Interventions

How do we control these arboviruses??
Massachusetts WNV Risk Categories

Effective September 20, 2012

Current WNV Risk Level:
- Remote
- Low
- Moderate
- High
- Critical

State Laboratory Institute
Arbovirus Surveillance Program
Mosquito Abatement Practices

Water Management

Larviciding

Adulticiding
Larvicide Program

To reduce the emergence of adult mosquitoes in areas where mosquito larvae are present and targeted to specific water source

• Control the larval and pupal stages
  – No control measures for the egg stage
• Use biological pesticides when applicable
• Rely on MassGIS photos and MADEP wetland layers
Hand & Aerial

• Database for hand applied larvicide requests
  o Record time and date
  o Wet or dry
  o Larvae present or not
  o Calculate application rate based on product
  o Catch basins

• Helicopter applications
  o Pre and Post data collection from known breeding sites and non-treatment control sites for comparison
  o Application normally made in the spring before the tree’s leaf out
  o Not all MCP have an aerial larvicide program
Larviciding for WNV

• Cx. pipiens
  - Lots of small containers in people’s yards
  - Catch basins
  - High organic matter
Larviciding for EEE

- **Cs. melanura**
  - Habitat usually within sensitive areas
  - Low pH
  - Research has shown few products work due to habitat, water conditions or have difficulty delivering into crypts
  - Biorational product - *B. sphaericus* shows potential in a laboratory setting
Larviciding for EEE

- *Cq. perturbans*
  - Cattail areas are extensive
  - Delivering product to where larvae are within the root systems
  - Larvae do not surface so hard to evaluate control measures
Adult Control

Ground vs. Aerial
Mosquito Adulticides

- Pesticides designed to travel as an aerosol through the air to come in contact with a adult mosquito

- Small droplets remain airborne for a period of time necessary to come in contact with a mosquito

- Down wind movement of adulticide droplets are essential to their effectiveness
Products

• Pesticide
  ▪ Anvil® 10+10 (Sumithrin 10.0% and Piperonyl Butoxide 10.0%)

• Rate of Application
  ▪ 0.21 to 0.62 oz/acre
Why Anvil?

- Synthetic Pyrethroid = quick knockdown
- Highest Oral LD 50 > 10,000 mg/kg
- No Aquatic setback
- Most environmentally sensitive adulticide
- Registered for use in MA
- No biting frenzy
- Non Corrosive, No Paint Spotting
- Virtually Odorless
Making Applications

Starts with either a residential request or population levels in our traps that warrant control measures for nuisance or vector reasons.
Adult Control – Truck
ultra-low volume (ULV)
ULV Spraying Parameters

- 5-15 mph
- Not less than 55° F
- Not while raining
- Not in winds of greater than 10 mph
- Between dusk and dawn

- Nozzle position or angle has no effect
- Spray leaving cul-de-sacs
- Turn spray off for pedestrians
Truck Obstacles

- Schools and Day cares
- Other NO Spray Areas
- Physical Objects
- Effective Range
  - 300ft Range
    - ~ 90% at 100 ft.
      - More product within the first 100 ft.
    - ~ 50% at 200 ft.
    - ~ 10% at 300 ft.
What the Driver sees

• Can add any data layers that you need
  – Wetlands
  – Priority Habitat
  – Individual No Sprays
  – Schools and Daycares
Maps created by Bristol Co. truck-based spray equipment
Red line- No application
Green Line- Application of pesticides
WNV vs. EEE Control

- **WNV** tends to be found in areas where backyard breeders are responsible and they don’t fly very far
  - Truck-based application work best
  - May require multiple applications because of rebounding

- **EEE** tends to be found in the swamp areas
  - Aerial applications work best
Better Coverage and Evenness of Application
Aerial Applications in Southeast MA for EEE

- 1956, 1957, 1958- DDT
- 1973, 1974, 1975- Malathion
- 1990- Malathion
- 2006, 2010, 2012- Anvil
Aerial Adulticiding Goal

Primary Goal

• Knock out/reduce immediately “mammal biters”

Secondary Goal

• Halt/ slow down amplification between birds and mosquitoes
Aerial Adulticiding Staging Area

- Operational decisions are made with input from many state agencies, special interest groups, local officials and MCPs
- Pilot and ground crew briefings
- Calibration Tests
- Efficacy Trapping
- Droplet and Weather Data
Where do we spray?

6.1 mile radius circle around EEE foci
First Application 2006
Proposed Areas and Exclusion Zones for Mosquito Spraying Operations
August 3, 2010

Legend
- Treatment Area
- Public Water Supply- No Spray
- NHESP No Spray
- Coast- No Spray
- Aquaculture_Organic Farms- No Spray

Proposed Spray Polygon: 302,062 acres
Proposed No- Spray Area: 17,550 acres
Net Spray Area: 284,512 acres
## Efficacy

<table>
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<tr>
<th>Species</th>
<th>Treatment night of 20 July 2012</th>
<th>Treatment night of 22 July 2012</th>
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<tbody>
<tr>
<td>Cs. melanura</td>
<td>66.8%</td>
<td>14%</td>
</tr>
<tr>
<td>Cq. perturbans</td>
<td>86%</td>
<td>No control</td>
</tr>
<tr>
<td>Oc. canadensis</td>
<td>55.4%</td>
<td>No control</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>75.1%</td>
<td>No control</td>
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</table>
Map of Spray Block and Traps for Aerial Intervention on 13 August 2012
### Efficacy for Application 13 Aug 2012

<table>
<thead>
<tr>
<th>Species</th>
<th>% Control</th>
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<tbody>
<tr>
<td>Cs. melanura</td>
<td>73.9</td>
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<tr>
<td>Cq. perturbans</td>
<td>63.3</td>
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<tr>
<td>Oc. canadensis</td>
<td>No control</td>
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<tr>
<td>Ae. vexans</td>
<td>44.7</td>
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<td>Overall</td>
<td>47.2</td>
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</tbody>
</table>
NO human cases to date have been reported within the Aerial spray zone

Aerial efficacy is primarily based on the chemical chosen, temperature, wind speed, and droplet size
Aerial Adulticiding
Environmental Monitoring

- Bees-MDAR
- Water Supplies-DEP
- Macroinvertebrates-DEP
- Cranberries-DEPH
- Non-Target Species-DFW
Risk Communication
Protecting Yourself- 5D’s

• Avoid outdoor activities at Dusk and Dawn
  – **Dress:** Wear long sleeves and pants when outdoors

• Use repellents and follow the label:
  – **DEET**
  – Picaridin
  – Oil of Lemon Eucalyptus
  – Permethrin (great for ticks)

• **Drain:** Remove Standing Water
The Future of EEE and WNV in MA

• Both viruses are here to stay

• Periodic epidemics
  o Unknown how often epidemics of WNV will occur
  o EEE epidemic occurrences have increased with unknown causes

• Key to management is interrupting the virus cycle by reducing the vector population
  o Water management
  o Larviciding
  o Adulticiding
Thank You!