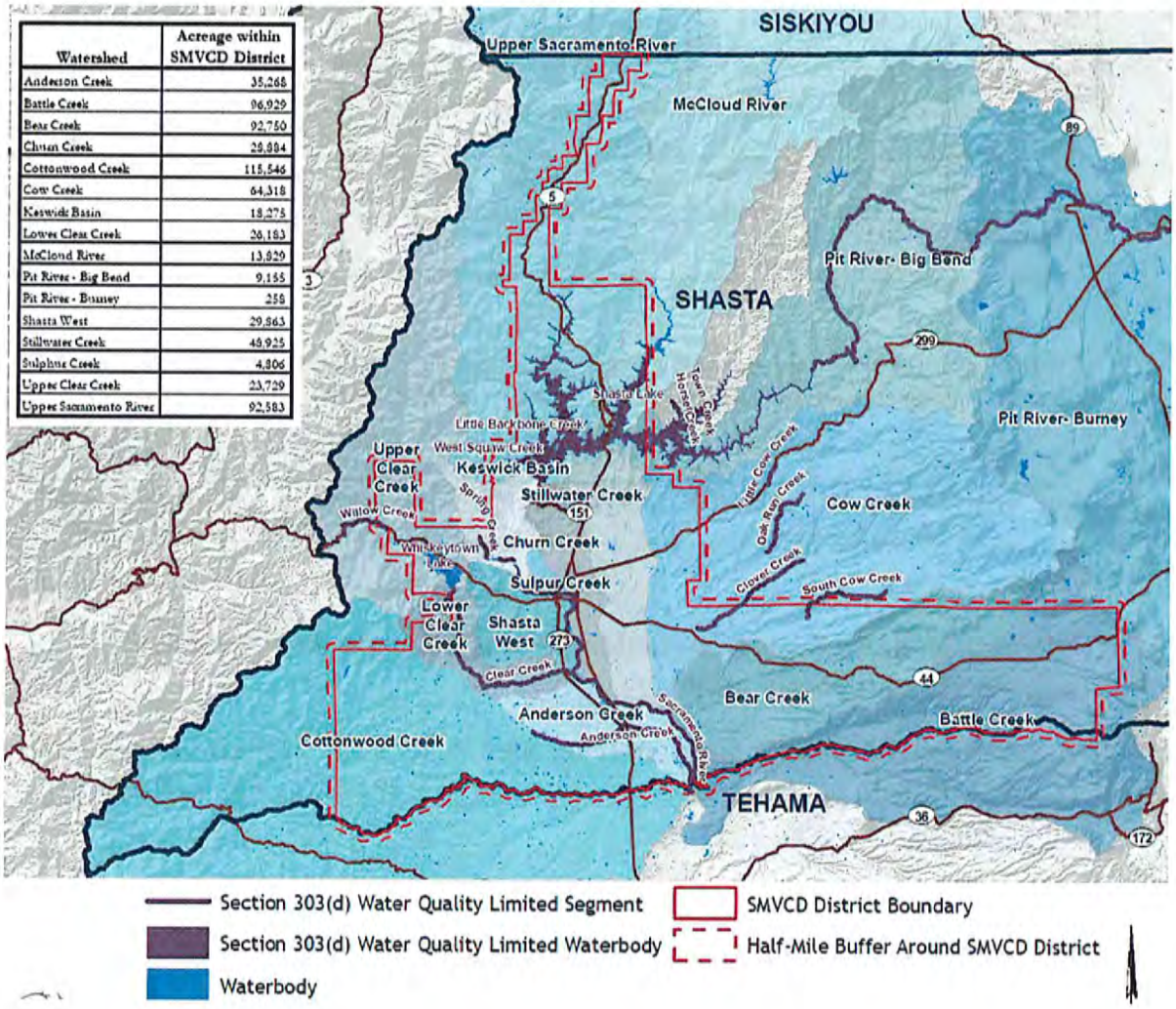
Shasta Mosquito and Vector Control District (District) Pesticide Application Plan (PAP):

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 form the water body of the target areas;**

   Please see Agency Boundary Map.



Watershed	Acreage within SMVCD District
Anderson Creek	35,268
Battle Creek	96,929
Bear Creek	92,750
Churn Creek	26,884
Cottonwood Creek	115,546
Cow Creek	64,318
Keswick Basin	18,275
Lower Clear Creek	26,183
McCloud River	13,929
Pit River - Big Bend	9,155
Pit River - Burney	256
Shasta West	29,563
Stillwater Creek	48,925
Sulphur Creek	4,806
Upper Clear Creek	23,729
Upper Sacramento River	92,583

In prior years, the District has applied adulticides and/or larvicides directly to or in the vicinity of the following water bodies:

Sacramento River	Shasta Lake	Anderson Creek	Battle Creek	Bear Creek	Churn Creek	Clear Creek	Cottonwood Creek	Cow Creek
Stillwater Creek	Sulphur Creek	McCloud River	Pit River-Big Bend	Pit River-Burney	Upper Sacramento River	Upper Clear Creek	Falks Lake	Middle Creek
Olinda Creek	Buckeye Creek	Dry Creek	Oak Run Creek	Clover Creek	Ash Creek	Sheridan Creek	Swede Creek	French Creek
Clough Creek	Jenny Creek	Basin Hollow Creek	Deep Hole Creek	Yank Creek	East Valley Creek	Elks Creek	Manzanita Creek	Mirror Lake
Moody Creek	Nelson Creek	Newtown Creek	Oat Creek	Olney Creek	Salmon Creek	Soda Creek	Fall Creek	Deer Creek
Flume Creek	Sweetbriar Creek	Spring Branch						

In prior years, the District has applied adulticides and/or larvicides directly to or in the vicinity of canals, ditches, or other constructed conveyance facilities owned and controlled by:

Keswick CSD	Buckeye WTP	Shasta CSD	Centerville CSD
City of Redding	City of Shasta Lake	Mountain Gate CSD	Anderson-Cottonwood Irrigation District

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

   Please see: The Best Management Practices for Mosquito Control in California http://westnile.ca.gov/downloads.php?download_id=2376&filename=BMPforMosquitoControl07-12.pdf

   And

   The 2015 California Mosquito-borne Virus Surveillance and Response Plan https://www.cdph.ca.gov/programs/vbds/Documents/2015CAResponsePlan.pdf

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 US 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 may be applied by truck, backpack, hand can and airplane.

Active Ingredients:

Bacillus thuringiensis subsp. *Israelensis (Bti)*

Bacillus sphaericus (Bs) (Lysinibacillus sphaericus)

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 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 the Best Management Practices for Mosquito Control in California http://westnile.ca.gov/downloads.php?download_id=2376&filename=BMPforMosquitoControl07-12.pdf Mosquito breeding sources and areas that require adult mosquito control are difficult to predict from year to year based on the weather and environmental conditions variations. However, typical sources treated by this District include: permanent/ semi-permanent/seasonal wetlands, irrigated crops and associated water conveyance systems, storm drains, river seepage and creeks within ULV spray blocks. Please see Agency Boundary Map and response to Question Number 1.

5. **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 vector potential. The most commonly used methods and their limitation are included in the Best Management Practices for Mosquito Control in California http://westnile.ca.gov/downloads.php?download_id=2376&filename=BMPforMosquitoControl07-12.pdf An example of an alternative is the District's use of *Gambusia affinis* in the approved wetlands, irrigation drains, and neglected swimming pools on a yearly basis. The District also identifies mosquito breeding sited throughout the District and works with property owners and land managers to incorporate Mosquito Control BMPs to reduce or eliminated mosquito breeding habitat. These practices can be highly effective, but not possible in every habitat and in some cases difficult to complete due to the complexity.

6. **How much product is needed and how this amount is determined;**

Material	Pounds	Gallons
Mineral Oil		7.45
Malathion		17.25
Methoprene Granule 21 day	51.25	
Spinosad 30 day Pellet	113	
Permethrin 31%		19.7
Bti liquid		2.7
Bti WDG	11	
Bti Granule	51	
Bti/Bs Granule	121	
Etofenprox	41.78	
Spinosad Briquets 120 day	.6	

The above totals represent estimated pesticides application within the District boundaries to Waters of the US for 2015. These amounts will change from year to year due to annual variability in required pesticide application 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;**
Please see: Best Management Practices for Mosquito Control in California http://westnile.ca.gov/downloads.php?download_id=2376&filename=BMPforMosquitoControl07-12.pdf

9. **Description of the BMPs to be implemented. The BMPS shall include at a minimum:**
The District's BMPs are described in the Best Management Practices for Mosquito Control in California http://westnile.ca.gov/downloads.php?download_id=2376&filename=BMPforMosquitoControl07-12.pdf and in the 2015 California Mosquito-borne Virus Surveillance and Response Plan https://www.cdph.ca.gov/programs/vbds/Documents/2015CAResponsePlan.pdf. Specific elements have been highlighted below under items a-f.

a. Measures to prevent pesticide spill;
    a. All pesticide applicators receive annual spill prevention and response training. District employees ensure daily that application equipment is in proper working order. Spill mitigation devices are placed in all vehicle and pesticide storage areas.
b. Measures to ensure that only a minimum and consistent amount is used
    a. Application equipment is calibrated at least annually as required by the Department of Pesticide Regulations (DPR) and the terms of a cooperative agreement with the California Department of Public Health (CDPH).
c. A plan to educate Coalition's or Discharger's staff and pesticide applicators on any potential adverse effects to the waters of the US from the pesticide application;
    a. This will be included in our pesticide applicators annual pesticide application and safety training, continuing education programs, and/or regional NPDES Permit training programs.
d. Descriptions of specific BMPs for each application mode, e.g. aerial, truck, hand, etc.;
    a. The SMVCD calibrates truck-mounted and handheld larviciding equipment each year to meet application specifications. Supervisor review application records daily to ensure appropriate amounts of material are being used. Ultra-low volume (ULV) application equipment is calibrated for output and droplet size to meet label requirements. If used, aerial adulticide equipment is calibrated regularly and droplet size will be monitored by the District to ensure droplets meet label requirements. If used, the airplane in urban area ULV applications and the airplane used for rural ULV application will be equipped with advanced guidance and drift management equipment to ensure the best available technology is being used to place product in the intended area.
e. Descriptions of specific BMPs for each pesticide product used; and
    a. Please see the Best Management Practices for Mosquito Control in California http://westnile.ca.gov/downloads.php?download_id=2376&filename=BMPforMosquitoControl07-12.pdf
f. Descriptions of specific BMPs for each type of environmental setting (agricultural, urban, and wetland)

a. Please see the Best Management Practices for Mosquito Control in California http://westnile.ca.gov/downloads.php?download_id=2376&filename=BMPforMosquitoControl07-12.pdf

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 water of the US, and at least once each calendar year thereafter prior to the first pesticide application for that calendar year, the Dischargers must do the following for each vector management area:**
    a. If applicable, establish densities for larval and adult vector populations to serve as action threshold(s) for implementing pest management strategies;
        i. The SMVCD staff only applies pesticides to sources of mosquitoes that represent imminent threats to public health or quality of life. 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 critera:
            - 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
            - Presence of sensitive/endangered species or habitats.
    b. Identify target vector species to develop species-specific pest management strategies based on developmental and behavioral considerations for each species;

        Please see the Best Management Practices for Mosquito Control in California http://westnile.ca.gov/downloads.php?download_id=2376&filename=BMPforMosquitoControl07-12.pdf
    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 Best Management Practices for Mosquito Control in California http://westnile.ca.gov/downloads.php?download_id=2376&filename=BMPforMosquitoControl07-12.pdf

d. Analyze existing surveillance data to identify new or unidentified sources of vector problems as well as areas that have recurring vector problems. This is included in the Best Management Practices for Mosquito Control in California http://westnile.ca.gov/downloads.php?download_id=2376&filename=BMPforMosquitoControl07-12.pdf. The District continually collects adult and larval mosquito surveillance data, dead bird reports, and sentinel chicken test results and uses this data to guide mosquito control activities.

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:

i. No action
ii. Prevention
iii. Mechanical or physical methods
iv. Cultural methods
v. Biological control agents
vi. Pesticides

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

Implementing preferred alternative 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

This is described in the District's existing integrated vector management (IVM) program, as well as the practices described the Best Management Practices for Mosquito Control in California http://westnile.ca.gov/downloads.php?download_id=2376&filename=BMPforMosquitoControl07-12.pdf.

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 precaution 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 if 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

www.shastamosquito.org

References:

Best Management Practices for Mosquito Control in California http://westnile.ca.gov/downloads.php?download_id=2376&filename=BMPforMosquitoControl07-12.pdf.

2015 California Mosquito-borne Virus Surveillance and Response Plan https://www.cdph.ca.gov/programs/vbds/Documents/2015CAResponsePlan.pdf

MVCAC NPDES Coalition Monitoring Plan.

ATTACHMENT G – NOTICE OF INTENT

WATER QUALITY ORDER NO. 2016-xxxx-DWQ
GENERAL PERMIT NO. CAG 990004

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			
Shasta Mosquito and Vector Control District			
B. Mailing Address			
19200 Latona Rd			
C. City	D. County	E. State	F. Zip Code
Anderson	Shasta	CA	96001
G. Contact Person	H. Email address	I. Title	J. Phone
Peter Bonkrude	pbonkrude@shastamosquito.org	District Manager	530-365-3768

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 Shasta County

3. Directly to river, lake, creek, stream, bay, ocean, etc.
☒ Name of water body: various- see attachment A

* 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 1st End Date December 31st

D. Types of Adjuvants Added by the Discharger:

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

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

A. Printed Name: Peter Bonkrude

B. Signature: _____ **Date:** 3/18/2016

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 #:**

INSTRUCTIONS FOR COMPLETING THE NOI

WATER QUALITY ORDER NO. 2011-0002-DWQ
GENERAL PERMIT NO. CAG 990004

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

These instructions are intended to help you, the Discharger, to complete the Notice of Intent (NOI) form for the Statewide General National Pollutant Discharge Elimination System (NPDES) permit. **Please type or print clearly when completing the NOI form.** For any field, if more space is needed, submit a supplemental letter with the NOI.

Send the completed and signed form along with the filing fee and supporting documentation to the State Water Resources Control Board (State Water Board). .

Section I – Notice of Intent Status

Indicate whether this request is for the first time coverage under this General Permit or a change of information for the discharge already covered under this General Permit. For a change of information or ownership, please supply the eleven-digit Waste Discharge Identification (WDID) number for the discharge.

Section II – Discharger Information

A. Enter the name of the Discharger.
B. Enter the street number and street name where correspondence should be sent (P.O. Box is acceptable).
C. Enter the city that applies to the mailing address given.
D. Enter the county that applies to the mailing address given.
E. Enter the state that applies to the mailing address given.
F. Enter the zip code that applies to the mailing address given.
G. Enter the name (first and last) of the contact person.
H. Enter the email address of the contact person.
I. Enter the contact person's title.
J. Enter the daytime telephone number of the contact person.

Section III – Billing Address

Enter the information **only** if it is different from Section II above.

A. Enter the name (first and last) of the person who will be responsible for the billing.
B. Enter the street number and street name where the billing should be sent (P.O. Box is acceptable).
C. Enter the city that applies to the billing address.
D. Enter the county that applies to the billing address.

E. Enter the state that applies to the billing address.
F. Enter the zip code that applies to the billing address.
G. Enter the email address of the person responsible for billing.
H. Enter the title of the person responsible for billing.
I. Enter the daytime telephone number of the person responsible for billing.

Section IV – Receiving Water Information

A. Check all boxes that apply. At least one box must be checked.
   1. Check this box if the application area is a canal, ditch, or other constructed conveyance system owned and controlled by the Discharger. Print the name of the conveyance system.
   2. Check this box if the application area is a canal, ditch, or other constructed conveyance system owned and controlled by an entity other than the Discharger. Print the name of the owner and the name of the conveyance system..
   3. Check this box if the application area is to the river, lake, creek, stream, bay, ocean, etc. Print the name of the water body.

B. List all Regional Water Board numbers where pesticide application is proposed. Regional Water Board boundaries are defined in section 13200 of the California Water Code. The boundaries can also be found on our website at http://www.waterboards.ca.gov/waterboards_map.shtml. The numbers with corresponding Regional Water Board names are given below:

Regional Water Board Numbers	Regional Water Board Names
1	North Coast
2	San Francisco Bay
3	Central Coast
4	Los Angeles
5	Central Valley (Includes Sacramento, Fresno, Redding Offices)
6	Lahontan (South Lake Tahoe, Victorville offices)
7	Colorado River Basin
8	Santa Ana
9	San Diego

Section V – Pesticide Application Information

A. Check the appropriate target organism.
B. List the name and active ingredients of each pesticide to be used.
C. List the start and end date of proposed pesticide application event.
D. List the name(s) and type(s) of adjuvants added by the Discharger.

Section VI – Pesticides Application Plan

The Discharger must prepare and complete a Pesticides Application Plan (PAP). The minimum contents of PAP are specified in the permit under item VIII.C of the General Permit. The Discharger must ensure that its applicator is familiar with the PAP contents before pesticide application.

If a PAP is not complete at the time of application, enter the date by which it will be completed.

Section VII – Notification

Have you notified potentially affected governmental agencies, as required under item VIII.B of the General Permit?

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

Section VIII – Fee

The amount of fee shall be based on Section 2200(b)(6) of Title 23, California Code of Regulations. Fee information can be found at http://www.waterboards.ca.gov/resources/fees/docs/fy10_11_fee_schedule.pdf. Check the YES box if you have included payment of the fee. Check the NO box if you have not included this payment.

Section IX– Certification

A. Print the name of the appropriate official. For a municipality, State, federal, or other public agency, this would be a principal executive officer, ranking elected official, or duly authorized representative. The principal executive officer of a federal agency includes the chief executive officer of the agency or the senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrator of U.S. EPA).

B. The person whose name is printed above must sign and date the NOI.

C. Enter the title of the person signing the NOI.

Endangered Species Act

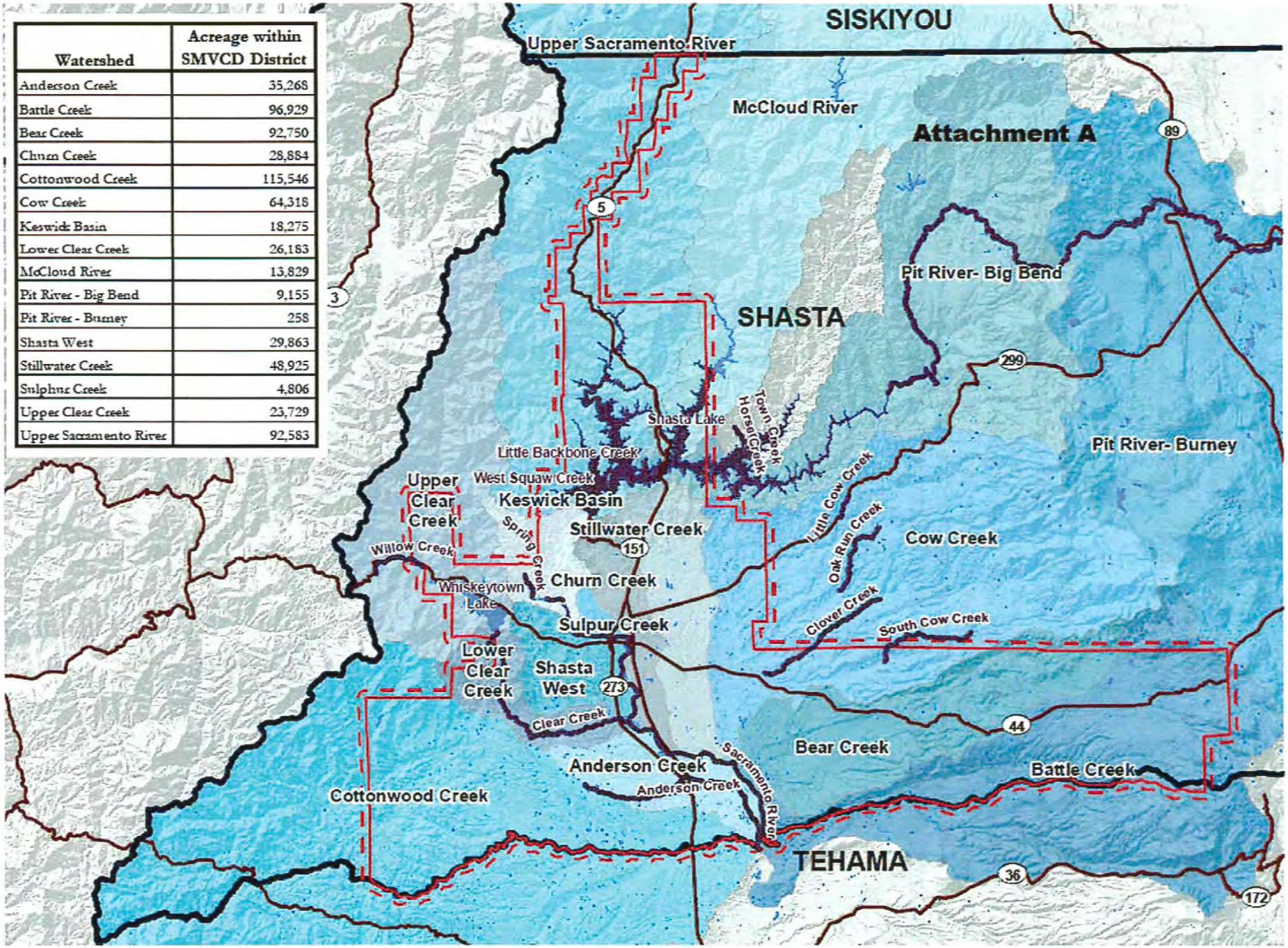
This General Permit does not authorize any act that results in the taking of a threatened or endangered species or any act that is now prohibited, or becomes prohibited in the future, under either the California Endangered Species Act (Fish and Game Code sections 2050 et. seq) or the Federal Endangered Species Act (16 U.S.C.A. sections 1531 et. seq). This General Permit requires compliance with effluent limitations, receiving water limitations, and other requirements to protect the beneficial uses of waters of the state. The Discharger is responsible for meeting all requirements of the applicable Endangered Species Act.

Additional information on federally-listed threatened or endangered species and federally-designated critical habitat is available from NMFS (www.nmfs.noaa.gov) for anadromous or marine species or FWS (www.fws.gov) for terrestrial or freshwater species.

Section 303(d) List

This General Permit does not authorize the discharge of biological and residual pesticides or their breakdown by-products to waters of the US that are impaired by the same pesticide active ingredient or any pesticide in the same chemical family included in permitted larvicides and adulticides listed in Attachments E and F. Impaired waters are those waters not meeting quality standards pursuant to Section 303(d) of the CWA. California impaired waters, as approved by the State Water Board, are listed on http://www.waterboards.ca.gov/water_issues/programs/tmdl/2010state_ir_reports/2010_combo303d.xls

Watershed	Acreage within SMVCD District
Anderson Creek	35,268
Battle Creek	96,929
Bear Creek	92,750
Churn Creek	28,884
Cottonwood Creek	115,546
Cow Creek	64,318
Keswick Basin	18,275
Lower Clear Creek	26,183
McCloud River	13,829
Pit River - Big Bend	9,155
Pit River - Burney	258
Shasta West	29,863
Stillwater Creek	48,925
Sulphur Creek	4,806
Upper Clear Creek	23,729
Upper Sacramento River	92,583



Section 303(d) Water Quality Limited Segment

Section 303(d) Water Quality Limited Waterbody

Waterbody

SMVCD District Boundary

Half-Mile Buffer Around SMVCD District

Attachment B

Shasta Mosquito and Vector Control District NOI

V. Pesticide Application Information

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

Active Ingredient
Bacillus thuringienses var. israelensis
Bacillus sphaericus (Lysinibacillus sphaericus)
Deltamethrin
Etofenprox
Lamda-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

Attachment C

List of Agencies to be contacted:

Agency Name	Address
City of Anderson	1887 Howard Ave. Anderson, CA 96007
City of Shasta Lake	PO Box 777 Shasta Lake, CA 96019
Redding Electric Utility	PO Box 496071 Redding, CA 96001
Anderson Fire Protection District	1925 W. Howard St. Anderson, CA 96007
Cottonwood Water District	3282 Chestnut St. Cottonwood, CA 96022
Cottonwood Fire Protection District	3271 Brush St. Cottonwood, CA 96022
Happy Valley Fire Protection District	17441 Palm Ave Anderson, CA 96007
Bella Vista Water District	11368 East Stilwater Way Redding, CA 96003
Shasta Lake Fire Protection District	4126 Ashby Court Shasta Lake, CA 96019
Mountain Gate Community Service	PO Box 496071 Redding, CA 96007
Shasta Community Services District	PO Box 2520 Shasta, CA 96087
Shasta County	1450 Court St Suite 308A Redding, CA 96001
Redding Basin Water Resources Management Plan	1855 Placer St. Redding, CA 96001
Cottonwood Creek Watershed Group	20404 Gas Point Rd Cottonwood, CA 96002
California Department of Transportation	1657 Riverside Dr Redding, CA 96001
Department of Fish and Wildlife	601 Locust St. Redding, CA 96002
US Army Corps of Engineers	152 Hartnell Ave Redding, CA 96002
US Bureau of Land Management	14225 Holiday Rd Redding, CA 96003
Shasta County Office of Education	1644 Magnolia Ave Redding, CA 96001
City of Redding	PO Box 496071 Redding, CA 96001

SHASTA MOSQUITO AND VECTOR CONTROL DISTRICT

19200 Latona Road, Anderson, CA 96007
Telephone: (530) 365-3768 Fax: (530) 365-0305
Web: shastamosquito.org

March 21st, 2016

Dear Agency,

The Shasta Mosquito and Vector Control District (District) may be making larvicide and/or adulticide applications to water of the US under your jurisdiction for mosquito reduction purposes. Application information is available upon request. The District is required to notify all Governmental 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.

Please contact Peter Bonkrude at (530) 365-3768 if you have additional questions.

Sincerely

Peter Bonkrude
District Manager
pbonkrude@shastamosquito.org

March 21st, 2016

Notice of Intent to Apply Public Health Pesticides for Vector Control Purposes to Surface Waters and Waters of the US within Shasta County.

- The Shasta Mosquito and Vector Control 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 an entity other than the District for Vector Control purposes per the requirements of the General NPDES Permit for Biological and Residual Pesticide Discharges for Vector Control Applications.
- The NPDES Permit requirements for listing of the Public Health Pesticides anticipated to be used were modified from the previous permit, to the new permit which was issued in 2016. The newer requirements specify that any pesticide product can be used that contain approved active ingredients, provided all pesticide label restrictions and instructions are followed. In addition, pesticides which fall under the "minimum risk" category can be used. The minimum risk pesticides have been exempted from FIFRA requirements. The following tables list the active ingredients approved for FIFRA regulated pesticides.

Active Ingredients for larval mosquito control
Bacillus thuringiensis subsp. *israelensis (Bti)*
Bacillus sphaericus (Bs)
Methoprene
Monomolecular Films
Petroleum Distillates
Spinosad
Temephos

Active Ingredients for adult mosquito control
Deltamethrin
Etofenprox
Lambda-Cyhalothrin
Malathion
Naled
N-octyl bicycloheptene dicarboximide (MGK-264)
Piperonyl butoxide (PBO)
Permethrin
Prallethrin
Pyrethrin
Resmethrin
Sumithrin

- 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 for the application of the pesticides is January through December, 2016. Locations of expected use will be constructed conveyances, surface waters and other waters of the US located within Shasta County.
- There are no known water use restrictions or precautions during treatment.
- Interested persons may contact the District at (530) 365-3768

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2011

Shasta Mosquito and Vector Control Best Management Practices

Shasta Mosquito and Vector Control District

2011

Contents

Shasta Mosquito and Vector Control Mission Statement

"To protect the public's health from vector-borne disease and nuisance, through a comprehensive mosquito and vector control program focused on innovation, experience and efficiency."

General Information about the District

The Shasta Mosquito and Vector Control District (SMVCD) is an independent, non-enterprise, special district.

SMVCD serves a population of over 110,000 throughout a District of approximately 1,100 square miles. The District does not serve all areas of Shasta County. Two other mosquito abatement districts, Burney Basin and Pine Grove Mosquito Abatement Districts, serve limited areas of northeastern Shasta County.

The District boundaries extend from Castella on the north to Cottonwood Creek on the south and from the town of French Gulch on the west to Viola on the east.

District Boundaries

The District is governed by a five-member Board of Trustees. The Board meets on the third Tuesday of every month at the District Office in Anderson at 1:30 p.m. The District is financed by a combination of *ad valorem* property taxes and by Mosquito and Vector Control Special Benefit Assessment charges. Currently, SMVCD employs a full-time staff of 15. The District's field technicians are certified by the California Department of

Public Health for the use of public health pesticides, and some maintain Qualified Applicators Licenses through the California Department of Pesticide Regulation (CDPR). The SMVCD has a fleet of specialized mosquito control vehicles including ARGO All-Terrain Vehicles (ATVs), larviciding and adulticiding trucks, a backhoe, a boat, and ATVs.

District Powers

The District operates under the provisions of Sections 2200-2093 of the California Health and Safety Code (CHSC). Pursuant to the CHSC, the District Board may do all of the following:

(a) Take all necessary or proper steps for the control of mosquitoes, either in the District or in territory not in the District, but so situated with respect to the District that mosquitoes may disperse from the territory into the District.
(b) Abate as nuisances all standing water and other breeding places for mosquitoes, either in the District or in territory not in the District, but so situated with respect to the District that mosquitoes from the territory disperse into the District.
(c) Purchase the supplies and materials, employ the personnel, and contract for the services which may be necessary or proper in furtherance of the objects of this chapter.
(d) If necessary or proper in the furtherance of the objects of this chapter, build, construct, repair, and maintain the necessary dikes, levees, cuts, canals, or ditches upon any land and acquire by purchase, condemnation, or by other lawful means, in the name of the District, any lands, rights-of-way, easements, property, or material necessary for any of those purposes.
(e) Contract to indemnify or compensate any owner of land or other property for any injury or damage necessarily caused by the use or taking of property for dikes, levees, cuts, canals, or ditches.
(f) Enter upon any property without hindrance or notice, either within the District or so reasonably adjacent thereto that vectors may disperse into the District, for any of the following purposes:
    (1) To inspect to ascertain the presence of vectors or their breeding places.
    (2) To abate public nuisances in accordance with this article, either directly or by giving notice to the property owner to abate a nuisance.
    (3) To ascertain if a notice to abate vectors has been complied with.
    (4) To treat property with appropriate physical, chemical, or biological control measures.

District Office Location

District Services

As an independent special district, SMVCD exists to provide direct service to the public. The District offers a number of direct services to the public including but not limited to:

- Respond to public complaints about mosquitoes or mosquito-like insects in the District and determine the source of the problem to correct as needed
- Deliver mosquitofish to residents of the District free of charge
- Monitor populations of disease carrying and nuisance mosquitoes
- Provide Vector-Borne Disease surveillance for District areas including: mosquitoes, ticks, and rodent/flea borne diseases
- Inspect and treat mosquito sources to control populations
- Identify mosquitoes and other insects
- Provide a comprehensive public education program to inform the public about vector biology and control
- Conduct routine surveillance and treatment for neglected swimming pools

Local Habitat Types

Mosquito habitats or sources are any place that can hold water and provide a place for mosquito larvae to grow. Most areas treated by the District are artificial catchments, but some natural waters are treated when necessary. The types of sources that produce mosquitoes within the SMVCD boundaries are:

Agricultural

Pastures: Irrigated and non-irrigated fields used for the purpose of raising livestock.

Stock Ponds: Artificially constructed ponds to catch and hold runoff water used for stock watering or irrigation.

Agricultural drains: Ditches used for draining excess water from agricultural operations.

Return Sumps: Holding ponds used to collect excess agricultural water for return to fields or disposal to another source.

Watering Troughs: Tanks, troughs, or other containers used for watering stock.

Tail Water: Water left in low portions of an agricultural field from irrigation.

Domestic/Urban/Commercial

Fish Ponds: Artificially constructed landscape ponds for fish or accent.

Septic Tanks: Underground storage and processing tanks for sewage.

Wells: Drilled or dug wells for water, usually old and no longer used.

Swimming Pools/Hot Tubs: In-ground or above-ground neglected swimming pools.

Bird Baths: Small pools or ornamental structures maintained for use by birds.

Cesspools: Open collection ponds for sewage (not legal).

Roof Gutters: Clogged or misaligned roof gutters that hold water.

Domestic Container: Any water-holding container, bucket, tub, boat, barrel, wheelbarrow, rubbish (e.g. tire), urn, or receptacle etc. found in a private or public urban environment or yard.

Catch Basins/Gutters: Basins or gutters used to collect and direct runoff water; found in streets, parking lots, loading docks, or private driveways.

Storm Drains: Underground structures for carrying runoff water.

Gravel Pits: Pond or pit created to mine gravel.

Borrow Pit: Pits or depressions created to obtain soil for construction; usually found along railroad tracks or occasionally buildings.

Sewer Ponds/Treatment Plants: Ponds and water-holding structures used for sewage treatment.

Utility Vaults: Underground structures for utilities: Pacific Gas & Electric, water departments, telephone, Redding Electric Utility, or private.

Sumps: Holding ponds or structures for collecting industrial waste water or runoff.

Sewer Lines: Underground structures for collecting and carrying sewage.

Log Mill Ponds: Ponds/ditches created by sprinklers being utilized over log decks to prevent lumber from drying out.

Channel (lined): Channels lined with rock or concrete used for flood control or to collect runoff.

Channel (unlined): Channels with soil bottoms and sides used for flood control or to collect runoff.

Waste Water Marsh: Marsh constructed to hold or treat waste water, usually sewage.

Broken/Leaking Pipes: Water sources created by broken or leaking pipes.

Seepage: Water sources created by seepage from natural or unknown sources.

Natural

Creeks: Natural or slightly modified main channels of creeks.

Creek Isolations: Isolations holding water that are separated from the main creek channel.

Marshes: Shallow marshy areas, artificial or natural, with emergent vegetation.

Lakes (20 acres+): Natural or artificial bodies of water, usually more than 20 feet deep.

Ponds (less than 20 acres): Natural or artificial bodies of water, usually less than 20 feet deep.

Treeholes: Rot cavities or cavities caused by tree damage or growth.

Temporary Pools (storm water): Areas that collect rain water or, in domestic areas, occasionally collect irrigation water.

Temporary Pools (vernal pools): Seasonal depression wetlands, which are covered by shallow water for variable periods from winter to spring but may be completely dry for most of the summer and fall.

Mosquito Species of Concern

Genus	Species	Common Larval Habitats	Adult Season	Blood Meal Pref.	Vector Signf.
Aedes	melanimon	Irrigated Fields	Spring-Summer	Animals and Man	High Pest Signf.
	nigromaculis	Irrigated Fields	Spring-Summer	Animals and Man	High Pest Signf.
	sierrensis	Treeholes, tires, containers	Spring-Summer	Animals and Man	High Pest Signf. and Vector of Canine Heartworm
	vexans	Temporary	Spring	Animals and Man	High Pest Signf. and Vector of Canine Heartworm
	washinoi	Temporary woodland pools	Spring	Animals and Man	High Pest Signf.
Anopheles	freeborni	Seepages, lakes, streams	Summer	Animals and Man	Low Pest Signf. and Vector of Malaria
	punctipennis	Temporary pools, streams	Summer	Animals and Man	Vector of human malaria in woodland/foothill habitats
	franciscanus	Shallow pools and streams, algae mats	Summer	Large animals and Man	Low potential as a vector of human malaria
Culex	pipiens	Storm drain systems, lumber mills, cemetery urns, containers	Spring, Summer, Fall	Birds, Animal, Man	High Pest Signf., Vector of WNV, SLE
	tarsalis	Creeks, marshes, fresh water, roadside ditches	Spring, Summer, Fall	Birds, Animal, Man	Moderate Pest Signf. and Vector of WNV, WEE
	stigmatosoma	Foul water, sewage, temporary pools	Spring, Summer, Fall	Birds, Animal, Man	Low Pest Signf.
	erythrothorax	Lakes and ponds, associated with tulles	Spring, Summer, Fall	Birds, Rarely Man	Low Pest Signf.
Culiseta	incidens	Fish ponds, catch basins, roadside ditches	Spring, Summer, Fall	Large animals and Man	High Pest Signf.
	inornata	Marshes, roadside ditches, temporary pools	Spring, Summer, Fall	Large animals and Man	High Pest Signf.
	particeps	Shaded clean pools, streams	Spring, Summer, Fall	Animals and Man	Low Pest Signf.
	impatiens	Man-made and natural waters rich in organic matter	Spring	Large animals and Man	Low Pest Signf.

Mosquito-Borne Diseases

The District is concerned with a number of mosquito-transmitted diseases that are endemic to California or could be potentially introduced into the District. The most important diseases are:

Western Equine Encephalitis (WEE): WEE is a virus closely related to Eastern and Venezuelan equine encephalitis. Symptoms range from mild flu-like illness to encephalitis, coma and death. WEE is primarily vectored by *Culex tarsalis.*

Saint Louis Encephalitis (SLEV): SLEV is a virus closely related to West Nile virus (family Flaviviridae), Yellow fever virus, and Dengue virus. Symptoms range from mild headache and fever to more severe neck stiffness, stupor, coma, tremors and death. SLEV is primarily vectored by *Culex tarsalis* and *Culex pipiens* mosquitoes.

West Nile Virus (WNV): WNV is also a virus belonging to the family Flaviviridae and, like ZLEV, yellow fever virus, and Dengue virus, symptoms range from fever, headache, and nausea to high fever, coma, vision loss, paralysis, permanent neurological effects and death. WNV is primarily vectored by *Culex tarsalis* and *Culex pipiens* mosquitoes.

Canine Heartworm: Canine heartworm is caused by the transmission of the organism *Dinofilaria immitis*, normally from canine to canine. Symptoms in canines include coughing, exercise intolerance, and indications of heart failure. Canine heartworm is primarily vectored by *Aedes sierrensis* and *Aedes vexans* mosquitoes.

Malaria: Although malaria is not presently considered a problem in California, malaria was found in California until the 1940s when it was finally eradicated. California had a high incidence of malaria from the 1850s until about 1920. This disease played an important role in organizing mosquito control in the state. Currently, the District works closely with state and local health departments to monitor imported malaria cases.

District Activities

Integrated pest management or, specifically, in this case, an Integrated Vector Management Program (IVMP), describes a systematic process that applies scientific knowledge regarding the target organisms to be controlled with information and technical data about the available products to develop a control strategy that simultaneously maximizes control and minimizes harm to the environment. By integrating a variety of methods that eliminate habitat, disrupt breeding, and limit population growth, more intensive methods (such as chemical control of larvae and

adults) are not required. Thus, with an IVMP a synergistic effect may be achieved where the control efforts are greater than the sum of the individual parts.

The basic tenets of the IVMP are to:

- Use a science-based approach to know which vectors pose a risk to human health and monitor populations. Treat populations when they are most biologically susceptible to treatments that limit population growth. Keep populations below thresholds that indicate a risk to public health exists.
- Limit the need for treating vector populations by eliminating breeding habitats near human receptors. Promoting natural predators and other beneficial organisms is a necessary first step.
- Target vectors in their sessile, immature life stages so that treatments can be limited in space and time (i.e. focused during breeding cycles and in aquatic habitats). Apply physical control measures that limit the survival of immature life stages and prevent maturation to the adult stage as the preferred method of control.
- Use the least intensive methods that effectively achieve the desired level of control so that any disruption of the natural environment is minimized.

The components of IVMP are:

- Surveillance: The collecting of information about mosquito and other vector abundance and prevalence of disease. Samples and organisms collected by the District are tested for disease by CDPH or other laboratories.
- Education: The presentation of information to the public regarding methods to reduce exposure to vectors, curtail practices that promote mosquito production and how to eliminate breeding sites and habitats.
- Physical Control: The removal or modification of structures, catchments, and habitats that provide breeding opportunities for vectors (primarily mosquitoes).
- Biological Control: The use of other organisms to reduce vector abundance or limit the transmission of vector-borne diseases. Biological control agents range from vertebrate predators such as mosquito fish to microbes that are pathogenic to specific groups of insect vectors.
- Chemical Control: The judicious use of pesticides to achieve specific vector control objectives and control resistance to pesticides by vector populations.

Potential Impacts to the Environment

The District's IVMP has the potential to impact the environment through the modification of habitat (including soils, air, water, and vegetation), direct disturbance (noise and light), or by the use of biological or chemical control agents. Most of these impacts are minor in scope. The primary resources potentially affected are human health and fish and wildlife (including plants). Cultural resources are considered, even though the IVMP poses very limited risk to such resources.

The Best Management Practice Approach

A set of Best Management Practices (BMPs) to reduce the risk of environmental harm that might result from the District's implementation of the IVMP is followed. These BMPs are in the form of hierarchical guidance that applies broadly (state BMPs) and more site-specifically (District BMPs). The State BMPs can be found in the document *Best Management Practices for Mosquito Control in California* developed by the Vector-Borne Disease Section (VBDS), California Department of Public Health (2011).

Methods to Avoid or Reduce Potential Impacts

As the first step, several sources of information and databases are checked prior to initiating any field activity. By knowing what sensitivities exist, methods to avoid impacts can be applied. Location data for sensitive wildlife and plant species and known cultural resource sites are maintained in several databases or records available to the District. Databases include the California Natural Diversity Database (CNDDB), the California Native Plant Society (CNPS) online inventory, the Shasta County General Plan list of cultural resource sites, and the Northeast Information Center (NEIC), one of 12 offices of the California Historical Resource Information System (CHRIS) established by the California Office of Historic Preservation (OHP) to maintain an inventory of the state's historical resources. Any work near these sites is conducted carefully, and field staff are trained to recognize biological or cultural resources that should be avoided or reported.

Similarly, when possible, sites are avoided upon request of residents who have expressed concerns about exposure to public health pesticides. The locations of other potentially sensitive receptors, such as schools, hospitals, nursing homes, etc., are known to the District, so impacts associated with noise, light, equipment exhaust, or pesticides can be avoided near these sites.

Awareness and vigilance are the primary keys to avoiding and reducing impacts. District staff are aware of the consequences of their actions in the field and are trained

to be respectful of public and private property, the environment, and associated wildlife and cultural resources. They are always observant and follow reporting procedures when noteworthy information or conditions are encountered. Additionally, when physical, biological or chemical control methods are employed, standard guidelines or regulatory requirements are followed to reduce or avoid any potential impacts.

General BMPs

BMP G1: Conduct activities as needed to achieve District objectives.

BMP G2: Comply with all laws, regulations, permits and agreements; consult with other agencies as needed.

BMP G3: Check databases for known sensitivities prior to conducting field work. Avoid, when possible, known locations of sensitive species occupied by listed plants and invertebrates. Do not damage or disturb cultural sites or resources.

BMP G4: Report any accidents, spills (including leaks in equipment and vehicles), or observed impacts to natural or cultural resources; clean up spills and repair leaks immediately. If environmental damage cannot be prevented or corrected immediately, take appropriate action such as notifying supervisor, other appropriate agencies, and initiating emergency response.

BMP G5: Previously unknown biological or cultural resources (such as a bald eagle nest or observed archeological site, etc.) should be recorded and reported. Consult with experts as needed.

Mosquito/Disease Surveillance

The practice of monitoring both mosquito densities and the diseases they carry is termed "surveillance." Applied properly, surveillance provides the District with valuable information on what mosquito species are present, when they occur, how many there are, and if they are carrying diseases that affect humans. Equally important is the use of surveillance in evaluating the effectiveness of control actions in reducing mosquito abundance and mosquito-borne human diseases.

District technicians conduct surveillance work in areas where disturbance to fish and wildlife (including plants) may result. Driving near streams or wet areas, operating ATVs, or wading may increase turbidity or sediment transport. Damage to vegetation may result from trampling or driving; however, these impacts are of low intensity, of short duration, and temporary; thus, they are generally considered minimal.

Sampling Habitats for Immature Mosquitoes

SMVCD routinely targets the larval and pupal stages to reduce numbers of mosquitoes prior to emergence as adults. During this process, SMVCD staff document the presence, abundance, and species composition of mosquitoes in immature life stages. Sampling is accomplished using field collection techniques. The primary tool is the "dip count" which indicates whether a habitat is producing mosquitoes and estimates larval density. A 1-pint cup attached to a long handle is used to collect a standard volume of water ("dip sample"). The "count" may be expressed as the number of immature (larvae and pupae) mosquitoes per dip, per unit volume, or per unit surface area of the site. Operationally, the abundance of the immature mosquitoes in any identifiable breeding source is measured as the number of immature (includes numbers representing each individual instar of larval development as well as pupae) per unit volume/area of the source.

Adult Sampling

Adult mosquito populations are sampled by hand collection (sweep nets and landing counts), light traps, CO_2 baited traps, and collections from resting boxes. The District uses 20-plus fixed-location New Jersey light traps, 20-plus fixed-location Encephalitis virus surveillance (EVS) CO_2 baited traps and oviposition traps, resting boxes and fay traps in varying locations.

Disease Surveillance

Adult mosquito surveillance accounts for a large portion of disease surveillance for SMVCD. Mosquito trapping and several other tools are used to gauge the risk to the public's health from vector-borne disease.

Encephalitis virus surveillance (EVS) mosquito trapping: In addition to providing population data as a measure of exposure risk for mosquito-borne diseases, mosquitoes caught live in CO_2-baited EVS traps and gravid traps are routinely submitted to the UC Davis Center for Vector-borne Disease Research to be directly tested for the presence of disease-causing viruses. Mosquitoes are sent on a weekly basis from approximately May through September, and whenever sufficient numbers of mosquitoes can be caught to provide samples suitable for testing.
Detection of arboviral transmission to bird populations can be accomplished by

1. Using caged chickens as sentinels and routinely collecting blood samples that are analyzed to detect viral antibodies (seroconversions)
2. Collecting and bleeding wild birds to detect viral antibodies (which currently the District does not participate in)
3. Testing dead birds reported by the public for WNV

Sentinel Chickens: Flocks of 5-10 chickens are placed in locations of the District where mosquito abundance is known to be high or where there is a history of virus activity. Blood is collected from each chicken once every 2 weeks by pricking the comb and collecting blood on a filter strip. The blood is tested at the CDPH Viral and Rickettsial Disease Laboratory for antibodies to SLEV, WEE, and WNV. Frequent testing of strategically placed flocks of sentinel chickens provides one of the most sensitive and cost-effective methods to monitor encephalitis virus activity in an area. Because chickens are continuously available to host-seeking mosquitoes, they are usually exposed to more mosquitoes than can be collected by trapping, especially when adult mosquito abundance or viral infection rates are low.

Dead Birds: Unlike the endemic encephalitides, WNV frequently causes death in North American birds, especially those in the family Corvidae. Dead bird surveillance was initiated by SMVCD to provide early detection of WNV. Dead bird surveillance has been shown to be one of the earliest indicators of WNV activity in a new area. Birds that meet certain criteria are shipped, necropsied, and tested at the UC Davis, California Animal Health and Food Safety Laboratory and the Center for Vectorborne Diseases (CVEC) or in some cases rapid antigen tests are conducted at the District.

Other Infections

As part of a statewide, integrated program, detection of mosquito-borne diseases largely relies on the surveillance of other organisms.

Tree Squirrels: In 2004, CDPH included tree squirrels as a WNV surveillance tool based upon evidence that they are susceptible to WNV and could provide information on localized WNV transmission. In conjunction with dead birds, dead tree squirrels were reported to the California WNV hotline, shipped, and necropsied at the California Animal Health and Food Safety Laboratory; kidney tissue was tested at CVEC.

Equine Infections: Currently, equine disease due to WEE and WNV is not a sensitive indicator of epizootic activity in California because of the widespread vaccination of equines against these viruses. Confirmed cases are a strong indication that WEE or WNV has amplified to levels where tangential transmission has occurred in that region of the state.

Human Infections: The District relies on rapid detection and reporting of human vector-borne disease cases to facilitate a timely and effective response. However, human cases of arboviral infection are and insensitive surveillance indicator of virus activity because most human infections cause no, or only mild, symptoms.

Analysis and Interpretation of Disease Surveillance Data

1. All weather reports received from state and local agencies that can affect mosquito breeding are reviewed and analyzed by District staff. Weekly and biweekly mosquito occurrence reports from the SMVCD laboratory and from CDPH-VBDS statewide are used for forecasting purposes.
2. Reports from CDPH-VBDS and University of California –Davis on virus isolations in mosquito pools* and chicken blood samples tested, confirmed human cases and horse cases of encephalitis or any other indicator of the presence of an arboviral threat to human health will be used for operational planning.

(*A mosquito "pool" refers to a collection of mosquitoes from a particular area that is tested for the virus)

Mosquito/Disease Surveillance BMPs

BMP S1: Be as unobtrusive as possible, do not knowingly step or drive over sensitive plants, nest sites, dens, etc. Use vehicles with care or walk.

BMP S2: Drive slowly to allow wildlife to move out of the way. Do not drive in saturated areas where ruts are created or sedimentation occurs.

BMP S3: Return water to source following sampling.

BMP S4: Place sentinel chicken coops where they will not contaminate water.

BMP S5: Place lighted traps where they will not create a nuisance.

BMP S6: Because most District activities take place within one major river basin, the Sacramento River Drainage, the spread of exotic species between invaded and non-invaded watersheds is not a major concern. However, the District strives to not spread noxious weeds or invasive species via clothing, sampling equipment, or vehicles. The CDFG California Aquatic Invasive Species Management Plan (2008) and Salmon Spawning Survey Procedures Manual (ODFW, 2010) are followed to the extent practicable when transporting equipment and personnel between isolated water bodies within the District.

Physical Control and Source Reduction

Physical control, also known as source reduction, is one part of the District's IVMP. Physical control is usually the most effective technique available and is accomplished by eliminating mosquito breeding sites or modifying these sites to favor natural

predation or to be unfavorable to mosquitoes. Source reduction can virtually eliminate the need for costly chemical control treatments. The primary means for reducing potential effects from physical control activities is to conduct only that work which is necessary to protect public health. Minor mechanical clearing of vegetation and removal of rubbish that holds water, poses virtually no risk to the environment. Scope, intensity, and duration are limited; effects are minor and most are temporary. Some minor level of disturbance to wildlife may occur but not more than that which might be associated with residential lawn mowing or street or highway maintenance.

Where herbicides are used to clear vegetation, labels are followed and applications are made by Certified Vector Control Technicians. Herbicides are selected over mechanical clearing when they are less intrusive (i.e. reduce noise, in areas of limited equipment access, near areas where equipment would create ruts or damage soils, etc.). Other factors such as nearness to water, the presence of known special status plant species, etc., are also considered when evaluating the appropriateness of herbicide treatments.

Where drainage facilities are maintained via excavation, each site is evaluated to determine possible impacts to "waters of the U.S." that would trigger the need to obtain a permit from the U.S. Army Corps of Engineers (USACE). Most District activities that are conducted to facilitate drainage or reduce water holding time are conducted in artificial facilities such as agricultural ditches or irrigated areas. Where appropriate, State and federal permits (California Department of Fish and Game Code 1602, State Water Quality Control Board Section 401 Certification, and USACE Section 404 permit) are acquired and each contains site-specific requirements that limit potential environmental impacts. In cases where CEQA compliance is required, the District's PEIR can be used to tier subsequent analyses and provide a baseline for evaluating potential effects.

Physical Control activities include the following:

- Improving or repairing drainage facilities
- Emptying containers
- Vegetation management
- Planning review (to avoid creation of vector habitat)
- Dewatering
- Ditching
- Creating a fish reservoir

Physical Control BMPs

BMP P1: Minimize physical disturbance and consider herbicides if use of equipment will cause damage to soils or other problems. Consider cultural resources and ground disturbance, especially near known sites.

BMP P2: If using herbicides consider potential impacts to surface waters and sensitive plants or non-target organisms. Follow labels, particularly the avoidance of aquatic habitats.

BMP P3: Do not spread noxious weeds or invasive species (via equipment)

BMP P4: In the unlikely event that historic or cultural artifacts or remains are encountered, work shall cease at the site of discovery and a professional archeologist shall be consulted.

BMP P5: District staff shall attend annual training aimed at identification of protected wildlife and plant species and other sensitive habitats.

Biological Control of Mosquitoes

Biological control of mosquitoes is the intentional use of mosquito pathogens or predators to reduce the size of target mosquito populations. It is one of the principle components of a rational and integrated vector control program and does not contribute to pesticide resistance.

The District uses biological agents to reduce larval mosquito populations and promote predation on immature mosquitoes. These agents include bacteria which selectively target mosquito and other vector larvae but have few effects on other organisms, and mosquito fish (*Gambusia affinis*), which feed on immature mosquitoes.

Mosquitofish and Mosquito Control

Gambusia affinis is the most commonly used biological control agent for mosquitoes all over the world. Mosquitofish were first introduced into California in the 1920s and have been used by SMVCD since the 1930s. Correct use of these fish can provide safe, effective, and persistent suppression of a variety of mosquito species in many types of mosquito sources. As with all safe and effective control agents, the use of mosquitofish requires a good knowledge of operational techniques and ecological implications, careful evaluation of stocking sites, use of appropriate stocking methods and regular monitoring of stocked fish.

Biological Control BMPs

BMP B1-Use only biological control agents approved for use in California

BMP B2- Only District technicians release mosquitofish.

BMP B3- Mosquitofish are not released into open waters, only closed basins.

BMP B4- Natural mosquito predators are favored, and sensitive locations such as vernal pools or sites occupied by sensitive species are not treated with biological control methods that may impact those species. For example, mosquitofish would not be used since they may consume listed fairy shrimp species, but bacteria (Bti or Bs) could be used because they do not affect fairy shrimp.

Chemical Control

Two basic chemical control methods are used to control mosquitoes: larval control and adult control. Only those pesticides registered by the United State Environmental Protection Agency (U.S. EPA) and California Environmental Protection Agency (Cal EPA) are used by the District for mosquito control. With the existing federal and state limitations and regulations, the pesticides available for mosquito control are environmentally sensitive and are unlikely to cause adverse environmental impacts. The District follows label instructions strictly and carefully monitors environmental and meteorological conditions to maximize effectiveness while avoiding and minimizing non-target exposure and adverse environmental effects. These practices substantially reduce the potential for environmental harm as the result of the use of public health pesticides under the District's IVMP. District personnel performing chemical treatments are certified by the CDPH as Vector Control Technicians.

Larval Control (Larviciding)

Larviciding is a general term for the process of controlling mosquitoes by applying natural agents or commercial products designed to control larvae and pupae (collectively called larvicides) to aquatic habitats. Larviciding is the preferred chemical control strategy because it targets discrete areas with high densities of the target organisms at their most susceptible life stage. There are three general types of larvicides:

- Stomach toxins
- Contact Pesticides
- Surface Active Agents

Larval Control Products Used by the District:

- *Bacillus thuringiensis*, subspecies *israelensis* (Bti: e.g., Aquabac 200G, VectoBac 12AS, Teknar HP-D)
- *Bacillus sphaericus* (Bs: e.g., VectoLex CG)
- Spinosad (bacteria derived natural insecticide: e.g., Natular G)
- (S)-Methoprene (e.g. Altosid pellets)
- Larviciding Oils (BVA oil)
- Monomolecular films (e.g., Agnique MMF)
- Organophosphate compounds (Temephos (e.g., Abate))

Larval Control Compounds currently approved and used by SMVCD are listed in Appendix B.

Adult Mosquito Control (Adulticiding)

Adult mosquitoes can only be effectively controlled with adulticides; pesticides that target the winged adult lifestage. The use of adulticides is an integral component of the District's IVMP. Adulticiding falls into two categories – barrier applications and ultra-low volume (ULV) applications. Barrier applications target resting mosquitoes by applying pesticides to vegetation and structures. Barrier applications typically cover relatively small areas and are applied to alleviate specific problems rather than an area - wide adult mosquito problem.

In general, ULV applications are used to control adult mosquitoes over large areas. An "ultra-low volume" (typically less than 2 oz/acre total volume) of tiny oil or water droplets carrying an insecticide are emitted from specialized equipment mounted to trucks or aircraft. The District does not currently use aircraft during adulticiding, but would consider this practice if faced with an emergency public health situation or threat of an epidemic that could be prevented through aerial applications of adulticides. The goal of ULV applications is to immediately reduce mosquito populations and halt disease transmission. Multiple applications in a particular area may be utilized when the objective is to kill a high enough proportion of older adult mosquitoes to break a disease transmission cycle.

The District's IVMP initiates adult mosquito control when action levels or thresholds are reached or exceeded. Thresholds are based on sampling of the adult mosquito population and/or when the risk of mosquito-borne disease increases above levels established by SMVCD. Thresholds are an integral component of mosquito control because they are used to trigger predetermined actions based on quantified data. Thresholds establish expectations and limitations for responses that ensure appropriate

mosquito control activities are implemented at the appropriate time. The thresholds used by the District for adult mosquito control depend on several factors including:

- Presence of mosquito-borne disease in the region.
- Abundance of mosquito species that are vectors of disease.
- Overall mosquito abundance.
- How local citizens tolerate nuisance mosquitoes by evaluating public service requests.
- Local acceptance of adult mosquito control activities.
- Meteorological and climate data.

Chemicals currently registered for ULV application against mosquitoes in California include organophosphates (e.g. malathion and naled), pyrethrins, (e.g. pyrethrum) and pyrethroids (e.g., sumithrin, permethrin, and etofenprox). With the exception of the active ingredient etofenprox, formulations of both pyrethrins and pyrethroids include the synergist piperonyl butoxide (PBO), which increase their activity against mosquitoes.

1. Organophosphates: Malathion and naled are neurotoxins that act by inhibiting neurologic transmission. Malathion may be used early and late in the season as a pesticide resistance control measure.
2. Pyrethrins: Pyrethrins and pyrethroids are neurotoxins that act by causing uncontrolled firing of neurons. Pyrethrum is a natural insecticide derived from chrysanthemum flowers. Adult mosquitoes are rapidly paralyzed and killed on contact. Pyrethrins are degraded rapidly by sunlight and chemical processes. Residual pyrethrins from ULV applications typically remain less than 1 day on plants, soil, and water.
3. Pyrethroids: Pyrethroids are manufactured pyrethrins that have very low toxicity to birds and mammals but are toxic to fish if misapplied.

Adult Control Compounds currently approved and used are listed in Appendix B.

Chemical Control BMPs

BMP C1: Make determination based on all available information and verify that chemical application is needed to protect the public health.

BMP C2: Follow all label instructions including weather and climate guidelines.

BMP C3: Precisely follow equipment calibration and application rate recommendations.

BMP C4: Consult with agencies as directed.

BMP C5: Monitor results for effectiveness.

BMP C6: Report use and identify treated areas as required

BMP C7: Follow emergency spill or accidental release procedures.

Relationship with CDPH

Many aspects of the District IVMP are conducted under the direction of the CDPH. The District maintains an annual agreement with CDPH. This is an agreement between CDPH and vector control agencies that obligates signatory agencies to certain practices that promote safe and effective vector control. The Cooperative Agreement also ensures that all state and federal pesticide use requirements are met and adherence to the conditions of the agreement constitute BMPs. The areas, terms, conditions, and specifications of the Cooperative Agreement are prescribed by the CDPH Director (CHSC 116180). The current requirements include:

- Regular and proper calibration of all application equipment and maintenance of calibration records;
- Maintenance of comprehensive pesticide application records;
- Monthly submission of pesticide use reports;
- Reporting any conspicuous or suspected adverse effects upon non-target organisms or property from pesticide applications;
- Appropriate employee certification and maintenance of continuing education information; and
- Regular compliance inspections by the county agricultural commissioner's office.

Certification, Education, and Training

All technical staff employed by the District are certified by the CDPH in Pesticide Safety and Use and at least one of the following four categories:

A. Pesticide Application and Safety Training for Applicators of Public Health Pesticides
B. The Biology and Control of Mosquitoes in California
C. Arthropods of Public Health Significance in California
D. Vertebrates of Public Health Importance in California

Most District employees have all four certifications. Several staff are also licensed by the CDPR and the Structural Pest Control Board. To maintain these certifications, employees take at least the minimum hours of continuing education each cycle.

Certification in each category is based upon passing a standardized test administered by CDPH VBDS. Following certification, continuing education is required consisting of programs officially approved by CDPH VBDS every two years as follows:

Category A: 12 Hours
Category B: 8 Hours
Category C: 8 Hours
Category D: 8 Hours

Per District standards, full-time employees conducting field work must be certified or directly supervised by a certified technician. New staff are required to complete their certification in Categories A & B by the end of their 1-year probationary period. Further advancement generally requires certification in the remaining two categories.

District personnel also receive training in first aid, CPR, equipment operation and maintenance, computer use, and other job-related training. Additional training on wildlife identification and habitat associations is conducted annually so that District staff can recognize the various taxa that inhabit the District and understand how to avoid impacting sensitive wildlife and habitats while implementing the IVMP.

Agency Cooperation and Consultation

Although the District is an independent special district created under the CHSC, every effort is made to work closely and cooperatively with other agencies and associations to ensure that the IVMP BMPs are applying cutting-edge methods to adequately protect the environment and public trust resources.

Federal Agencies

United States Army Corps of Engineers (USACE) - When wetlands and watercourses may be impacted by the IVMP (Physical Control), USACE is consulted as to jurisdiction and applicability of Section 404 of the Clean Water Act (CWA). Depending on the exact nature of the activity, the District may be required to obtain a permit from the USACE.

The US EPA- oversees compliance with the Clean Air Act and Clean Water Act. The District relies heavily on the federal pesticide registration process used by the EPA for establishing pesticide application procedures such that impacts to air and water resources are minimized or avoided.

Occupational Health and Safety Administration (OSHA)- The District complies with OSHA regulation and requirements. OSHA laws and regulations are administered by California OSHA.

United States Fish and Wildlife Service (USFWS) and the National Oceanic and Atmospheric Administration (NOAA) Fisheries Service (Services)- are the federal agencies responsible for overseeing the U.S. Endangered Species Act (ESA) and other laws designed to protect fish and wildlife resources. The District complies with laws and regulations relating to endangered and threatened wildlife and habitats and informally consults with the Services when District operations pose a risk of impacts to protected species or habitats. Pesticide labels often specifically direct the procedure for coordinating applications or consulting with the Services. The District adheres to these procedures and follows label requirements.

State of California Agencies

CDPH - The District maintains an annual Cooperative Agreement with CDPH. This agreement specifies how the District activities will comply with certain California regulations for Public Health Pesticide use and vector control. The agreement also requires recordkeeping and reporting of pesticide use to the County Agricultural Commissioner each month as well as the certification of Mosquito Control Technicians. The detailed training and ongoing professional development of certified technicians is one of the primary means of avoiding adverse environmental impacts. This training is conducted by CDPH and emphasizes all aspects of BMPs (i.e. identification and avoidance of hazard resulting from pesticide use). The CDPH also requires ongoing continuing education that ensures District technicians are using "state of the art" methods and materials at the highest professional level.

California Department of Fish and Game (CDFG)- The District interacts with the CDFG on several fronts. For biological control activities, the Distinct complies with laws and regulations relating to transport and use of biological organisms, such as mosquitofish, and each release site is carefully evaluated to ensure that adverse ecological effects do not result from introducing this non-native species into sensitive areas. The District also works closely with CDFG to identify areas where habitat for endangered and threatened species is present so that appropriate protection measures can be applied during vector control activities. This includes activities involving vegetation management and use of herbicides to reduce mosquito habitat and maintain access to control sites. For activities that can substantially divert, obstruct, or alter the natural flow, banks, or channel of any river, stream, or lake, the District complies with

the Streambed Alteration Agreement it has maintained with DFG for many years (SAA No. R1-98-0819 and renewals)

Cal-EPA- This agency administers federal and state environmental laws and regulations within California and is comprised of several departments, two of which regulate activities and resources potentially affected by the District's IVMP.

CDPR- This agency is part of Cal-EPA and is responsible for all aspects of pesticide sales and use to protect public health and the environment. It registers pesticides for use in California.

Central Valley Regional Water Quality Control Board RWQCB (5R)- This Board is also part of Cal-EPA and regulates the protection of surface and ground waters within the District and other parts of the Central Valley. The State of California acts to enforce the federal CWA and may issue National Pollutant Discharge Elimination System (NPDES) permits. A NPDES permit is required of any entity that discharges pollutants through a point source into any water of the United States. A point source is any discharge that flows directly into a water body. These permits are tailored specifically to the entity that will be discharging the pollutant and include limits on what can be discharged, monitoring and reporting requirements, and other provisions designed to protect the quality of the water and the public health.

Department of Motor Vehicles (DMV)- The operation of District vehicles, material transport, insurance requirements and the driver licensing of all District employees is subject to regulation by DMV.

Local Agencies and Other Groups

Shasta County Agricultural Commissioner- The District provides the Agricultural Commissioner's office with monthly reports of pesticide usage and is subject to periodic inspections of equipment, facilities, and records.

Shasta County Public Health- This county department coordinates information regarding incidence of disease, health risks, and special conditions requiring responses to threats to public health. They directly facilitate the exchange of useful information among affected agencies and health care providers.

Cities- The cities of Redding, Anderson, and Shasta Lake exchange information that helps residents stay fully informed about District activities and potential health risks related to vectors in the local area.

Vector Control Joint Powers Authority (VCJPA)-This is a joint powers authority formed by participating vector and mosquito control district in California to provide insurance pooling and administration for Workers Compensation, vehicle insurance, and general liability insurance. The District complies with their requirements and participates in the VCJPA training program to reduce risks to the District.

Memberships

Memberships and participation with technical and trade associations and professional societies provides professional development for District staff. The District maintains memberships and participates in technical workshops, conferences, and symposia with the American Mosquito Control Association (AMCA), the California Special District Association (CSDA), the Mosquito and Vector Control Association of California (MVCAC), and the Society of Vector Ecologists (SOVE). The District's participation in these organizations ensures the science-based application of the IVMP at the highest professional level including the proper use of widely accepted BMPs.

Follow-up, Feedback, and Adaptive Response

The District routinely re-visits sites to follow-up on previous control efforts and ensure that treatments have effectively reduced the public health risk for which the treatment was originally applied. Also, surveillance is conducted on an ongoing basis. Repeated sampling at specific locations provides data regarding trends in vector populations, species composition, and prevalence of disease. The data is fed back to agencies such as the CDPH and Shasta County Health Department to keep health care agencies and professionals apprised of the status of vector-borne diseases at state and local levels.

Several of the District's activities include reporting of conditions that help influence public decision making with respect to vector control. The District provides feedback on planning efforts such that new projects do not create new significant sources of mosquito production. Surveillance data and specimens collected by the District are submitted to several laboratories so that indices of disease transmission capability can be developed. Pesticide use data is provided the Shasta County Agricultural Commissioner's office so that the amount of each product used can be tracked over time, and a complete record of public health pesticide usage is available to the CDPR, CDPH, and other relevant agencies (i.e., CVRWQCB, CARB, etc.).

In consultation with professional wildlife biologists, observations of special status wildlife and plant species can be reported to the CNDDB so that a more complete record of sensitive species locations and habitats within the District can be developed. Similarly, artifacts or other cultural resources that are encountered in the field can be reported to a

professional archeologist for investigation. Sites judged to be significant can be recorded with the Northeast Center of the California Historic Resource Information System so they are protected in the future.

The ongoing effort to record new sensitive locations as they are discovered leads to improved protection for biological and cultural resources over time. The site-specific data that is submitted to larger, more comprehensive databases serves as a feedback loop that leads to better protection of sensitive resources across space and time.

As the District's ongoing collection and reporting of information occurs, successes are recognized as are practices where effectiveness can be improved. Adjustments to site-specific practices can be made to increase the efficiency or reduce any adverse impacts that may occur. This adaptive-response methodology leads to improvements in the overall IVMP that can be applied within the District and shared among other vector control professionals.

Triggers for Initiating Mosquito Control Activities

1. A human illness caused by a mosquito-borne virus or pathogen is detected within the District.
2. Mosquito-borne virus or pathogen is detected in a dead bird or other animal within the District boundaries.
3. Testing indicates a sentinel chicken or other animal within the District boundaries has been exposed to a mosquito-borne virus or pathogen.
4. Mosquito collected within the District boundaries tests positive for a disease causing virus or pathogen.
5. Trapping or collecting efforts capture more mosquitoes than the number established in thresholds*.
6. Mosquitoes creating a public health nuisance at a residence as verified by the District.

**Threshold values vary by mosquito species (some are more prone to carry diseases) and sampling methods (some traps target virus carrying mosquitoes). Threshold values range from 8 to 35 mosquitoes captured per sample.*

Determining Need and Options for Control of Larvae

1. Will mosquitoes develop in the habitat (standing water present more than 72 hours)?
2. Is the site close enough to humans or livestock to be of concern?
3. Does abundance of mosquito larvae of the proper life stage exceed the threshold values:

- *Culex* sp.: ≥ 1/10 dips
- *Aedes* sp.: ≥ 1/10 dips
- *Anopheles* sp.: ≥ 1/10 dips
- *Coquillettidia* sp.: ≥ 2/10 dips
- *Culiseta* sp.: ≥ 2/10 dips

4. Is the site a vernal pool?
5. Are threatened, endangered, or otherwise protected species present?
6. Are there cultural or historic or other sensitive resources present that could be impacted?
7. Can physical control or habitat modification be used to eliminate the source without harming some sensitive habitat or resource?
8. Can biological agents be used effectively without harming beneficial or protected species?
9. Can a combination of physical and biological control be used to increase effectiveness?
10. Is larvacidal chemical control needed as an initial or follow-up treatment?
11. Are there sensitive human receptors present or concerns with water quality?
12. Is pesticide resistance a concern?

When sensitivities exist, consult with supervisor and/or other responsible resource agencies prior to applying selected control methods. Comply with existing permit conditions. For long-term projects, apply for site-specific permit(s) if necessary. Select most appropriate treatment method while considering pesticide label restrictions and resistance avoidance techniques.

Considerations or Conditions that Influence Adult Control Options

1. Presence of mosquito-borne disease or pathogen in any organism tested (mosquito, dead bird or other animal, sentinel chicken, livestock, or human) confirmed and source presumed within District boundaries.
2. Will adulticiding effectively protect human health?
3. Is pesticide resistance a concern?
4. Are climate and meteorological conditions favorable for ULV application?
5. Should aerial application be considered based on risk of epidemic or seriousness of threat?
6. Can pesticide use be avoided near sensitive human receptors or areas where residents have made requests to limit applications?
7. Are organic agricultural operations likely to be affected; can they be avoided?

8. Do labels require specific avoidance of habitats?
9. Are sensitive environmental resources present and will they be potentially affected?
10. Is consultation with other agencies required or prudent?

Continuance/Termination Criteria

Once initiated, treatments generally continue until surveillance and sampling indicate mosquito abundance has fallen below thresholds, no more incidence of disease or pathogens are detected, climate or meteorological conditions become unfavorable, or seasonal considerations and the biology of the mosquito species reduces risk (i.e. species that are die or become inactive during winter months).

Appendix A. Explanation of Acronyms

SMVCD-Shasta Mosquito and Vector Control District

MAD-Mosquito Abatement District

ATV-All Terrain Vehicle

WNV-West Nile Virus

WEE-Western Equine Encephalomyelitis

SLEV-St. Louis Encephalitis

CVEC-Center for Vector-borne Diseases

IVM-Integrated Vector Management

IPM-Integrated Pest Management

IMM-Integrated Mosquito Management

Bti-Bacillus thuringiensis israelensis

IGR-Insect Growth Regulator

MMF-Monomolecular Film

PHP-Public health Pesticide

ULV-Ultra-Low Volume

PBO-Piperonyl butoxide

EVS-Encephalitis Surveillance

FEMA-Federal Emergency Management Agency

SEMS-Standardized Emergency Management System

Appendix B. Mosquito-Control Pesticides Currently used by the District

EPA Registration No.	Trade Name	Chemical Name/Family	Mode of Action	Signal Word/Category	Hazardous/Non Hazardous (DOT)	Comments
Larvacides						
2724-448	Zoecon Altosid pellets	(S)-Methoprene / Terpenoid	Growth regulator	Caution / III	Not Regulated as Hazardous Material	Prevents adult emergence
2724-375	Zoecon Altosid Briquetes	(S)-Methoprene / Terpenoid	Growth regulator	Caution / IV	Not Regulated as Hazardous Material	Prevents adult emergence
2724-421	Zoecon Altosid XR Extended Release Briquetes	(S)-Methoprene / Terpenoid	Growth regulator	Caution / IV	Not Regulated as Hazardous Material	Prevents adult emergence
2724-392	Zoecon Altosid liquid	(S)-Methoprene / Terpenoid	Growth regulator	Caution / IV	Not Regulated as Hazardous Material	Prevents adult emergence
73049-10	Vectobac G (granules)	*Bacillus thuringiensis*, subsp. *Israelensis (Bti)*	Spore forming bacterium, disrupts digestion in midgut of insects	Caution / IV	Not Regulated as Hazardous Material	Selective biological agent
73049-20	Vectolex CG	*Bacillus thuringiensis*, subsp. *Israelensis* (Bti)	Spore forming bacterium, disrupts digestion in midgut of insects	Caution / IV	Not Regulated as Hazardous Material	Selective biological agent
73049-57	Vectolex WDG	*Bacillus sphaericus (Bs)*	Spore forming bacterium, disrupts digestion in midgut of insects	Caution / IV	Not Regulated as Hazardous Material	Selective biological agent
73049-429	VectoMax CG	*Bti* & *Bs* combined	Spore forming bacterium, disrupts digestion in midgut of insects	Caution / IV	Not Regulated as Hazardous Material	Selective biological agent
83362-3	Fourstar Briquetes	*Bti* & *Bs* combined	Spore forming bacterium, disrupts digestion in midgut of insects	Caution / IV	Not Regulated as Hazardous Material	Extended release product
73049-38	Vectobac 12AS	*Bti* in aqueous suspension	Spore forming bacterium, disrupts digestion in midgut of insects	Caution / IV	Not Regulated as Hazardous Material	Selective biological agent
70589-1	BVA 2 Mosquito Larvicide Oil	Aliphatic solvent, non-hazardous mineral oil	Surface oil, suffocates larval and pupal stages	Caution / IV	Not Regulated as Hazardous Material	Use in areas that do not support fish

8329-72	Mosquito Larvicide GB-IIII, aka "Golden Bear Larvicide Oil"	Aliphatic solvent, non-hazardous mineral oil	Surface oil, suffocates larval and pupal stages	Caution / IV	Not Regulated as Hazardous Material	
8329-70	5% Skeeter Abate	Temephos / organophosphate	Neurotransmitter (cholinesterase) inhibitor	Warning / II	Non-Hazardous	May only be applied by public vector control agencies in agreement with CDPH
8329-80	Natular G (granules)	Spinosad	neural excitation in susceptible organisms	Caution / IV	Not Regulated as Hazardous Material	Spinosad is derived from a naturally occurring soil microbe
8329-84	Natular XRT (extended release tablets)	Spinosad	neural excitation in susceptible organisms	Caution / IV	Not Regulated as Hazardous Material	Spinosad is derived from a naturally occurring soil microbe
Adulticides						
1021-1688	Anvil 10 + 10 ULV	Sumithrin / pyrethroid	Neurotransmitter disrupter (ionic pathway, not cholinesterase inhibitor)	Caution / IV	Non-Hazardous	May only be applied by public vector control agencies in agreement with CDPH
1021-1795	Duet Dual-Action	Prallethrin and Sumithrin / pyrethroid	Neurotransmitter disrupter (ionic pathway, not cholinesterase inhibitor)	Caution / III	Non-Hazardous	May only be applied by public vector control agencies in agreement with CDPH
67760-34	Fyfanon ULV Mosquito	Malathion /organophosphate	Neurotransmitter (cholinesterase) inhibitor	Caution / III	Hazardous (slight hazard, NFPA rating 1)	Used to combat resistance to pyrethroids
432-1050	Pyrenone 25-5 Public Health	Pyrenone / pyrethroid	Neurotransmitter disrupter (ionic pathway, not cholinesterase inhibitor)	Caution / IV	Hazardous (Class 9)	May only be applied by public vector control agencies in agreement with CDPH
2724-791	Zenivex E20	Etofenprox / pyrethroid	Neurotransmitter disrupter (ionic pathway, not cholinesterase inhibitor)	Caution / IV	Chronic Health Hazard.	May only be applied by public vector control agencies in agreement with CDPH

Category I - **High Toxicity.** Signal words "Danger" or "Poison". Acute oral LD50 < 50 mg/kg
Category II - **Moderate Toxicity.** Signal word "Warning". Acute oral LD50 > 50 to 500 mg/kg
Category III - **Low Toxicity.** Signal word "Caution". Acute oral LD50 > 500 to 5000 mg/kg
Category IV -**Very low Toxicity.** Signal word "Caution" optional. Acute oral LD50 > 5000 mg/kg