Public Health
MADISON & DANE COUNTY
Healthy people and places

West Nile Virus Surveillance in Madison and Dane County
2016

01 December 2016

Prepared by: Jeffery S. Lafferty, Environmental Epidemiologist

Summary

- Testing of sick and dead birds that were collected in Dane County reported a positive result for West Nile virus (WNV) in June 2016.
- A total of 87 sick or dead birds were reported in Madison and Dane County during 2016; this included a total of 66 sick or dead crows and blue jays.
- The Public Health Department 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.
- Mosquito larvae monitoring determined that approximately 5.4% of water sources in the Madison metropolitan area produced high numbers of *Culex* mosquitoes at least once in 2016; another 3.9% produced high numbers of *Aedes* larvae.
- A total of three human cases of WNV were reported in Dane County in 2016.
- No deaths related to WNV illness were reported among Dane County residents in 2016.

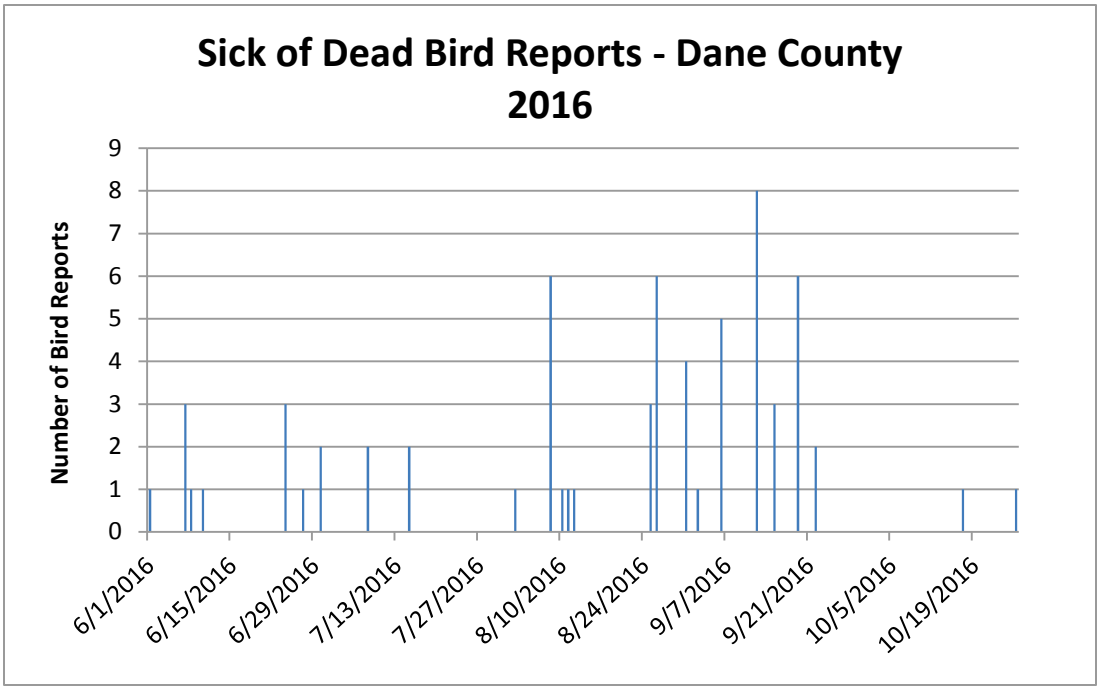
Bird Surveillance

In 2016, 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 West Nile virus infection and compose the majority of birds that test positive for the virus. Table 1 provides a summary of the sick or dead bird surveillance data. In the current reporting year, a total of 66 crows and blue jays were reported. Five birds were submitted for testing for WNV. All other reported dead birds were either not collected, unsuitable for testing, or reported after testing stopped in Dane County. A bird, found in the Madison metro area tested positive for WNV June 1 2016.

Table 1. Results of sick/dead bird (crows and blue jays) surveillance in Dane County.

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Date first bird reported	Apr 23	May 3	May 10	May 19	May 18	May 24	March 1	May 18	May 29	May 28	May 11	June 1
Date first WNV positive bird collected	May 19	Jun 5	Jun 13	Aug 6	N/A	N/A	Aug 9	Jul 9	N/A	June 3	June 1	June 10
Date WNV testing discontinued for the year	Jun 7	Jun 19	Aug 21	Aug 28	Sep 5	Aug 10	Aug 9	Jul 9	Oct 10	June 3	June 05	June 16
Total # WNV positive birds	2	7	2	2	0	0	1	1	0	1	1	1
Total # birds collected	9	15	2	5	6	3	5	3	1	3	5	5
Total # of sick or dead crows and blue jays reported	283	365	106	55	17	8	26	213	36	33	37	66
Peak weekly average of sick/dead bird reports	8.4	5.2	1.9	1.4	0.4	0.3	0.9	5.6	0.7	0.9	0.7	1.6
Date of sick/ dead bird report peak	Aug 22	Aug 17	Jul 3	Jul 7	Aug 3	July 13	Aug 24	Aug 22	Sept 30	June 16 July 02	June 29	Sept 12

As in previous years, only a small percentage of the birds reported as sick or dead were collected for WNV analysis. In 2007, PHMDC 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 2016 for monitoring purposes. Figure 1 shows the number and date of occurrence 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) reported during 2016 was significantly decreased compared to 2012 but increased in comparison with each of the previous three monitoring seasons (2013 – 2015).



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 (June through early July). The highest activity was observed in the late summer and early fall months of August and September. The highest number of birds collected during a single day during the current monitoring season was eight separate bird reports; this occurred on September 12th. The last report of the season occurred in late October.

The peak average reports per week (1.6 reports) during this reporting timeframe were greatly decreased compared to 2012 but elevated in comparison to the results reported during 2013 – 2015 but similar to the results recorded in 2007 and 2008. One positive result of WNV was reported in 2016 from tested birds that continue to demonstrate the endemic nature of the exposure in our community.

Mosquito Surveillance

In 2016, 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 2016 mosquito season, a total of 65 treatments were performed at 30 sites that reported high levels of mosquito larvae; 3 additional treatments were scheduled but cancelled due to weather, site conditions, or availability of larvicide that prevented effective treatment or eliminated the need for treatment. The remaining sites that reported elevated levels of *Culex* activity larvicidal treatment was deemed unnecessary due to weather and site conditions.

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.

Table 2. Summary results of 2016 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*	27	0	1	0	0	3	1	1	**33**
High *Aedes*	18	0	4	0	0	0	2	0	**24**
# of inspected sites	379	3	57	19	0	113	13	29	**613**
% High *Culex*	7.1%	0.0%	1.8%	0.0%	0.0%	2.6%	7.7%	3.4%	**5.4%**
% High *Aedes*	4.7%	0.0%	7.0%	0.0%	0.0%	0.0%	15.4%	0.0%	**3.9%**

During the summer of 2016, department staff made 2,069 inspections of 613 accessible sites in the metro area. Similar to previous years, the bulk of these inspections were made at ditches and detention/ retention ponds (47.7% and 40.0%, respectively); however, other sites evaluated included, but not limited to, creeks, marshes, rivers, rain gardens, and flooded areas. In the metro area, 5.4% of all inspected sites produced high number of *Culex* larvae at least once during surveillance (approximately May through August); 3.9% of inspected sites produced high numbers of *Aedes* larvae.

At the community level, the City of Madison reported approximately 7.1% of the 379 inspected sites demonstrated high numbers of *Culex* larvae. Other communities in the metro area that reported *Culex* activity included the Town of Madison (7.7%), the University of Wisconsin-Madison campus and arboretum (3.4%), and the Cities of Middleton (1.8%) and Sun Prairie (2.6%). High concentrations of *Aedes* larvae were also reported in the Cities of Madison (4.7%) and Middleton (7.0%) and the Town of Madison (15.4%).

For additional information on these efforts for 2016, 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 70 - 80%) infected with WNV experience no adverse symptoms and less than 1% will have serious encephalitis or meningitis result from infection. As of December 31, 2015, a total of 43,937 cases of the disease and 1,911 deaths (approximately 4% of total cases) had been reported in the United States since 1999. Preliminary data for 2016 (as of November 22, 2016) indicate that a total of 1,617 human cases of the disease (855 cases of neuroinvasive disease and 762 non-neuroinvasive disease) and 81 disease-related deaths have been reported to the Centers for Disease Control and Prevention (CDC). This preliminary data suggests a slight decrease from the number of cases of WNV reported during the previous mosquito season (1,617 cases in 2016 compared to 2,175 cases in 2015).

West Nile virus infection is a reportable illness in Wisconsin. In Wisconsin, a total of 239 positive human cases of the disease have been reported to the CDC since 2002 through 2015. Preliminary data totals in 2016 (as of November 22, 2016) have reported a total of 9 cases of human WNV (6 cases of neuroinvasive disease and 3 cases of non-neuroinvasive disease). No disease-related deaths have been reported during the current year. The number of reported cases during the current year is similar to 2015 and continues to be a notable decrease from the 21 cases of disease reported during 2013 in Wisconsin.

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. In 2015, only 1 presumptive viremic blood donor was reported to the CDC from the State of Wisconsin; a significant decrease from the 11 presumptive reported in 2014. Preliminary data totals in 2016 (as of November 22, 2016) have also only identified 1 presumptive viremic blood donor.

PHMDC continues to conduct passive surveillance for human cases of WNV infection at the county level. Since 2002, surveillance has recorded a total of 26 cases of human WNV infection (probable and confirmed) in Dane County including 2 deaths. Three human cases of the disease were reported in 2016. A breakdown of these cases is given in Table 3 below.

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

	Cases Identified		
	2015	2016	Total since 2002
WNV Fever	0	1	12
WNV Encephalitis (non-fatal)	0	2	9
WNV Encephalitis (fatal)	0	0	2
Total	0	3	26

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. One positive case of WNV activity was found in the dead birds collected for surveillance; three cases of the disease were reported in humans in 2016.

The documented levels of WNV activity reported during annual bird surveillance have increased since the previous three monitoring seasons but are still considerably lower than levels reported in 2012. 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 collection of sick and dead bird reports continues to be the Department's best measure of WNV activity in the area. Adult mosquito surveillance and control also continues to be important tools for measuring overall mosquito activity and reducing potential human exposure to the disease.

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 communities and provide recommendations on addressing the threat of illness. Program efforts planned for 2017 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.