

Alameda County Mosquito Abatement District



CHINDI PEAVEY

DISTRICT MANAGER

Who We Are



- Independent Special District
- Funded by Property taxes
- Currently covers entire county except Albany
- Established in 1930
- 15 Full Time staff, 3 seasonals
- Governance – Board of Trustees

District Services

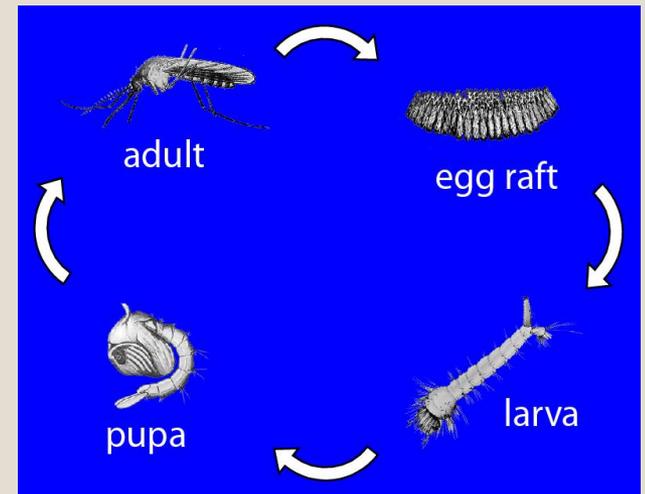


- Regular inspection / treatment of known sources
- Search for new sources
- Service Requests - (510) 783-7744
 - Mosquito Biting reports
 - Reports of Standing Water
 - Requests for Mosquito Fish
 - Insect Identification

Mosquito Control Program



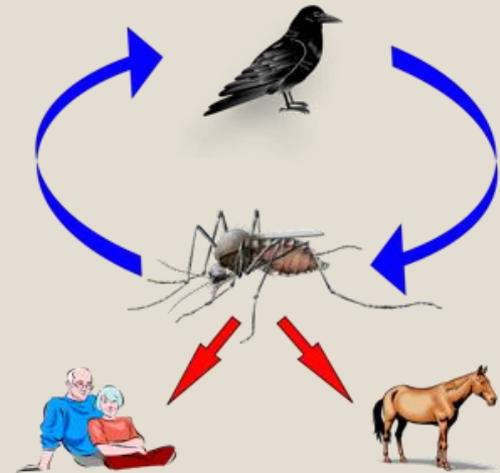
- Integrated Approach
 - Science – based
 - ✦ 20 species of mosquitoes locally
 - Focus on larval stage in water
- Biological Control Materials
 - Safe
 - Specific to mosquitoes



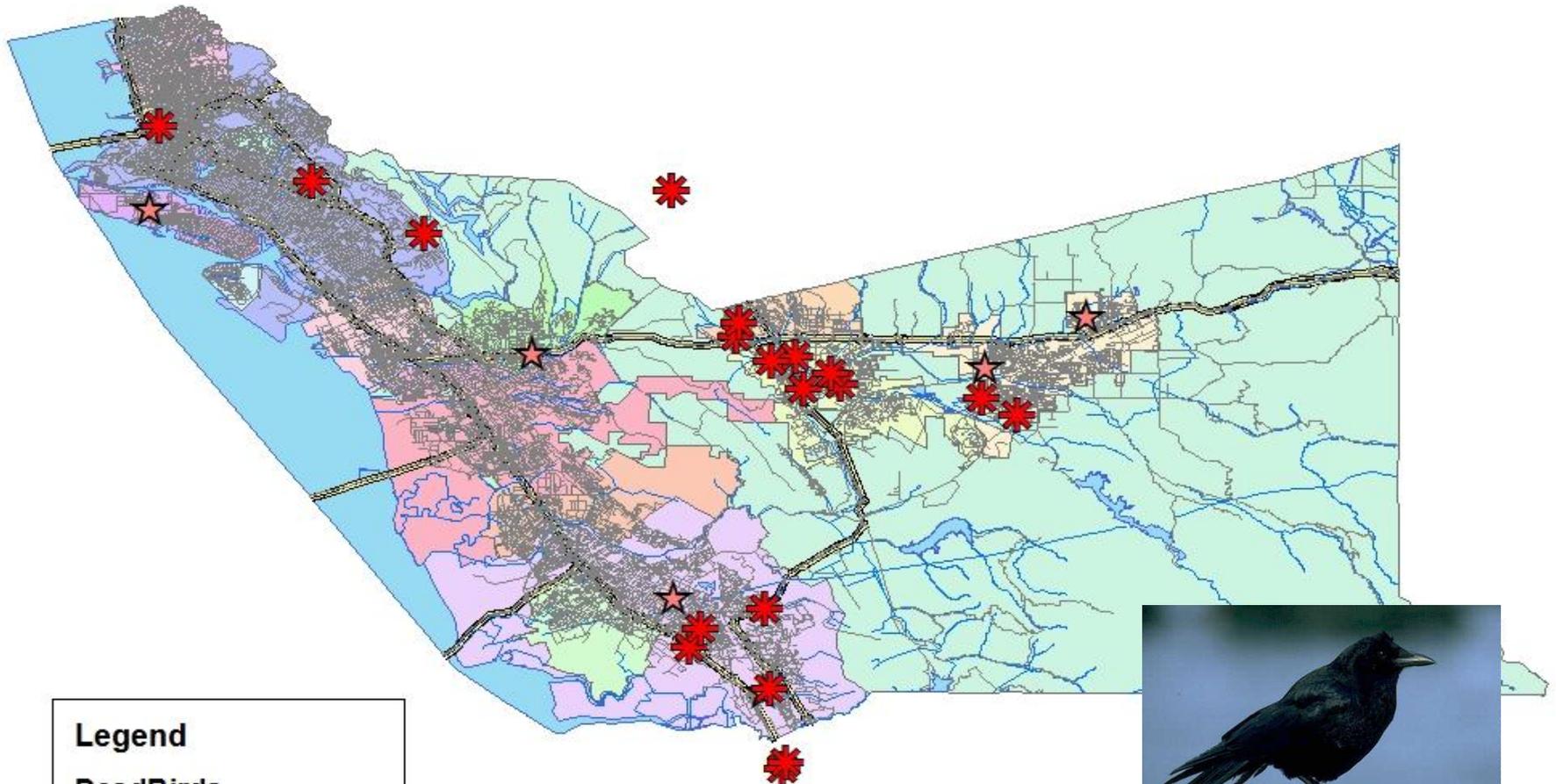
West Nile Virus



- Transmitted by mosquitoes in summer
- 3,997 cases in California to date
- 7 cases in Alameda County to date
 - 1 in 2013, 2 in 2012
 - 1 each in 2005, 2006, 2008, 2010
- 22 Positive dead birds in Alameda Co. in 2013



West Nile Virus Detections in 2013



Legend

DeadBirds

WNVResult, Year_

- ★ Chronic positive, 2013
- ✱ positive, 2013



Report Dead Crows
(877) WNV-BIRD

Salt Marsh Mosquito Control



Storm Drain Treatment



- Catch basins are a major source of mosquitoes in summer
- Our trucks treat with bacterial products



Neglected Swimming Pools



Fish Pond Mosquito control



We deliver mosquitofish to hundreds of ponds throughout the County every year. At no additional cost to the resident.

Rain Barrels

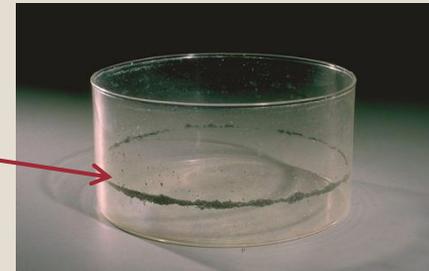
Screen the Openings to Prevent Mosquitoes



New Mosquito in the Coastal Region



- *Aedes aegypti* – Yellow Fever Mosquito
- Develops in small containers
- Lays eggs above water line
- Adapted to biting humans in homes
- Now in Madera, Fresno, San Mateo



Ae aegypti in Containers



Turn containers upside down, so they do not fill with rainwater



Filled containers need to be scrubbed with bleach to kill mosquito eggs



What You Can Do



- Call if you find a dead bird – 877 WNV-BIRD
- Call if you have mosquitoes biting you
- Dump standing water
- Maintain swimming pools
- Call us for fish for ornamental ponds
- Wear repellent

Contact us at:



Alameda County Mosquito Abatement District

(510) 783-7744

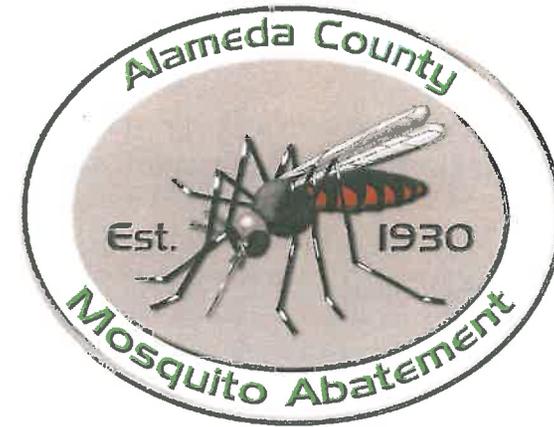
23187 Connecticut St.

Hayward, CA 94545

www.mosquitoes.org

Checklist of Common Mosquito Sources

- Fishpond** Stock with mosquitofish (provided free by us), remove excess vegetation and construct properly
- Swimming pool** Keep sanitized and filtered; keep water off any cover; stock with fish if no longer being maintained
- Spa, hot tub** Keep sanitized, filtered and heated; if no longer in use, keep empty or remove it
- Bird bath** Flush out completely once a week and refill
- Containers** Empty, turn over, throw out or cover any container to prevent water from accumulating
- Leaky pipes** Drain the area; correct leaky plumbing, dripping air conditioner or refrigerator; water under houses is a major source of mosquitoes in urban areas
- Catch basin, storm drains** Do not throw garbage or garden debris into these as it enhances mosquito habitat
- Sump** Construct so that water does not stand, or screen to prevent mosquito entrance
- Standing water** If water stands for more than a week eliminate it by draining or filling
- Tires** Dispose of properly or cover so that water does not collect inside
- Treeholes** Inspect for breeding during the rainy season; if breeding, consult a licensed arborist or tree service to determine the best method of eliminating water
- Septic tank** Keep tightly covered or eliminate; septic tanks can produce huge numbers of mosquitoes
- Watering trough** Stock with our free mosquitofish or change the water weekly
- Creek** Do not throw garbage or garden debris into creeks - these obstructions can create mosquito habitat
- Irrigation** Don't over-irrigate your landscaping; excess water can provide mosquito habitat



Alameda County Mosquito Abatement District

General Information

23187 Connecticut St
Hayward, CA 94545-1605

www.mosquitoes.org
Phone: 1.510.783.7744
Fax: 1.510.783.3903
acmad@mosquitoes.org



ENVIRONMENTAL BENEFITS STATEMENT

This project is printed on New Leaf Everest Natural, made with 100% post-consumer waste, and processed chlorine free. By using this environmentally friendly paper, the following resources were saved:

trees	water	energy	solid waste	gases
9 fully grown	3,753 gallons	6 million BTUs	415 pounds	820 pounds

Calculated based on research done by Environmental Defense and other members of the Paper Task Force.

*An Independent Special District serving
Alameda County residents since 1930*

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We need your help !

We are asking you for your assistance and cooperation. In order for the Alameda County Mosquito Abatement District to more effectively reduce mosquito populations in your neighborhood, please use our checklist of common mosquito breeding sources (see back of this brochure). If you have any questions or would like further assistance, please contact us. You can request mosquitofish, fill out a mosquito biting complaint, or ask for an inspection of standing water all online. Go to our website: www.mosquitoes.org, click on "About us & our Services" and fill out the simple online form. You can also contact us by phone: 1. 510. 783. 7744. Your help is most appreciated!

Introduction

The Alameda County Mosquito Abatement District (ACMAD) has provided control of mosquitoes for the citizens of Alameda County (except Albany) since 1930. ACMAD is an independent special district governed by a Board of Trustees comprised of one representative from each city in our service area and the County-at-large. Funding is provided by a combination of property tax (ad valorem) and a special tax authorized by more than two thirds of the voters in 1982.

ACMAD works closely with other public agencies and park districts to provide ecologically sound mosquito control programs. The District also works with planning agencies to minimize mosquito production in wetland restoration and enhancement projects.

Your Mosquito Abatement district does these things:

- Assists land owners and agencies in eliminating mosquito sources and managing mosquito breeding areas within the County, to reduce mosquitoes to a tolerable and healthful level.
- Responds to public complaints of mosquitoes within the County, determines the source of the problem, and takes corrective action.
- Delivers mosquitofish anywhere in the County free of charge.
- Monitors populations of disease carrying and pest mosquitoes using sampling, service requests, traps and sentinel chicken flocks.
- Provides immediate control of larval (immature) mosquitoes until long term preventative measures can be taken.
- Provides information to the public about mosquitoes and insects.

Mosquito Control

Your District controls mosquitoes by focusing control efforts on the larvae which are found in standing water (larviciding). By preventing adult emergence, a more effective program is conducted that has the least impact on the environment.

Different methods of mosquito control exist:

Physical control - improve water circulation or eliminate standing water

Biological control - use natural predators (i.e., fish), parasites, fungi, etc.

Biorational control - use bacterial agents and juvenile hormone mimics

Chemical control - emergency spraying for adults (adulticiding)

Public education - provide information to the public on ways to eliminate backyard mosquito breeding

Why Do We Ask For A Specimen?

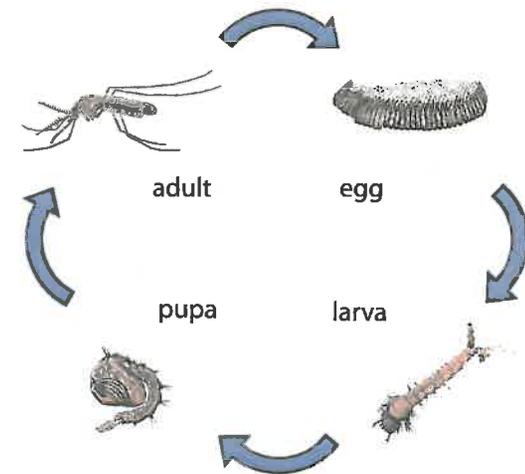
A solution to your mosquito problem can be obtained much sooner if you provide us with a specimen of the biting mosquitoes. There are 20 known species of mosquitoes in Alameda County, each with its own definite characteristics and preference for certain breeding sites. Identification of the specimen assists us in efficiently finding their breeding sites. The sites will then be inspected and treated to prevent further mosquito production. Another reason to ask for specimens is that there are many insects that look like mosquitoes but do not bite and are not health hazards (see the section titled "Mosquito-like insects" page 13-14).

Human Diseases

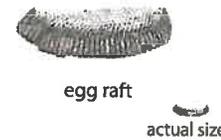
West Nile Virus has made its way to California - across the US in only 4 short years. We expect it to become established throughout the state yielding constant, low levels of human and equine infection. Please visit our website - www.mosquitoes.org or the California Department of Health Services website - www.westnile.ca.gov for updated information.

There has been public concern about mosquitoes and AIDS. Several scientific studies conducted by the federal Centers for Disease Control and the World Health Organization have shown that mosquitoes DO NOT transmit AIDS

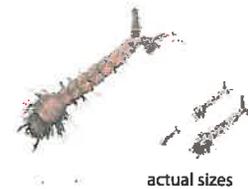
Mosquito Life Cycle



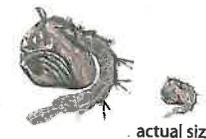
Mosquitoes must have standing water to develop



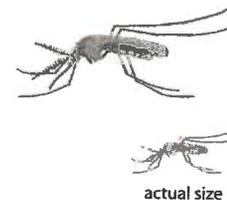
Eggs: Females deposit eggs singly or in rafts (of up to 200 eggs) on the water surface or in places where water will ultimately cover them, depending on the species. The eggs will then hatch into larvae.



Larvae: Because of their distinct movement through the water, larvae are commonly called "wrigglers". They are very active, feeding on microorganisms and debris and may be easily seen at the water surface. There are four larval stages followed by the pupae.

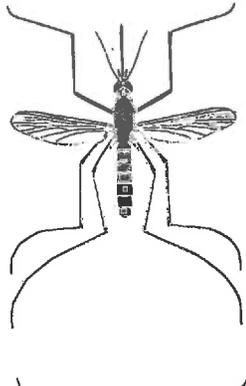


Pupae: These are also active, but nonfeeding, and can be seen resting at the water surface. Because of their method of swimming, they are often called "tumblers". During this stage, the transformation to the adult occurs.



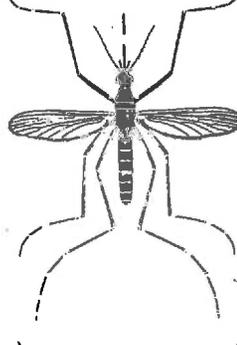
Adults: Only adult mosquitoes live out of water. After mating and then biting to obtain a blood meal, the females return to a water source to deposit eggs. Adult males do not feed on blood but drink only plant juices and nectar.

Common Mosquitoes of Alameda County



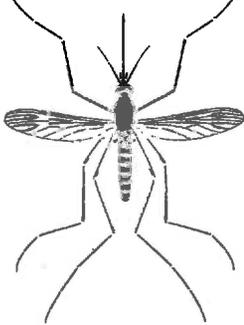
House mosquito (*Culex pipiens*)

This mosquito causes the largest number of service requests and is generally an urban problem. It is also an efficient vector of West Nile Virus (WNV). They can be found all year and breed in storm drains, catch basins, utility vaults, septic tanks, flooded basements, sumps, and in just about any water container found near man. Adults readily enter homes and bite at night. Because of the type and variety of breeding sources it can take many hours to locate the cause of a problem.



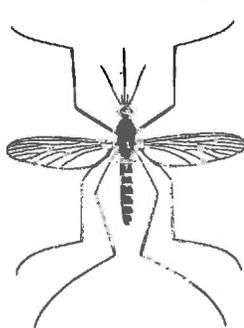
Encephalitis mosquito (*Culex tarsalis*)

This mosquito, also an efficient carrier of West Nile Virus, is produced in rain pools, marshes, non-maintained swimming pools, ponds, and other fresh water sources. Although this species does not generate a large number of our service requests, it does require considerable control effort to prevent the spread of encephalitis and WNV in Alameda County. This species feeds primarily on birds and is only moderately aggressive towards man.



Fish pond mosquito (*Culiseta incidens*)

This mosquito is produced in fish ponds, creeks, and containers. It is the second major cause of service requests for the District. Small breeding sources can produce sufficient numbers to cause discomfort in a neighborhood. This mosquito is moderately aggressive and bites in the evening or in shady places during the day. It is primarily an urban and suburban problem and is readily noticed because of its large size.



Winter marsh mosquito (*Culiseta inornata*)

Females of this species rest during the summer and become active in the fall after the first rains. Eggs are laid on the surface of rain filled ponds in the fall. Many generations can be produced in one season. This mosquito bites at dusk in the fall and spring and can be aggressive. This is our largest mosquito.

Winter salt marsh mosquito (*Ochlerotatus squamiger*)

This species is produced in the marshes along the bay. The eggs are laid on plants and muddy areas in the marsh during the spring, remain dormant all summer, and hatch as soon as the marsh fills with rain water in the fall. Adults emerge the following spring and are an aggressive daytime biting mosquito capable of flying long distances.

Western tree hole mosquito (*Ochlerotatus sierrensis*)

This species breeds in tree holes (rot cavities or depressions in trees which hold water). Any container near trees, that is partially filled with water and leafy debris, may also produce this pest. The eggs hatch when the tree hole or container fills with water. The adults emerge in March and remain in the area until early summer. This mosquito has a short flight range, is an aggressive biter, and is the primary vector of canine heartworm in Alameda County.

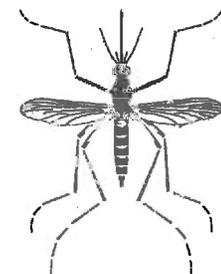
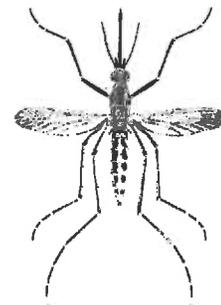
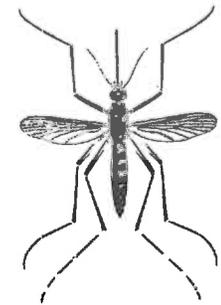
Salt marsh mosquito (*Ochlerotatus dorsalis*)

This species is found primarily during the summer months in tidal salt marsh areas. The eggs are laid on plants and muddy areas in the marsh and hatch when the marsh is filled by high tides. Adults are an aggressive daytime biting species capable of flying moderate distances from the marshes.

Woodland pool mosquito (*Ochlerotatus washinoi*)

This mosquito is produced in woodland depressions that fill with rain water. Eggs are laid on the mud and organic material along the edges of receding water in these areas. Adults are generally present in the early spring and are very aggressive biters.

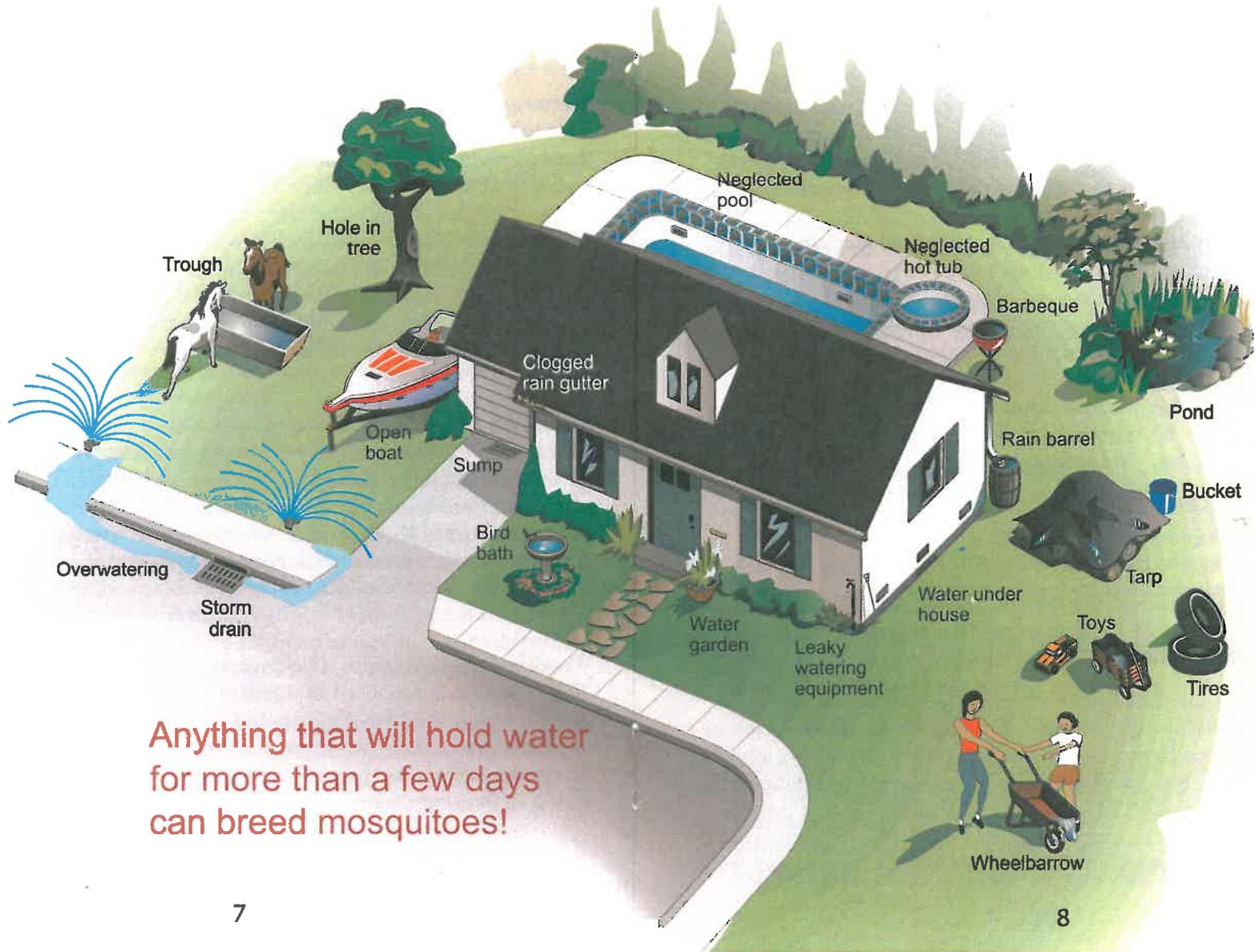
Mosquito images used with permission from Carpenter and LaCasse, Mosquitoes Of North America (North of Mexico) (c) 1955, Berkeley, The Regents of the University of California



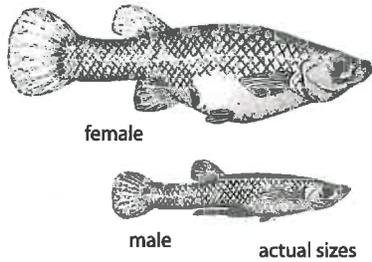
West Nile Virus

Fight the bite! Target the source.

Eliminate all sources of standing water!



Controlling Mosquitoes With Fish



Western mosquitofish (*Gambusia affinis*) are indispensable to our mosquito control program in Alameda County. The fish eat mosquito larvae. Mosquitofish are provided, without charge, to the public for ponds, unused swimming pools and animal watering troughs.

They require minimal feeding or care other than to protect them from garden sprays, chlorine, chloramines or other chemicals, and predators such as raccoons, cats, opossums, herons or egrets. Mosquitofish generally live peacefully with other pond fish. The District also stocks these fish in other waterways to eliminate the need for frequent spraying.

These fish do not lay eggs but give birth to well-developed and very active young. Therefore, they require no special environment for depositing and hatching eggs. Mosquitofish breed throughout the summer producing a new brood at monthly intervals. The newborn are approximately one-half inch in length and are immediately ready to begin the work of eating mosquito larvae. *Gambusia* grow rapidly, reaching a maximum size of about three inches. The fish become sexually mature when 4-5 months old; the earliest broods of the season are born in April to May. Mosquitofish can live two to three years.

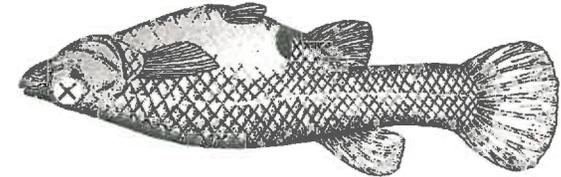
Keeping a healthy population of fish in your pond is the first line of defense against mosquitoes. Goldfish and koi will feed on mosquito larvae but are not as effective as mosquitofish. Overfeeding your fish will also reduce their effectiveness for mosquito control.

How to obtain mosquitofish

To obtain free fish call the District office. Mosquitofish are normally available from April through October. The fish are usually delivered to your pond, but if you have a dog or keep the gates locked, leave a bucket of water (be sure to treat for chloramines) on the porch and indicate the size of the pond when you call. The District is always glad to provide mosquitofish to County residents, even on repeat calls, to encourage the biological control of mosquitoes in ponds and other backyard sources.

The Danger of Chloramines to Fish

All tap water in Alameda County is now being treated with chloramines (not chlorine) which are **toxic to fish**, shellfish, reptiles and amphibians. Chloramines are chemicals which contain chlorine and ammonia, and are being added to tap water to disinfect it. If you use well water to fill your ponds or troughs, chloramines are not an issue.



What can you do to protect your fish?

Water used for fish must be treated in a manner appropriate to remove both the chlorine and ammonia components of the chloramines. In order to do this you must use conditioning chemicals designed to remove chloramines (such as Amquel[®] or ChlorOut[®]) available at pet stores, fish supply stores, and some variety stores.

Treatments which are NOT effective:

- letting the untreated water stand outside for a day or two
- boiling the water first
- using chemicals that remove only chlorine

To be completely safe, always pretreat the new water before adding it to your pond, no matter how little you add. Treatment and test kits are available at most pet and fish supply stores. Chloramine residuals in treated water should be below 0.1 mg per liter.

For additional information regarding your water, contact:

East Bay Municipal Utilities District 1. 866. 403. 2683

Alameda County Water District 1. 510. 668. 4200

Zone 7 Water Agency 1. 925. 447. 0533

San Francisco Public Utilities Commission 1. 415. 554. 3289

Checking Your Pond for Mosquitoes

Mosquitoes and their predators have co-existed for millions of years. Mosquitoes will seek out places in a pond where survival of their next generation is most likely. Egg-laying female mosquitoes will seek areas protected from predators in any pond to lay eggs. Be especially aware of the following: water trapped in the top of planter pots; very shallow margins; water in gravel or between rocks; algae mats; thick emergent aquatic plants and areas sheltered by overhanging plants. By managing these areas to minimize opportunities for egg-laying, you can help prevent any mosquitoes from hatching in your pond.

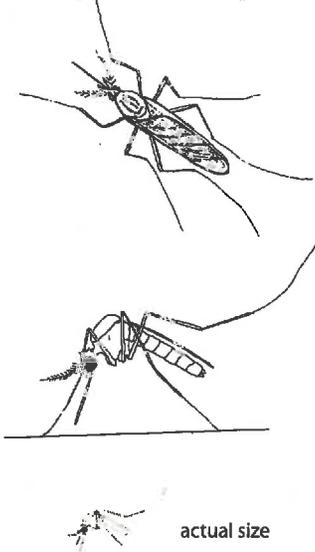
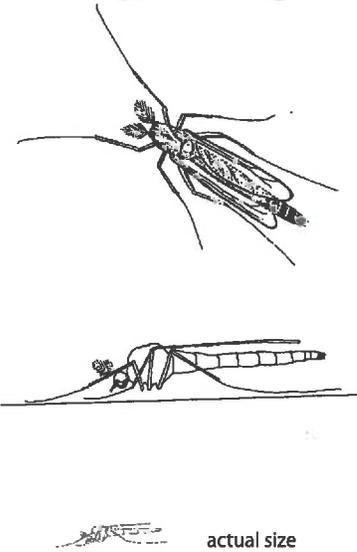
Potential mosquito producing areas in a typical pond



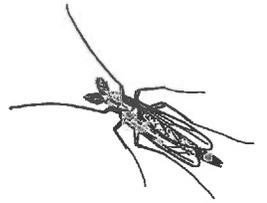
You can check suspect areas in your pond for the presence of mosquito larvae by looking closely at areas where larvae may find shelter from fish. You can also use a white cup or bowl to dip water from these areas (mosquito control professionals use an old-fashioned dipper attached to a long handle). The white bottom will make it easier to see any larvae, which can be very small and range up to 3/8 inch long. Generally they swim in a snake-like sideways motion ("wrigglers"). Pupae are rounder and tumble as they move ("tumblers"). See page 4 for larvae and pupae illustrations.

Mosquito-midge Comparison

Homeowners frequently call us to report mosquito problems. In many instances what appears to be a mosquito is actually another kind of insect. The most commonly encountered look-a-likes are midges (gnats). These insects frequently form swarms and are also attracted to lights. These insects do not bite but can still be annoying. For information on the biology and identification of insects that look like mosquitoes see below and pages 13 and 14.

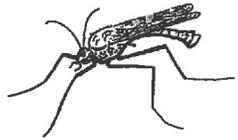
Typical mosquito	Typical midge
	
<ol style="list-style-type: none"> 1 - bites with its proboscis (needle-like mouthparts) 2 - wings are longer than body 3 - always develops in standing water 4 - can carry diseases 5 - rests on objects with its body above the surface 	<ol style="list-style-type: none"> 1 - cannot bite (has no proboscis) 2 - wings are shorter than body 3 - develops in mud on the bottom of lakes and ponds 4 - cannot carry diseases 5 - rests on objects with its body almost touching the surface

Mosquito-like Insects (harmless)



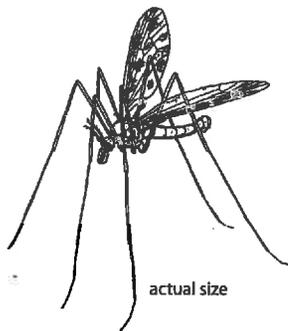
actual size

Midges (Chironomidae) are the most widespread and numerous insects resembling mosquitoes. Adult midges are commonly observed flying in swarms or "clouds", or are seen resting on fences, walls, under eaves and in protected areas such as porches and entryways. Individual adults will live about seven days depending upon the species and weather conditions. The larvae, often called bloodworms, develop in sources that have extensive areas of standing water. See page 12 for additional information.



actual size

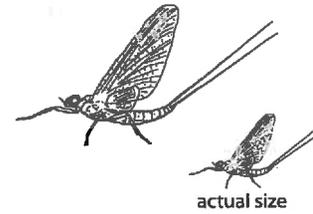
Dixid Midges (Dixidae) are common around moist areas where vegetation is abundant and may be seen swarming at dusk along the edges of streams and lakes. The adults are short lived, usually being active less than a week. The larvae are found in slow moving water, at the surface, and swim in a characteristic "U" shape.



actual size

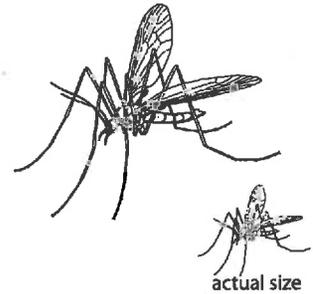
Crane Flies (Tipulidae) are delicate insects varying in size from 0.25 inch to as large as 1.5 inches in length. The largest crane flies are sometimes called "daddy-long-legs", "gully nippers", or "mosquito hawks". They do not bite people and they do not (unfortunately) eat mosquitoes. Some species of crane flies emerge from aquatic sources and others from terrestrial or decaying vegetation sources.

Mosquito-like Insects (cont'd)



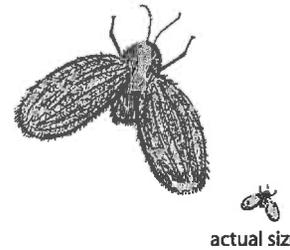
actual size

Mayflies (Ephemeroptera) are quite abundant in Alameda County near creeks, flood control channels and other water sources. Their larvae are found in most aquatic habitats and can live in moving water. Usually the adults live for only one day.



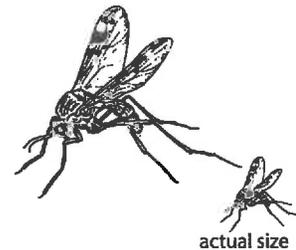
actual size

Winter Crane Flies (Trichoceridae) are often quite abundant in Alameda County in the winter. They so closely resemble mosquitoes that they are frequently mistaken for them and reported to the District. Their larvae are found in roots, fungi, decaying vegetation, rotting leaves, manure, and other vegetative material.



actual size

Owl Midges (Psychodidae) are small hairy flies that can move about very nimbly, but are weak fliers. The larvae are aquatic or semiaquatic and are very common in sewers and drains. The larvae are able to live in soapy water and are a good indicator of a leak in a shower/bath, sink, or laundry drain.



actual size

Wood Gnats (Anisopodidae) larvae are found in or near decaying vegetation, fermenting sap, animal manure, tree trunks, mud and sometimes sewage. Adults can be found on foliage in or near damp places or around flowing sap. They are sometimes seen in small swarms.

**Alameda County
Mosquito Abatement
District**



23187 Connecticut Street
Hayward, CA 94545
(510) 783 - 7744

SERVICES PROVIDED

MOSQUITO CONTROL

Inspection, Advice
and Control

MOSQUITOFISH

Supplied without
charge for ponds

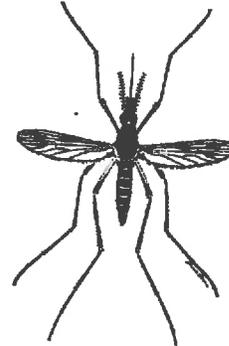
PUBLIC EDUCATION

Literature and
Presentations

**Serving Alameda County
for over 60 Years.**



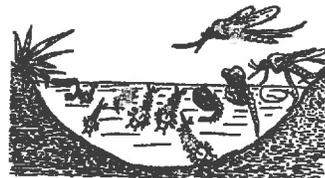
**WHAT YOU
CAN DO
TO CONTROL
MOSQUITOES**



**Eliminate Unnecessary
Standing Water**

Check your property for
these breeding sources:

- Water under the house
- Swim pool and cover
- Fish ponds and birdbaths
- Boats and covers
- Tires, cans, or buckets
- Treeholes
- Septic tanks or cisterns
- Watering troughs
- Stock ponds
- Any standing water



Algae and troughs

There are three kinds of algae that grow in water troughs: "carpet" algae, string algae (filamentous) and plankton algae (unicellular).

Carpet algae can grow on all the underwater surfaces in the trough, resembles a green carpet (1/2" thick) and is beneficial to the fish and water quality. They produce oxygen and are food for the fish when mosquito larvae are not present.

String algae grows as long, slimy green strands, will adhere to the bottom and sides of the container and also float in the water. This algae can grow at an uncontrolled rate and become a problem.

Plankton algae are microscopic plants that turn the water green. In excessive amounts they create the green "pea soup" phenomenon which is also detrimental to the fish.



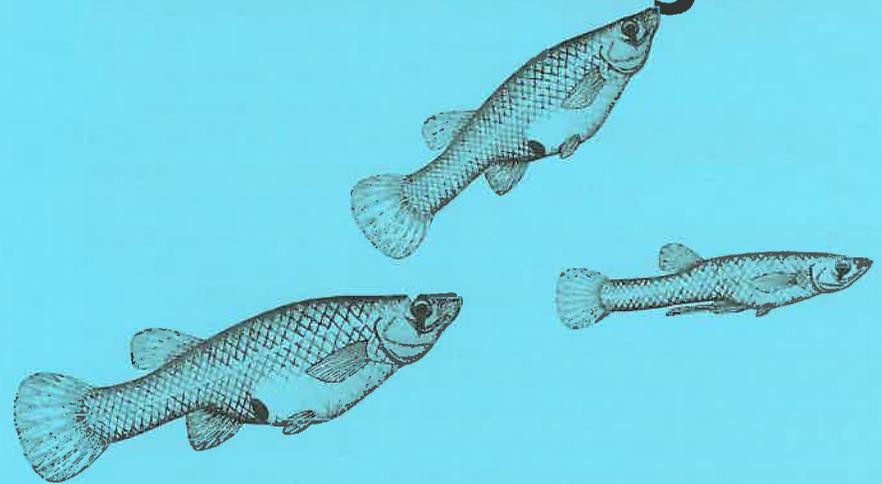
Mosquitofish Stocking Policy

In an effort to minimize unwanted environmental impacts, mosquito abatement personnel refrain from putting mosquitofish in sources known, or suspected to be, habitats for endangered or threatened species. Care must be taken when introducing mosquitofish into sources where they can migrate to habitats used by endangered or threatened species (by flood as an example). Mosquitofish can still be used safely in ornamental fish ponds, watering troughs and abandoned swimming pools in urban and suburban areas without worrying about endangered species conflicts.

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

Mosquitofish provided by the Alameda County Mosquito Abatement District are intended for mosquito control only, and should not be introduced into natural water bodies by anyone other than certified mosquito control technicians or Fish and Game personnel.

Mosquito Prevention for Water Troughs



Alameda County Mosquito

Abatement District

23187 Connecticut St.
Hayward, CA 94545

Phone: (510) 783-7744

Fax: (510) 783-3903

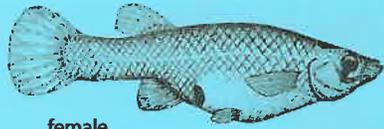
www.mosquitoes.org

acmad@mosquitoes.org

Controlling mosquitoes with fish

Keeping a healthy population of fish in your water trough is the first line of defense against mosquitoes. Goldfish and koi will also feed on mosquito larvae but are not as effective as mosquitofish or other top feeding minnows.

The mosquitofish



female



male

actual sizes

Gambusia affinis, the Western Mosquitofish, are indispensable to our mosquito control program in Alameda County. The fish eat mosquito larvae. Mosquitofish are provided, without charge, to the public for ponds, unused swimming pools and animal watering troughs. They require minimal feeding or

care other than to protect them from garden sprays, chlorine, chloramines or other chemicals, and predators such as raccoons, cats, opossums, herons or egrets. Mosquitofish generally live peacefully with other pond fish.

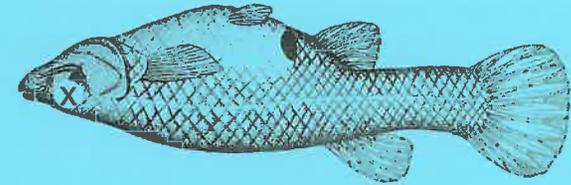
These fish do not lay eggs but give birth to well-developed and very active young. Therefore, they require no special environment for depositing and hatching eggs. Mosquitofish breed throughout the summer producing a new brood at monthly intervals. The newborn are approximately one-half inch in length and are immediately ready to begin the work of eating mosquito larvae. *Gambusia* grow rapidly, reaching a maximum size of about three inches. The fish become sexually mature when 4-5 months old; the earliest broods of the season are born in April to May. Mosquitofish can live two to three years.

How to obtain mosquitofish

To obtain free fish call the District office. Mosquitofish are normally available from April through October. The fish are usually placed directly into troughs by one of our technicians, but if you have a dog off-leash or keep the gates locked, leave a bucket of water accessible (be sure to treat for chloramines) and indicate the size and number of troughs when you call. The District is always glad to provide mosquitofish to County residents, even on repeat calls, to encourage the biological control of mosquitoes in troughs, ponds and other man-made water sources.

The danger of chloramines to fish

All tap water in Alameda County is now being treated with chloramines (not chlorine) which are **toxic to fish**, shellfish, reptiles and amphibians. Chloramines are chemicals which contain chlorine and ammonia, and are being added to tap water to disinfect it. If you use well water to fill your ponds or troughs, chloramines are not an issue.



What can you do to protect your fish?

Water used for fish must be treated in a manner appropriate to remove both the chlorine and ammonia components of the chloramines. In order to do this you must use conditioning chemicals designed to remove chloramines (such as Amquel®) available at pet stores, fish supply stores, and some variety stores.

Treatments which are NOT effective:

- ♦ letting the untreated water stand outside for a day or two
- ♦ boiling the water first
- ♦ using chemicals that remove only chlorine

To be completely safe, always pretreat your water before adding it to your trough no matter how little you add. Treatment and test kits are available at most pet and fish supply stores. Chloramine residuals in treated water should be below 0.1 mg per liter.

For additional information regarding your water, contact:
East Bay Municipal Utilities District (866) 403-2683
Alameda County Water District (510) 668-4200
Zone 7 Water Agency (925) 454-5000