A Look at the Local Level
Mosquito Surveillance and Vector Control Planning

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Ohio Department of Health

2017 Mosquito Vector Surveillance and Control Regional Workshops
Quick links to specific topics:

- **Gravid traps** for *Culex* mosquitoes (West Nile Virus) - slide 4
- **BG Sentinel traps** for *Aedes* mosquitoes (Zika Virus) - slide 16
- **NEW field collection records** and trap IDs - slide 26
- List of assigned 4-digit **agency numbers** - slide 31
- **Shipping** information - slide 43
- Creating a **vector control plan** - slide 48
Reasons to Conduct Surveillance

- Determine where mosquitoes are most abundant
- Identify mosquito breeding sites
- Create distribution maps of identified species
- Track populations and infection rates over time
- Focus control measures for greatest impact
- Evaluate effectiveness of pesticide application
Culex spp. mosquitoes (the vectors for West Nile Virus) are drawn to stagnant pools of nutrient-rich water for laying their eggs.

Gravid traps re-create this preferred breeding environment to attract females that have already had a blood meal.
Parts of an Upright Gravid Trap

- Collection net
- Trap body
- Brackets
- Tub

Fan inside trap body (before net)
Parts of a Toolbox Gravid Trap

- **Collection net**
- **Trap body**
- **Brackets**
- **Tub**
- **Fan inside trap body (after net)**
How Gravid Traps Work

Orange arrows indicate the direction of airflow.
To create the stinky organic water, ODH uses:

- Fresh-cut grass clippings
- Large containers with spigot at bottom
- Clean, fresh water
- 5-7 days in the sun/heat

For stronger brew, try adding:

- Moldy grass clippings
- Brewer’s yeast
- Lactalbumin (malted milk powder)
- Rabbit alfalfa pellet food

For easier clean-up, try making a grass clipping “tea bag” with:

- Fiberglass screen
- Synthetic twine
Culex spp. mosquitoes are most active at dawn and dusk.

- Set traps no later than 2 hours before sunset
- Collect traps no earlier than 2 hours after sunrise
- Ok to leave out longer, but no more than 24 hours (less if in direct sun)

Aim for weekly collections at each location.

- More than once a week is not necessary
- Every other week is ok

Example: A county has four traps.

- Set those traps in locations #1 - #4 on Monday
- Move the traps to locations #5 - #8 on Tuesday
- Move the traps to locations #9 - #12 on Wednesday
Where to Set Gravid Traps

Place traps in areas frequented by the public.

- Start with community parks, playgrounds, picnic areas
- Around schools and sports complexes
- Cemeteries or other city-owned land
- Neighborhoods (with property-owners’ permission)

Expand to more rural locations if time and resources permit.

The aim is for surveillance data to give an idea of what is going on where people are living.
Traps can be placed near natural breeding areas.

- Retention ponds or water-holding ditches
- Storm drains, pipes, and culverts
- Low-lying areas that flood or stay “soggy”
- Edges of ponds with emergent vegetation

Ideally, gravid traps should be set in grassy areas with taller vegetation nearby, away from direct wind.
Identify centers of population (cities, towns, villages).
Using Google to Find Potential Sites

Zoom in to look for green areas.
Using Google to Find Potential Sites

Zoom in again with satellite view to see vegetation and water.
BG Sentinel traps attract *Aedes* spp. mosquitoes (potential Zika Virus vectors) with a synthetic lure that imitates the chemicals in human skin.

In addition to the scented BG lure, other attractants can be used such as Octenol, carbon dioxide, or ultraviolet light.
Parts of a Sentinel Trap

- Intake funnel
- Trap cover
- Trap body
- Funnel net
- Catch bag
- BG lure
- Fan
How Sentinel Traps Work

Orange arrows indicate the direction of airflow.
Handling and Replacing the Lures

BG “human skin” lure
✓ Skin irritant - gloves recommended
✓ Remove wrapper before using
✓ Do not expose to extreme heat or cold
✓ Store in a dry, sealed container or bag
✓ Effective for up to 5 months

Octenol bait lure
✓ WEAR GLOVES when handling!
✓ Cut open silver pouch and remove bait packet
✓ Do not expose to extreme heat or cold
✓ Store in a dry, sealed container
✓ Effective for up to 2 months
Aedes spp. mosquitoes are most active during the day.

- Traps should be out from 8:00 AM to 8:00 PM
- Ok to leave out overnight or longer
- Fully-charged 12-volt battery should last 24 hours
Where to Set Sentinel Traps

Mind the weather and surroundings when placing traps.

- Set traps in areas that will remain shaded all day
- Do not set traps if the day is windy or if they will get rained on
- Maintain approximately two feet of clearance around the trap
Aedes spp. mosquitoes don’t fly far from their breeding sites.

- Place sentinel traps within a few meters of suspected breeding containers
Using Google to Find Potential Sites

Instead of searching for areas of stagnant water:

- Search for junk yards, solid waste disposal, or recycling centers (especially those dealing with tires)
- Use satellite view to search for cluttered yards filled with items that could hold water for breeding mosquitoes
Mosquito traps can look suspicious...

- A strange object left abandoned in the park?
- What is this pipe with wires and batteries?!
- Is that cloud of gas some sort of dangerous chemical?
- Whatever it is, it doesn’t belong here

Mosquito traps can look inviting...

- Ooo, a strange object left abandoned in the park!
- Those items look like they could be worth something
- Check out the bugs inside, let’s take them home!
- Whatever it is, I bet it would be fun to tip over
Post laminated signs at each trap.

- “DO NOT DISTURB. Mosquito surveillance in progress.”
- “Property of _______ Health Department”
- “For more information, call (614) 752-1029”

Other ways to inform the public:

- Local paper or radio
- Social media accounts
- Include photos of the traps
- Communicate with groundskeepers
- Inform the local police/sheriff department
NEW for the 2017 Mosquito Surveillance Season:

Standardized Field Records and Trap Identification
The CDC is requesting new details to be included in our mosquito surveillance data reports.

- Type of trap and attractant used
- Time of day traps set and collected
- GPS coordinates and nearest street address
- Consistent naming for trap identification

A new Field Collection Record is being drafted and all agencies will be asked to use this form.

- Everyone collects and reports the same information
- More consistent and complete data that can be tracked over time
- Less time dedicated to data entry = quicker turnaround for test results
- Potential for digital submission of Field Records in the future
The new Trap IDs will be tied to a physical location.

They will remain the same from week-to-week (and ideally from year-to-year).

They will not change based on other variables.

- Type of trap used (no ‘GT’ or ‘BG’ in the ID)
- Collection date (no MMWR week # in the ID)
- Number of samples submitted (doesn’t matter if there are 8 tubes of mosquitoes from that trap or only 1, they all have the same ID)

For agencies who do their own testing before shipping their samples to ODH, record your individual sample IDs in the ‘Notes’ section of the field record.
✓ Remember: Trap IDs are tied to a physical place
✓ New Trap IDs will consist of seven digits: XXXX-XXX
✓ The first four digits are the agency number
✓ The last three digits are the location number
Agency Numbers

Every county health department has an assigned number, based on their alphabetical order out of Ohio’s 88 counties.

- **Example:**
  - Adams County is the first alphabetically, so its agency # is **0100**
  - Wyandot County is the last alphabetically, so its agency # is **8800**

Every city health department is numbered after the county in which it is located.

- **Example:**
  - Washington County’s agency # is **8400**
  - Marietta City’s agency # is **8401**
  - Belpre City’s agency # is **8402**
<table>
<thead>
<tr>
<th>County</th>
<th>Agency</th>
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# Agency Numbers – NECO Region

<p>| County    | Agency                                                                 | ID # |
|-----------|                                                                      |     |
| Ashland   | Ashland County Health Department                                    | 0300|
|           | Ashland City Health District                                        | 0301|
| Carroll   | Carroll County General Health District                               | 1000|
| Columbiana| Columbiana County General Health District                            | 1500|
|           | East Liverpool City Health District                                  | 1501|
|           | Salem City Health Department                                         | 1502|
| Holmes    | Holmes County General Health District                                | 3800|
| Mahoning  | Mahoning County General Health District                              | 5000|
|           | Youngstown City Health Department                                   | 5001|
| Medina    | Medina County Combined General Health District                      | 5200|
| Portage   | Portage County Combined General Health District                     | 6700|
|           | Kent City Health District                                            | 6701|
| Richland  | Richland Public Health                                               | 7000|
|           | Shelby City Health Department                                        | 7002|
| Stark     | Stark County Combined General Health District                        | 7600|
|           | Canton City Health Department                                        | 7601|
|           | Massillon City Health Department                                     | 7602|
|           | Alliance City Health Department                                      | 7603|
| Summit    | Summit County Public Health                                          | 7700|
|           | Barberton-Norton Mosquito Abatement District                         | 7710|
| Trumbull  | Trumbull County Combined Health District                             | 7800|
|           | Warren City Health Department                                        | 7801|
| Tuscarawas| Tuscarawas County General Health District                            | 7900|
|           | New Philadelphia City Health District                                | 7901|
| Wayne     | Wayne County Health Department                                       | 8500|</p>
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Leeanne C. Garrett, Public Health Entomologist
Ohio Department of Health - Zoonotic Disease Program
## Agency Numbers – SE Region

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Assigning Location Numbers

All location numbers will be three digits (001 through 999). You may assign these numbers however you choose.

OK to add new trap sites with new location numbers at any time throughout the season, as the need arises.

OK to discontinue trapping at a location - however, don’t re-assign that location’s number to another trap site.

Suggestions for assigning numbers:

- Simply number them in the order you set traps for the first time
- Number them west-to-east across your county
- Based on township or neighborhood (skipping numbers is ok)
Some information about the trap sites only needs to be reported once:

- Nearest street address and city
- Latitude and longitude
- Type of location (residential, school, vacant lot, etc.)

These details will be reported to ODH the first time mosquito samples are sent from that location.

If a new location is added later on, don’t forget to report this information.
Using satellite view, zoom in and click where the trap was set.
# NEW Field Collection Record

## 2017 Mosquito Field Collection Record

(report with every collection)

<table>
<thead>
<tr>
<th>Location # (001 to 999)</th>
<th>Trap Type ¹ (choose from list)</th>
<th>Attractant(s) ² (choose from list)</th>
<th>Date Trap Placed</th>
<th>Time of Day ³</th>
<th>Date Trap Collected</th>
<th>Time of Day ³</th>
<th># of Mosquitoes</th>
<th>Notes</th>
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</thead>
</table>

¹ Trap Type options: Gravid Trap / Sentinel Trap / Urban Monitor / Jersey Trap / Gryntrap / Other (describe)

² Attractant options: Organic Brew / Bees / Ocident / Light / Carbon Dioxide / None / Other (describe)

³ Time of Day options: Morning (before noon) / Afternoon (12 - 5 PM) / Evening (after 5 PM)

To be completed by ODH:

- Collection #:
- Date Received:
- Date Processed:
- Field Site:

Leeanne C. Garrett, Public Health Entomologist
Ohio Department of Health - Zoonotic Disease Program
Collecting Samples

When collecting mosquito traps, place the nets in a cooler with dry ice or in a freezer as soon as possible.
Keep mosquitoes as cold/frozen as possible when sorting and preparing for shipment.

Place no more than (approximately) 50 mosquitoes in each tube.

Label each tube clearly with:
- 7-digit Location ID
- Collection Date
- Tube ___ of ___

Ship weekly collections for ODH to receive samples as quickly as possible.
When ODH receives samples, all mosquitoes are counted and identified

All female *Culex* spp. mosquitoes are prepared and tested for West Nile Virus

You will receive an email right away if a positive sample is identified from your collection

You will receive regular updates throughout the summer regarding surveillance in Ohio as a whole

You can contact me at any time in between with questions or concerns
2017 Mosquito Surveillance Contact Information form

Thank you for partnering with the Ohio Department of Health for the current mosquito surveillance season. Your work contributes to reducing mosquito vector populations, preventing human cases of West Nile Virus, and tracking potential vectors of Zika Virus.

Every participating agency will receive regular updates throughout the summer on the overall status of mosquito surveillance in Ohio. In addition, agencies will be notified by email within 1 business day of finding a positive WNV sample among the mosquitoes collected.

It is important that we have updated contact information for your agency. At minimum, please provide the emails and phone numbers of your Health Commissioner and Director of Environmental Health, as well as the agency’s shipping address for receiving packages.

You may also provide the contact information for anyone else in your department who would like to be included in our communications. If you need to make any changes or additions to this information, send an email to Leanne.Garrett@odh.ohio.gov

Leeanne Garrett
Public Health Entomologist
Ohio Department of Health

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2017 Mosquito Surveillance Contact Information

Leeanne C. Garrett, BA, LATg
Public Health Entomologist

Zoonotic Disease Program
Ohio Department of Health
zoonoses@odh.ohio.gov
Main phone: (614) 752-1029
Secure fax: (614) 564-2437
http://www.odh.ohio.gov/zdn

Shipping Address (May – October):
Ohio Department of Health, Attn: ZDP
8995 East Main Street, Building 22
Reynoldsburg, OH 43068
Lab phone: (614) 752-1030

Shipping Address (November – April):
Ohio Department of Health, Attn: ZDP
35 East Chestnut Street, 6th Floor
Columbus, OH 43215
Office phone: (614) 752-1031

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Additional Department Contacts (continued) –

Name: ______________________ Position: ______________________
Email: ______________________ Phone: ______________________
Name: ______________________ Position: ______________________
Email: ______________________ Phone: ______________________
Name: ______________________ Position: ______________________
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Name: ______________________ Position: ______________________
Email: ______________________ Phone: ______________________
Name: ______________________ Position: ______________________
Email: ______________________ Phone: ______________________
# Requests for Supplies

**Request for Mosquito Surveillance Equipment / Supplies**

Zoonotic Disease Program, Bureau of Infectious Diseases, Ohio Department of Health

Fax to: 614-564-2437  
Mail to: 35 E. Chestnut St., Columbus, OH 43215  
Email to: Zoonosis@odh.ohio.gov  
Phone: 614-752-1029

Please select the number of each item needed. There is no charge for these materials.

<table>
<thead>
<tr>
<th>Supplies</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ODH 1112BQ.11</td>
<td>Mosquito dipper with 3 feet handle</td>
</tr>
<tr>
<td>ODH 1412GQ.11</td>
<td>Mosquito-bourdon breather</td>
</tr>
<tr>
<td>ODH 2000.11</td>
<td>Gravid Mosquito Trap-complete trap (4 D batteries not included)</td>
</tr>
<tr>
<td>ODH 2000A.11</td>
<td>Extra collection chamber-Gravid Trap or Light Trap</td>
</tr>
<tr>
<td>ODH 26MBQX.11</td>
<td>CDC Mini Light Trap-complete trap (12v rechargeable batteries not included)</td>
</tr>
<tr>
<td>ODH 6204.11</td>
<td>BG Sentinel Trap-complete trap (12v rechargeable batteries not included)</td>
</tr>
<tr>
<td>ODH 2610GC.11</td>
<td>Extra BG sentinel catch bag</td>
</tr>
<tr>
<td>ODH</td>
<td>Mechanical aspirator (2 D batteries not included)</td>
</tr>
</tbody>
</table>

**Ship Materials to:** Agency:  
Name:  
Address:  
City: State: Zip:  
Date:  
E-mail: 
Phone:

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# Requests for Educational Materials

Zoonotic Disease Program, Bureau of Infectious Diseases, Ohio Department of Health

Fax to: 614-564-2437  
Mail to: 35 E. Chestnut St., Columbus, OH 43215  
Email to: Zoonosis@odh.ohio.gov  
Phone: 614-752-1029

Please select number of copies. For larger orders of pamphlets, please order in increments according to package size. (Usually 25, 50 or 100). This does not apply to posters. There is no charge for these materials.

<table>
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<tr>
<th>Supplies</th>
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<tbody>
<tr>
<td>ODH 0843.11</td>
<td>Tri-fold Pamphlet: Bats and Rabies, A Public Health Guide (50 Per Pack)*</td>
</tr>
<tr>
<td>ODH 0894.11</td>
<td>Poster 12x18: Take The Bite Out Of Rabies Poster</td>
</tr>
<tr>
<td>ODH 0845.11</td>
<td>Tri-fold Pamphlet: Ticks: A Guide to Tick Prevention (50 Per Pack)*</td>
</tr>
<tr>
<td>ODH 0896.11</td>
<td>Poster 18x24: Fight The Bite Poster</td>
</tr>
<tr>
<td>ODH 0897.11</td>
<td>Poster 11x17: WNV Prevention Around The Home Poster</td>
</tr>
<tr>
<td>ODH 0899.11</td>
<td>Card 6 X 8: Bed Bugs and Household Insect Identification Card</td>
</tr>
</tbody>
</table>

* A pdf version is available to view and for download from the Zoonotic Disease Program website: [http://www.odh.ohio.gov/zip](http://www.odh.ohio.gov/zip)

**Ship Materials to:** Agency:  
Name:  
Address:  
City: State: Zip:  
Date:  
E-mail: 
Phone:
Remember:

Surveillance is just one step in the process!
Creating a Vector Control Plan

1. Education
2. Prevention
3. Surveillance
4. Control
5. Evaluation
Step #1 – Education

This portion of your Vector Control Plan should include:

✔ How your agency will educate your staff about vectors and diseases
✔ How your agency will educate the public about prevention and symptoms
✔ Ensure consistent messaging from medical, veterinary, and media sources
✔ Ensure accurate messaging based on CDC’s latest recommendations
✔ Plans for Public Health Awareness Campaigns
✔ Templates for Public Health Press Releases

LEMANE C. GARRETT, Public Health Entomologist
Ohio Department of Health - Zoonotic Disease Program
This portion of your Vector Control Plan should include:

- Actions your agency will take to prevent human infection
- Resources available to assist the public in taking action

Prevention can overlap somewhat with the education portion of your plan, but should include preventative actions as well as education.
This portion of your Vector Control Plan should include:

- Resources your agency has to conduct mosquito surveillance
- How appropriate trapping locations are identified
- Amount and distribution of trapping locations
- Types of traps and attractants that will be used
- Method of shipping samples to ODH for testing
- Coordination efforts with human disease monitoring
- How plans will change if Zika Virus is identified in local mosquitoes

Also, if you rely on state support for equipment or field work, describe what you will do if the state is no longer able to provide these resources.
This portion of your Vector Control Plan should include:

- How your agency will conduct larviciding and adulticiding
- Equipment and chemicals to be used
- Schedule for routine application of pesticides
- Communication plan so the public is informed
- Actions taken when positive West Nile Virus samples are identified
- Changes to your plan if Zika Virus is found in local mosquitoes
Step #5 – Evaluation

This portion of your Vector Control Plan should include:

✓ How you will determine if your education actions are effective
✓ How you will determine if your prevention actions are effective
✓ How you will determine if your surveillance actions are effective
✓ How you will determine if your control actions are effective
✓ Frequency of program evaluation
✓ Plan of action if improvement is needed
✓ Where to focus if additional resources become available
Resources to Help You Get Started

American Mosquito Control Association

- [http://www.mosquito.org](http://www.mosquito.org)

Leeanne C. Garrett, Public Health Entomologist
Ohio Department of Health - Zoonotic Disease Program

Best Practices for Integrated Mosquito Management

American Mosquito Control Association
January 2017
Resources to Get Started, cont.

Mississippi State Department of Health

➢ [http://msdh.ms.gov/msdhsite/_static/14,0,93.html](http://msdh.ms.gov/msdhsite/_static/14,0,93.html)

Setting Up a Mosquito Control Program

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Leeanne C. Garrett, Public Health Entomologist
Ohio Department of Health - Zoonotic Disease Program
Centers for Disease Control and Prevention


Surveillance and Control of Ae. aegypti and Ae. albopictus in the United States

Leanne C. Garrett, Public Health Entomologist
Ohio Department of Health - Zoonotic Disease Program
Thank you! Any questions?

Leeanne C. Garrett, BA, LATg
Public Health Entomologist
Office phone: (614) 466-7215
Lab phone: (614) 752-1030
leeanne.garrett@odh.ohio.gov

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