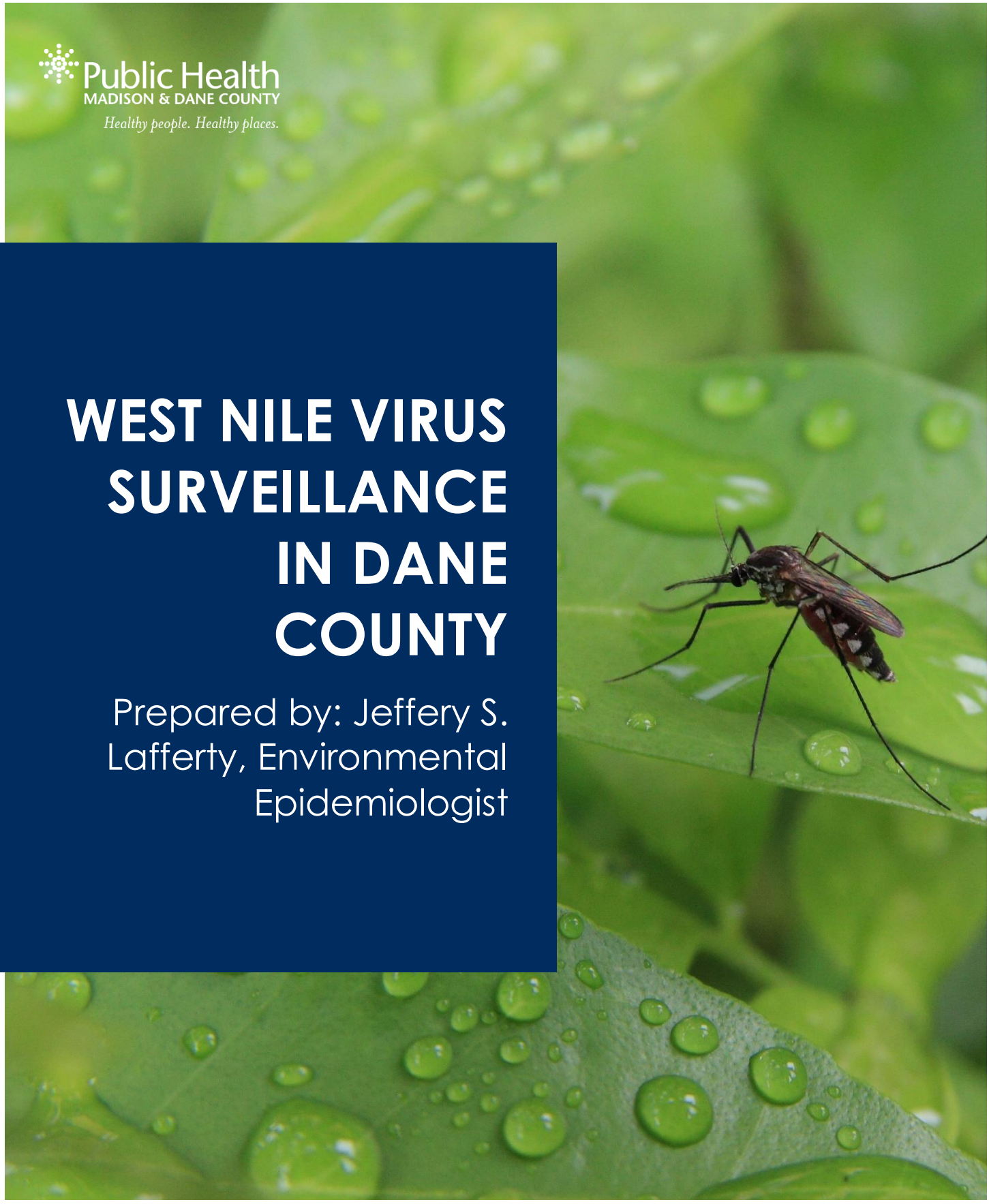
Public Health
MADISON & DANE COUNTY
Healthy people. Healthy places.

WEST NILE VIRUS SURVEILLANCE IN DANE COUNTY

Prepared by: Jeffery S. Lafferty, Environmental Epidemiologist



APRIL 2020

publichealthmdc.com/pests

SUMMARY

TESTING

39

sick or dead birds were reported in 2019.

13 were **crows and blue jays.**

0

Birds tested positive for West Nile Virus in 2019.

1

One case of St. Louis encephalitis virus (SLEV) disease was confirmed in Dane County during 2018. There were no cases in 2019.

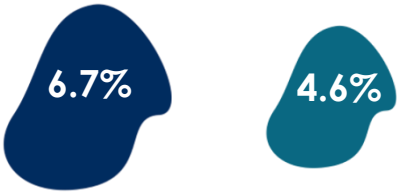
0

Human cases of WNV were reported in Dane County in 2019.

MONITORING

We 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.

Larvae breeding areas in Dane County



of water sources produced high numbers of **Culex larvae.**

of water sources produced high numbers of **Aedes larvae.**

BIRD SURVEILLANCE

In 2019, Public Health Madison & Dane County 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 West Nile virus infection and are the majority of birds that test positive for the virus. Table 1 provides a summary of the sick or dead bird surveillance data over the past decade (2010 – 2019). In the current reporting year, a total of 13 crows and blue jays were reported. Seven birds were submitted for testing; no birds tested positive for WNV during the current monitoring season. All other reported dead birds were either not collected or unsuitable for testing.

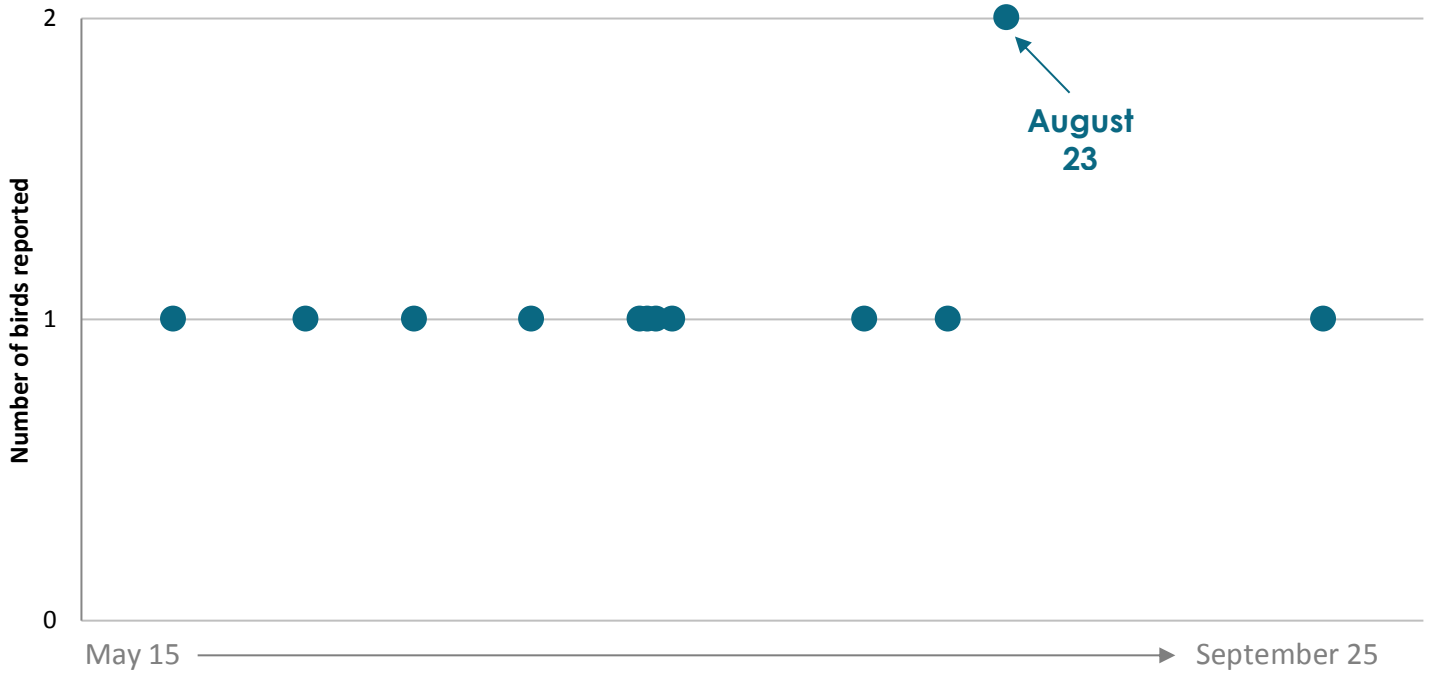
As in previous years, only a small percentage of the birds reported as sick or dead were collected for WNV analysis. In 2007, Public Health changed procedures to focus on collecting sick birds. Prior to 2007, considerable effort was made to collect both sick and dead birds; however, we found that many dead birds reported for collection were not suitable for testing or clearly died from a cause other than WNV. Dead bird reports were still recorded during 2019 for monitoring purposes. Figure 1 shows the number and date for all crows and blue jays reported and/or collected during the current reporting period. As demonstrated in the table above, the number of reported sick and dead birds (Crows and Blue Jays) during 2019 was lower in comparison to the 2018 season and much lower than levels reported in 2012. The number of sick and dead American Crows and Blue Jays was the second lowest in the past decade (2010 – 2019).

TABLE 1. Summary of sick or dead bird surveillance data over the past decade (2010 – 2019).

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Date first bird reported	May 24	March 1	May 18	May 29	May 28	May 11	June 1	May 4	May 24	May 15
Date first WNV positive bird collected	N/A	Aug 9	Jul 9	N/A	June 3	June 1	June 10	June 1	June 27	N/A
Date WNV testing discontinued for the year	Aug 10	Aug 9	Jul 9	Oct 10	June 3	June 5	June 16	June 6	June 27	Oct 1
Total # WNV positive birds	0	1	1	0	1	1	1	2	1	0
Total # birds collected for testing	3	5	3	1	3	5	5	11	6	7
Total # of sick or dead crows and blue jays reported	8	26	213	36	33	37	66	133	38	13
Peak weekly average of sick/dead bird reports	0.3	0.9	5.6	0.7	0.9	0.7	1.6	2.3	1.0	0.4
Date of sick/ dead bird report peak	Jul 13	Aug 24	Aug 22	Sept 30	Jun 16 Jul 2	Jun 29	Sept 12	Sept 14	Sept 5	Sept 23

WNV activity was moderate to light in the early months of the season and highest near the end of August.

FIGURE 1. Sick or Dead Bird Reports - Dane County in 2019



According to bird reports displayed in the accompanying figure, WNV activity was moderate to light throughout the early months of the season and into the summer months (May through July). The highest activity was observed near the end of August before slowing down as temperatures began to decline. The highest number of birds collected (American Crows and Blue Jays) during a single day during the current monitoring season was two separate bird reports; this occurred on August 23rd. The last report of the season occurred at the end of September.

The peak average reports per week (0.4) during this reporting timeframe continue to be much lower than bird reported in 2012 but was also the second lowest in the past decade. There were no positive WNV results reports in sampled birds during the 2019 monitoring season but the results from previous sampling periods continue to demonstrate the endemic nature of the exposure in our community.

MOSQUITO SURVEILLANCE

In 2019, Public Health continued our 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 target of this annual surveillance is the *Culex* mosquito species. This is because it is the principal vector for human transmission of WNV and because it 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 Public Health staff from late May through September to locate water sources producing large numbers of mosquito larvae.

Overall, during the 2019 mosquito season, a total of 71 treatments were performed at 39 sites that reported high levels 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 2019 mosquito season, a total of 71 treatments were performed at 39 sites that reported high levels of mosquito larvae; nine 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 that the predominate species identified was not associated with WNV.

The table below (Table 2) 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.

Sites with high amounts of Culex and Aedes larvae.

FIGURE 2. Percentage of inspected sites with high larvae amounts.

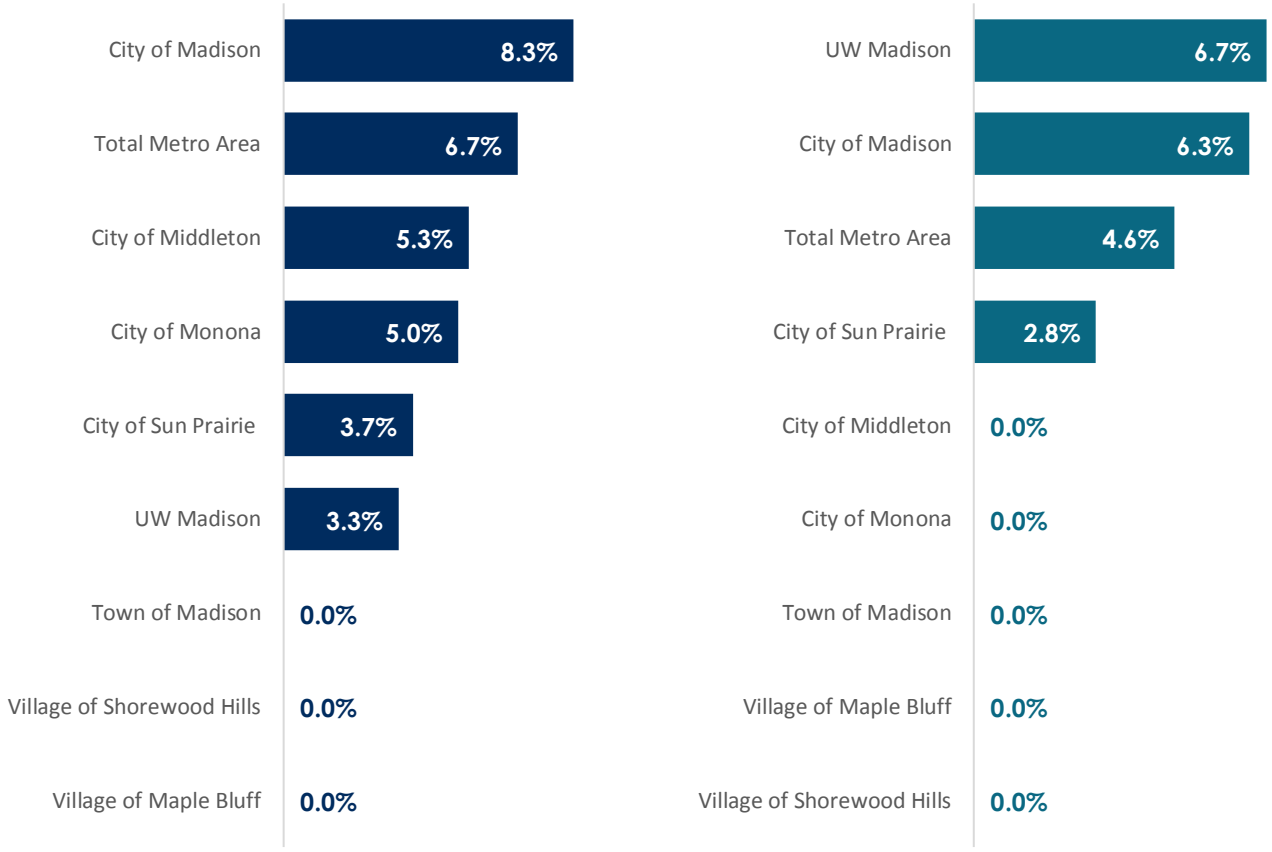


TABLE 2. Summary results of 2019 mosquito larvae inspections of accessible sources in the Madison metropolitan area.

	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 *Culex*	32	0	4	1	0	4	0	1	**42**
High *Aedes*	24	0	0	0	0	3	0	2	**29**
# of inspected sites	384	3	75	20	1	108	15	30	**636**
% High *Culex*	8.3%	0.0%	5.3%	5.0%	0.0%	3.7%	0.0%	3.3%	**6.7%**
% High *Aedes*	6.3%	0.0%	0.0%	0.0%	0.0%	2.8%	0.0%	6.7%	**4.6%**

During the summer of 2019, department staff made 2,048 inspections of 636 accessible sites in the metro area. Approximately 34% of the 966 potential inspection sites were not accessible for the 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 (41.9% and 43.9% respectively); however, other sites evaluated included, but not limited to, creeks, marshes, rivers, rain gardens, and flooded areas. In the metro area, 6.7% 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 8.3% of the 384 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 (3.3%) and the Cities of Middleton (5.3%), Monona (5.0%), and Sun Prairie (3.7%). High concentrations of *Aedes* larvae were reported at the University of Wisconsin – Madison campus and arboretum (6.7%), and the Cities of Madison (6.3%) and Sun Prairie (2.8%).

For additional information on these efforts for 2019, 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: publichealthmdc.com/.

HUMAN SURVEILLANCE

Most humans (approximately 70 - 80%) infected with WNV experience no symptoms. 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.

WNV IN THE US

Since 1999, a total of 50,830 cases of the disease and 2,330 deaths (approximately 4% of total cases) has been reported in the United States; the preliminary data for 2019 is not included in this total.

As of January 7, 2020, a total of 917 human cases of the disease (607 cases of neuroinvasive disease and 317 non-neuroinvasive disease) and 51 disease-related deaths have been reported to the Centers for Disease Control and Prevention (CDC) in 2019. This preliminary data reflects a significant decrease in the number of cases of WNV reported compared to the previous mosquito season (917 currently reported cases in 2019 compared to 2,647 cases in 2018). This is the first decrease of reported WNV cases since 2011 but additional surveillance is necessary to determine if this decrease represents an actual trend in the number of cases or if it can be explained by annual variation.

WNV IN WISCONSIN

West Nile virus infection is a reportable illness in Wisconsin. In Wisconsin, a total of 336 positive human cases of the disease have been reported to the CDC from 2002 through 2018; this total includes 23 disease related deaths. Preliminary data totals in 2019 (as of January 7, 2020) have reported 2 cases of human WNV (both cases are neuroinvasive disease and no cases of non-neuroinvasive disease were reported). There were no disease-related deaths reported during the current year. The number of reported cases in the current season has significantly decreased in comparison to 2018, and is one of the lowest number of reported cases in the state since 2010.

Area providers are 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 2019 have identified 2 presumptive viremic blood donors that were reported to the CDC from the State of Wisconsin; a significant decrease from the 8 donors reported in 2018 but still higher than the number of presumptive viremic blood donors reported in five of the last 10 years (2010 – 2019).

Total cases of WNV since 2002 in Dane County and Wisconsin

Public Health continue 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. There were no cases reported in 2019 but there were eight human cases of the disease reported in the previous year; each were neuroinvasive. A breakdown of these cases is show in Table 3 below.

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

	Cases Identified		
	2018	2019	Total since 2002
WNV Fever	0	0	12
WNV Encephalitis (non-fatal)	8	0	24
WNV Encephalitis (fatal)	0	0	2
Total	8	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. There were no additional cases of SLEV reported in Dane County in 2019.

PUBLIC OUTREACH

At the beginning of each of the seasons reported above, a press release was issued to educate the public about the risks of WNV illness, the importance of preventing mosquito bites, and eliminating standing water, in addition to an annual report of WNV and mosquito activity in the county. This information is available on our 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. There were no positive cases of WNV activity found in the dead birds collected during surveillance; there were also no cases of the disease reported in humans in 2019. In comparison, there were eight cases of the disease reported in humans in 2018.

The documented levels of mosquito activity reported during the current monitoring season is slightly higher in comparison to the results of *Culex* activity reported in 2018 (6.7% in 2019 compared to 5.2% in 2018). The continued monitoring of WNV activity in the upcoming seasons will determine if this increase in activity is sustained.

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.

Madison and Dane County typically have low numbers of mosquito-impacted water sites and human cases of WNV infection. Due to this level of annual activity, sick and dead bird reports continue to be the Department's best measure of WNV activity in the area. Adult mosquito surveillance and control also are important tools for measuring overall mosquito activity and reducing potential human exposure to the disease.

FUTURE ACTIONS

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, birds, and humans in the future. Continued surveillance efforts are necessary to assess the intensity of this illness in our community and provide recommendations on addressing the threat of illness. Program efforts planned for 2020 will continue to include:

- Dead and sick bird surveillance and testing identifies when the virus is active in the community and provides a measure of severity between years.
- 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.


Public Health
MADISON & DANE COUNTY
Healthy people. Healthy places.