Richland Public Health
2019 Vector Program Annual Report

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Prevent. Promote. Protect.
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**Prevent. Promote. Protect.**
Richland Public Health Vector Program
2019 Community Partnerships

Blooming Grove Township
  Butler Village
  Camp Mowana
  Happy Hollow Camp
  Hidden Hollow Camp
  Jackson Township
Light & Life Christian Camp
  Mansfield Christian
  Mansfield City
  Mifflin Township
  Monroe Township

Oakwood Crossing
  Ontario City
  Plymouth Village
  River Trail Crossing
  Sandusky Township
  Shelby Country Club
  Shiloh Village
  Springfield Township
  Washington Township
  Weller Township

These listed cities, municipalities, townships and other areas were treated or affected by Mosquito control activities conducted by Richland Public Health in 2019.
At a Glance

Richland Public Health Vector Program

2019

- Number of Traps Set: 158
- Miles Sprayed: 143
- WNV Positive Pools: 1
- Mosquitoes Caught: 11,897
- Acres Treated: 4804.34
- Trap Locations: 64
- Trap Types Used: 4
- Mosquito Spray Vehicles: 2
Mosquitoes are the most common and widespread insects and carriers of disease. They can make outdoor events unbearable and disrupt normal living and business activities. Importantly, some species of mosquitoes are able to spread a number of diseases to humans.

**Mosquito Life Cycle**
Mosquitoes have four (4) separate stages in their lifecycle. They begin as eggs laid on the surface of water both singly and in clusters called “rafts.” The eggs hatch underwater and become larvae. Larvae go through four (4) stages of their own growth phases called “instars” before molting into pupae. In the pupal stage the adult mosquito begins to form. Within a few days, the cycle will be complete with the adult emerging on the surface of the water. A mosquito can be fully developed in as little as five (5) days. With the exception of the adult, all stages need water to occur. (Life Cycle, 2013).

**The Mosquito Life Cycle**

![Mosquito Life Cycle Diagram]

**Mating and Feeding Habits**
After mating, the adult female needs the blood from an animal host for her eggs to develop. Different mosquito species feed at different times of the day, ranging from early morning to late evening hours. Male mosquitoes feed on plant nectar and do not take blood meals. Female mosquitoes typically live for one month and can produce up to 1,000 eggs in their lifetime. The adult female of some species lay eggs in masses on the surface of stagnant water. Mosquitoes can also lay their eggs on moist soil or in other locations that flood with water. Heavy rains and flooding quickly activate the eggs and produce large mosquito populations.
Prevent Mosquito Breeding Tips and Tricks

Empty water in bird baths at least one a week.

Chlorinate pools and hot tubs. If not in use, keep pools and hot tubs empty and covered.

Eliminate standing water that collects on your property.

Remove all discarded tires from your property.

Make sure doors and windows have tight-fitting screens.

Check trees for cavities that hold water. Fill them with soil, gravel or sand.

Clean and drain gutters properly.

Dispose of water-holding Containers.

STOP Mosquito Breeding
Mosquito Disease Monitoring

Mosquito identification and West Nile Virus (WNV) testing have been conducted by the Ohio Department (ODH) since the disease was introduced into the United States more than a decade ago, but was discontinued in 2013 due to budget issues. After much discussion with local health departments, the program was re-introduced in July of 2014. In 2019, ODH tested mosquitoes from 78 entities in Ohio. Submitting mosquito samples to ODH is not a requirement of local health departments, but is conducted on a voluntary basis.

In 2019, the presence of WNV carrying mosquitoes was found in 28 of 78 submitting jurisdictions in Ohio. Mosquitoes are tested in pools, which is a grouping from 1-50 mosquitoes of the same species collected from the same trap. Of the pools tested in Ohio - 263 were WNV positive. For Richland County, one (1) of those pools were WNV positive. Richland Public Health places traps in areas that have a history of WNV so potential disease can be identified early and controlled within mosquito populations.

Ohio Mosquito-borne Disease 2019 Data (as of November 21, 2019)

LaCrosse

<table>
<thead>
<tr>
<th>24</th>
<th>LaCrosse Human Cases</th>
</tr>
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<tbody>
<tr>
<td>17</td>
<td>Male</td>
</tr>
<tr>
<td>7</td>
<td>Female</td>
</tr>
</tbody>
</table>

Median Age: 8 Years

Ashland (3), Champaign (1), Franklin (2), Geauga (1), Gurnsey (1), Hancock (1), Holmes (3), Knox (3), Muskingum (1), Pike (1), Portage (1), Richland (2), Trumbull (1), Wayne (3) counties.

Transmitted by *Aedes triseriatus* species

Unspecified California Virus Human Cases

<table>
<thead>
<tr>
<th>0</th>
<th>Unspecified California Virus Human Cases</th>
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</thead>
<tbody>
<tr>
<td>0</td>
<td>Male</td>
</tr>
<tr>
<td>0</td>
<td>Female</td>
</tr>
</tbody>
</table>

Median Age: 0 Years

No reported cases as noted on the Ohio Department of Health vector-borne disease surveillance webpage.
Ohio Mosquito-borne Disease 2019 Data (as of November 21, 2019)

**West Nile Virus**

**West Nile Virus (WNV) Human Cases**

- **Male**: 3
- **Female**: 0

**Equine Cases**

- **West Nile Virus (WNV) Equine Cases**: 3

**Median Age**: 68 Years

**Homes (1), Lucas (1), Trumbull (1) counties.**

**WNV asymptomatic Viremic blood donors**: 0

**WNV asymptomatic Viremic organ donors**: 0

**West Nile Virus (WNV) virions under high magnification.**

**Fulton (1), Morrow (1), Stark (1) counties.**

**Onset of Symptoms**: 9/13/2019 - 10/22/2019

Reported by the Ohio Department of Agriculture Animal Disease Diagnostic Lab

Horses are at high risk of contracting and dying from West Nile virus. Symptoms in Horses who are infected with West Nile virus are fever, weakness and incoordination.

Horses are dead-end hosts of West Nile Virus. They can become ill from West Nile virus, but they do not maintain sufficient virus in the blood to infect either other mammals (including humans) or mosquitoes. A vaccine is available for horses to prevent West Nile virus.

(Ohio Department of Health Website)
Ohio Mosquito-borne Disease 2019 Data
(as of November 21, 2019)

Eastern Equine Encephalitis (EEE)

4 Eastern Equine Encephalitis Cases

Ashtabula (2), Portage (2) counties.

Onset of Symptoms: 8/25/2019 - 10/3/2019
Reported by the Ohio Department of Agriculture Animal Disease Diagnostic Lab

“EEE is a virus circulated between birds and certain mosquito species, especially in marshy areas and swamps. Horses, humans, pheasants, emus and other animals are accidental, dead-end hosts and are not usually a source of infection to humans.”

“EEE is the rarest of the mosquito-borne arboviral infections. An average of eight (8) sporadically occurring infections in humans are reported annual in the United States; however, the illness is fatal in at least 30% of cases and even higher case fatality rates are observed at the extremes of age.”

(ODH-IDCM, EEE Page 4, Section 3, 2018)

Travel-associated Mosquito-borne Diseases
(as of November 21, 2019)

Malaria

56 Malaria Human Cases

<table>
<thead>
<tr>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>38</td>
<td>18</td>
</tr>
</tbody>
</table>

Median Age: 28 Years

Afghanistan (1), Burkina Faso (2), Surundi (2), Cameroon (1), Central African Republic (1), Ghana (2), Guinea (4), India (1), Ivory Coast (3), Kenya (4), Liberia (1), Nigeria (7), Rwanda (1), Senegal (1), Sierra Leone (13), Somalia (1), Sudan (1), Tanzania (6)Uganda (2), Multiple Countries (2)

“Endemic malaria no longer occurs in the United States and many temperate zone countries. Malaria is known to exist in parts of Mexico, Haiti, Central and South America, Africa, the Middle East, Turkey, the Indian subcontinent, Southeast Asia, China, the Malay Archipelago and Oceania.”

“Historically, malaria was indigenous to Ohio. Although indigenous malaria has been eliminated here, vector Anopheles mosquitoes remain prevalent. Thus, Ohio is an area free of disease but with a continued risk of transmission.”

(ODH-IDCM, Malaria Page 4, Section 3, 2018)
Travel-associated Mosquito-borne Diseases Continued...
(as of November 21, 2019)

**Chikungunya Virus**

- **9 Chikungunya Virus Human Cases**
  - Male: 5
  - Female: 4
  - Median Age: 33 Years
  - Brazil (2), Cayman Islands (1), Cuba (1), Dominican Republic (1), India (1), Vietnam 1

**Dengue**

- **11 Dengue Human Cases**
  - Male: 4
  - Female: 7
  - Median Age: 32 Years
  - Costa Rica (1), Cuba (2), Dominican Republic (2), India (1), Indonesia (1), Jamaica (2), Mexico (1), Multiple Countries (1)

**Transmitted by:**
- *Aedes aegypti (Principal Vector)*
- *Aedes albopictus (Possible Vector)*

“The Yellow Fever mosquito, *Aedes aegypti*, serves as the principal vector for Chikungunya virus, and is widely distributed throughout the tropics. This mosquito is not known to be established in Ohio. However, the Asian Tiger mosquito, *Aedes albopictus*, is established in Ohio and could potentially transmit Chikungunya virus.

“Mosquitoes become infected when they feed on a person infected with Chikungunya virus. Infected mosquitoes can then spread the virus to other humans when they bite.”

(ODH-IDCM, Chikungunya Page 4, Section 3, 2018)

**Zika Virus**

- **0 Zika Virus Human Cases**

“No human-to-human transmission occurs outside of blood and organ/tissue donation and congenital transmission, which are rare.”

(ODH-IDCM, Dengue Page 5, Section 3, 2018)
The Richland Public Health Vector Control Program includes investigations and providing educational information. A total of 20 complaints/requests for adult mosquito control services were investigated and/or addressed by RPH in 2019 compared to 34 in 2018.

### Vector Control Program Complaints

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<tr>
<td>Fleas</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
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<tr>
<td>Adult Mosquitoes</td>
<td>20</td>
<td>34</td>
<td>52</td>
<td>53</td>
<td>59</td>
</tr>
<tr>
<td>Ticks</td>
<td>0</td>
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<td>0</td>
<td>0</td>
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<tr>
<td>Vector General</td>
<td>0</td>
<td>1</td>
<td>7</td>
<td>10</td>
<td>18</td>
</tr>
<tr>
<td>Rodents</td>
<td>0</td>
<td>1</td>
<td>8</td>
<td>19</td>
<td>25</td>
</tr>
<tr>
<td>Bedbugs</td>
<td>10</td>
<td>0</td>
<td>3</td>
<td>7</td>
<td>17</td>
</tr>
</tbody>
</table>

Richland Public Health’s program receives many different types of complaints throughout the year. (Note: Not all of these types are vectors causing disease but they are classified within the vector control program.) In addition, RPH may provide educational materials depending on the complaint type to encourage prevention and compliance. Of the 10 adult mosquito complaints reported in 2019, all 10 complaints were abated.

Richland Public Health uses an Integrated Pest Management (IPM) approach to effectively reduce pests such as mosquitoes. The IPM strategy manages mosquito populations through the use of all appropriate pest management methods, such as: managed habitat mapping, active adult and larval surveillance, source reduction, public education programs and targeted adulticide applications, when necessary. This approach is environmentally sensitive, effective, reduces public exposure to pesticides and is recommended by the U.S. Environmental Protection Agency and the Center for Disease Control, CDC.
Mosquito Larvicing & Adulticiding Control

Overview

The purpose of the Vector Control Program is to reduce the public’s exposure to diseases carried by insects such as mosquitoes. RPH employees are particularly trained to identify mosquitoes throughout their lifecycle and responsibly apply pesticides when it is not possible to remove the mosquito source.

RPH takes great care in using pesticides responsibly. This means treatments are selected and used to control targeted pests without having a substantial impact on other beneficial animals and the environment. Examples include: Duet™ that is used as an adulticide which is dual action (Anvil and Prallethrin); these two (2) products combined cause a benign agitation which in turn improves mosquito kill rates. For larviciding, Natular™ is used which received the 2010 U.S. EPA Presidential Green Chemistry Challenge Award. Furthermore, all local properties with known state registered apiaries, or beehives are attempted to be avoided when spraying occurs to reduce the chance pesticides will come into contact with the hives. Residents are informed about RPH pesticide applications through media releases to the local radio stations, newspaper and social media such as Twitter™ and Facebook™. Partnering agencies are encouraged to assist in the process of notification to residents through the use of their websites and communication abilities.

Madison, a 2018 Richland Public Health Employee, sets a Gravid Mosquito Trap.

Larval Mosquito Monitoring & Control

Mosquitoes are easiest to control during their early life stages because they develop in contained bodies of water. When stagnant water sites cannot be otherwise modified or removed, larvicide can be applied to prevent further mosquito development. Various local stagnant water locations are monitored each season from April through October to protect human populations from biting mosquitoes during the active season.

The photo above is Culex sp. mosquito larvae. Mosquito larvae of most species have a prominent breathing siphon. The larvae rest suspended diagonally from the water surface with the end of the siphon tube penetrating its surface, enabling the larvae to access their air supply. Mosquitoes in this stage can be controlled with properly applied larvicide.
Adult mosquito control is conducted by contract throughout Richland County to reduce the number of mosquitoes that can spread disease to humans. During the 2018 season, 143 miles were treated. Truck-mounted equipment sprays tiny droplets of treatment into the air which interrupts the mosquito’s nervous system. In 2019, a total of 4804.34 acres of adulticide was applied in the county. RPH application rates from the adulticide range from 0.43 - 1.28 fluid ounces per acre. Richland Public Health operates two (2) trucks with mounted spray systems active throughout the vector season.

**No Spray Areas**

Richland Public Health maintains a list of locations that are not treated during mosquito spray events. These locations are referred to as no spray areas. A specific location is labeled as a no spray area due to a variety of factors. A list of registered apiaries in Richland County is obtained from the Ohio Department of Agriculture prior to the start of each vector season. The locations of the apiaries are then entered into Richland Public Health’s adulticiding software as no spray areas. A no spray area is a radius of approximately 300 feet around a specific address. A no spray area will show up as a yellow circle on the map and an alarm will alert the technician to a no spray area during an adulticiding event. Specialty crop areas such as organic farm fields are also included in no spray areas. Other areas avoided during an adulticiding event include surface water such as ponds, lakes, streams, creeks, rivers, swamps, marshes, and estuaries. Lastly, an area may be labeled as a no spray due to customer request or health concerns. Homeowners can request a no spray area for their property by contacting Richland Public Health.
Richland Public Health adult mosquito surveillance (monitoring) and control begins by identifying where disease-carrying mosquitoes are located. Richland Public Health initiates this process by setting mosquito traps every season in late April/early May. Trapping locations are based upon trapping data from previous years. When a trap is set, it remains at a location overnight until it is collected the following morning. After the trap is collected, the type of mosquitoes, the quantity of mosquitoes and the presence of WNV are documented and analyzed to develop a control plan (if necessary). In 2019, RPH was notified of 1 WNV positive mosquito pool in Richland County along with one (1) case of La Crosse Virus. RPH verified that the areas where WNV positive traps were set had been adulticided (since the trapping date) to discourage the spread of disease. Educational material was also delivered to homeowners where WNV positive trap locations were located. Further, RPH conducted surveillance and provided educational material those affected by the La Crosse Virus.

Trapped mosquitoes are brought back to Richland Public Health where they are identified and prepared for shipment to the Ohio Department of Health lab for testing. Identification of these mosquitoes allows RPH to determine the different types of species of mosquitoes prevalent in Richland County.

*Pools may have up to 50 mosquitoes.
**Ohio Department of Health lab stopped testing for 2013
A key factor in controlling mosquito-borne diseases is accomplished by members of the community eliminating mosquito breeding habitats on their property. Richland Public Health strives to educate and empower the public to protect themselves from mosquito bites, eliminate mosquito habitats found on their property and to report sources of standing water. Providing detailed mosquito control information to the public is accomplished through a number of techniques which include: speaking at public meetings, social media updates, local television announcements, educational vignettes at local theatres prior to movie showings and field consultations.

In 2020, Richland Public Health will continue to use an Integrated Pest Management approach to help monitor and control mosquito populations. Data gathered in past years will be used in planning for the 2020 mosquito season to focus on areas with prior high mosquito populations and areas with evidence of disease carrying mosquitoes. Another key component to 2020 surveillance is continued source reduction. This includes compliance with scrap tire clean ups and reducing stagnant bodies of water that become breeding grounds for mosquitoes.

For 2020, Richland Public Health will continue to provide education to the public for eliminating breeding sites and protecting the public from being bitten. Please look for us on Facebook™, Twitter™ and local billboards.
Sources


Center for Disease Control and Prevention, Public Health Image Library (PHIL)