Public Health
MADISON & DANE COUNTY
Healthy people and places

West Nile Virus Surveillance in Madison and Dane County
2014

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Prepared by: Jeffery S. Lafferty, Environmental Epidemiologist

Summary

- Bird surveillance reported a positive result of West Nile virus (WNV) during 2014.
- A total of 118 sick or dead birds were reported in 2014; this included a total of 33 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 nearly 7.7% of water sources in the Madison metropolitan area produced high numbers of *Culex* mosquitoes at least once in 2014; another 6.4% produced high numbers of *Aedes* larvae.
- No cases of WNV illness disease-related deaths were reported among Dane County residents in 2014.

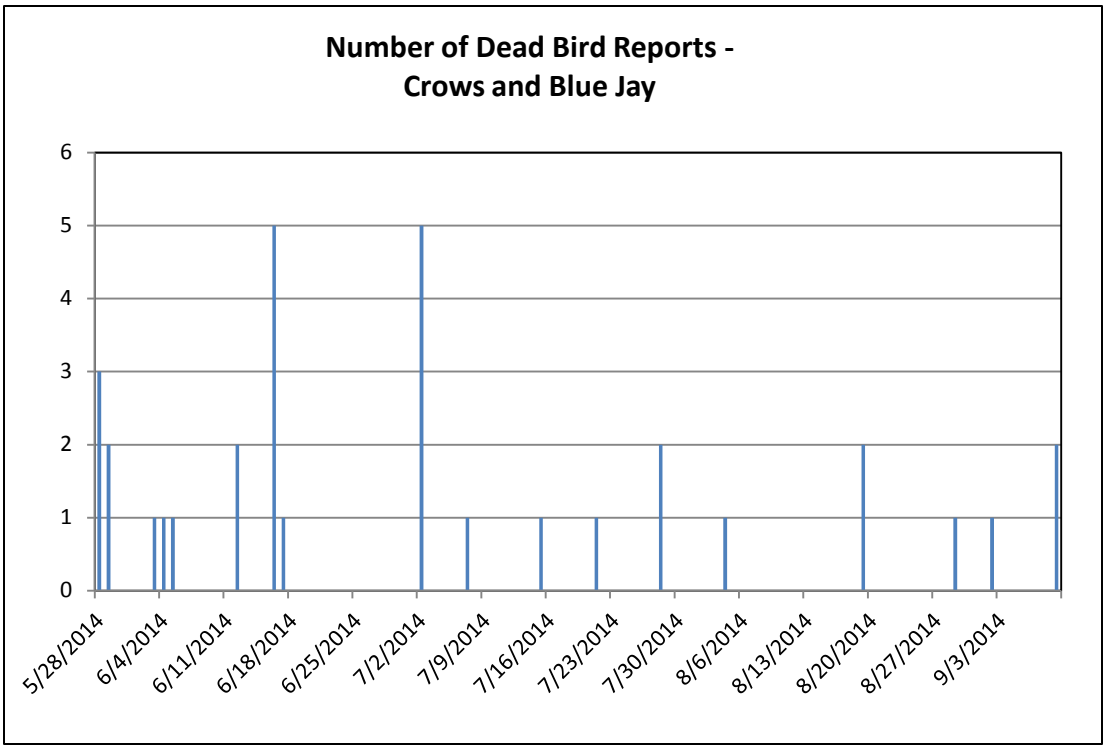
Bird Surveillance

In 2014, Public Health Madison and Dane County (PHMDC) cooperated with statewide efforts to collect and test dead crows and blue jays for WNV; two types of birds shown to be susceptible to West Nile 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 33 crows and blue jays were reported and/or collected; one bird was submitted for testing for WNV. All other reported dead birds were either not collected or unsuitable for testing. Bird surveillance reported positive results for WNV from the testing of collected bird specimens from the City of Madison metro area.

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
Date first bird reported	Apr 23	May 3	May 10	May 19	May 18	May 24	March 1	May 18	May 29	May 28
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
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
Total # WNV positive birds	2	7	2	2	0	0	1	1	0	1
Total # birds collected	9	15	2	5	6	3	5	3	1	3
Total # of sick or dead crows and blue jays reported	283	365	106	55	17	8	26	213	36	33
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
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

As in previous years, only a small percentage of the birds reported as sick or dead were collected for WNV analysis. In 2007, the Department 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 birds were still recorded during 2014 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) was significantly decreased compared to 2012 but consistent with the 2013 monitoring season.



According to bird reports displayed in the accompanying figure, WNV activity was moderate throughout the early months of the season and increased during the summer months (June through early July). The highest number of birds collected during a single day during the current monitoring season was five separate bird reports; this occurred on both June 16 and July 02, 2014. The last report of the season occurred in early September.

The peak average reports per week (0.9 reports) during this reporting timeframe was greatly decreased compared to 2012 but more consistent with the results reported during 2013 and 2008 - 2011 prior to the large increase recorded during the 2012 monitoring season. One positive result of WNV was reported in 2014 from tested birds demonstrating the endemic nature of the exposure in our community.

Mosquito Surveillance

Similar to previous years, PHMDC continued its partnership with the Town of Madison, Village of Maple Bluff, City of Middleton, City of Monona, Village of Shorewood Hills, City of Sun Prairie, and the University of Wisconsin during 2014 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* 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 deemed potential vectors for WNV are also monitored; in Dane County, this primarily includes the *Aedes* mosquito species.

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 2014 mosquito season, a total of 36 treatments were performed at 30 sites that reported high levels of mosquito larvae; 2 additional treatments were scheduled but cancelled due to weather or site conditions 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 2014 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*	31	0	7	1	0	1	1	0	**41**
High *Aedes*	22	0	9	0	0	0	1	2	**34**
# of inspected sites	320	1	64	17	0	98	12	23	535
% High *Culex*	9.7%	0.0%	10.9%	5.9%	0.0%	1.0%	8.3%	0.0%	**7.7%**
% High *Aedes*	6.9%	0.0%	14.0%	0.0%	0.0%	0.0%	8.3%	8.7%	**6.4%**

During 2014, department staff made 2,193 inspections of 535 sites in the metro area. Similar to previous years, the bulk of these inspections were made at ditches and detention/ retention ponds (61.4% and 34.3%, respectively); however, other sites evaluated included, creeks, marshes, rivers, rain gardens, and flooded areas. In the metro area, 7.7% of all inspected sites produced high number of *Culex* larvae at least once during surveillance (approximately May through August); 6.4% of inspected sites produced high numbers of *Aedes* larvae.

At the community level, the City of Middleton reported the largest percentage of sites with high numbers of *Culex* larvae (10.9%); *Culex* larvae were also reported at sites in the Town of Madison (8.3%) and the Cities of Madison (9.7%), Monona (5.9%), and Sun Prairie (1.0%). The City of Middleton also reported the largest percentage of sites with high concentrations of *Aedes* larvae (14.0%) but high concentrations were also reported in the City of Madison (6.9%), the University of Wisconsin – Madison (8.7%), and the Town of Madison (8.3%).

For additional information on these efforts for 2014, 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 (~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, 2013, a total of 39,557 cases of the disease and 1,668 deaths (approximately 4% of total cases) had been reported in the United States since 1999. Preliminary data for 2014 (as of December 16, 2014) indicate that a total of 2,085 human cases of the disease (1,262 cases of neuroinvasive disease and 823 non-neuroinvasive disease) 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 (2,086 cases in 2014 compared to 2,469 cases in 2013).

West Nile virus infection is a reportable illness in Wisconsin. In Wisconsin, a total of 224 positive human cases of the disease have been reported to the CDC since 2002 through 2013. Preliminary data totals in 2014 (as of December 16, 2014) have reported a total of 7 cases of human WNV (4 cases of neuroinvasive disease and 3 cases of non-neuroinvasive disease) and a single disease-related death. The number of reported cases during the current year is 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 2013, a total of 11 presumptive viremic blood donors were reported to the CDC from the State of Wisconsin.

PHMDC continues to conduct passive surveillance for human cases of WNV infection at the county level. Since 2002, surveillance has recorded a total of 21 cases of human WNV infection (probable and confirmed) in Dane County including 2 deaths. No human cases of the disease were reported in 2014. A breakdown of these cases is given in Table 3 below.

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

	Cases Identified		
	2013	2014	Total since 2002
WNV Fever	2	0	12
WNV Encephalitis (non-fatal)	2	0	9
WNV Encephalitis (fatal)	0	0	2
Total	4	0	23

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; no cases of the disease were reported in humans in 2014 but have been reported in the county in previous years.

The documented levels of WNV activity reported during annual bird surveillance are similar to levels reported in 2013 and consistent with previous monitoring seasons (2008 – 2011). 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 2015 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.