

West Nile Virus Surveillance Overview of Activities – 2016

Winnebago County Health Department
Center for Environmental Health

November 17, 2016

Introduction

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

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.

In 2016, Winnebago County found WNV activity in 5 mosquito pools (out of 126 tested) and 3 birds (out of 14 tested). WNV activity was found in ZIP codes 61104, 61107, 61108, 61109, and 61115. There were no human cases of WNV confirmed or investigated, however it is possible that some residents in Winnebago County did contract the virus with little to no symptoms which would not prompt a doctor's visit.

To date, the statewide data shows an increase in the number of human WNV cases from 2015, but fewer deaths caused by the disease. Fewer counties throughout Illinois reported WNV activity; however the number of positive birds and mosquito pools increased statewide from 2015.

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

Year	First positive bird	First positive pool	Human WNV cases
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

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. For 2016, the WCHD was granted up to \$34,136, down from 2015 when the WCHD was granted \$51,489. This decrease in funding prevented the WCHD from hiring 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 in some of their events.

The WCHD's West Nile program also began utilizing community members and resources more directly in 2016. 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. Unfortunately the WCHD was unable to recruit any 'Mosquito Captains' this year, however the program will continue to seek neighborhood volunteers in upcoming WNV seasons.

Lastly, the WCHD hosted a major training session with municipal public works employees representing municipalities throughout the County. This training session was presented by staff from IDPH and covered mosquito control techniques specific to municipalities and also assisted with completing EPA NPDES permits for larvicide use.

Winnebago County Mosquito Plan

Due to the media attention surrounding the spread of the Zika virus in early 2016, as well as the ever-present threat of West Nile virus, Winnebago County developed a county-wide Mosquito Plan. This was designed to be a proactive way to address growing concerns over potential public health emergencies caused by these and other mosquito-borne diseases. To begin, the WCHD had

to create and perform a county mosquito surveillance and control assessment. As a result of the assessment, the WCHD hosted a mosquito-borne outbreak awareness meeting with heads of municipalities and county emergency planners. The primary focus of this meeting was to encourage these leaders to plan and budget for possible emergencies related to mosquito-borne diseases. This meeting, combined with the municipal public works training mentioned above, helps give Winnebago County the ability to respond with vector control actions at multiple levels of local government.

Personal Protection Index

For the second 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. 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.





Risk Level*	Definitions	Recommended Actions
 0 NONE	Off season. Climate conditions not favorable for <i>Culex</i> species.	None required
 1 LOW	Localized abundance of active mosquitoes. Climate conditions favorable for development of virus.	Drain Defend
 2 MODERATE	Virus indicated in the area with a moderate number of infected mosquitoes detected. Climate conditions favorable.	Drain Defend Dawn & Dusk Dress
 3 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 2016 for the WCHD's West Nile Virus program.

As with most previous years, press releases were published for program milestones. On July 15, a press release was made when the first positive mosquito pool was confirmed. And on August 5, a release was published following the first bird tested positive. These press releases were picked up by several media outlets, who published several pieces regarding WNV developments.

The WCHD also published a series of WNV-related posts to its social media accounts on Facebook and Twitter. These posts focused on preventing the spread of mosquitoes and minimizing their bites, and were published primarily in advance of the labor day weekend.

Additionally, WNV was a prominent feature at two neighborhood informational meetings held on July 28 and August 16. These meetings were held in areas with significantly high rates of rubbish-related code violations and were aimed at informing residents how to comply with county codes and how to report violators. This rubbish tends to accumulate water which increases mosquito breeding. Information regarding WNV was presented in order to help encourage compliance with these codes.

Lastly, the CLSR program staff included WNV program materials at several of their outreach events. Notably, these events included several shifts at the WCHD's information booth at the 2016 Winnebago County Fair. In addition to CLSR materials, program staff provided attendees with informational brochures on how to prevent the spread of mosquitoes around their homes. The WCHD's County Fair booth also included a sealed petri dish of mosquito samples for attendees to view under a high-powered magnifying glass. Many attendees, particularly school-aged children, were particularly drawn to this simple hands-on activity at the booth.

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 repellents 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 repellents.

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 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.

Without the use of multiple media mechanisms, we would not be able to educate as many people and keep them informed during the WNV season.

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 second 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 indicate when there is an increase in WNV activity, particularly when a heave of Corvid reports occur within several days of each other.

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 received a total of 61 phone calls and 10 online submissions this season. As a result, 14 birds were tested with 3 testing 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 corvids. 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 Illinois Department of Public Health (IDPH) laboratory as a confirmatory test for birds that tested positive for WNV through the WCHD's lab.

Avian Surveillance Data

Two birds tested positive via RAMP testing for the 2016 WNV season in Winnebago County, however a total of four birds were sent to the IDPH laboratory for confirmative testing. Of these four birds, three tested positive for WNV including one crow and two sparrows. These birds were found in ZIP codes 61104, 61109, and 61115.

Table 2 - Summary of Dead Birds tested for WNV

Date Collected	ZIP Code	Type of Bird	Date Tested	WNV Result
06/02/16	61102	Sparrow	06/07/16	Negative
06/07/16	61115	Finch	06/08/16	Negative
06/08/16	61072	Blackbird	06/10/16	Negative
06/08/16	61115	Sparrow	06/10/16	Negative
06/08/16	61102	Crow	06/10/16	Negative
06/10/16	61108	Robin	06/26/16	Negative*
06/15/16	61109	Robin	06/16/16	Negative
06/25/16	61115	Crow	06/26/16	Positive**
08/19/16	61104	Sparrow	08/24/16	Positive
08/22/16	61109	Sparrow	08/24/16	Positive
08/23/16	61072	Sparrow	08/24/16	Negative
08/26/16	61114	Crow	08/26/16	Negative
08/31/16	61107	Sparrow	08/31/16	Negative
09/14/16	61101	Crow	08/15/16	Negative
06/02/16	61102	Sparrow	06/07/16	Negative

*RAMP analysis for this bird tested negative (97.7), but was sent to the IDPH lab for confirmation. IDPH lab results were negative for WNV.

RAMP analysis for this bird tested negative (94.4), but was sent to the IDPH lab for confirmation. IDPH lab results were **positive for WNV.

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

Positive Data for Mosquito Pools

The WCHD Neighborhood Code Enforcement staff assisted with mosquito surveillance by collecting mosquitoes from 142 pools across 19 different locations throughout the season. 126 of these pools were suitable for testing, and only five tested positive. These five positive pools were located in ZIP codes 61104, 61107 (2x), 61108, 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 3 - Summary of Mosquito Pools tested for WNV

Trap Number	Date Pickup	Zip Code	Date Tested	Results
1	04/27/16	61101	05/06/16	Negative
1	05/18/16	61101	05/27/16	Negative
1	05/31/16	61101	06/03/16	Negative
1	06/13/16	61101	06/14/16	Negative
1	06/27/16	61101	06/28/16	Negative
2	06/03/16	61088	06/06/16	Negative
2	06/27/16	61088	06/28/16	Negative
3	05/06/16	61101	05/18/16	Negative
3	05/18/16	61101	05/27/16	Negative
3	05/25/16	61101	05/27/16	Negative
3	06/13/16	61101	06/14/16	Negative
3	06/13/16	61101	06/14/16	Negative
3	06/13/16	61101	06/14/16	Negative
3	06/15/16	61101	06/16/16	Negative
3	06/15/16	61101	06/16/16	Negative
3	07/05/16	61101	07/07/16	Negative
3	07/15/16	61101	07/18/16	Negative
3	07/25/16	61101	07/26/16	Negative
3	08/22/16	61101	08/23/16	Negative
4	04/27/16	61016	05/06/16	Negative
4	05/26/16	61016	05/27/16	Negative
4	07/20/16	61016	07/22/16	Negative
4	09/19/16	61016	09/20/16	Negative
5	04/27/16	61108	05/06/16	Negative
5	05/26/16	61108	05/27/16	Negative
5	06/01/16	61108	06/03/16	Negative

Trap Number	Date Pickup	Zip Code	Date Tested	Results
5	06/13/16	61108	06/14/16	Negative
5	06/13/16	61108	06/14/16	Negative
5	06/10/16	61108	06/14/16	Negative
5	06/17/16	61108	06/22/16	Negative
5	06/17/16	61108	06/22/16	Negative
5	06/24/16	61108	06/27/16	Negative
5	06/24/16	61108	06/27/16	Negative
5	06/24/16	61108	06/27/16	Negative
5	06/24/16	61108	06/27/16	Negative
5	06/27/16	61108	06/28/16	Negative
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5	06/29/16	61108	07/01/16	Negative
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5	07/08/16	61108	07/08/16	Negative
5	07/11/16	61108	07/12/16	Negative
5	07/13/16	61108	07/14/16	Negative
5	07/15/16	61108	07/18/16	Negative
5	07/15/16	61108	07/18/16	Negative
5	07/15/16	61108	07/18/16	Negative
5	07/18/16	61108	07/19/16	Positive
6	05/05/16	61108	05/18/16	Negative

Trap Number	Date Pickup	Zip Code	Date Tested	Results
6	05/23/16	61108	05/27/16	Negative
6	06/03/16	61108	06/06/16	Negative
6	06/17/16	61108	06/22/16	Negative
6	06/22/16	61108	06/27/16	Negative
6	06/29/16	61108	07/01/16	Negative
6	06/29/16	61108	07/01/16	Negative
6	07/01/16	61108	06/07/16	Negative
6	7/7/2016	61108	07/08/16	Negative
6	07/11/16	61108	07/12/16	Negative
7	05/27/16	61115	06/03/16	Negative
7	06/02/16	61115	06/03/16	Negative
7	06/06/16	61115	06/07/16	Negative
7	06/13/16	61115	06/14/16	Negative
7	06/13/16	61115	06/14/16	Negative
7	06/15/16	61115	06/16/16	Negative
7	06/21/16	61115	06/27/16	Negative
7	06/23/16	61115	06/27/16	Negative
7	06/27/16	61115	06/28/16	Negative
7	06/27/16	61115	06/28/16	Negative
7	06/27/16	61115	06/28/16	Negative
7	06/29/16	61115	07/01/16	Negative
7	07/06/16	61115	07/07/16	Negative
7	07/06/16	61115	07/07/16	Negative
7	07/06/16	61115	07/07/16	Negative
7	07/08/16	61115	07/08/16	Negative
7	07/08/16	61115	07/08/16	Negative
7	07/08/16	61115	07/08/16	Negative
7	07/08/16	61115	07/08/16	Negative

Trap Number	Date Pickup	Zip Code	Date Tested	Results
7	07/13/16	61115	07/14/16	Positive
8	06/02/16	61073	06/03/16	Negative
8	07/13/16	61073	07/14/16	Negative
8	07/15/16	61073	07/15/16	Negative
9	06/02/16	61080	06/06/16	Negative
10	06/13/16	61072	06/14/16	Negative
10	06/23/16	61072	06/27/16	Negative
11	06/27/16	61072	06/28/16	Negative
11	06/27/16	61072	06/28/16	Negative
11	07/08/16	61072	07/08/16	Negative
11	07/15/16	61072	07/15/16	Negative
11	07/25/16	61072	07/26/16	Negative
12	07/06/16	61104	07/07/16	Negative
12	07/07/16	61104	07/08/16	Negative
12	07/11/16	61104	07/11/16	Negative
12	07/13/16	61104	07/14/16	Negative
12	07/15/16	61104	07/15/16	Negative
12	07/18/16	61104	07/19/16	Negative
12	08/17/16	61104	08/23/16	Positive
13	07/07/16	61109	07/08/16	Negative
13	07/07/16	61109	07/08/16	Negative
13	07/15/16	61109	07/18/16	Negative
13	07/18/16	61109	07/19/16	Negative
13	07/22/16	61109	07/22/16	Negative
13	07/25/16	61109	07/26/16	Negative
13	08/05/16	61109	08/09/16	Negative
13	08/22/16	61109	08/23/16	Negative
13	08/29/16	61109	08/30/16	Negative

Trap Number	Date Pickup	Zip Code	Date Tested	Results
13	08/31/16	61109	09/02/16	Negative
13	09/06/16	61109	09/09/16	Negative
14	07/25/16	61107	07/26/16	Negative
14	08/05/16	61107	08/09/16	Positive
15	08/11/16	61072	08/15/16	Negative
15	08/19/16	61072	08/23/16	Negative
15	08/23/16	61072	08/26/16	Negative
15	09/19/16	61072	09/20/16	Negative
16	08/18/16	61107	08/23/16	Negative
16	08/12/16	61107	08/23/16	Negative
16	08/26/16	61107	08/26/16	Positive
17	08/26/16	61111	08/26/16	Negative
18	09/02/16	61111	09/02/16	Negative
18	09/19/16	61111	09/20/16	Negative
19	09/02/16	61107	09/02/16	Negative
19	09/06/16	61107	09/09/16	Negative
19	09/16/16	61107	09/20/16	Negative

Human Cases

As of November 8, 2016, 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. A total of 1,521 human cases of WNV had been reported nationwide. This is a small decrease from this time last year in which 1,650 cases had been reported.

To date, IDPH has reported a total of 136 human cases in Illinois, spread across 21 counties. The majority of these cases occurred in the greater-Chicago area (Cook, DuPage, Will, and Kane counties). This is an increase from last year, in which 67 human cases were reported statewide. To date, no human cases have been reported in Winnebago County. The last confirmed human case of WNV in Winnebago County occurred in 2013.

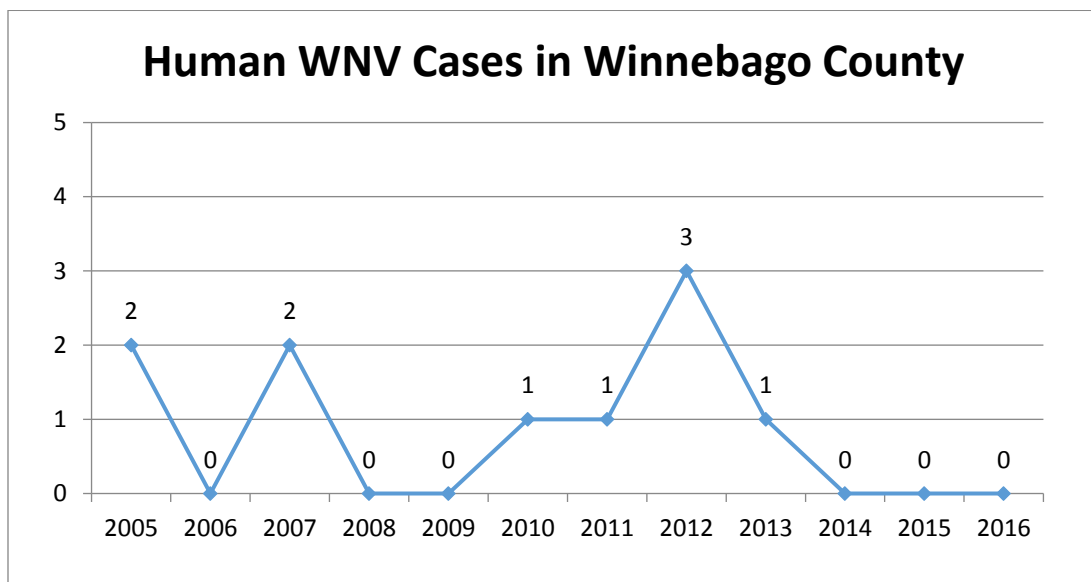


Figure 3 - History of Human WNV Cases by Year

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 May 12, 2016. 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 2016 season, program staff responded to a total of 41 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.

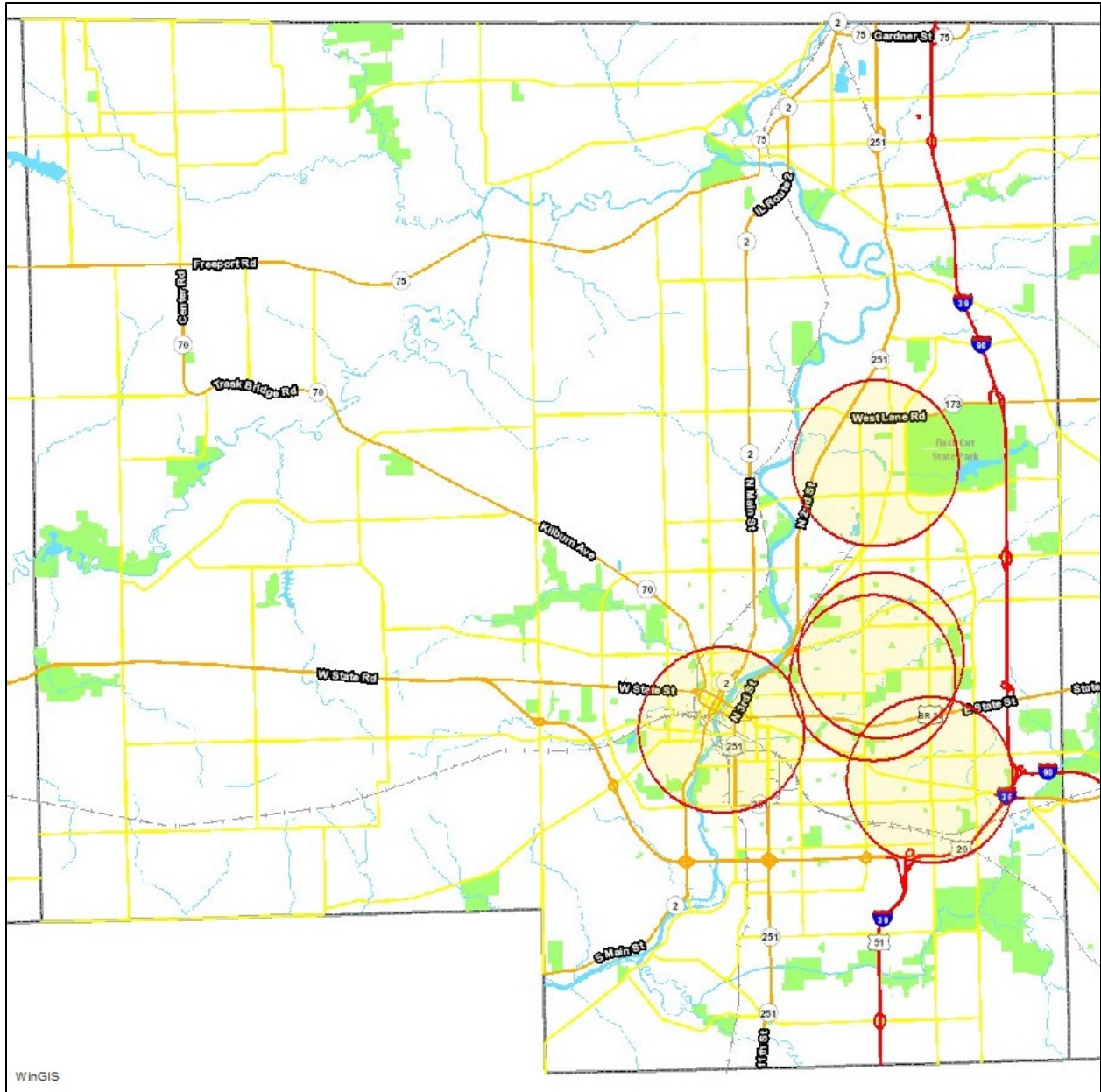


Figure 4 - "Hot Spot" map of positive mosquito pools in Winnebago County, 2016