Pesticides Application Plan (PAP) for the NPDES Vector Control Permit Application of the San Joaquin County Mosquito and Vector Control District (*revised 9/12/2011*)

1. Target areas: surface waters and waters of the U.S. within San Joaquin County, CA. Map of San Joaquin County enclosed.

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

   Dry Creek, tributary to Mokelumne River
   Goose Creek, tributary to Dry Creek
   Coyote Creek, tributary to Dry Creek
   Jahant Slough, tributary to Tracy Lakes
   Tracy Lakes
   Gill Creek, tributary to Mokelumne River
   Murphy Creek, tributary to Mokelumne River
   Camanche Reservoir
   Lodi Lake
   Mokelumne River, tributary to Sacramento River-San Joaquin River Delta
   North Fork Mokelumne River
   South Fork Mokelumne River
   Beaver Slough, tributary to South Fork Mokelumne River
   Hog Slough, tributary to South Fork Mokelumne River
   Sycamore Slough, tributary to South Fork Mokelumne River
   Upland Canal, tributary to White Slough
   Bear Creek, tributary to Disappointment Slough
   Pixley Slough, tributary to Disappointment Slough
   Telephone Cut, tributary to Bishop Cut
   Paddy Creek, tributary to Bear Creek
   Middle Paddy Creek, tributary to Paddy Creek
   South Paddy Creek, tributary to Paddy Creek
   Mosher Creek, tributary to Mosher Slough
   Mosher Slough, tributary to Disappointment Slough
   Five Mile Slough, tributary to Disappointment Slough
   Duck Creek, tributary to Mormon Slough
   Indian Creek, tributary to Calaveras River
   Calaveras River, tributary to San Joaquin River
   Podesto Lake
   Mormon Slough, tributary to Stockton Diverting Canal
   Stockton Diverting Canal, tributary to Calaveras River
   Mormon Slough, tributary to Stockton Deep Water Channel
   Stockton Deep Water Channel, tributary to San Joaquin River
   Smith's Canal, tributary to San Joaquin River
   Potter Creek, tributary to Mormon Slough
   North Fork Duck Creek, tributary to Duck Creek
   Duck Creek, tributary to Walker Slough
   Walker Slough, tributary to French Camp Slough
   Rock Creek, tributary to LittleJohns Creek
   LittleJohns Creek, tributary to North and South LittleJohns creeks
   North LittleJohns Creek, tributary to French Camp Slough
   South LittleJohns Creek, tributary to N. Fork S. LittleJohns Creek
   South LittleJohns Creek, tributary to S. Fork S. LittleJohns Creek
   N. Fork S. LittleJohns Creek, tributary to French Camp Slough
   S. Fork S. LittleJohns Creek, tributary to French Camp Slough
   French Camp Slough, tributary to San Joaquin River
   Avena Drain, tributary to Lone Tree Creek
   Lone Tree Creek, tributary to S. Fork S. LittleJohns Creek
   Stanislaus River, tributary to San Joaquin River

San Joaquin River, tributary to Sacramento River-San Joaquin River Delta
Walthall Slough, tributary to San Joaquin River
Red Bridge, tributary to Walthall Slough and San Joaquin River
Tom Paine Slough, tributary to Old River
Sugar Cut, tributary to Tom Paine Slough and Old River
Hospital Creek
PegLeg Creek, tributary to Lone Tree Creek (sw)
Middle Fork Lone Tree Creek, tributary to Lone Tree Creek (sw)
Sulpher Springs Gulch Creek, tributary to Lone Tee Creek (sw)
North Fork Lone Tree Creek, tributary to Lone Tree Creek (sw)
Corral Hollow Creek
Hellsinger Creek, tributary to Corral Hollow Creek
Patterson Run
Mountain House Creek
White Slough
Honker Cut
Disappointment Slough
Ten Mile Slough
Fourteen Mile Slough
Little Potato Slough
Potato Slough
Venice Cut
Venice Reach
Mandeville Reach
Mandeville Cut
Three River Reach
Burns Reach
Dredge Cut
Twentyone Mile Cut
Haypress Reach
Bishop Cut
Turner Cut
Empire Cut
Whiskey Slough
Latham Slough
Columbia Cut
Middle River
Old River
Connection Slough
Dredger Cut
North Victoria Canal
Victoria Canal
Trapper Slough
Paradise Cut
Salmon Slough
Grant Line Canal
Fabian and Bell Canal

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:

Byron-Bethany Irrigation District
Banta-Carbona Irrigation District
California Irrigation District
Central San Joaquin Water Conservation District
Lathrop Irrigation District
Neglee-Burk Irrigation District
New Del Puerto Water District
North San Joaquin Water Conservation District

Nyjo Water District
Oakdale Irrigation District
South San Joaquin Irrigation District
Stockton East Water District
Woodbridge Irrigation District
West Side Irrigation District
West Stanislaus Irrigation District

Reclamation District #1	*Union Island*
Reclamation District #2	*Union Island*
Reclamation District #17	*Mossdale*
Reclamation District #38	*Staten Island*
Reclamation District #348	*New Hope*
Reclamation District #403	*Rough and Ready Island*
Reclamation District #404	*Boggs Tract*
Reclamation District #524	*Middle Roberts Island*
Reclamation District #544	*Upper Roberts Island*
Reclamation District #548	*Terminous*
Reclamation District #684	*Lower Roberts Island*
Reclamation District #756	*Bouldin Island*
Reclamation District #773	*Fabian Tract*
Reclamation District #828	*Weber Tract*
Reclamation District #1007	*Pico and Nagle*
Reclamation District #1608	*Smith Tract*
Reclamation District #2023	*Venice Island*
Reclamation District #2027	*Mandeville Island*
Reclamation District #2028	*Bacon Island*
Reclamation District #2029	*Empire Tract*
Reclamation District #2030	*McDonald Island*
Reclamation District #2033	*Brack Tract*
Reclamation District #2038	*Lower Jones Tract*
Reclamation District #2039	*Upper Jones Tract*
Reclamation District #2040	*Victoria Island*
Reclamation District #2041	*Medford Island*
Reclamation District #2042	*Bishop Tract*
Reclamation District #2044	*King Island*
Reclamation District #2058	*Pescadero District*
Reclamation District #2062	*Stewart Tract*
Reclamation District #2064	*River Junction*
Reclamation District #2072	*Woodward Island*
Reclamation District #2074	*Sargent-Barnhart Tract*
Reclamation District #2075	*McMullin Ranch*
Reclamation District #2085	*Kasson District*
Reclamation District #2086	*Canal Ranch*
Reclamation District #2089	*Stark Tract*
Reclamation District #2094	*Walthall*
Reclamation District #2095	*Paradise Junction*
Reclamation District #2096	*Wetherbee Lake*
Reclamation District #2101	*Blewett*
Reclamation District #2107	*Mossdale*
Reclamation District #2108	*Tinsley*
Reclamation District #2113	*Fay Island*
Reclamation District #2114	*Rio Blanco Tract*
Reclamation District #2115	*Shima Tract*
Reclamation District #2116	*Holt Station*
Reclamation District #2118	*Little Mandeville Island*
Reclamation District #2119	*Wright-Elmwood Tract*
Reclamation District #2126	*Atlas Tract*

California Department of Water Resources – California Aqueduct
U.S. Bureau of Reclamation - Delta Mendota Canal

2. Please see the following enclosed references that identify the factors influencing the decision to select pesticide applications for vector control:

   a. **Best Management Practices for Mosquito Control in California**. *2011*. California Department of Health Services, Vector-Borne Disease Section
   b. **California Mosquito-Borne Virus Surveillance & Response Plan**. *2011*. California Department of Health Services, Vector-Borne Disease Section.
   c. **Operational Plan for Emergency Response to Mosquito-Borne Disease Outbreaks.** 2010. California Department of Public Health, Vector-Borne Disease Section.
   d. **Overview of Mosquito Control Practices in California.** 2008. California Department of Public Health, Vector-Borne Disease Section.
   e. **Epidemic/Epizootic West Nile Virus in the United States: Guidelines for Surveillance, Prevention, and Control.** 2003. U.S. Department of Health and Human Services, Centers for Disease Control and Prevention.
   f. **Integrated Pest Management Plan for Certain Vectors in San Joaquin County, CA.** 2008. San Joaquin County Mosquito and Vector Control District.

   The use of pesticides to control adult and immature stages of mosquitoes is determined when other control methodologies cannot or will not be feasible. Following are examples of the limitations that other control methodologies present that may then trigger the need for a pesticide application:

   Biological control (use of mosquitofish) has definite limitations. For example:

   - *They can seldom inhabit two important larval sites: small containers and highly polluted water. In temporary water sites, repeated introduction of fish will be required.*
   - *Mosquito-eating fish can harm beneficial organisms (e.g., other fish or insect predators) by eating their eggs and young or by superior competition for food. Their release carries the potential to reduce or eliminate non-target species.*
   - *Larvivorous fish may be preyed upon by larger fish. Their vulnerability to fungi and other pathogens may keep their populations in check.*
   - *Where larvivorous fish are harvested or removed, their populations could be reduced to a level inadequate for mosquito control.*
   - *Mosquito-eating fish may prefer food other than mosquito larvae. In some situations, mosquito larvae production outruns the increase in fish population that would be necessary for control.*
   - *The District can only rear certain amounts of mosquitofish per year in. All mosquitofish produced are used in the District's biological control element of the IPM program.*

   Natural control (a pest management strategy whereby the environment is disturbed as little as possible) has definite limitations. For example:

   - *Natural control is sometimes difficult to implement or assess due to the amount of man-made or manipulated vector sources found in the District. Natural control is advocated for sites that are remote and undisturbed, to the least amount practical, for the individual vector specie being contemplated for control.*

   Physical control (or mosquito habitat modification) has definite limitations. For example:

   - *Only man-made or managed mosquito sources are capable of being physically altered to reduce mosquito abundance. In some cases physically altered lands will reduce, but not eliminate mosquito breeding, requiring the implementation of other forms of control, including biological and chemical control.*

   g. **Pesticides and Public Health: Integrated Methods of Mosquito Management.** 2001. U.S. Environmental Protection Agency.

3. Pesticide products or types expected to be used and the method in which they will be applied:

Pesticide Product	EPA Reg.	Method of Application
Pyrocide Mosquito Adulticiding Concentrate for ULV Fogging 7395	1021-1570	Ultra low volume (ULV), vehicle (ground) and aircraft (air)
Evergreen Crop Protection EC 60-6	1021-1770	ULV ground and air
Pyrenone Crop Spray	432-1033	ULV ground and air
Prentox Pyronyl Crop Spray	655-489	ULV ground and air
Pyrocide Mosquito Adulticiding Concentrate for ULV Fogging 7396	1021-1569	ULV ground and air
Aquahalt Water-Based Adulticide	1021-1803	ULV ground and air
Pyrocide Mosquito Adulticide 7453	1021-1803	ULV ground and air
Pyrenone 25-5 Public Health Insecticide	432-1050	ULV ground and air
Prentox Pyronyl Oil Concentrate #525	655-471	ULV ground
Prentox Pyronyl Oil Concentrate or 3610A	655-501	ULV ground and air
Permanone 31-66	432-1250	ULV ground and air
Kontrol 30-30 Concentrate	73748-5	ULV ground and air
Aqualuer 20-20	769-985	ULV ground and air
Aqua-Reslin	432-796	ULV ground and air
Aqua-Kontrol Concentrate	73748-1	ULV ground and air
Kontrol 4-4	73748-4	ULV ground and air
Biomist 4+12 ULV	8329-34	ULV ground and air
Permanone RTU 4%	432-1277	ULV ground and air
Prentox Perm-X UL 4-4	655-898	ULV ground and air
Allpro Evoluer 4-4 ULV	769-982	ULV ground and air
Biomist 4+4	8329-35	ULV ground and air
Kontrol 2-2	73748-3	ULV ground and air
Scourge Insecticide with Resmethrin/Piperonyl Butoxide 18%+54% MF Formula II	432-667	ULV ground and air
Scourge Insecticide with Resmethrin/Piperonyl Butoxide 4%+12% MF Formula II	432-716	ULV ground and air
Anvil 10+10 ULV	1021-1688	ULV ground and air
AquaANVIL Water-based Adulticide	1021-1807	ULV ground and air
Duet Dual-Action Adulticide	1021-1795	ULV ground and air
Anvil 2+2 ULV	1021-1687	ULV ground and air
Zenivex E20	2724-791	ULV ground and air
Trumpet EC Insecticide	5481-481	ULV ground and air
Fyfanon ULV Mosquito	67760-34	ULV ground and air

Vectolex CG Biological Larvicide	73049-20	Conventional, vehicle (ground), hand-held (hand), and aircraft (air)
Vectolex WDG Biological Larvicide	73049-57	Conventional ground/hand/air
Vectolex WSP Biological Larvicide	73049-20	Conventional ground/hand
Vectobac Technical Powder	73049-13	Conventional ground/hand/air
Vectobac-12 AS	73049-38	Conventional ground/hand/air
Aquabac 200G	62637-3	Conventional ground/hand/air
Aquabac XT	62637-1	Conventional ground/hand/air
FourStar Briquets	83362-3	Conventional ground/hand
FourStar SBG	85685-1	Conventional ground/hand/air
Spheratax SPH (50G) WSP	84268-2	Conventional ground/hand

Spheratax SPH (50G)	84268-2	Conventional ground/hand/air
Teknar HP-D	73049-404	Conventional ground/hand/air
Vectobac-G Biological Mosquito Larvicide Granules	73049-10	Conventional ground/hand/air
Vectomax CG Biological Larvicide	73049-429	Conventional ground/hand/air
Vectomax WSP Biological Larvicide	73049-429	Conventional ground/hand
Vectomax G Biological Larvicide/Granules	73949-429	Conventional ground/hand/air
Zoecon Altosid Pellets	2724-448	Conventional ground/hand/air
Zoecon Altosid Pellets	2724-375	Conventional ground/hand/air
Zoecon Altosid Liquid Larvicide Mosquito Growth Regulator	2724-392	Conventional ground/hand/air
Zoecon Altosid XR Entended Residual Briquets	2724-421	Conventional ground/hand
Zoecon Altosid Liquid Larvicide Concentrate	2724-446	Conventional ground/hand/air
Zoecon Altosid XR-G	2724-451	Conventional ground/hand/air
Zoecon Altosid SBG Single Brood Granule	2724-489	Conventional ground/hand/air
Mosquito Larvicide GB-1111	8329-72	Conventional ground/hand/air
BVA 2 Mosquito Larvicide Oil	70589-1	Conventional ground/hand/air
BVA Spray 13	55206-2	Conventional ground/hand/air
Agnique MMF Mosquito Larvicide & Pupicide	53263-28	Conventional ground/hand/air
Agnique MMF G	53263-30	Conventional ground/hand/air
Abate 2-BG	8329-71	Conventional ground/hand/air
5% Skeeter Abate	8329-70	Conventional ground/hand/air
Natular 2EC	8329-82	Conventional ground/hand/air
Natular G	8329-80	Conventional ground/hand/air
Natular XRG	8329-83	Conventional ground/hand/air
Natular XRT	8329-84	Conventional ground/hand

4. Following is a general description and listing of the application areas and the target areas in San Joaquin County that are being planned to be applied or may be applied:

001 Alfalfa
002 Small grains (corn, milo, safflower, oats, wheat)
003 Pasture, clover
004 Rice, white
005 Rice, wild
006 Row crops, (tomatoes, sugar beets, cucumbers, melons, etc.
007 Sudan grass
008 Weeds, fallow
009 Other field crops
010 Orchards, fruit
011 Orchards, nuts
012 Vineyards, grape
013 Vineyards, other (kiwi, berry, etc.)
014 Animal waste ponds
015 Animal waste drains
016 Animal water trough
017 Animal cooling water
018 Irrigation ditch
019 Irrigation pipeline
020 Drain ditch, canal
021 Return flow drain or pond
022 Organic crop (all)
023 Spud ditch
024 Nursery
025 Sod
026 Vegetable packing shed waste drain
027 Vegetable packing shed waste pond
028 Walnut huller pond, drains
040 Creek, slough, river
041 Area, community drains

042 Natural drain
043 Duck, fish ponds, stock pond
044 Marsh
045 Rain pond, vernal pond
046 Tree holes
047 Refuge/preserve
048 River seepage
060 Bird bath
061 Cans, containers
062 Car body, boats, etc
063 Swimming pools
064 Hot tubs
065 Fish pond, ornamental pond
066 Vase, flower pots, urns
067 Water under building
068 Septic tank – leach lines
069 Basements
070 Sump
071 Residential neighborhood
072 House rain gutter
073 Resident lots
074 Landscape area
090 Reservoir
091 Sprinkler irrigation
092 Sump/Storm pump station
093 Trucking gondolas
094 Loading dock
095 RR Borrow pit
096 Highway/freeway borrow pit
097 Catch basins
098 Street gutter
099 Storm vault/storm line
100 Roadside ditch
101 Utility vault
102 Municipal waste ponds, drains
103 Industrial waste ponds, drains
104 Dredging/excavation pit
105 Storm water retention ponds
106 Lawn area (park, school, golf course)
107 Cooling water/tower
108 Fire barrel
109 Tires
110 Gun club, duck club
111 Barrels, food vats
112 Truck scale
113 Cannery bin liners
114 Resort areas (water ski clubs, yacht clubs, etc.)

5. The other control methods used and their limitations include:

   a. Biological Control. Biological control is the intentional use of natural predators, parasites or pathogens to achieve desired reductions in pest and vector population levels. The use of biological control is a primary method of control if the use of other control methods presents environmental concern and current vector populations are low or tolerable.
   The use of biological control organisms and strategies is limited to those that have been researched and field tested against target and non-target organisms. In addition, any biological control organism to be considered for use by the District will also be recognized and authorized by appropriate federal, state, and local agencies.

   The District operates a large-scale aquaculture facility that produces several thousand pounds of mosquitofish annually. The fish are planted in aquatic sites in agriculture (e.g. rice), environmental (e.g. managed wetlands), residential (e.g. swimming pools), and industrial (e.g. storm water retention ponds) sources.

   b. Legal abatement. Legal abatement is the process of preventing vectors through the enactment of legislation that enforces control measures or imposes regulations to prevent the production, introduction, or spread of pests and vectors. Legal abatement includes

the use of federal, state and local guidelines and laws designed to prevent the creation and/or harborage of pests and vectors.
The District regularly enforces the California Health and Safety Code, which specifically addresses the creation and/or harborage of vectors and vector breeding sites.

*The District's legal abatement policy provides for a three-step process to work with landowners to limit mosquito production on lands under their control. The steps proceed from providing the landowner with information that acknowledges their creation of a public nuisance and specific recommendations on mosquito prevention (including reference to CDPH's **Best Management Practices for Mosquito Control in California, 2011**). If the mosquito problem continues, the landowner can be cited per California Health and Safety Code regulations (Section 2000 et seq). Not all mosquito sources can be legally abated. Naturally-occurring sources created by rainfall (e.g. native tree holes and vernal pools) would be exempt from the District's implementation of legal abatement.*

c. Natural control. Natural control is a pest management strategy in which the environment is disturbed as little as possible. Reliance is placed on naturally occurring parasites, predators, and diseases to control vectors. One scientific definition of natural control is "… the maintenance of a fluctuating population density within definable upper and lower limits over a period by the combined affects of abiotic and biotic elements in the environment". Natural control is sometimes difficult to implement or assess due to the amount of man-made or manipulated vector sources found in the District. Natural control is advocated for sites that are remote and undisturbed, to the least amount practical, for the individual vector specie being contemplated for control.

d. Physical control. Physical control, or habitat modification, is achieved by altering the major ecological components of the vector's environment associated with the establishment and production of the vector's immature stages. The primary operational objective of physical control is to reduce the vector carrying capacity of a site to preclude the use of control methods that would adversely impact the environment and wildlife. The District complies with requirements, as specified, of any general permit issued to the California Department of Health Services as the lead agency, pertaining to physical environmental modification to achieve pest and vector prevention. Additionally, the District routinely reviews and comments on proposed projects within San Joaquin County being considered by the various city and county departments, thus providing opportunities to "design out" vector breeding conditions prior to construction and development.

6. The amount and type of product needed and how this amount was determined is difficult to project on a prospective basis, however, the *San Joaquin County Mosquito and Vector Control* District can provide the amount and type of products used in 2010 as an estimate of what may be used in 2011 and outlying years. Following is the 2010 information:

PRODUCT NAME	EPA REG. NO.	AMOUNT USED	# OF APPLICATIONS	ACRES TREATED
Pyrenone Crop Spray	432 1033	17.79 gal	123	490.96
Suspend SC	432 763	8.12 gal	294	341.41
Aquabac XT	62637 1	531.64 gal	1076	2,136.78
BVA 2	70589 1	8,007.39 gal	2,048	2,821.73
Golden Bear 1111	8329 72 AA	107.02 gal	152	32.21
Agnique MMFG	53263 30	65.44 lb	10	9.28
Agnique MMF	2302 14	6.66 gal	6	19.52
Evergreen EC 60-6	1021 1770 AA	495.67 gal	295	98,167.12
Pyrocide 7396	1021 1569	243.06 gal	194	37,551.74
Prentox Pyronyl Crop	655 489 ZA	0.61 gal	4	19.65
Pyronyl Crop Oil 525	655 471	20.5 gal	18	3,116.60
Trumpet EC	5481 481	607.50 gal	8	78,436
VectoBac 12 AS	73049 38	11034.1 gal	2,309	4,586.57
VectoBac G	73049 10	238,940.40 lb	278	47,425.5
VectoLex CG	73049 20	60.64 lb	30	9.3
VectoLex WDG	73049 57	68.25 lb	39	139.26

VectoLex WSP	73049 20	2.25 lb	4	0.73
VectoMax CG	73049 429	12,658.92 lb	1,636	14,658.21
Altosid Pellets WSP	2724 488 ZC	64.62 lb	53	13.40
Altosid Briquets	2724 375 64833	241.25 lb	411	651.24
Altosid Briquets XR	2724 421 AA 64833	1,010.41 lb	614	257.06
Altosid Pellets	2724 448 ZA 64833	1,619.97 lb	368	527.281
Altosid Liquid Larv.	2724 446	42.5 gal	5	1,372
Abate 5% Skeeter	8329 70	682.00 lb	5	212

7. Representative monitoring locations and the justification for selecting these locations are provided in the MVCAC NPDES Coalition Monitoring Plan.

8. Not applicable.

9. Items 2.a. through 2.g. (above) were used in the evaluation of available BMPs for the determination of feasible alternatives to selected pesticide applications that could reduce potential water quality impacts.

   Specifically, employees will evaluate the ability of a given mosquito breeding source to be reduced or eliminated per biological and/or physical control strategies outlined in the District's IPM plan after determining: 1) the species of mosquito, 2) the immediate population of mosquitoes, and 3) the current public health threat posed by the mosquito specie(s), the current mosquito population, and related arbovirus activity. Additional information regarding arbovirus activity is also used in determining what type of control technique should be implemented and when.

10. Items 2.a. through 2.g. (above) describe the BMPs to be implemented.

11. Prior to the first pesticide application covered under the permit that will result in a discharge of biological and residual pesticides to waters of the U.S., and at least once each calendar year thereafter prior to the first pesticide application for that calendar year the District will do the following for each vector management area:

    a. Utilize densities for larval and adult vector populations identified in the District's IPM plan (item 2.f. above) for implementing pest management strategies;

       The District utilizes the term "tolerance threshold" when determining if or when mosquito control should be implemented. Tolerance threshold is the population density of mosquitoes at which control measures should be implemented to prevent an increasing population from reaching an intolerable level. The data from sampling and monitoring is used to help decide at which infestation level to initiate control activities. This decision level is based on larval and adult mosquito populations, citizen complaints, and the potential for disease outbreaks, and the risk of control activities to non-target organisms.

       Action levels are different for each situation. In some areas, a public health or general annoyance condition does not occur until the number of adult female mosquitoes exceeds 10 per trap night. Other action levels that have been used are landing rates averaging more than two mosquitoes in one minute, and dipper counts averaging 0.1 larvae per dip. Action levels for urban, suburban, and rural residential areas can be lower than for remote, uninhabited areas, or areas of low human use.

       Adult mosquito threshold(s)

       Adult mosquitoes are measured by the use of the three techniques identified in the section "Surveillance". Because the District operates the mosquito surveillance and control program year round, the tolerance threshold can be changed by many factors. Examples of the many factors that change the adult mosquito tolerance threshold are listed below:

- *As weather conditions change in late fall and early winter, human activity in the outdoors is reduced, and arbovirus activity in the environment less important. Although the adult mosquito population is at or above a tolerance threshold for other conditions, the District may not implement certain control actions because the mosquito population will not create an annoyance or public health problem.*
- *Generally, adult mosquito control is implemented when populations of the encephalitis mosquito Culex tarsalis reach a level of 10 females per trap night. However, if encephalitis virus has been detected in humans, domestic animals, mosquito pools, dead birds or sentinel chicken flocks, the District may initiate adulticiding at a lower number of adult mosquitoes per trap night.*
- *High populations (≥10 mosquitoes/trap night) of certain species, i.e., Culex erythrothorax, would not necessarily require control action if the population were found in a low human-use or remote area.*

Immature mosquito threshold(s)

Immature mosquitoes are generally measured by the use of the dipping technique identified in the section "Surveillance". Because the District operates the mosquito surveillance and control program year round, the tolerance threshold can be changed by many factors. Examples of the many factors that change the immature mosquito tolerance threshold are listed below:

- *Although an immature mosquito population of 0.1 larvae per dip (one larvae in 10 dips) is not seen as a large problem with certain species, i.e., Culiseta inornata, in the winter months, it would be a significant public health risk for the species Culex tarsalis during the months of April through November.*
- *Relatively small populations of larvae (<1 larvae per dip) of the species Culex pipiens can be tolerated in a rural waste water impoundment, but would be unacceptable if found in a suburban area swimming pool.*
- *The larvae of the mosquito species Aedes nigromaculis can develop rapidly into more mature stages in warm weather, generally requiring immediate treatment with the use of a larvicide. Larvae of the species Aedes sierrensis can mature much slower, allowing for aspects of naturalistic control to be considered as a method of IPM.*

b. Utilize vector identification and surveillance techniques identified in the Best Management Practices for Mosquito Control in California (item 2.a. above), the California Mosquito-Borne Disease Surveillance and Response Plan (item 2.b. above), and the District's IPM plan (item 2.f. above) to identify vector species in the development of species-specific pest management strategies;

Monitoring immature mosquito populations

Typically, the application of biological control agents and larvicides in locations where physical control is not an option is preferred to adulticiding. This procedure minimizes the area treated and the amount of resources (bio-control agents or chemicals) required. Because the District's mosquito control program utilizes several different types of control strategy, information and data regarding mosquito breeding sites and larval monitoring are collected. The District maintains a permanent record of each mosquito-breeding site, along with information on larval development found at each inspection.

Immature mosquitoes are sampled using a variety of methods and equipment. Mosquito larvae and pupae are collected with dippers, suction devices, and container evacuation methods. The most commonly used apparatus is the standard one-pint dipper, using standardized dipping techniques. The dipper is used as a survey tool simply to determine *the presence of larvae. Standardized dipping methods are used when mosquito densities are to be quantified, usually in values taking additional dipper samples from specific areas in the habitat and counting the number of larvae in each dip. In most cases, the District's control program uses the measure of larval density as a basis for control action. Currently, the District utilizes a threshold value of 0.1 larvae per dip (≥1 larvae in 10 dips) for consideration of a form of mosquito control, i.e., mosquitofish planting, larviciding, etc.*

To maximize the usefulness of immature mosquito surveillance data, the District monitors certain environmental parameters such as rainfall and mountain snow pack. In certain areas of San Joaquin County, tide levels are also monitored. Rainfall and tide changes dictate when certain areas will need to be inspected for mosquito larvae. Mountain snow pack levels can translate to adequate agriculture irrigation supplies and river flows capable of creating seepage problems.

Monitoring adult mosquito populations

The District uses one or more methods to measure adult mosquito populations before a control decision is made. The two (2) methods used most often are landing/resting rates and mechanical trap counts. The purpose of monitoring adult mosquitoes is 1) to determine where adults are most numerous, 2) to substantiate telephone service request claims of a mosquito problem, 3) to provide data that satisfies District policy and state regulation for applying adulticides (e.g., the pest or vector must be present at the treatment site), and 4) to determine the effectiveness of different control methods.

Landing/resting rates are a frequently used method for measuring adult mosquito activity. For the mosquito genera Aedes and Anopheles, the landing rate technique comprises a count of the number of mosquitoes that land on a person in a given amount of time. Resting rates are a method of measuring the activity of Culex, and to a lesser degree, Anopheles and Culiseta species of mosquitoes. The quantity of adult mosquitoes found resting on walls, under eaves, in culverts and pipelines, and in dense vegetation is measured by area, i.e., the number of mosquitoes per square foot. The specific method used to determine landing or resting rates could vary. Important variables are the time of day at which observations are made, the length of time an observation is made, and the portion of body and/or number of sites examined. Emphasis is placed on using the same protocol at given sites, and to use the same inspector to assess landing or resting counts at the same site from one date to the next.

Mechanical traps are used extensively throughout the District on a continuous, year-round basis to monitor adult mosquito populations. Mechanical traps include the standard New Jersey-style light trap (NJLT), encephalitis virus surveillance (EVS) trap, baited Fay trap, and gravid trap.

- *EVS traps are used at different times during the year. The traps are used to collect adult Culex pipiens and Cx. tarsalis mosquitoes for use as mosquito pools, which are either tested in the District's laboratory or sent to the CDPH Viral and Rickettsial Disease Laboratory for encephalitis virus detection. EVS traps are also used to assess pre- and post-treatment populations of adult mosquitoes to determine control effectiveness.*
- *Fay traps are used for special purpose monitoring, i.e., in the spring to measure localized populations of Aedes sierrensis.*
- *Gravid traps can be used to selectively sample gravid female mosquitoes that are seeking suitable oviposition sites and are generally used in urban and suburban settings where Culex pipiens have been detected.*

Monitoring telephone service requests and resident complaints

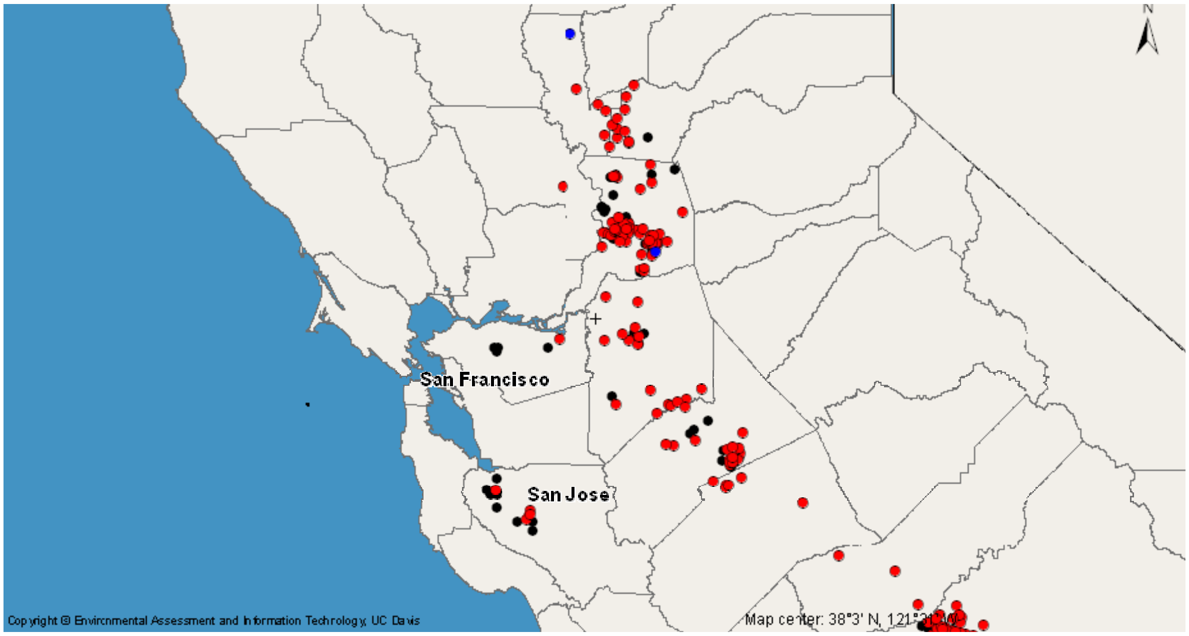
The third method of ascertaining a mosquito problem is through telephone and website service requests and resident complaints. The District maintains several different listed telephone numbers, including a toll-free line that residents and visitors can call to request mosquito control services; additionally, residents are encouraged to use District's website at www.sjmosquito.org to seek assistance also. Service requests are also received at numerous community fairs where the District operates an information booth. The District responds to an average of 1,000 service requests per year.

Service requests generally are related to specific mosquito species, although the mosquitoes that cause service requests vary considerably from one area to the next. Telephone service requests and citizen complaints are always verified as to their validity prior to any control action being implemented. District personnel substantiate mosquito activity by assessing larval and adult mosquito populations using the techniques described earlier.

c. Utilize the District's GIS mosquito surveillance and control record keeping system (Sentinel) for the identification of known breeding areas for source reduction, larval control, and habitat management;

d. Utilize the District's GIS mosquito surveillance and control record keeping system (Sentinel), the University of California/CVEC Gateway system, and the California Department of Public Health's data sets to analyze existing surveillance data for the identification of new or unidentified sources of vector problems as well as areas that may have recurring vector problems.

Following is an example of some of the West Nile virus surveillance information provided by the University of California, Center for Vector-Borne Disease (CVEC). The black, blue and red dots indicate the presence of virus activity in dead birds, mosquito pools (e.g. collections), and sentinel chicken flocks. The surveillance information is collected from local mosquito control agencies and the California Department of Public Health. The surveillance information provides real-time analysis of mosquito and arbovirus information that can be used to determine a mosquito control strategy.



12. The District will utilize the resources identified in 2.a. through 2.g. (above) in the examination of alternatives to pesticides. If there are no alternatives to pesticides, the District, to the extent practical, will use the least amount of pesticide necessary to control the target pest, and will only apply pesticides when vectors are present at a levels identified in the IPM plan (item 2.f. above).

    The District's interpretation of integrated pest management, referred to as IPM, is a sustainable approach, or plan, to managing public health pests and vectors, by combining biological, chemical, legal, natural and physical control tactics in a way that minimizes economic, health and environmental risks. IPM can also be considered as a systematic approach to public health pest management, which combines a variety of surveillance and control practices. For the purposes of the District's plan, a pest is defined as any organism that is unacceptably abundant. A vector is an organism (such as an insect or other arthropod) which 1) transports and transmits a parasite (including disease causing pathogens) from one host to another, 2) causes direct harm or injury without transmitting a parasite, or 3) causes significant annoyance to humans and/or animals. The words pest and vector are used interchangeably for the purposes of the District's surveillance and control plans for specific vectors.

13. The District will ensure that all reasonable precautions are taken to minimize the impacts caused by pesticide applications, and will comply with all regulations related to pesticide application, mixing, storing, and transport. The District is signatory to a cooperative agreement administered by the California Department of Public Health (copy attached) regarding pesticides, and agrees to: 1) calibrate all application equipment, 2) seek assistance from the County Agriculture Commissioner (CAC) for interpretation of pesticide labeling, 3) maintain records of each pesticide application for two or more years, 4) to submit monthly pesticide use reports to the CAC and CDPH-VBDS, 5) to report to the CAC and CDPH-VBDS any suspected adverse issues resulting from a pesticide application, 6) to certify and routinely train pesticide applicators, and 7) to be inspected by the CAC and the CDPH-VBDS to ensure that our activities are in compliance with laws and regulations related to pesticide application.

14. Public notices specified in Section VIII.B. of the permit will be posted on the District's website, www.sjmosquito.org.