

# West Nile Virus: What does Tarrant County Do?

**By: Nina Dacko**  
**Tarrant County Public Health**

# Overview

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  - Horses
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- Future plans

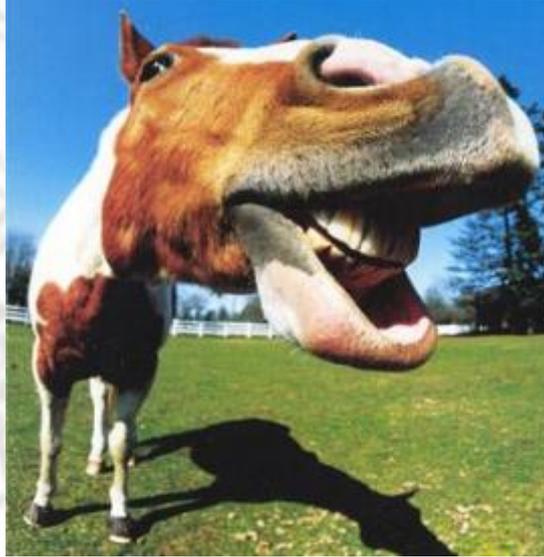
# Goals

- To study and understand WNV disease dynamics
- To test for the presence of WNV
- To give proper risk assessment
- To discover regular and temporary mosquito sources
- To reduce human exposure to mosquitoes (control)

# The 5 Ws



<http://birdnut.wordpress.com/2012/08/12/the-blue-jay/>

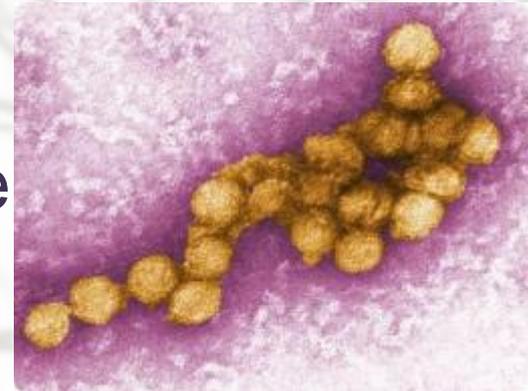


<http://www.picturescaption.com/funny-horse-pictures-with-captions-6/funny-horse-pictures-with-captions-28/>



<http://www.against-the-grain.com/2013/12/people-in-the-news-121813/>

- Who
  - Birds, humans, horses, other mammals
- What
  - Arbovirus in the family Flaviviridae
  - Japanese encephalitis complex



<http://www.msosquito.com/vectors-diseases/diseases/west-nile-virus-wnv>

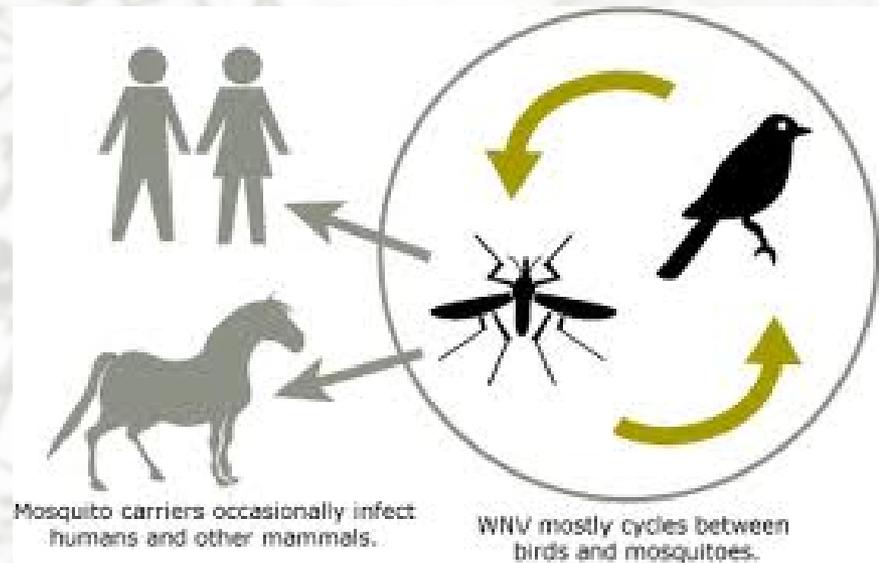
# The 5 Ws

- Where
  - Tarrant County
- When
  - Seasonal activity
    - April 1st to mid November



# The 5 Ws

- Why and How
  - Transmission
- Vector
- Reservoir
- Dead End Host



<http://www.portmoody.ca/index.aspx?page=706>

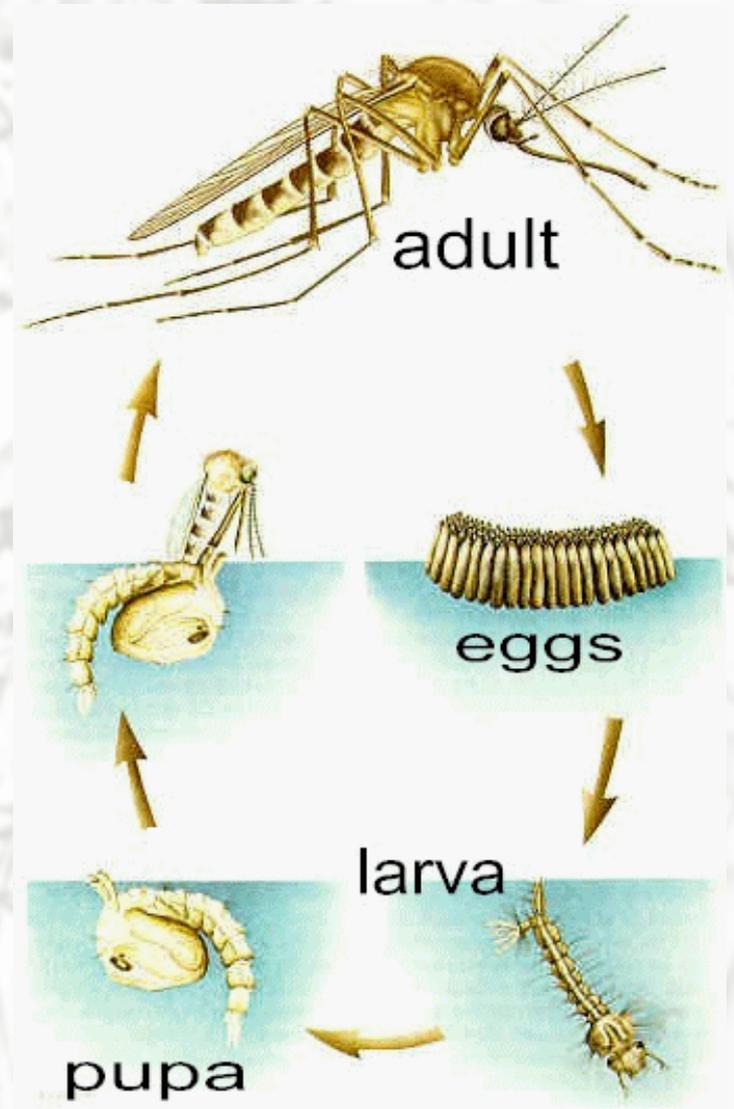
# About the Vector

- *Culex quinquefasciatus*
- Other possible-
  - *Culex restuans*
  - *Culex tarsalis*
  - *Aedes albopictus*
- Multiple hosts



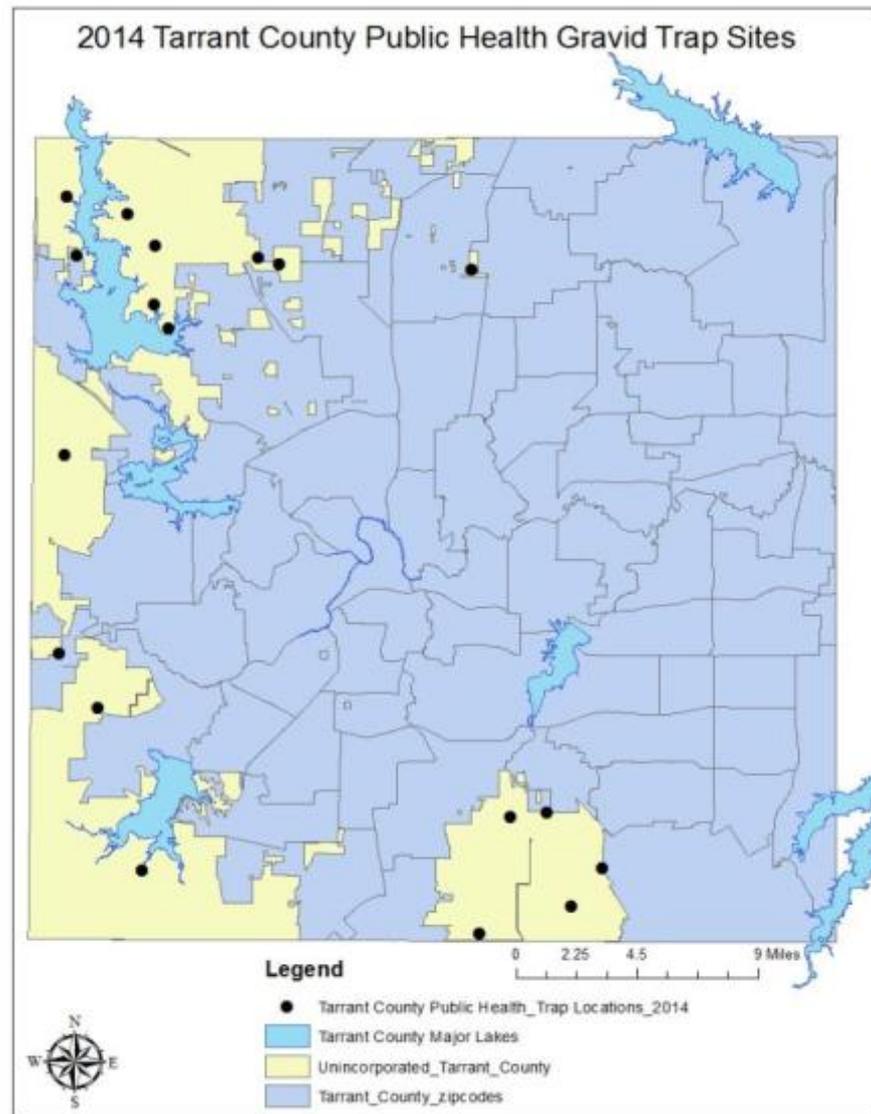
©1999 Richard C. Russell

<http://medent.usyd.edu.au/arbovirus/mosquit/culexquinquefasciatus.htm>



<http://www.mosquito-misting.com/life%20cycle.htm>

# Area for TCPH



Map created by Shannon Solberg

# WNV Surveillance in Mosquitoes

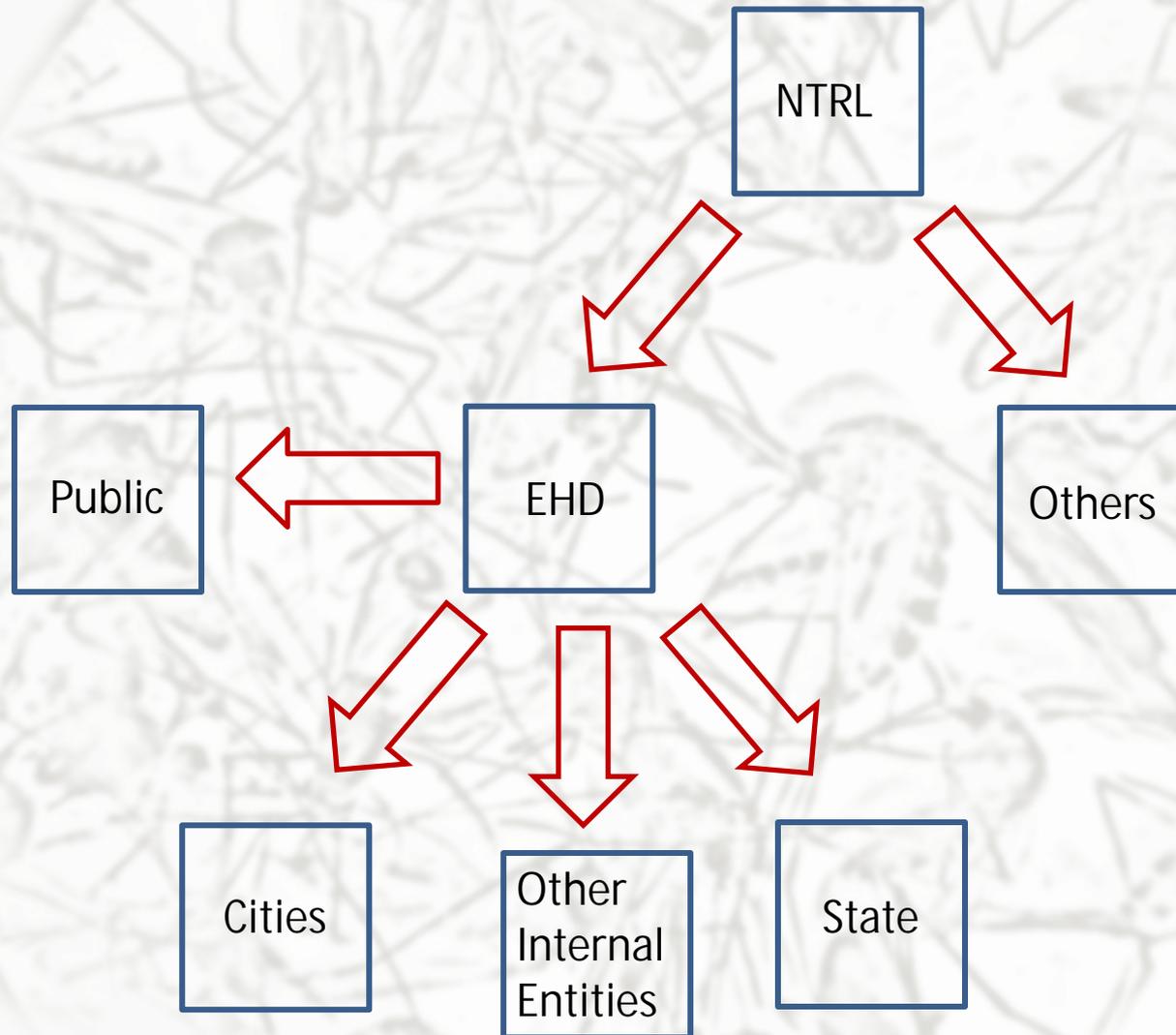
- Collection
  - CDC Gravid traps
- Identification
- Separation and prep
- Homogenate
- RNA isolation
- Real time RT-PCR



<http://johnwhock.com/products/mosquito-sandfly-traps/cdc-gravid-trap/>

NTRL

# WNV Surveillance in Mosquitoes



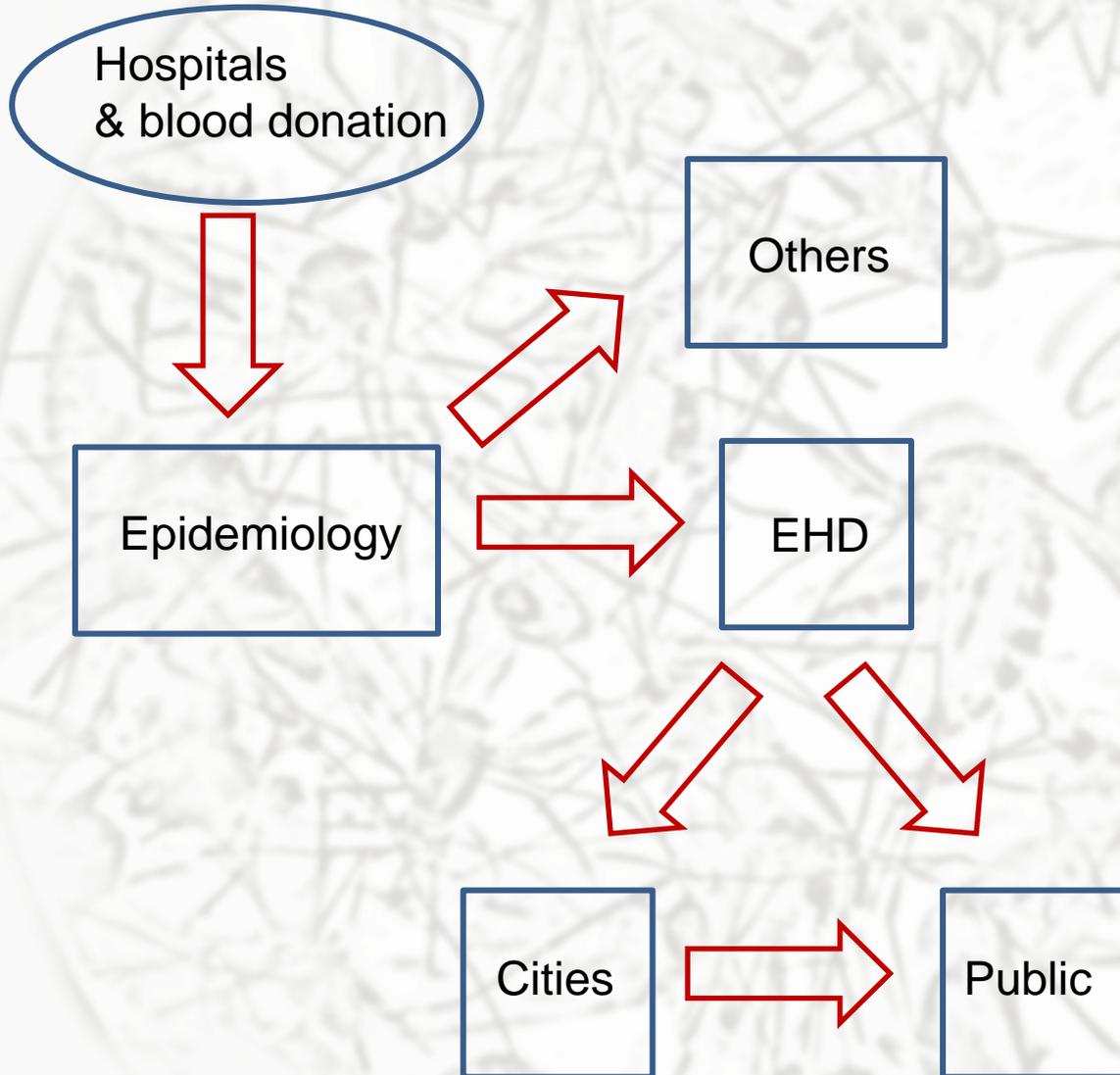
# WNV Surveillance in Mosquitoes

- Calculations in Risk Assessment
  - Minimum infection rate
    - Estimates % of mosquitoes carrying WNV
    - # of positive pools/total number of mosquitoes tested
    - Biases
    - Usually expressed per 1000 mosquitoes ( $\times 1000$ )
  - Vector index
    - How many mosquitoes/trap have WNV
    - MIR  $\times$  average number of mosquitoes/trap

# WNV Surveillance in Humans

- WNV is nationally notifiable
- Neuroinvasive vs. febrile disease
- Case Definition
  - IgM positive
  -

# WNV Surveillance in Humans



# WNV Surveillance in Birds

- Dead bird reporting?
  - Limited in many places
  - Detection
- Resources
- Tarrant- passive reporting



# WNV Surveillance in Horses

- Reportable by vets to the state
- Disease manifestation similar to humans
- Equine vaccines = less horse sickness



# Responses to Positives

- TCPH
  - One Positive (mosquitoes) = aduenticiding
  - Ongoing positives in a row = aduenticiding 2 or 3 consecutive nights
  - Outbreak = possible aerial aduenticiding
- Human Cases = additional trapping around the area
- Other cities
  - Most follow our protocol- hire company to aduenticide (usually a yearly contract)
  - Fort Worth
    - Aduenticide only if multiple positives in the same location

# Mosquito Investigation

- Complaint basis
- Call the environmental health division
  - Green pools
  - Abandoned properties
  - Know of a mosquito source



<http://www.nwmadil.com/images/tires3.jpg>



<http://www.nwmadil.com/breeding%20sites1.htm>



<http://www.sccgov.org/sites/vector/pests/Pages/surveys.aspx>

# Laws

- Health and Safety Codes (Texas Constitution)
  - Title 5 (Sanitation and Environmental Quality)
    - Subtitle A (Sanitation)
      - Chapter 341 Minimum Standards of Sanitation and Health Protection Measures
        - » Subchapter B (Nuisances and General Sanitation)
          - .011-Defines public health nuisances
          - .012-Requires abatement of the nuisance
          - .019- Public official can treat an abandoned or uninhabited property w/ mosquito breeding sites (9/13)

# Laws

- Chapter 343 (Abatement of Public Nuisances)  
Subchapter B
  - » .011- maintain property so as not to attract mosquitoes, rodents, vermin or disease-carrying pests
  - » .012- Penalty- between \$50 and \$200 if not abated within 30 days of notification (first offence). With previous offences- between \$200 and \$1000 and/or confinement in jail for no more than six months. Each day a violation occurs is a separate offense.
  - » .013- After trial for .012 and Injunction- County Officials can remedy the violation
- Subchapter C
  - » .024- Authority to enter premises with identification

# Laws

- Chapter 344 (Mosquito Control Districts)  
Subchapter A
  - » .001 Needs at least 200 voters petition for Abatement District and tax on property not exceeding 25 cents/100 dollars
  - » .002 Ballot for election
  - » .003 Commissioners can lower tax
  - » .004 Advisory commission board
  - » .005 Mosquito control engineer (district manager)
  - » .006 Ability to merge districts
  - » .007 Ability to dissolve districts

# Larval Surveillance

- Texas has 85 mosquito species- AMCA (<http://www.mosquito.org/faq>)

<http://www.mfwwc.org/floodplain.html>

- Vernal pool
- Permanent pool
- Floodplain
- Treehole



<http://www.bio.umass.edu/biology/conn.river/vernal.html>



# Larval Control

- Natural predator
  - Mosquito fish (*Gambusia affinis*)
- Larvicides- control larvae!
- Microbial
  - Bti (*Bacillus thurengensis israelensis*)
  - Bs (*Bacillus sphaericus*)
  - Spinosad <sup>TM</sup>



[http://wdfw.wa.gov/ais/gambusia\\_affinis/](http://wdfw.wa.gov/ais/gambusia_affinis/)

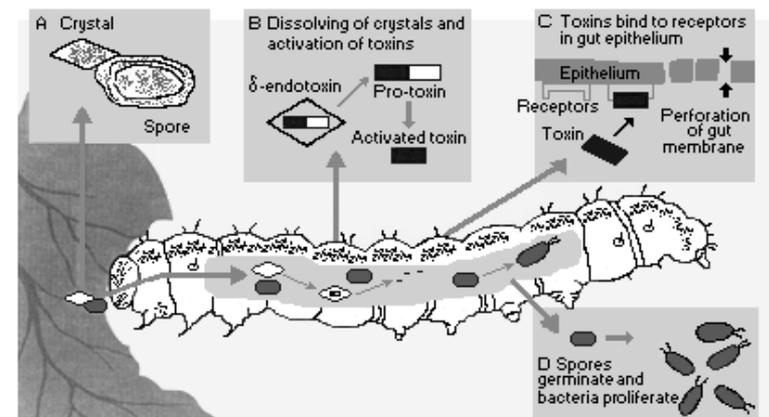


Fig. 1. Mechanism of toxicity of Bt

<http://www.inchem.org/documents/ehc/ehc/ehc217.htm>

# Larval Control

- Chemical
  - Methoprene (and other IGRs)
  - Monomolecular Films (MMFs)
  - Oils
  - Temophos (OP)



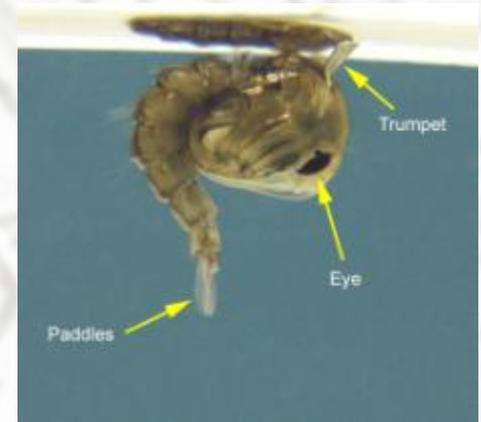
<http://www.norfolkcountymosquito.org/Products.html>



<http://www.landcareresearch.co.nz/resources/identification/animals/bug-id/alphabetical-list-of-bugs/mosquito-larvae-wriggler>



[http://www.lowes.com/pd\\_92460-1643-MODU1\\_0](http://www.lowes.com/pd_92460-1643-MODU1_0)



<http://fme1.ifas.ufl.edu/key/anatomy/pupal.shtml>

# Adult Surveillance

- Traps
  - Gravid
  - CO<sub>2</sub>
  - NJLT
  - Resting boxes



<http://johnwhock.com/products/mosquito-sandfly-traps/new-jersey-stainless-steel-light-trap/>



<http://www-rci.rutgers.edu/~insects/restbox.htm>



<http://www.citrusmosquito.org/surveillance.php>

# Adult Control

- ULV
  - Truck, aerial, hand held
    - Pyrethroids
    - Organophosphates



<http://www.flickr.com/photos/afpmb/4707005702/>

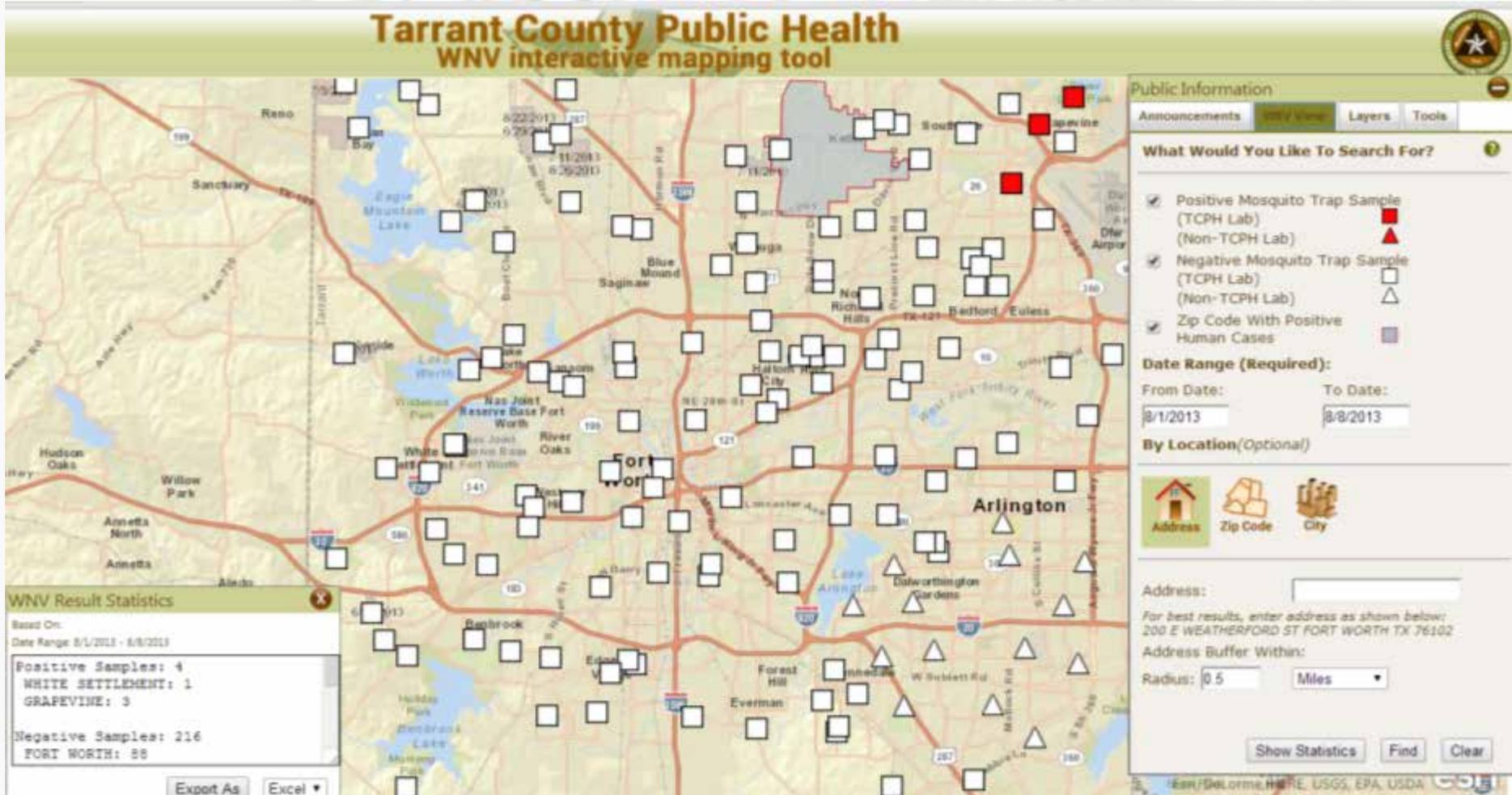


<https://www.casscountynnd.gov/county/depts/Vector/control/Pages/AdultControlProducts.aspx>

# Media

- Tarrant County website (Public Health)
  - Interactive map
    - Must enter date range when traps have been set
    - Gives approximate locations on where traps are set for mosquitoes- also test + or – for WNV
    - Gives zip code locations of human + for WNV
      - Abides by HIPPA

# Media



<https://mapit.tarrantcounty.com/WNVCoopPublic/#>

# Media

- Education tables at health fairs
  - Pamphlets, fliers, small cans of DEET, showed examples of larvae and mosquito traps
- Numerous newspaper and news channel reports



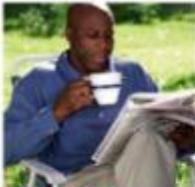
# Media

Remember the  
**“Four D’s”**  
to defend yourself against  
**West Nile virus**



### **DUSK / DAWN**

are the times of day you should try to stay indoors. This is when infected mosquitoes are most active.



### **DRESS**

in long sleeves and long pants when you're outside. For extra protection, you may want to spray thin clothing with repellent.



### **DEET**

(N, N-diethyl-m-toluamide) is an ingredient to look for in your insect repellent. Follow label instructions, and always wear repellent when outdoors.



### **DRAIN**

standing water in your back yard and neighborhood — old tires, flowerpots, and clogged rain gutters. These are mosquito breeding sites.



Tarrant County  
Public Health

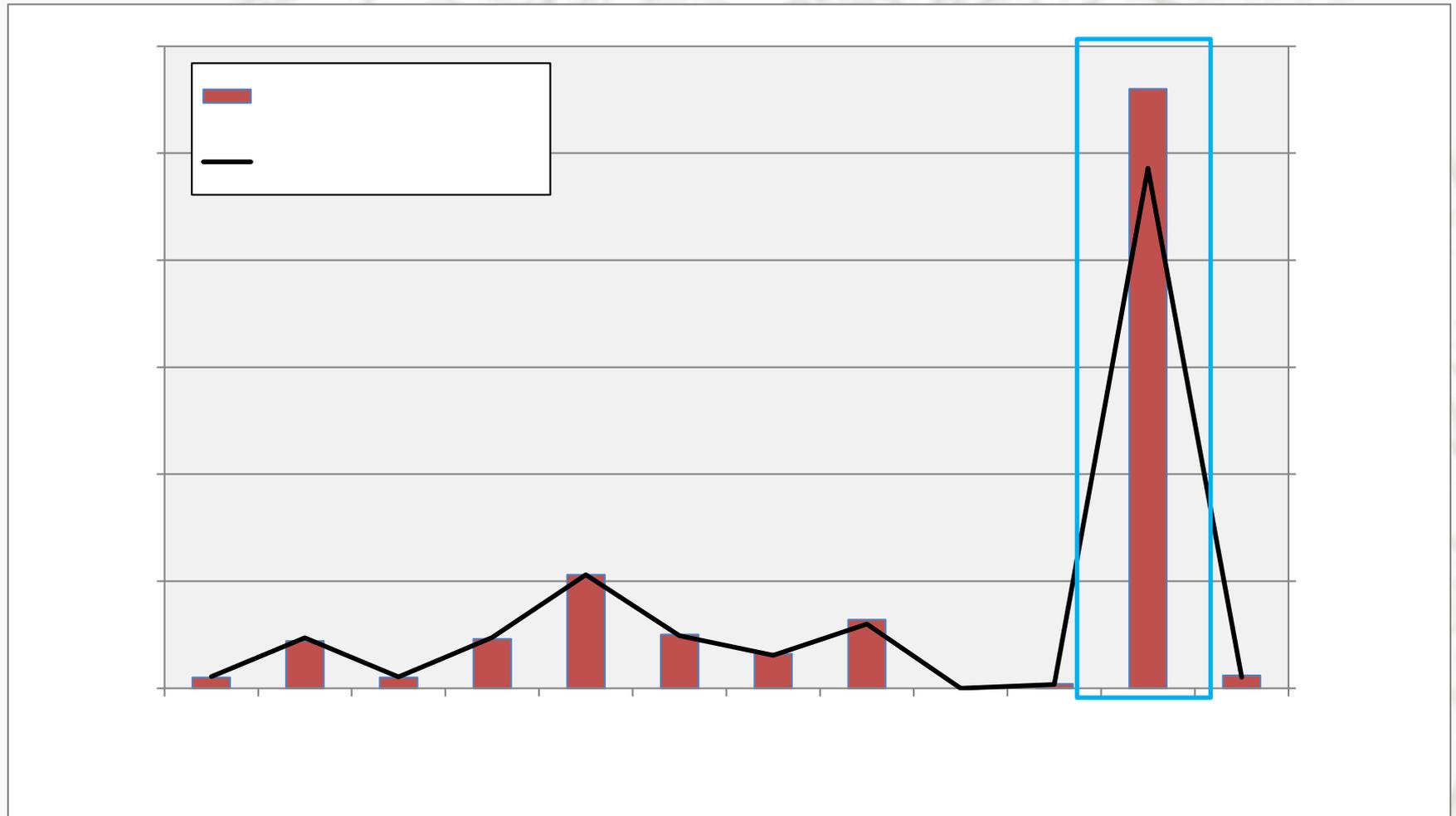
<http://health.tarrantcounty.com>

**FIGHT  
THE BITE!**

**JOIN THE  
“SWAT TEAM” AGAINST  
WEST NILE VIRUS**

<http://www.citrusheights.net/home/index.asp?page=10&recordid=1227>

# Human Cases, Tarrant County 2002-2013



WNV associated mortality: ; ; ; ;

Data prepared by Mickey Moerbe, Epidemiology

# Human Cases in 2012

- WNF -179
- WNND - 101
- Deaths - 11
- Cities involved - 23, plus unincorporated Tarrant County

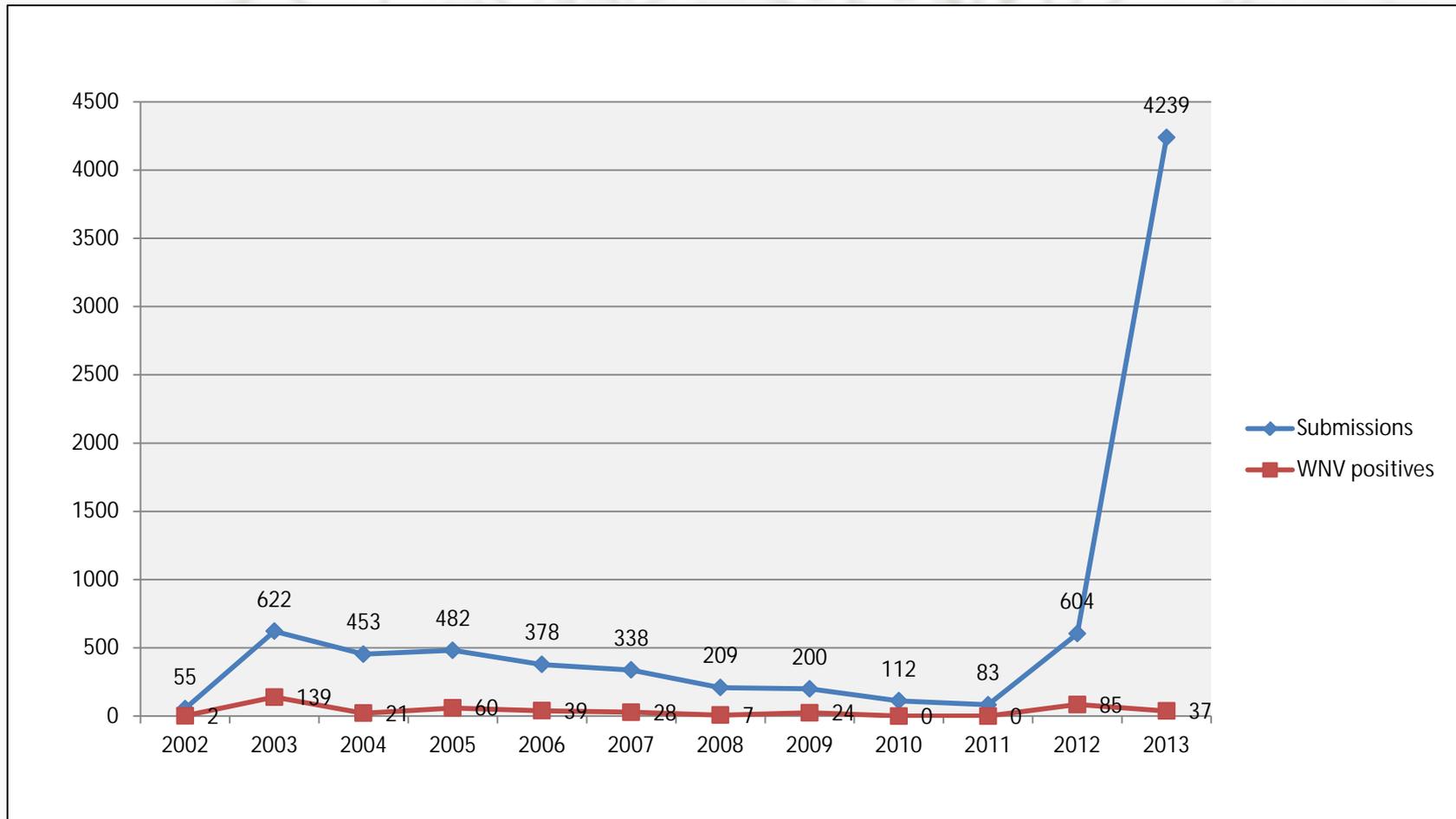
# Human Cases in 2013

- WNF - 3
- WNND - 6
- Deaths - 2
- Cities involved - 4

# Why the Outbreak?

- Confluence of ecologically interrelated drivers may be responsible for the outbreak
- Amplification of West Nile virus in its enzootic bird–mosquito–bird transmission cycle depends on several critical factors that are differentially influenced by the weather, including the numbers and distributions of susceptible birds and vector mosquitoes and the rate of virus replication in mosquitoes
  - In English? Could be a lot of things...

# As a result of 2012



Graph modified from data supplied by RP Nilsson, PhD, NTRL

# For the future

- Prior- only gravid traps (resting storm drain collection in 2002)
- For future
  - Regular gravid trapping
  - Year round NJLT collection
  - Occasional CO2 traps
  - Resting collections
  - Dead bird clustering?
  - Sentinel chickens?

# Acknowledgements

- Tarrant County Public Health
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