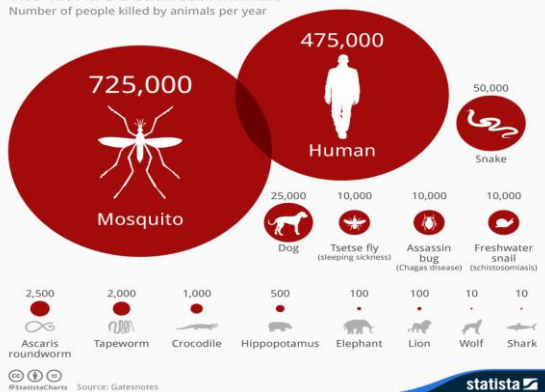


Taking a Mosquito Safari : What you need to know about the deadliest animal in the world

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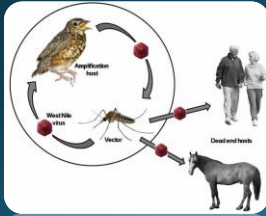
The World's Deadliest Animals

Number of people killed by animals per year



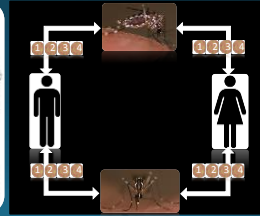
Mosquito-borne virus transmission cycles

West Nile virus
zoonotic disease



G. Hamer, Dept. Entomology, Texas A&M University

Dengue virus
human - human



Common pest species in Texas

Two Basic Types

- Standing water species
 - *Aedes albopictus/aegypti*
 - *Aedes sollicitans*
 - *Culex quinquefasciatus*
 - *Culex tarsalis*
- Floodwater species
 - *Psorophora columbiae*
 - *Aedes vexans*



Floodwater species

Psorophora columbiae
Aedes vexans

- Typically live 4-5 days (up to one month)
- Excellent fliers (5-10 miles or more)
- eggs survive up to 2 years in soil
- painful bites



Floodwater species

- Difficult to control due to flight range
 - drainage of marshes
 - floodwater control
 - community fogging
 - avoidance
- Water need only stand 3-4 days to breed mosquitoes
- Not important vectors of human disease



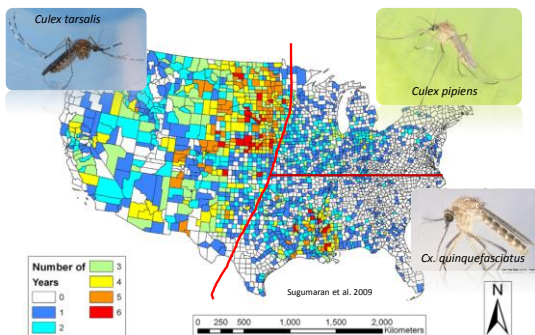
Photo by Sean McCann, BugGuide.net

Important standing water species *Culex*, *Aedes*

- WNV
 - *Culex quinquefasciatus*
 - *Culex tarsalis* (West TX)
- Zika/CHIKV/DEGV
 - *Aedes aegypti*
 - *Aedes albopictus*



Culex species responsible for WNV transmission to humans



Culex quinquefasciatus – Southern house mosquito

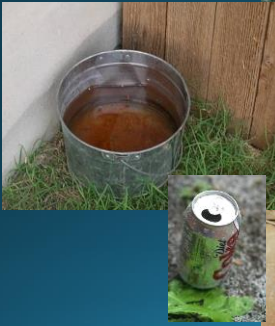
- delicate, dull brown mosquito; lacks bands on tarsi and proboscis
- prefers polluted water in containers or other standing water
- mostly feeds on birds, but thought to be principal vector of WNV to humans

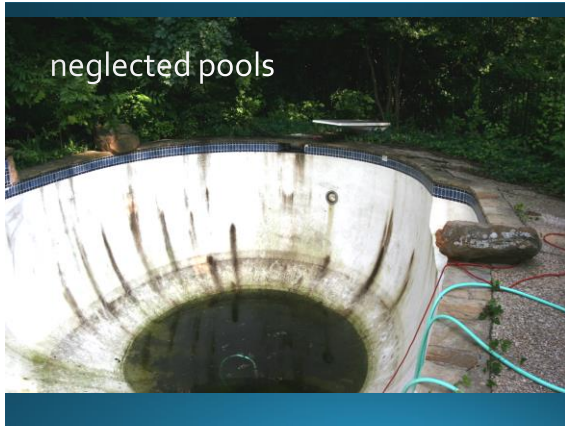


Typical backyard breeding sites



backyard containers







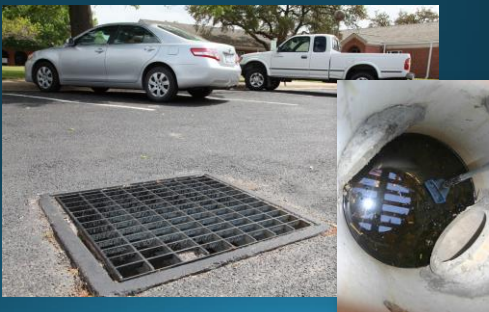
The terrible tire: A municipal nuisance

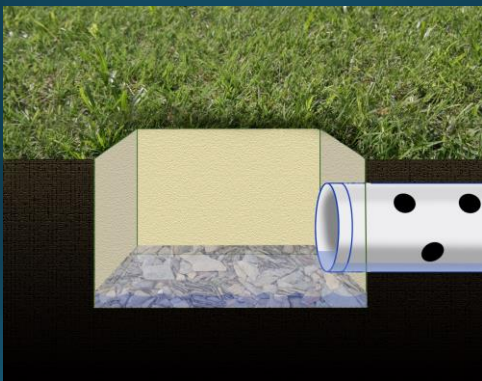
Leaves
Dust
Organic
debris

MOSQUITOES



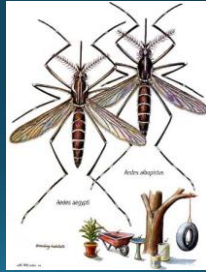
Stormwater catch basins





Other standing water species

- *Aedes aegypti* – yellow fever mosquito
 - Historical vector of yellow fever, dengue fever
 - Now key vector of ZIKV/CHIKV
- *Aedes albopictus** - Asian tiger mosquito
 - Since early 1990s in eastern Texas
 - Thought capable of transmitting same diseases as *Ae. aegypti*
- Weak fliers with range of 200 yards



Aedes aegypti Yellow fever mosquito

- Feeds almost exclusively on humans
- Lives in cities in close proximity to humans
- Breeds in artificial containers
- Daytime AND evening biter
- Principal vector of Yellow fever, Dengue fever, CHIKV, ZIKV in tropics



Red areas indicate location of *Ae. aegypti*
Ae. Aegypti – CDC Map

Aedes albopictus Asian tiger mosquito

- Artificial container, treehole breeder
- Arrived in Texas in 1990s
- Aggressive daytime biter
- Vector of CHIK, Dengue fever, Zika Virus



Green areas indicate location of *A. albopictus*

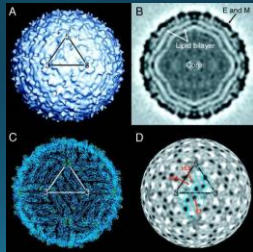
Ae. Albopictus – CDC Map



Key diseases

What is West Nile virus?

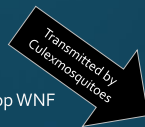
- Arbovirus first described from Uganda in 1937
- Discovered in New York state in 1999, Texas 2002
- Number one arbovirus public health concern in Texas



©2003 Texas Cooperative Extension

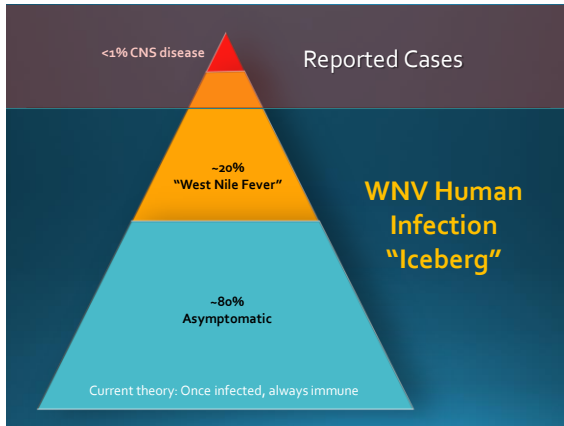
West Nile Fever

- 20% of infected people develop WNF
- Incubation period of 2-15 days
- Most illness: "West Nile fever"
 - Self-limited dengue-like illness
 - Fever, headache
 - Rash, lymphadenopathy
 - Nausea, vomiting
- Rarely pancreatitis, hepatitis, myocarditis
- Average 60 day recovery



Southern house mosquito
Culex quinquefasciatus



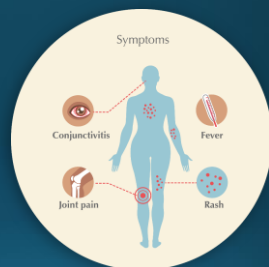


West Nile Neuroinvasive Disease

- One in 150 infected people develop WNND (most older than 50)
- Severe neurologic illness categories
 - Disorientation, cognitive impairment
 - Stiff neck
 - Muscle weakness
 - Parkinson-like muscle movement disorders
- 4-18% fatality rate
- Multi-year recovery or permanent disability

Zika Virus

- Symptoms of disease
 - Fever
 - Rash
 - Joint pain
 - Conjunctivitis
 - Muscle pain
 - Headache
- Usually mild with symptoms lasting days to a week



Zika and Pregnancy

- Zika virus can pass from a pregnant woman to her fetus
- A woman should prevent being bitten by infected mosquitoes while pregnant
- Men who contract Zika can transmit it through semen
 - Use protection during sex or abstain for 6 months

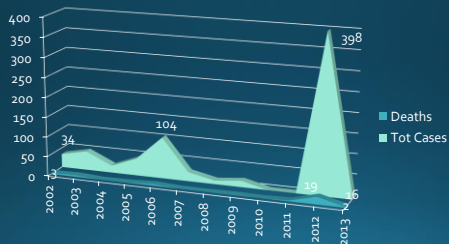


Zika and Pregnancy

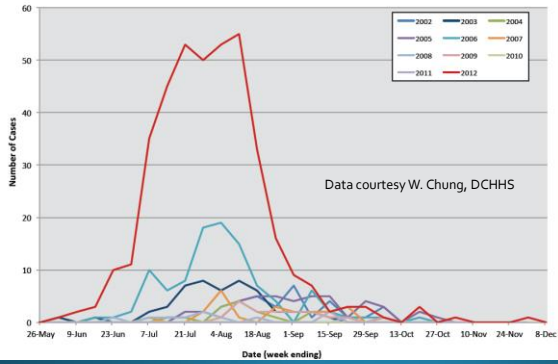
- Zika virus during pregnancy causes microcephaly in the developing fetus
 - Microcephaly - brain stops growing
 - Small head
 - Infant death or severe brain damage



Total WNV cases and deaths – Dallas County 2002-2013

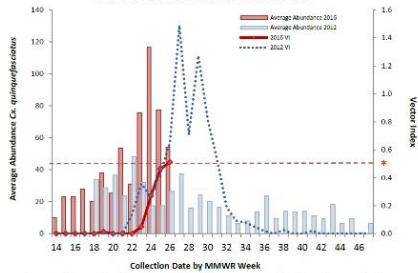


Number of West Nile Virus Cases by Week of Onset, Dallas County:
2002-2012



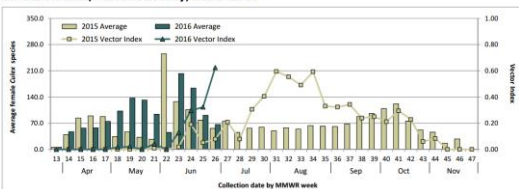
WNV Data- Dallas Co. (7-6-2016)

Figure 4: Average Numbers of Female *Cx. quinquefasciatus* per Trap-night and WNV Vector Index by Week:
2012 Season and 2016 Season (through Week 26)



WNV Data- Tarrant Co. (7-6-2016)

Figure 1. Average number of female *Culex* species per trap and vector index by
collection date, Tarrant County, 2015-2016



Government IMM options (SSLAP)

- Surveillance
- Source reduction
- Larvicides to treat breeding sites
- Adult mosquito control
 - Truck-mounted ULV
 - Aerial application
- Public Education
 - source reduction
 - personal Protection



Municipal adult mosquito control

- Needed when source reduction is insufficient to prevent significant mosquito infection rates
- Effectiveness less for Aedes mosquitoes
- Being used automatically in ½ mile radius around positive WNV mosquito traps
- Cover same area on three consecutive nights for best control



Destroy or treat backyard breeding sites for mosquitoes

- *Bacillus spp.* (briquettes and granules)
- Methoprene (Altosid, Pre-Strike) granules



Thermal fogger treatment



Kills mosquitoes resting in backyard, but leaves no residual

- Very small particle size (5-25 microns)
- Advantages: fast relief for biting mosquitoes for up to two days
- Disadvantages: heavy visible fog may drift, alarm neighbors; may kill or temporarily drive out beneficial insects

Other backyard residual sprays

Hose-end, pump and aerosol sprays containing short or medium residual insecticides



- Advantages: Several day relief from mosquitoes, affordable, easy to apply
- Disadvantages: Care should be taken to avoid flowering plants to protect pollinators, beneficial insects

Residual treatments with pyrethroid insecticides

Professional application leaves residues of insecticide in mosquito resting sites

- Backpack mist blowers produce larger particle size (50-60 microns)
- Advantages: affordable, 3-4 week suppression of mosquitoes; apply when needed
- Disadvantages: care to avoid treating flowering plants, may harm some beneficials



Mosquito misting systems



- controversial
- Largely unregulated industry
- 1-2 day install time
- expensive
- effective?
- Effects on non-target organisms and mosquito resistance?

DEET and alternatives

- DEET (no more than 30%)
- Picaridin (Cutter brand)
- Lemon Oil of Eucalyptus (Repel brand)
- IR3535 (Avon)



Extension Online Resources

- **Insects in the City** website
 - Videos on mosquito control around the home
 - New Zika and mosquito control factsheets
- NEXT talks

<http://citybugs.tamu.edu>



Zika materials for Extension agents

<http://entomology.tamu.edu/zika-materials-for-extension-agents>

- New resource page for internal use
 - Videos
 - Infographics
 - Articles/pubs
 - Social media icons
- Password: Zika*2016



New Extension pubs



Mosquito Safari website

Take a virtual tour of a backyard in search of mosquito breeding sites



<http://mosquitosafari.tamu.edu>