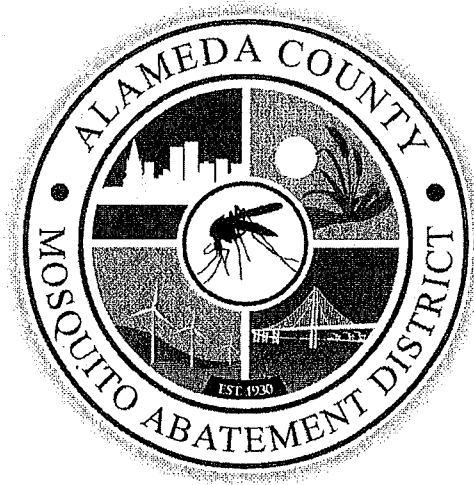


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Mosquitoes and the bugs they spread

An Independent District Protecting Public Health
since 1930



Oakland City Council Presentation x/xx/xxxx

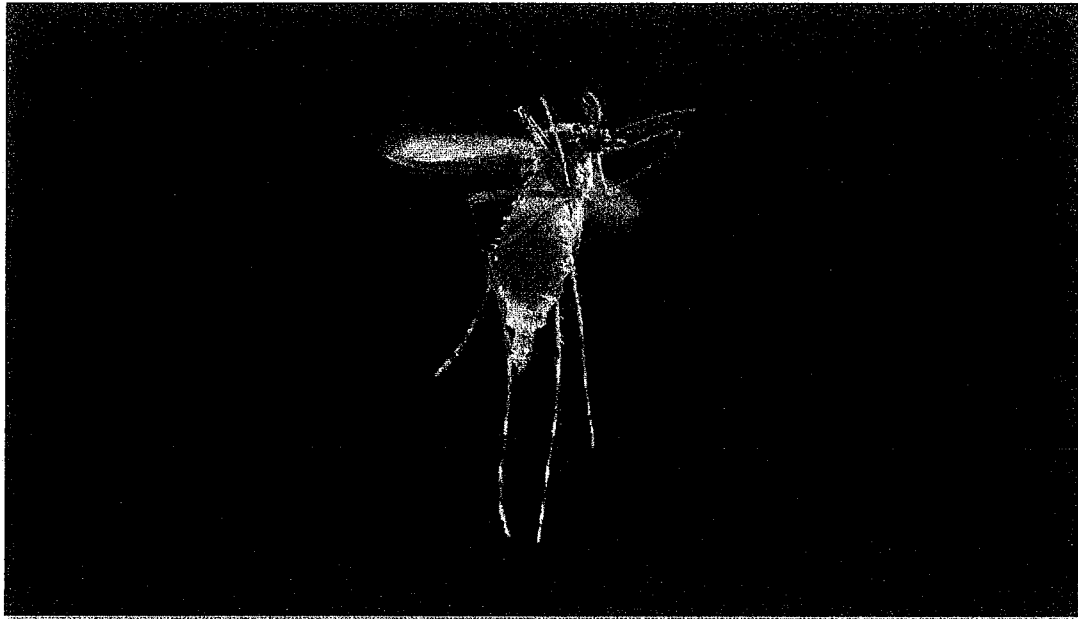
What we'll talk about today

- Overview of ACMAD
- Mosquito Biology
- Where mosquitoes breed
- Mosquito control
- Bugs transmitted by bugs
 - West Nile virus
 - Response plan
 - Zika virus
 - Response plan
- Mosquito breeding in the City of Oakland

History and Overview

- Formed in 1930 as an Independent Special District
- Serve all cities and unincorporated areas of Alameda County, except for the City of Albany
- Governed by a board of 14 Trustees, appointed by their respective cities and the County-at-Large
- Three sources of revenue contribute to a balanced budget of \$3.9 million
 - Ad valorem tax (.0009% of 1% property tax)
 - 1983 Special Tax (\$1.72/per parcel)
 - 2008 Benefit Assessment (\$2.50, never raised)
- Fully-funded retiree health benefits, 85% funded pension, and debt free
- 16 full-time and six seasonal staff, with a full fleet of vehicles, aquaculture program, and a fully capable molecular laboratory at our Hayward facility

Mosquito Ecology, Biology, & Control



one of the most voracious predators of humans

• What do mosquitoes need?

Water:

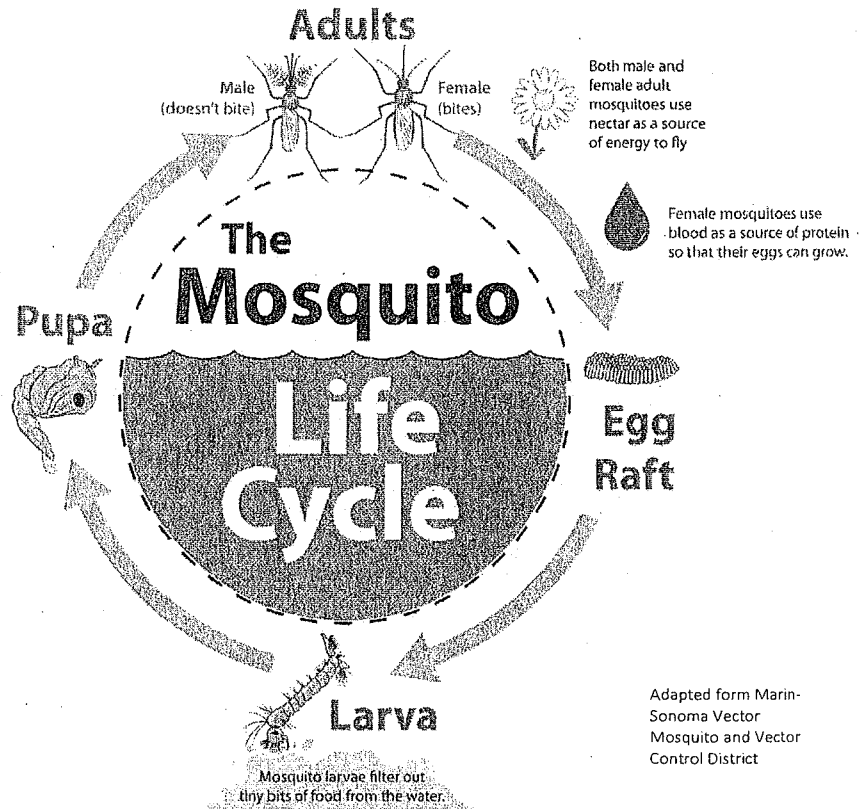
- Stagnant
 - *Culex pipiens* (common house mosquito)
- Clear:
 - *Aedes aegypti* (yellow fever mosquito)

1 – 2 weeks for growth:

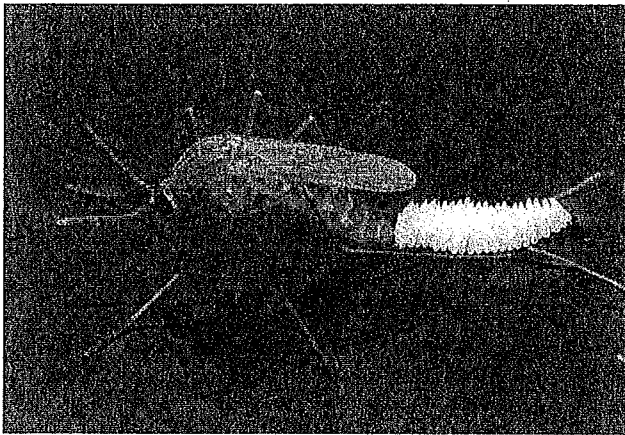
- Depends on species

Blood:

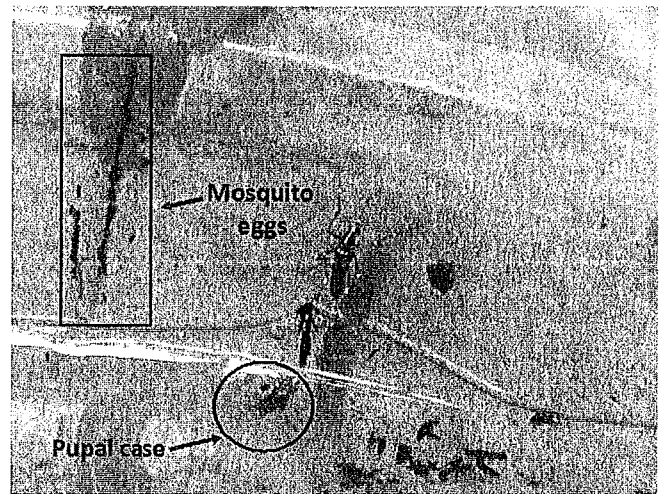
- Typically birds, people, or other mammals



Adult female mosquitoes need water to lay eggs



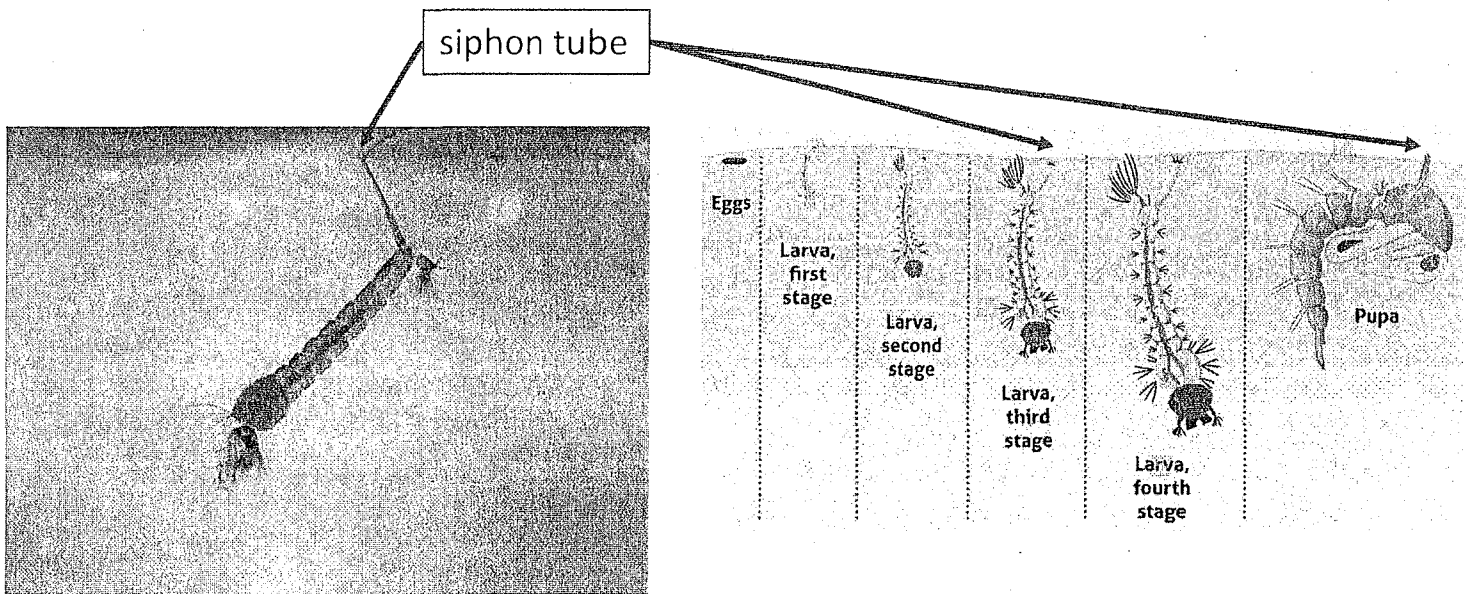
On the surface of water



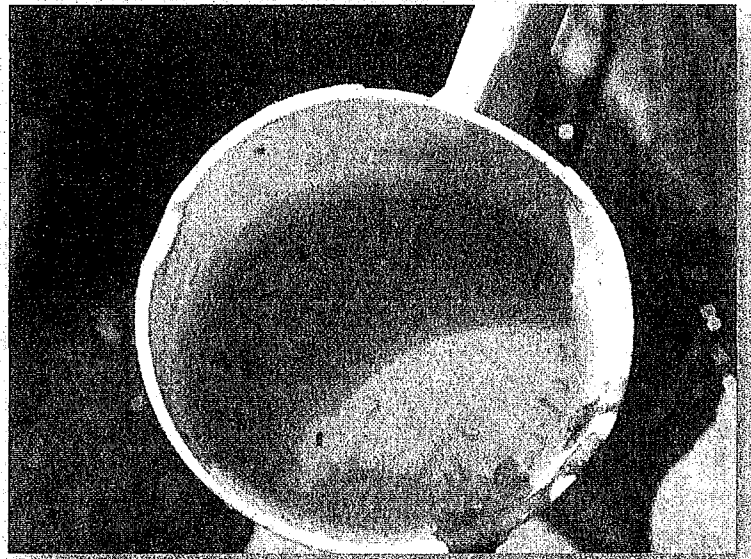
Near a spot that will fill with water

Aquatic lifestyle

- Urban mosquitoes spend 1st 1 - 2 weeks as larvae or pupae
- Breathe air at the surface of water
 - Use a siphon tube for breathing
 - Ripples in the water prevent breathing

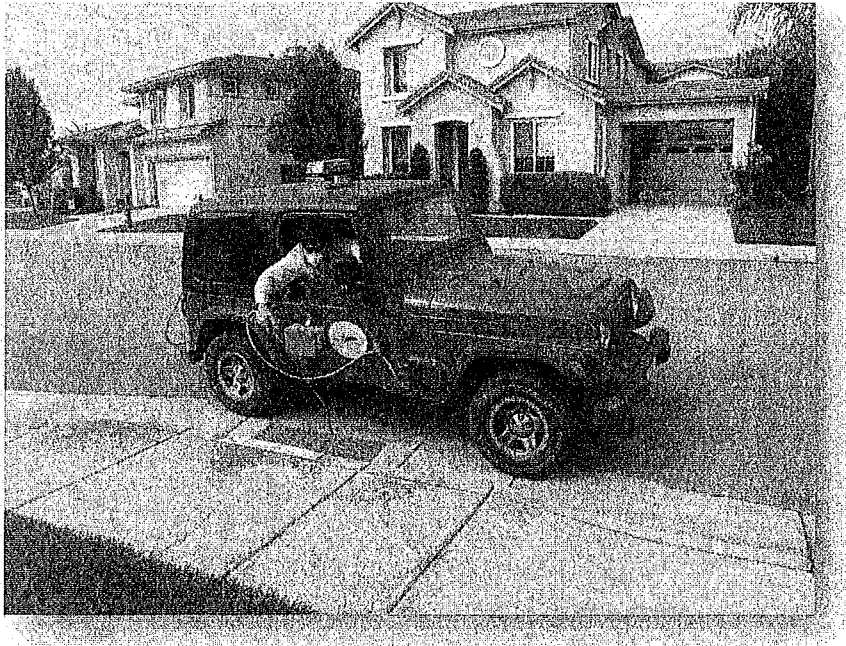


Monitoring mosquito abundance



Dipping for mosquito larvae

Larval mosquito management

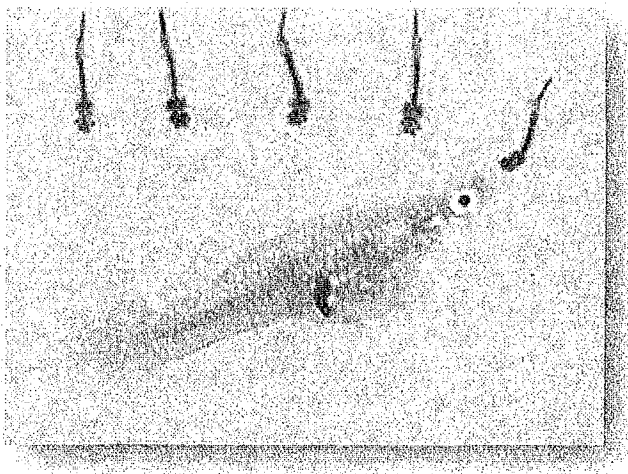


3 oz of mineral oil placed into catch basins



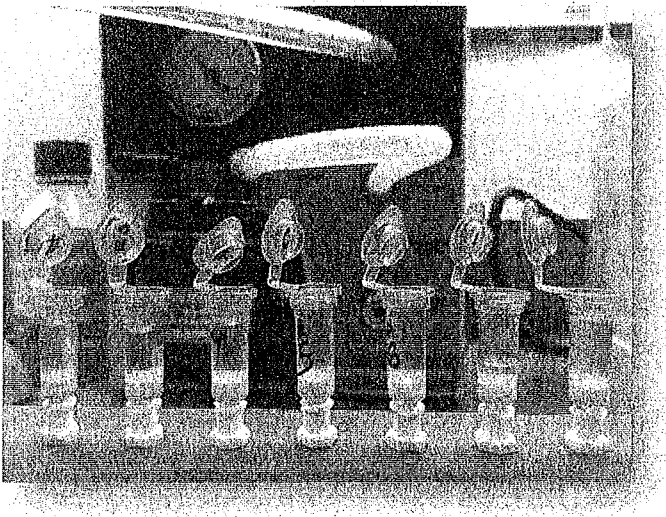
Biorational larvicide in marsh with breeding mosquitoes

Mosquitofish: *Gambusia affinis*

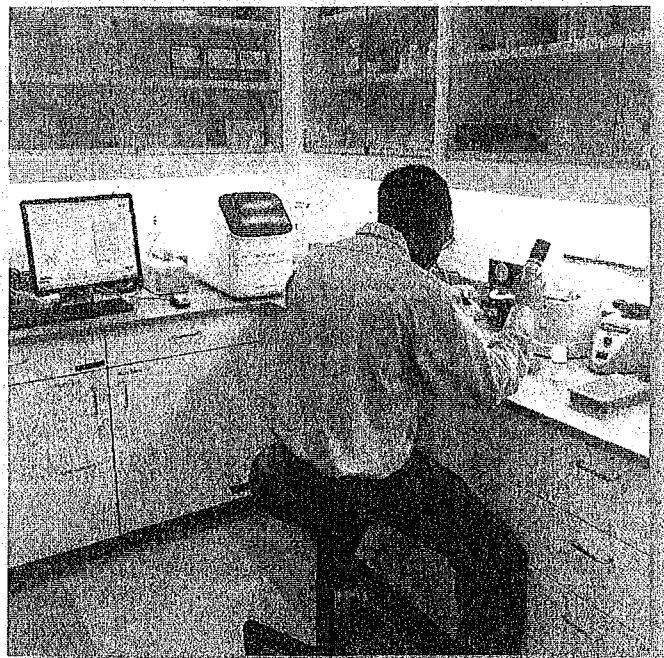


- Eat a variety of aquatic insects and zooplankton
- Love to eat mosquito larva
- Relatively small
 - 1.5 – 3 inches
- Live in shallow fresh water
- Resilient to low oxygen levels
- Should not be introduced into natural habitats
 - streams, natural ponds

Monitoring mosquito abundance and diseases they spread



Testing collected mosquitoes
for human diseases



Pathogens spread by mosquitoes of concern for Alameda County

the short list...

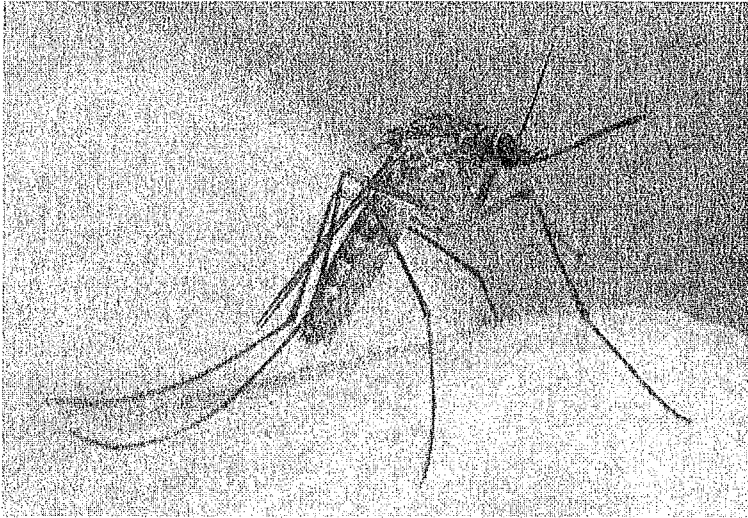
Mosquito vector present in Alameda County:

- West Nile virus
- Western equine encephalitis virus
- Saint Louis encephalitis virus
- Dog heartworm
- Malaria

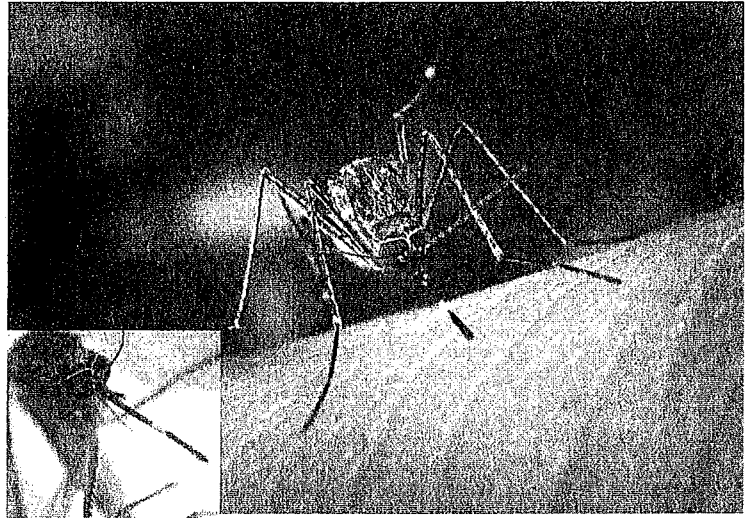
Mosquito vector present in California:

- Zika virus
- Chikungunya virus
- Dengue virus
- Yellow fever virus

Mosquitoes in the Bay Area that transmit West Nile virus

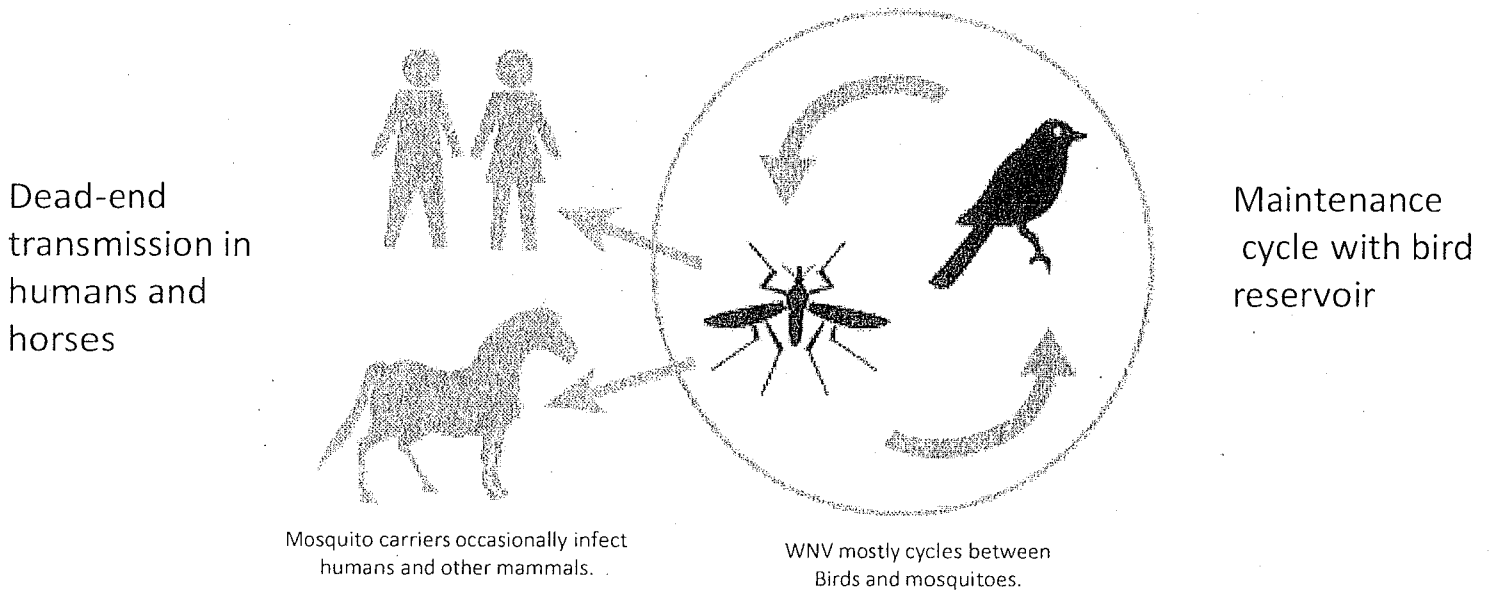


Culex pipiens:
common house mosquito



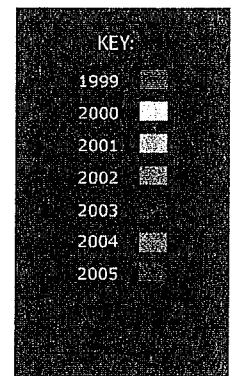
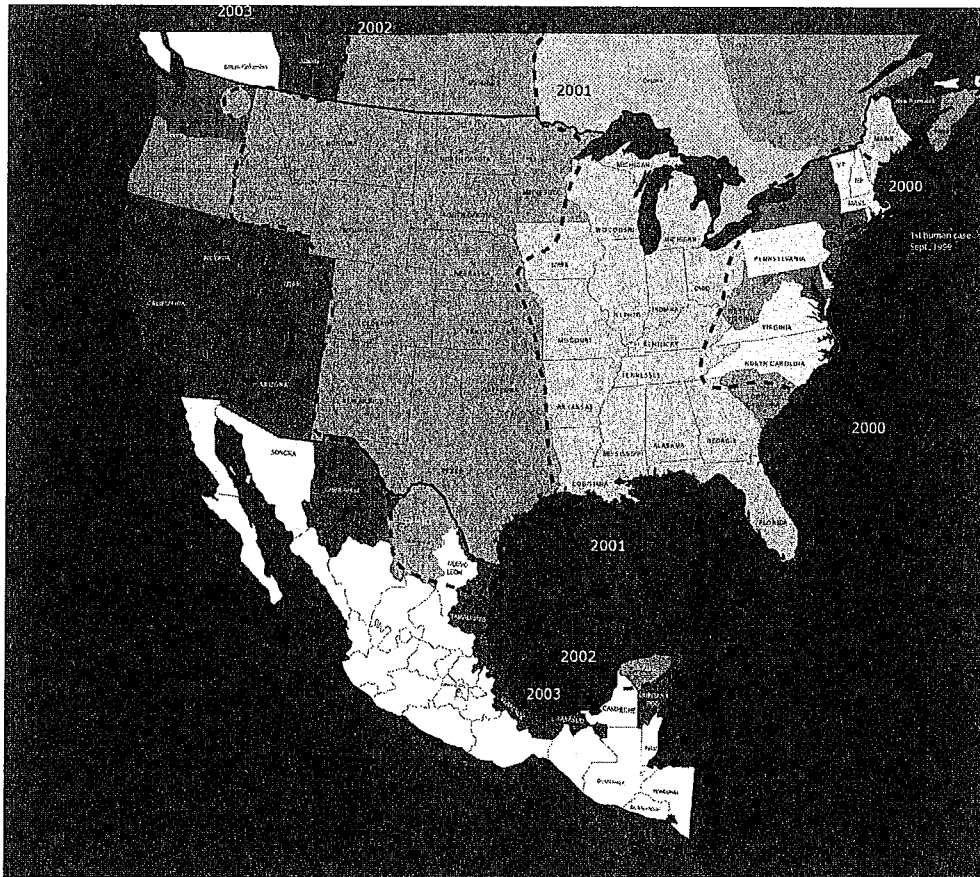
Culex tarsalis:
western encephalitis mosquito

West Nile virus transmission cycle



More than 138 bird species that can be infected, and more than 43 mosquito species can transmit WNV

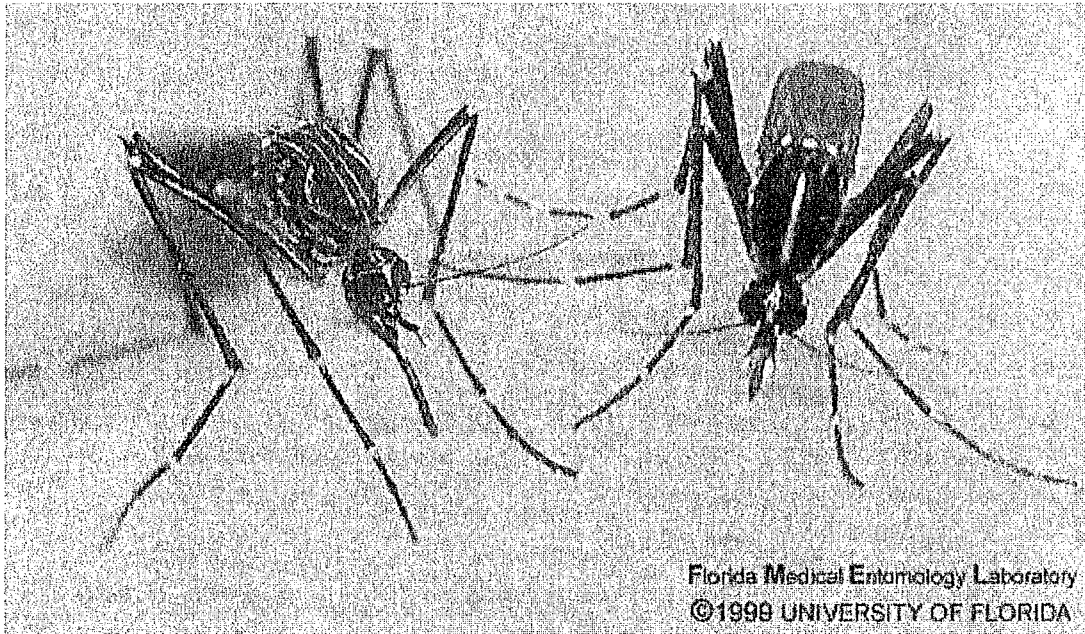
Rapid spread of West Nile virus across the US



ACMAD's response plan to West Nile virus

- The District's response plan includes:
 - In house testing of reported dead birds
 - Focused surveillance and testing of all captured mosquitoes
 - Intensified inspections and treatments in areas with positive detections
 - Key notifications to the public through press releases, social media, and voluntary signup through the District website

Mosquitoes that spread Zika virus

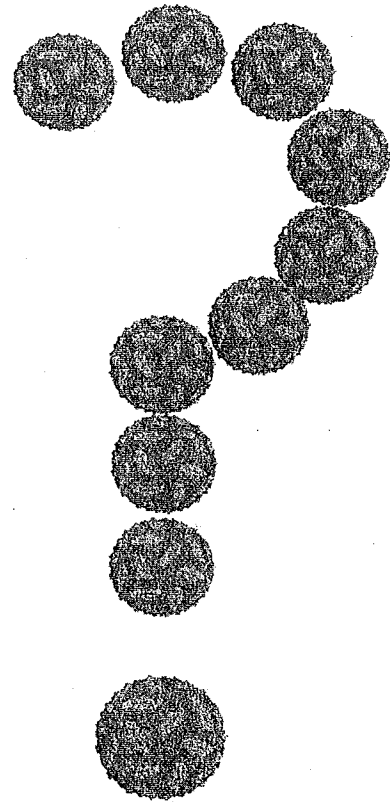


Aedes aegypti
lyre-shaped pattern on thorax

Aedes albopictus
bright lateral line on thorax

Zika virus

- A lot still unknown
- Discovered in 1947 and named after the Zika Forest in Uganda
- Before 2007, only 14 cases documented
 - But likely many more
- In 2015, thousands of cases
- Transmitted by mosquitoes not native to Alameda County
- Causes rash, microcephaly, and linked to Guillain-Barre' syndrome



How Zika virus spreads

Most people get Zika from a mosquito bite



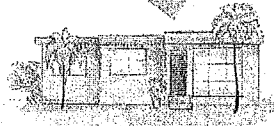
More members in the community become infected



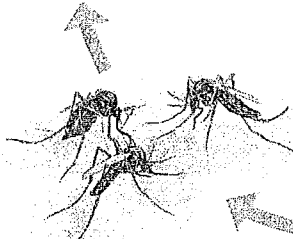
A mosquito bites a person infected with Zika virus



The mosquito becomes infected



A mosquito will often live in a single house during its lifetime



More mosquitoes get infected and spread the virus



The infected mosquito bites a family member or neighbor and infects them

Other, less common ways, people get Zika:



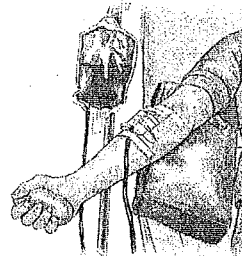
During pregnancy

A pregnant woman can pass Zika virus to her fetus during pregnancy. Zika causes microcephaly, a severe birth defect that is a sign of incomplete brain development.



Through sex

Zika virus can be sexually transmitted by a man to his partners.



Through blood transfusion

There is a strong possibility that Zika virus can be spread through blood transfusions.



Zika virus symptoms

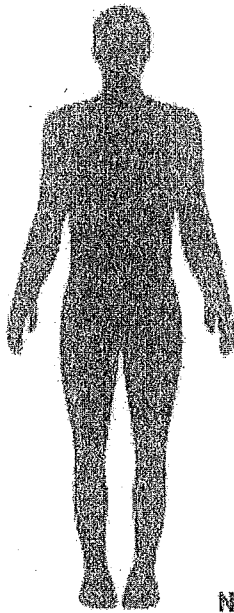
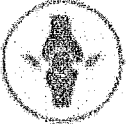
Headaches



Fever



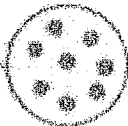
Muscle &
Joint Pain



Red Eyes



Rash



No treatment
or vaccine is
available



2-7
days

Symptoms
normally last
for 2-7 days

1 in 4

Infected people
show symptoms

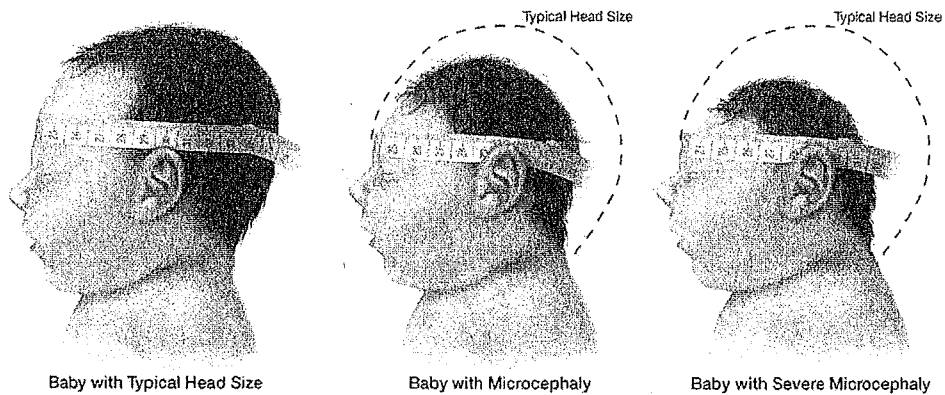
2 weeks

How long the
virus stays in the
blood stream

unknown

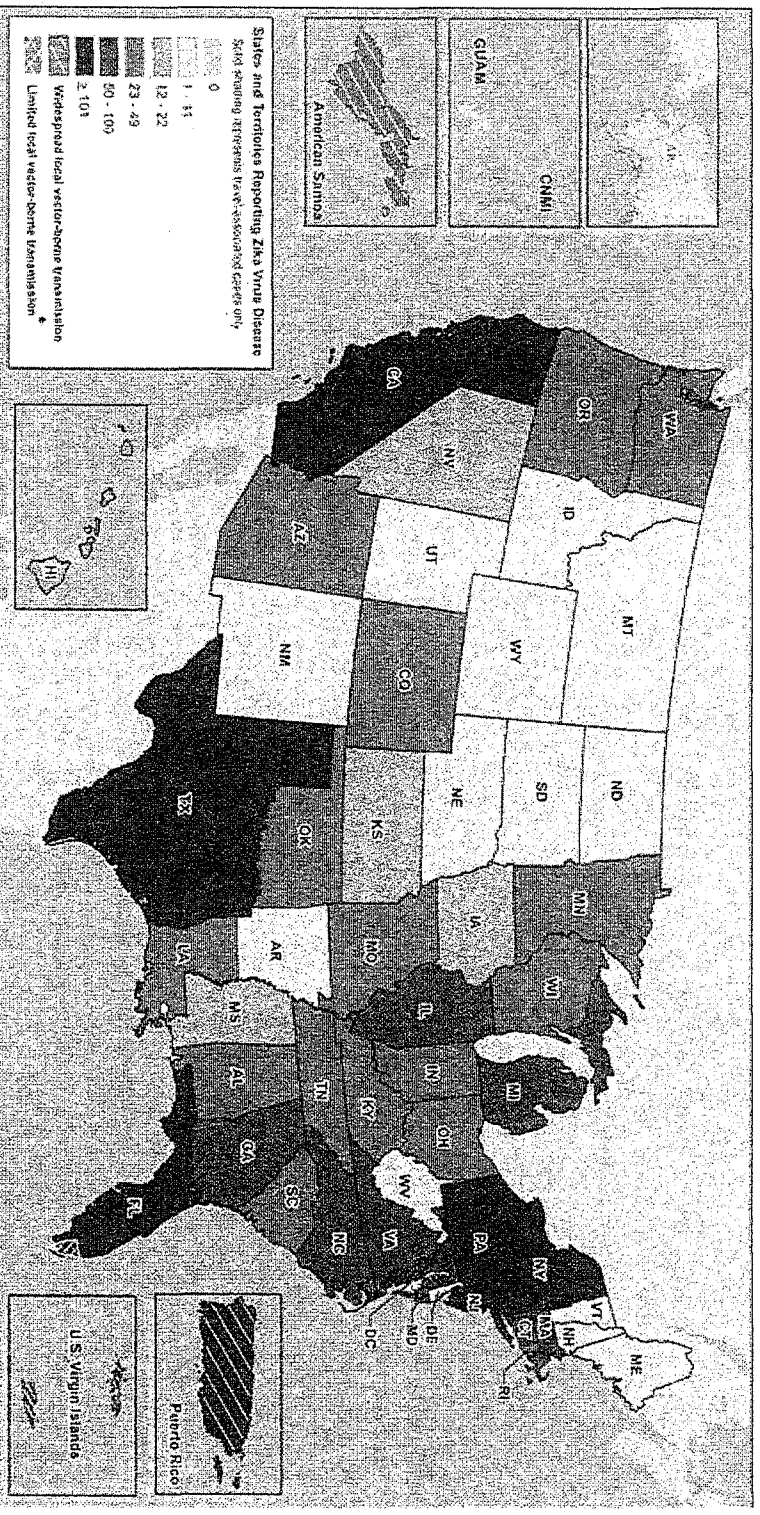
How long the
virus is in semen

Microcephaly



- Symptoms include below-average head size
- Many causes: last year 25,000 children affected in the US
- Also caused by Zika virus infecting and killing brain stem cells early during pregnancy
- Up to 13 % of women infected during 1st trimester may have child with severe microcephaly
- Other severe conditions may result from congenital Zika infection:
 - abnormal eyes, reduced cognitive function, developmental disability

Zika virus: cases reported in the US (as of 9/19/16)

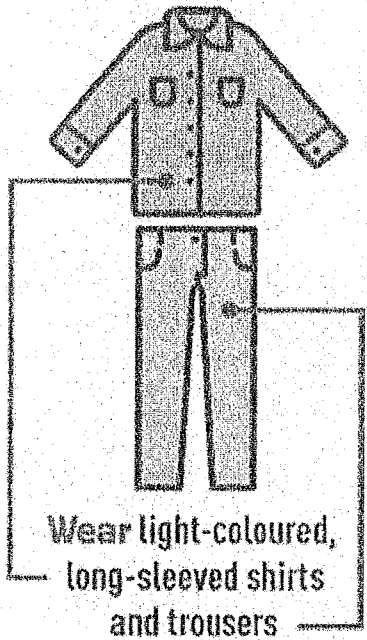


Zika prevention

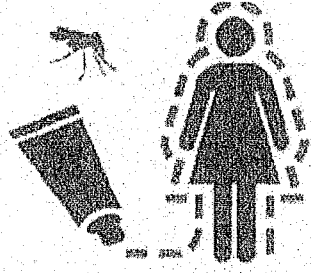


window screens

Use physical barriers: screens, closed doors and windows

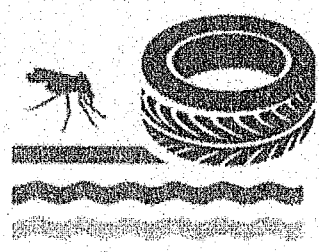
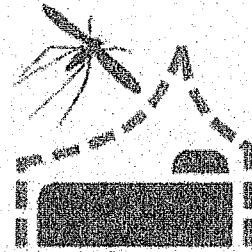


Wear light-coloured,
long-sleeved shirts
and trousers



Use insect
repellent

Sleep under a
bed net



Get rid of stagnant water
from places where
mosquitoes breed,
such as in old containers,
flower pots and used tyres

ACMAD's response plan to invasive *Aedes*

- The District's response plan includes:
 - Door to door inspection and treatments in confirmed detection areas
 - Expanded surveillance to monitor dispersion
 - Coordination with the Alameda County Public Health Department
 - Dissemination of information through press releases and social media
 - Cooperation with local volunteer groups (CERT) in order to collect more information

Common Sources in the City of Oakland

- Airport sources (Rolls Royce marsh, tank farm)
- Mills College
- AW Pottery
- Lake Merritt (seepages, ponds)
- Lake Temescal
- Leona Trout Ponds
- Port of Oakland—Southern Pacific Terminal
- Unmaintained swimming pools, catch basins (especially downtown & Lake Merritt), flood control channels

Contact us for no-cost services:

- mosquitoes biting
- mosquito fish
- advice for reducing mosquito breeding sites
 - at your house or workplace
- Report of standing water or neglected pool
- dead bird report
- educational presentation

www.mosquitoes.org

(510) 783 – 7744

acmad@mosquitoes.org

Trustee: Dr. Jan O. Washburn

Vector Control Technicians:

Sarah Erspamer (West)

Nick Appice (Central)

Ben Rusmisel (East)

