CONTROLLING CULEX

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Overview

- History of Culex pipiens/restuans in the City of Norfolk
- Identifying the problem
- Challenges
- Study Design
- Results
- Discussion
Past Data on Culex pipiens in Norfolk 2014-2019

**Trapping:**
- Of the 307,018 mosquitoes trapped, 203,909 were Cx. pip/res, 66%
- Average Cx. pip/res per gravid trap: 68
- Record high of 1677 collected on May 30, 2018

**West Nile Virus (WNV) Activity**
- 6 year average for WNV positive mosquitoes pools: 54
- 2018 Record setting year for Cx. pip/res WNV positives: 198
Where are they coming from?

- Urban/Suburban Landscape
  - Artificial Containers
  - Trash and Debris
  - Polluted Water

- Ditches
  - Stormwater
  - Tidal

- Utility Structures
  - Pump Stations
  - Catch Basins
Target: Catch Basins

- Majority of catch basin in Norfolk were installed in the 1950s.
- Percentage of drains hold water continuously.
- Mosquito breeding observed in catch basins.
- Historically drains were treated as needed.
- Wide-scale treatments have been attempted but poorly tracked and timed.
- Use the City’s GIS data to identify and locate all of the catch basins in the City of Norfolk.
Challenges

Approximate # of catch basins: 8,500

Small Staff: 4 plus Crew Leader

Lifting storm drain lids can lead to injury and accidents.

High Cost
Study Design

- Two replicates
- 3 different treatment methods and a control
- Monitor Culex pipiens/restuans population in each study block
- Evaluate the effectiveness of each treatment on the adult mosquito population
Site Selection

- Two Test Areas: Norview and Kempsville
  - 4 trapping locations each, all pump stations excluding one site.
  - Use the City’s GIS database to identify all catch basins with \( \frac{1}{4} \) mile of each trap site.
  - Drains were pre-marked with \textcolor{green}{green} spray paint to alert Vector Control Staff NOT to treat drains located in the study areas.

- Study sites represented areas of historically moderate mosquito population activity.
## Treatment Cost Comparison

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Duration</th>
<th>Cost Per Drain</th>
<th>No. of Treatments*</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fourstar CRG</td>
<td>60 days</td>
<td>$0.26</td>
<td>34,000</td>
<td>$8,840</td>
</tr>
<tr>
<td>Fourstar 180 briquet</td>
<td>180 days</td>
<td>$3.41</td>
<td>17,000</td>
<td>$57,970</td>
</tr>
<tr>
<td>Nuvan Prostrip</td>
<td>120 days</td>
<td>$3.51</td>
<td>17,000</td>
<td>$59,670</td>
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</tbody>
</table>

*Based on treating 8,500 drains from March 1 to November 1 (245 Days).*
Methods

- Gravid traps placed at trap sites every other week on Thursday and collected on Friday.

- Begin trapping on Week 17.

- Collect baseline mosquito population data prior to treating storm drains.

- Initially hoped to apply treatments at week 23 but delays pushed it to week 32.

- Conclude trapping at week 42.
Results - Kempsville

Treatment Applied
Week 32

Legend:
- NORF056 - Fourstar CRG
- NORF063 - Control
- NORF134 - Nuvan
- NORF179 - Fourstar 180
Results - Norview

Treatment Applied
Week 32

- NORF089 - Fourstar CRG
- NORF147 - Control
- NORF149 - Fourstar 180
- NORF165 - Nuvan
Results – All Traps

![Graph showing results for different traps and treatments]
Results

- Treatments applied at Week 32
- Decrease for 2 weeks post treatment
- Sharp Increase at Week 36
- Treated areas follow same trends as control areas
- No significant suppression observed
- Trapping numbers impacted by other influences
Gravid Water

- Two barrels in rotation when on full scale trapping schedule
  - Approximately 36 gravid traps set per week
  - Gravid water also used by Naval Station for gravid trapping
- 2019, Reduced trapping schedule due to loss of Environmental Health Assistant
  - Right barrel regularly updated, left barrel not refreshed.
  - Left barrel used for study sites
Results - Norview

Traps set with Fresh Gravid Water

Treatment Applied Week 32

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Code</th>
<th>Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fourstar CRG</td>
<td>NORF089</td>
<td>Blue</td>
</tr>
<tr>
<td>Control</td>
<td>NORF147</td>
<td>Red</td>
</tr>
<tr>
<td>Fourstar 180</td>
<td>NORF149</td>
<td>Yellow</td>
</tr>
<tr>
<td>Nuvan</td>
<td>NORF165</td>
<td>Gray</td>
</tr>
</tbody>
</table>
Precipitation and Culex Totals by Week

Week

Inches of Rain

Total Culex Trapped

Rainfall

Cx pip
Conclusions

■ Influence of catch basins on overall Culex population is undetermined.
■ No treatment method was more effective than the others.
■ Age of gravid water had impact on trap numbers.
■ Decreased rainfall contributed to increase in trap numbers.
Acknowledgements

- Stephen Rehak
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  - Mona Smith
  - Philip Benton
- Ted Bean, Adapco Inc.

Any Questions?