



# Village of Oswego

## 2018 Mosquito Management Program Annual Service Report

Submitted by:

Clarke Environmental Mosquito Management, Inc., a Clarke Company

Consultant:

Jack Thennisch



A Global Environmental Products and Services Company

675 Sidwell Court  
Saint Charles, IL 60174  
630-894-2000 P  
800-323-5727  
630-443-3070 F  
[www.clarke.com](http://www.clarke.com)



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## Clarke Environmental Mosquito Management 2018 Annual Report

### **Introduction**

Floodwater mosquitoes may have dominated the headlines in 2018, with major floodwater superbrood events in May, June and September, but a significant increase in West Nile Virus may be this mosquito season's lasting legacy.

In Illinois, we experienced a very active floodwater mosquito spring with high temperatures and consistent rains creating significant floodwater hatch-off opportunities. Both Memorial Day and Labor Day rains and subsequent high temperatures created a perfect storm of mosquito breeding. The only respite came during a mostly dry July.

Illinois Department of Public Health announced the first positive mosquitoes in the state on May 30, in batches collected in Glenview and Morton Grove. The first human case was detected in a Chicago resident on June 20 – a full month earlier than 2017.

Clarke is dedicated to helping residents and communities reduce their risk of contracting mosquito-borne diseases like West Nile Virus through a comprehensive program of support, education and contracted services.

### **Service Contracts**

Each year, Clarke provides its customers with an annual report of control activity and overview of mosquito control challenges around the country and in our state. As mosquito control is weather-dependent, we examine carefully the impact that local weather had on mosquito breeding and the responsive control undertaken by Clarke. We work closely with our municipal partners to create and execute a mosquito control program specifically tailored to their environmental challenges, risks and community needs.

Using best practices and proven industry protocols, Clarke works in close consultation with customers to conduct mosquito surveillance and interventional methods to reduce mosquito populations, especially when the risk of disease is present.



## **Seasonal Overview**

### **Late Spring, Rainy Summer and Hot Autumn Lead to Floodwater Mosquito “Perfect Storm”**

For the fifth year running, Illinois remained in a wetter cycle, though temperatures did not warm up until well into spring. The 4<sup>th</sup> coldest April quickly rebounded into a hot, wet May, creating perfect conditions to trigger 5 floodwater mosquito hatch-offs.

### **Seasonal Highlights from the National Weather Service:**

#### **Spring:**

- Wettest May ever recorded (8.21 inches at O’Hare in mid-May, then another 2-3 inches of rain on May 30); 4<sup>th</sup> coldest April.
- Four consecutive 90-degree temperatures recorded over Memorial Day weekend, making May one of the hottest on record.

#### **Summer:**

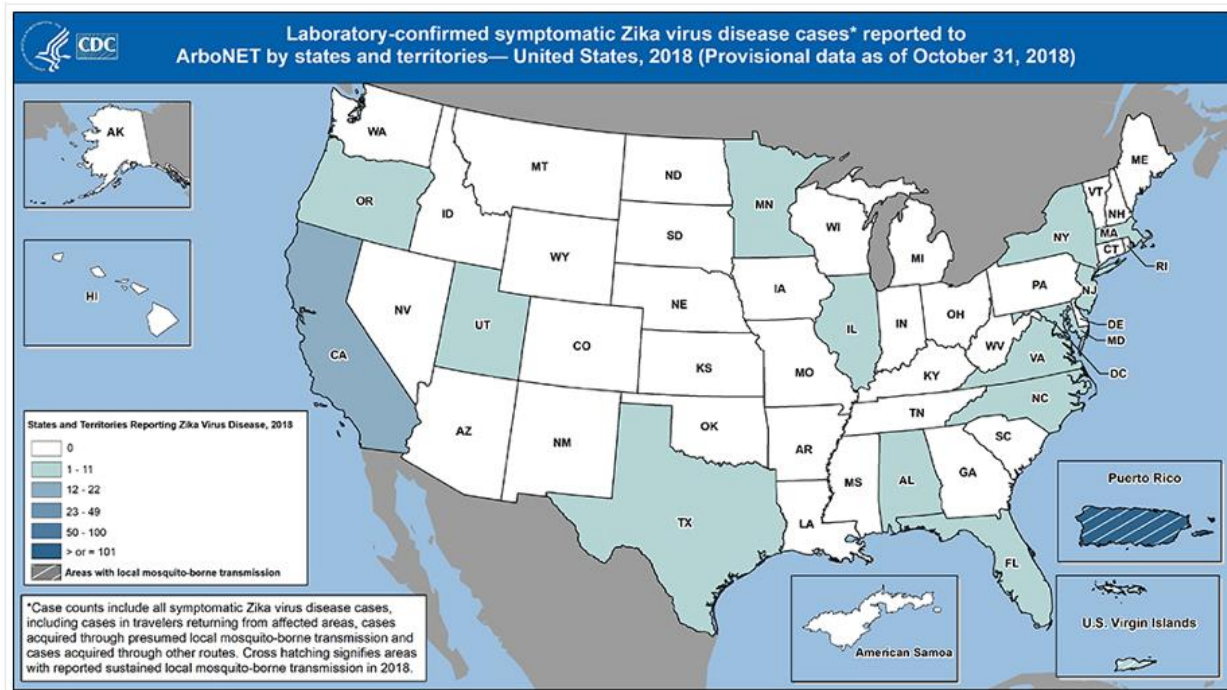
- Heavy rains continued, with June ranking as the 3<sup>rd</sup> wettest on record. The rains of May and June triggered 10 floodwater mosquito hatch-offs. Rockford area received over 14 inches of rain in June – the most ever in its history.
- July was mostly dry – 7<sup>th</sup> driest on record. Labor Day weekend saw substantial rains, with most of northern Illinois receiving 2-4 inches. Temperatures in June and July were slightly above normal.
- September continued with substantial high temperatures, and wet weather from Labor Day resulted in late-season floodwater mosquito hatchings.



## About Zika Virus

Zika virus is a mosquito-borne disease that is transmitted primarily by the *Aedes aegypti* mosquito and through sexual transmission. While Zika symptoms are generally mild in adults (fever, rash, joint pain, conjunctivitis), pregnant women who contract Zika virus can pass the virus to their unborn children, increasing the risks of serious birth defects like microencephaly. When Zika debuted in the US, more than 5,100 travel-related cases of Zika were confirmed nationwide, including 139 locally transmitted cases of transmission in areas of south Florida in 2016. Since that time, cases have steadily decreased. In 2018, the number of Zika cases continued to be very low – 52 for the continental US.

## Zika Virus in the United States 2018



Source: <https://www.cdc.gov/zika/reporting/2017-case-counts.html> Retrieved 11-5-18

## Zika Virus in Illinois

Illinois does not have a significant population of *Aedes aegypti* mosquitoes, so local transmission risk is small. Illinois reported 103 travel-related human cases in 2016, seven (7) cases in 2017 and two (2) in 2018.



## **About West Nile Virus**

West Nile virus is primarily a mosquito-borne disease, which can cause West Nile encephalitis (swelling of the brain) and West Nile fever in humans. Though the majority of humans infected will not show symptoms, those who develop West Nile virus risk debilitating effects and possibly death. While the most severe cases and the highest risk of West Nile occur traditionally in people over 50 years of age or with compromised immune systems, all people who spend time outside are at risk of contracting the virus. The disease also affects birds, horses and other animals, with higher mortality rates.

West Nile Virus has spread rapidly across North America since it was discovered in the Western hemisphere, reports the U.S. Geological Survey. West Nile Virus swept from the New York City region in 1999 to almost all of the continental U.S., seven Canadian provinces and throughout Mexico and parts of the Caribbean by 2004. Of those infected, one in five will develop symptoms.

Currently in 2018, 45 states and the District of Columbia have reported West Nile virus infections in people, birds or mosquitoes. To date, 2,204 cases of West Nile have been reported to the CDC, on track to be the highest incidence in the last 5 years.

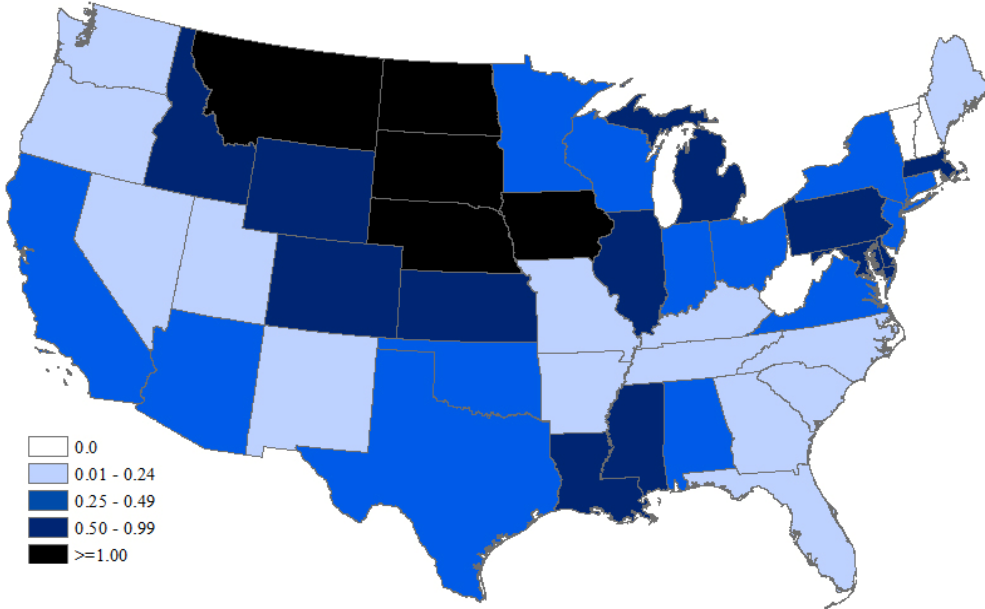
## **West Nile in the United States 2018**

- 2013: 2,469 cases
- 2014: 2,205 cases
- 2015: 2,175 cases
- 2016: 2,149 cases
- 2017: 2,097 cases
- 2018 2,204 cases (as reported through October 30, 2018)



## West Nile in the United States 2018

West Nile Virus Neuroinvasive Disease Incidence by State – United States, 2018 (as of October 30, 2018)



West Nile Virus Activity by State – United States, 2018 (as of October 30, 2018)



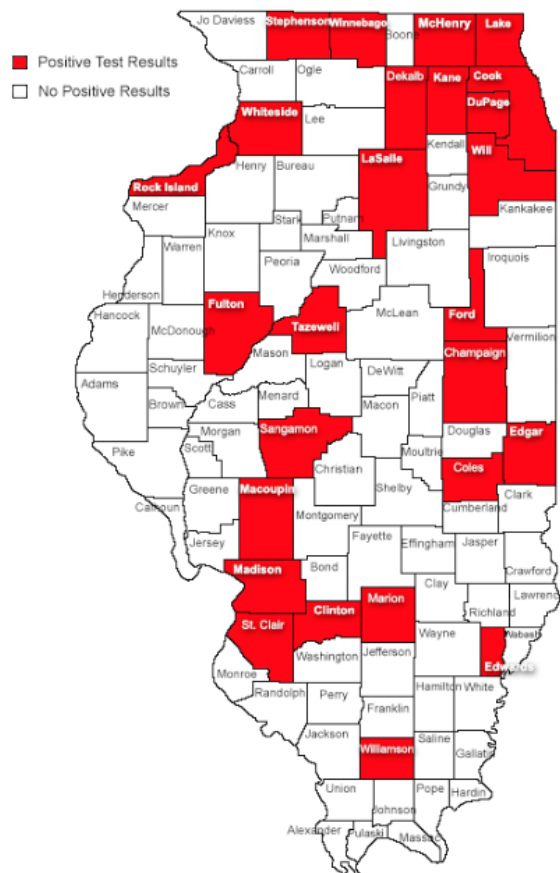


## West Nile in Illinois 2018

As of October 30, 2018, Illinois has reported 137 human cases of West Nile virus.

- 2014 – 44 human cases
- 2015 – 77 human cases
- 2016 – 154 human cases
- 2017 – 90 human cases
- 2018 – 137 human cases

### 2018 Human Case Data



Illinois West Nile Virus statistics in 2018 (reported to-date) are:

- 137 human cases (up from 90 in 2017)
- 11 fatalities (up from 1 in 2017)
- 73 counties reporting West Nile activity (up from 60 in 2017)
- 34 positive birds (up from 25 in 2017)
- 3,012 positive mosquito batches (up from 1,977 in 2017)

<http://www.dph.illinois.gov/topics-services/diseases-and-conditions/west-nile-virus/surveillance/humanCases2018>





Illinois first identified West Nile virus this year on May 30, with a positive mosquito pool from Glenview and Morton Grove.

On June 20, the first human case of West Nile virus was reported in a resident of Chicago. The first fatality was reported in a LaSalle County resident on August 29.

Below are the specific county West Nile virus statistics as of October 19, according to the Illinois Department of Public Health<sup>1</sup>

## 2018 Positive Birds, Mosquitoes, Horses and other Animals

County	American Crow	Blue Jay	Other Birds	Mosquito Batches	Horse	Other Mammals
<a href="#">BOND</a>	0	0	0	1	0	0
<a href="#">BOONE</a>	0	0	0	5	0	0
<a href="#">BUREAU</a>	0	0	0	3	0	0
<a href="#">CALHOUN</a>	0	0	0	2	0	0
<a href="#">CARROLL</a>	1	0	0	1	0	0
<a href="#">CASS</a>	0	0	0	9	0	0
<a href="#">CHAMPAIGN</a>	2	0	0	23	0	0
<a href="#">CLAY</a>	0	0	0	1	0	0
<a href="#">COLES</a>	0	1	0	0	0	0
<a href="#">COOK</a>	0	0	4	2021	0	0
<a href="#">DEKALB</a>	2	0	0	21	0	0
<a href="#">DEWITT</a>	0	0	0	2	0	0
<a href="#">DOUGLAS</a>	2	0	0	0	5	0
<a href="#">DUPAGE</a>	0	0	0	168	0	0
<a href="#">FAYETTE</a>	0	0	1	2	0	0
<a href="#">FORD</a>	0	1	0	13	0	0
<a href="#">FULTON</a>	0	0	0	6	0	0
<a href="#">GALLATIN</a>	0	0	0	2	0	0
<a href="#">GREENE</a>	0	0	0	7	0	0
<a href="#">GRUNDY</a>	0	0	0	51	0	0
<a href="#">HANCOCK</a>	0	0	0	2	0	0
<a href="#">HENRY</a>	0	0	0	5	0	0
<a href="#">IROQUOIS</a>	1	0	0	0	0	0
<a href="#">JACKSON</a>	0	0	0	5	0	0
<a href="#">JASPER</a>	0	0	0	1	0	0

<sup>1</sup> [http://public.dph.illinois.gov/wnvpublic/wnvsurveillance\\_data.aspx](http://public.dph.illinois.gov/wnvpublic/wnvsurveillance_data.aspx), retrieved Nov 5, 2018



# Annual Program Update

County	American Crow	Blue Jay	Other Birds	Mosquito Batches	Horse	Other Mammals
<a href="#">KANE</a>	0	0	0	98	0	0
<a href="#">KANKAKEE</a>	0	0	0	48	0	0
<a href="#">KENDALL</a>	0	0	0	45	0	0
<a href="#">LAKE</a>	1	0	1	72	0	0
<a href="#">LASALLE</a>	4	1	0	1	0	0
<a href="#">LEE</a>	1	0	1	6	0	0
<a href="#">LIVINGSTON</a>	0	1	0	8	0	0
<a href="#">LOGAN</a>	0	0	0	2	0	0
<a href="#">MACON</a>	0	0	0	88	0	0
<a href="#">MADISON</a>	0	0	0	20	0	0
<a href="#">MARSHALL</a>	0	0	0	1	0	0
<a href="#">MCDONOUGH</a>	0	0	0	5	0	0
<a href="#">MCHENRY</a>	0	0	1	17	0	0
<a href="#">MCLEAN</a>	1	0	0	3	0	0
<a href="#">MENARD</a>	0	0	0	3	0	0
<a href="#">MERCER</a>	0	1	0	3	0	0
<a href="#">MONROE</a>	0	0	0	12	0	0
<a href="#">MONTGOMERY</a>	0	1	0	6	0	0
<a href="#">MORGAN</a>	0	0	0	1	0	0
<a href="#">MOULTRIE</a>	0	0	0	0	2	0
<a href="#">OGLE</a>	2	0	0	1	0	0
<a href="#">PEORIA</a>	0	0	0	3	0	0
<a href="#">PERRY</a>	0	0	0	1	0	0
<a href="#">PIATT</a>	0	0	0	4	1	0
<a href="#">PIKE</a>	0	0	0	0	1	0
<a href="#">POPE</a>	0	0	0	1	0	0
<a href="#">PUTNAM</a>	0	0	0	1	0	0
<a href="#">ROCK ISLAND</a>	0	0	0	19	0	0
<a href="#">SAINT CLAIR</a>	0	0	0	18	0	0
<a href="#">SALINE</a>	0	0	0	2	0	0
<a href="#">SANGAMON</a>	0	0	0	8	0	0
<a href="#">SCOTT</a>	0	0	0	5	0	0
<a href="#">STARK</a>	0	0	0	2	0	0
<a href="#">STEPHENSON</a>	1	0	0	7	0	0



County	American Crow	Blue Jay	Other Birds	Mosquito Batches	Horse	Other Mammals
<a href="#">TAZEWELL</a>	0	0	0	2	0	0
<a href="#">UNION</a>	0	0	0	4	0	0
<a href="#">WASHINGTON</a>	0	0	0	3	0	0
<a href="#">WAYNE</a>	0	0	1	7	2	0
<a href="#">WHITE</a>	0	0	0	4	0	0
<a href="#">WHITESIDE</a>	0	0	0	5	0	0
<a href="#">WILL</a>	0	0	0	100	0	0
<a href="#">WILLIAMSON</a>	0	0	0	3	0	0
<a href="#">WINNEBAGO</a>	1	0	0	22	0	0
<b>TOTAL</b>	<b>19</b>	<b>6</b>	<b>9</b>	<b>3012</b>	<b>11</b>	<b>0</b>

### **Climatology and Mosquito Overview**

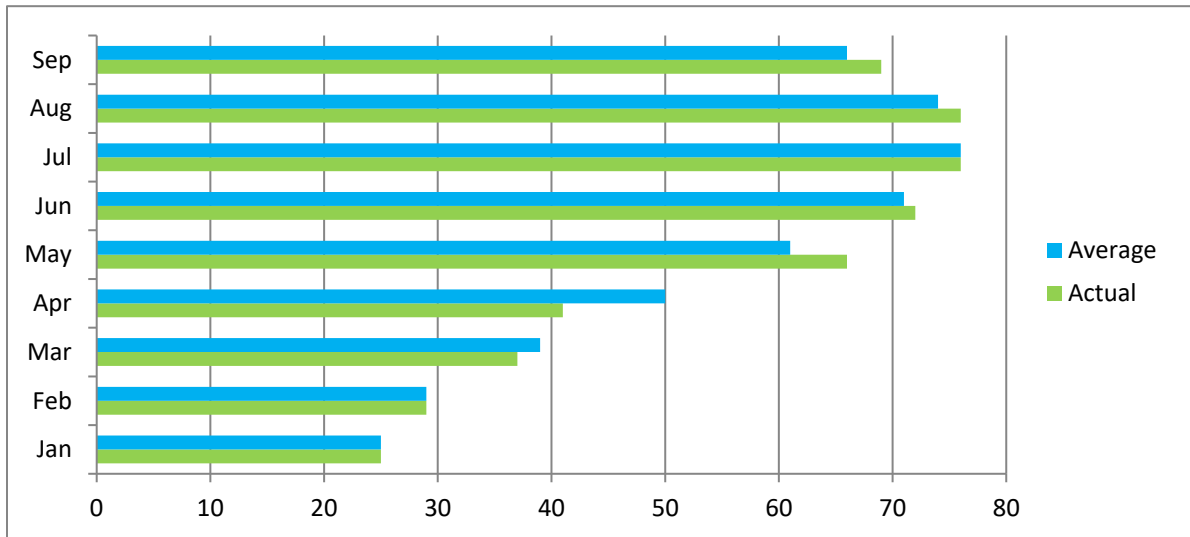
The weather dramatically impacts mosquito breeding and population. Special attention should be paid to weather conditions as weather has a huge impact on mosquito populations – with floodwater mosquitoes, rainfall determines if mosquito eggs will hatch, fierce storm can wash away egg rafts and variations in temperature can affect mosquito activity and larval development. In periods of hot, dry weather, water sources dwindle for vector species, and virus transmission can amplify, creating a greater percentage of infected mosquitoes.



## 2018 O'Hare International Airport (Chicago) Weather Survey

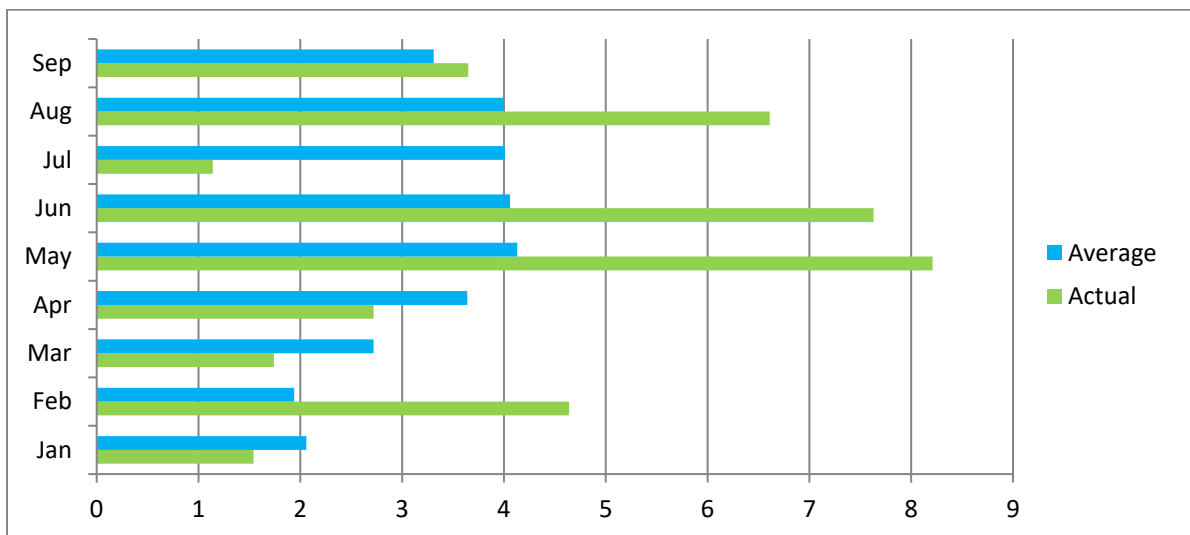
### Temperature (degrees Fahrenheit)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
<b>Actual</b>	25	29	37	41	66	72	76	76	69
<b>Average</b>	25	29	39	50	61	71	76	74	66



### Precipitation (inches)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
<b>Actual</b>	1.54	4.64	1.74	2.72	8.21	7.63	1.14	6.61	3.65
<b>Average</b>	2.06	1.94	2.72	3.64	4.13	4.06	4.01	3.99	3.31

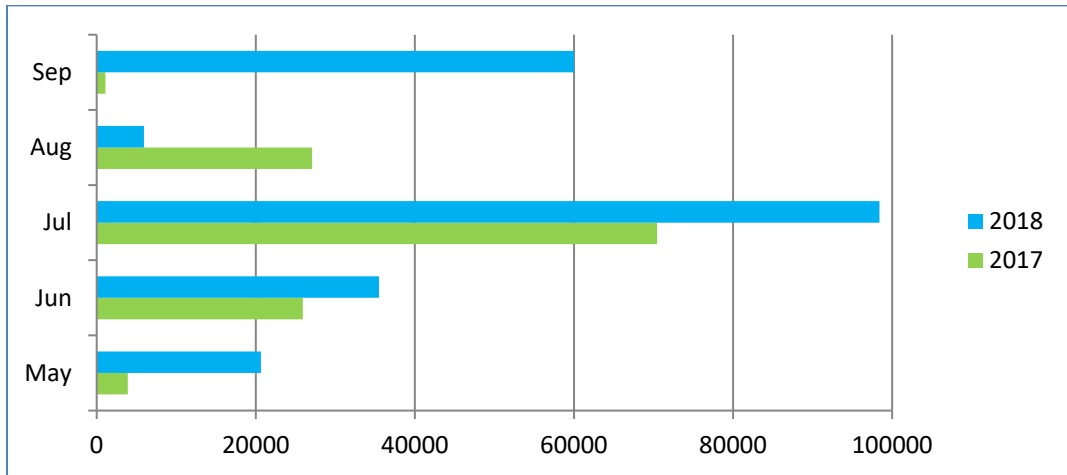




## 2018 Mosquito Light Trap Network Target Species Comparison

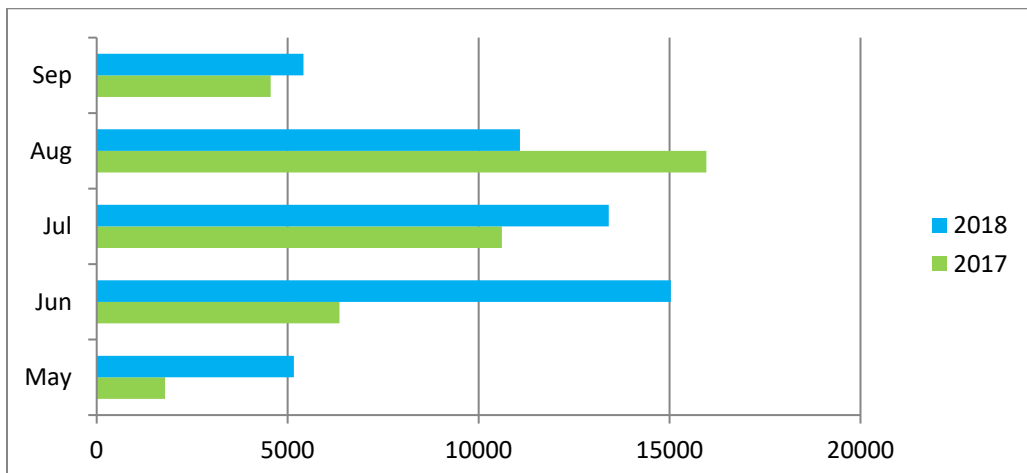
### *Aedes vexans*

	May	Jun	Jul	Aug	Sep
<b>2017</b>	3903	25906	70448	27088	1089
<b>2018</b>	20649	35493	98413	5935	60003



### *Culex pipiens and Culex restuans*

	May	Jun	Jul	Aug	Sep
<b>2017</b>	1789	6357	10608	15962	4554
<b>2018</b>	5161	15033	13407	11081	5415





## Surveillance Network

### *New Jersey Light Trap Network*



An important supplement to any mosquito control program is a New Jersey Light Trap. Developed in the 1930s, the trap helps determine species diversity and monitors mosquito populations. These traps are located in residential areas and are operated between dusk and dawn (the peak activity period for many species) and should be maintained each year to identify historic and habitual mosquito sites.

A 25-watt bulb in the trap attracts mosquitoes, which are drawn into the trap via an electric fan. Data generated by the trap catches serve several purposes: it confirms the arrival of predicted floodwater mosquito migrations, reflects the effectiveness of mosquito control efforts and identifies fluctuations in adult mosquito populations.

### *West Nile Virus Surveillance Trap*

A vital tool in adult mosquito and arbovirus surveillance is the West Nile virus, or gravid, trap. Developed by the Centers for Disease Control and Surveillance, the trap primarily collects gravid (*Culex*) mosquitoes (principal vectors of West Nile virus), which makes it particularly effective in tracking the disease. A gravid female mosquito has taken a blood meal and is ready to lay her eggs. Typically, (*Culex*) mosquitoes search for water rich in organic material to lay their eggs. If they've obtained their blood meal from an infected animal, they can transmit the virus to their eggs. The mosquitoes are captured live, which allows us to test them for arboviruses and get an early indicator that the virus is present in the area.



### *Centers for Disease Control and Prevention (CDC) Trap*



Mosquitoes looking for a blood meal are mainly attracted by carbon dioxide, exhaled by humans and animals. The CDC trap provides carbon dioxide as bait, though dry ice (frozen carbon dioxide), and a light source to attract female mosquitoes. This trap is set out at prime activity hours for the species targeted. A fan draws mosquitoes into a net and the live mosquitoes are trapped for arbovirus testing. CDC traps often show a very high species diversity and large overall mosquito numbers, indicating the presence of a mosquito-borne virus and relative indices of adult mosquito species.



## Light Trap Species Summary

The following table summarizes the species composition from the light trap network operating in Northern Illinois.

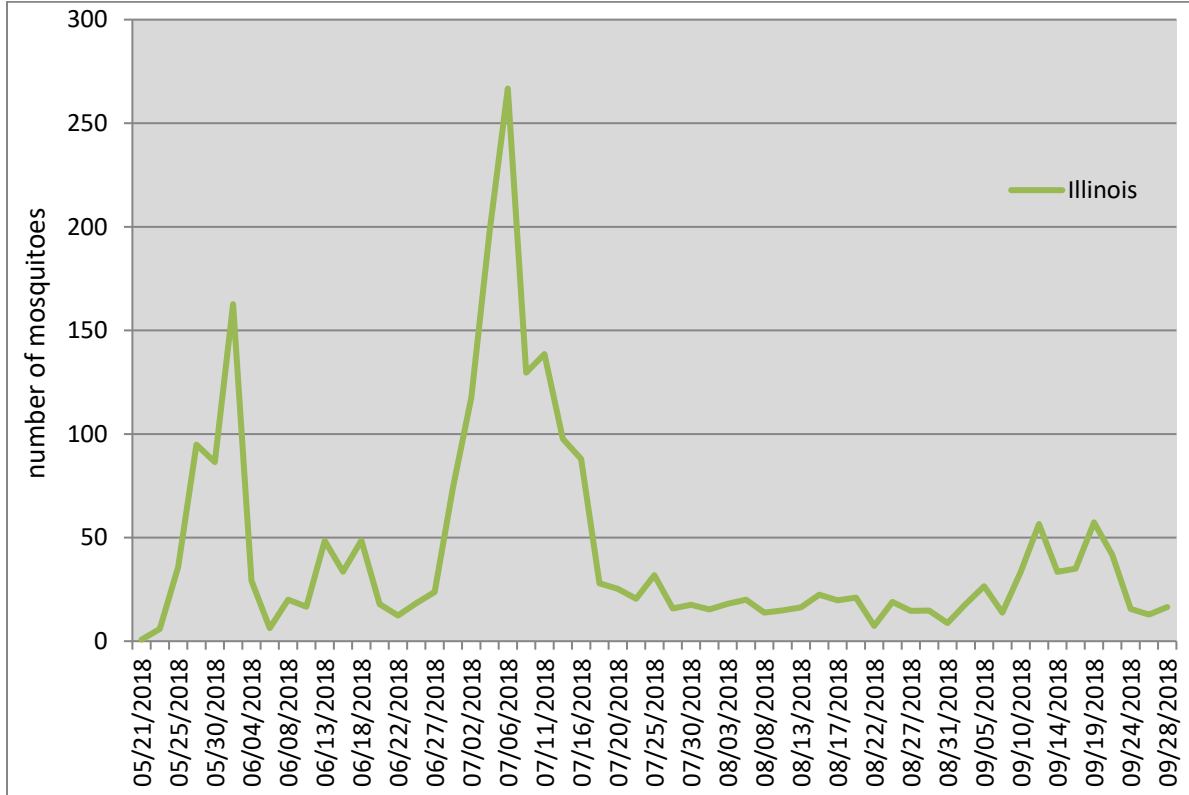
<b>Light Trap Species Summary</b>				
<b>Species</b>	<b>Females</b>	<b>Percent</b>	<b>Males</b>	<b>Percent</b>
<i>Ae cinereus</i>	2075	0.52%	880	0.98%
<i>Ae vexans</i>	221532	54.99%	46806	51.86%
<i>Ae misc</i>	25833	6.41%	13420	14.87%
<i>An punctipennis</i>	4093	1.02%	306	0.34%
<i>An quadrimaculatus</i>	14341	3.56%	1568	1.74%
<i>An walkeri</i>	245	0.06%	8	0.01%
<i>An species</i>	880	0.22%	184	0.20%
<i>Cq perturbans</i>	3532	0.88%	176	0.20%
<i>Cx erraticus</i>	727	0.18%	20	0.02%
<i>Cx pipiens</i>	5071	1.26%	1265	1.40%
<i>Cx restuans</i>	5411	1.34%	1052	1.17%
<i>Cx species</i>	39992	9.93%	20647	22.88%
<i>Cx tarsalis</i>	84	0.02%	2	0.00%
<i>Cx territans</i>	1353	0.34%	273	0.30%
<i>Cs inornata</i>	98	0.02%	10	0.01%
<i>Cs minnesotae</i>	19	0.00%	0	0.00%
<i>Cs species</i>	22	0.01%	21	0.02%
<i>Mosquito, Misc.</i>	1016	0.25%	805	0.89%
<i>Oc excrucias</i>	11	0.00%	0	0.00%
<i>Oc grossbecki</i>	6	0.00%	0	0.00%
<i>Oc sticticus</i>	15	0.00%	0	0.00%
<i>Oc japonicus</i>	435	0.11%	341	0.38%
<i>Oc canadensis</i>	55	0.01%	10	0.01%
<i>Oc stimulans</i>	19	0.00%	5	0.01%
<i>Oc triseriatus</i>	352	0.09%	219	0.24%
<i>Oc trivittatus</i>	71200	17.67%	1642	1.82%
<i>Oc. species</i>	598	0.15%	98	0.11%
<i>Or signifera</i>	31	0.01%	5	0.01%
<i>Ps ciliata</i>	82	0.02%	17	0.02%
<i>Ps ferox</i>	3071	0.76%	32	0.04%
<i>Ps columbiae</i>	3	0.00%	1	0.00%
<i>Ps misc</i>	75	0.02%	1	0.00%
<i>Ur sapphirina</i>	605	0.15%	440	0.49%
<b>Total</b>	<b>402,882</b>	<b>100.00%</b>	<b>90,254</b>	<b>100.00%</b>

**Total Number of Mosquitoes: 493,136**



## Light Trap Counts by Region, County and Community

### Light Trap Comparison Chart







# Annual Program Update

## **Services Performed Year-to-Date**

Below is a report outlining all services performed year-to-date.

<b>Service Item</b>	<b>Service Item Description</b>	<b>Start Date</b>
ROS2008 - Natular XRT CB Truck	Catch basin treatment for larval control.	06/13/2018
ROS2011 - Natular XRT BYCB Truck	Backyard catch basin treatment for larval control.	06/13/2018
ROS2888 - Biomist 3+15 Truck ULV	ULV application insecticide for adult mosquito control.	06/06/2018
ROS2888 - Biomist 3+15 Truck ULV	ULV application insecticide for adult mosquito control.	06/13/2018
ROS2888 - Biomist 3+15 Truck ULV	ULV application insecticide for adult mosquito control.	06/20/2018
ROS2888 - Biomist 3+15 Truck ULV	ULV application insecticide for adult mosquito control.	06/26/2018
ROS2820 - DUET 4th of July ULV Special E	ULV application insecticide for adult mosquito control.	07/03/2018
ROS2888 - Biomist 3+15 Truck ULV	ULV application insecticide for adult mosquito control.	07/06/2018
ROS2888 - Biomist 3+15 Truck ULV	ULV application insecticide for adult mosquito control.	07/12/2018
ROS2888 - Biomist 3+15 Truck ULV	ULV application insecticide for adult mosquito control.	07/19/2018
ROS2888 - Biomist 3+15 Truck ULV	ULV application insecticide for adult mosquito control.	07/25/2018
ROS2816 - DUET Truck ULV Festival Applic	ULV application insecticide for adult mosquito control.	08/06/2018
ROS2888 - Biomist 3+15 Truck ULV	ULV application insecticide for adult mosquito control.	08/09/2018
ROS2888 - Biomist 3+15 Truck ULV	ULV application insecticide for adult mosquito control.	09/06/2018

## **Services Invoiced Per Contract:**

Services Invoiced Year-to-Date: \$98,468.12