

West Nile Virus Surveillance Overview of Activities
Winnebago County Health Department • Division of Environmental Health
Vector Control Specialist • Terri J. Howard
November 2015

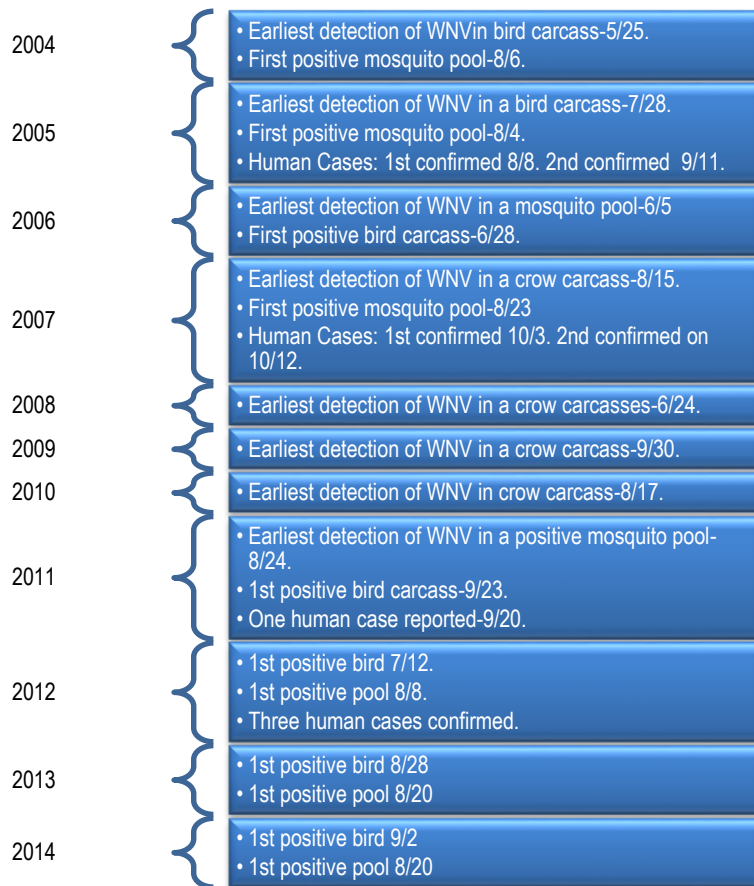
INTRODUCTION

West Nile virus (WNV) is an emerging disease first detected in the United States in 1999, in the state of Illinois in 2001, and in Winnebago County in 2002. In 2015, WNV activity was detected in 6 mosquito pools and in 6 birds in Winnebago County. Moreover, activity was found in zip codes 61019, 61072, 61088, 61101, 61102, 61104, 61107, 61108, 61109, 61111 and 61115. There were no human cases investigated and/or confirmed for having WNV. It is reasonable to presume that some residents in Winnebago County did contract WNV with little to no symptoms which would not prompt a doctor's visit.

To date the statewide data shows that WNV activity for 2015 was about where it was in 2014, at a low to moderate level. At the end of July leading into August, rapid amplification was experienced due to low precipitation and high temperatures reaching 90°F. As a result, all six of the positive mosquito pools were detected with the majority of the birds collected tested positive in September.

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.

WEST NILE VIRUS HISTORY IN WINNEBAGO COUNTY



PARTNERSHIP & COLLABORATION

The WNV program successfully partnered with the Winnebago County Health Department’s Neighborhoods Program. The program consists of three staff members whose primary responsibility is to enforce the correction of housing code violations in Winnebago County. Because of their excessive presence in the field, the Neighborhood’s staff was able to assist the WNV program with prevention education, larvicide applications and mosquito surveillance.




Furthermore, the WNV program collaborated with the Creating Lead Safe Rockford (CLSR) grant program regarding outreach opportunities. The CLSR program is a grant program funded by the Department of Housing and Urban Development currently available to identify and correct lead hazards in qualifying households. This collaboration helped us to reach approximately 1,696 residents through 6 separate outreach events. Outreach materials such as flyers and pamphlets were passed out to educate residents about WNV prevention. Also, the Vector Control Specialist was there to answer questions and educated families/residents on how to take appropriate precautions against WNV and how to reduce breeding habitats around their home.

PERSONAL PROTECTION INDEX

This season, WCHD adopted the Personal Protection Index (PPI) from DuPage County Health Department and the CDC as an additional tool to help residents protect themselves against West Nile virus (WNV). This tool is located on WCHD’s website and 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 being no activity and 3 announcing an increased chance for human infection because of high numbers of infected mosquitoes.

When activated, residents should follow the 4 D’s of prevention that coincide with the PPI risk level.

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

PUBLICITY

We utilized various media avenues for reaching out to the public. Some of the media avenues used this season were:

- ✓ Two press releases (start of season and first positive)
- ✓ 3 newspaper articles
- ✓ 3 local news television broadcasts
- ✓ A number of Facebook and Twitter posts

We stress the “3 R’s – reduce, repel and report” message because it is the best way for each and every one of us to fight West Nile Virus. It states:

1. Reduce areas of standing water around your home. Eave troughs, birdbaths, 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 can tolerate no more than a 10% 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 Winnebago County Health Department dead bird hotline at (815) 720-4245 or by visiting www.wchd.org and using the new online dead bird reporting tool.

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

REPORTING DEAD BIRDS

Winnebago County Health Department was excited to launch a new online reporting template for residents to report dead birds (an early indicator of WNV). Information about bird population was obtained by cumulative ecological data from all bird deaths reported by the public who utilized the new online reporting tool on WCHD's website or phoned in to WCHD's dead bird hotline.

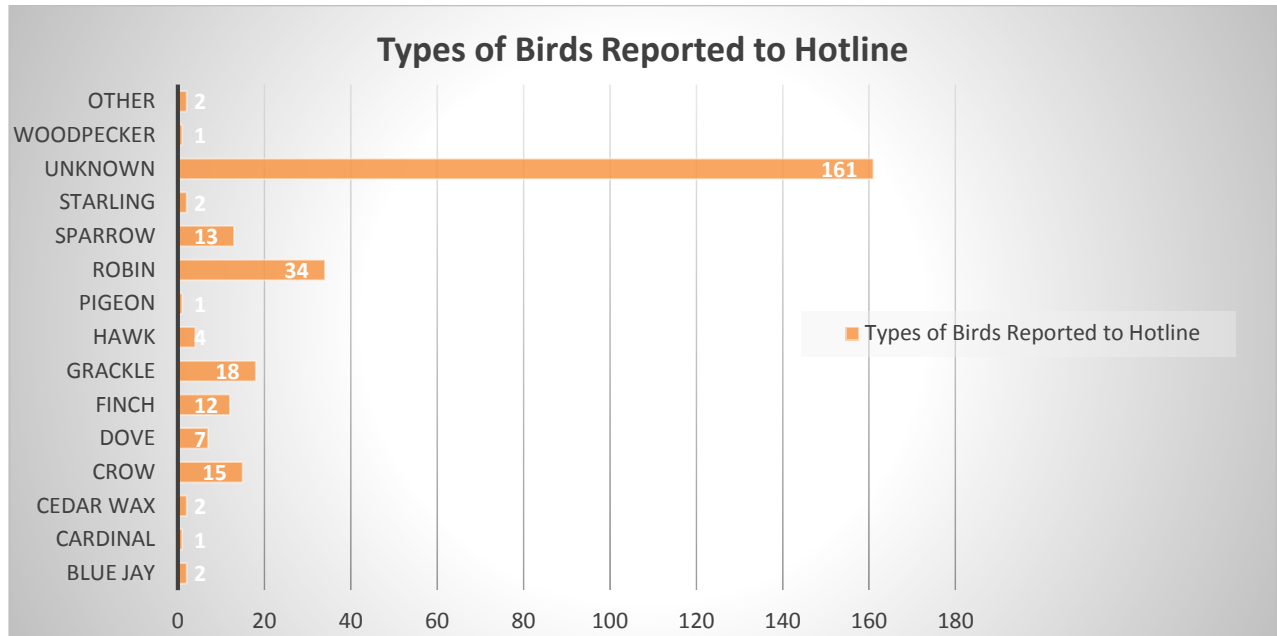
The instructions for the hotline and online tool were very thorough, and described all the conditions necessary for a bird to be suitable for testing. These tools are an immediate indicator of WNV activity and can indicate when there is an increase in WNV activity, particularly when a heave of Corvid reports occur within several days of each other.

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

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 275 calls and there were 24 online submissions this season. As a result, 88 birds were retrieved and 51 of them were suitable for testing. The month of July had the highest call

volume, unfortunately, no birds tested positive during this period even though the first positive bird carcass was found in late June.



It is worth noting that residents often had difficulty identifying particular species of birds and occasionally misreported species (i.e. reporting grackles as crows). The WCHD website could benefit from a page on the identification of local bird species similar to that of the IDPH (www.idph.state.il.us/), perhaps supplemented with size ranges for each bird.

TESTING METHODS

The WCHD utilized a couple of different testing methods to verify the presence of WNV. The primary testing that was utilized this year was Rapid Analyte Measurement Platform (RAMP) assay. The RAMP test is a highly sensitive pre-screening test used for identifying WNV in mosquitoes and corvids. This type of testing was 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 testing is more time consuming and expensive, and could only be performed at IDPH laboratories as a confirmatory test on birds which had previously tested positive via RAMP testing.

AVIAN SURVEILLANCE DATA

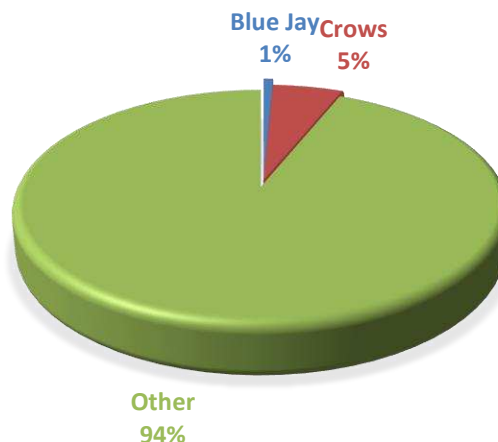
Six birds tested positive via RAMP testing this season. The birds that tested positive included, 3 Crows, a Blue Jay, a Grackle, and a Robin. The Grackle and the Robin were sent to the state lab and were confirmed positive.

Bird Species - Data Reported to IDPH

Following protocol, the Vector Control Specialist shipped a total of 2 birds to the Illinois Department of Agriculture Laboratory in Galesburg, Illinois for confirmatory testing. It is worth noting that the first positive bird, a Grackle, was found early in the season and was confirmed positive on July 1.

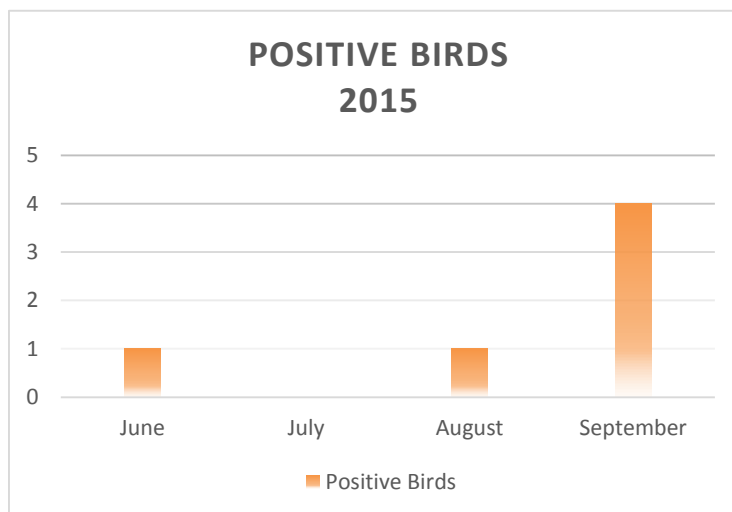
Out of all the birds tested, 94% were non-Corvids and are categorized “other” in the graph below. This group consisted of Finches, Grackles, Warblers, Grey Catbirds, Yellow-Bellied Sapsuckers, Mourning Doves, Hawks, Robins and Sparrows. One Blue Jay tested and 5% of birds tested were American Crows (*Corvus brachyrhynchos*).

BIRDS TESTED BY TYPE



Data for Positive Birds

A majority of the positive birds were tested in September. This could be attributed to a spike in positive mosquitoes that was detected in August.



ARC GIS Mapping System/Hot Spots

Data from all bird carcasses that tested positive for WNV were collected and entered into the ARC GIS mapping system. This mapping system provides a geographical overview and means of statistical analysis for the identification of “hot spots”. Hot spots can be defined as areas within a square mile of each other where two or more bird carcasses have tested positive for WNV. This prompts the Vector Control Specialist to set a gravid trap in the area and/or pass out precautionary information door to door.

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 the 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 in our pools, we collected mosquitoes using as many as 12 gravid traps in the field at a time (traps specifically targeted to capture Culex female mosquitoes).

Gravid Trap

- Water prepared with alfalfa pellets and other organic materials in container.
- Attracts female Culex mosquitoes.
- Fan transports mosquitoes into the net.
- Nets collected every 2-3 days.



Positive Data for Mosquito Pools

As stated earlier, the Neighborhoods Program assisted with mosquito surveillance. They helped in collecting 150 pools of mosquitoes with approximately 16,464 individual mosquitoes tested, with an average of 110 mosquitoes per pool. Six pools tested positive in August.

Locations

Mosquito samples were taken from locations throughout the county determined to be high risk areas. These areas were selected by the following criteria:

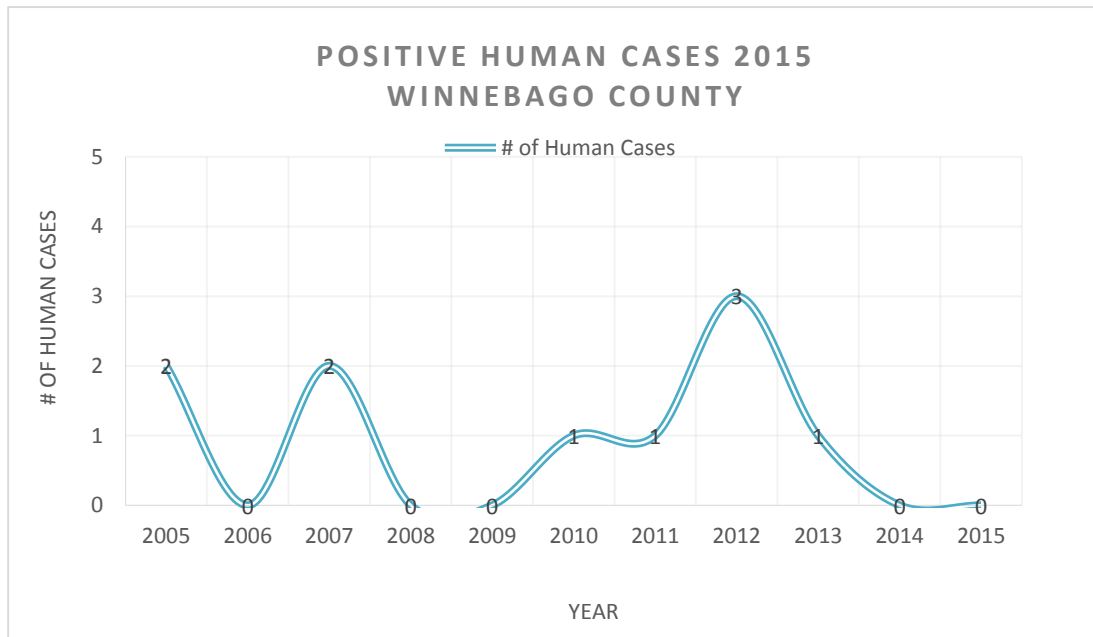
1. Location had a positive pool during previous WNV seasons.
2. Location had a higher than average density of dead bird reports.
3. Location is in a high density urban area.
4. Location was likely to be an excellent habitat for mosquitoes and birds, and frequented by humans (parks, forest preserves,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

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

HUMAN CASES

As of November 3, the Center for Disease Control confirmed that there were 47 states and the District of Columbia that reported having WNV infections in humans. Overall, 1,650 cases of West Nile virus disease in people have been reported to the CDC of these, 1,066 (65%) were classified as neuroinvasive disease (such as meningitis or encephalitis) and 584 (35%) were classified as non-neuroinvasive disease.

As of November 11, 2015, there were 67 human cases confirmed within the state of Illinois, which is a 20% increase of human cases from the 2014 season. There were no confirmed human cases reported in Winnebago County.



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 West Nile 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 West Nile, 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 meticulously monitored WNV through mosquito and bird sampling; it also took an active role in managing the mosquito population. Here at WCHD, larvicide was used to treat areas of standing water that had the potential to contain mosquito larvae. This ensures that mosquito larvae will not progress to the adult stage of their life cycle.

The Vector Control Specialist along with three Neighborhoods' Program staff were trained in the application of Altosid XR Larvicide this year. All larvicide training was conducted per the Illinois Pesticide Act (415 ILCS 60) by the WCHD Environmental Health Supervisor, Public Applicator License #: PA 20173182. This additional training provided much needed assistance in targeting **against** the larval life stage of mosquitoes.

Altogether, the WCHD distributed approximately 440 briquettes of the 150-day Altosid-XR extended residual briquets. Larvicide was applied to various sites, including but not limited to, abandoned properties with unmaintained pools, exposed outdoor containers, tires, and public locations that were accumulating standing

water and producing possible breeding locations for mosquitoes. The application of larvicide in pools is used as an interim control until a pool is drained or brought up to operational standards.

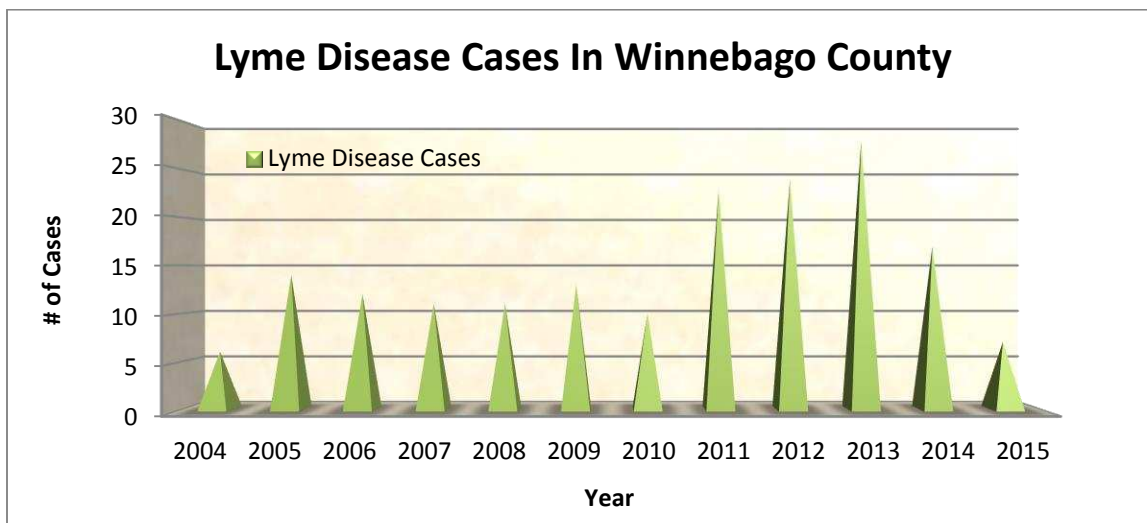
Local municipalities were contacted and offered larvicide. WCHD was able to help out the Village of Rockton and the Village of Winnebago by providing them with several boxes of larvicide in order to control their mosquito population.

In addition to using larvicide, the Vector Control Specialist along with the help of the Neighborhood's Program staff, had the opportunity to educate people about mosquito breeding sites in the field. Many people were not aware that bird baths, flower pots and other decorative containers that house water are great places for female Culex mosquitoes to lay their eggs. With a resident's permission, we were able to dump containers and empty bird baths holding water, which immediately decreased the attraction of female Culex mosquitoes.

WCHD strongly recommends that all standing water, even small amounts that people may deem trivial be eliminated. This greatly decreases the favorable conditions for female Culex mosquitoes to lay their eggs, however, it is understood that it is not always possible to clear an area of standing water (such as floodwaters, small ponds, etc...). In this case, the WCHD advocates the use of commercially available larvicide for the maintenance of problematic standing water as the best alternative.

LYME DISEASE SURVEILLANCE

As of November 16, 2015, 7 Lyme disease cases were confirmed in Winnebago County by IDPH. However, there may be more cases in the preliminary stage, not yet confirmed.



CONCLUSION

West Nile virus continues to emerge in Winnebago County and it is unlikely it will ever be 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 from around properties 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 costs associated with the West Nile Virus.