

STATEWIDE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM PERMIT
FOR BIOLOGICAL AND RESIDUAL PESTICIDE DISCHARGES TO WATERS OF THE
UNITED STATES
FROM VECTOR CONTROL APPLICATIONS

I. NOTICE OF INTENT STATUS (see Instructions)

Mark only one item A. New Applicator B. Change of Information: WDID# _____
 C. Change of ownership or responsibility: WDID# _____

II. DISCHARGER INFORMATION

A. Name Orange County Vector Control District			
B. Mailing Address 13001 Garden Grove Blvd.			
C. City Garden Grove	D. County Orange	E. State CA	F. Zip Code 92843
G. Contact Person Larry Shaw	H. Email address lshaw@ocvcd.org	I. Title Dir. of Operations	J. Phone (714)971-2421

III. BILLING ADDRESS (Enter Information only if different from Section II above)

A. Name			
B. Mailing Address			
C. City	D. County	E. State	F. Zip Code
G. Email address	H. Title	I. Phone	

IV. RECEIVING WATER INFORMATION

A. Pesticide residues Biological and residual pesticides discharge to (check all that apply)*:

- Canals, ditches, or other constructed conveyance facilities owned and controlled by Discharger.
 Name of the conveyance system: _____
- Canals, ditches, or other constructed conveyance facilities owned and controlled by an entity other than the Discharger.
 Owner's name: Various private and government ownership
Name of the conveyance system: all water conveyance systems in Orange County
- Directly to river, lake, creek, stream, bay, ocean, etc.
 Name of water body: waters of the US, all waters that breed vectors

* A map showing the affected areas for items 1 to 3 above may be included.

B. Regional Water Quality Control Board(s) where application areas are located (REGION 1, 2, 3, 4, 5, 6, 7, 8, or 9): 8 and 9
(List all regions where pesticide application is proposed.) See Exhibits 1-3

A map showing the locations of A1-A3 in each Regional Water Board shall be included.

V. PESTICIDE APPLICATION INFORMATION

A. Target Organisms: Vector Larvae Adult Vector

B. Pesticides Used: List Name, and aActive ingredients and, if known, degradation by-products
See Table 1.

C. Period of Application: Start Date Continuous End Date Continuous

D. Types of Adjuvants Added by the Discharger: water and mineral oil

VI. PESTICIDES APPLICATION PLAN

A. Has a Pesticides Application Plan been prepared?*

Yes No

If not, when will it be prepared? _____

* A copy of the PAP shall be included with the NOI.

B. Is the applicator familiar with its contents?

Yes No

TENTATIVE ORDER

VII. NOTIFICATION

Have potentially affected governmental agencies been notified?

Yes No

* If yes, a copy of the notifications shall be attached to the NOI.

VIII. FEE

Have you included payment of the filing fee (for first-time enrollees only) with this submittal?

Yes NO NA

IX. CERTIFICATION

"I certify under penalty of law that this document and all attachments were prepared under my direction and supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine or imprisonment. Additionally, I certify that the provisions of the General Permit, including developing and implementing a monitoring program, will be complied with."

A. Printed Name: Michael G. Hearst

B. Signature: *M.G. Hearst*

Date: 3/3/11

C. Title: District Manager

X. FOR STATE WATER BOARD USE ONLY

WDID:	Date NOI Received:	Date NOI Processed:
Case Handler's Initial:	Fee Amount Received: \$	Check #:

INITIATIVE
ORDER

NOI Supplemental Attachment - IV. Receiving Water Information

Below is a list of the receiving waters in Orange County. These features, their tributaries, lakes, reservoirs, marshes, unnamed drainages, ditches and the water conveyances and infrastructure throughout the county can be subject to mosquito control applications by the Orange County Vector Control District (see associated map).

List of Orange County Receiving Waters by Water Quality Control Board Regions

Santa Ana Region 8

Anaheim Bay-Huntington Harbour

- Bolsa Chica Channel
- Bolsa Chica Wetlands
- East-Garden Grove Wintersburg Channel
- Westminster Channel

Newport Bay

- Big Canyon Wash
- Costa Mesa Channel
- Santa Isabella Channel
- Santa Ana Delhi

San Diego Creek

- Peters Canyon Wash

Newport Coast

- Muddy Creek

San Gabriel River

- Coyote Creek
- Carbon Creek

Santa Ana River

- Santiago Creek

San Diego Region 9

Aliso Creek

- Wood Canyon
- Sulphur Creek
- Aliso Hills Channel
- English Channel

Dana Point Har

Salt Creek

Laguna Canyon Creek

- Boat Canyon Drainage
- Blue Bird Canyon Drainage
- Rim Rock Canyon Drainage
- Hobo Canyon Drainage
- Emerald Canyon Drainage

Prima Deshecha Canada

Prima Deshecha

Segunda Deshecha Canada

San Juan Creek

- Arroyo Trabuco
- Oso Creek

San Mateo Creek

Regional Water Quality Boards within Orange County, Ca

Los Angeles Co.

San Bernardino Co.












Riverside Co.




San Diego Co.

Santa Ana Region 8

San Diego Region 9

Orange County Watershed Boundaries

- | | |
|--|--|
|  Aliso Creek |  San Clemente Coastal Streams |
|  Anaheim Bay-Huntington Harbour |  San Gabriel-Coyote Creek |
|  Dana Point Coastal Streams |  San Juan Creek |
|  Laguna Coastal Streams |  San Mateo Creek |
|  Newport Bay |  Santa Ana River |
|  Newport Coastal Streams | |

-  Water Bodies and Conveyance Systems
-  Orange County Boundary
-  Regional Water Quality Control Boards Boundary



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MAR 07 2011

DIVISION OF WATER QUALITY

PESTICIDE APPLICATION PLAN

For the Biological and Residual Pesticide Discharges to Surface Waters of
the US by the Orange County Vector Control District

FOR WATER QUALITY ORDER NO. 2011-XXXX-DWQ STATEWIDE NATIONAL
POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT FOR
BIOLOGICAL AND RESIDUAL PESTICIDE DISCHARGES TO WATERS OF THE OF
THE UNITED STATES FROM VECTOR CONTROL APPLICATIONS (GENERAL
PERMIT) NO. CAG*****

March 4, 2011

Prepared for:

State Water Resources Control Board
Santa Ana Regional Water Quality Control Board (Region 8)
San Diego Regional Water Quality Control Board (Region 9)

Prepared by:

Orange County Vector Control District
13001 Garden Grove Blvd.
Garden Grove, CA 92843
Contact: Larry Shaw, Director of Operations
Telephone: (714) 971-2421
Fax: (714) 971-3940

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Introduction

The Orange County Vector Control District (the District) is a public health agency charged with protecting the citizens of Orange County from vectors and vector-borne disease under Division 3 (Pest Abatement) of the California Health and Safety Code (CAL. HSC. § 2000-2910). The District is an Independent Special District that carries out its mission with a balanced approach focused on protecting public health and the environment. The District's operations are based out of the city of Garden Grove, California, and service all 789 square miles of Orange County, home to more than three million residents. Service is provided to all 34 cities within Orange County as well as unincorporated areas, federal and state lands. The District operates year-round to control mosquitoes, other flies, red imported fire ants (RIFA), and rats.

The District is within the jurisdiction of the Santa Ana Regional Water Quality Control Board (Region 8) and the San Diego Regional Water Quality Control Board (Region 9), and is seeking coverage under the General Permit No. CAG **** as "a public entity" that applies biological and residual pesticides for vector control in or near waters of the United States (Exhibit 1). The District has previously obtained coverage under General Permit Order No. 2004-0008-DWQ for application of aquatic pesticides (larvicides) for vector control. This new Order No. 2011-**** replaces Order No. 2004-0008-DWQ and covers adulticides (pesticides used to control adult mosquitoes) in addition to larvicides (pesticides used to control aquatic larval stages of immature mosquitoes).

The District utilizes an Integrated Vector Management (IVM) Program strategy to control the production of mosquitoes, filth flies and black flies, red imported fire ants (RIFA), and rats. The IVM Program consists of the following activities: 1) Surveillance for vectors, vector habitats, and associated pathogens/diseases-this includes field and laboratory analysis of vectors in order to evaluate populations and emerging disease threats; 2) Source reduction to limit breeding by vectors; this includes management of vegetation, land, and water with appropriate landowners to minimize vector production; 3) Education and outreach efforts targeted toward the public and private landowners in ways to facilitate source reduction and minimize disease-carrying vectors; 4) Distribution of mosquito fish (*Gambusia affinis*), a biological control measure used to reduce mosquito production isolated aquatic features, such as neglected residential swimming pools; and 5) Application of pesticides to minimize vector populations and reduce the threat of potential vector-borne disease transmission to humans.

The District is a member of the Mosquito and Vector Control Association of California (MVCAC), a statewide association of over 60 mosquito and vector control agencies. The District has joined the MVCAC NPDES Coalition Monitoring Program in an effort to meet water quality testing requirements set forth in this General Permit.

As required under Section VIII. Pesticide Use Requirements. C., of the General Permit, the District is submitting this document as its Pesticide Application Plan for review and approval by the State Water Resources Control Board (SWRCB).

Excerpts from Section VIII. Pesticide Use Requirements. C. Pesticide Application Plan., are included in ***bold italics***.

1 Description of Target Areas

Description of the ALL target areas and adjacent areas, if different from the water body of the target area, in to which larvicides and adulticides pesticides are being planned to be applied or may be applied to control vectors. The description shall include adjacent areas, if different from the water body of the target areas.

Orange County (the County) is a coastal county comprised of approximately 789 square miles. It is bordered on the southwest by the Pacific Ocean, on the north by Los Angeles County, on the northeast by San Bernardino County and Riverside County, and on the southeast by San Diego County. The northwestern part of the county lies on the coastal plain of the Los Angeles Basin, while the southeastern end rises into the foothills of the Santa Ana Mountains. With a Mediterranean climate, Orange County has a diversity of land uses ranging from urban/metropolitan centers, agricultural croplands, and residential communities as well as regional parks and national forests. The County also has nearly 40 miles of the Pacific Ocean coastline.

The District applies pesticides for the purpose of vector control to locations within the jurisdiction of two different Regional Water Quality Control Boards (RWQCBs): Santa Ana, Region 8 and San Diego, Region 9 (Exhibit 1). Watersheds of Orange County include the larger Santa Ana River, San Gabriel-Coyote Creek, Anaheim Bay-Huntington Harbor, Newport Bay, Aliso Creek, San Juan Creek, San Mateo Creek, and the smaller San Clemente Coastal Streams, Dana Point Coastal Streams, Laguna Coastal Streams, and Newport Coastal Streams watersheds (County of Orange, 2008). All watersheds in Orange County are potentially subject to treatment applications if threshold levels of target vectors are present.

The receiving water systems in Orange County which are subject to pesticide applications by the District include any and all navigable waters and their tributaries, waters of the State, and waters of the US in Orange County and any adjacent to District boundaries that breed mosquitoes, black flies, or midges. This includes water features like the Santa Ana River and its tributaries, any and all flood control channels, basins, storm drains, gutters, roadside low spots, backyard pools, ponds, wetlands and any stagnant water feature found to be breeding mosquitoes exceeding threshold numbers.

For more specific application areas/sites see Section 4 of this document.

2 Pesticide Selection Factors

Discussion of the factors influencing the decision to select pesticide applications for mosquito vector control.

The District's Board of Trustees adopted an Integrated Vector Management & Response Plan (the IVM Plan) in May of 2010 (Appendix 1). The District's IVM Plan outlines surveillance and control measures for vectors in Orange County. The purpose of the IVM Plan is to provide guidelines to the District's 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. This document details the roles and responsibilities of Management, Administration, Communications, Scientific/Technical, 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. The IVM Plan includes guidelines for surveillance for vectors and disease, site assessment, source reduction, biorational and chemical control methods, and public education. The IVM Plan establishes specific thresholds for the initiation of physical and chemical control based on numbers and species of vectors and the presence or absence of infective agents. Treatment thresholds are established for mosquito developmental sites in the IVM Plan where potential disease vector and/or nuisance risks are evident. Only those sources that represent imminent threats to public health or quality of life are treated.

Treatment thresholds are based on the following criteria: mosquito species present, mosquito stage of development, nuisance or disease potential, mosquito abundance, flight range, proximity to populated areas, size of source, presence/absence of natural enemies or predators, and presence of sensitive/endangered species.

When thresholds are exceeded, an appropriate control strategy is implemented. Control strategies are selected to minimize potential environmental impacts while maximizing efficacy. The method of control is based on the above threshold criteria but also habitat type, water conditions and quality, weather conditions, cost, site accessibility, size of site and a number of other factors as specified in the IVM Plan.

Considerations are also drawn from and in accordance with the California Mosquito-borne Virus and Surveillance & Response Plan (Appendix 2).

3 Types of Pesticide Products

The types of pesticides used in mosquito control and the methods of applications are discussed in detail and listed in the Best Management Practices for Mosquito Control in California (Appendix 3).

The District plans to use the pesticides listed in attached Table 1 below in 2011 and reserves the right to use any product approved under the terms of this General Permit.

Table 1. Planned Pesticides for Use by Orange County Vector Control District.

PESTICIDES USED FOR MOSQUITO CONTROL AT ORANGE COUNTY VECTOR CONTROL DISTRICT

Active Ingredient	Trade Name	EPA Reg. No.	Manufacturer	Formulation	Active Ingredient	Application	Pesticide Classification
Bacillus thuringiensis israelensis (Bti)	VectoBac 12AS	73049-38	Valent BioSciences Corporation	Liquid	11.61%	Larvae	Biorational
Bacillus thuringiensis israelensis (Bti)	VectoBac G	73049-10	Valent BioSciences Corporation	Granules	2.80%	Larvae	Biorational
Bacillus sphaericus (Bs)	VectoLex CG	73049-20	Valent BioSciences Corporation	Granules	7.5%	Larvae	Biorational
Bacillus sphaericus (Bs)	VectoLex WSP	73049-20	Valent BioSciences Corporation	Water Soluble Pouches	7.5%	Larvae	Biorational
Bacillus sphaericus (Bs)	VectoLex WDG	73049-57	Valent BioSciences Corporation	Water Disperible Granules	51.2%	Larvae	Biorational
Bacillus sphaericus (Bs) 6% Bacillus thuringiensis israelensis (Bti) 1%	FOURSTAR	83362-3	Fourstar Microbials	Briquet	7.0%	Larvae	Biorational
Spinosad	Natular 2EC	8329-82	Clarke Mosquito Control Products, Inc.	Liquid	21%	Larvae	Biorational
Monomolecular Film	Agnique MMF	53263-28	Cognis Corporation	Liquid	100%	Larvae & Pupae	Surface Film
Monomolecular Film	Agnique MMF-G	53263-30	Cognis Corporation	Granules	32%	Larvae & Pupae	Surface Film
Aliphatic Petroleum Hydrocarbons	Mosquito Larvicide GB-1111	8329-72	Clarke Mosquito Control Products, Inc.	Liquid	98.7%	Larvae & Pupae	Surface Film
Highly refined petroleum distillate	BVA 2	70589-1	BVA OILS	Liquid	97.0%	Larvae & Pupae	Surface Film
S-Methoprene	Altosid Briquets	2724-375	Wellmark International Zoecon	Briquet	8.62%	Larvae	IGR
S-Methoprene	Altosid XR Extended Residual Briquets	2724-421	Wellmark International Zoecon	Briquet	2.1%	Larvae	IGR
S-Methoprene	Altosid Liquid Larvicide Concentrate	2724-446	Wellmark International Zoecon	Liquid	20%	Larvae	IGR
S-Methoprene	Altosid Pellets Mosquito Growth Regulator	2724-448	Wellmark International Zoecon	Pellet-type Ganules	4.25%	Larvae	IGR
S-Methoprene	AQUAPRENE XL Briquets	75318-9	B2E Biotech	Briquet	2.50%	Larvae	IGR
S-Methoprene	AQUAPRENE XL Granules	75318-7	B2E Biotech	Granules	2.80%	Larvae	IGR
Sumithrin 10% Piperonyl Butoxide 10%	Aqua Anvil	1021-1807-8329	Clarke Mosquito Control Products, Inc.	Liquid	20.00%	Adult	Pyrethroid
Etofenprox 20%	Zenivex E20	2724-791	Wellmark International Zoecon	Liquid	20.00%	Adult	Pyrethroid

4 Description of Application Areas

Description of ALL the application areas and the target areas in the system that are being planned to be applied or may be applied. Provide a map showing these areas.*

Any site that holds water for more than 96 hours (4 days) can produce mosquitoes. Source reduction is the District's preferred solution, and whenever possible the District works with property owners to effect long-term solutions to reduce or eliminate the need for continued applications as described in Best Management Practices for Mosquito Control in California (Appendix 3).

The targets for application projects are primarily the immature aquatic stages of insect vectors, including mosquitoes, midges, and black flies, which predominantly breed in standing or slow-moving water. These insect disease vectors may pose a threat to human public health, especially due to the risk they may spread West Nile virus, and require treatment to eliminate or minimize the health risks. Using the District's IVM Plan (Appendix 1) decision matrix, District personnel use pesticides as a last resort to treat water features that have undesirable insect pest vectors exceeding threshold levels. Larvicides are applied at larval mosquito development sites which can include drainage channels, riparian areas, wetlands, roadside ditches, neglected swimming pools, ornamental ponds, catch basins, detention/retention basins, and potentially, any aquatic site or low lying area that has standing water for longer than 96 hours. Many of these applications take place in urban watershed storm water conveyance systems. Exhibit 2 depicts the anticipated larviciding application areas within water conveyance systems throughout the County based on 2010 treatment application data. Additional application areas include breeding locations within the coastal wetlands, and intermittent or ephemeral streams.

Areas requiring larvicide applications are treated, as necessary, primarily from spring to late fall during the warmest months (approximately March – November). However, if vectors are a persistent problem at some locations, applications may be made year-round. Pesticides are applied only when a vector is present at threshold levels, and to water that will be present for at least 96 hours.

Directing our main efforts at controlling mosquito larvae allows the District to localize treatments and use the least toxic alternatives. Adult mosquitoes may occasionally be targeted for control. However, since pesticides must be applied over a greater area and are less selective, the District avoids using them wherever possible. Currently, there are four sites in the County that are receive adulticide treatment when they exceed threshold levels due to persistent mosquito breeding conditions and their proximity to human populations (Exhibit 3).

5 Other Control Methods Used

Other control methods used (alternatives) and their limitations.

With any mosquito or other vector source, the District's first goal is to look for ways to eliminate the source, or, if that is not possible, for ways to reduce the vector potential. The most commonly used methods and their limitations are included in the Best Management Practices for Mosquito Control in California (Appendix 3). In addition, the District has recently formalized its agency-specific Vector Reduction Program by developing and adopting the Vector Reduction Manual: Procedures & Guidelines (the VRM) (Appendix 4). This document describes how the District aims to work with property owners to reduce or eliminate vector-favorable conditions by encouraging the implementation of Vector Reduction Guidelines, which are based on IVM techniques and strategies.

Some specific methods used by the District include educating residents that mosquitoes develop in standing water and encouraging them to remove sources of standing water on their property, working with property owners to find long-term water/environmental management strategies that meet their needs while minimizing the need for public health pesticide applications, and use of non-pesticide biological control agents like mosquito fish, *Gambusia affinis*, when appropriate.

6 Anticipated Product Amounts

Approximately how much product is needed/anticipated to be used and how this amount was determined.

The total amounts of mosquito control pesticides applied by the District from January 2010 – December 2010 are shown in Table 2 below. These amounts serve as an approximation of the amount of product anticipated for annual future use. Several factors influence the amounts of pesticides applied, which can include rainfall, weather patterns, disease outbreak, and availability of products.

Table 2. Pesticide Usage for Mosquito Control by OCVCD (January 2010 – December 2010).

Jan 2010 – Dec 2010			
Product	Amount	Unit	No. of Applications
Altosid Pellets	816.79	pounds	518
Altosid Briquets	50.82	pounds	559
Altosid XR Briquets	1,158.54	pounds	2,945
GB-1111	948.72	gallons	2,529
BVA-2	1,351.72	gallons	220
Aquaprene XL Briquets	30.00	pounds	3.0
Aquaprene XL Granules	19.00	pounds	2.0
Agnique MMF	4,426.30	ounces	823
Agnique MMF-G	157.00	pounds	19
Vectobac G	42,619.50	pounds	2,085
Vectobac 12AS	138.26	gallons	542
Vectolex CG	1,444.00	pounds	4.0
Vectolex WDG	294.56	pounds	121
Aqua Anvil	98.39	gallons	181

Please note that the District intends to discontinue the use of Golden Bear (GB-1111), as this product is no longer being manufactured.

7 Monitoring Locations

Representative monitoring locations and the justification for selecting these monitoring locations.*

The District is a member of the MVCAC NPDES Coalition Monitoring Program (the Coalition). The Coalition will expedite the Monitoring and Reporting Plan to the State Water Resources Control Board.

8 Evaluation of Available BMPs

Evaluation of available BMPs to determine if there are feasible alternatives to the selected pesticide application project that could reduce potential water quality impacts.

The District uses BMPs described in its own IVM Plan (Appendix 1) and Vector Reduction Manual (Appendix 4), as well as practices in accordance with state guidelines from the Best Management Practices for Mosquito Control in California (Appendix 3) and the California Mosquito-borne Virus and Surveillance & Response Plan (Appendix 2).

Prior to each pesticide application, all feasible alternatives are evaluated. Protocol for these evaluations are discussed in the aforementioned documents.

9 Description of BMPs

Description of the BMPs to be implemented. The BMPs shall include, at the minimum.

The District uses BMPs described in its own IVM Plan (Appendix 1) and Vector Reduction Manual (Appendix 4), as well as practices in accordance with state guidelines from the Best Management Practices for Mosquito Control in California (Appendix 3) and the California Mosquito-borne Virus and Surveillance & Response Plan (Appendix 2).

9.1 Measures to Prevent Pesticide Spill

District staff monitors application equipment on a daily basis to ensure it remains in proper working order. Spill mitigation devices are placed in all spray vehicles and pesticide storage areas to respond to spills. Employees are trained on spill prevention and response annually. All safety, handling, and use requirements and instructions are followed per pesticide product labels and Material and Safety Data Sheets.

9.2 Measures to Ensure Minimum and Consistent Amount Used

Spray equipment is calibrated each year and is a part of stipulation of the Cooperative Agreement, a Memorandum of Understanding with the California Department of Public Health. All safety, handling, and use requirements and instructions are followed per pesticide product labels and Material and Safety Data Sheets.

9.3 Applicator Education on Adverse Effects of Pesticide Application

The California Vector Control Technician Certification and Continuing Education Guidelines (CPDH, 2007) describes all topics that vector control technicians are trained and certified in. Applicators are required to complete pesticide training annually.

9.4 BMPs for Pesticide Products Used

District will calibrate truck and hand larviciding equipment each year to meet application specifications. Supervisors review spray records daily to ensure appropriate amounts of material are being used. When used aerial larviciding equipment is calibrated by an independent contractor. Ground-based Ultra Low Volume (UVL) adulting equipment is calibrated for output and droplet size to meet label requirements. All safety, handling, and use requirements and instructions are followed per pesticide product labels and Material and Safety Data Sheets.

9.5 BMPs for Environmental Setting

The District uses environmental setting, specific BMPs described in its own IVM Plan (Appendix 1) and Vector Reduction Manual (Appendix 4), as well as practices in accordance with state guidelines from Best Management Practices for Mosquito Control in California (Appendix 3) and the California Mosquito-borne Virus and Surveillance & Response Plan (Appendix 2).

10 Identification of the Problem

Prior to first pesticide application covered under this General Permit that will result in a discharge of biological and residual pesticides to waters of the US, and at least once each calendar year thereafter prior to the first pesticide application for that calendar year, the Discharger must do the following for each vector management area.

10.1 Establishment of Vector Populations

If applicable, Establish densities for larval and adult vector populations to serve as action threshold(s) for implementing pest management strategies;

Only those mosquito sources that District staff determine to represent imminent threats to public health or quality of life are treated. The presence of any mosquito may necessitate treatment, however higher thresholds may be applied depending on the District's resources, disease activity, or local needs. Treatment thresholds are based on a combination of one or more of the following criteria: mosquito species present, mosquito stage of development, pest, nuisance, or disease potential, disease activity, mosquito abundance, flight range, proximity to populated areas, size of source, presence/absence of natural enemies or predators, and presence of sensitive/endangered species or habitats. This is discussed in detail in the District's IVM Plan (Appendix 1).

10.2 Identification of Target Vector Species

Identify target vector species to develop species-specific pest management strategies based on developmental and behavioral considerations for each species;

The District address this practice as discussed in its IVM Plan (Appendix 1) and Vector Reduction Manual (Appendix 4), as well as practices in accordance with state guidelines from the Best Management Practices for Mosquito Control in California (Appendix 3) and the California Mosquito-borne Virus and Surveillance & Response Plan (Appendix 2) that are used by this agency.

10.3 Identification of Known Breeding Areas

Identify known breeding areas for source reduction, larval control programs and habitat management;

Any site that holds water for more than 96 hours (4 days) can produce mosquitoes. Source reduction is the District's preferred solution, and whenever possible, the District works with property owners to implement long-term solutions to reduce or eliminate the need for continued applications. The District address this practice as discussed in its IVM Plan (Appendix 1) and Vector Reduction Manual (Appendix 4), as well as practices in accordance with state guidelines from the Best Management Practices for Mosquito Control in California (Appendix 3) and the California Mosquito-borne Virus and Surveillance & Response Plan (Appendix 2).

10.4 Analysis of Surveillance Data

Analyze existing surveillance data to identify new or unidentified sources of vector problems as well as areas that have recurring vector problems.

The District continually collects adult and larval mosquito surveillance data, dead bird reports, avian seroprevalence test results, and uses them to guide mosquito control activities. The District address this practice as discussed in its IVM Plan (Appendix 1) and Vector Reduction Manual (Appendix 4), as well as practices in accordance with state guidelines from the Best Management Practices for Mosquito Control in California (Appendix 3) and the California Mosquito-borne Virus and Surveillance & Response Plan (Appendix 2).

11 Examination of Alternatives to Treatments

Dischargers shall continue to examine alternatives to pesticide use to reduce the need for applying larvicides that contain temephos and for spraying adulticides. Such methods include:

a. Evaluating the following management options, in which the impact to water quality, impact to non-target organisms, vector resistance, feasibility, and cost effectiveness should be considered: no action, prevention, mechanical or physical methods, cultural methods, biological control agents, or pesticides.

If there are no alternatives to pesticides, dischargers shall use the least toxic pesticide necessary to control the target pest.

b. Applying pesticides only when vector are present at a level that will constitute a nuisance

c. Using the least intrusive method of pesticide application.

d. Public education efforts to reduce potential vector breeding habitat.

e. Applying a decision matrix concept to the choice of the most appropriate formulation.

These criteria are described in the District's existing Integrated Vector Management Program. The District address this practice as discussed in its IVM Plan (Appendix 1) and Vector Reduction Manual (Appendix 4), as well as practices in accordance with state guidelines from the Best Management Practices for Mosquito Control in California (Appendix 3) and the California Mosquito-borne Virus and Surveillance & Response Plan (Appendix 2).

12 Correct Use of Pesticides

Users Coalition's or Discharger's use of pesticides must ensure that all reasonable precautions are taken to minimize the impacts caused by pesticide applications. Reasonable precautions include using the right spraying techniques and equipment, taking account of weather conditions and the need to protect the environment.

This is an existing practice of the District, and is required to comply with the Department of Pesticide Regulation's (DPR) requirements and the terms of the MOU with the CDPH's and the District's Cooperative Agreement. All pesticide applicators receive annual safety and spill training in addition to their regular continuing education. All errors in application and spills are reported to the proper authority.

13 Public Notices

Specify a website where public notices, required in Section VIII.B, may be found.

Attached as Appendix 5 is the Public Notice the District will distribute to potentially affected government agencies and post on its website (www.ocvcd.org).

14 Pesticide Application Log

The application log will contain, at a minimum, the following information, when practical, for larvicide or adulticide applications:

- 1. Date of application;*
- 2. Location of the application and target areas (e.g., address, crossroads, or map coordinates);*
- 3. Name of applicator;*
- 4. The names of the water bodies treated (i.e., specific canal, creek, lake, etc.);*
- 5. Application details, such as application started and stopped, pesticide application rate or concentration, pesticide(s) and adjuvants used by the Discharger, and volume or mass of each component discharged. For larvicide application details shall also include flow rate of the target area, surface water area, and volume of water treated; and*
- 6. Visual monitoring assessment for larvicide applications and adulticide applications, unless inappropriate; and*
- 7. Certification that applicators followed the PAP.*

This is an existing practice of the District as required to comply with DPR regulations and the MOU with the CDPH. The District will maintain a log of each pesticide application per the requirements of this General Permit Section VIII.E.

15 References

California Department of Public Health. 1989. The California Vector Control Technician Certification and Continuing Education Guidelines (2007 Revision). Accessed 3/03/2011 <http://www.cdph.ca.gov/certlic/occupations/Documents/VCTCEGuide.pdf>

County of Orange. 2008. Orange County General Plan 2005 (2008 Revision). Accessed 3/03/2011 <http://www.ocplanning.net/GeneralPlan2005.aspx>

State Water Resources Control Board (SWRCB), 2011, Water Quality Order No. 2011-XXXX-DWQ, Statewide General National Pollutant Discharge Elimination System Permit For Biological and Residual Pesticide Discharges to Waters of Waters Of The United States From Vector Control Vector Control Applications (General Permit No. CAG *****).

EXHIBIT 1

Orange County Vector Control District Jurisdictional Map

Los Angeles Co.

San Bernardino Co.

Riverside Co.

Santa Ana Region 8

San Diego Region 9

San Diego Co.

— Orange County Boundary

— Regional Water Quality Control Boards Boundary

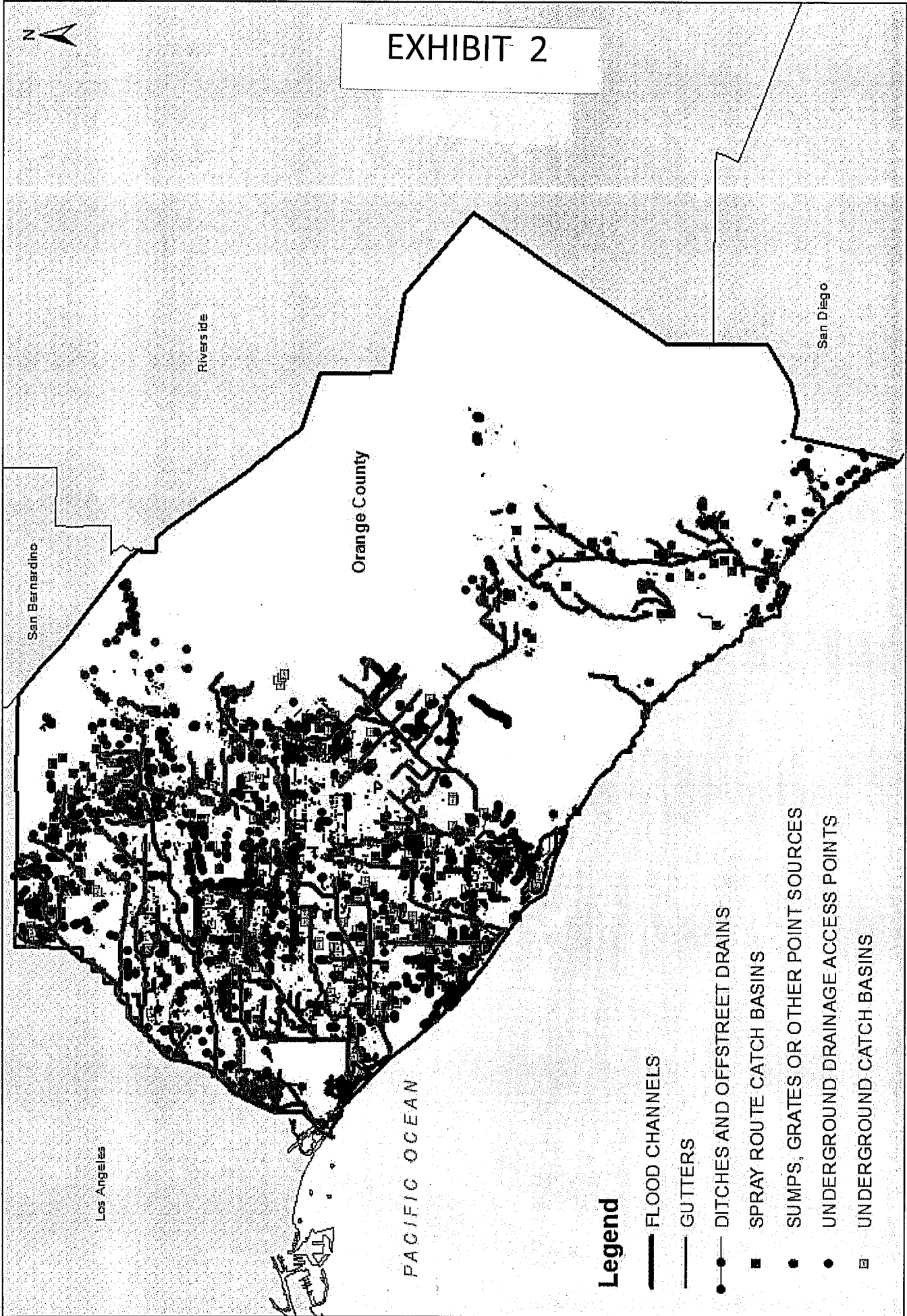
□ Orange County Vector Control District Jurisdiction

N



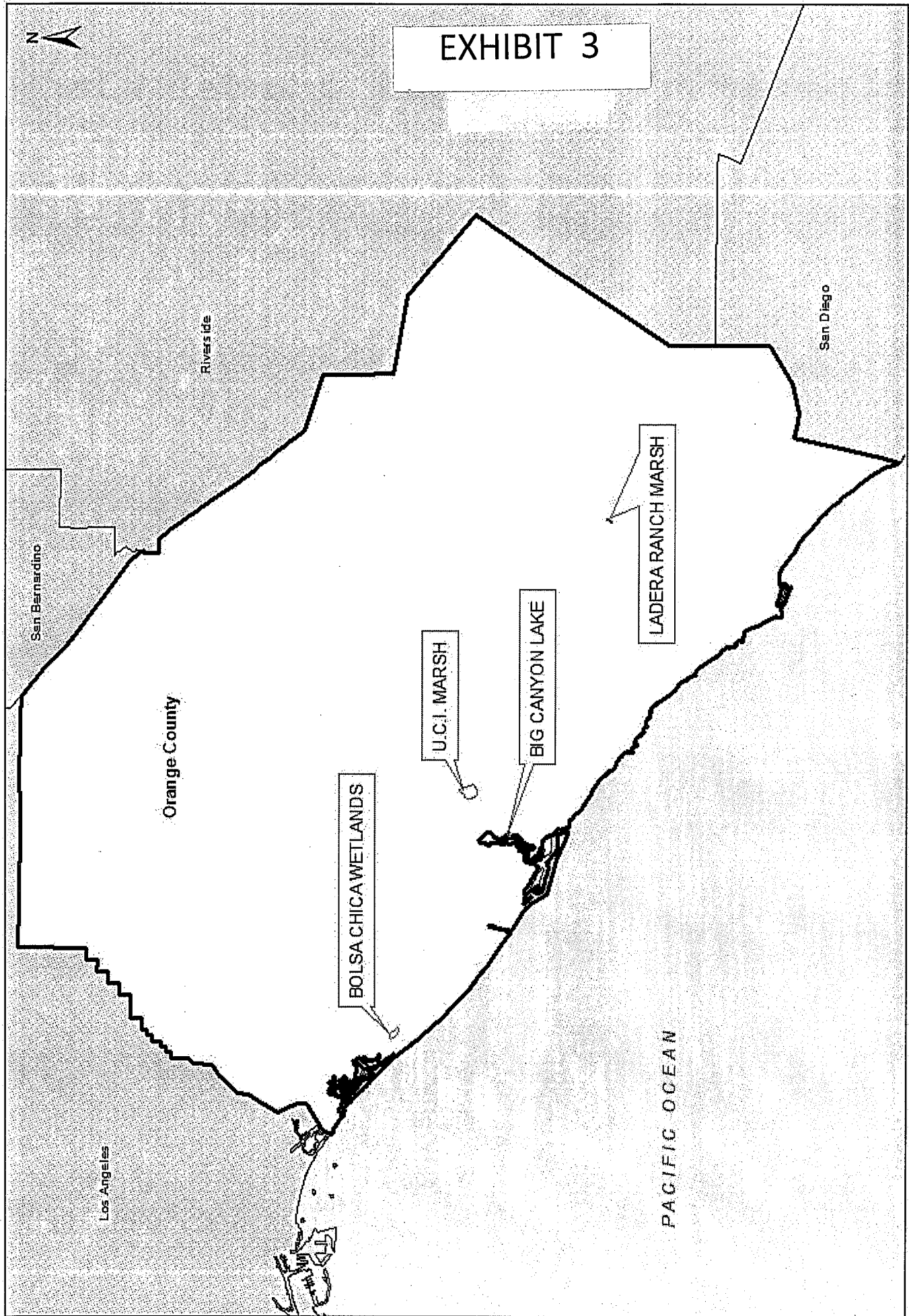
ANTICIPATED LARVICIDING LOCATION WITHIN WATER CONVEYANCE SYSTEMS

EXHIBIT 2



ORANGE COUNTY VECTOR CONTROL

ANTICIPATED ADJACENT LOCATIONS



ORANGE COUNTY VECTOR CONTROL



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.
- CO₂ – Carbon dioxide.
- GIS – Geographical Information System.
- HCPS – Hantavirus Cardiopulmonary 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/CO₂-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.

<p>Management Responsibility Notify the District Board of Trustees. Evaluate District staffing and program needs.</p>	<p>Communications Department Responsibility Distribute a News Release.</p>
<p>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.</p>	<p>Control Operations Management Responsibility Prepare for controlling adult mosquitoes when initiation criteria are met.</p>
<p>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.</p>	<p>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.</p>

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.

<p>Management Responsibility Notify the District Board of Trustees. Evaluate District staffing and program release needs.</p>	<p>Communications Department Responsibility Coordinate the distribution of a news with OCHCA.</p>
<p>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.</p>	<p>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.</p>
<p>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.</p>	<p>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.</p>

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.

<p>Management Responsibility Consider holding a special Board of Trustee meeting. Shift District staffing and resources to meet program needs.</p>	<p>Communications Department Responsibility Distribute a News Release. If truck mounted ULV is necessary, include additional information in News Release.</p>
<p>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.</p>	<p>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.</p>
<p>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.</p>	<p>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.</p>

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.

<p>Scientific and Technical Services Responsibility Determine scope of activity. Identify adult mosquitoes collected. Determine if <i>Anopheles</i> spp. are infected with malaria parasites.</p>	<p>Control Operations Management Responsibility Determine if adult mosquito control is necessary if initiation criteria are met in area. Delineate treatment area, as necessary.</p>
<p>Control Operations Zone Responsibility Inspect <i>Anopheles</i> mosquito development sites in area. Assess adult mosquito population.</p>	<p>Control Operations Special Services Responsibility Inspect <i>Anopheles</i> 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.</p>

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.

<p>Management Responsibility Notify District Board of Trustees President. Evaluate District staffing and program needs.</p>	<p>Communications Department Responsibility Prepare educational materials. Coordinate the distribution of a news release with OCHCA. Consider a region-wide press conference.</p>
<p>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 <i>Anopheles</i> are infected with malaria parasites. Provide GIS maps.</p>	<p>Control Operations Management Responsibility Contact County Agricultural Commissioner. Delineate and map the treated area. Coordinate response with other local vector control agencies.</p>
<p>Control Operations Zone Responsibility Inspect <i>Anopheles</i> mosquito development sites in area. Assess adult mosquito population. Conduct surveillance for <i>Anopheles</i> at local airports. Distribute educational materials.</p>	<p>Control Operations Special Services Responsibility Inspect <i>Anopheles</i> 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.</p>

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.

<p>Management Responsibility Notify District Board of Trustees. Contact and coordinate response with other stakeholders.</p>	<p>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.</p>
<p>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.</p>	<p>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.</p>
<p>Control Operations Zone Responsibility Assess adult population. Conduct a thorough inspection for and treat mosquito development sites. Control adult mosquitoes. Distribute educational materials.</p>	<p>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.</p>

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/CO₂-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.

<p>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.</p>	<p>Control Operations Management Responsibility Determine a control strategy. Delineate treatment area. As necessary, contact and coordinate with other local agencies.</p>
<p>Control Operations Zone Responsibility Distribute educational materials.</p>	<p>Control Operations Special Services Responsibility Distribute educational materials. Assist in source removal, if necessary. Apply pesticides to control flies, if necessary.</p>

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.

<p>Management Responsibility Notify District Board of Trustees. Contact and coordinate response with other stakeholders.</p>	<p>Communications Department Responsibility Conduct a press conference and distribute a news release.</p>
<p>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.</p>	<p>Control Operations Management Responsibility As necessary, contact and coordinate with other local agencies.</p>
<p>Control Operations Zone Responsibility Distribute educational materials and assist with surveillance activities. Assist with comprehensive flea-borne typhus risk assessment.</p>	

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 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 burrow dusting flea control is necessary, include additional information in news release.
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Cont'd. on next page

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

<p>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.</p>	<p>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.</p>
<p>Control Operations Zone Responsibility Distribute educational materials. Assist with comprehensive plague risk assessment.</p>	<p>Control Operations Special Services Responsibility Distribute educational materials. Assist with burrow dusting flea control as necessary.</p>

Response to a Human Hantavirus Cardiopulmonary 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.

<p>Management Responsibility Notify District Board of Trustees. Contact and coordinate response with other stakeholders.</p>	<p>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.</p>
<p>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.</p>	<p>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.</p>
<p>Control Operations Zone Responsibility Distribute educational materials. Assist with comprehensive HCPS risk assessment.</p>	<p>Control Operations Special Services Responsibility Distribute educational materials.</p>

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.

Cont'd. on next page

5/11/10

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

<i>Criteria</i>	<i>Evaluation</i>	<i>Decision</i>
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 there 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

<i>Criteria</i>	<i>Evaluation</i>	<i>Decision</i>
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

<i>Criteria</i>	<i>Evaluations</i>	<i>Decision</i>
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 criteria .
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 .		

Integrated Vector Management Immature Mosquito Guidelines

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

Integrated Vector Management Immature Mosquito Guidelines

Larvicide Application

<i>Criteria</i>	<i>Evaluation</i>	<i>Decision</i>
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 <i>Culex</i> 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.		

Integrated Vector Management Immature Mosquito Guidelines

Treatment Method

<i>Criteria</i>	<i>Evaluation</i>	<i>Decision</i>
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

<i>Criteria</i>	<i>Evaluation</i>	<i>Decision</i>
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

<i>Criteria</i>	<i>Evaluation</i>	<i>Decision</i>
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

Adult Mosquito Guidelines - cont'd.

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

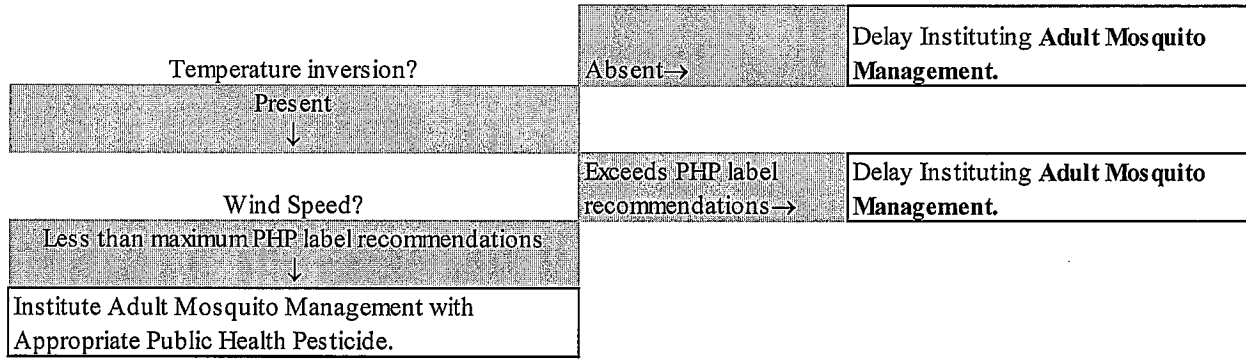
1. Consult Public Health Pesticide (PHP) label before treatment.
2. Apply PHPs within the same class or mode of activity on a rotational basis as determined by the Director of Operations.
3. If resistance is suspected in the field, laboratory and operations staff should be notified for follow-up.

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

Meteorological Conditions for Ground Applications



Integrated Vector Management Adult Mosquito Guidelines

<u>Delineate Treatment Area</u>		
Is the initiation or continuance criteria met?	Yes →	Define the boundaries of the Treatment Area and consider Agricultural and Land Use Practices.
<u>Agricultural and Land Use Practices</u>		
Are endangered or threatened species present?	No ↓	Consider the presence of Endangered or Threatened Species, then consider Meteorological Conditions within the Delineated Treatment Area.
Environmentally sensitive habitat?	No ↓	Consider treatments compatible with an environmentally sensitive habitat, then consider Meteorological Conditions within the Delineated Treatment Area.
Organically grown crops?	No ↓	Consider treatments that meet Organic Standards, then consider Meteorological Conditions within the Delineated Treatment Area.
Consider Meteorological Conditions within the Delineated Treatment Area.		

Integrated Vector Management Adult Mosquito Guidelines

USDS, Catch Basin and Freeway Drain Treatment Criteria

<i>Criteria</i>	<i>Evaluation</i>	<i>Decision</i>
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

<i>Criteria</i>	<i>Evaluation</i>	<i>Decision</i>
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 District 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 <i>Cx. tarsalis</i> , and/or 75 female <i>Cx. quinquefasciatus</i> , <i>Cx. stigmatostoma</i> , <i>Cx. erythrothorax</i> , or <i>Anopheles</i> per collection per trap nights , and/or→ 5 or more female of any <i>Aedes</i> or 10 of a <i>Culiseta</i> 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 <i>Cx. tarsalis</i> , and/or less than 75 female <i>Cx. erythrothorax</i> , <i>Cx. stigmatostoma</i> , <i>Cx. quinquefasciatus</i> or <i>Anopheles</i> per collection per trap nights , and/or less than 5 female of any <i>Aedes</i> or 10 of a <i>Culiseta</i> 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 <i>Culex</i> 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		

Integrated Vector Management Adult Mosquito Guidelines

Continuance Criteria

Criteria	<i>Evaluation</i>	<i>Decision</i>
CDC/CO ₂ trap or Gravid Trap collection with less than 25 female <i>Cx. tarsalis</i> , <i>Cx. erythorhorax</i> , <i>Cx. stigmastoma</i> , <i>Cx. quinquefasciatus</i> , or <i>Anopheles</i> per collection per trap night , and/or less than 5 female of any <i>Aedes</i> or 10 Culiseta per collection per trap night , and/or less than 25 total female mosquitoes per collection per trap night <div style="text-align: center;">↓</div>	25 or more female <i>Cx. tarsalis</i> , <i>Cx. erythorhorax</i> , <i>Cx. stigmastoma</i> , <i>Cx. quinquefasciatus</i> , or <i>Anopheles</i> per collection per trap night , and/or → 5 or more female of any <i>Aedes</i> or 10 Culiseta per collection per trap night , and/or → 25 or more total female mosquitoes per collection per trap night →	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> Consider Meteorological Conditions in the Treatment Area. </div>
Presence of adult mosquitoes in an USDS, catch drains <div style="text-align: center;">↓</div>	1 or more <i>Culex</i> species →	<div style="border: 1px solid black; padding: 5px;"> USDS Treatment Criteria. </div>
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;"> Do Not Institute Adult Mosquito Management </div>		

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 <i>Cx. tarsalis</i> , <i>Cx. quinquefasciatus</i> , <i>Cx. erythrothorax</i> , or <i>Cx. stigmatostoma</i> or <i>Anopheles</i> per collection for per trap night, and/or → less than 1 female of any <i>Aedes</i> or 5 <i>Culiseta</i> 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 <i>Cx. tarsalis</i> , <i>Cx. quinquefasciatus</i> , <i>Cx. erythrothorax</i> , or <i>Cx. stigmatostoma</i> per collection per trap night, and/or 1 or more female of any <i>Aedes</i> or 5 <i>Culiseta</i> 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		

Integrated Vector Management Adult Mosquito Guidelines

Determine Level of Mosquito Activity

Criteria	Evaluation	Decision
Malaria case? Mosquito Not Present ↓	<i>Anopheles freeborni</i> present in a trap within 1/4 mile radius of human case	Delineate Treatment Area.
↓		
Do Not Initiate Adult Mosquito Management		
WNV, WEE, SLE, or other mosquito-borne virus case? Mosquito Not Present ↓	<i>Cx. tarsalis</i> , <i>Cx. quinquefasciatus</i> , or another mosquito species that can vector a virus pathogen within a one mile radius of a human case.	Delineate Treatment Area.
↓		
Do Not Institute Adult Mosquito Management		
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

<i>Criteria</i>	<i>Critical Value</i>
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

<i>Criteria</i>	<i>Critical Value</i>
Malaria parasite.	1 <i>Plasmodium</i> spp. as determined by appropriate analysis.

Mosquito Abundance

<i>Criteria</i>	<i>Definition</i>
Historical mosquito breeding site.	Consistent 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

<i>Criteria</i>	<i>Evaluation</i>	<i>Decision</i>
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

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

Integrated Vector Management Fly Control Guidelines

Fly Site Assessment

<i>Criteria</i>	<i>Evaluation</i>	<i>Decision</i>
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

<i>Criteria</i>	<i>Evaluation</i>	<i>Decision</i>
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

<i>Criteria</i>	<i>Evaluation</i>	<i>Decision</i>
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

<i>Criteria</i>	<i>Evaluation</i>	<i>Decision</i>
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

<i>Criteria</i>	<i>Evaluation</i>	<i>Decision</i>
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.		

Integrated Vector Management Rat Control Guidelines

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

<i>Criteria</i>	<i>Evaluation</i>	<i>Decision</i>
Is homeowner, or adult > 18 years old, available for consultation?	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.		

Integrated Vector Management Rat Control Guidelines

Rodent Bait Station Placement

<i>Criteria</i>	<i>Evaluation</i>	<i>Decision</i>
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

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.

Occupant's Signature

Date	
ZONE NO.	MAP AREA
Thomas Bros. Guide	
PAGE NO.	GRID
SERVICE REQUEST NUMBER	

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.

<input type="checkbox"/> 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.	<input type="checkbox"/> No dogs reside on property.
<input checked="" type="checkbox"/> Occupant's Signature	

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.

Occupant's Signature

DO NOT RELOCATE BAIT BLOCKS OR BAIT STATIONS.

Occupant's Name (Please Print) _____

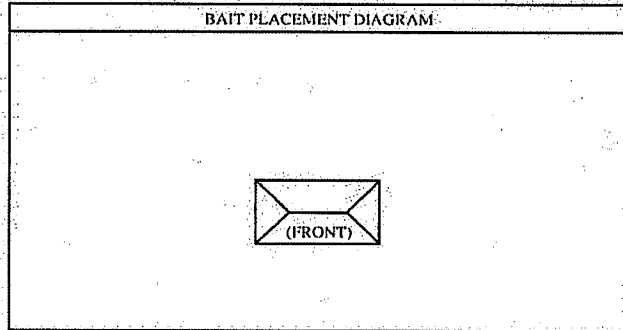
Street Address _____ Apt. No. _____

City _____ Zip Code _____

Telephone Number _____

Inspector's Name _____ Phone Ext. No. _____

Date Replaced _____ Date Removed _____



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

Appendix 2

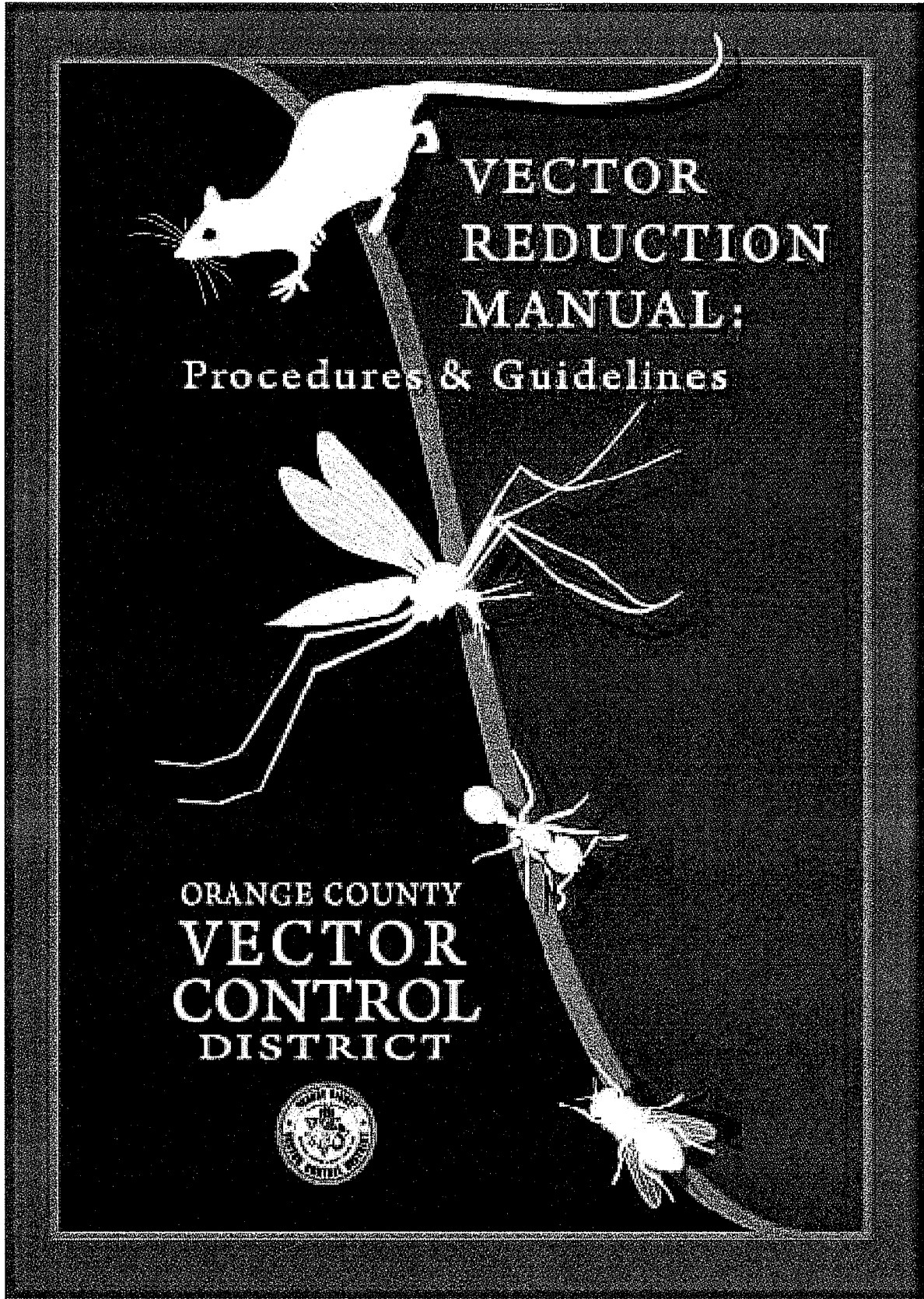
California Mosquito-Borne Virus Surveillance & Response Plan

To reduce file size, this appendix was not scanned. This document may be downloaded at <http://www.cdph.ca.gov/HealthInfo/discond/Documents/CAResponsePlanJuly2010.pdf>

Appendix 3

Best Management Practices for Mosquito Control in California

To reduce file size, this appendix was not scanned. This document may be downloaded at <http://www.cdph.ca.gov/HealthInfo/discond/Documents/BMPforMosquitoControl08-10.pdf>



VECTOR
REDUCTION
MANUAL:
Procedures & Guidelines

ORANGE COUNTY
VECTOR
CONTROL
DISTRICT



Vector Reduction Guidelines

The Vector Reduction Guidelines contained in this manual are assembled from a number of sources including scientific literature, state and inter-agency documents, pesticide label and use requirements, and from experienced vector control professionals. The intended use of this document is to provide general guidance, not site-specific requirements. The Vector Reduction Guidelines that are most applicable to a specific vector-breeding source may be selected from the list and incorporated into a specific Vector Management Plan for a specific source in consultation with District personnel.

Vector Reduction Program

VECTOR REDUCTION PROGRAM POLICIES

The Orange County Vector Control District (the District) recognizes that cooperative land management practices can reduce vector¹ populations. Long-term costs are reduced because smaller populations require less staff time and lower pesticide use. These practices help to protect public health and are an integral part of the District's Integrated Vector Management (IVM) approach to mosquito and vector control.

Integrated Vector Management is a process that focuses on site-specific, scientifically sound strategies to manage vector populations. These policies and procedures have been adopted by the District as effective control measures for vectors. Landowners and land managers can use these guidelines to address vector control problems that are identified by the District.

Integrated Vector Management techniques vary at each site depending on the conditions found at the site. These techniques are commonly grouped into four categories:

1. Cultural Control – Change the behavior of people so that their actions prevent the development of vector populations or the transmission of vector-borne disease.
2. Source Reduction or Physical Control – Environmental manipulation that results in a reduction of vector development sites.
3. Biological Control – Use of biological agents to limit vector populations
4. Chemical Control – Pesticides that target different life stages of vector populations

The Vector Reduction Guidelines referred to in this document are the recommended land management practices that can provide a reduction in vector populations by various means including: reducing or eliminating breeding areas, or harborages, increasing the efficacy of biological controls, increasing the efficacy of chemical controls, and improving access for control operations. These Vector Reduction Guidelines have been developed based on the District's experiences with stakeholder groups including landowners, land managers, regulatory agencies, and other interest groups. As a result of this process, the District is prepared to offer practical and appropriate Vector Reduction Guidelines for the variety of land uses that exist in Orange County. Not all vector reduction guidelines included in this document will apply equally to all vector sources; however, they serve as a starting point in the cooperative development of a site-specific Vector Management Plan.

The District encourages those responsible for Significant Vector Sources on properties under their control to develop and implement a cooperative Vector Management Plan with the District

¹ A vector means any insect or other animal capable of transmitting the causative agent of human disease or capable of producing human discomfort or injury including, but not limited to, mosquitoes, flies, red imported fire ants, and rats.

to avoid the need for the formal enforcement actions authorized under the California Health and Safety Code (HSC). In some situations, the District must employ the HSC in order to ensure safe conditions and to carry out its public responsibilities. However, it has been the District's experience that a cooperative approach to source reduction results in effective and long-lasting vector management.

The Vector Reduction Guidelines are designed to address vector sources including, but not limited to, managed wetlands, stormwater structures, wastewater facilities, residential properties, cemeteries, and golf courses. Many of these sources provide favorable habitats for vectors and produce significant vector populations.

Vector populations in Orange County can be reduced through the widespread implementation of vector reduction strategies and techniques. The policies and procedures outlined in this document specifically target Significant Vector Sources, but can be applied to any vector sources.

In circumstances where the implementation of a Vector Management Plan would cause economic hardship or technical difficulties, the District may choose to offer assistance in the form of technical advice, or other resources. Vector reduction projects can be planned in stages to provide time for budgeting considerations and obtaining any necessary regulatory permits. The level of assistance offered will be determined on a case-by-case basis.

SIGNIFICANT VECTOR SOURCES

Significant Vector Sources will be identified based on the following criteria:

- Vector production from the source is more than similar land uses, and exceeds treatment thresholds outlined in the Vector Management Plan;
- Treatment costs incurred by the District are increased due to problems caused by management practices;
- The source is in close proximity to areas of significant population density; and/or
- Vector Reduction Guidelines exist to address the land management practices and can be reasonably utilized to reduce vector production, harborage, or other vector favorable conditions.

If left untreated, a Significant Vector Source would be considered a public nuisance as defined in the California Health and Safety Code (HSC) §2002(j). Sources adjacent to and within population centers will be selected for inclusion in the Vector Reduction Program. Other factors, such as treatment costs, vector-borne disease status, vector species produced, and the efficacy of available treatment options will be considered when evaluating a Significant Vector Source, as defined above.

Surveillance data will be used to determine vector abundance prior to, and after implementation of, the Vector Management Plan for a Significant Vector Source. When mosquitoes are the problem, a combination of larval dip data and adult mosquito surveillance data will be used to assess vector abundance. When rats are the problem, signs of a rodent infestation, such as feces and gnawing, availability of food sources, and potential harborage will be used. If Red Imported Fire Ants (RIFA) are the cause of a Significant Vector Source, mound counts and presence of foraging workers will be used to assess Vector Management Plan success. Adult flies and presence of larval fly sources will be used to assess a significant fly source. In cases where existing data or current sampling methods are not sufficient to determine the efficacy of a particular Vector Management Plan, a specific monitoring plan will be established to meet the needs of the Significant Vector Source.

Management practices that contribute to increased vector production include, but are not limited to, poor water management, lack of emergent vegetation control, buildup of debris that restricts water conveyance, poor condition of water conveyance or drainage structures, practices that impede access to the source, and lack of notification of practices that would affect vector control operations.

VECTOR MANAGEMENT PLAN

Once the District has identified a Significant Vector Source, staff will present a draft Vector Management Plan to the responsible party, in consultation with state and federal biologists, if appropriate, proposing a course of action based on one or more Vector Reduction Guidelines that, if implemented, can reduce or eliminate the Significant Vector Source.

The draft Vector Management Plan will contain at least the following:

- Justification for requested actions.
- Description of the proposed Vector Reduction Guidelines, including specific guidance regarding method and timing of implementation.
- District resources available to assist with Vector Reduction Guideline implementation.
- Assessment method.

The responsible party will have the opportunity to review and comment on the draft plan. Reasonable adjustments may be negotiated between the responsible party and the District to achieve a mutually agreeable plan. A reasonable time limit will be set at the beginning of the negotiation phase, at which time the District will finalize any unresolved issues at its discretion. This time limit may be extended if all parties agree that there is reasonable cause to do so.

If the responsible party is unwilling to accept the terms of this cooperative process, the District will proceed to the legal Vector Abatement Process under the California Health and Safety Code

§2060-2067 and District Resolution No. 340: Orange County Vector Control District's Nuisance Abatement Procedures (see Appendix 1).

CHARGES FOR TREATMENT COSTS

The District is authorized by the Health and Safety Code to recover treatment costs for vector control operations. Since properties in the District pay for a base level of vector control through the payment of property taxes, the District would consider charging for treatment costs that are above and beyond the normal level of treatment required by a similar vector source with a similar land use. Since one of the primary goals for the Vector Reduction Program is to reduce pesticide use in Orange County, the District would only consider accepting charges for additional treatment in lieu of implementing Vector Reduction Guidelines on a case-by-case basis for a limited time. As new Vector Reduction Guidelines are developed and efficacy of existing Vector Reduction Guidelines are researched further, the expectation would be that the charges for pesticide treatment would be replaced by non-pesticide based, long-term Vector Management Plans.

APPEAL PROCESS

The responsible party may submit comments in writing to the Director of Operations before the implementation deadline indicated on the draft Vector Management Plan presented to the responsible party in Step #2 on Figure 1 (Flow Chart). After review, the Director of Operations will issue a determination which may include; 1) no change in the content of the draft Vector Management Plan; 2) an extension of the implementation deadline; 3) a waiver of fees; or 4) other appropriate action, such as the implementation of an abatement process leading to civil action (see Appendix 1).

If the responsible party is a state agency, appeals may be made to the State Department of Public Health, pursuant to the California Health and Safety Code.

VECTOR REDUCTION PROGRAM IMPLEMENTATION PROCESS FOR SIGNIFICANT VECTOR SOURCES

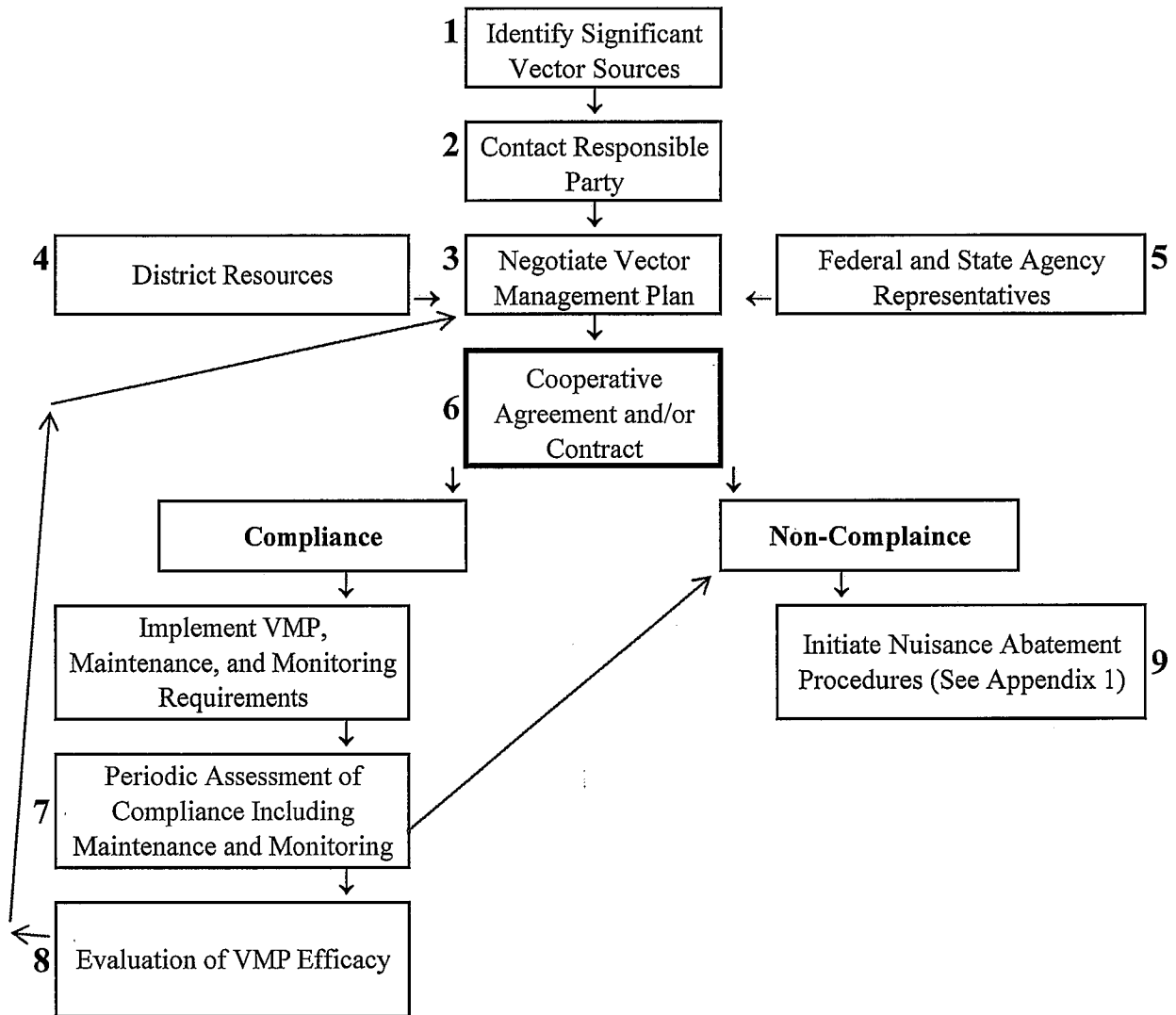
The following items represent a chronological progression of the Vector Reduction Program actions after a Significant Vector Source is identified.

Note: The numbered items correspond to the numbers on Figure 1.

1. **Identify a Significant Vector Source** – The District will identify Significant Vector Sources based on the previously defined criteria.
2. **Contact Responsible Party** – The District will contact the responsible party (as defined in the California Health and Safety Code §2060) of properties in Orange County that have been identified as a Significant Vector Source, that if untreated, would become a public nuisance. The District will also contact state and federal agencies that have a vested interest in the property, such as a conservation easement, habitat management plan, or other habitat maintenance agreement. A draft Vector Management Plan will be provided to the responsible parties. This plan will include an explanation of why the site was determined to be a Significant Vector Source, including vector surveillance data, if requested.
3. **Negotiate Vector Management Plan** – The District will work with the responsible party to determine a course of action to address the vector source including specific Vector Reduction Guidelines, implementation timeline, maintenance requirements, and monitoring plan. A defined negotiation period will be designated at the start of the negotiations.
4. **District Resources** – At the discretion of the District, resources may be made available to assist in complying with the Vector Management Plan requirements. In cases where District resources are used, specific maintenance requirements will be specified in the cooperative agreement, and will be signed by the responsible party and the District. In some cases, the District will use a Vegetation Agreement or Source Reduction Agreement to establish a contract with the property owner. The Agreement will contain the name of the responsible party, location of the property, description of the work to be done, the cost of the work, if any, to be paid by the responsible party, and requirements for maintenance to be performed by the responsible party. These agreements shall be subject to the same requirements as any other agreement covered by these policies.
5. **Coordinate and Assist with Other Regulatory Agencies** – Coordinate with other local, state, federal, and conservation agencies during the negotiation process to avoid or address any potential regulatory conflicts with the draft Vector Management Plan.
6. **Cooperative Agreement and/ or Contract** – A cooperative agreement and/or contract will formalize the relationship between the District and the responsible party. This document will also outline the consequences of non-compliance with the Vector Management Plan under the California Health and Safety Code.
7. **Monitoring** – After successful implementation of the requirements, regular inspections of the property will be conducted to assess continued maintenance and compliance with the site's Vector Reduction Guidelines as identified in the Vector Management Plan. The District reserves the right to renegotiate the Vector Management Plan if it is determined that adequate vector control is not being achieved. In this case, the process would return to Step 2. As long as the responsible party is in compliance with the terms of the cooperative agreement, no additional charges or penalties will be assessed by the District.

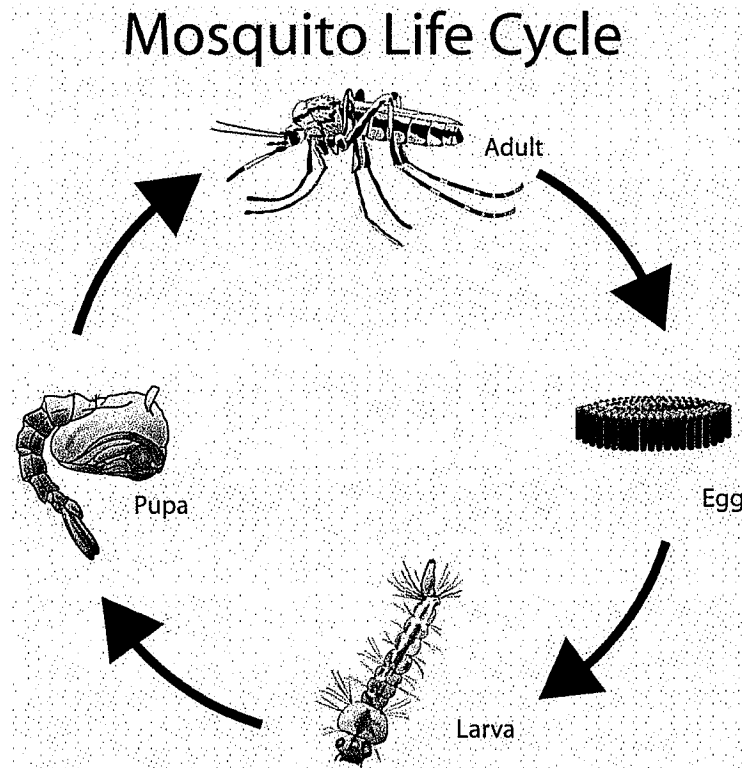
8. **Evaluation of Vector Management Plan Efficacy** – An effective vector control plan requires regular assessment and adaptive management to address changing conditions or unforeseen effects. The District will evaluate each Vector Management Plan to determine if the Vector Reduction Guidelines are meeting the needs of both the responsible party and the District. Based on this evaluation, either party may initiate a review of the Vector Management Plan pursuant to the terms of the cooperative agreement.
9. **Abatement Process** – if the responsible party does not take corrective action or does not provide a reasonable explanation for the continued lack of compliance with the cooperative agreement, the case may be brought to the District Manager pursuant to the District's Nuisance Abatement Procedures (see Appendix 1) to begin the Formal Abatement process as defined in HSC §2061.

Figure 1. Vector Reduction Program Implementation Process Flow Chart



MOSQUITO REDUCTION GUIDELINES

There are over 20 species of mosquitoes that occur in Orange County. Fortunately, only 13 species are of significant concern in our area. It is important to realize that each species of mosquito has different habitat requirements and behaviors that affect its ability to transmit disease, bite humans, and be controlled by a specific Vector Reduction Guideline.



Mosquito Biology

All mosquitoes share a similar life cycle with an aquatic stage (larvae) and an aerial stage (adult). Nearly all Vector Reduction Guidelines focus on managing the aquatic stage of the mosquito by creating conditions that are less favorable for mosquito development. This usually involves manipulating the amount or timing of standing water, decreasing the amount of vegetation in and around the standing water, and creating situations where natural or introduced predators can consume the mosquito larvae. Since each species of mosquito has slightly different habitat requirements, it is important to understand which mosquitoes favor which habitats to understand how a particular mosquito reduction guideline reduces the population.

To understand mosquito reduction guidelines, it is useful to think of mosquitoes as belonging to one of the following three categories.

Standing –Water Mosquitoes prefer water commonly found in ornamental ponds, unmaintained swimming pools, freeway drains, stormwater systems, natural waterways, and flood control channels.

Common Mosquito Reduction Guidelines:

- a. Drain standing water.
- b. Reduce or eliminate emergent vegetation in and along the edges of the water.
- c. Hold water level constant to encourage natural predators or biological control agents (e.g. mosquito fish).
- d. Contact the District to coordinate mosquito prevention with other mosquito control operations.

Container Mosquitoes prefer contained areas of water, such as tree holes, buckets, tires, etc. Some standing water mosquitoes will also develop in containers.

Common Mosquito Reduction Guidelines:

- a. Drain containers of standing water.
- b. Cover, overturn, or create drainage holes that prevent standing water in the container.
- c. Identify and prevent water from refilling containers.
- d. Contact the District to coordinate mosquito prevention with other mosquito control operations.

Salt Water Mosquitoes lay their eggs on moist soil. When they become submerged, due to tidal fluctuations, the eggs hatch.

Common Mosquito Reduction Guidelines:

- a. Flood when air temperatures do not encourage rapid mosquito development (late fall rather than summer).
- b. Reduce or eliminate emergent vegetation.
- c. Flood quickly to encourage all eggs to hatch at once and minimize the need for multiple larvicide applications.
- d. Contact the District to coordinate mosquito prevention with other mosquito control operations.

RESIDENTIAL AND COMMERCIAL MOSQUITO SOURCES

Common Mosquito Development Sites

- Backyard Sources
- Low Impact Developments (e.g., Rain Barrels)
- Pools & Spas
- Ornamental Ponds & Water Features
- Tire storage
- Unmaintained swimming pools and spas
- Decorative ponds and fountains
- Bird baths
- Water-filled containers
- Clogged rain gutters
- Poorly designed or damaged landscape irrigation systems
- Cemetery vases
- Koi ponds
- Stored or waste tires
- Small Drains

Common Mosquito Species

- Cleaner water sources: *Culex tarsalis*.
- Water with more organic material: *Culex quinquefasciatus*, *Culex stigmatosoma*, and *Culiseta incidens*.

Special Concerns

Urban and suburban mosquito sources are especially problematic because they produce mosquitoes in areas of high population density where many people live and work. This can quickly lead to vector-borne disease transmission since the vector (mosquito) and host (human) are often in close proximity. These sources may be in and around private residences which are not easily seen or accessed by District staff. Economic or social changes in a neighborhood can result in an increase in mosquito sources, such as unmaintained swimming pools and spas. Fortunately, many of the Mosquito Reduction Guidelines for residential areas are relatively inexpensive and easy to implement.

General Mosquito Reduction Principles

1. Prevent or eliminate unnecessary standing water that remains for more than 96 hours.
2. Maintain irrigation systems to avoid excess water use and runoff into storm drains.
3. Maintain water features such as ponds and fountains to circulate water with pumps that run at least eight hours a day. If the feature has no pump, water should be changed every 96 hours to prevent mosquito breeding and/or pesticide treatment may be necessary.

4. Maintain access for District staff to monitor and treat mosquito breeding sources.
5. Contact District staff for technical guidance or assistance in implementing Vector Reduction Guidelines for large mosquito breeding sources.
6. If unable to control mosquito breeding contact, the District for advice and help.

Residential and Commercial Mosquito Reduction Guidelines

RC-1 Drain all containers of standing water, including pet dishes, potted plant drip trays, boats, birdbaths, and tires and buckets at least once per week. Mosquitoes can develop in as little as a 1/8" of standing water. Be aware of containers and objects that are subject to collecting water. If possible, drill drainage holes, cover, or invert any container, or object, that holds standing water and must remain outdoors. Be sure to check for containers or trash in places that may be hard to see, such as under bushes or buildings.

RC-2 Dispose of unwanted or unused artificial containers, and properly dispose of old tires.

RC-3 Maintain pools and spas. Use skimmers and filter systems to remove egg rafts and mosquito larvae.

RC-4 If a pool or spa is not going to be operational for any reason, notify the District so that the pool or spa can be inspected regularly and treated with an appropriate larvicide and/or stocked with mosquito fish, if needed. These services are provided at no additional charge and are supported by property taxes.

RC-5 Notify the District of any ponds or water features (including ponds with ornamental fish such as Koi or goldfish) with permanent water. Allow District Inspectors to inspect and periodically stock mosquito fish or other biological control, as necessary, for the control of mosquito larvae.

RC-6 Landscape irrigation drainage should be managed such that no water stands for more than 96 hours.

RC-7 All underground drain pipes should be laid to grade to avoid low areas that may hold water for longer than 96 hours.

RC-8 Maintain rain gutters and other gutter structures by removing leaves, debris, and standing water from these features, as necessary, following rain events.

RC-9 Provide safe access for District staff to all pools, spas, ponds, landscape irrigation structures, catch basins, storm drains, drainage pipes, sewer cleanouts, or any other potential mosquito breeding source.

RC-10 Repair leaks or damaged drainage system components to prevent standing water for more than 96 hours.

RC-11 Notify District staff of any condition that may produce mosquitoes on the property such as flooding, broken pipe, damaged septic tank cover, or a leaking outdoor faucet if it results in standing water for more than 96 hours.

RC-12 Small Drains – screen and keep free of water and debris.

Low Impact Developments (e.g., Rain Barrels)

RB-1 Prevent mosquito breeding in rain barrels by properly screening all openings to prevent mosquito access to the stored water. If larvae are observed in a rain barrel, contact the District.

Ornamental Ponds and Water Features

P-1 All ponds should be surrounded by land of adequate width to allow safe passage of District staff and/or equipment.

P-2 Banks should be steeply sloped and lined to three feet below the water level with a suitable material such as concrete or clay, or be regularly treated with residual herbicides to ensure permanent weed prevention².

P-3 To minimize invasive emergent vegetation in ponds, use a slope angle of at least 2:1. Bank slopes of 2.5:1 to 4:1 (vertical: horizontal) and minimum depths of four to five feet to significantly reduce bottom-rooted aquatic plants.

P-4 Large ponds and lakes should have raised embankments a minimum width of 12 feet and be adequately constructed to support maintenance vehicles.

P-5 Ponds or ornamental water features should be stocked with mosquito fish when possible. Contact the District for an assessment.

P-6 Vegetation should be controlled regularly to prevent overgrowth of emergent vegetation and vegetative barriers for District access. This includes vegetation control to maintain access to lanes and paths, interior pond embankments, and any weed growth that might become established within the pond.

Tire Storage

TS-1 Never allow water to accumulate in tires. Tires should be stored in a covered location or covered by a tarp in order to prevent accumulation of water.

² Per National Pollutant Discharge Elimination System (NPDES) authorization, or other approval if needed.

TS-2 Tires should never be stored in a pile. Tires should be stored on racks or in a stack not more than two rows wide.

TS-3 Tires should be stored in a manner that allows inspections of each individual tire.

TS-4 Waste tires should be picked up by the proper disposal entity on a regular basis.

TS-5 Those responsible for stored tires should inspect and dump out any water that may have accumulated inside tires on their premises on a weekly basis.

TURF AND LANDSCAPE

Common Mosquito Development Sites

- Sprinklers & Irrigation Systems
- Small Drains
- Nurseries
- Cemeteries
- Golf Courses
- Equestrian Facilities
- Parks
- Agriculture

Common Mosquito Species

- Cleaner water sources: *Culex tarsalis*.
- Water with more organic material: *Culex quinquefasciatus*, *Culex stigmatosoma*, and *Culiseta incidens*.

Special Concerns

Turf and landscape sources are especially important because they occur near areas of high population density and contain vector sources (e.g., ponds, vases, plant containers) that may not be easily accessible to the District. These sources occur in areas where people recreate and/or work during dusk and dawn which are periods of high mosquito activity. Additionally, these sources can add significant water to the underground storm drain system, thereby increasing vector habitat.

General Mosquito Reduction Principles

1. Prevent or eliminate unnecessary standing water that remains for more than 96 hours.
2. Maintain irrigation systems to avoid excess water use and runoff into storm drains.
3. Maintain water features, such as ponds and fountains, to circulate water with pumps avoid stagnate water conditions. If the feature has no pump, water should be changed every 96 hours to prevent mosquito breeding and/or pesticide treatment may be necessary.
4. Maintain access for the District to monitor and treat mosquito breeding sources.
5. Contact the District for technical guidance or assistance in implementing mosquito reduction strategies for larger mosquito breeding sources.
6. If unable to control mosquito breeding, contact the District.

Sprinkler & Irrigation Systems

SL-1 Landscape irrigation drainage should be managed such that little or no water enters the stormwater system.

SL-2 Avoid over-irrigation to prevent accumulation of wastewater that results in pooling and runoff.

SL-3 All underground drain pipes should be laid to grade to avoid areas that may hold water.

SL-4 Repair leaks or damaged drainage system components to prevent standing water.

Nurseries

N-1 Follow all recommendations for mosquito breeding reduction in sprinkler and irrigation sources.

N-2 Inspect to ensure that all containers drain properly and contain no standing water, including potted plants and potted plant bases.

N-3 Inspect plants imported from outside of Orange County for standing water and/or mosquito eggs (e.g., *Aedes albopictus*).

N-4 Notify the District immediately if employees are being bitten by mosquitoes.

N-5 Back-fill tire ruts and other low areas that hold water for more than 96 hours.

N-6 Keep drainage ditches free of excessive vegetation and debris to promote rapid drainage.

N-7 Repair and seek to improve irrigation systems to increase water use efficiency.

Cemeteries

C-1 Empty all flower vases weekly.

C-2 Seek alternatives to in-ground or mounted flower vases which hold water for more than 96 hours.

C-3 Switch flower vases to wire stands that hold flowers or plants above ground surface.

C-4 Notify District staff immediately if employees or visitors are bitten by mosquitoes.

Golf Courses

GC-1 Land grades should have sufficient fall to prevent mid-field ponding, especially in soils with high clay content.

GC-2 Irrigate only as frequently as is needed to maintain proper soil moisture. Check soil moisture regularly.

GC-3 Manage irrigation to prevent ponding of water.

GC-4 Drains should have gradients from 1 in 40 to 1 in 110 to provide good water flow and be maintained free of clogs and vegetation.

GC-5 Do not over fertilize. Over-fertilization can leach into irrigation run-off which may facilitate mosquito production in ditches and/or become contamination further downstream.

GC-6 Keep equipment off soil when the ground is soft. Mosquito habitat is created when water collects in tire ruts.

GC-7 Refer to Pond section for information regarding reduction of mosquito breeding in water hazards.

Equestrian Facilities

EF-1 Identify areas on the property where water can accumulate and remain standing for more than 96 hours. Mark these areas on a site map and assess them after rainfall or irrigation.

EF-2 Eliminate containers that accumulate and hold water for more than 96 hours. When containers cannot be eliminated, drain standing water every 96 hours, or place mosquito fish.

Agriculture

A-1 Water allotments to farming operations should be limited to reasonable needs for the size of fields, type of soil, and crop requirements.

A-2 Plantings watered by drip irrigation should be checked to ensure that the system is not over watering and causing standing water that could produce mosquitoes.

A-3 Land grades should have sufficient fall to prevent mid-field ponding, especially in soils with high clay content, except where drip irrigation is being used.

A-4 Graded ditches should be located at the low ends of fields for draining and proper management of rainwater runoff and tail water.

A-5 Remove vegetation and other blockages from V ditches on the property on a regular basis to prevent stagnant water from pooling and becoming a mosquito breeding site.

A-6 Provisions should be made to drain irrigation ditches, pipelines, and other features of water after each use to prevent mosquito breeding habitats.

A-7 Animal confinement operations should be designed with sloped loafing and feeding corrals for proper drainage. If water troughs are being used, they should be monitored to detect potential mosquito production.

A-8 Inform the District of organic agriculture practices so that the District can provide control.

STORMWATER SYSTEMS AND URBAN RUNOFF

Common Mosquito Development Sites

- Detention/retention basins
- Treatment wetlands
- Catch basins/storm drains
- Underground water storage devices
- Underground drain systems
- Clogged sediment screens
- Blocked culverts
- Roadside ditches

Common Mosquito Species

- Above ground/clean-water sources: *Culex tarsalis*.
- Underground/polluted or nutrient rich water: *Culex quinquefasciatus*, *Culex stigmatosoma*, and *Culiseta incidens*.

Special Concerns

Management of mosquitoes and other vectors in stormwater management structures, such as flood control basins and other structural stormwater Best Management Practices (BMPs) is critical for protecting public health. With careful planning, such structures can be designed, built, operated, and maintained in a manner that minimizes opportunities for the proliferation of vectors. The District stresses the importance of identifying and resolving potential mosquito sources in stormwater structures at the planning stages of new development.

General Mosquito Reduction Principles

1. Maintain access for District staff to monitor and treat mosquito breeding sources.
2. Consider mosquito reduction standards during the design and construction of stormwater infrastructure and allocate funds to maintenance of the infrastructure.
3. Manage sprinkler and irrigation systems to minimize runoff entering stormwater infrastructure.
4. Avoid intentionally running water into stormwater systems (e.g., washing sidewalks and driveways, washing cars on streets, etc.).
5. Minimize emergent vegetation and surface debris in the water.
6. Provide the District access to accumulated water allowing for mosquito treatment and control.

Above Ground Structures

AG-1 Build shoreline perimeters as steep and uniform as practicable to discourage excessive plant growth.

AG-2 Whenever possible, maintain stormwater ponds and wetlands at depths in excess of four feet to limit the spread of invasive emergent vegetation, such as cattails (*Schoenoplectus* spp.) and bulrush (*Typha* spp.).

AG-3 Eliminate floating vegetation conducive to mosquito production (e.g., water hyacinth *Eichhornia* spp., duckweed *Lemna* and *Spirodela* spp., and filamentous algal mats).

AG-4 Perform routine maintenance to reduce and contain emergent plant densities to facilitate the ability of mosquito predators (i.e., fishes) to move throughout vegetated areas.

AG-5 Keep or make shorelines accessible for periodic maintenance, control, and removal of emergent vegetation, as well as for routine mosquito monitoring and abatement procedures, if necessary.

AG-6 Design in drainage systems and obtain necessary approvals for all stormwater ponds and wetlands to allow for complete draining when needed for periodic maintenance and silt removal.

AG-7 The effective swath width of most backpack or truck-mounted larvicide sprayers is approximately 20 feet on a windless day. Because of these equipment limitations, all-weather road access (with provisions for turning a full size work vehicle) should be provided along at least one side of large above-ground structures that are less than 25 feet wide.

AG-8 Access roads should be built as close to the shoreline as possible. Vegetation or other obstacles should not be permitted between the access road and the stormwater treatment device that might obstruct the application of larvicides to the water. Access roads and paths need to be maintained and free of vegetation overgrowth.

AG-9 Vegetation should be controlled (by removal, thinning, or mowing) periodically to prevent barriers to access.

AG-10 Design structures so they do not hold standing water for more than 96 hours. Special attention to groundwater depth is essential to prevent groundwater seepage and permanent standing water.

AG-11 Allow water to flow by gravity through the structure by use of a hydraulic grade line. Pumps are not recommended, are subject to failure, and often require sumps that hold water.

AG-12 Avoid the use of loose riprap or concrete depressions that may create and hold standing water.

AG-13 Avoid barriers, diversions, or flow spreaders that may retain standing water.

AG-14 Use concrete or liners in shallow areas to discourage unwanted plant growth where vegetation is not necessary.

AG-15 Where feasible, compartmentalize managed treatment wetlands so that the maximum width of ponds does not exceed two times the effective distance (40 feet) of land-based application technologies for mosquito control agents.

AG-16 Incorporate features that prevent or reduce the possibility of clogging discharge orifices (e.g., debris screens). The use of weep holes is not recommended due to rapid clogging.

AG-17 Design distribution piping and containment basins with adequate slopes to drain fully and prevent standing water. The design slope should take sediment accumulation into consideration between maintenance periods. Compaction during grading may also be needed to avoid slumping and settling.

AG-18 Catch Basins, drop inlets, storm drains, and other structures originally designed to fully drain water should be regularly checked and maintained to function as designed.

AG-19 Basins designed to be dry, but remain wet, should be corrected by retrofit, replacement, repair, or more frequent maintenance.

AG-20 Coordinate cleaning of catch basins, drop inlets, or storm drains with mosquito treatment operations.

AG-21 Enforce the prompt removal of silt screens installed during construction when no longer needed to protect water quality.

Underground Structures (Sumps, vaults, drop inlets, catch basins, driveway sump drains)

US-1 Completely seal structures that retain water permanently or longer than 96 hours to prevent entry of adult mosquitoes.

US-2 Stormwater structures utilizing covers should be tight fitting, with maximum allowable gaps 1/16 inch, to exclude entry of adult mosquitoes.

US-3 If the sump, vault, or basin is sealed against mosquitoes, with the exception of the inlet and outlet, submerge the inlet and outlet completely to reduce the available surface area of water for mosquito egg-laying (female mosquitoes can fly long distances through pipes to access water).

US-4 Design structures with the appropriate pumping, piping, valves, or other necessary equipment to allow for easy dewatering of the unit.

Flood Channels

FC-1 Provide proper grades to ensure that water flows freely.

FC-2 Low-flow channels should be maintained free of debris.

FC-3 Perform regular maintenance to remove vegetation, debris, trash, and sediment accumulated inside the channel to ensure that water flows freely.

FC-4 Remove or trim vegetation that overhangs the channel to minimize the amount of material that naturally falls into the channel.

FC-5 Avoid the use of loose rock riprap that may create and hold standing water.

FC-6 Maintain clear access along the entire length of the channel for the District to conduct surveillance and control activities.

Natural Watercourses

NW-1 Perform frequent maintenance as needed to trim or remove vegetation, debris, trash, and sediment accumulated inside the natural watercourse to ensure that water flows freely.

NW-2 Perform routine maintenance to reduce emergent plant densities to facilitate the ability of mosquito predators (e.g., fishes) to move throughout vegetated areas.

NW-3 Assure accessibility to maintenance and vector control crews for periodic maintenance, control, and trimming or removal of emergent vegetation, as well as for routine mosquito monitoring and abatement procedures, if necessary.

NW-4 Coordinate with Orange County Flood Control Division on areas under their jurisdiction for maintenance. Report blockages and problematic vegetation to Orange County staff to perform needed maintenance.

Freeway Drains

FD-1 Provide proper grades to ensure that water flows freely and does not stand for more than 96 hours.

FD-2 Perform frequent maintenance as needed to remove vegetation, debris, trash, and sediment accumulated inside the drain to ensure water flows freely.

FD-3 Remove or trim vegetation that overhangs the freeway drain to minimize the amount of material that naturally falls into the structure.

FD-4 Avoid the use of loose rock riprap that may hold standing water.

FD-5 Maintain clear access along the entire length of the freeway drain for District staff to conduct surveillance and control activities.

Wastewater Management

WM-1 Monitor all treatment ponds for mosquito larvae – particularly in areas of emergent vegetation.

WM-2 Remove emergent vegetation from edges of aerated ponds.

WM-3 Immediately incorporate sludge into soil through plowing or disking.

WM-4 Ensure all water distributed onto evaporation ponds dries completely in less than 96 hours.

WM-5 Check abandoned ponds or tanks weekly to ensure they are completely dry.

WM-6 Prevent the formation of any crust on treatment ponds or tanks.

WETLANDS

Common Mosquito Development Sites

- Permanent wetlands for habitat or species conservation
- Constructed vernal pools and other wetlands
- Seasonal wetlands
- Tidal marshes

Common Mosquito Species

- Permanent wetlands: *Culex tarsalis*, *Culex erythrothorax*, and *Culiseta incidens*.
- Seasonal wetlands: *Aedes* species.

Special Concerns

Wetlands vary depending on the management goals for the habitat, and may be subject to additional regulations, including state and federal conservation easements and policies, and habitat mitigation or management plans. Vector Reduction Guidelines attempt to balance the management goals of land managers, land owners, and other regulatory agencies with the ultimate goal of creating and maintaining habitat that is least-suitable for mosquito breeding. The District is committed to working with wetland managers and state and federal regulatory agencies to implement mosquito control practices in a proactive and cooperative manner.

General Mosquito Reduction Principles

1. Maintain access for District staff to monitor and treat mosquito breeding sources.
2. Minimize emergent vegetation and surface debris on the water.
3. Contact the District for technical guidance, assistance in implementing vector reduction guidelines, or to coordinate flood/treatment schedules with mosquito control operations.

Design and Maintenance

DM-1 Maintain all open ditches by regularly removing trash, silt, and vegetation, including roots to maintain efficient water delivery and drainage.

DM-2 Provide reasonable access along existing roads and levees to allow the District access for monitoring, and control activities. Make shorelines of natural, agricultural, and constructed water bodies accessible to crews for periodic maintenance, control, and removal of emergent vegetation.

DM-3 Inspect, repair, and clean water-control structures of debris. Remove silt and vegetation build-up in front of structures that impede drainage or water flow. Completely close, board, or fill in to prevent unnecessary water flow, except where water circulation is necessary.

DM-4 Perform regular pump efficiency testing and make any necessary repairs to maximize output, if pumps are required.

DM-5 Ensure adequately sized water control structures are in place. Increase size and number of water control structures, if necessary, to allow for complete draw-down and rapid flooding.

DM-6 Inspect and repair roads and levees, at least annually.

DM-7 Design managed wetland projects to include independent inlets and outlets for each wetland unit.

DM-8 Construct or enhance swales so they are sloped from inlet to outlet and allow the majority of the wetland to be drawn down.

DM-9 Excavate deep channels or basins to maintain permanent water areas (> 2.5 feet deep) within a portion of seasonal managed wetlands. This provides year-round habitat for mosquito predators which can inoculate seasonal wetlands when they are irrigated or flooded.

Vegetation Management

VM-1 Control floating vegetation conducive to mosquito production (e.g., water hyacinth, water primrose, parrot's feather *Eichhornia* spp., duckweed *Lemna* and *Spirodela* spp., and filamentous algal mats).

VM-2 Perform routine maintenance to reduce problematic emergent plant densities and to remove dead top-killed vegetation from periodic freezing weather conditions to facilitate the ability of mosquito predators (e.g., fishes) to move throughout vegetated areas and allow good penetration of pesticides.

Water Management

WM-1 Maintain stable water level by ensuring constant flow of water into pond or wetland to reduce water fluctuation due to evaporation, transpiration, outflow, and seepage.

WM-2 Delay fall flooding to avoid increasing late-season mosquito production (Kwasny et. al., 2004).

WM-3 Flood managed wetlands as fast as possible and as deep as possible (18–24"). Shallow water levels can be maintained during winter months.

WM-4 Maintain permanent or semi-permanent water where mosquito predators can develop. Discourage the use of broad spectrum pesticides.

WM-5 Where feasible, have an emergency plan that provides for immediate drainage into acceptable areas, if a public health emergency occurs.

Coordination with District

CD-1 Consult with the District on agency-sponsored habitat management plans on private lands (and on the timing of wetland flooding on public and private lands); urge private landowners to do the same.

CD-2 Identify problem locations that produce mosquitoes, with the aid of the District, and work to implement mosquito reduction guidelines. Identify potential cost-share opportunities prior to implementing mosquito reduction guidelines.

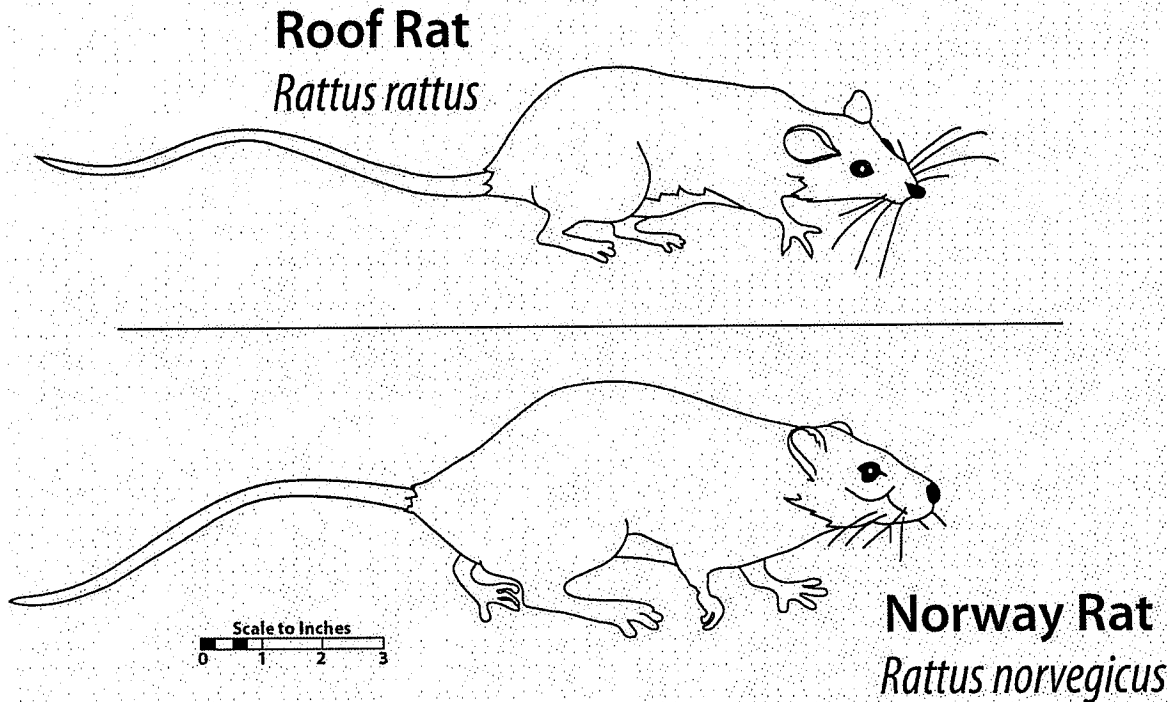
CD-3 Consult with the District on the design of restoration and enhancement projects that have the possibility of affecting mosquito production or control operations.

RAT REDUCTION GUIDELINES

Rat Species:

Norway rat: *Rattus norvegicus*

Roof rat: *Rattus rattus*



Rat Biology

Rats are mostly active at night. They have poor eyesight, but they make up for this with their keen senses of hearing, smell, taste, and touch. Rats constantly explore and learn about their environment, memorizing the locations of pathways, obstacles, food and water, shelter, and other elements in their domain. They quickly detect and tend to avoid new objects placed into a familiar environment. Thus, objects, such as traps and baits often are avoided for several days or more following their initial placement. Both Norway and roof rats may gain entry to structures by gnawing, climbing, jumping, or swimming through sewers and entering through the toilet or broken drains.

Roof rats (*Rattus rattus*), sometimes called ship rats or house rats, are the most common rat in Orange County. Unlike Norway rats, sometimes called brown or sewer rats, their tails are longer than their heads and bodies combined. Roof rats are very agile climbers and usually live and nest above ground in shrubs, trees, and dense vegetation such as ivy. In buildings, they are most often found in enclosed or elevated spaces in attics, walls, false ceilings, and cabinets.

Norway rats (*Rattus norvegicus*) are stocky burrowing rodents that dig burrows into the ground or take advantage of existing burrows of other animals. The burrows are found along building

foundations, beneath rubbish or woodpiles, and in moist areas in and around gardens and fields. While Norway rats are more powerful swimmers, roof rats are more agile and are better climbers. Rats may grab food and carry it off to feed elsewhere. Rats of either species, especially young rats, can squeeze beneath a door with only a 1/2-inch gap. If the door is made of wood, the rat may gnaw to enlarge the gap, but this may not be necessary.

Norway rats eat a wide variety of foods but mostly prefer cereal grains, meats, fish, nuts, and some fruits. When searching for food and water, Norway rats usually travel an area of about 100 to 150 feet in diameter; seldom do they travel any further than 300 feet from their burrows or nests. Roof rats eat a wide variety of foods, but prefer fruits, nuts, berries, slugs, and snails. The average female Norway rat has four to six litters per year and may successfully wean 20 or more offspring annually. The average number of litters a female roof rat has per year depends on many factors, but generally is three to five with from five to eight young in each litter.

Roof rats are especially fond of avocados and citrus and often eat fruit that is still on the tree. When feeding on a mature orange, they make a small hole through which they completely remove the contents of the fruit, leaving only the hollowed out rind hanging on the tree. Their favorite habitats are attics, trees, and overgrown shrubbery or vines. Roof rats prefer to nest in locations off the ground and rarely dig burrows.

Roof rats routinely travel up to 300 feet for food. They may live in the landscaping of one residence and feed at another. They can often be seen at night running along overhead utility lines or fence tops. They have an excellent sense of balance and use their long tails for balance while traveling along overhead utility lines. They may live in trees or in attics and climb down to a food source.

Special Concerns

The roof rat is the major pest species in Orange County. This agile rat frequently enters buildings and moves about neighborhoods using utility lines and fences as runways. They prefer to feed on wild bird seed, pet food, and many of the fruits and nuts (including those that people do not eat) commonly found in residential backyards. Rats and their fleas are capable of transmitting a variety of human diseases making them vector species. Among the diseases transmitted by rats, plague is perhaps the best known and the most serious. The potential of a plague outbreak increases as rat populations increase. Rats can also transmit a variety of bacteria, including rat bite fever and food-borne illness. Rats have no control over their bowels so the presence of droppings is a sure sign of rat activity, as is gnaw marks on food sources, and ingress and egress into buildings.

Guidelines for the Prevention of Rat Infestations

1. Eliminate food and water sources (e.g., pet food, bird food, snails, bird bath, and close garbage cans).
2. Exclude rats from structures.
3. Control rat populations through trapping and rodenticide bait use.
4. Remove rat harborage (e.g., overgrown plants, wood piles, abandoned sheds, old furniture).

Elimination of Food & Water Sources

RF-1 Remove potential food sources from the premises. This includes pet foods, bird seed left out for birds, snails, and dog and cat feces that can be eaten by rats.

RF-2 Maintain fruit trees and fruiting ornamentals. Routinely harvest ripe fruit and dispose of all fruit that has fallen to the ground

RF-3 Maintain vegetable gardens. Routinely harvest produce from gardens.

RF-4 Store pet food in metal containers with tight sealing lids indoors and do not leave uneaten pet food, or water, outdoors overnight.

RF-5 Keep trash cans closed at all times with tightly fitted lids.

RF-6 Repair leaky faucets and eliminate any other unnecessary standing water

Rat Control

RC-1 Trap rats if they are inside a residence or building. Poisoning with rodenticide bait indoors is not recommended because a rat may die inside an inaccessible area of the structure and create an odor and fly problem.

RC-2 Place traps near nesting areas, or where rats are likely to hide. Do not place traps where children or pets will disturb or be harmed by them.

RC-3 Use the following guidelines when placing poison baits outside; 1) Use tamper-resistant bait stations; 2) Secure bait stations so they cannot be carried away or moved and so bait will not spill out; 3) Place bait stations in areas where rats are found, such as behind shrubbery. These formulations are *POISONOUS* and must be placed where pets and children cannot reach them.

Remove Harborage

RS-1 Remove harborage and nesting areas after the rats have been controlled. It is important to wait until after the rats have been eliminated because they will disperse into the surrounding area when the harborage is disturbed during removal.

RS-2 Periodically thin, trim or eliminate completely Algerian ivy, palm trees, yucca, bougainvillea, and other dense shrubbery away from roofs, walls, fences, utility poles, and trees and/or eliminated completely.

RS-3 Stack firewood and lumber piles at least 18" off the ground and 12" away from fences and walls.

RS-4 Close off all openings to potential harborage areas that cannot be removed (like structures), with 1/4 inch hardware cloth screen or stainless steel scrubbing pads. Harborage areas can include barbecues, pool heaters, air conditioners, old furniture, block wall fences, pool sheds, water heater closets, hose storage, crawl areas, attics, and vents.

Excluding Rats From Structures

RP-1 Screen all access openings with 1/4 inch galvanized hardware cloth and inspect at least once a year for condition. Common rat access points to structures include gaps under doors, turbine vents, roof openings, attic louvers and wire openings, pipe openings, gaps between roof and chimney, warped or missing shingles, air conditioning pipe openings, air ducts, and missing or torn vent covers.

RP-2 Seal gaps around pipes and electrical conduits, and weatherproof cracks around doors and windows.

RP-3 Keep tree limbs away from the eaves, roof, and exterior walls of the house.

Maintaining a Rat Free Property

RF-1 Eliminate harborage and food and water sources after rats have been exterminated.

Proper Disposal of a Rat Carcass

CD-1 Using a plastic bag, place your hand in the bag like a glove, pick up the carcass with the bag, invert the bag or turn bag inside out, tie a knot at the end of the bag, place bag in another bag, and dispose of rat in a trash container with a secure lid.

RED IMPORTED FIRE ANT REDUCTION GUIDELINES

Ant Species: *Solenopsis invicta*



Red Imported Fire Ant (RIFA) Biology

The life span of RIFA workers depends on their size. Minor workers may live 30 to 60 days, media workers 60 to 90 days, major workers 90 to 180 days, and queens may live two to six years. Complete life cycle from egg to adult takes between 22 and 38 days. Mating flights are the primary means of colony propagation, secondarily, budding can occur in which a portion of a split off satellite colony becomes an autonomous unit. After the colony reaches one year of age, reproductive alates are produced. Six to eight mating flights consisting of up to 4,500 female or queen alates each occur between the spring and fall. Mating flights usually occur midday on a warm (>74°F/24°C), sunny day following rain. Mating occurs during flight and the males die soon after mating with females. In the southern United States, as many as 97,000 queens may be produced per acre of infested land per year. By six months the colony has reached several thousand workers and the mound can be seen in a field or lawn. Colonies of this size generally contain a few large workers (major workers), many medium sized workers (media workers), and a majority of small workers (minor workers). The queen is the single producer of eggs and is capable of producing as many as 1,500 eggs per day. Mature RIFA colonies may contain as many as 240,000 workers with a typical colony consisting of 80,000 workers. The food collection of foraging workers consists mostly of insects and earthworms. RIFA have also been known to attack immobile and dead vertebrates. Workers also collect honeydew and will forage for sweets, proteins, and fats in homes. Fire ants will attach to the skin using their mandibles and will subsequently lower the tip of their abdomen to inject the stinger into the victim. Thus, fire ants both bite and sting, but only the sting is responsible for the painful burning and pustule.

Special Concerns

The RIFA is a quarantined pest in California and is subject to various federal and state laws and regulations. A native of South America, this imported fire ant was first introduced in the southeastern United States and eventually found its way into Orange County. The colony or nest is very distinctive and easily recognized as a loosely compacted, finely granular dome (18 inches in diameter and six to ten inches high) of soil that somewhat resembles wet coffee grounds. This mound will become hardened as rain and sprinkler waters dries on its surface. Lawn mowing often chops and spreads the mound so be aware that it may take many shapes. Gopher mounds may be similar in size to a RIFA mound but have larger (coarser) soil particles and rocks than RIFA mounds. This ant is considered a vector because, unlike most ants, it delivers a venomous sting that produces immediate pain, a burning/itching sensation, and raised pustules that often last for several days. The venom is relatively toxic and potentially lethal to pets, wildlife, and sensitized humans. Because of the number and severity of their stings, residents of Orange County should be aware of the existence of RIFA on their property and the potential hazards posed by accidental contact.

Guidelines for Red Imported Fire Ant Pre and Post Treatments

Before Survey and/or Pesticide Ant Bait Treatment for RIFA

BR-1 Do not disturb nests and/or foraging workers. RIFA is an aggressive and defensive pest that will bite and sting to defend its self and the colony. Disturbing a mound prior to, or during, a treatment can cause treatments to fail and distract the foraging ants from collecting the bait.

BR-2 Provide the District access to the property for treatment of the fire ant mounds, and/or, if required, the entire property.

BR-3 Sprinkler systems must be turned off the night before the RIFA treatment and not turned on until the day after treatment is complete. The treatment area must be dry for the pesticide ant bait to work effectively.

BR-4 Keep people, pets, and/or companion animals away from the area being treated during the application. People and animals can return to the area immediately after treatment.

After Pesticide Ant Bait Treatment for RIFA

AR-1 Do not irrigate the property for 24 hours after treatment.

AR- 2 Do not apply pesticides to the treated area for one week following treatment.

AR- 3 Do not mow or disturb the area for 24 hours after treatment. Do not use blowers or mowers that may move bait from the treated area, especially within close proximity to a pond or other water feature. The pesticide ant bait is not to come into contact with water, and/or

conditions that favor runoff, areas where surface water is present, or to intertidal areas below the mean high water mark.

Coordination with District

CD-1 Consult with the District on special concerns regarding RIFA and provide access for the District to monitor and treat the site.

CD-2 Working with the District, identify RIFA locations and work to implement the RIFA Reduction Guidelines. Identify potential cost-share opportunities to implement the RIFA Reduction Guidelines.

CD-3 Consult with the District on projects that have the possibility of affecting RIFA populations or control operations.

FLY REDUCTION GUIDELINES

Fly Species:

House Fly: *Musca domestica*

Little House Fly: *Fannia canicularis*

Blow Flies: *Phormia* spp., *Calliphora* spp., *Phaenicia* spp.

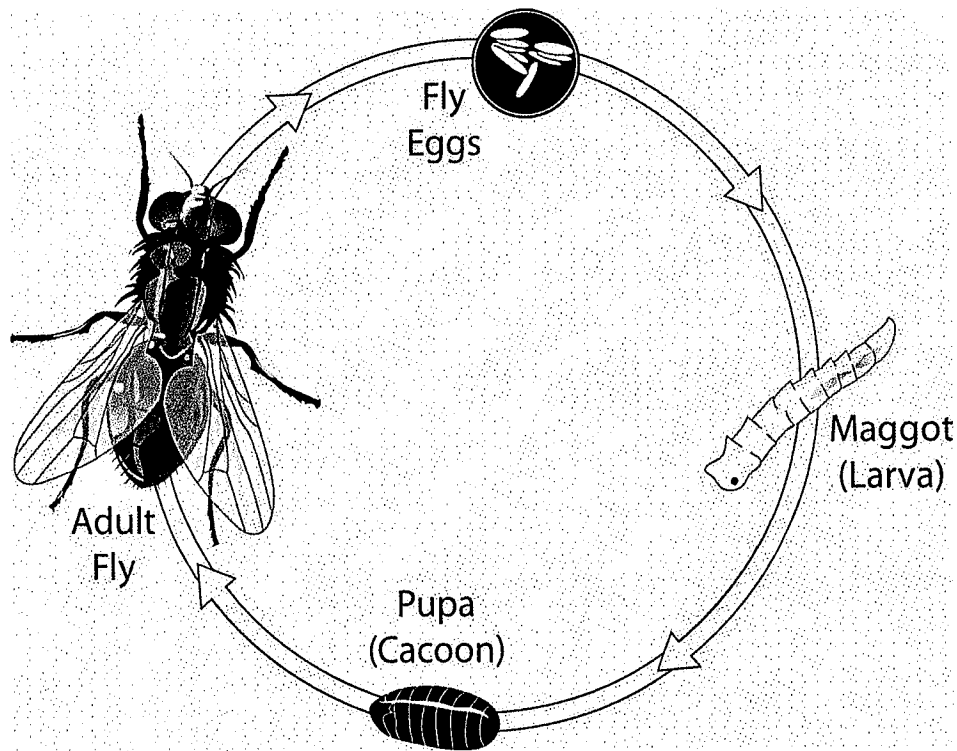
Black Garbage Fly: *Ophyra* spp.

Stable Fly: *Stomoxys calcitrans*

False Stable Fly: *Muscina stabulans*

Flesh Fly: *Sarcophagidae* spp.

Oriental Latrine Fly, *Chrysomya megacephala*



Fly Biology

Flies undergo complete metamorphosis that includes development from an egg, larva, pupa, and adult. Larval stages of flies are uniquely adapted to living in various sources. Some flies do not lay eggs but deposit live larvae directly to the food source. Eggs deposited by egg laying species usually hatch in one to two days and subsequently grow and molt depending on the existing environmental conditions like temperature, nutrient availability, and competition from other species. The larval development stage usually includes five instars. The final instar eventually ceases feeding and seeks a sheltered area near the source for pupation. When the adult is fully

developed, it emerges from the puparium and crawls to a site to expand its wings and cure the cuticle. The fly then mates and begins laying eggs. Fly populations can reach large numbers quickly, depending on the previously listed environmental conditions. Different species of adult flies are able to fly varying distances from the original source. Often flies are seen resting on southern facing surfaces to warm themselves in the morning. They rest at night in sheltered areas like bushes, trees, and eaves of buildings.

Special Concerns

Flies and fly larva feed on a wide range of food sources including blood, flesh, carrion, fecal material, organic waste products, and decomposing vegetable matter to include composting materials. Because flies feed on these foods, they have the ability to mechanically transmit pathogens and vector-borne diseases to humans. Flies found inside of food establishments are a violation of the California Retail Food Code and can be reported to the Orange County Health Care Agency. Flies have an amazing reproductive capacity that allows them to produce tremendous populations when optimal environmental conditions are present. In situations where flies are breeding prolifically, their populations can reach such high numbers as to become nuisance pests at parks, schools, and in residential neighborhoods. Some fly species are attracted to methane gas and may congregate in an area with a natural gas leak.

Guidelines for the Prevention of Fly Problems

- 1) Remove or eliminate fly breeding sources.
- 2) Exclude flies from structures.

Eliminate Fly Breeding Sources

F-1 Place garbage in plastic bags inside of trash receptacles. Keep trash receptacle lids closed.

F-2 Dispose of trash every seven days.

F-3 Pick up pet droppings and place in a sealed plastic bag at least once every seven days. Dog droppings should be picked up daily, while pet birds kept in outdoor aviaries should be cleaned weekly. Cat litter boxes should be changed weekly.

F-4 Do not leave pet food outside, as it can attract flies and serve as a larval fly source.

F-5 Quickly dispose of small animal carcasses such as rats, opossums, and birds by placing them in a plastic bag in the trash. An alternative may be to bury the carcass if space is available and

allowed by local ordinance. Contact the local animal care agency for information on disposing of large animal or pet carcasses.

F-6 Dispose of fruits and vegetables that drop from gardens and trees at least once per week by placing them in a plastic bag in the trash.

F-7 Remove animal manure from property every three days, according to local ordinances.

F-8 Compost decaying vegetable matter in a way that minimizes fly breeding, such as deep burial, tilling, or rapid drying of fruit and vegetable culls.

F-9 Contact the District for an inspection if flies are found on a property.

Exclusion

F-10 Keep the lids on garbage containers closed. Check to make sure there are no openings for fly entry.

F-11 Screen all windows and doors.

F-12 Keep things that attract flies, such as pet food, bright colors, and attractive scents, away from unscreened doorways.

REFERENCE MATERIAL

Best Management Practices for Mosquito Control in California Recommendations of the California Department of Public Health and the Mosquito and Vector Control District of California. 2010. California Department of Public Health.

Best Management Practices for Mosquito Control on California State Properties. 2008. California Department of Public Health.

Dever, T., Hagele, C. A., Mellor, K. S., and Middleton, K. Are you raising a killer in your cemetery? 2007. American Cemetery, April 2007.

Kwasny, D. C., Wolder, M., and Isola, C. R. *Technical Guide to Best Management Practices for Mosquito Control in Managed Wetlands*, Central Valley Joint Venture. 2004. U.S. Bureau of Reclamation.

Lawler, S. P. *UC IPM Pest Management Guidelines: Rice.* 2005. UC ANR, Publication #8117.

Lawler, S. P. and Lanzaro, G.C. *Managing Mosquitoes on the Farm.* 2005. UC ANR, Publication #8158.

Metzger, M. E. *Managing Mosquitoes in Stormwater Treatment Devices.* 2004. UC ANR Publication #8125.

Meyer, R. P., and Madon, M. B. *Arthropods of Public Health Significance in California.* 2002. MVCAC Publication.

Mosquito Reduction Best Management Practices. 2008. Sacramento-Yolo Vector Control District.

Salmon, T. P., Marsh, S. P., and Timm, R. M. *Pest Notes: Rats.* 2003. UC ANR Publication #74106

Walton, W. E. *Managing Mosquitoes in Surface Flow Constructed Treatment Wetlands.* 2003. UC ANR Publication #8117.



Public Notice

March 8, 2011

Re: Notification to Potentially Affected Governmental Agencies Regarding Application of Pesticides by the Orange County Vector Control District

The Orange County Vector Control District (District) is hereby notifying potentially affected governmental agencies of our application of mosquito control pesticides within Orange County pursuant to the National Pollutant Discharge Elimination System (NPDES) Permit (Order No. 2011-XXXX-DWQ) [General Permit No. CAG XXXXXX]. This permit is for discharges of biological and residual pesticides to waters of the United States issued by the State Water Resources Control Board.

The District is a public health agency charged with protecting the citizens of Orange County under Division 3 of the California Health and Safety Code (CAL. HSC. §2000-2910). The District carries out its mission with a balanced approach focused on protecting public health and the environment through an effective, county-wide Integrated Vector Management (IVM) Program. As part of this IVM Program, the District applies mosquito control pesticides that primarily target aquatic, immature (larval) stages of mosquitoes to prevent the emergence of adult mosquitoes, which inflict painful bites and may transmit diseases such as West Nile Virus. District personnel conduct larval mosquito control year-round in a variety of urban and natural habitats, such as unmaintained swimming pools, ornamental ponds, small containers, stormwater treatment systems, riparian corridors, tidal marshes, and seasonal and permanent wetlands. Larval control products include: Agnique MMF, Agnique MMF-G, Altosid Briquets, Altosid XR Extended Residual Briquets, Altosid Liquid Larvicide Concentrate, Altosid Pellets Mosquito Growth Regulator, AQUAPRENE XL Briquets, AQUAPRENE XL Granules, BVA 2, FOURSTAR Briquets, Natular 2EC, VectoBac 12AS, VectoBac G, VectoLex CG, VectoLex WSP, and VectoLex WDG. Adult mosquito control, if necessary, occurs typically in the warmer months near mosquito producing habitats like seasonal and permanent wetlands, tidal marshes, and natural watercourses. Pesticides applied to control adult mosquitoes include: Aqua Anvil and Zenivex E20.

All mosquito control pesticides are applied only when necessary by licensed, District personnel according to product label instructions and in compliance with all local, state, and federal regulations. Proper applications maximize a product's effectiveness while avoiding or minimizing any adverse impacts to the public and environment. No special precautions need to be taken by your representative agencies as the District performs these ongoing activities.

For more information please call (714) 971-2421 or visit the District's website (www.ocvcd.org).