ENVIRONMENTAL HEALTH DIVISION

Vector Surveillance & Mitigation

BOARD OF HEALTH

Quarterly Meeting

Presented April 28, 2025

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Our Vision

Healthy People in Healthy Communities

Our Mission

To Promote, Protect, and Improve
the Health of our Communities

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OBJECTIVES

- Provide an overview of mosquitoes and general characteristics
- Describe mosquitoes as vectors
- Summarize mosquito populations in Mohave County
- Define the role of Public Health in surveillance and mitigation
- Summarize the activities of the Environmental Health Division in this role

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MOSQUITO FAST FACTS

- **Species**: 2,700 globally, 176 in the United States, 46 identified in Arizona, 9 identified in Mohave County
- **Migration**: Fly an estimated 1 to 1.5 mph with most species having a flight range of 1 to 3 miles
- **Lifespan**: Varies by species, most adult females live 2 to 3 weeks
- **Overwintering**: Some species may **overwinter**, or hibernate, for as long as 6 months
- **Feeding**: Both male and female mosquitoes feed on plant nectars
- **Blood Meals**: Only **females** take a blood meal (bite) so eggs may mature prior to laying
- **Hosts**: Found by **sight** (infra-red radiation) and **chemical signals** (CO_2 and lactic acid)
- **Disease**: The majority of mosquito species do not carry or spread disease

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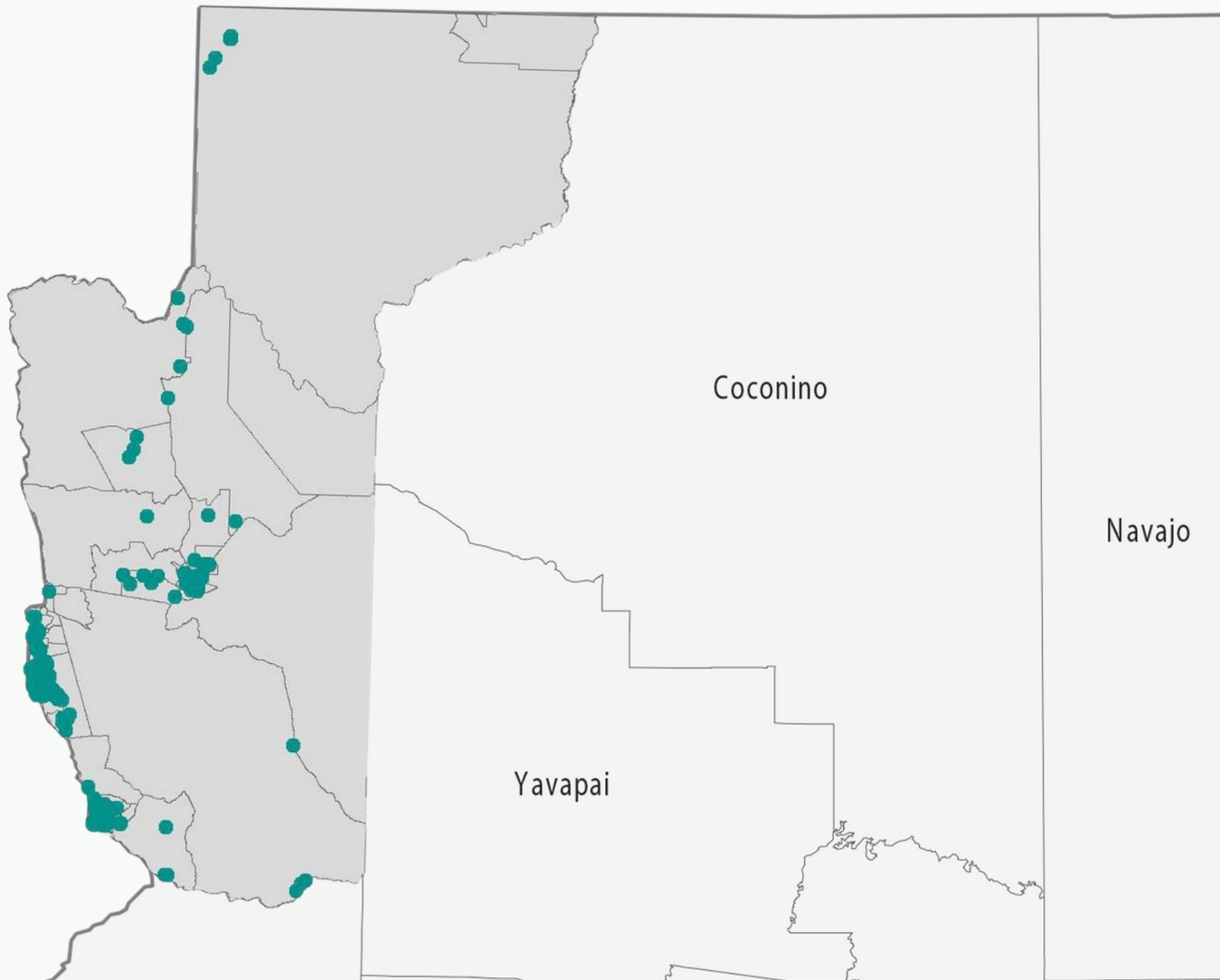
MOSQUITOES IN MOHAVE COUNTY | 2017 - 2023

Surveillance

- 1,890 traps set
- 3,778,161 mosquitoes collected

Species of Relevance

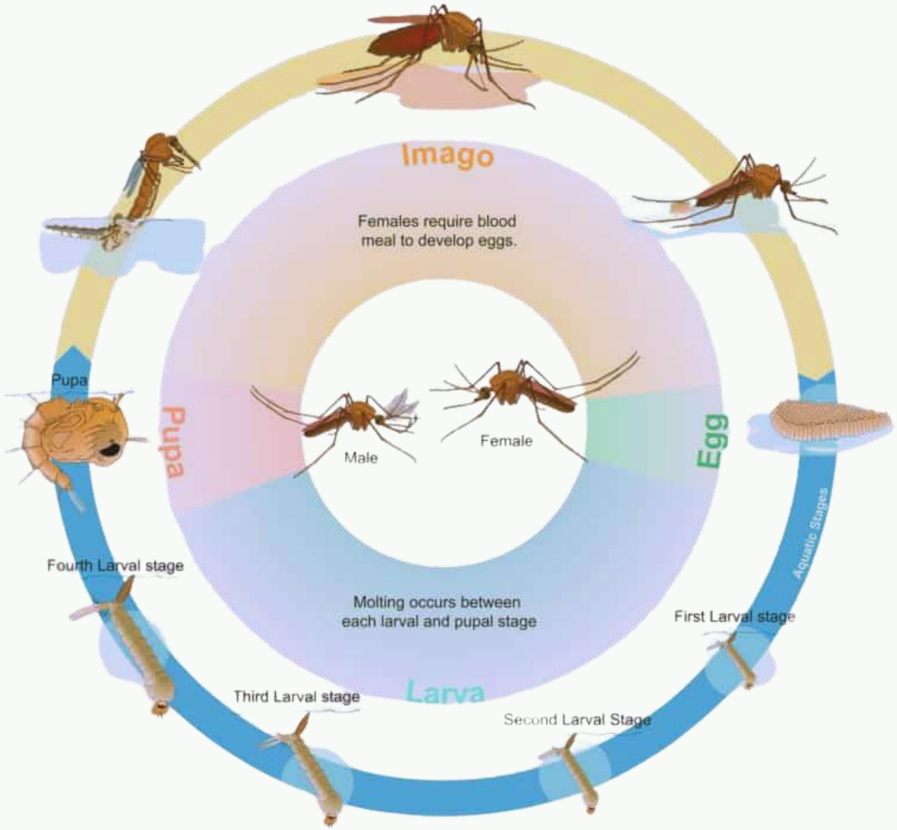
- *Culex tarsalis*: 11,362 collected
- *Culex erythrothorax*: 1,350 collected
- *Culex quinquefasciatus*: 240 collected
- *Aedes aegypti*: 95 collected
- *Psorophora columbiae*: 3,664,557 collected



CULEX MOSQUITOES

Lifecycle Development

- 4 Stages: Egg, larva, pupa, “imago” (adult)
- Development takes 7 to 14 days, less in higher temperatures
- Lay eggs in “rafts” on still water surfaces, as many as 300 eggs
- Adults can “overwinter” in protected places



Behavior & Dispersal

- Opportunistic feeding habits, preference for birds but will feed on mammals
- Most active at dusk and after dark
- Rest in and around structures and other protected areas in the daytime
- May fly 1 to 2 miles from their breeding site for a blood meal, typically stay relatively close

Disease Transmission

- Known vector of West Nile Virus

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WEST NILE VIRUS

Overview

- Leading cause of mosquito-borne disease in the continental U.S.
- First detected in 1999 in the U.S., New York
- Maintained in the environment by *Culex* species and avian hosts
- Rates of infection vary season to season

Transmission

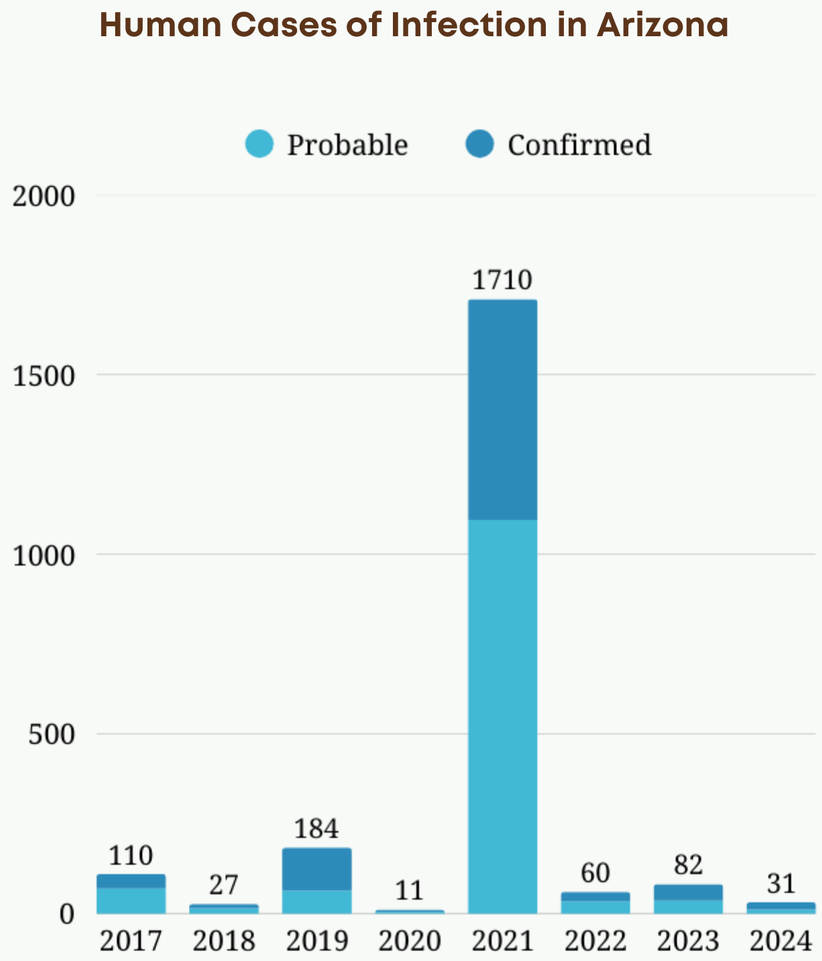
- Most commonly spread to humans and other mammals from the bite of an infected mosquito, mammals are a dead-end host
- Mosquitoes become infected when they feed on infected birds
- It can take 7 to 14 days for the virus to propagate, become transmissible

Symptoms

- 8 in 10 people infected with WNV do not develop symptoms
- 1 in 5 people infected develop a fever with other symptoms
- 1 in 150 people infected develop severe illness affecting the central nervous system or meningitis
- 1 in 10 infections affecting the central nervous system are fatal

Treatment

- The are no medications which treat West Nile Virus
- Severe cases may require hospitalization to provide supportive treatment



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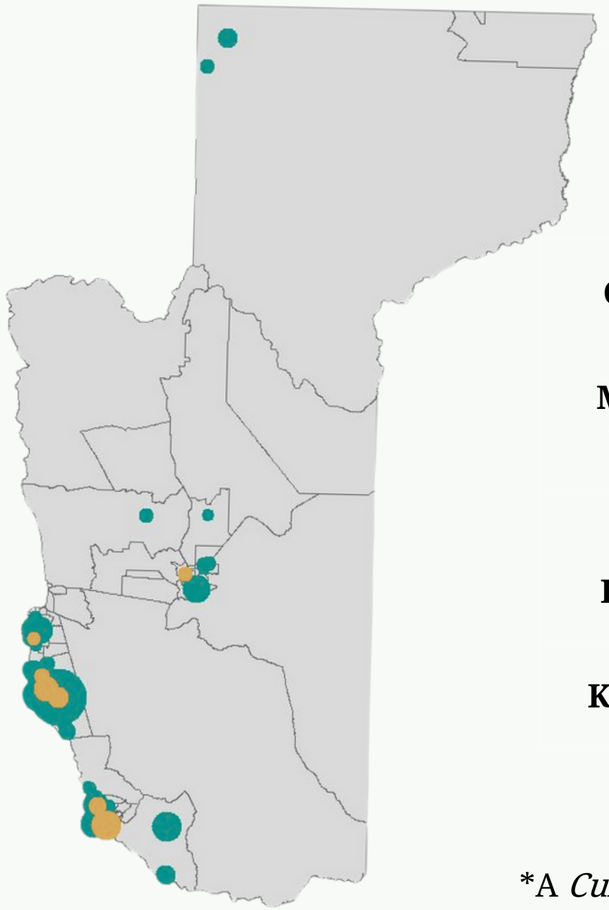
CULEX AND WEST NILE VIRUS TESTING

MOHAVE COUNTY | 2017-2023



	Total Mosquitoes	*Culex* spp	Proportion of *Culex*	*Culex* Pools Tested for WNV*	*Culex* Pools Positive for WNV	Proportion of Positive WNV Tests
County	3,778,161	18,777	0.49%	824	23	2.79%
Mohave Valley	3,761,389	13,642	0.36%	606	9	1.48%
Lake Havasu	6,241	3,591	57.53%	146	13	8.90%
Kingman	3,076	213	6.92%	19	1	5.26%

*A *Culex* pool is a count of 1 to 50 mosquitoes from the same trap or trapping area and placed into a vial for testing.

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AEDES MOSQUITOES

Lifecycle Development

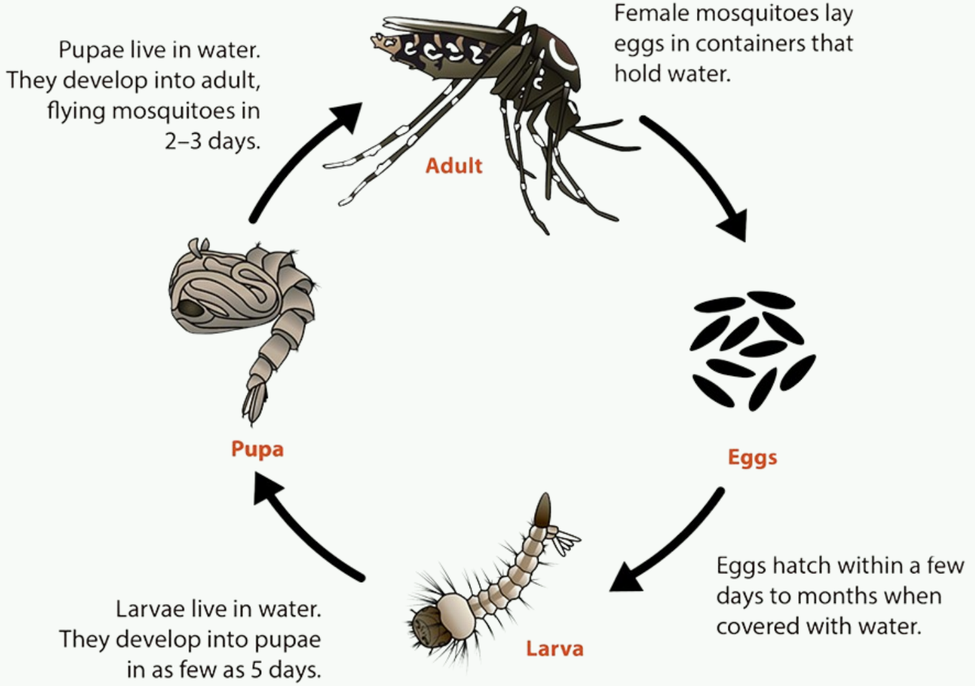
- Over 950 species of *Aedes*
- 4 Stages: Egg, larva, pupa, “imago” (adult)
- Development takes 7 to 10 days, less in higher temperatures
- Lay single eggs on moist surface, close to waterline
- A. *aegypti* eggs can “overwinter” in water-holding containers

Behavior & Dispersal

- Prefer human hosts, will feed on other mammals
- Active during the day, peak feeding periods are early morning and before dusk
- Breed and dwell in and around human habitations

Disease Transmission

- A. *aegypti* and A. *albopictus* known vectors of Zika, dengue, chikungunya, and yellow fever



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ZIKA VIRUS

Overview

- First cases detected in 2015, travel-related
- Cases have been declining

Transmission

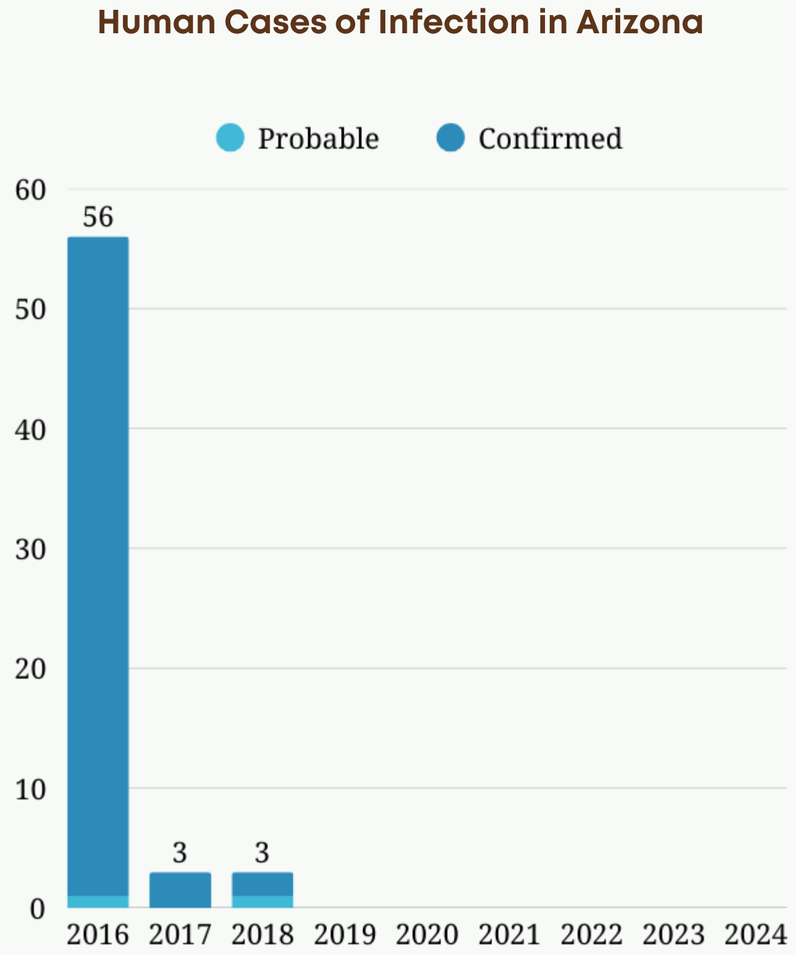
- A. *aegypti* and A. *albopictus* are primary vectors, human-mosquito-human transmission
- Maternal, may cause certain birth defects
- Sexual contact with infection person
- It can take 7 to 14 days for the virus to propagate, become transmissible

Symptoms

- Most people infected with Zika virus do not develop symptoms
- Those who do may experience fever, rash, muscle and joint pain, headache, malaise, and conjunctivitis
- Symptoms may last several days to a week or more

Treatment

- The are no medications which treat Zika virus
- Infections are rarely fatal



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DENGUE VIRUS

Overview

- Leading cause of mosquito-borne disease globally
- Locally acquired cases have been detected in Arizona, Florida, Texas, California, and Hawaii

Transmission

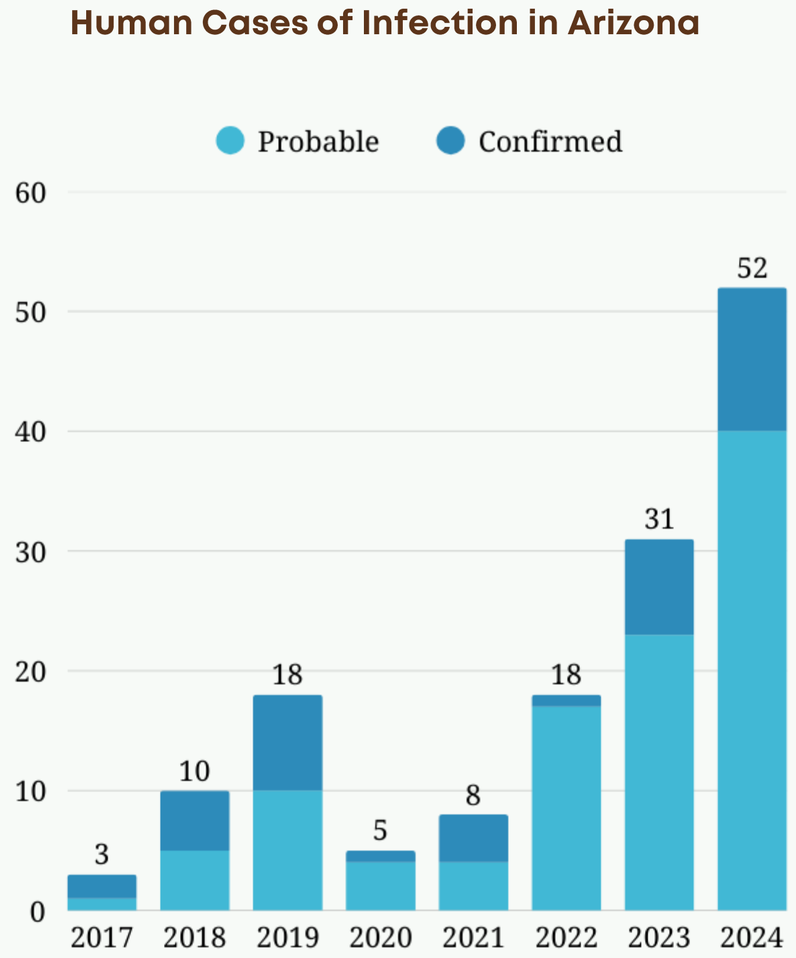
- A. *aegypti* is a primary vector, human-mosquito-human transmission
- Maternal, may cause pre-term birth, low birth weight, fetal distress
- It can take 8 to 12 days for the virus to propagate, become transmissible

Symptoms

- Most people infected with dengue do not develop symptoms
- Those who do may experience fever, rash, head/body aches, muscle and joint pain, nausea, vomiting, swollen glands
- Symptoms typically last 2 to 7 days
- Severe dengue may develop after a second infection

Treatment

- Treated with pain medication, no specific treatment
- Severe cases often require hospitalization to provide supportive treatment, may be fatal
- Vaccination may be recommended for some travelers



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CHIKUNGUNYA

Overview

- In 2014, local transmission identified in Florida, Texas, Puerto Rico, and the Virgin Islands
- Locally acquired cases have not been reported from U.S. states or territories since 2019, all travel associated

Transmission

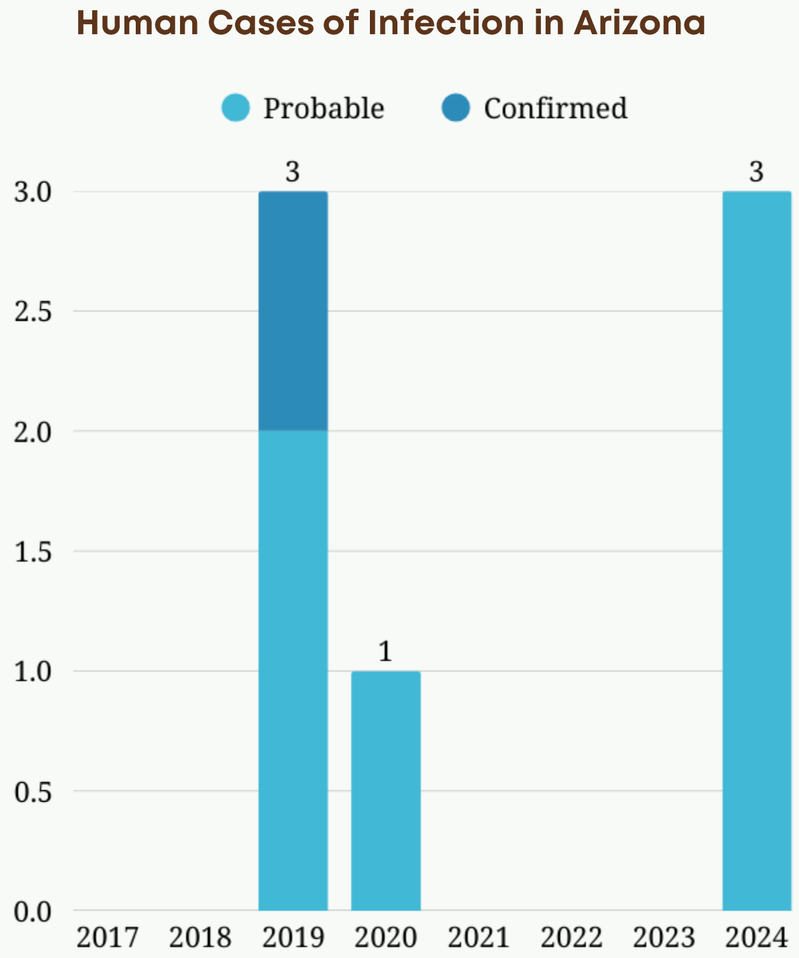
- A. *aegypti* and A. *albopictus are* primary vectors, human-mosquito-human transmission
- Maternal, primarily in second trimester
- Bloodborne, exposure to infected blood

Symptoms

- Most people infected with chikungunya will develop some symptoms
- Those who do may experience fever, rash, head/body aches, severe joint pain and swelling, nausea, vomiting, fatigue
- Symptoms typically last 7 to 10 days

Treatment

- The are no specific medications which treat Chikungunya
- Fatality is rare



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ARBOVIRUS DISEASE IN MOHAVE COUNTY | 2017 - 2024

	Mohave Cases Assessed	Mohave Cases Probable	Mohave Cases Confirmed	AZ Cases Probable	AZ Cases Confirmed	AZ Case Fatalities
West Nile Virus	18	2	2	1,329	876	178
Zika Virus	22	0	0	1	5	0
Dengue	0	0	0	45	100	0
Chickungunya	0	0	0	3	4	0
Combine Arbovirus	**40**	**2**	**2**	**1,378**	**985**	**178**

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PSOROPHORA COLUMBIAE

Lifecycle Development

- 4 Stages: Egg, larva, pupa, “imago” (adult)
- Development in as few as 4 to 6 days
- Lay single eggs on moist surface
- Floodwater mosquito, develop when saturated

Behavior & Dispersal

- Active day and night, persistent and aggressive biters
- Primarily feed on mammals, may feed on birds
- Capable of dispersing several miles, tend to stay where hatch
- Mate almost immediately upon hatching
- Populations peak from mid-July to late August

Disease Transmission

- Not known to carry or transmit disease

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ROLE OF PUBLIC HEALTH

Public Health Goal

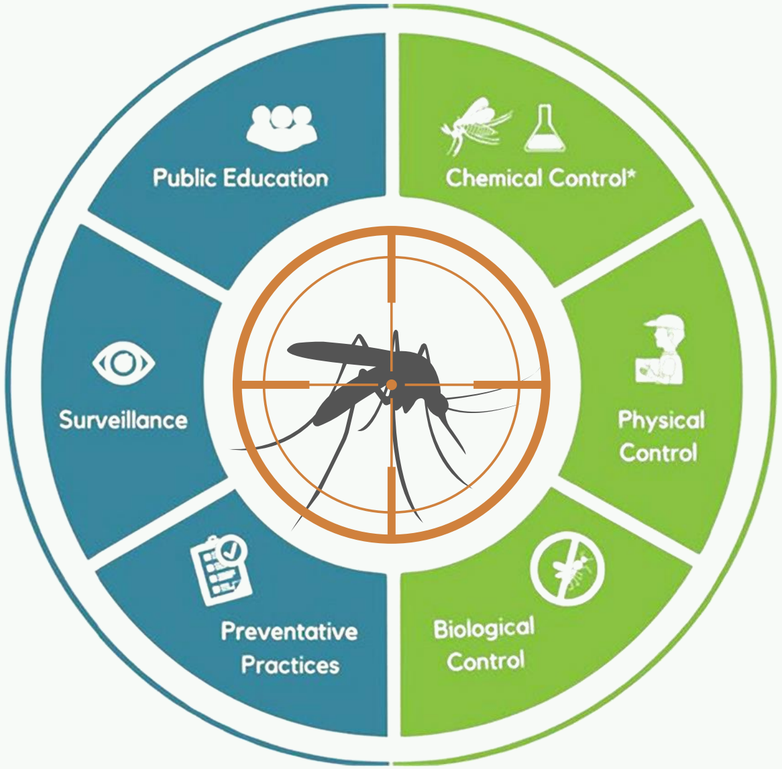
Reduce the risk of vector-borne illness and disease

Environmental Health Objectives

- Identify and mitigate species of concern
- Prepare for and respond to mosquito-borne illness outbreaks

Program Activities

- Mosquito and Disease Surveillance
- Mitigation Methods
- Public Education
- Stakeholder Collaboration



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SURVEILLANCE | MOHAVE COUNTY

Pre-Emergence: Immatures

- Monitor and assess target areas for water retention, presence of eggs and/or larvae

Trapping: Adults

- In identified problem areas pre- and post-treatment
- In areas with reported abundance, when not already being surveilled

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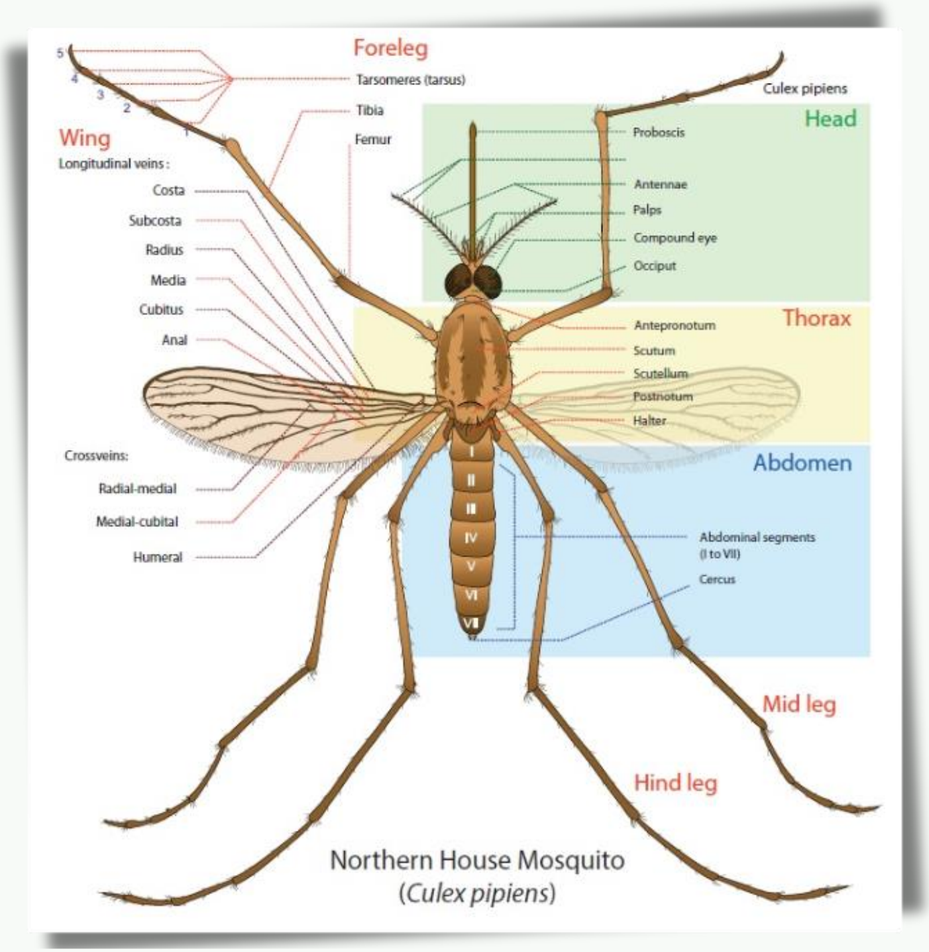
SURVEILLANCE | MOHAVE COUNTY

Enumerating and Speciating

- Counted or weighed to determine abundance, proportional to species of concern
- Identified by sex and species, reserving species of concern

Testing

- Females identified as *Culex* tested in EH lab for West Nile Virus
- Other species of concern sent to ADHS for testing



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MITIGATION | MOHAVE COUNTY

Larvicide Application

Advantages

- Larval source reduction, most effective

Disadvantages

- Employing Certified Pest Applicator
- Knowledge of agricultural watering cadence

Adulticide Application - Fogging

Advantages

- Immediate removal of adults
- Prevention of egg laying

Disadvantages

- Product contact with flying mosquitoes
- Limited reach
- Cost-benefit, short-term results

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COMMUNITY & STAKEHOLDER OUTREACH | MOHAVE COUNTY

Community

Residents

- Media messaging
- Door hangers

Agencies & Organizations

- Event participation and hosting
- Informational material distribution

Stakeholder

Bullhead City Pest Abatement District

- Emerging issues
- Surveillance and mitigation coordination

Private and Tribal Agriculture

- Watering schedule
- Crops and rotation

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CHALLENGES | MOHAVE COUNTY

Geography

- Wildlife Refuges, wetlands
- Varied, interspersed jurisdictions

Agriculture

- Private
- Tribal

Resources

- Funding
- Expertise
- Time/timing

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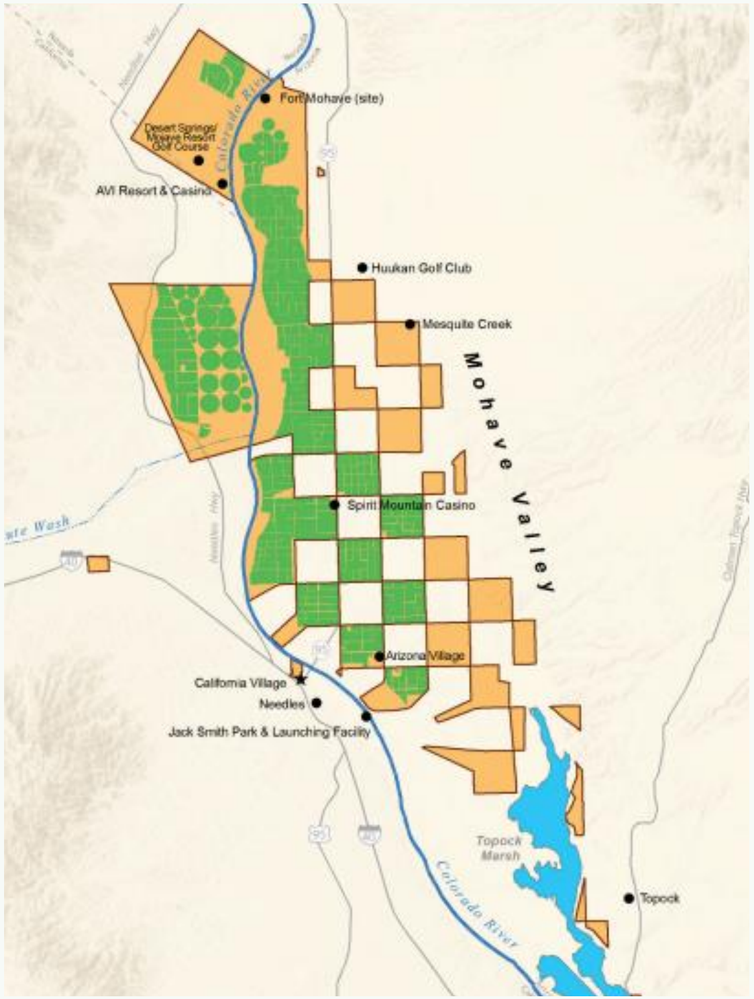
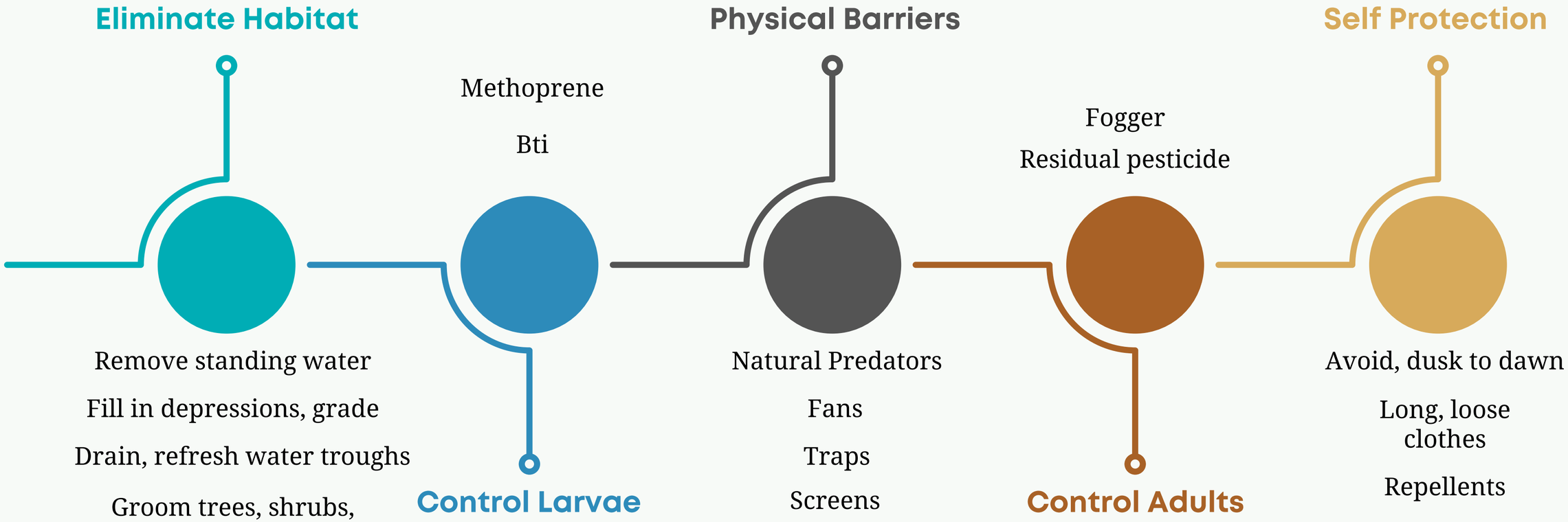


Source: Fort Mojave Indian Tribe,
Colorado River Basin Ten Tribes Partnership Tribal Water Study

RESIDENTS ROLE | MOHAVE COUNTY



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ENVIRONMENTAL HEALTH DIVISION

Thank You

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