

RECEIVED

MAR 14 2016

DIVISION OF WATER QUALITY

ATTACHMENT E – NOTICE OF INTENT

WATER QUALITY ORDER 2016-XXXX-DWQ
GENERAL PERMIT CAG990004

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	<input checked="" type="checkbox"/> A. New Applicator	<input type="checkbox"/> B. Change of Information: WDID# _____
	<input type="checkbox"/> C. Change of ownership or responsibility: WDID# _____	
	<input type="checkbox"/> D. Enrolled under Order 2011-0002-DWQ: WDID# _____	

II. DISCHARGER INFORMATION

A. Name <i>TURLOCK MOSQUITO ABATEMENT DISTRICT</i>			
B. Mailing Address <i>4412 N. WASHINGTON RD.</i>			
C. City <i>TURLOCK</i>	D. County <i>STANISLAUS</i>	E. State <i>CA</i>	F. Zip Code <i>95380</i>
G. Contact Person <i>DAVID HEFT</i>	H. Email address <i>dheft@fire2wire.com</i>	I. Title <i>GENERAL MANAGER</i>	J. Phone <i>209-634-1234</i>

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

1. Canals, ditches, or other constructed conveyance facilities owned and controlled by Discharger.
Name of the conveyance system: _____

2. Canals, ditches, or other constructed conveyance facilities owned and controlled by an entity other than the Discharger.
Owner's name: VARIOUS - SEE ATTACHMENT A
Name of the conveyance system: APPLICATIONS MAY BE MADE TO VARIOUS CONVEYANCE SYSTEMS WITHIN STANISLAUS COUNTY.

3. Directly to river, lake, creek, stream, bay, ocean, etc.
Name of water body: VARIOUS - SEE ATTACHMENT A - APPLICATIONS HAVE HISTORICALLY BEEN MADE TO SOURCES NEAR SAN JUAN, MERCED, AND TUOLUMNE RIVERS AND ASSOCIATED TRIBUTARIES.
* 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): Region 5
(List all regions where pesticide application is proposed.)

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, active ingredients and, if known, degradation by-products
SEE ATTACHMENT B

C. Period of Application: Start Date JANUARY 1 End Date NOVEMBER 30

D. Types of Adjuvants Added by the Discharger:
NONE

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 Pesticides Application Plan shall be included with the NOI.

B. Is the applicator familiar with its contents?

Yes No

VII. NOTIFICATION

Have potentially affected governmental agencies been notified?
 Yes No

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

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 Order, including developing and implementing a monitoring program, will be complied with."

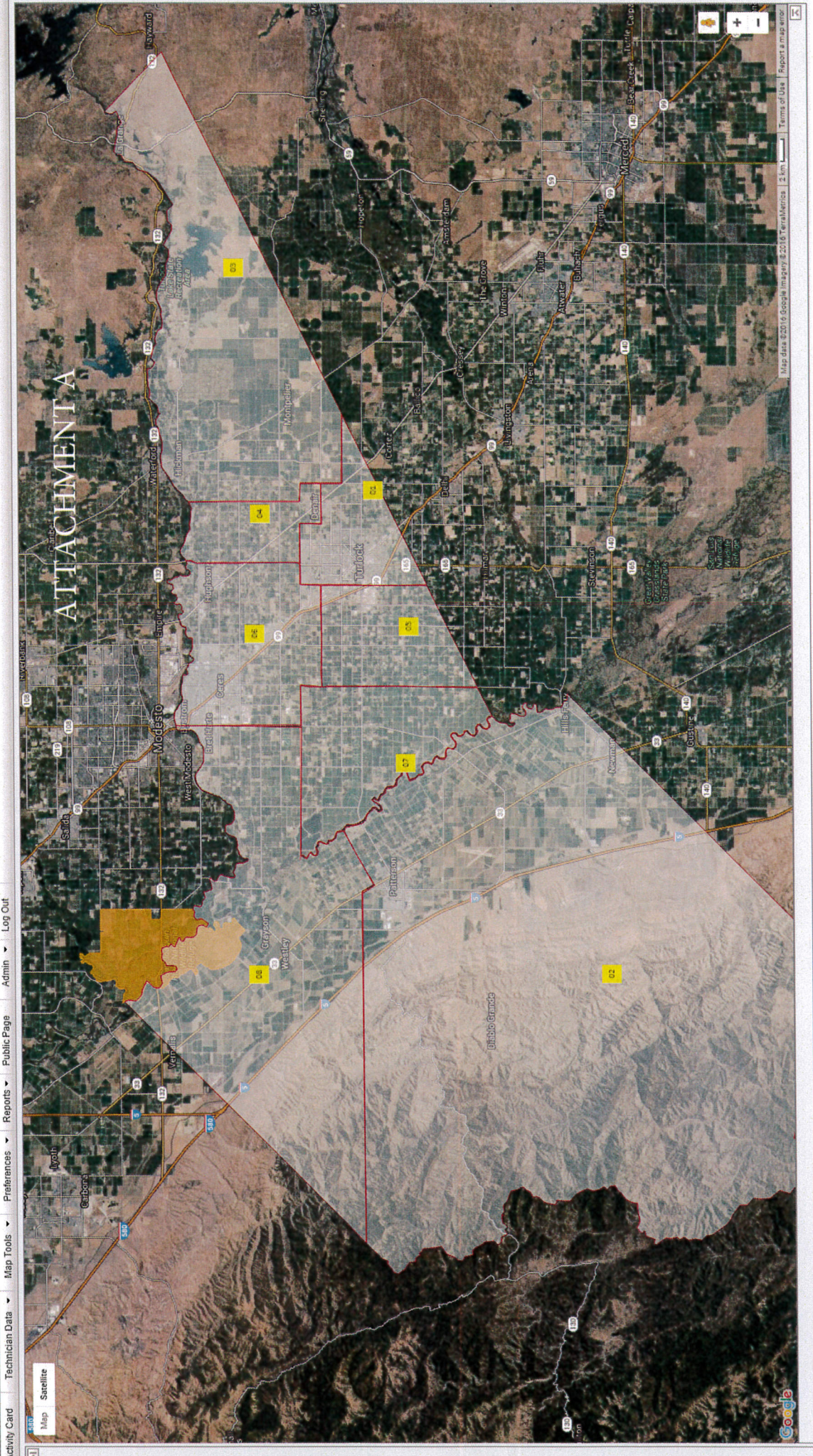
A. Printed Name: DAVID HEST

B. Signature: *David Hest* Date: 03/01/2016

C. Title: GENERAL MANAGER

X. FOR STATE WATER BOARD USE ONLY

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



ATTACHMENT A

Activity Card Technician Data Map Tools Preferences Reports Public Page Admin Log Out

Map data ©2016 Google Imagery ©2015 TerraMetrics 2 km Report a map error



Attachment B

Turlock Mosquito Abatement District NOI

V. Pesticide Application Information

List of Active Ingredients that may be used under NPDES Permit.

Active Ingredient
Bacillus thuringiensis var. israelensis
Bacillus sphaericus (Lysinbacillus sphaericus)
Deltamethrin
Etofenprox
Lambda-Cyhalothrin
Malathion
Methoprene
Monomolecular Films
Naled
N-octyl Bicycloheptene Dicarboximide (MGK-264)
Petroleum Distillates
Permethrin
Piperonyl Butoxide
Prallethrin
Pyrethrin
Resmethrin
Spinosad
Sumithrin
Temephos
Any "minimum risk category" pesticides that are FIFRA exempt and registered for use in California and used in a manner specified in 40 C.F.R. section 152.25.

Central California Irrigation District	Chris White, Manager	P.O. Box 1231 Los Banos, CA 95635
Crows Landing CSD	Ignacio Lopez, Manager	P.O. Box 537 Crows Landing, CA 95313
Del Puerto Canyon Water District	William Harrison, Manager	P.O. Box 1596 Patterson, CA 95363
Grayson CSD	Ignacio Lopez, Manager	P.O. Box 158 Westley, CA 95387
Patterson Irrigation District	Peter Rietkerk, Manager	P.O. Box 685 Patterson, CA 95363
Turlock Irrigation District	Casey Hashimoto, General Manager	P.O. Box 949 Turlock, CA 95381
West Stanislaus Irrigation District	Robert Pierce, Manager	P.O. Box 37 Westley, CA 95387
City of Turlock	Position Open, City Manager	156 S. Broadway #230 Turlock, CA 95380-5456
City of Patterson	Ken Irwin, City Manager	P.O. Box 667 Patterson, CA 95363
City of Ceres	Toby Wells, City Manager	2727 Third St. Ceres, CA 95307-3292
City of Newman	Michael Holland, City Manager	P.O. Box 787 Newman, CA 95360
City of Hughson	Raul Mendez, City Manager	7018 Pine Street Hughson, CA 95326
City of Modesto, Jennings Wastewater Plant	Aaron Trott, Plant Maintenance Supervisor	7007 Jennings Road Modesto, CA 95358
County of Stanislaus Chief Executive Office	Stan Reisen, Chief Executive Officer	1010 10 th St., Suite 6800 Modesto, CA 95354
County of Stanislaus Department of Agriculture	Milton O'Haire, Agricultural Commissioner	3800 Cornucopia Way, Suite B Modesto, CA 95358
U.S. Fish & Wildlife Service San Luis National Wildlife Complex	Eric Hopson, Assistant Refuge Manager	San Joaquin River NWR 947 Pacheco Blvd., Suite C Los Banos, CA 93635
U.S. Department of Agriculture	Diana Waller, Soil Conservationist	3800 Cornucopia Way, Suite E

National Resources Conservation Service (NRCS)		Modesto, CA 95358
California Department of Fish & Wildlife Los Banos Wildlife Complex, Region 4	William Cook	18110 West Henry Miller Avenue Los Banos, CA 93635

Notice of Intent to Apply Public Health Pesticides for Vector Control Purposes to Surface Waters of the U.S. Within Stanislaus County

GENERAL NPDES PERMIT FOR BIOLOGICAL AND RESIDUAL PESTICIDE DISCHARGES FROM VECTOR CONTROL APPLICATIONS

Order No. 2016-XXXX-DWQ

NPDES No. CAG 990004

Re: Notice of Intent by Turlock Mosquito Abatement District to Apply Pesticides to Waters of the United States for Mosquito Control Purposes Under the General NPDES Permit for Vector Control Applications

The Turlock Mosquito Abatement District (District) may be making larvicide and/or adulticide applications to waters of the US under your jurisdiction for mosquito reduction purposes. The District is required to notify all Government Agencies that may be affected by these applications under the requirements of the Statewide national Pollutant Discharge Elimination System (NPDES) Permit for Biological and Residual Pesticide Discharges to Waters of the United States from Vector Control Applications.

The District intends to make public health pesticide applications to, over and adjacent to constructed conveyances, surface waters and other waters of the US owned and controlled by entities other than the District for vector control purposes.

The following is a list of active ingredients that may be used by the District in controlling mosquitoes:

Active Ingredient
Bacillus thuringiensis var. israelensis
Bacillus sphaericus (Lysinbacillus sphaericus)
Deltamethrin
Etofenprox
Lambda-Cyhalothrin
Malathion
Methoprene
Monomolecular Films
Naled
N-octyl Bicycloheptene Dicarboximide (MGK-264)
Petroleum Distillates
Permethrin
Piperonyl Butoxide
Prallethrin
Pyrethrin
Resmethrin

Spinosad

Sumithrin

Temephos

Any "minimum risk category" pesticides that are FIFRA exempt and registered for use in California and used in a manner specified in 40 C.F.R. section 152.25.

The purpose of the use of larvicide and adulticide pesticides containing these active ingredients is for the control of larval and adult mosquitoes to minimize the threat of mosquito-borne diseases and biting annoyances.

The general time period of the application of pesticides to waters of the US is April 1, 2016 to November 30, 2016. Locations of expected use will be constructed conveyances, surface waters, and other waters of the US within Stanislaus County.

For additional information, please call the District at (209) 634-1234, Monday-Friday, 8:00 am to 3:30 pm.

David Heft, General Manager
Turlock Mosquito Abatement District
4412 N. Washington Road
Turlock, CA 95380
www.turlockmosquito.org

Turlock Mosquito Abatement District (District)

Pesticide Application Plan (PAP):

- 1. Description of ALL target areas, if different from the water body of the target area, in to which larvicides and adulticides 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:**

Please see District Project Area Boundary Map. The District routinely control mosquitoes in portions of Merced County along the border of Stanislaus County to control mosquitoes that affect residents of Stanislaus County. The following water bodies that may receive pesticides from District spray operations: San Joaquin River and associated tributaries in Stanislaus County, including Orestimba Creek, Del Puerto Creek, Ingram Creek, Salado Creek and Hospital Creek; Merced River, and Tuolumne River.

- 2. Discussion of the factors influencing the decision to select pesticide applications for vector control:**

The District uses Integrated Vector Management (IVM) to determine when pesticide applications are appropriate. The District considers source reduction, which is the elimination of mosquito breeding sites, as the best solution; but, unfortunately this is not always possible. Decisions to use pesticides for control of mosquitoes include, but are not limited to, growth stage of mosquito, habitat that may affect efficacy of certain pesticides, inability to implement BMP (such as draining or management of water) in a timely fashion to prevent emergence, adult mosquito density and/or virus activity that require widespread ultra-low volume application, etc.

The District also recognizes the responsibility of property owners and will use legal abatement proceedings as allowed under the California Health and Safety Code sections 2060-20678, 100170, and 100175. Enclosed is the District's Mosquito and Mosquito-Borne Disease Guidelines adopted by the District's Board of Trustees on April 15, 2013.

The District uses "Best Management Practices for Mosquito Control in California" as a guidance document. This document provides recommendations from the California Department of Public Health and the Mosquito and Vector Control Association of California to promote mosquito control on California properties and enhance early detection of West Nile virus (WNV). This document can be obtained in electronic format by accessing the following website:

<http://www.westnile.ca.gov/resources>.

- 3. Pesticide products or types expected to be used and if known, their degradation by-products, the method in which they are applied, and if applicable, the adjuvants and surfactants used:**

The NPDES Permit for Biological and Residual Pesticide Discharges to Waters of the U.S. from Vector Control Applications was amended to list the approved active ingredients rather than having specific products named. All pesticide label restrictions and instructions will be followed for pesticides which contain the active ingredients listed below. In addition, pesticides which fall

under the “minimum risk” category may be used. The minimum risk pesticides have been exempted from FIFRA requirements. Products will be applied by truck, backpack, hand can, all-terrain vehicle, and airplane/helicopter.

<i>Bacillus thuringiensis</i> subsp. <i>israelensis</i> (Bti)
<i>Bacillus sphaericus</i> (Bs) (<i>Lysinibacillus sphaericus</i>)
Methoprene
Monomolecular Films
Petroleum Distillates
Spinosad
Temephos
Deltamethrin
Etofenprox
Lambda-Cyhalothrin
Malathion
Naled
N-octyl bicycloheptene dicarboximide (MGK-264)
Piperonyl butoxide (PBO)
Permethrin
Prallethrin
Pyrethrin
Resmethrin
Sumithrin
Any minimum risk category pesticides that are FIFRA exempt and registered for use in California and used in a manner specified in 40 C.F.R. section 152.25.

4. 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 of 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” published by California Department of Health and the Mosquito and Vector Control Association of California or in the District’s “Mosquito and Mosquito-Borne Disease Guidelines” document.

Mosquito breeding sources and areas that require adult mosquito control are difficult to predict from year-to-year based on the weather and environmental variables. Typical sources treated by the District include: permanent/semi-permanent/seasonal wetlands; irrigated crops such as pastures, corn, orchards, vineyards, dairy ponds, and associated water conveyance systems, storm drains, Old San Joaquin River Channel, White Lake, San Joaquin River/Tributaries, Merced River, and Tuolumne River/tributaries. Please see District Project Area Boundary Map.

5. Other control methods used (alternatives) and their limitations:

With any mosquito 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” by CDPH or the District’s own “Mosquito and Mosquito-Borne Disease Guidelines”. An example of an alternative is the District’s use of *Gambusia affinis* in wetlands, irrigation drains, and neglected swimming pools on a yearly basis. District staff identify mosquito breeding sites throughout the District and work with property owners and land managers to incorporate District BMPs to reduce or eliminate mosquito breeding habitat. An example of sites where BMPs have been incorporated, are: implementation of proper draining/ditches, vegetation management that provides water movement and removal of mosquito habitat, wetland postponement of (re)-flooding, draining of duck club habitat, discing, and legal abatement.

6. How much product is needed and how this amount was determined:

Material	Pounds	Gallons
<i>Bti</i> liquid		14.91
Etofenprox (6.67%)		9.59
Naled		564.46

The above total represent estimated pesticide applications to Waters of the U.S. for 2015. These amounts will vary from year-to-year due to variability in required pesticide applications for mosquito control. This data is provided as an example of the products and amounts used in one year.

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

Please see the MVCAC NPDES Coalition Monitoring Plan

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

As mentioned in No. 5 above, elimination of breeding sources or utilizing BMPs to reduce or prevent the necessity of pesticide use is the District’s primary objective. For instance, working with wetland and duck club managers to delay fall flooding for water fowl habitat allows for water to be applied at a time of year mosquitoes are not active and disease transmission is no longer taking place. In addition, proper vegetation management can have significant impacts by not providing habitat protection for mosquitoes; thereby reducing the amount of pesticide applied. The District operates an active vegetation management program and has been very successful in reducing the amount of mosquito control pesticides applied. The distribution of *Gambusia affinis* in neglected swimming pools, for instance, means that no pesticides need to be applied at all as long as the fish remain. The District provides *Gambusia affinis* to the public for free.

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

a. 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.

b. Measures to ensure that only a minimum and consistent amount is used:

Spray equipment is calibrated each year and is part of the MOU with CDPH. However, the pesticide label and associated registration by USEPA and CDPR are the authority of how much product can be legally applied to control the target.

c. A plan to educate Coalition's or Discharger's staff and pesticide applicator on any potential adverse effects to waters of the U.S. from the pesticide application:

Applicators are required to complete pesticide training on an annual basis. Records are kept of these training sessions for review by the local agricultural commissioner and/or CDPH. Employees certified by the CDPH must perform at least 20 hours of Continuing Education units to maintain their certification.

d. Descriptions of specific BMPs for each spray mode, e.g. aerial spray, truck spray, hand spray, etc.:

The 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. ULV equipment is calibrated for output and droplet size to meet label requirements. Aerial larviciding and adulticiding equipment are calibrated by the Contractor. Droplet sizes are monitored to ensure droplets meet label requirements. Airplanes used in ULV applications are equipped with advanced guidance and drift management equipment to ensure the best available technology is being used to place product in the intended spray area.

e. Descriptions of specific BMPs for each pesticide product used:

Please see District's Mosquito and Mosquito-Borne Disease Management Guidelines and CDPH document Best Management Practices for Mosquito Control in California.

f. Descriptions of specific BMPs for each type of environmental setting (agriculture, urban, and wetlands):

Please see District's Mosquito and Mosquito-Borne Disease Management Guidelines and CDPH document Best Management Practices for Mosquito Control in California.

10. Identification of the problem. Prior to first pesticide application covered under this General Permit will result in a discharge of biological and residual pesticides to waters of the U.S., 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:

Please see District's Mosquito and Mosquito-Borne Disease Management Guidelines and CDPH document Best Management Practices for Mosquito Control in California.

- a. **If applicable, establish densities for larval and adult vector populations to serve as action threshold(s) for implementing pest management strategies:**

Please see District's Mosquito and Mosquito-Borne Disease Management Guidelines and CDPH document 2015 California Mosquito and Mosquito-Borne Virus Surveillance and Response Plan. This document can be obtained in electronic format by accessing the following website:

<http://westnile.ca.gov/resources>.

- b. **Identify target vector species to develop species-specific pest management strategies based on developmental and behavioral considerations for each species:**

Please see District's Mosquito and Mosquito-Borne Disease Management Guidelines and CDPH document Best Management Practices for Mosquito Control in California.

- c. **Identify known breeding areas for source reduction, larval control program, and habitat management: and**

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 as described in the District's Mosquito and Mosquito-Borne Disease Management Guidelines and CDPH document Best Management Practices for Mosquito Control in California.

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

This information is located in the District's Mosquito and Mosquito-Borne Disease Management Guidelines. The District utilizes mosquito surveillance traps on a weekly basis to obtain appropriate mosquito abundance and disease activity data to guide control decisions.

- 11. Examination of Alternatives. Dischargers shall continue to examine alternatives to pesticide use in order 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**
- **Pesticides**

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

Implementing preferred alternatives depends on a variety of factors including availability of agency resources, cooperation with stakeholders, coordination with other regulatory agencies, and the anticipated efficacy of the alternative. If a pesticide-free alternative does not sufficiently reduce the risk to public health, pesticides are considered, beginning with the least amount necessary to effectively control the target vector.

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

Please see District's Mosquito and Mosquito-Borne Disease Management Guidelines and CDPH document Best Management Practices for Mosquito Control in California.

In addition, the District may utilize legal abatement authority to mitigate mosquito production.

12. Correct Use of Pesticides.

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 our California Department of Public Health (CDPH) Cooperative Agreement. All pesticide applicators receive annual safety and spill training in addition to their regular continuing education.

13. Website for Public Notices

<http://www.turlockmosquito.org>

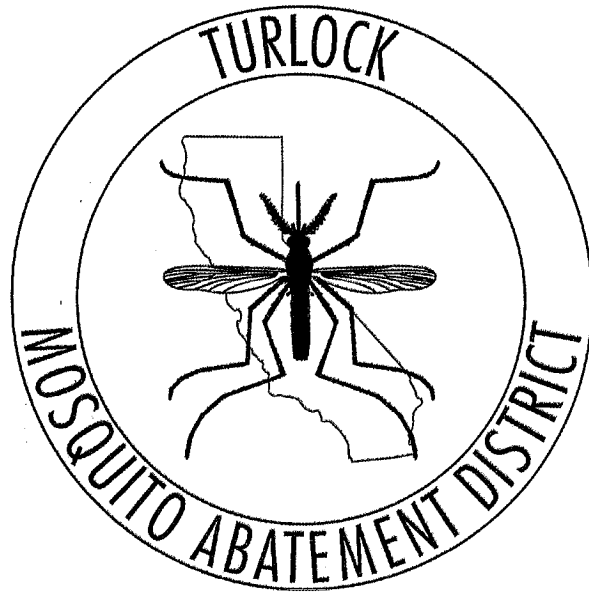
References

Mosquito and Mosquito-Borne Disease Management Plan. 2013. Turlock Mosquito Abatement District. (209) 634-1234

Best Management Practices for Mosquito Control in California. 2010. <http://westnile.ca.gov/resources>.

California Mosquito and Mosquito-Borne Virus Surveillance and Response Plan. 2015. <http://westnile.ca.gov/resources>.

MVCAC NPDES Coalition Monitoring Plan.



Mosquito and Mosquito-Borne Disease Management Guidelines

Turlock Mosquito Abatement District
4412 N. Washington Rd
Turlock, CA 95380
(209)-634-1234

Table of Contents

I.	INTRODUCTION.....	4
II.	BACKGROUND INFORMATION.....	4
III.	MOSQUITO SURVEILLANCE OBJECTIVES	5
	A. Mosquito Surveillance	
	B. Mosquito Infections	
	C. Avian Infections	
	D. Equine Infections	
	E. Human Infections	
	F. Data Analysis and Interpretation	
	G. Public Information and Education	
IV.	MOSQUITO CONTROL OBJECTIVES.....	7
	A. Larval Control	
	B. Adult Control	
V.	RESPONSE LEVELS.....	8
VI.	MOSQUITO-BORNE VIRUS ASSESSMENT – TABLE 1. - WNV	10
VII.	CHARACTERIZATION OF CONDITIONS AND RESPONSES.....	11
	A. Level 1: Normal Season	
	B. Level 2: Emergency planning	
	C. Level 3: Epidemic Conditions	
VIII.	Immature Mosquito Guidelines.....	14
	Immature Mosquito Guideline Definitions.....	18
IX.	Adult Mosquito Guidelines	19
	Adult Mosquito Guidelines Definitions.....	25
X.	Appendix.....	26
	A. WNV Risk Assessment Table.....	27
	B. SLE Risk Assessment Table.....	28
	C. WEE Risk Assessment Table.....	29
	D. Key Agency Responsibilities	30

Turlock Mosquito Abatement District Mission Statement

“The Turlock Mosquito Abatement District is dedicated to enhancing the quality of life for our community by providing effective and environmentally sound mosquito control and disease prevention through timely and efficient surveillance, control and public awareness programs.”

Core Values

These values represent the principles of the District’s culture and Board’s expectations:

- Protecting the public health;
- Professional delivery of services;
- High ethical standards;
- Open government and transparency;
- Environmentally conscientious;
- Fiscally responsible.

Management Guidelines:

1. Introduction:

The Turlock Mosquito Abatement District was formed on January 28, 1946, to protect the health of residents from the transmission of mosquito borne viruses and enhance the quality of life in the communities we serve. The District was organized as a mosquito abatement district under Chapter 1, Division 3 of the Health and Safety Code. Under the code, the District has the authority to conduct programs for the surveillance, prevention, abatement, and control of mosquitoes.

The mosquito management guidelines were established to provide District staff and other stakeholder's information on how to assess the level of mosquitoes and mosquito-borne virus activity, along with the appropriate measures to stop the transmission of mosquito-borne viruses and manage mosquito populations.

The information in this document will direct staff to utilize Integrated Vector Management (IVM), and best management practices, when making decisions regarding mosquitoes and the diseases they vector. Integrated Vector Management offers a variety of response options, such as: public education, physical control, biological control, and chemical control. IVM encourages all parties involved to collaborate to eliminate mosquito breeding and prevent the transmission of mosquito-borne viruses.

The Mosquito-borne Virus Surveillance & Response Plan generated by California Department of Health Services, Mosquito & Vector Control Association of California and University of California, is the core of this document; however, adjustments have been made to reflect the conditions within the Turlock Mosquito Abatement District.

2. BACKGROUND INFORMATION

Mosquito-borne viruses belong to a group of arthropod-borne viruses referred to as arboviruses (for arthropod-borne). Out of 12 mosquito-borne viruses known to occur in California, only St. Louis encephalitis virus (SLE), Western Equine encephalomyelitis virus (WEE), and West Nile virus (WNV) have caused significant outbreaks of human disease. These viruses are maintained in nature in wild bird-mosquito cycles, and therefore do not depend upon infections of humans or domestic animals for their persistence.

Surveillance includes the monitoring of immature and adult mosquito abundance and detecting virus activity by testing (a) adult female mosquitoes, (b) wild birds, (c) horses, and (d) humans for infection.

3. MOSQUITO SURVEILLANCE OBJECTIVES

A. Mosquito Surveillance

Surveillance includes monitoring of immature and adult mosquito abundance in the District throughout the year. To monitor mosquito larvae, “dippers” or long-handled ladles are used to collect samples from known and new water sources, and the number of larvae and pupae per “dip” is estimated. The records of the number and developmental stages of larvae, source size treated product name and amount used, with the control effectiveness data can provide an early warning tool for forecasting the size of the adult population and can determine larval control measures.

Mosquito adult surveillance in the District is conducted by setting Encephalitis Vector Survey (EVS) traps on a weekly basis. Traps are generally placed from May until the end of October, depending on the weather conditions. Adult mosquito abundance is a key factor when evaluating the risk of disease transmission.

B. Mosquito Infections

Early detection of virus activity may be accomplished by testing *Culex tarsalis*, and *Culex pipiens*, which are the primary vectors of SLE, WEE, and WNV infection in the District. Sampling of other mosquito species may be necessary to detect the introduction of viruses that do not have a primary avian-*Culex* transmission.

Mosquitoes are trapped by using EVS (carbon-dioxide-baited) traps and the females are then pooled in groups up to 50 for submission to the laboratory at the UCD Center for Vector-borne Disease (CVEC). The current surveillance system is designed to detect WNV, SLE, WEE and other potentially new viruses.

C. Avian Infections

In 2000, DHS initiated a dead bird surveillance program in collaboration with other public agencies. DHS annually notifies about 600 agencies, organizations and veterinarians involved with wildlife, including rehabilitation centers, about the program. Dead birds are reported to DHS, shipped to a California Animal Health & Food Safety Laboratory for screening and removal of kidney tissue, which is then sent to the UC Davis Arbovirus Research Unit for WN viral isolation.

TMAD follows up with adult surveillance when reports are received of WNV positive birds.

D. Equine Infections

Equine disease due to WEE is not a sensitive indicator of epizootic (infections only in animals) WEE activity in California. The reason for this is the widespread vaccination of equines. If confirmed cases do occur, it is a strong indication that WEE is active in the region. California Department of Agriculture (CDFA) and DHS annually contact veterinarians to insure equine vaccinations. Besides WEE and WNV, other mosquito-

borne viruses may also cause encephalitis in horses, and consequently, testing of equine specimens by DHS has been expanded to include other viruses.

E. Human Infections

In general, human cases are not a sensitive surveillance indicator of virus activity because most human infections (>99%) have no, or only mild, symptoms. When severe encephalitis cases do occur, rarely are arboviruses suspected, and sera generally are not sent to DHS for testing. Rapid detection and reporting of confirmed human cases is crucial to local mosquito control agencies in planning and expending emergency control activities to prevent additional infections.

F. Data Analysis and Interpretation

1. All weather reports received from state and local agencies that can affect mosquito breeding will be reviewed and analyzed by the District staff.
2. Reports from DHS – VBDS and UCD on virus isolations in mosquito pools and confirmed human cases and horse cases of encephalitis will be used for operational program planning.

G. Public information and education

Residents, farmers and duck club owners can play an important role in reducing the number of adult mosquitoes by eliminating standing water that may support the development of immature mosquitoes. Farmers and ranchers can ensure that irrigation practices do not allow standing water for extended periods and duck club owners can work with mosquito control agencies to determine appropriate flooding schedules. Education regarding personal protective measures will help reduce exposure to mosquitoes (insect repellents, protective clothing, etc). Equally important is the education of the medical community to recognize the symptoms of WEE, SLE, and WNV and request proper laboratory testing for their confirmation. Public health officials need to be alerted if a mosquito-borne viral disease is detected, especially if the public health risk is high. The level of public information and education depends on the conditions and required response.

4. Mosquito Control Objectives

The Turlock Mosquito Abatement District is one of many agencies whose purpose is to protect the health their residents from the transmission of mosquito borne viruses and provide relief from the nuisance of mosquitoes. The District covers 966 square miles in the southern portion of Stanislaus County (south of the Tuolumne River). The service area includes cities such as Ceres, Hughson, Grayson, Newman, Patterson and Turlock. The District also serves the unincorporated areas within the southern portion of the county.

A. Larval control

This strategy prevents producing another generation of mosquitoes capable of transmitting disease. Control of larvae is target-specific and covers a defined area. Larval mosquito control includes environmental manipulation, biological control, and chemical control.

Physical Control decreases habitat availability for immature mosquitoes. It may include irrigation water management to prevent water standing in fields, drainage in the urban areas, re-circulation of water at the fish farms and water disposal through evaporation, such as at duck clubs.

Biological control uses natural predators to suppress immature stages of mosquitoes. Mosquitofish, *Gambusia affinis*, are used mostly in abandoned pools and water troughs. District personnel do not place mosquitofish in sources known or thought to be habitats for endangered or threatened species. Special consideration must be taken when stocking fish in sources where the potential for migration into endangered or threatened species' habitats exists. District personnel also do not stock mosquitofish in areas that may overflow into U.S. waterways (creeks, streams, rivers, etc).

It is against California Department of Fish & Game regulations for private citizens to plant mosquitofish in waters of the state without a permit (Title 14 CCR, Fish and Game Code, Section 1.63, Section 6400, and Section 238.5).

Chemical control presently includes products that are highly specific and have minimal impact on non-target organisms. Larval control products are selected for their use based on factors such as species present, stage of development, habitat and environmental concerns.

B. Adult control

Adult mosquito control may be required as an additional measure to control populations of infected mosquitoes and reduce disease transmission. Adult mosquito control products may be applied by ground-based equipment (more common) or airplane / helicopter. Many factors need to be considered when selecting a pesticide and the target area for adult mosquito control treatments. These factors may include (1) efficacy against the target species or life cycle stages, (2) pesticide resistance (3) pesticide label requirements, (4) availability of pesticide and application equipment, (5) environmental conditions, (6) cost, and (7) toxicity to non-target species, including humans.

Mosquito-Borne Virus Risk Assessment and Response Plan

The California Mosquito-borne Virus Surveillance and Response Plan was developed to meet several objectives. Specifically, the Plan:

- Provides guidelines and information on the surveillance and control of mosquito-borne viruses in California, including West Nile, St. Louis encephalitis, and western equine encephalomyelitis viruses;
- Incorporates surveillance data into risk assessment models;
- Prompts surveillance and control activities associated with virus transmission risk level;
- Provides local and state agencies with a decision support system; and
- Outlines the roles and responsibilities of local and state agencies involved with mosquito-borne virus surveillance and response.

Response Levels and Surveillance Factors

The California Mosquito-borne Virus Surveillance and Response Plan was developed to provide a semi-quantitative measure of virus transmission risk to humans that could be used by local mosquito control agencies to plan and modulate control activities.

Independent models are presented for WEE, SLE and WNV to accommodate the different ecological dynamics of these viruses (Barker et al. 2003). SLE and WN viruses are closely related, require similar environmental conditions, and employ the same *Culex* vectors.

Seven surveillance factors are measured and analyzed to determine the level of risk for human involvement and thereby gauge the appropriate response level. Each factor is scored on a scale from 1 (lowest risk) to 5 (highest risk). Table 1 provides a worksheet to record the assessed scores of each factor and aid in calculating the response level.

1. Environmental or climatic conditions (snowpack, rainfall, temperature, season)
2. Adult *Culex* vector abundance
3. Virus infection rate in *Culex* mosquito vectors
4. Sentinel chicken seroconversions
5. Fatal infections in birds (WNV only)
6. Infections in humans
7. Proximity of detected virus activity to urban or suburban regions (WEE only)

The mean score calculated from these seven factors corresponds to 3 general response levels which can lead to utilizing activities from 5 levels.

1. Normal season (average assessment rating 1.0-2.5)– Level 1 activities
2. Emergency planning (average assessment rating 2.6 to 4.0)- Levels 1 and 2 activities
3. Epidemic (average assessment rating 4.1 to 5.0)- All activities

Table 1 includes the Risk Assessment Guide for West Nile Virus. Please see the Appendix for Assessment Guides on Saint Louis Encephalitis (SLE) and Western Equine Encephalitis (WEE).

Table 1. Mosquito-borne Virus Risk Assessment.

WNV Surveillance Factor	Assessment Value	Benchmark	Assigned Value	
			<i>Cx tars</i>	<i>Cx pip</i>
1. Environmental Conditions High-risk environmental conditions include above-normal temperatures with or without above-normal rainfall, runoff, or snowpack. Weather data link: http://ipm.ucdavis.edu	1	Avg daily temperature during prior 2 weeks $\leq 56^{\circ}\text{F}$		
	2	Avg daily temperature during prior 2 weeks $57 - 65^{\circ}\text{F}$		
	3	Avg daily temperature during prior 2 weeks $66 - 72^{\circ}\text{F}$		
	4	Avg daily temperature during prior 2 weeks $73 - 79^{\circ}\text{F}$		
	5	Avg daily temperature during prior 2 weeks $> 79^{\circ}\text{F}$		
2. Adult <i>Culex tarsalis</i> and <i>Cx. pipiens</i> complex relative abundance* Determined by trapping adults, enumerating them by species, and comparing numbers to those previously documented for an area for the prior 2-week period.	1	Vector abundance well below average ($\leq 50\%$)		
	2	Vector abundance below average (51 - 90%)		
	3	Vector abundance average (91 - 150%)		
	4	Vector abundance above average (151 - 300%)		
	5	Vector abundance well above average ($> 300\%$)		
3. Virus infection rate in <i>Culex tarsalis</i> and <i>Cx. pipiens</i> complex mosquitoes* Tested in pools of 50. Test results expressed as minimum infection rate per 1,000 female mosquitoes tested (MIR) for the prior 2-week period.	1	MIR = 0		
	2	MIR = 0.1 - 1.0		
	3	MIR = 1.1 - 2.0		
	4	MIR = 2.1 - 5.0		
	5	MIR > 5.0		
4. Sentinel chicken seroconversion Number of chickens in a flock that develop antibodies to WNV during the prior 2-week period. If more than one flock is present in a region, number of flocks with seropositive chickens is an additional consideration. Typically 10 chickens per flock.	1	No seroconversions in broad region		
	2	One or more seroconversions in broad region		
	3	One or two seroconversions in a single flock in specific region		
	4	More than two seroconversions in a single flock or two flocks with one or two seroconversions in specific region		
	5	More than two seroconversions per flock in multiple flocks in specific region		
5. Dead bird infection Number of birds that have tested positive (recent infections only) for WNV during the prior 3-month period. This longer time period reduces the impact of zip code closures during periods of increased WNV transmission.	1	No positive dead birds in broad region		
	2	One or more positive dead birds in broad region		
	3	One positive dead bird in specific region		
	4	Two to five positive dead birds in specific region		
	5	More than five positive dead birds in specific region		
6. Human cases Do not include this factor in calculations if no cases are detected in region.	3	One or more human infections in broad region		
	4	One human infection in specific region		
	5	More than one human infection in specific region		
			<i>Cx tars</i>	<i>Cx pip</i>
Response Level / Average Rating: Normal Season (1.0 to 2.5) Emergency Planning (2.6 to 4.0) Epidemic (4.1 to 5.0)			TOTAL	
			AVERAGE	

* Calculation of separate risk values for *Cx. tarsalis* and the *Cx. pipiens* complex may be useful if their spatial distributions (e.g., rural vs. urban) differ within the assessment area.

Mosquito Control Activities- Summary

Level 1 – Normal Season (Average Risk Assessment Value between 1.0 to 2.5)

A. Conditions (based on California Response Plan):

- No human cases
- Average or below average snowpack and rainfall
- Below or average seasonal temperatures (Average daily temperatures generally less than 65F during prior 2 weeks)
- *Culex (tarsalis and pipiens)* mosquito abundance below five year average
- No or little virus infection detected in mosquitoes
- No seroconversions in sentinel chickens (possibly 1 in region)
- No recently infected WNV-positive dead birds (possibly 1 region)

B. Responses (Standard On-going Mosquito Management Activities)

- Surveillance
 - Conduct routine mosquito and mosquito-borne disease surveillance activities
 - Encephalitis Vector Survey (EVS) trapping in areas with large populations of mosquitoes and high frequency areas of WNV in the past.
 - Gather data such as species present, abundance, habitats and virus levels
 - Encephalitis virus testing in mosquitoes and dead birds
 - Conduct epidemiological studies on birds infected with mosquito borne viruses
 - Identify larval sources; evaluate sites for immature mosquito threshold densities and species

- Control Measures

Larva Control

- Conduct routine mosquito management with emphasis on larval control
- Evaluate environmental and regulatory conditions and requirements
- Utilize physical controls when possible (such as drainage or modification to sources to prevent further breeding by eliminating standing water.)
- Introduce biological control measures where appropriate(mosquitofish)
- Apply public health pesticides when necessary

Adult Mosquito Control (see guidelines)

- Adult management is initiated when threshold criteria in the IVM of adult mosquito application guidelines are met or exceeded.
 - Applications may be conducted by ground and/or air applications in areas that exceed adult mosquito threshold levels

- District Preparation

- Inventory pesticides and equipment
- Ensure adequate emergency funding
- Meet with Stanislaus County West Nile Task Force

- Public Outreach Via District
 - Conduct routine public education community events and schools
 - Release routine press notice in coordination with Stanislaus County Health Service Agency and the Stanislaus County West Nile Task Force.
 - Inform public of the availability of mosquito fish
 - Encourage the use of personal protection measures to prevent bites
- District Wide Communication
 - Meet /communicate with the Stanislaus County West Nile Virus Task Force, which includes Stanislaus County Health Services, CDPH and others concerned with mosquito borne virus activity in our district.
 - Stanislaus Co. Health Services will communicate with area physicians.
 - Stanislaus Co Health Services will aid in distributing press releases

Level 2 - Emergency planning (Average Risk Assessment Value between 2.6 to 4.0)

A. Conditions (based on *California Response Plan*):

- Above average snowpack and rainfall
- Average to above average temperatures. (Average daily temperatures temperatures generally ranging from 66 to 79 F during the prior 2 weeks.)
- Adult Culex mosquito abundance greater than 5-year average (150% to 300% above normal)
- One or more virus infections detected in Culex mosquitoes (MIR / 1000 is <5)
- One or more seroconversions in single flock or one to two seroconversions in multiple flocks in specific region
- One to five recently infected WNV-positive dead birds in specific region
- One human case in broad or specific region
- WEE virus detected in small towns or suburban area

B. Response

- Surveillance
 - Increase adult mosquito surveillance
 - Continue with monitoring areas discussed in level 1
 - Conduct epidemiological investigations in cases involving horses or humans infected with mosquito-borne viruses.
 - Trap to monitor mosquito population migration.
 - Increase the number of mosquito sites and samples tested for virus. (Note: all adult *Culex pipiens and tarsalis* collected by TMAD are tested for WNV, SLE and WEE. The number of samples will increase due to increases in trapping.)
 - Increase monitoring of mosquito larva development sites

- Control Measures
 - Larva control:
 - Increase monitoring larva development sites. Treat as necessary
 - Adult Mosquito Control
 - Conduct or increase ULV applications as necessary.

- District Preparation
 - Review epidemic response plan
 - Contact Eastside Mosquito Abatement to discuss potential large scale aerial adulticiding needs.
 - Review pesticide inventory for availability of candidate pesticides. Order any products necessary.

- Public Outreach
 - Continue to inform public through community events and other presentations on how they can protect themselves and what are common symptoms of the mosquito borne viruses
 - Post Wide-area adulticiding announcements on website and via Twitter.

- District Wide Communication
 - Coordinate with Stanislaus County Health Services to deliver current information to health care providers
 - Work with Stanislaus County Health Services to provide press releases with:
 - current statistics
 - reminders on steps to protect yourself from mosquito-borne viruses.
 - Communicate mosquito-borne virus activity with TMAD board.

Level 3 - Epidemic (Average Risk Assessment Value between 4.1 to 5.0)

A. Conditions (based on *California Response Plan*):

- Snowpack, rainfall, and water release rates from flood control dams well above average
- Above average temperatures (Average daily temperatures generally above 79F during the prior 2 weeks)
- Adult vector population extremely high (>300%)
- Virus infections detected in multiple pools of *Culex tarsalis* or *Cx. pipiens* mosquitoes (MIR / 1000 > 5.0)
- More than two seroconversions per flock in multiple flocks in specific region
- More than five recently infected WNV-positive dead birds and multiple reports of dead birds in specific region
- More than one human case in specific region
- WEE virus detection in urban or suburban areas

B. Response

- Surveillance

- Broaden geographic coverage of adult mosquito surveillance
 - Continue with monitoring areas discussed in level 1 and 2
 - Conduct epidemiological investigations in cases involving horses or humans infected with mosquito-borne viruses.
 - Trap to monitor mosquito population migration.
- Increase the number of mosquito samples tested for virus. (Note: all adult *Culex pipiens* and *tarsalis* collected by TMAD tested for WNV, SLE and WEE. The number of samples will increase due to increases in trapping.)
 - Continue increased monitoring of mosquito larva

- Control Measures

Larva control:

- Continue enhanced monitoring of mosquito larva. Treat larval development sites as necessary.

Adult Mosquito Control

- Increase adult mosquito control as appropriate by ground and/or air.

- District Preparation

- Contact Eastside Mosquito Abatement (or other commercial applicator if necessary) to discuss potential large scale adulticiding needs
- Monitor and maintain pesticide inventory of necessary pesticides

- Public Outreach

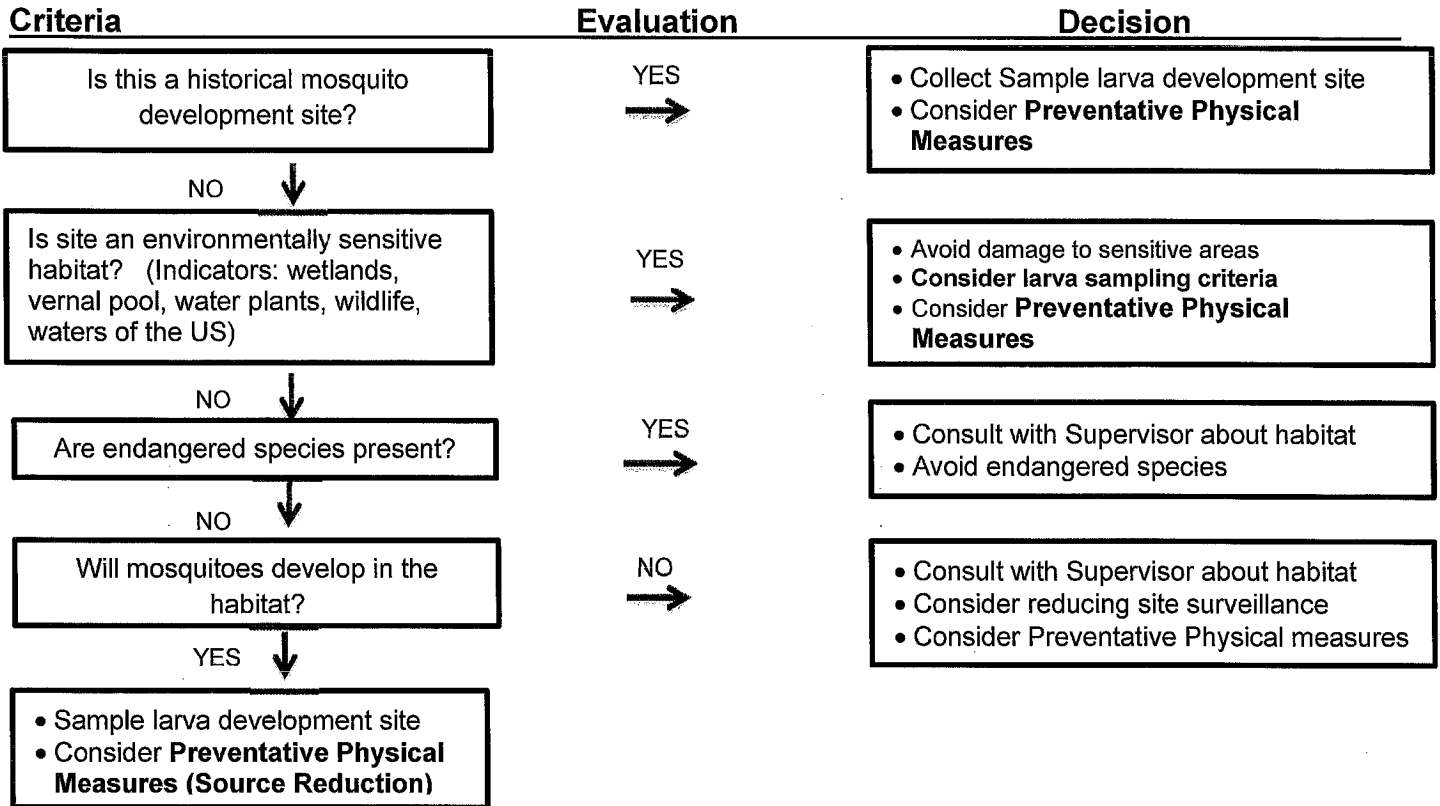
- Continue to inform public through community events and other presentations on how they can protect themselves and what are common symptoms of the mosquito borne viruses
- Continue to post Wide-area adulticiding treatments on website

- District Wide Communication

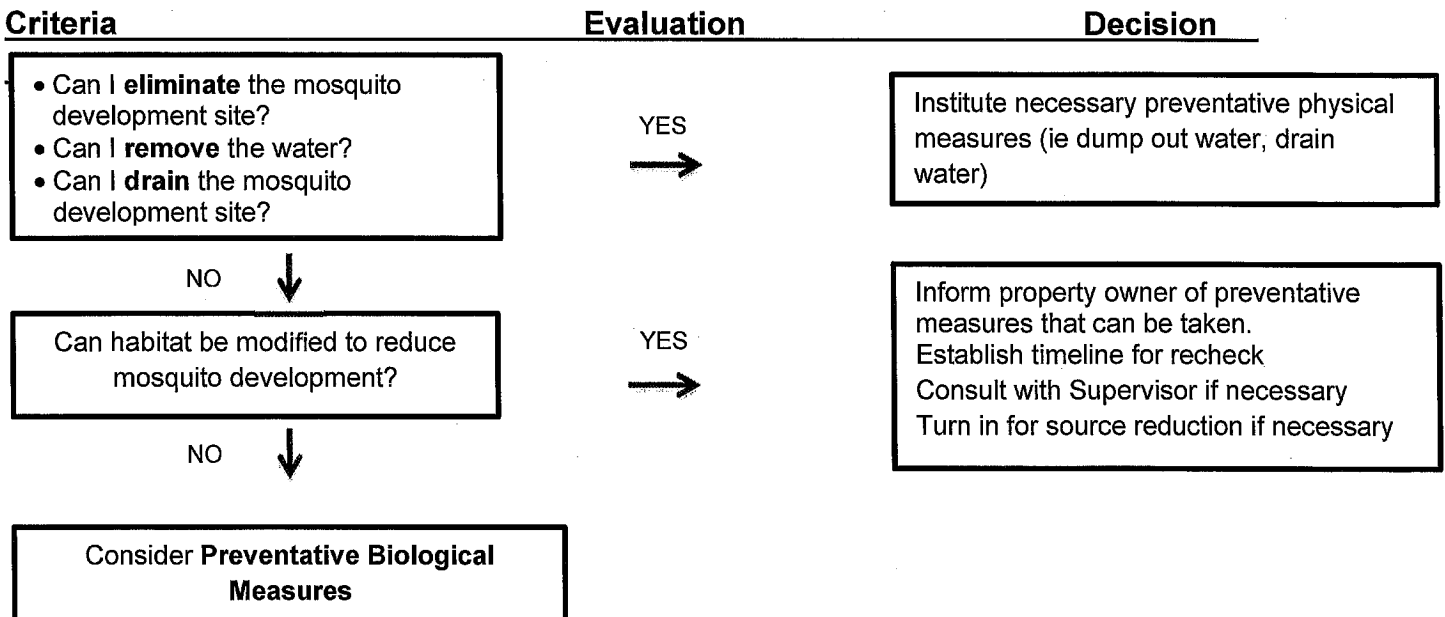
- Coordinate with Stanislaus County West Nile Virus Task force and Stanislaus County Health Services to alert health care providers.
- Work with the West Nile Virus Task Force and Stanislaus County Health Services to conduct a full scale media campaign.
- Keep TMAD board members apprised of current WNV activity.

Immature Mosquito Guidelines

1. Monitoring Site Assessment



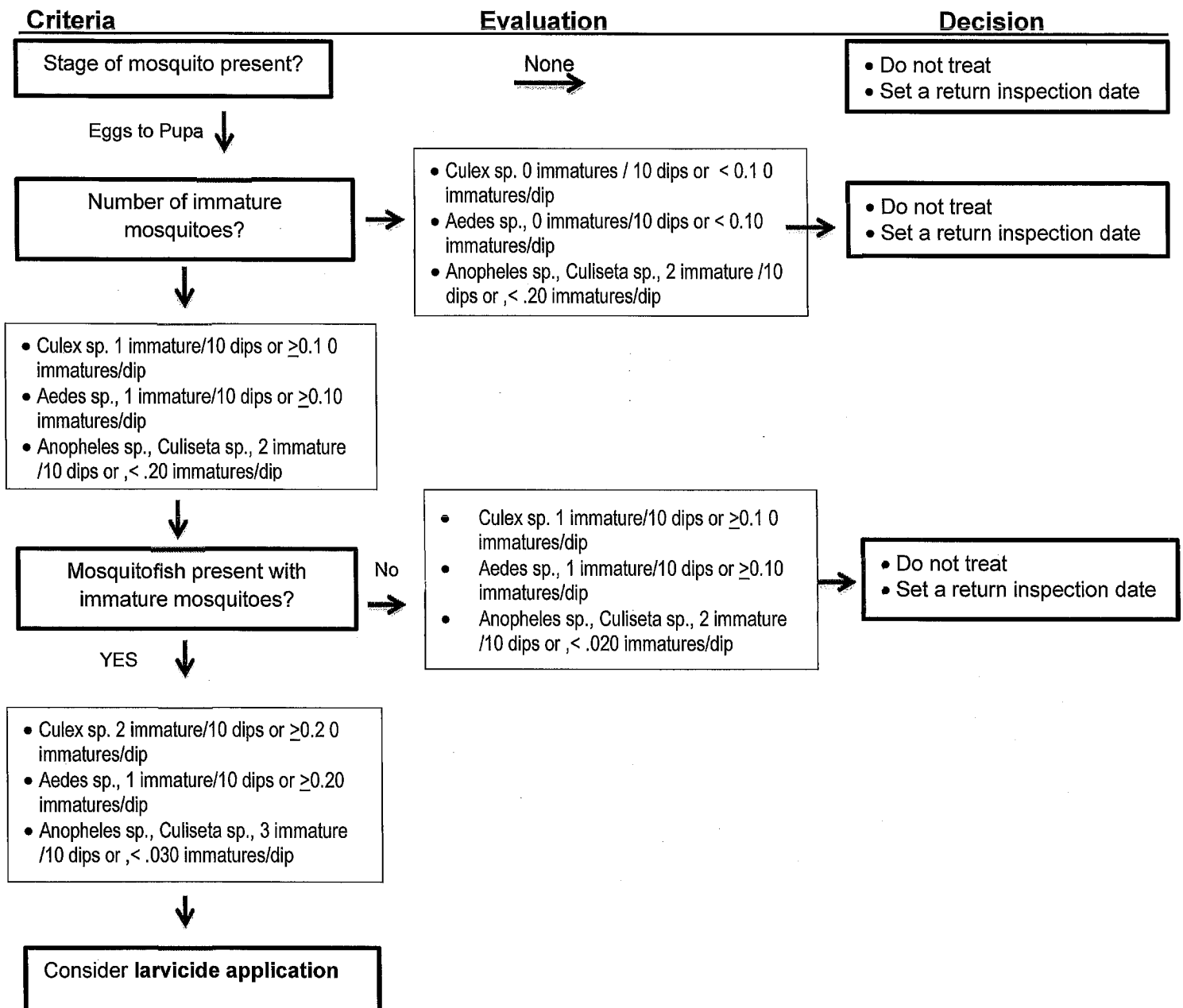
2. Preventative Physical Measures



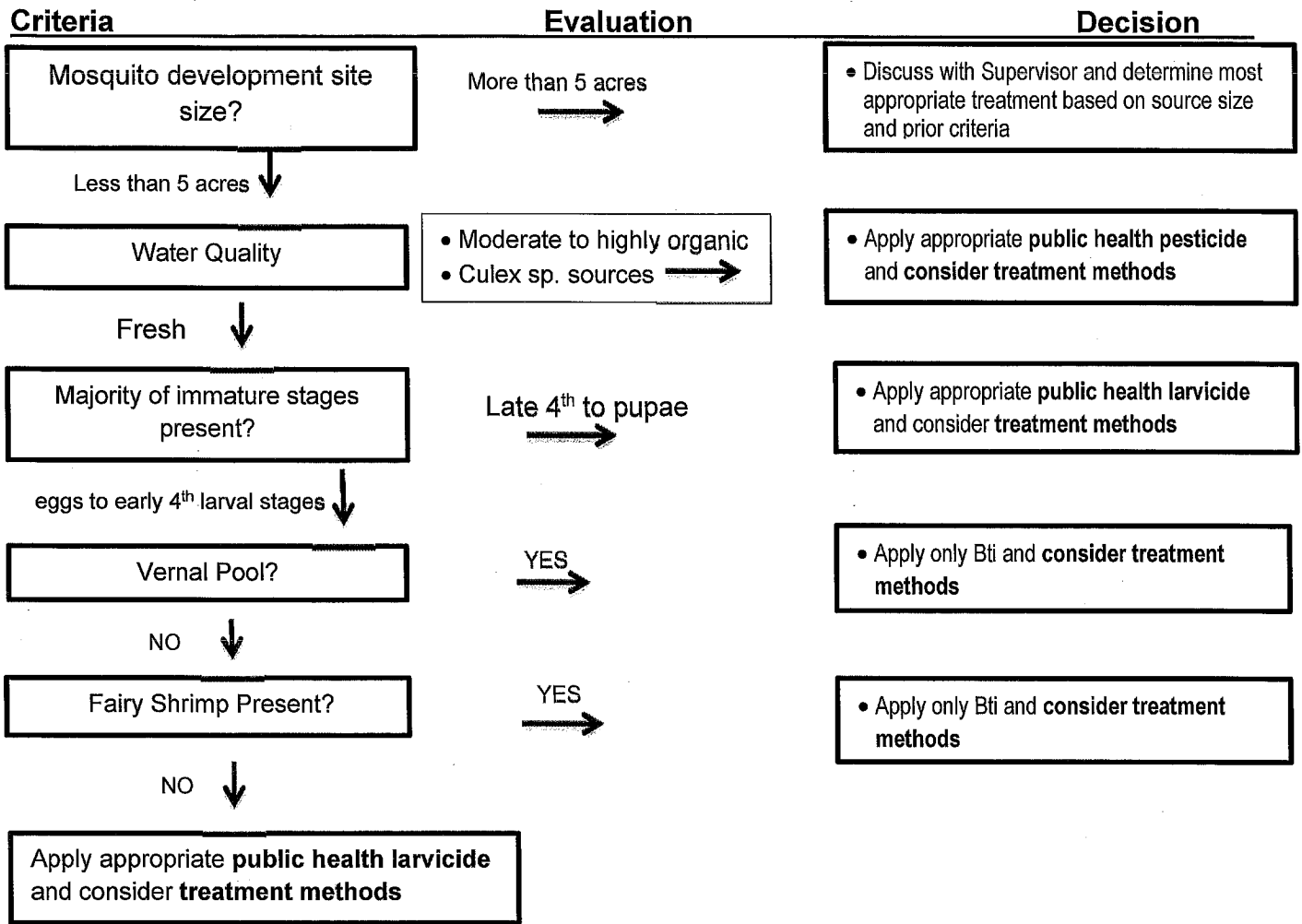
3. Preventative Biological Measures

Criteria	Evaluation	Decision
Will habitat support immature mosquitoes?	NO →	<ul style="list-style-type: none"> • Do not apply biorationals • Set a return inspection date • Consider preventative physical
YES ↓		
Time Water will remain in site?	Intermittent < 96 hours →	<ul style="list-style-type: none"> • Consider Larvae Sampling Criteria
Semi-permanent / Permanent ↓		
Environmentally sensitive habitat?	YES →	Consult with supervisor before release of mosquitofish or larvicide application
NO ↓		
Water Quality ?	Highly organic →	<ul style="list-style-type: none"> • Consider Larvae Sampling Criteria • Consider stocking with mosquitofish • Consider larvicide application • Set a return inspection date
Fresh ↓		
Swimming pool or Backyard pond?	YES →	<ul style="list-style-type: none"> • Stock with mosquitofish if possible • Set a return inspection date
NO ↓		
<ul style="list-style-type: none"> • Consider stocking with mosquitofish • Consider Larvae Sampling Criteria • Set a return inspection date 		

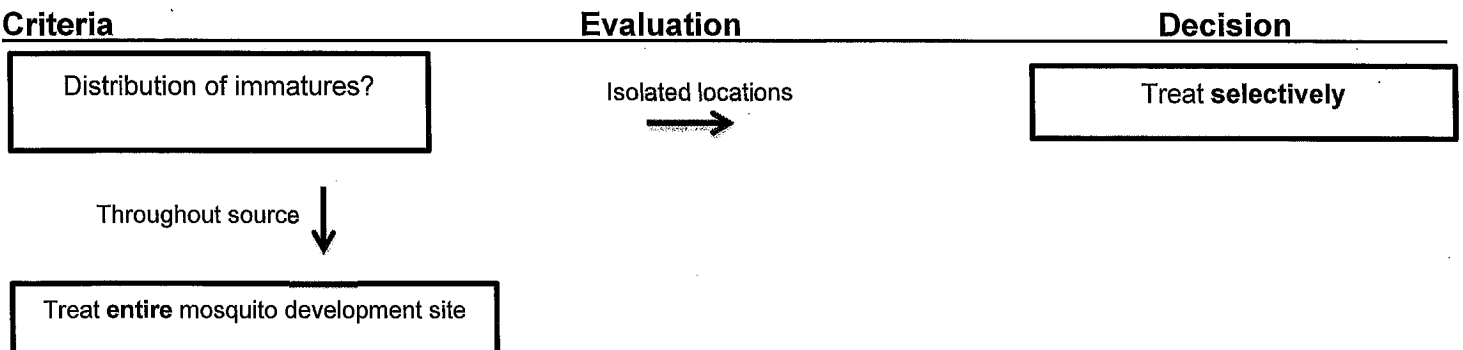
4. Larvae Sampling Criteria



5. Larvicide Application (Target Population Modification)



6. Treatment Methods



Abbreviations and Definitions:

1. The Endangered Species Act - 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).
2. Environmental sensitive habitats - wetlands, riparian areas, organic producers, State, Federal, local wildlife areas or other areas posted as such.
3. Public Health Larvicide- A pesticide registered by the Environmental Protection Agency and the California Department of Pesticide Regulation for use against pests of public health importance in California.

Public health pesticide (PHP) use and resistance management

(applications can be over more than one year)

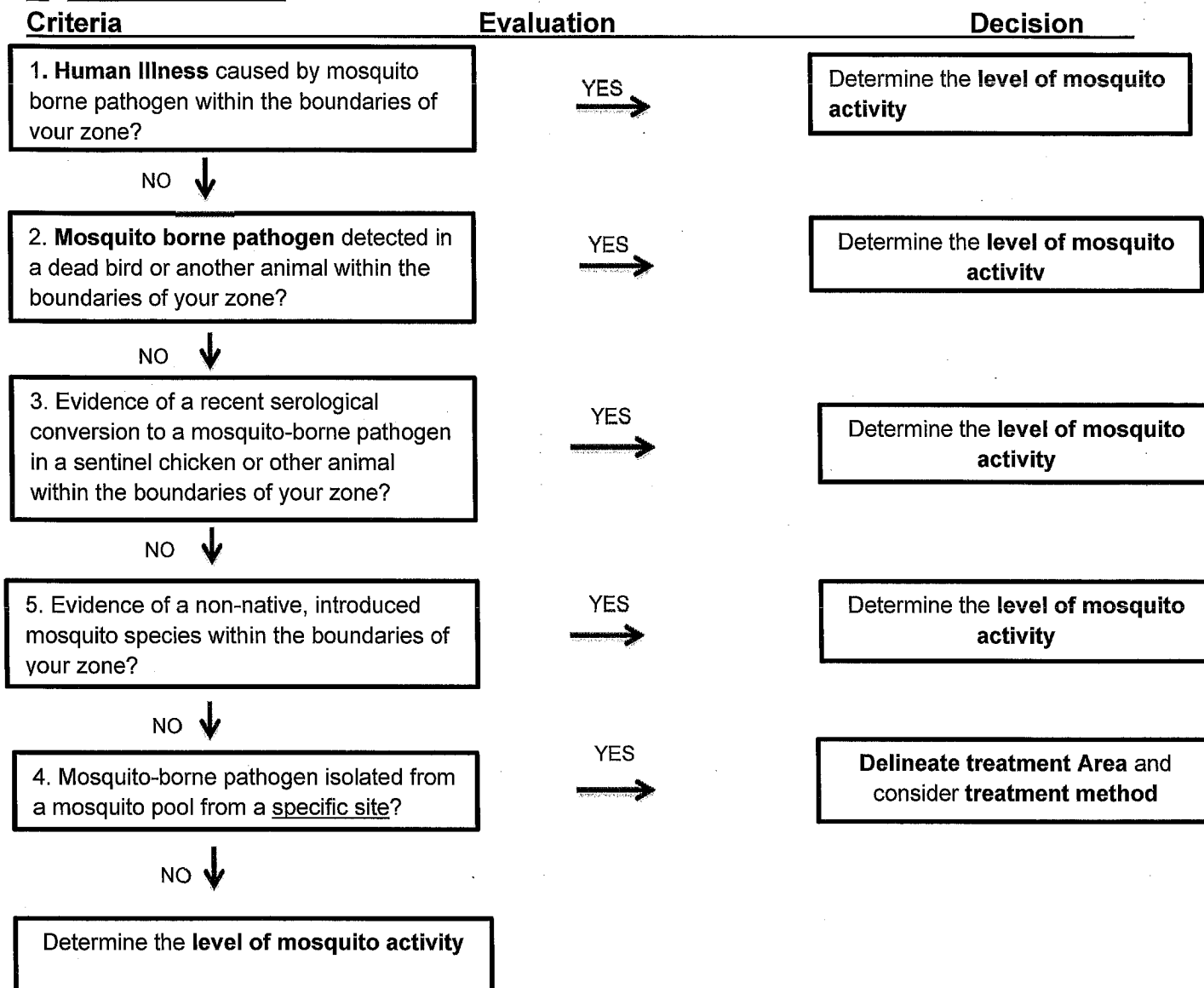
1. Consult PHP's label before treatment
2. Apply PHP's within the same class or mode of activity on a rotational basis by the following guidelines unless no other alternatives are available:
 - a. Slow release PHP formulations- rotate to a new class after three consecutive applications to the same site.
 - b. Short-lived PHP's formulations- rotate to a new class after ten consecutive applications to the same site.

Factors or conditions that may modify immature mosquito management guidelines:

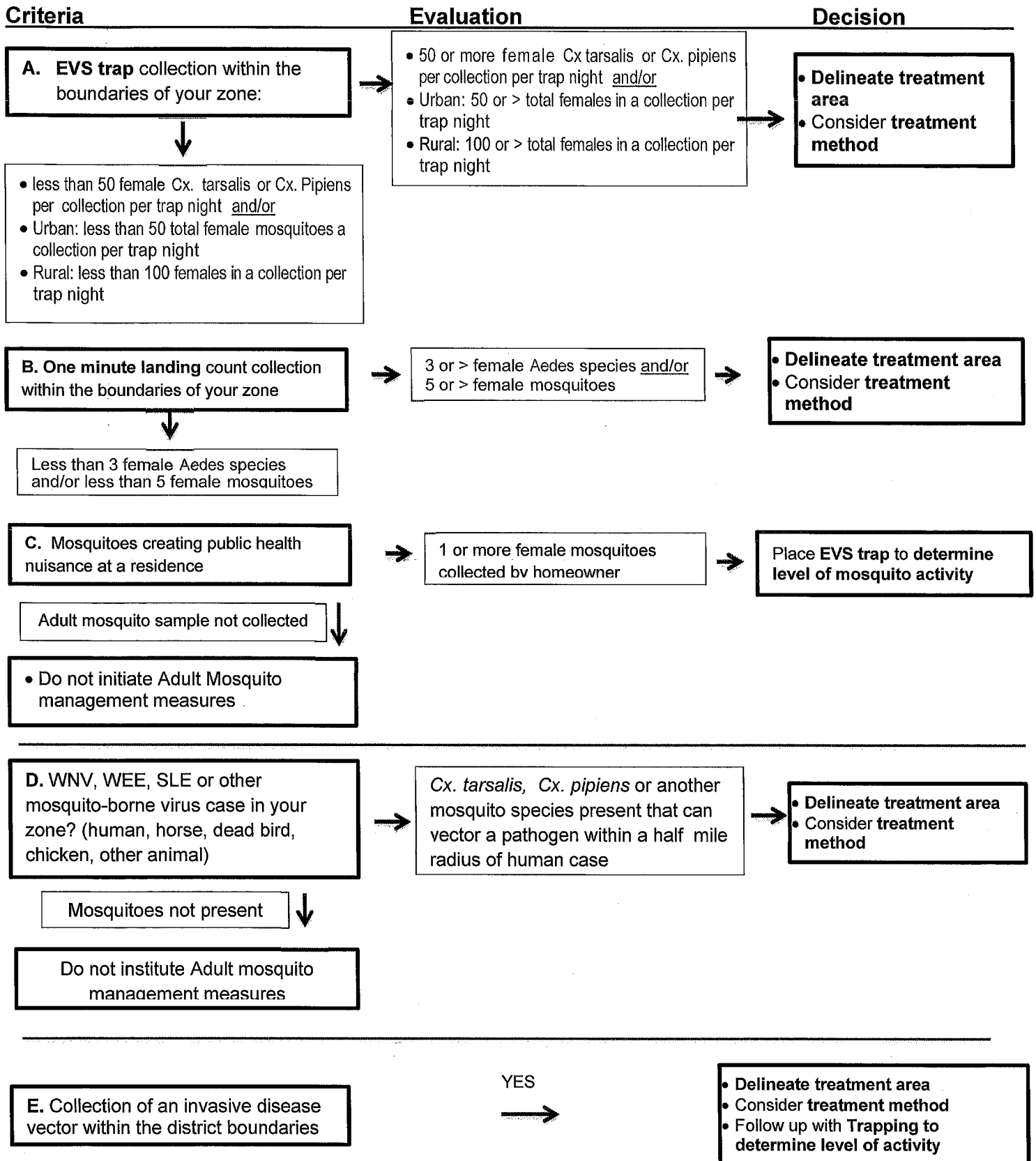
1. Human malaria or encephalitis occurrence
2. Encephalitis or malaria mosquito pool isolation
3. Unforeseen biological or environmental conditions
4. Introduction of an invasive disease vector
5. Legislation or regulation
6. Availability of District funding, resources or equipment
7. Availability of suitable larvicides
8. Susceptibility of immature mosquito populations to larvicides
9. Environmental conditions not listed in the program
10. Continued occurrence of immatures in a development site
11. Natural disasters

Adult Mosquito Guidelines

1. Initiation Criteria



2. Determine Level of Mosquito and Virus Activity (Initiation Criteria Continued)



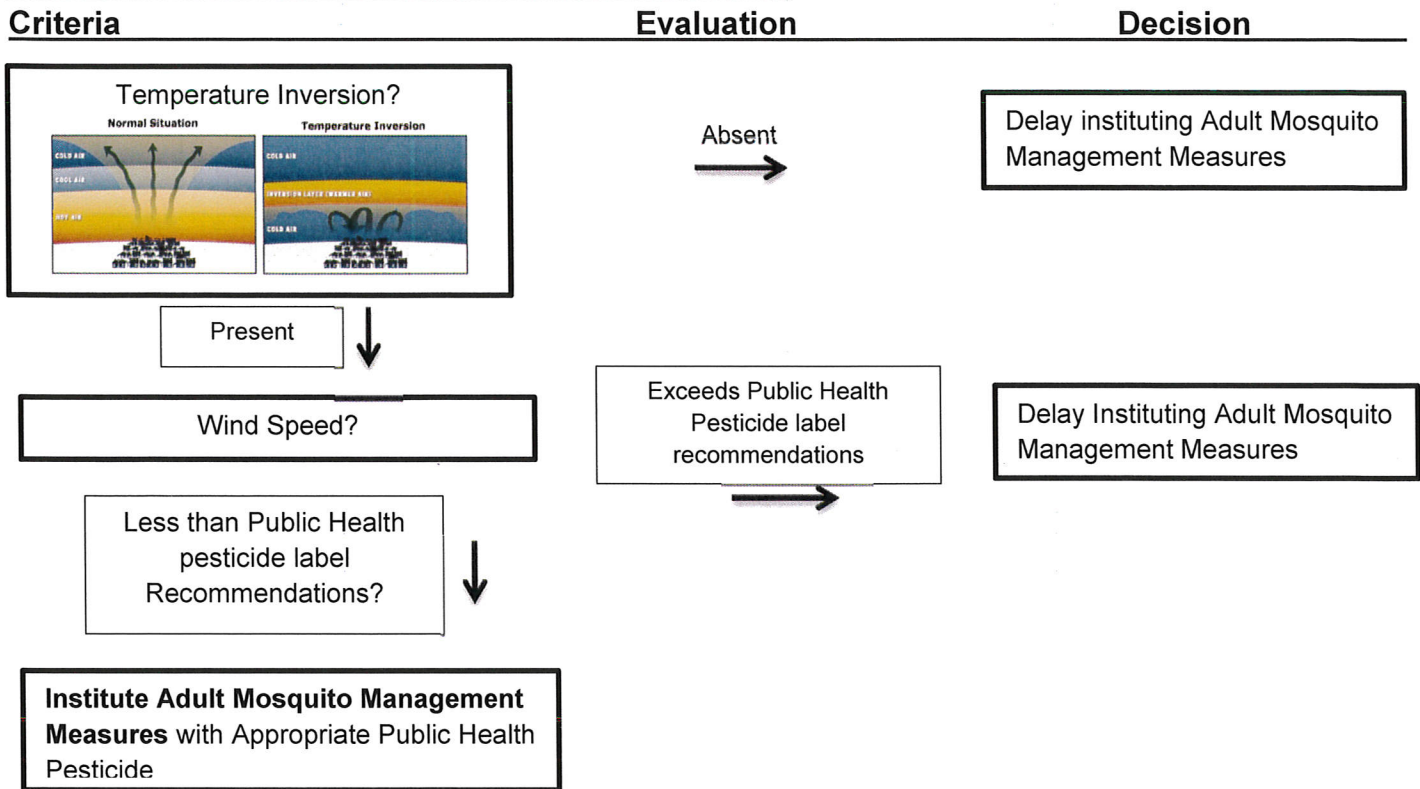
3. Delineate Treatment Area

Criteria	Evaluation	Decision
Is the initiation or continuance criterion met?	YES →	Consider Agricultural and Land use Practices

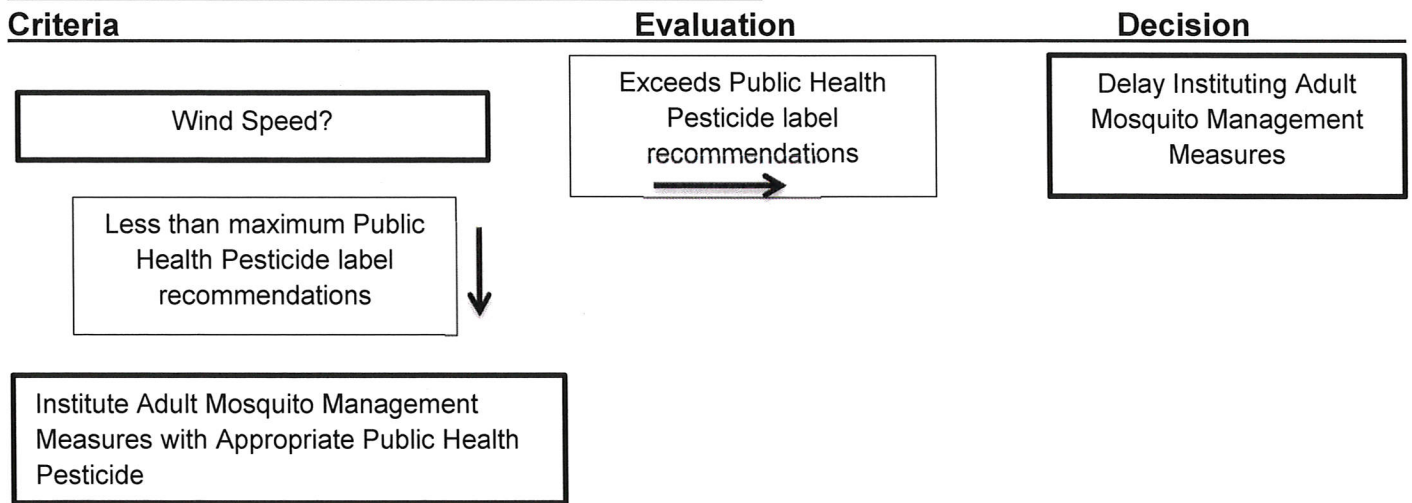
4. Agricultural and Land Use Practices

Criteria	Evaluation	Decision
Are endangered or threatened species present?	YES →	<ul style="list-style-type: none"> • Consider the presence of endangered or threatened species • Consider meteorological conditions within the delineated treatment area
NO ↓		
Environmentally sensitive habitat?	YES →	<ul style="list-style-type: none"> • Consider treatments compatible with the sensitive habitat • Consider meteorological conditions within the delineated treatment area.
NO ↓		
Organically grown crops?	YES →	<ul style="list-style-type: none"> • Consider Treatments that meet Organic Standards • Consider meteorological conditions within the delineated treatment area
NO ↓		
Consider Metrological Conditions within the delineated treatment area		

5. Meteorological Conditions for Ground Applications



6. Meteorological Conditions for Aerial Applications

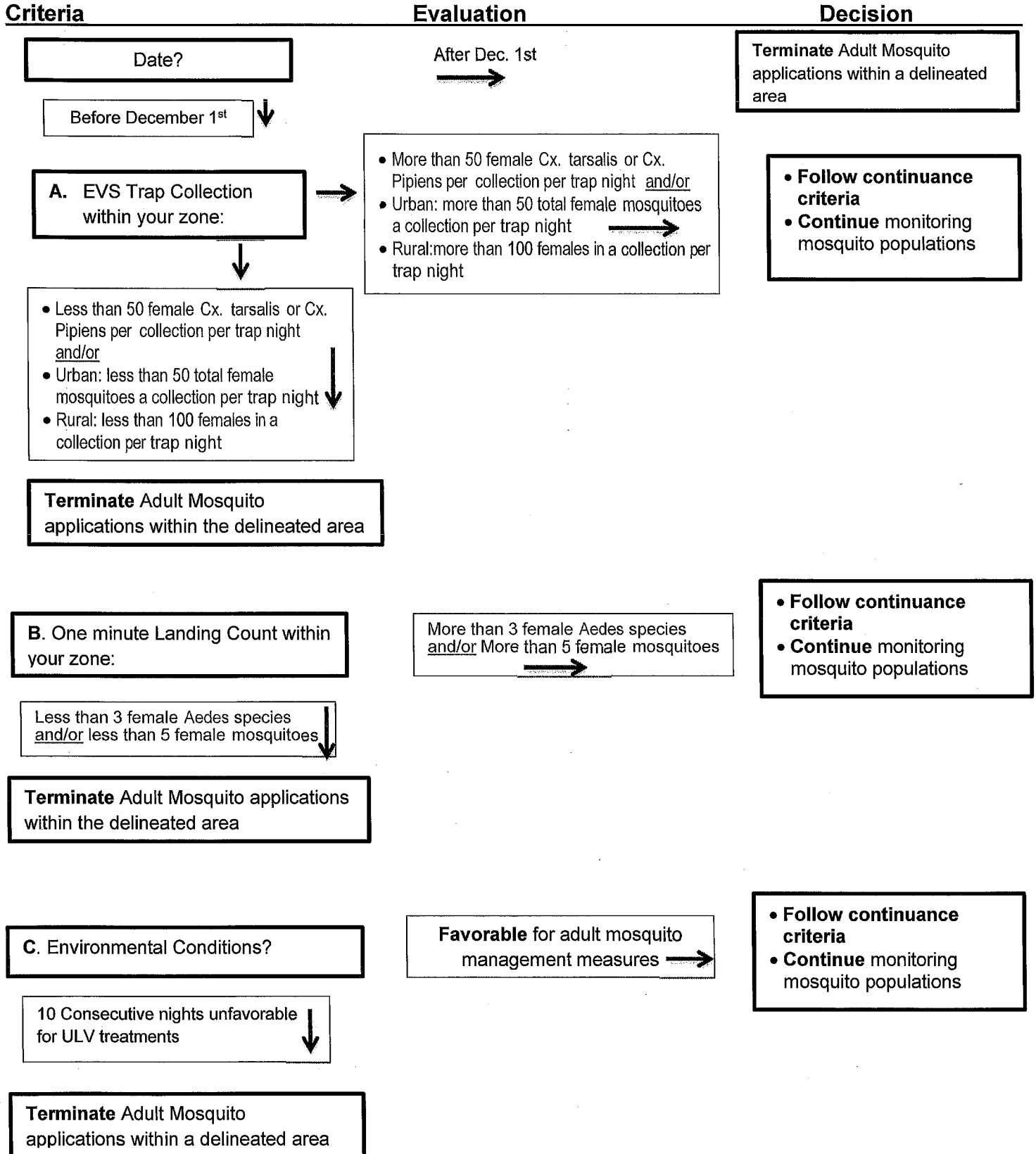


7. Continuance Criteria (Continuance of Mosquito Control Activities)

Criteria	Evaluation	Decision
<p>A. EVS trap collection within your zone:</p> <ul style="list-style-type: none"> • less than 50 female Cx. tarsalis or Cx. Papiens per collection per trap night <u>and/or</u> • Urban: less than 50 total female mosquitoes a collection per trap night • Rural: less than 100 females in a collection per trap night 	<ul style="list-style-type: none"> • 50 or more female Cx tarsalis or Cx. pipiens per collection per trap night <u>and/or</u> → • Urban: 50 or > total females in a collection per trap night • Rural: 100 or > total females in a collection per trap night 	<p>Consider Meteorological conditions in the treatment area</p>
<p>Do not institute Adult Mosquito Management Measures</p>		

<p>B. One minute Landing count Collection within your zone:</p>	<p>3 or > female Aedes species <u>and/or</u> 5 or > female mosquitoes →</p>	<p>Consider Meteorological conditions in the treatment area</p>
<p>Less than 3 female Aedes species <u>and/or</u> less than 5 female mosquitoes ↓</p>		
<p>Do not institute Adult Mosquito Management Measures</p>		

8. Termination Criteria



Definitions

A. Initiation Criteria

These are criteria that when achieved trigger the initial adult mosquito application measures. At present, the District recognizes seven separate conditions to be adult mosquito application triggers:

1. Environmental or climatic conditions (snowpack, rainfall, temperature, season)
2. Adult *Culex* vector abundance
3. Virus infection rate in *Culex* mosquito vectors
4. Sentinel chicken seroconversions
5. Fatal infections in birds (WNV only)
6. Infections in humans
7. Proximity of detected virus activity to urban or suburban regions

B. Continuance Criteria

When achieved these are 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.

C. Termination Criteria

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

D. Adult Mosquito Management Measures

These management measures may consist of application of public health pesticides by ultra low volume (ULV) application equipment or direct application (barrier treatments) to residences, outbuildings, other structures and mosquito resting sites.

Public Health Pesticide Use and Resistance Management

1. Consult Public Health Pesticide (PHP) label before treatment
2. Apply PHP's within the same class or mode of activity on a rotational basis by the following guidelines unless no other alternatives are available:
 - a. Rotate to a new class after five consecutive applications to the same site.Note: applications can be over more than one year

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. Legal or political legislation
6. Unforeseen biological conditions
7. Presence or absence of mosquito-borne disease

Appendix

Table 1. West Nile Virus Risk Assessment

WNV Surveillance Factor	Assessment Value	Benchmark	Assigned Value	
1. Environmental Conditions High-risk environmental conditions include above-normal temperatures with or without above-normal rainfall, runoff, or snowpack. Weather data link: http://ipm.ucdavis.edu	1	Avg daily temperature during prior 2 weeks ≤ 56 °F		
	2	Avg daily temperature during prior 2 weeks 57 – 65 °F		
	3	Avg daily temperature during prior 2 weeks 66 – 72 °F		
	4	Avg daily temperature during prior 2 weeks 73 – 79 °F		
	5	Avg daily temperature during prior 2 weeks > 79 °F		
			<i>Cx tars</i>	<i>Cx pip</i>
2. Adult <i>Culex tarsalis</i> and <i>Cx. pipiens</i> complex relative abundance* Determined by trapping adults, enumerating them by species, and comparing numbers to those previously documented for an area for the prior 2-week period.	1	Vector abundance well below average ($\leq 50\%$)		
	2	Vector abundance below average (51 - 90%)		
	3	Vector abundance average (91 - 150%)		
	4	Vector abundance above average (151 - 300%)		
	5	Vector abundance well above average ($> 300\%$)		
3. Virus infection rate in <i>Culex tarsalis</i> and <i>Cx. pipiens</i> complex mosquitoes* Tested in pools of 50. Test results expressed as minimum infection rate per 1,000 female mosquitoes tested (MIR) for the prior 2-week period.	1	MIR = 0		
	2	MIR = 0.1 - 1.0		
	3	MIR = 1.1 - 2.0		
	4	MIR = 2.1 - 5.0		
	5	MIR > 5.0		
4. Sentinel chicken seroconversion Number of chickens in a flock that develop antibodies to WNV during the prior 2-week period. If more than one flock is present in a region, number of flocks with seropositive chickens is an additional consideration. Typically 10 chickens per flock.	1	No seroconversions in broad region		
	2	One or more seroconversions in broad region		
	3	One or two seroconversions in a single flock in specific region		
	4	More than two seroconversions in a single flock or two flocks with one or two seroconversions in specific region		
	5	More than two seroconversions per flock in multiple flocks in specific region		
5. Dead bird infection Number of birds that have tested positive (recent infections only) for WNV during the prior 3-month period. This longer time period reduces the impact of zip code closures during periods of increased WNV transmission.	1	No positive dead birds in broad region		
	2	One or more positive dead birds in broad region		
	3	One positive dead bird in specific region		
	4	Two to five positive dead birds in specific region		
	5	More than five positive dead birds in specific region		
6. Human cases Do not include this factor in calculations if no cases are detected in region.	3	One or more human infections in broad region		
	4	One human infection in specific region		
	5	More than one human infection in specific region		
			<i>Cx tars</i>	<i>Cx pip</i>
Response Level / Average Rating: Normal Season (1.0 to 2.5) Emergency Planning (2.6 to 4.0) Epidemic (4.1 to 5.0)			TOTAL	
			AVERAGE	

* Calculation of separate risk values for *Cx. tarsalis* and the *Cx. pipiens* complex may be useful if their spatial distributions (e.g., rural vs. urban) differ within the assessment area.

Table 2. Saint Louis Encephalitis Risk Assessment Table

SLE Surveillance Factor	Assessment Value	Benchmark	Assigned Value	
1. Environmental Conditions High-risk environmental conditions include above-normal temperatures with or without above-normal rainfall, runoff, or snowpack. Weather data link: http://ipm.ucdavis.edu	1	Avg daily temperature during prior 2 weeks $\leq 56^{\circ}\text{F}$		
	2	Avg daily temperature during prior 2 weeks $57 - 65^{\circ}\text{F}$		
	3	Avg daily temperature during prior 2 weeks $66 - 72^{\circ}\text{F}$		
	4	Avg daily temperature during prior 2 weeks $73 - 79^{\circ}\text{F}$		
	5	Avg daily temperature during prior 2 weeks $> 79^{\circ}\text{F}$		
			<i>Cx tars</i>	<i>Cx pip</i>
2. Adult <i>Culex tarsalis</i> and <i>Cx. pipiens</i> complex relative abundance* Determined by trapping adults, enumerating them by species, and comparing numbers to those previously documented for an area for the prior 2-week period.	1	Vector abundance well below average ($\leq 50\%$)		
	2	Vector abundance below average (51 - 90%)		
	3	Vector abundance average (91 - 150%)		
	4	Vector abundance above average (151 - 300%)		
	5	Vector abundance well above average ($> 300\%$)		
3. Virus infection rate in <i>Culex tarsalis</i> and <i>Cx. pipiens</i> complex mosquitoes* Tested in pools of 50. Test results expressed as minimum infection rate per 1,000 female mosquitoes tested (MIR) for the prior 2-week collection period.	1	MIR = 0		
	2	MIR = 0.1 - 1.0		
	3	MIR = 1.1 - 2.0		
	4	MIR = 2.1 - 5.0		
	5	MIR > 5.0		
4. Sentinel chicken seroconversion Number of chickens in a flock that develop antibodies to SLEV during the prior 2-week period. If more than one flock is present in a region, number of flocks with seropositive chickens is an additional consideration. Typically 10 chickens per flock.	1	No seroconversions in broad region		
	2	One or more seroconversions in broad region		
	3	One or two seroconversions in a single flock in specific region		
	4	More than two seroconversions in a single flock or two flocks with one or two seroconversions in specific region		
	5	More than two seroconversions per flock in multiple flocks in specific region		
5. Human cases Do not include this factor in calculations if no cases are detected in region.	3	One or more human cases in broad region		
	4	One human case in specific region		
	5	More than one human case in specific region		
			<i>Cx tars</i>	<i>Cx pip</i>
Response Level / Average Rating: Normal Season (1.0 to 2.5) Emergency Planning (2.6 to 4.0) Epidemic (4.1 to 5.0)		TOTAL		
		AVERAGE		

* Calculation of separate risk values for *Cx. tarsalis* and the *Cx. pipiens* complex may be useful if their spatial distributions (e.g., rural vs. urban) differ within the assessment area.

Table 3. Western Equine Encephalitis Risk Assessment Table

WEE Surveillance Factor	Assessment Value	Benchmark	Assigned Value
1. Environmental Conditions High-risk environmental conditions include above normal rainfall, snow pack, and runoff during the early season followed by a strong warming trend. Weather data link: http://ipm.ucdavis.edu	1	Cumulative rainfall and runoff well below average	
	2	Cumulative rainfall and runoff below average	
	3	Cumulative rainfall and runoff average	
	4	Cumulative rainfall and runoff above average	
	5	Cumulative rainfall and runoff well above average	
2. Adult <i>Culex tarsalis</i> abundance Determined by trapping adults, enumerating them by species, and comparing numbers to averages previously documented for an area for the prior 2-week period.	1	<i>Cx. tarsalis</i> abundance well below average ($\leq 50\%$)	
	2	<i>Cx. tarsalis</i> abundance below average (51 - 90%)	
	3	<i>Cx. tarsalis</i> abundance average (91 - 150%)	
	4	<i>Cx. tarsalis</i> abundance above average (151 - 300%)	
	5	<i>Cx. tarsalis</i> abundance well above average ($> 300\%$)	
3. Virus infection rate in <i>Cx. tarsalis</i> mosquitoes Tested in pools of 50. Test results expressed as minimum infection rate per 1,000 female mosquitoes tested (MIR) for the prior 2-week collection period.	1	<i>Cx. tarsalis</i> MIR = 0	
	2	<i>Cx. tarsalis</i> MIR = 0.1 - 1.0	
	3	<i>Cx. tarsalis</i> MIR = 1.1 - 2.0	
	4	<i>Cx. tarsalis</i> MIR = 2.1 - 5.0	
	5	<i>Cx. tarsalis</i> MIR > 5.0	
4. Sentinel chicken seroconversion Number of chickens in a flock that develop antibodies to WEEV during the prior 2-week period. If more than one flock is present in a region, number of flocks with seropositive chickens is an additional consideration. Typically 10 chickens per flock.	1	No seroconversions in broad region	
	2	One or more seroconversions in broad region	
	3	One or two seroconversions in a single flock in specific region	
	4	More than two seroconversions in a single flock or two flocks with one or two seroconversions in specific region	
	5	More than two seroconversions per flock in multiple flocks in specific region	
5. Proximity to urban or suburban regions (score only if virus activity detected) Risk of outbreak is highest in urban areas because of high likelihood of contact between humans and vectors.	1	Virus detected in rural area	
	3	Virus detected in small town or suburban area	
	5	Virus detected in urban area	
6. Human cases Do not include this factor in calculations if no cases found in region or in agency.	3	One or more human cases in broad region	
	4	One human case in specific region	
	5	More than one human case in specific region	
Response Level / Average Rating: Normal Season (1.0 to 2.5) Emergency Planning (2.6 to 4.0) Epidemic (4.1 to 5.0)		TOTAL	
		AVERAGE	

Key Agency Responsibilities

A. Local Mosquito and Vector Control Agencies

- Gather, collate, and interpret regional weather data
- Monitor abundance of immature and adult mosquitoes
- Collect and submit mosquito pools for virus isolation
- Maintain sentinel chicken flocks, obtain blood samples, and send them to laboratory
- Conduct routine control of immature mosquitoes
- Conduct control of adult mosquitoes when needed
- Educate public on mosquito avoidance
- Coordinate with local Office of Emergency Services personnel
- Communicate regularly with neighboring agencies

B. Mosquito and Vector Control Association of California

- Coordinate purchase of sentinel chickens
- Receive, track, and disperse payment for surveillance expenses
- Coordinate surveillance and response activities among member agencies
- Maintain a standby contract with a large scale aerial pesticide applicator
- Serves as spokesperson for member agencies
- Establish liaisons with press and government officials

C. California Department of Health Services

- Collate adult mosquito abundance data submitted by local agencies; provide summary of data to local agencies
- Coordinate submission of specimens for virus testing
- Maintain database of all specimens tested
- Test sentinel chicken sera for viral antibodies
- Test human specimens for virus
- Distribute a weekly bulletin summarizing surveillance test results
- Send weekly surveillance results to the UC Davis interactive website
- Immediately notify local vector control agency and public health officials when evidence of viral activity is found
- Conduct epidemiological investigations of cases of equine and human disease
- Coordinate and participate in a regional emergency response in conjunction with California Office of Emergency Services
- Conduct active surveillance for human cases
- Coordinate equine and “dead bird” surveillance programs for WNV and other arboviruses
- Provide oversight to local jurisdictions without defined vector-borne disease control program
- Maintain inventory of antigens and antisera to detect exotic viruses

D. University of California at Davis (CVEC)

- Conduct research on arbovirus surveillance, transmission of mosquito-borne diseases, and mosquito ecology and control
 - Test mosquito pools for virus
- Provide a panel of tests for a wide range of viruses for identification of viruses from human, equine, bird, or arthropod vectors
- Maintain an interactive website for dissemination of mosquito-borne virus information and data
- Maintain inventory of antigens and antisera to detect exotic viruses
- Provide confirmation of tests done by local or state agencies

E. California Department of Food and Agriculture

- Notify veterinarians and veterinary diagnostic laboratories about WEE and testing facilities available at UCD Center for Vector-borne Disease Research
- Conduct necropsies on dead crows and other birds

- Provide outreach to general public and livestock and poultry producers on the monitoring and reporting of equine and ratite encephalitides
- Facilitate equine and ratite sample submission from the field

F. Local Health Departments

- Refer human and equine specimens to DHS for further testing
- Notify local medical community, including hospitals and laboratories, if evidence of viral activity present
- Participate in emergency response
- Assist in public education

Governor's Office of Emergency Services

- Coordinate the local, regional, or statewide emergency response under epidemic conditions in conjunction with DHS via the Standardized Emergency Management System (SEMS)
- Serve as liaison with the Federal Emergency Management Agency (FEMA) in the event that a federal disaster has been declared

Centers for Disease Control and Prevention

- Provide consultation to state and local agencies in California if epidemic conditions exist
- Provide national surveillance data to state health departments