

# West Nile Virus Surveillance Overview of Activities – 2017

Winnebago County Health Department  
Center for Environmental Health

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## Introduction

West Nile virus (WNV) is a virus most commonly spread by mosquitoes that can cause several severe illnesses in humans, including encephalitis and meningitis.<sup>1</sup>

West Nile virus was first detected in the United States in New York in 1999. WNV quickly spread throughout the country and was first detected in Illinois in 2001. Winnebago County first detected the virus in 2002 and has been performing surveillance activities ever since.<sup>2</sup>

In 2017, Winnebago County found WNV activity in 7 mosquito pools (out of 82 tested) and 2 birds (out of 35 tested). WNV activity was found in ZIP codes 61063, 61072, 61073, 61080, 61102, 61107, 61109, and 61115. The Illinois Department of Public Health reported 3 lab-confirmed human cases of West Nile virus in Winnebago County, the first local cases since 2013. None of these cases resulted in the death of the patient. It is possible that additional residents in Winnebago County contracted the virus with little to no symptoms which would not prompt a doctor's visit.

Statewide, the data shows a decrease in the number of human WNV cases and fewer deaths caused by the disease (155 cases and 6 deaths in 2016 down to 89 cases and 1 death in 2017). Additionally, the number of positive birds and mosquito pools dropped statewide (74 birds and 2,434 pools in 2016 to 25 birds and 2,022 pools in 2017).<sup>3,4</sup>

It is unlikely that WNV will ever be completely eradicated because it is a zoonotic disease that can reside overwinter and amplifies in wild birds. Other similar viruses could also pose a threat of an epidemic outbreak, as do possible mutations of the West Nile virus which could increase its virulence and lethality.

**Table 1 - History of West Nile Virus in Winnebago County**

<b>Year</b>	<b>First positive bird</b>	<b>First positive pool</b>	<b>Human WNV cases</b>
2004	May 25	August 6	0
2005	July 28	August 4	2
2006	June 28	June 5	0
2007	August 15	August 23	2
2008	June 24	n/a	0
2009	September 30	n/a	0
2010	August 17	n/a	1
2011	September 23	August 24	1
2012	July 12	August 8	3
2013	August 28	August 20	1
2014	September 2	August 20	0
2015	July 1	August 6	0
2016	June 26	July 14	0
2017	September 7	June 7	3

## Partnerships and Collaboration

The Winnebago County Health Department (WCHD) conducts WNV surveillance throughout Winnebago County for the State of Illinois' West Nile Virus program. The State grants the WCHD funds in order to carry out the collection and testing of mosquito and bird samples for WNV. In 2017, the Illinois Department of Public Health shifted the fiscal year for the WNV program, resulting in a three-month period between April and June 2017 that did not fit into either the Fiscal Year 2017 or Fiscal Year 2018 grant.

**Table 2 - History of West Nile Virus in Winnebago County**

Fiscal Year	Maximum Funding Amount
FY 2015 (April 1, 2014 – March 31, 2015)	\$68,094.00
FY 2016 (April 1, 2015 – March 31, 2016)	\$51,489.00
FY 2017 (April 1, 2016 – March 31, 2017)	\$34,136.00
FY 2018 (July 1, 2017 – June 30, 2018)	\$34,159.00

For Fiscal Year 2018 (July 1, 2017 – June 30, 2018), the WCHD was granted up to \$34,159.00, a relatively similar amount that was granted for the previous year. For the second year in a row, the WCHD did not hire a seasonal West Nile virus specialist, who in years past was responsible for performing most sample collection and testing, as well as reporting and conducting community education. Without a WNV specialist, all surveillance activities had to be assigned to existing WCHD staff and surveillance and educational actions were reduced from years past.

The WCHD's WNV program partnered again with the WCHD's Neighborhood Code Enforcement program. This program consists of three staff members who are responsible for enforcing the correction of housing code violations in Winnebago County. Because of their frequent presence in the community, the Code Enforcement staff was able to carry out the majority of sample collection, larvicide application, and educational information to the public.

Additionally, the WNV program relied on the WCHD's Creating Lead Safe Rockford (CLSR) grant program to carry out additional outreach and educational activities. The CLSR program is funded by the U.S. Department of Housing and Urban Development to identify and correct lead-based paint hazards in qualified households. This program frequently performs community outreach and was able to include WNV program materials at some of their events.

One of the first activities the WCHD WNV program conducted was to host a major training session for public works employees representing municipalities throughout the County. This training session was presented by WCHD staff who are licensed to apply mosquito larvicide. The training covered mosquito control techniques specific for public works employees and proper use of the larvicide product used by the WCHD. After completing this training, these municipal employees became authorized to apply this larvicide themselves. The names of the trainees were sent to the Illinois Department of Public Health to document this training.

During the season, the WCHD received several calls from citizens concerned with the adulticiding methods used by certain municipalities in Winnebago County. WCHD staff looked into these concerns and found that the municipalities had contracted with a licensed pest control firm, but had not always communicated that information clearly. As a result, WCHD will add to its annual municipal worker training how to handle calls from the public and what kind of information they should be able to provide to the public. WCHD will expect that its staff as well as those it trains to be able to provide clear information on what products and methods are being used and to supply Safety Data Sheets for any pesticides used, and not simply refer citizens to the contracted firm.

The WCHD's West Nile program continued to utilize community members and resources more directly. The program reached out to Neighborhood Networks, an organization who coordinates many of the Rockford-area's local neighborhood organizations to help get the word out about WNV surveillance and education. The WCHD sought community members within these groups to act as 'Mosquito Captains,' or individuals who could act as their neighborhood's point-of-contact with the WCHD. This person would help disseminate WNV educational material, and report back to the WCHD on areas of stagnant water. As was the case in 2016, the WCHD was unable to recruit any 'Mosquito Captains' this year. Program staff were invited to two different neighborhood association meetings to discuss WNV prevention and surveillance activities, reaching a total of 30 individuals. The WCHD hopes to build on these successful meetings to generate further public interest in assisting with WNV education.





## **Personal Protection Index**

For the third year, the WCHD published a Personal Protection Index (PPI) on the WNV program page on its website. The PPI was adapted from the DuPage County Health Department and the CDC as an additional tool to help residents protect themselves against WNV.<sup>5</sup> This tool informs residents of the amount of WNV activity in the county as well as prevention steps that are recommended.

The PPI provides residents with a current snapshot of WNV activity, ranging from 0 to 3, with 0 representing no activity during the WNV off-season and 3 representing an increased chance for human infection because of high numbers of infected mosquitoes.

When activated, residents should follow the "4 Ds" of prevention that coincide with the PPI risk level:

- **Drain** standing water on your property so mosquitoes won't breed
- **Defend** against mosquito bites using repellants containing DEET
- Stay indoors at **Dusk & Dawn** when mosquitoes are most active
- **Dress** in long sleeves and pants and spray repellant on your clothes

Risk Level*	Definitions	Recommended Actions
 <b>0</b> NONE	Off season. Climate conditions not favorable for <i>Culex</i> species.	None required
 <b>1</b> LOW	Localized abundance of active mosquitoes. Climate conditions favorable for development of virus.	Drain Defend
 <b>2</b> MODERATE	Virus indicated in the area with a moderate number of infected mosquitoes detected. Climate conditions favorable.	Drain Defend Dawn & Dusk Dress
 <b>3</b> HIGH	High numbers of infected mosquitoes. Climate conditions extremely favorable. Increased chance of human infection.	Drain Defend Dawn & Dusk Dress

**Figure 1 – Personal Protection Index as shown on wchd.org**

## Publicity

Without a seasonal WNV specialist, publicity and outreach was unfortunately limited in 2017 for the WCHD’s West Nile Virus program.

As with most previous years, press releases were published for program milestones. On May 8, 2017, a release was issued noting the beginning of the surveillance season. This release reminded residents about the risks posed by mosquito-borne disease.

On June 13, 2017 the WCHD issued a news release indicating the first mosquito pool to test positive for WNV. The pool was found in ZIP code 61073 (Roscoe, Illinois). In September, another release was issued to note the first positive birds and human cases of WNV in Winnebago County.

These press releases were picked up by local media, with many local newspapers and television stations publishing or covering the releases. Additionally, WCHD staff provided interviews for two televised pieces and one newspaper article during the 2017 season.

WNV was a prominent feature at two neighborhood informational meetings held on June 8, 2017 and June 21, 2017. WCHD staff were invited to discuss the WNV program and its activities, as well as how residents can help stop the spread of mosquito-borne disease. The WCHD’s Creating Lead Safe Rockford program also included WNV program materials at several of their outreach events.

During all outreach and media releases, the WNV program stresses the “3 Rs – reduce, repel, and report” message because it is a convenient and easy way to remember the actions that everyone can take to fight West Nile virus. It states:

1. **Reduce** areas of standing water around your home. Eave troughs, bird baths, children’s’ toys, swimming pools with and without covers, bottles, pails, jars, tires – anywhere that water is allowed to collect and become stagnant will become a breeding place for mosquitoes. If you need it, empty it and make sure it stays empty. If you don’t need it, throw it away!
2. **Repel.** If you are planning to spend time outdoors, use a mosquito repellent before you go out. Use commercial repellent with a 20 to 30% mix of DEET (N, N Diethyl-meta toluamide) found in well-known brands such as Cutters, Off, etc. DEET-based repellants should not be used on infants. Children ages 2 to 6 should use no more than a 10% DEET solution. Care must be taken to avoid the eyes when administering repellants.

Proper clothing can go a long way to providing protection. Make sure that you and your children wear long sleeves and pants during the primary mosquito biting times from sunset to midnight. Also check your window and door screens. Have them repaired to keep you safe inside while mosquitoes stay outside.

3. **Report.** Dead birds should be reported to the Winnebago County Health Department’s dead bird hotline at (815)720-4245 or by visiting [www.wchd.org](http://www.wchd.org) and using the online dead bird reporting tool. Additionally, residents should call to report areas of stagnant water, such as abandoned pools or poorly draining ditches for larvicide treatment by WNV program staff.

## **Reporting Dead Birds**

Winnebago County Health Department encourages residents to report dead birds to WNV program staff for collection and testing, as birds are often an early indicator of WNV presence in a community. The WCHD utilized its long-running dead bird hotline and for a third year, utilized its online dead bird reporting tool so that area residents could assist with vector surveillance.

The instructions for the hotline and online tool were very thorough, and described all the conditions necessary for a bird to be suitable for testing. These tools are an immediate indicator of WNV activity and can serve as an indicator for increased WNV prevalence in humans.

Data collected from residents reporting dead birds was utilized in a variety of ways, including:

1. Indicate locations to pick up birds for WNV testing.
2. Determine if there are areas of high WNV activity or a surge in activity.
3. Identify potential placement of Gravid traps.
4. Detect new and former “hot spots” for surveillance.
5. Make informed decisions about appropriate control measures.
6. Pin point the best media avenue when increasing public awareness of specific ZIP codes that have WNV activity.

The dead bird hotline and on-line reporting tool received a combined total of 133 referrals this season. As a result, 35 birds were tested, 8 were suspected to be WNV positive, but only 2 were confirmed by IDPH to be positive for WNV.

### Testing Methods

The WCHD utilizes a couple of different testing methods to verify the presence of WNV. The primary testing that is the Rapid Analyte Measurement Platform (RAMP) assay. The RAMP assay is a highly sensitive pre-screening test used for identifying WNV in mosquitoes and birds. This type of testing is used because it is easy to operate, results are easy to interpret, and there is no calibration or maintenance required.

The other type of testing used was reverse transcription polymerase chain reaction (RT-PCR). This type of testing is more time consuming and expensive, and is performed by the University of Illinois College of Veterinary Medicine laboratory as a confirmatory test for birds that tested positive for WNV through the WCHD’s lab.

Results from RAMP testing of dead birds indicated six positives, however when sent to the State lab, only two were confirmed positive for WNV. This led the WCHD to perform some quality control actions to ensure the validity of the RAMP results. Birds tested twice with the same result. Therefore in the off-season, WCHD plans to further look into the likelihood of false-positives from RAMP testing and other possible reasons for this discrepancy with the State lab.

### Avian Surveillance Data

Eight birds tested positive via RAMP testing for the 2017 WNV season in Winnebago County, six of which were sent to the IDPH laboratory for confirmative testing. Of these six birds, only two were confirmed to be positive for WNV. These birds were found in ZIP codes 61080 (South Beloit) and 61109 (Rockford).



**Table 3 - Summary of Dead Birds tested for WNV**

<b>RAMP #</b>	<b>Date</b>	<b>Zip</b>	<b>Type of Bird</b>	<b>Results</b>
1	05/17/17	61107	Grey Catbird	25.2
2	05/22/17	61107	Grey Catbird	n/a
3	05/22/17	61107	Chickadee	19.2
4	05/22/17	61108	Walber	<10.0
5	05/23/17	61109	Grackle	<10.0
6	05/26/17	61107	Crow	<10.0
7	05/26/17	61063	Crow	283.6
8	05/30/17	61101		12.2
9	06/04/17	61115		25.2
10	06/06/17	61080	Blue Jay	<10.0
11	06/12/17	61108	Crow	<10.0
13	06/14/17	61080	Crow	10.4
14	06/14/17	61073	Robin	<10.0
15	06/16/17	61115	Robin	17.3
16	06/15/17	61072	Robin	<10.0
17	06/19/17	61108	Robin	n/a
18	06/21/17	61107		<10.0
19	06/21/17	61114	Robin	<10.0
20	06/21/17	61072	Robin	<10.0
21	06/26/17	61108		< 10.0
22	06/29/17	61103		< 10.0
23	06/30/17	61104	Blackbird	<10.0
24	07/07/17	15528		33.1
25	07/12/17	61109	Robin	12.6
26	07/13/17	61103	Sparrow	< 10.0
27	07/14/17	61102	Cardinal	488.8
28	07/19/17	61107	Crow	> 640
29	07/20/17	61109	Robin	< 10.0
30	08/03/17	61114	Crow	>640
31	08/15/17	61109	Crow	> 640
32	08/15/17	61080	Crow	> 640
33	08/15/17	61115		45.1
34	08/21/17	61107	Robin	18.7
35	08/24/17	61104	Crow	170.4
36	08/25/17	61114	Crow	>640
37	08/27/17	61073	Crow	>640

Highlighted rows indicate birds that were confirmed WNV positive by IDPH.

## **Mosquito Surveillance Data**

### The *Culex* Mosquito

WNV is most likely to spread during the warm weather months when mosquitoes are most active. The season usually begins in the spring and continues until there are several consecutive mornings with hard frost.

In all local mosquito species, both the male and female adults acquire nutrition from nectar for energy. However, only the females need a blood meal for egg maturation. For this reason, adult female mosquitoes are most likely to carry the West Nile virus. In order to maximize the number of adult females tested for WNV, the WCHD uses as many as 12 gravid traps in the field at a time throughout the season. These traps are specifically designed to capture female *Culex* mosquitoes.

The gravid trap (pictured to the right) consists of a plastic basin filled with water containing organic material, typically prepared with alfalfa pellets. This attracts female *Culex* mosquitoes, and when they lay their eggs, a battery-powered fan draws the mosquitoes into a net. WCHD staff collect these nets every 2 to 3 days.



**Figure 2 - Gravid Trap**

### Other Mosquito Species

With increased attention to the Zika virus over the past couple years, WCHD attempted to identify additional mosquito species, specifically *Aedes aegypti* and *Aedes albopictus*, the primary carriers of the Zika virus. WCHD staff sent two mosquitoes that were thought to be of the *albopictus* species to IDPH for identification, however neither sample was of that species.

### Positive Data for Mosquito Pools

The WCHD Neighborhood Code Enforcement staff assisted with mosquito surveillance by collecting mosquitoes from 83 pools across 17 different locations throughout the season. 82 of these pools were suitable for testing, and seven tested positive (8.5%). These seven positive pools were located in ZIP codes 61063, 61072, 61073, 61080, 61102, 61107, and 61115.

## Locations

Mosquito samples were taken from locations throughout Winnebago County that were determined to be high-risk areas. These areas were selected based on the following criteria:

1. Location had a positive sample recorded for previous WNV seasons
2. Location had a higher than average density of dead bird reports
3. Location is in a high density urban area
4. Location was likely to be an excellent habitat for mosquitoes and birds, and is frequented by humans (parks, forest preserves, etc.)

Information about each pool collected (such as the location, mosquito count, and test results for each pool) were promptly entered into the IDPH database. Entering this information in a timely fashion allows for statewide data to be compiled in real-time as the season progressed, rather than in a bulk report after the season has ended. This information is crucial for determining the potential risk to humans during an active season.

**Table 4 - Summary of Mosquito Pools tested for WNV**

Location Number	Zip	Collection Date	Results
1	61107	05/12/17	Low Signal
1	61107	06/05/17	< 10.0
1	61107	06/07/12	< 10.0
1	61107	06/08/17	< 10.0
1	61107	06/19/17	16.4
1	61107	07/10/17	16.4
2	61080	07/17/19	< 10.0
2	61080	07/19/17	> 640
2	61080	07/21/17	25.8
3	61107	08/08/17	< 10.0
3	61107	08/21/17	328.8
4	61115	05/26/17	16.8
4	61115	05/30/17	25.2
4	61115	06/05/17	37.7
4	61115	06/08/17	< 10.0
4	61115	06/12/17	n/a
4	61115	06/12/17	23.9
4	61115	06/19/17	31.4
4	61115	06/23/17	18.5
4	61115	06/27/17	11.0
4	61115	06/29/17	< 10.0
4	61115	07/06/17	< 10.0
4	61115	07/10/17	45.8
4	61115	07/12/17	22.4
4	61115	07/17/17	> 640
4	61115	07/17/17	< 10.0
4	61115	07/21/17	< 10.0
5	61111	08/08/17	< 10.0
5	61111	08/21/17	55.1
6	61073	05/29/17	19.1

6	61073	05/30/17	40.4
6	61073	06/02/17	165.9
6	61073	06/06/17	< 10.0
6	61073	06/02/17	< 10.0
6	61073	06/08/17	< 10.0
6	61073	06/16/17	20.1
6	61073	06/19/17	< 10.0
7	61073	06/28/17	< 10.0
7	61073	07/05/17	< 10.0
7	61073	07/07/17	< 10.0
7	61073	07/17/17	< 10.0
8	61072	08/10/17	< 10.0
8	61072	08/21/17	>640
9	61088	05/16/17	52.6
9	61088	05/22/17	< 10.0
9	61088	05/26/17	< 10.0
9	61088	05/30/17	< 10.0
9	61088	06/02/17	n/a
10	61063	06/26/17	< 10.0
10	61063	06/30/17	15.5
10	61063	07/12/17	< 10.0
10	61063	07/14/17	< 10.0
10	61063	07/19/17	< 10.0
10	61063	07/20/17	< 10.0
10	61063	07/21/17	16.1
10	61063	08/04/17	< 10.0
10	61063	08/07/17	< 10.0
10	61063	08/10/17	< 10.0
10	61063	08/22/17	< 10.0
10	61063	09/07/17	<10.0
10	61063	09/08/17	182.9
11	61102	05/22/17	N/A
11	61102	05/26/17	< 10.0
11	61102	06/02/17	n/a

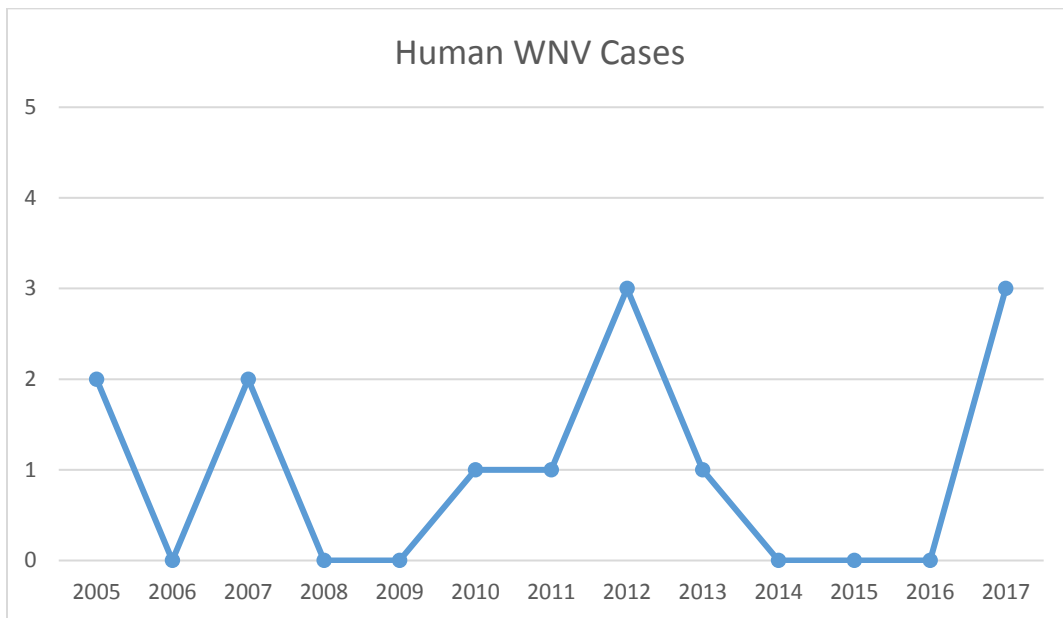
11	61102	06/07/17	< 10.0
11	61102	06/09/17	< 10.0
11	61102	06/13/17	n/a
11	61102	06/16/17	< 10.0
11	61102	06/21/17	< 10.0
11	61102	06/26/17	14.1
11	61102	06/30/17	> 640
11	61102	07/05/17	24.6
11	61102	07/12/17	< 10.0
12	61101	07/19/17	< 10.0
13	61102	08/28/17	< 10.0
14	61102	05/22/17	< 10.0
14	61102	05/26/17	< 10.0
14	61102	05/30/17	n/a
14	61102	06/02/17	< 10.0
14	61102	06/09/17	< 10.0
15	61102	06/21/17	< 10.0
15	61102	06/23/17	< 10.0
15	61102	07/14/17	< 10.0
16	61101	07/31/31	< 10.0
16	61101	08/10/17	< 10.0
16	61101	09/01/17	n/a
16	61101	09/08/17	<10.0
17	61104	06/29/17	< 10.0

Highlighted rows indicate a positive WNV sample.

## Human Cases

As of January 9, 2018, the U.S. Centers for Disease Control and Prevention (CDC) had confirmed that there were 47 states and the District of Columbia reporting WNV activity in people, birds, or mosquitoes during the 2017 season.<sup>6</sup> A total of 2,002 human cases had been reported nationwide.<sup>6</sup> This is an increase from years past with 1,521 human cases at this point in 2016 and 1,650 human cases in 2015.<sup>6</sup>

The Illinois Department of Public Health has reported a total of 89 human cases in Illinois, spread across 19 counties, including three in Winnebago County.<sup>7</sup> This is a statewide decrease from last year, in which 155 human cases were reported.<sup>3,4</sup> However, this is a large increase in the number of human cases in Winnebago County, and mark the first human cases in the County since 2013.



**Figure 3 - History of Human WNV in Winnebago County Cases by Year**

Only about 1 in 5 persons infected with WNV will develop even mild symptoms and of these, typically only half will seek medical treatment. On average, the disease will progress to serious neurologic symptoms in about 1 in 150 persons, though this ratio increases dramatically with age. Currently, the only treatments for WNV are supportive. While little progress has been made in the treatments for WNV infections which have progressed to encephalitis or meningitis, there have been promising advancements in passive immunization against the disease. This could be especially helpful for people at high risk of developing WNV, as well as those over 50 years of age, who have a greatly increased risk of developing serious symptoms.

## **Vector Control**

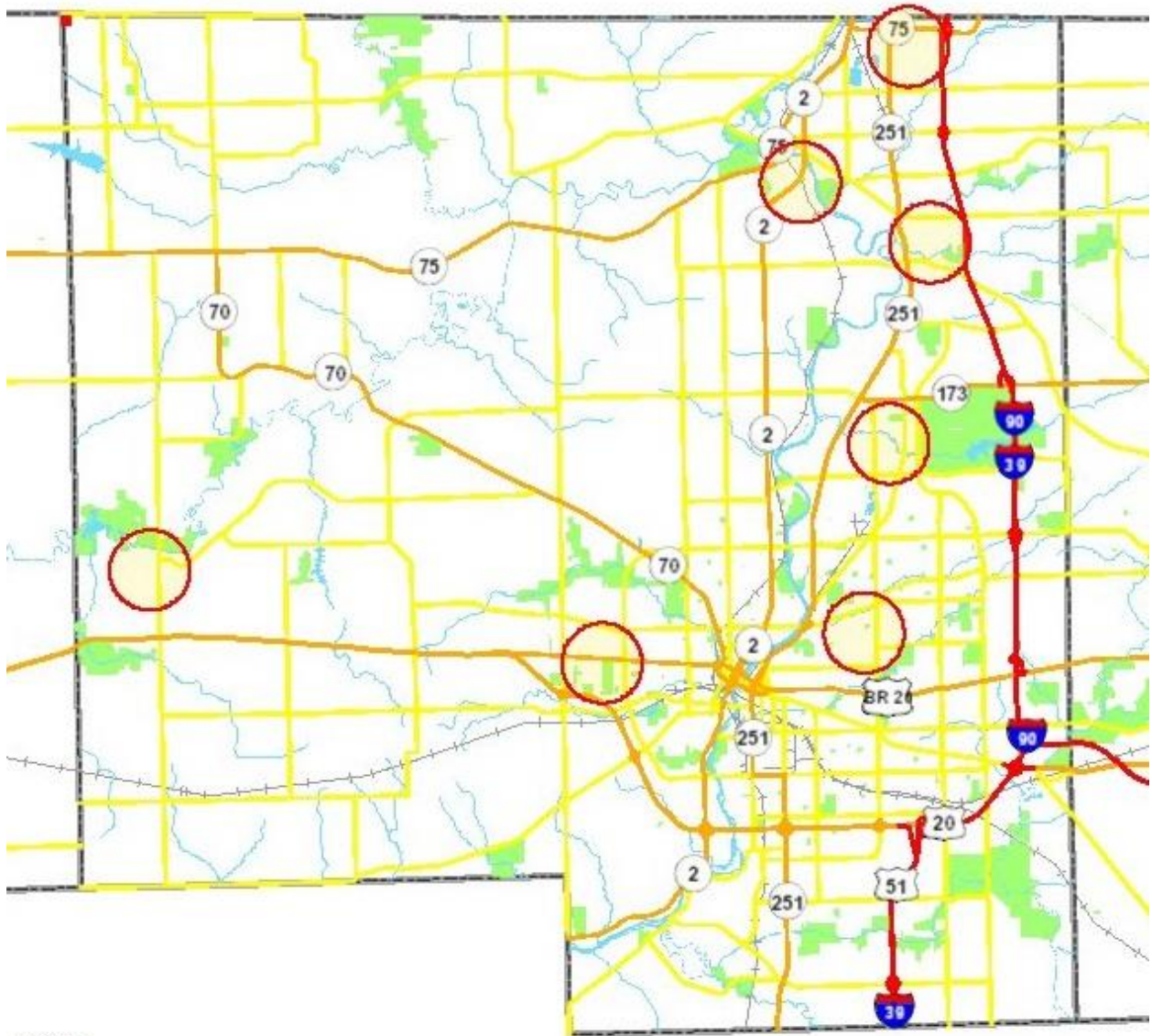
The WCHD not only monitored WNV activity through mosquito and bird sampling, it also took an active role in managing the mosquito population. WCHD Neighborhood Code Enforcement staff were trained in the application of Altosid XR Larvicide on April 11, 2017. Additionally, 16 municipal public works employees were also trained on April 28, 2017. All larvicide training was conducted per the Illinois Pesticide Act (415 ILCS 60) by the WCHD Environmental Health Supervisor (Public Applicator License #PA20173182). This training provided much needed assistance in targeting against the larval life stage of mosquitoes.

WCHD treats areas of standing water that have the potential to contain mosquito larvae. This ensures that larvae will not progress into the adult stage of their life cycle. In the 2017 season, program staff responded to a total of 38 specific stagnant water complaints from residents throughout the County in which larvicide was applied. These sites included abandoned swimming pools, exposed outdoor containers, tires, and public locations that were accumulating standing water.

## **Conclusion**

West Nile virus continues to be present in Winnebago County and is unlikely to be completely eradicated. Efforts to monitor the virus and its vectors should be continued at least until a predictable baseline level is reached for several years. Because the number of positive mosquito pools correlates so strongly to the number of human cases expected to occur, this surveillance tool serves an important and concrete purpose.

Because West Nile virus is a potentially life threatening infection, it is important to continue public awareness campaigns about prevention. Wearing insect repellent containing DEET, avoiding the outdoors during dusk and dawn, and eliminating standing water in residential areas are the most effective ways for people to protect themselves from contracting WNV. This combination of public education and epidemiological surveillance provides the best chance of minimizing human cases of West Nile virus.



**Figure 4 - "Hot Spot" map of positive mosquito pools in Winnebago County, 2017**

## Sources

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