West Nile Virus Update

April 15, 2014
CFW-UNTHSC Partnership WNV Surveillance and Response Program

- Environment-conscious and Risk-based Response Plan
- Weekly surveillance for the entire city
- Rapid responses to any confirmed WNV activities
  - Targeted public education
  - Assessment of potentials to further spread the virus transmission
- Surveillance WNV activities in the city parks
West Nile Virus-2013 Timeline

- **Jan**: WNV Discussions, TCHP and UNTHSC
- **Feb**: WNV Response Plan Developed
- **Mar**: WNV Surveillance Starts
- **April**: 1 Human Case Report
- **June**: 1 Positive Mosquito Pool Sample
- **July**: 2 Human Case Reports
- **August**: 2 Human Case Reports
- **Sept**: 1 Human Case with WNV Death
- **Oct**: 2 Human Case Reports
- **Nov**: 4 Positive Mosquito Pool Samples
- **Dec**:
Phased Response

+ WNV Virus Mosquito Pools & Related Human Cases

Isolated + WNV Mosquito Pools

Start of Season

Education Outreach Surveillance Larvicide

Off season

Planning Education Outreach

Education Outreach Surveillance Larvicide Targeted Ground Spray - Option

WNV Outbreak in Progress

Education Outreach Surveillance Larvicide Targeted Ground Spray*

*Consider other Epi factors before any spraying measure

IF aerial spraying is recommended by TCPH consider as option
City – County Responsibilities

County
• County Public Education
• Disease Reporting
• Epidemiology
• Lab
• Surveillance support

City
• [City Public Education](#)
• Vector mosquito (WNV Transmitter) surveillance/ Data management and analysis (Dr. Lee at UNTHSC)
• Larviciding
• Adulticiding (Spraying)
WNV Vector (Transmitter) Mosquito Surveillance

- Trapping locations
  - 42 Fire Stations
  - 8 Residential sites
WNV Vector (Transmitter) Mosquito Surveillance

- 42 Fire Stations
- 8 Residential sites
# WNV Human Cases in 2013

<table>
<thead>
<tr>
<th>WNV Activity</th>
<th>2013</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human cases (Deaths)</td>
<td>6 (1)</td>
<td>81 (4)</td>
</tr>
<tr>
<td>Positive mosquito pools</td>
<td>5</td>
<td>15</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2013 Characteristics</th>
<th>City of Fort Worth</th>
<th>Tarrant County</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Cases</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td>West Nile Fever</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>West Nile Neuroinvasive</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>Number of Deaths</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>
Responses to the WNV Activities in 2013

- 6 human cases: Responded within 24 hrs of any case report
  - Canvassing
  - Assessing Environmental Exposure Risk
- 5 Positive vector (transmitter) mosquito pools:
  - Estimating Vector Index (i.e., Exposure Risk to WNV)
  - Assessing Environmental Exposure Risk within 48 hours of the lab results
  - Larviciding (Control of immature mosquitoes)
- Citizens’ call of concern
  - Assessing Environmental Exposure Risk within 48 hours of a concern
  - Communicating with concerned citizens
WNV Vector Mosquito Surveillance

<table>
<thead>
<tr>
<th>Summary of WNV Surveillance in the Primary Vector Mosquito</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Trap Nights</strong></td>
</tr>
<tr>
<td><strong>Total No. of WNV vector mosquito collected</strong></td>
</tr>
<tr>
<td><strong>No. of the mosquito/ trap-night</strong></td>
</tr>
<tr>
<td><strong>No. of WNV positive pools/ No. of pools tested</strong></td>
</tr>
<tr>
<td>(No. of mosquito tested)</td>
</tr>
<tr>
<td><strong>Minimum Infection Rate</strong></td>
</tr>
<tr>
<td><strong>Vector Index (Risk of Exposure)</strong></td>
</tr>
</tbody>
</table>

*When VI is higher than 0.5, an epidemic (large outbreak) of WNV will likely occur, according to Chung et al., (2013).

The highest vector index in 2013 was 0.124 in the week of October 1.
WNV Vector Mosquito Surveillance

No. of Cx. mosquitos/Trap-night

Date of Mosquito Collection

Cumulative No. of Culex spp.

No. of Cx. mosqs/trap-night


Life Cycle of the Primary WNV Vector

1. Egg raft

2. Larvae (immature)

3. Pupa (immature)

4. Adult (female)
Implication of capturing 45,000 egg-carrying mosquitoes???

About 4 million* more WNV transmitter mosquitoes!

*Estimation is based on gravid rate (78%) obtained from observations in 4,274 mosquitoes collected from July 2 until Aug. 6, and Lee’s secondary analysis from the published information in Suman et al., (2011).
Risk of WNV Exposure in the Selected City Parks

- Light trap: Immediate risk of WNV transmission at or near the collection site
- Period: June 11—Sept. 30
- City Park
  - Fort Worth Nature Center and Refuge
  - Botanical Garden
  - Acadia Park
  - Gateway Park
  - Cob Park
  - Rolling Hills Park
Risk of WNV Exposure in the selected City Parks

Table. Potential WNV vectors collected in the Light Trap and their testing results for WNV infection

<table>
<thead>
<tr>
<th>WNV Vector Species</th>
<th>No. of mosquitoes tested</th>
<th>No. of pools tested</th>
<th>No. of WNV positive pools</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Culex quinquefasciatus</em></td>
<td>84</td>
<td>22</td>
<td>0</td>
</tr>
<tr>
<td><em>Culex erraticus</em></td>
<td>243</td>
<td>18</td>
<td>0</td>
</tr>
<tr>
<td><em>Aedes albopictus</em></td>
<td>21</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td><em>Aedes aegypti</em></td>
<td>37</td>
<td>5</td>
<td>0</td>
</tr>
</tbody>
</table>
2014 Plan

• Same level of WNV Prevention, Surveillance, and Response Activities

• Assessment of Exposure Risk in the city parks
  – Botanical Garden
  – Fort Worth Nature Center and Refuge
  – Fort Worth Zoo

• Developing A Citizen Participatory WNV Vector Control Program
Protect yourself against West Nile Virus

1. **DUSK AND DAWN**
   - Stay indoors at dusk and dawn. This is when infected mosquitoes are most active.

2. **DRESS**
   - Dress in long sleeves and pants when you are outside. For extra protection, you may want to spray thin clothing with repellent.

3. **REPELLENT**
   - Use repellent, follow label instructions and always wear repellent when outdoors.

4. **DRAIN**
   - Drain standing water in your yard and your neighborhood—old tires, flowerpots, and clogged rain gutters are just a few sites mosquitoes use to breed.

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Education

- 4 D’s
- 5 X 5
- PSA
- Twitter
- Facebook
- Neighborhood Emails
- Trade Organizations
## Mosquito Repellent

<table>
<thead>
<tr>
<th>Registered</th>
<th>Unregistered (Minimum Risk Pesticides but unproven effectiveness)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>• DEET (N,N-diethyl-meta-toluamide)</strong></td>
<td><strong>• Caster oil</strong></td>
</tr>
<tr>
<td></td>
<td><strong>• Cedar oil</strong></td>
</tr>
<tr>
<td></td>
<td><strong>• Cinnamon and cinnamon oil</strong></td>
</tr>
<tr>
<td></td>
<td><strong>• Citric acid</strong></td>
</tr>
<tr>
<td></td>
<td><strong>• Citronella and citronella oil</strong></td>
</tr>
<tr>
<td></td>
<td><strong>• Garlic and garlic oil</strong></td>
</tr>
<tr>
<td></td>
<td><strong>• Peppermint and peppermint oil</strong></td>
</tr>
<tr>
<td></td>
<td><strong>• Rosemary and rosemary oil</strong></td>
</tr>
<tr>
<td></td>
<td><strong>• Thyme and thyme oil</strong></td>
</tr>
<tr>
<td></td>
<td><strong>• Others</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Product Name</th>
<th>DEET Insect repellent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approved Date</td>
<td>Nov. 30, 2012</td>
</tr>
<tr>
<td>EPA Reg. No.</td>
<td>51147-1</td>
</tr>
<tr>
<td>Current Status</td>
<td>Active (Jan 13, 1984)</td>
</tr>
</tbody>
</table>

http://www.epa.gov/oppbppd1/biopesticides/regtools/25b_list.htm
2013 CFW-UNTHSC Partnership WNV Program

• Code Compliance
  – Mr. Brandon Bennett
  – Mr. Elmer DePaula

• UNTHSC
Benefits and Products of the WNV Partnership Program

• Leading the Tarrant County to use better practices!
• Training opportunity for students to get hands-on experience
• Applying science-based practices and Creating the best practices for the city—*A model program in Texas!*

  • “Environmental Exposure Risk Assessment of WNV in City Parks of Fort Worth, Texas”
    – 2014 Texas Public Health Association conference (March)
    – 2014 UNTHSC Research Appreciation Day Presentation (March)
  • “Evaluation of Weather factors and Storm Drain System Components for Abundance of the Primary WNV Vector Mosquito Population”
    – 2014 UNTHSC Research Appreciation Day Presentation (March)
WNV NO MORE!

THANK YOU!