

## INDICATOR: West Nile Virus

Emerging and Zoonotic Infectious Diseases Section  
Michigan Department of Health and Human Services  
517-335-8165

[www.michigan.gov/emergingdiseases](http://www.michigan.gov/emergingdiseases)

# WEST NILE



### Background

West Nile virus is a mosquito-transmitted disease that was first discovered in Uganda in 1937. It is considered an “Emerging Infectious Disease” because of the spread beyond its traditional geographic range. In recent years West Nile virus has caused illness in birds, horses, and humans in Europe, and now the United States after it was first discovered in the U.S. in 1999 in New York City. Today, West Nile virus is found in all 48 contiguous states and is the most common cause of mosquito-borne disease in the U.S.

West Nile virus is a disease of birds that is transmitted to humans by the bite of an infected mosquito. Mosquitoes that transmit West Nile virus are almost exclusively of the genus *Culex*, which are commonly found in urban environments, and lay their eggs in stagnant water that is rich in organic matter. Most humans infected with West Nile virus develop no symptoms of illness, however about 20 percent may become sick with a fever, headache and body aches three to 14 days after receiving a bite from an infected mosquito. Rarely, persons infected with West Nile virus may develop more severe disease, including encephalitis and sometimes death. Severe disease can occur in people of any age. However, people over 60 years of age are at the greatest risk for severe disease. People with certain medical conditions, such as cancer, diabetes, hypertension, kidney disease, and people who have received organ transplants, are also at greater risk for serious illness.

Individuals presenting with encephalitis, meningitis, or other acute neurologic illness in which an infectious etiology is suspected should be tested for mosquito-borne diseases, including West Nile virus, during the mosquito season. Testing is available free of charge at the Michigan Department of Health and Human Services Bureau of Laboratories through Michigan healthcare providers. Symptoms of encephalitis (inflammation of the brain) and meningitis (inflammation of the spinal cord and brain linings) include severe headache, high fever, neck stiffness, stupor, disorientation, coma, tremors, muscle weakness, convulsions and paralysis.

## Status and Trends

In response to the threat of West Nile virus in Michigan, the West Nile Virus Working Group (i.e., a multi-agency work group) emerged from the Arbovirus Core Group in 2000 (Michigan Department of Community Health 2006b). In 2001, a toll-free hot line was established for citizens to report dead crows, as monitoring death amongst these birds can be an early indicator of virus activity in an area (Figure 1). As a result of this effort, West Nile virus was first detected in Michigan in August 2001 in dead crows.

Human illness due to West Nile virus in Michigan was first documented in 2002, when a large-scale outbreak occurred in the Upper Midwest. Human cases were preceded by a massive die-off in resident corvid (crows, blue jays, ravens) populations. From early May to late October 2002, the Michigan Department of Community Health received over 10,000 reports of dead birds from the public. Southeast Michigan was particularly affected, accounting for 531 of 644 West Nile virus illnesses and 51 deaths statewide confirmed by public health authorities that year.

Although West Nile virus is now well-established in Michigan, we continue to maintain a multi-agency work group, with members from the Michigan departments of Natural Resources (MDNR), Agriculture and Rural Development (MDARD), the Environment, Great Lakes, and Energy (EGLE), Health and Human Services (MDHHS), and from Michigan State University. We also continue to ask citizens to monitor the health of wildlife by reporting sick, dead, or dying animals to the MDNR Wildlife Disease Laboratory. Wildlife submitted to the MDNR are tested for arboviruses by the Michigan State University Veterinary Diagnostic Laboratory. In 2018, 197 avian cases were reported, providing early warning of local WNV activity. West Nile virus also affects horses and suspected cases are reportable to MDARD, who can coordinate testing for WNV and other mosquito-borne viruses; in 2018, two horses were reported with WNV.

### *Mosquito Management*

Mosquito surveillance for West Nile virus has been conducted in Michigan since 2001. In 2018, over 4,000 mosquito pools were tested for the virus, and 159 pools were found to be positive. The West Nile Virus Community Surveillance Project provides training and equipment for mosquito trapping and testing in several local health jurisdictions in southeast Michigan and in Kent county. Mosquito control districts in Bay, Midland, Saginaw, and Tuscola counties additionally conduct their own surveillance to identify mosquitoes and test them for the presence of viruses.

There are many species of mosquito in Michigan, and some are more competent at transmitting West Nile virus than others. In the eastern United States, the primary vectors are within the genus *Culex*. These mosquitoes are active in the summer, and peak biting times are dusk and dawn. These mosquitoes are also more common in urban environments, where they reproduce readily in man-made containers containing nutrient-rich water. These habitats may include sewer catch basins, bird feeders, unused swimming pools, scrap tires, or practically any other man-made container.

Since it is not feasible to control the virus within wild bird populations, our best target for control is the mosquito. The use of licensed larvicides which kill the immature mosquitoes (larvae) in water have been shown to reduce mosquito populations and disease risk when used within an integrated mosquito management program. It is unlikely that individual treatment by citizens in a piecemeal fashion will reduce the risk, because mosquitoes can breed nearby in areas that are untreated.

## **Management Next Steps**

The Michigan Department of Health and Human Services considers West Nile virus an emerging disease issue and devotes considerable resources to surveillance, management, and public education. No human vaccine against West Nile virus is currently available so the most effective way to prevent the disease is to prevent mosquito bites.

- Use Environmental Protection Agency (EPA)-registered insect repellents when you go outdoors. Repellents containing DEET, picaridin, IR3535, and some oil of lemon eucalyptus and para-menthane-diol products provide longer-lasting protection.
- Wear long sleeves and pants from dusk through dawn when many mosquitoes are most active.
- Install or repair screens on windows and doors. If you have it, use your air conditioning.
- Help reduce the number of mosquitoes around your home. Empty standing water from containers such as flowerpots, gutters, buckets, pool covers, pet water dishes, discarded tires, and birdbaths at least once a week.

## **Research/Monitoring Needs**

Testing will continue to be conducted in order to provide community-based information about West Nile virus activity in birds and mosquitoes. The State of Michigan compiles surveillance information on the “Emerging Diseases” website, which can be viewed at: [www.michigan.gov/westnilevirus](http://www.michigan.gov/westnilevirus).

The public can also report sick or dead birds at <https://www2.dnr.state.mi.us/ORS/Home>, with feedback as to whether the bird is needed for surveillance purposes. Communities can use this information to target their intervention and prevention strategies to areas where West Nile virus activity has been detected. Michigan health workers are implementing a system of animal and human disease surveillance that utilizes geographic information system mapping capabilities to detect outbreaks more rapidly. Research continues on a possible human vaccine and health treatment options.

## **References**

Centers for Disease Control and Prevention. 2019. National Center for Emerging and Zoonotic Infectious Diseases, Division of Vector-Borne Diseases: West Nile Virus Prevention. Lansing, Michigan, USA.

<http://www.cdc.gov/westnile/prevention/index.html>. (accessed September 2019).

Michigan Department of Health and Human Services. 2019. Emerging Disease Issues: West Nile Virus. [https://www.michigan.gov/emergingdiseases/0,4579,7-186-76711\\_76752---,00.html](https://www.michigan.gov/emergingdiseases/0,4579,7-186-76711_76752---,00.html). (accessed September 2019).

### **Links for More Information**

Michigan Department of Health and Human Services:

<https://www.michigan.gov/westnile>

Centers for Disease Control and Prevention: <https://www.cdc.gov/westnile/index.html>