

October 2, 2009

## **West Nile Virus Surveillance Overview of Activities**

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### **Summary**

In 2009 there was significantly less West Nile Virus (WNV) activity observed not only in Winnebago County, but across Illinois. To date, 1 bird has been confirmed in Winnebago County. There have been no human cases or mosquito pools reported as of date. To date the statewide data shows an 80% decrease in human cases, a 46.2% decrease in positive mosquito pools, and a 35.5% decrease in positive birds reported compared to 2008. However, these reductions in activity likely reflect several outside factors including: above normal precipitation that damaged the Culex mosquito vector population during the peak of transmission season, cool summer temperatures that may have suppressed the amplification of the virus, increased awareness and control of the mosquito vector, as well as a wider development of human and avian immunity to the disease. Though these numbers are encouraging, it is unlikely that WNV will be completely eradicated because it is a zoonotic disease which can reside, over winter, and amplify in multiple reservoir hosts, most importantly migratory birds. Other similar viruses could also pose a threat of an epidemic outbreak, as do possible mutations of the West Nile Virus which could increase its virulence and lethality (Campbell 2002).

### **History**

In 2003, the earliest detection of WNV in Winnebago County was a positive mosquito pool collected on July 30<sup>th</sup>. The first positive bird carcass was collected on August 13<sup>th</sup>. There was one human case reported where the person was released from the hospital on September 22<sup>nd</sup>.

In 2004, the earliest detection of WNV in Winnebago County was a positive testing bird carcass collected on May 25<sup>th</sup>. Subsequently, a positive mosquito pool was collected on August 6<sup>th</sup>.

In 2005, the earliest detection of WNV in Winnebago County was a positive testing bird carcass collected on July 28<sup>th</sup>. Subsequently, a positive mosquito pool was collected on August 4<sup>th</sup>. There were two confirmed human cases; one person was confirmed with the virus on August 8<sup>th</sup>, the other person began to show symptoms on September 11<sup>th</sup>.

In 2006, the earliest detection of WNV in Winnebago County occurred in a mosquito pool collected on June 5<sup>th</sup>. Subsequently, an immature crow was collected on June 28<sup>th</sup>. No human cases were reported in Winnebago County during this period.

In 2007, the earliest detection of WNV in Winnebago County occurred in a mature crow carcass collected on August 15<sup>th</sup>, with 3 other crows testing positive by RT-PCR through October. Subsequently, a positive mosquito pool was found August 23<sup>rd</sup>. Two human cases were reported in 2007, the first occurring on October 3<sup>rd</sup>, and the other occurring on the 12<sup>th</sup>.

In 2008, the earliest detection of WNV in Winnebago County occurred in two mature crow carcasses collected on June 24<sup>th</sup>, with 3 other crows testing positive by RT-PCR in September.

In 2009, Winnebago County confirmed the presence of WNV in one crow collected one September 30.

### **Avian Surveillance Data**

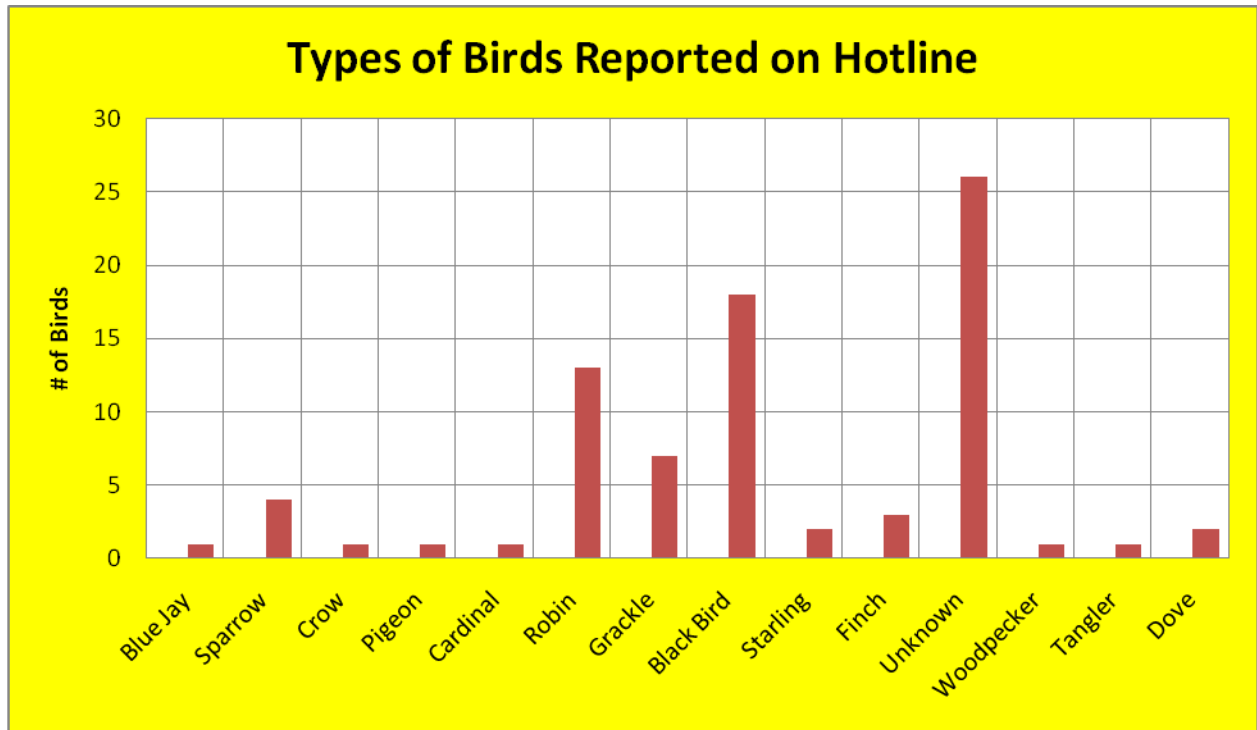
Data about bird population was obtained in two ways. The first method was testing of specific, high risk bird carcasses by Rapid Analyte Measurement Platform (RAMP) assay, with confirmation testing provided by IDPH state laboratories. The second source of information was the cumulative ecological data from all bird deaths reported by the public. The locations of all birds reported to the county's dead bird hotline were entered into an ARC GIS mapping system. This system provided a graphical overview and means of statistical analysis which allowed for

the identification of “hot spots” (areas with 2 or more separate dead bird reports within a square mile during a one week period).

The dead bird report line received a total of 80 calls. Approximately 19% of these birds were actually collected and 8% were tested. This seemingly large disparity is due principally to the fact that the majority of calls were determined to be unsuitable for testing (maggots present, unsuitable species, indications that the deaths were more likely due to other causes, etc.) We received about half as many dead bird reports from the public as we did in 2008.

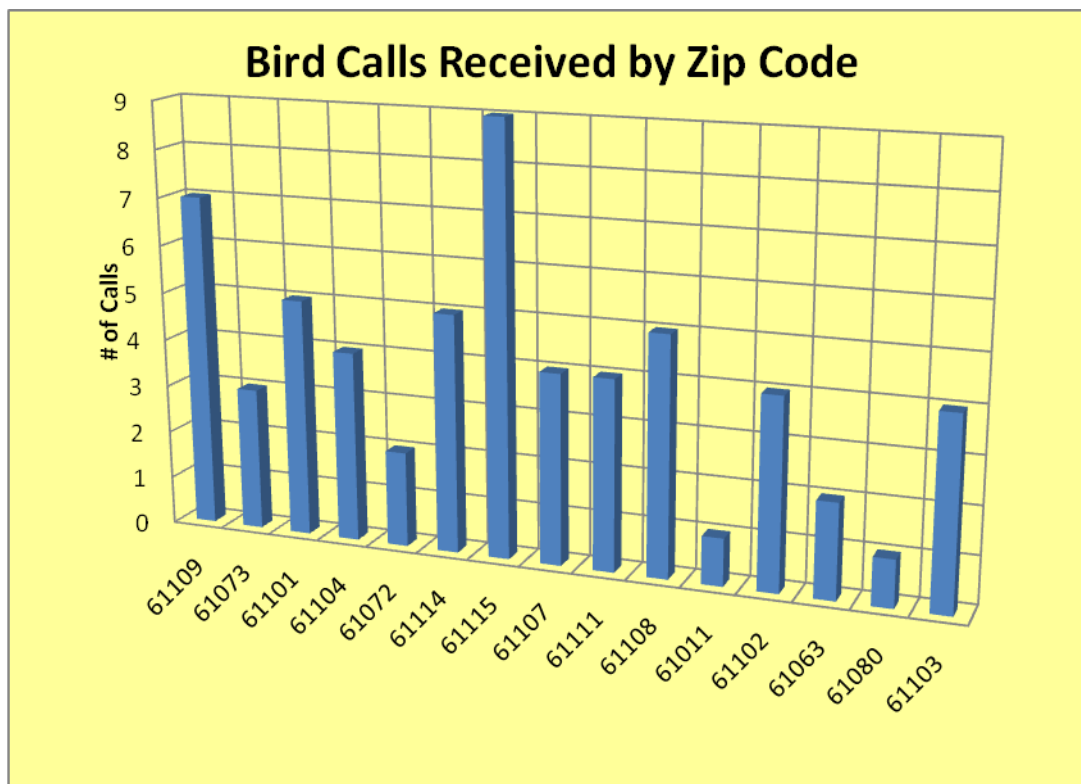
The recorded message for the dead bird hotline is very thorough, and describes all the conditions necessary for a bird to be suitable for testing. Many people are not alarmed by a single dead bird and do not find it necessary to contact a health authority, though these birds are more likely to carry the virus. When several birds are found in a single location, it is typically more alarming and tends to prompt calls to the bird line more often. This issue has been addressed in several of the press releases issued by the WCHD.

Though the IDPH lab has expanded the number of species they are willing to test for WNV, the majority of positives statewide occurred in American Crows and Blue Jays (due to their increased susceptibility to the virus (Panella, 2001)). The chart below shows a breakdown of bird species reported to the hotline. Crows and Blue Jays were a minority of birds reported to the WCHD in 2009.



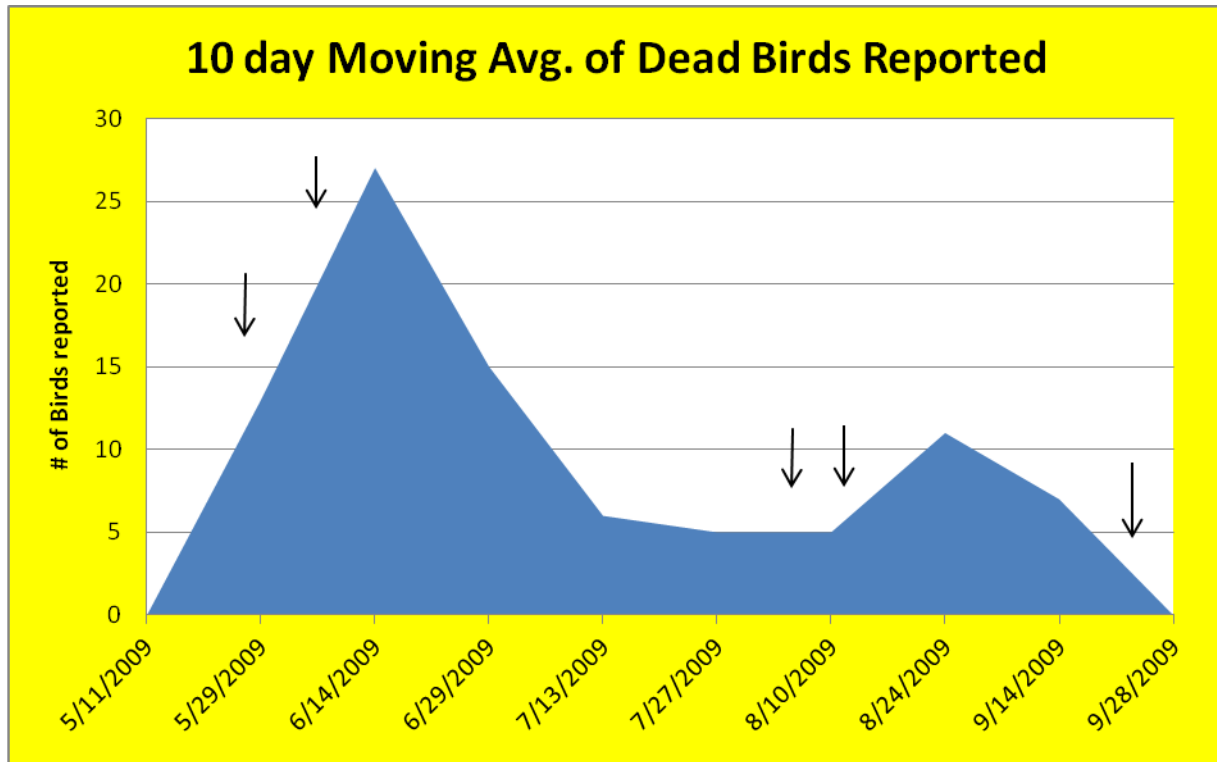
It is also worth noting that the general public often has difficulty identifying particular species of birds and occasionally misreport less well known species (i.e. reporting grackles as crows). The WCHD website could benefit from a page on the identification of local bird species similar to that of the IDPH ([www.idph.state.il.us/](http://www.idph.state.il.us/)), perhaps supplemented with size ranges for each bird. An example of a flyer or webpage has been attached to the end of this report.

The number of birds collected was broken down by zip code.



The WCHD was also able to sample 16 live birds for WNV at the Sands Bluff Bird Observatory located in Shirland, Illinois. There were no positive testing birds for WNV. No American Crows or Blue Jays were captured for testing.

Reports to the dead bird hotline fluctuated greatly throughout the season. The daily graph of dead bird reports is inherently erratic, so a daily 10 day moving average was applied to better elucidate a pattern in dead bird reporting. Certain points were marked on the graph to reflect the re lease dates of various press releases from the state and from the Winnebago County Health Department and to determine their effect on dead bird reports in Winnebago County.



1. (May 27) Release from WCHD marking the return of mosquito-borne encephalitis season.
2. (June 1) Release from IDPH concerning the first report of WNV in a vector in the state.
3. (August 6) Twitter release from WCHD marking start of WNV season.
4. (August 12) Release from WCHD reminding residents to be proactive against WNV.
5. (September 24) Twitter release from WCHD reminding residents of the 5 D's.

Winnebago County reported 1 positive bird this year. Reports of dead birds and identification of birds with WNV is down statewide and is likely due to a combination of community awareness and elimination of mosquito breeding sites, large reductions in the Crow and Blue Jay populations, and unseasonably cooler weather that has suppressed amplification of the virus in hosts. If past trends continue, WNV may be even less prevalent county and statewide in the coming years.

## **Mosquito Surveillance Data**

In all local mosquito species, both the male and female adults draw nutrition from nectar for energy. However, only the females need the blood meal for egg maturation. For this reason, adult female mosquitoes are most likely to carry the West Nile Virus. In order to maximize the number of adult females in our pools, we collected mosquitoes using 8 Frommer Updraft gravid traps (traps specifically targeted to capture gravid female mosquitoes). In addition, incidental male mosquitoes found in the pools were discarded after the collection phase but before the testing phase.

During the 2009 season approximately 210 individual mosquitoes were tested in 30 separate pools, with an average pool size of 7 mosquitoes per pool. Each pool was tested by Rapid Analyte Measurement Platform (RAMP) assays. While SLE and EEE are currently far less prevalent in the region, either could emerge as an outbreak as immunity to the West Nile Virus becomes more widespread in the general community. Sporadic outbreaks of these diseases have been observed in the United States for decades. For this reason, it would be beneficial to, at minimum, periodically test for SLE and EEE alongside WNV.

Of the 30 mosquito pools tested, no positive pool was identified. Of the 35 counties in Illinois reporting a mosquito, bird, or human positive, the median number of mosquito pools was 1. The unadjusted average number of pools was 11, but this number is largely skewed by the densely populated (nearly 50% of the state) Cook and DuPage counties, which reported over 85% of all positive mosquito pools in the state (US Census Bureau). Discounting these counties, the average number of positive mosquito pools was only 1.7.

Positive mosquito reports have dramatically decreased statewide; Winnebago County had no change in positive pools (0 in 2008, 0 in 2009). One possible reason for this could be the abnormal low spring and summer temperatures that suppressed the larval development rate as well as virus amplification. Also, residents are much more aware of standing water in their neighborhoods which prompted calls to the health department for larvicide action. Furthermore,

12 municipality employees were trained in larviciding this year; this could have prompted proactive activities such as reducing sources of potential hazards.

Mosquito samples were taken from locations throughout the county determined to be high risk areas. These areas were selected by the following criteria: location had a positive pool during a previous WNV season, location had a higher than average density of dead bird reports, area was likely to be an excellent habitat for mosquitoes and birds, and be frequented by humans (i.e. parks, forest preserves, etc.). The location, mosquito count, and test results for each pool was entered into the IDPH database. Entering this information on a regular basis allowed statewide data to be compiled in real-time as the season progressed rather than in a bulk report after the season had ended. This information is crucial in the timely determination of the potential risk to humans during an active season. In addition to information gathered for the IDPH, WCHD went one step further and gathered the average temperatures for each trap site for the three days each trap was left out to assess if temperature played an active role in the number of adult mosquitoes collected in each trap.

The WCHD not only passively monitored WNV through mosquito and bird sampling; it also took an active role in managing the mosquito population. The WCHD has at least 11 employees trained or licensed in the application of larvicide (Altosid XR and VectoLex WSP). In cooperation with the public and multiple health inspectors, larvicide was applied to a number of abandoned properties (with unmaintained pools, exposed outdoor containers, tires, etc.) and public locations that were accumulating standing water and producing possible breeding locations for mosquitoes. The WCHD also provided 4 cases of excess larvicide inventory to other municipalities in Winnebago County to aid the fight against WNV. Additionally, larvicide training was conducted for the City of Machesney Park Public Works (2 employees), the City of Roscoe Public Works (1 employees), the City of South Beloit (9 employees) and the City of Rockton (1 employee) per the Illinois Pesticide Act (415 ILCS 60) by the WCHD Vector Control Specialist, Tonya Kucharski. This additional training provided much needed assistance in the



control of larvae throughout the county. All together, the WCHD distributed over 30 pounds of larvicide in the treatment of problem standing water during the 2009 season.

Though the WCHD strongly recommends that standing water, even small quantities, be removed or replenished on a weekly basis, it is not always possible to clear an area of standing water (such as floodwaters, small ponds, etc.). In these cases, the WCHD advocates the use of commercially available larvicide for the maintenance of problematic standing water by homeowners as a good alternative. The Winnebago County Health Department used internet tweets this year as opposed to the informational packets used previous years as way to alert more residents on the effects of standing water and potential hazards of mosquitoes.

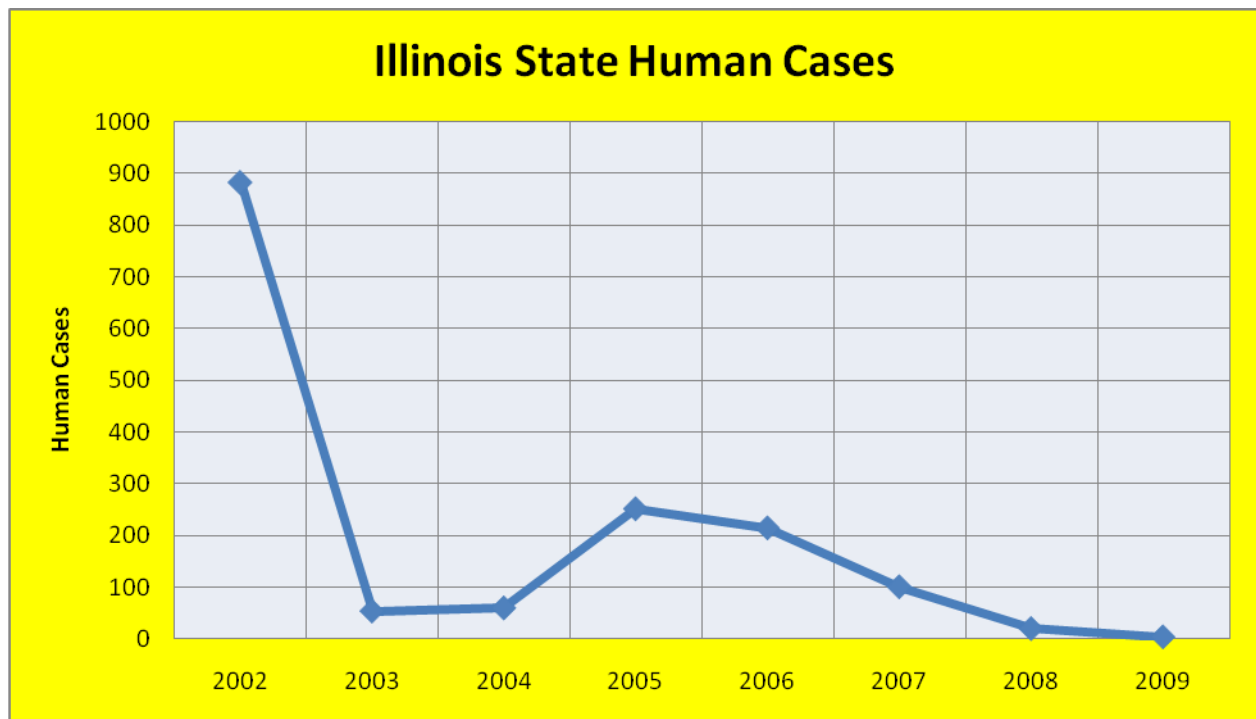
### **Testing Methods**

The WCHD utilized three different methods of testing birds and mosquitoes. The most common method used was rapid antigen capture assay. The WCHD specifically used VecTest brand antigen assays to detect the presence of WNV antigen in conjunction with the RAMP method. The RAMP assay was most frequently used because many samples could be analyzed at one time. The other type of testing used was reverse transcription polymerase chain reaction (RT-PCR). This testing is more time consuming and expensive, and could only be performed at IDPH laboratories as a confirmatory test on birds which had already tested positive via RAMP and rapid antigen capture assay.

### **Human Cases**

As of the writing of this report, 0 human cases had been reported in Winnebago County. Since 2001, there have been between 0 and 2 human cases per year in Winnebago County with no correlation to the number of cases statewide. The number of statewide cases over the past 8 years follows a typical epidemic curve with a large initial outbreak (peaking in the 2002 season)

followed by a smaller outbreak (peaking in the 2005-2006 season). Outbreaks of decreasing severity over similar time frames can be expected until the disease reaches a baseline level.



Though it is likely that the most profound outbreaks of WNV in local human populations have already passed, WNV will remain, at least at a baseline level, in the community for the foreseeable future. Because the virus is zoonotic and can amplify in migratory birds, it would be nearly impossible to completely eliminate it by vector controls alone. There are also several other viruses similar to West Nile (such as St. Louis Encephalitis, LaCrosse Encephalitis, etc.) that could possibly lead to another outbreak in Winnebago County.

Only about 1 in 5 persons infected with WNV will develop even mild symptoms and of these, typically only half will seek medical treatment. On average, the disease will progress to serious neurologic symptoms in about 1 in 150 persons, though this ratio increases dramatically with age. Currently, the only treatments for WNV are supportive. While little progress has been made

in the treatments for West Nile infections which have progressed to encephalitis or meningitis, there have been promising advancements in passive immunization against the disease. This could be especially helpful for people at high risk of developing West Nile, as well as those over 70, who have a greatly increased risk of developing serious symptoms. An effective vaccine has been developed for use in horses, but requires annual revaccination in order to remain effective (Gelfand, 2003).

### **Lyme Disease Surveillance**

In 2005 Winnebago County saw a spike in Lyme disease cases, (2004 = 6, 2005 = 14). Since then, human cases have slowly varied over the years (2006 = 12, 2007 = 11, 2008 = 11, 2009 = 13). WCHD would like to better understand if Lyme disease is originating in Winnebago County, and if so, where. Dr. Nelson of North Park University in Chicago conducted a tick screen for Lyme disease in Winnebago County in the spring of 2009 where 13 of those collected from the northern quadrant of the county tested positive for Lyme disease. In addition, 4 Black-legged ticks (1 adult female, 1 adult male, 2 nymphs) were collected in Rockford, IL.

### **Conclusion**

While the morbidity of West Nile Virus has been decreasing in Winnebago County, it is unlikely it will ever be eradicated. Efforts to monitor the virus and its vectors should be continued at least until a predictable baseline level is reached for several years. Because the number of positive mosquito pools correlates so strongly to the number of human cases expected to occur, this surveillance tool serves an important and concrete purpose.

Because West Nile Virus is a potentially life threatening infection, it is important to continue public awareness campaigns about prevention. Wearing insect repellent, avoiding the outdoors during dusk and dawn, and eliminating standing water from around properties are the most effective ways for people to protect themselves from contracting WNV. This combination of

public education and epidemiological surveillance provides the best chance of minimizing human costs associated with the West Nile Virus.

### Bird Species of Northern Illinois



American Crow 12" + long, black eyes



Blue Jay



American Robin (immature, female, male)



Grackle, yellow eyes, metallic colors



House Sparrow



European Starling



Gray Catbird



Mourning Dove



Pigeon



Male Cardinal