



WEST NILE VIRUS SURVEILLANCE IN MADISON AND DANE COUNTY

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Summary

- WNV vectors are present in the metropolitan area and create a potential WNV infection risk for humans in the area.
- Testing of sick and dead birds for West Nile Virus (WNV) was discontinued during the 2020 monitoring season; this policy continued in 2021. WNV is considered endemic to Dane County and the collection of birds to confirm the presence of the virus each season is no longer warranted.
- Public Health Madison and Dane County continued partnerships with other City of Madison agencies, six neighboring communities, and the University of Wisconsin campus to implement mosquito larvae monitoring and control activities in the Madison metropolitan area.
- Approximately 9.0% of water sources monitored in the Madison metropolitan area for mosquito larvae produced high numbers of *Culex* mosquitoes at least once during the current season; another 4.6% produced high numbers of *Aedes* larvae.

- In the last 10 years (2012 – 2021), a total of 185 sites have produced high numbers of *Culex* larvae at least once.
- No human cases of WNV or deaths related to WNV illness were reported in Dane County in 2021.
- One case of St. Louis encephalitis virus (SLEV) disease was confirmed in Dane County during 2018. Similar to the previous two monitoring seasons, there were no additional cases reported during 2021.

Bird Surveillance

Prior to 2020, Public Health Madison and Dane County (PHMDC) cooperated with statewide efforts to collect and test sick or dead crows and blue jays for WNV. These species have shown to be susceptible to WNV infection and compose the majority of birds that test positive for the virus. WNV is considered endemic in Dane County, meaning that the virus is a consistent presence in our community during the warmer months. Therefore, the collection of birds to confirm the presence of the virus each season is no longer warranted and was discontinued at the direction of the Wisconsin Department of Health Services; this policy continued during the 2021 monitoring season.

Mosquito Surveillance

In 2021, PHMDC continued its partnership with the City of Middleton, City of Monona, City of Sun Prairie, Town of Madison, Village of Maple Bluff, Village of Shorewood Hills, and University of Wisconsin to monitor and control the breeding activity of targeted mosquito species on public property. The primary targeted mosquito species of this annual surveillance is the *Culex* mosquito species due to its identification as the principal vector for human transmission of WNV and has accounted for the vast majority of WNV infected mosquitoes captured throughout the country. If present, other potential mosquito species that are potential vectors for WNV are also monitored; in Dane County, this primarily includes the *Aedes* mosquito species. Mosquito larvae sampling was performed by PHMDC staff from late May through September to locate water sources producing large numbers of mosquito larvae.

Control of mosquito activity involved public outreach to promote removal of water sources (source reduction) and larvicide applications when water sources were found to produce high levels of target mosquito larvae; *Culex* and/or *Aedes* mosquito species. Overall, during the 2021 mosquito season, a total of 142 treatments were performed at 60 sites that reported high levels of mosquito larvae; twenty-four of these sites were considered problematic and required treatment on 3 or more separate occasions. The remaining sites that reported elevated levels of *Culex* activity larvicidal treatment was deemed unnecessary due to weather and site conditions or the predominate species identified was not associated with WNV.

The table below (Table 1) lists the number of sites by community that reported high concentrations of *Culex* or *Aedes* larvae; all other sites tested reported either low concentrations that did not require treatment or no larvae detected.

Table 1. Summary results of 2021 mosquito larvae inspections of accessible sources in the Madison metropolitan area

	City of Madison	Village of Maple Bluff	City of Middleton	City of Monona	Village of Shorewood Hills	City of Sun Prairie	Town of Madison	UW Madison	Total Metro Area
High <i>Culex</i>	46	1	3	0	0	10	0	1	61
High <i>Aedes</i>	20	0	1	1	0	5	4	0	31
# of inspected sites	416	3	72	22	1	115	14	29	675*
% High <i>Culex</i>	11%	33%	4.2%	0.0%	0.0%	8.7%	0.0%	3.4%	9.0%
% High <i>Aedes</i>	4.8%	0.0%	1.4%	4.5%	0.0%	4.3%	28.6%	0.0%	4.6%

* Three additional sites were inspected in the Town of Burke included in total. No *Culex* or *Aedes* larvae were detected at these sites.

During the summer of 2021, department staff made 2,199 inspections of 675 accessible sites in the metro area. Approximately 30% of the 966 potential inspection sites in the metro area were not accessible for monitoring of mosquito activity due to ownership, safety, and/or physical or environmental barriers of the property.

Similar to previous years, the bulk of these inspections were made at ditches and detention/ retention ponds (48.3% and 39.7% respectively); however, other sites evaluated included, but not limited to, creeks, marshes, rivers, rain gardens, and flooded areas. In the metro area, 9.0% of all inspected sites produced high number of *Culex* larvae at least once during surveillance (approximately May through September); 4.6% of inspected sites produced high numbers of *Aedes* larvae.

At the community level, the City of Madison reported approximately 11.0% of the 416 inspected sites demonstrated high numbers of *Culex* larvae. Other communities in the metro area that reported *Culex* activity included the University of Wisconsin-Madison campus and arboretum (3.4%), the Village of Maple Bluff (33.3%) and the Cities of Middleton (4.2%) and Sun Prairie (8.7%). High concentrations of *Aedes* larvae were reported in the Cities of Madison (4.8%), Middleton (1.4%), Monona (4.5%), and Sun Prairie (4.3%) and the Town of Madison (28.6%).

For additional information on these efforts for 2021, please refer to the full mosquito monitoring and control program reports for these years entitled "Mosquito Monitoring and Control – Madison Metropolitan Area"; a separate report is available for each year. These reports are available at: <http://www.publichealthmdc.com/>.

Human Surveillance

Most humans (approximately 80%) infected with WNV experience no symptoms while approximately 20% will develop a fever with other potential symptoms including headache, body ache, joint pain, vomiting, and fatigue. Less than 1% of people who are infected will develop serious illness affecting the central nervous system such as encephalitis or meningitis with people over 60 years of age at the greatest risk.

Since 1999, a total of 51,801 cases of the disease and 2,390 deaths (approximately 4.6% of total cases) had been reported in the United States; the preliminary data for 2020 and 2021 are not finalized and not included in this total.

As of May 25, 2021, a total of 664 human cases of the disease (505 cases of neuroinvasive disease and 159 non-neuroinvasive disease) and 52 disease-related deaths have been reported to the Centers for Disease Control and Prevention (CDC) in 2020. This preliminary data reflects a significant decrease in the number of cases of WNV reported compared to the previous mosquito season (557 currently reported cases in 2020 compared to 971 cases in 2019). The totals for 2020 were the lowest number of reported WNV cases since 2001.

However, during the current monitoring season, a significant increase in the number of cases were reported in comparison to the 2020 season described above. As of November 30, 2021, a total of 2,550 human cases of WNV (1,551 case of neuroinvasive and 699 of non-neuroinvasive disease) and 150 disease-related deaths have been reported in 2021. The number of cases reported in the current season reflect a significant increase compared to 2019 and 2020 and is the highest number of reported cases nationwide since 2013. As demonstrated by the significant changes in WNV activity, continued surveillance is necessary to determine if this increase represents an actual trend in the number of cases or can be explained by annual variation.

West Nile virus infection is a reportable illness in Wisconsin. In Wisconsin, a total of 338 positive human cases of the disease have been reported to the CDC from 2002 through 2019; this total includes 23 disease related deaths. Preliminary data totals in 2020 (as of May 25, 2021) have reported 1 case of human WNV (one case of neuroinvasive disease and no cases of non-neuroinvasive disease were reported). In 2021 (as of November 30, 2021), preliminary data has reported 3 cases of neuroinvasive disease and no cases of non-neuroinvasive disease. There were no disease-related deaths reported during 2020 or 2021. The number of reported cases in the current season is similar in comparison to the previous two years and is one of the lowest number of reported cases in the state since 2009.

Area providers are also encouraged to participate in Wisconsin's Enhanced Arbovirus Surveillance program, which tests serum and cerebrospinal fluid of patients who met specific clinical criteria. Preliminary data totals in 2020 and 2021 do not identify any presumptive viremic blood donors that were reported to the CDC from the State of Wisconsin; a continued decrease from the 1 presumptive donor in 2019, the 8 donors reported in 2018, and the 13 donors reported in 2017. In the last 10 years (2012 – 2021) a total of 57 presumptive viremic blood donor were reported to the CDC; an annual total of 0 presumptive donors were only reported twice during this time period, 2020 and 2021.

PHMDC continues to conduct passive surveillance for human cases of WNV infection at the county level. Since 2002, surveillance has recorded a total of 38 cases of human WNV infection (probable and confirmed) in Dane County including 2 deaths. Similar to the previous year, there were no cases reported in 2021. A breakdown of these cases is show in Table 3 below.

Table 3. Number of human WNV cases in Dane County.

	Cases Identified		
	2020	2021	Total since 2002
WNV Fever	0	0	12
WNV Encephalitis (non-fatal)	0	0	24
WNV Encephalitis (fatal)	0	0	2
Total	0	0	38

St. Louis Encephalitis (SLEV)

SLEV is similar to WNV and can include symptoms of fever, headache, nausea, and fatigue in people infected with the mosquito borne disease. In rare cases, the disease can result in tremors, inflammation of the brain, and coma with older adults and people with weakened immune systems most at risk for the most severe symptoms.

One case of SLEV was reported in Dane County in the 2018 mosquito surveillance season; this was the first case of the disease to be reported in Wisconsin since 1981. Although this individual did die the death was determined to be caused by underlying health conditions and not related to SLEV. Similar to the previous two seasons, there were no additional cases of SLEV reported in Dane County in 2021.

Public Outreach

At the beginning of each of the seasons reported above, a press release was issued that provided a written briefing to educate the media. In addition, PHMDC staff continued efforts to provide information to the public including the risks of WNV illness, mosquito bite prevention, the reduction of mosquito-breeding areas, and an annual report of WNV and mosquito activity in the county. This and additional information is available on the PHMDC website (<http://www.publichealthmdc.com/disease/westNile/>).

Conclusion

West Nile virus surveillance activities continue to indicate that WNV risk for humans in Madison and Dane County is low but there are still areas that continue to report high level of *Culex* and/or *Aedes* mosquitoes. Similar to the previous year, there were no positive cases of WNV reported in humans in 2021.

The documented levels of mosquito activity reported during the current monitoring season is slightly elevated in comparison to the results of *Culex* activity reported in the 2020 season (9,0% in 2021 compared to 6.1% in 2020). The continued monitoring of WNV activity in the upcoming seasons will determine if this increase in activity is sustained.

Low numbers of mosquito impacted water sites and human cases of WNV infection are typically reported in the City of Madison and Dane County. Due to this level of annual activity, the adult mosquito surveillance and control continues to be important tools for measuring overall mosquito activity and reducing potential human exposure to the disease. WNV is considered endemic in Dane County; therefore, the collection of birds to confirm the presence of the virus each season is no longer warranted.

Based on activity trends demonstrated in the data over the past decade, we can expect at least a low level of WNV infection in mosquitoes and humans in the future. Continued surveillance efforts are necessary to assess the intensity of this illness in our communities and provide recommendations on addressing the threat of illness. Program efforts planned for 2022 will continue to include:

- **Mosquito larvae monitoring and control** detects standing water that may provide breeding opportunity for WNV competent mosquitoes and provides a mechanism for responding to sites on public property shown to produce high numbers of mosquitoes. This also provides an example for area residents to follow in preventing water sources on their property from producing mosquitoes.
- **Adult mosquito surveillance** provides information on the level of mosquito activity.
- **Human illness surveillance** detects when WNV activity has moved from bird populations to humans.