Plainfield Township

2019 Mosquito Management Program
Annual Service Report

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Clarke Environmental Mosquito Management
2019 Annual Report

Introduction

For mosquito control in Illinois, 2019 was a year of contradictions.

Despite the heavy precipitation, persistent cooler temperatures helped suppress mosquito activity across the region, with many communities seeing little to no mosquito activity well into their normal season. In addition, West Nile Virus cases were down significantly to its lowest numbers in Illinois in a decade, with just 23 cases reported.

But vigilance is still important – the main mosquito story of 2019 came from our neighbors to the east, as Eastern Equine Encephalitis gained footholds in Michigan and Indiana in record numbers.

As always, Clarke is dedicated to helping the 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

Clarke provides an annual report to its customers to outline control activity and provide an overview of mosquito control challenges around the country and in our state. As mosquito control is always 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.

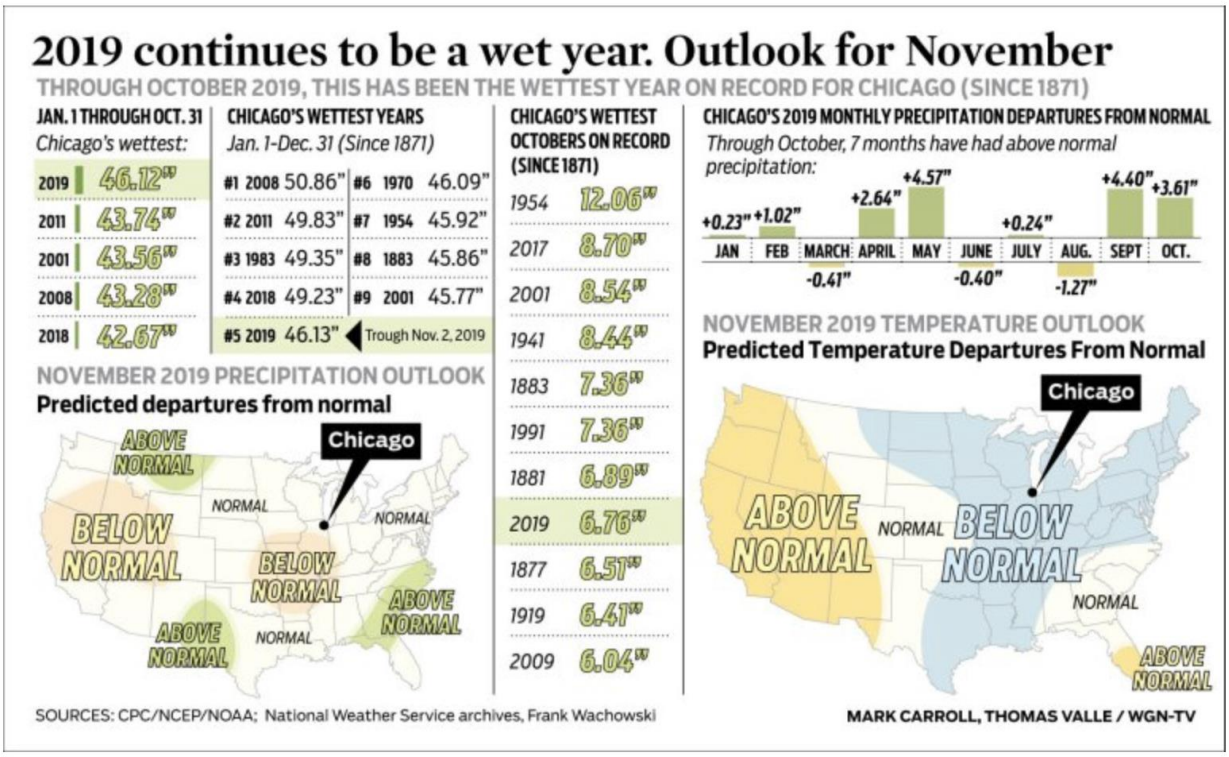
Using best practices and proven industry protocols, Clarke works in close consultation with customers to conduct mosquito surveillance and interventional methods to reduce mosquito populations, especially when the risk of disease is present.

Seasonal Overview

Wettest, coolest weather records persist in 2019, suppressing mosquito populations

For the past six years, Illinois has been experiencing years of high precipitation, but 2019 may be on track to break the record for the wettest year in recorded history.

Combined with persistent cold weather (longest stretch of days below 84 degrees in history), with the first 84+ degree day in late June, worked to suppress mosquito populations, including floodwater mosquitoes.



Source: https://wgntv.com/2019/11/03/2019-continues-to-be-a-wet-year-outlook-for-november/ Retrieved Nov 14, 2019

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.

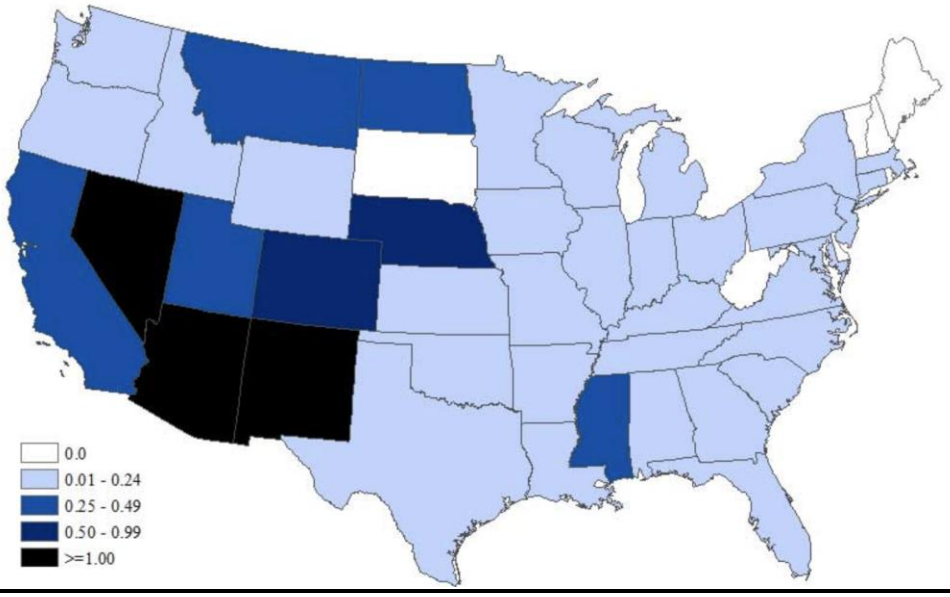
Currently in 2019, 47 states and the District of Columbia have reported West Nile virus infections in people, birds or mosquitoes. To date, 854 cases of West Nile have been reported to the CDC, less than half of the number of human cases at this time in 2018.

West Nile in the United States 2019

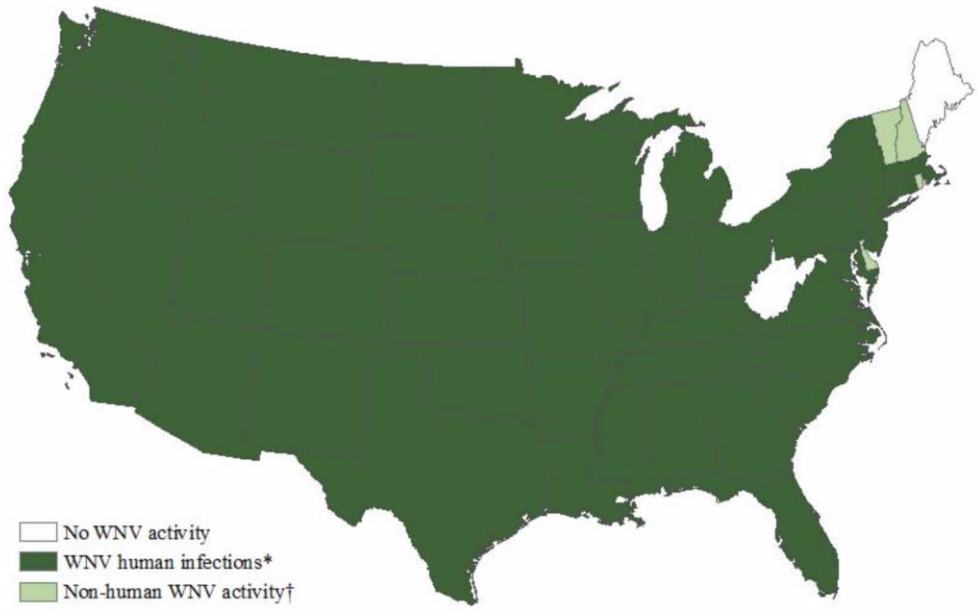
- 2014: 2,205 cases
- 2015: 2,175 cases
- 2016: 2,149 cases
- 2017: 2,097 cases
- 2018: 2,647 cases
- 2019: 854 cases reported as of November 12, 2019

West Nile in the United States 2019

West Nile Virus Neuroinvasive Disease Incidence by State – United States, 2019 (as of November 12, 2019)



West Nile Virus Activity by State – United States, 2019 (as of November 12, 2019)



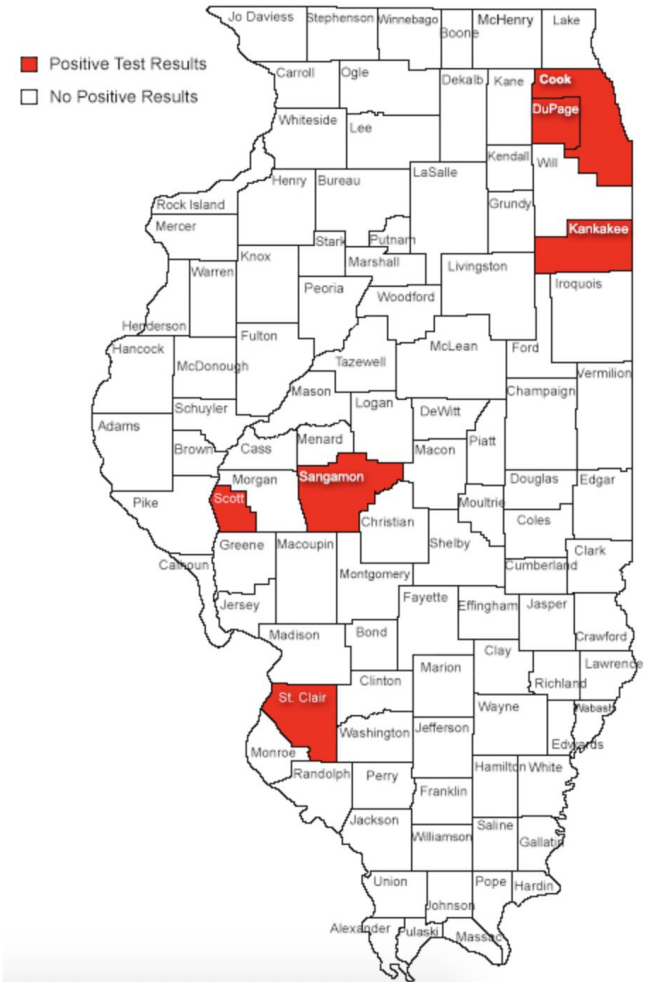
Retrieved from: https://www.cdc.gov/westnile/statsmaps/preliminarymapsdata2019/activitybystate2019.html on November 13, 2019

West Nile in Illinois 2019

As of November 14, 2019, Illinois has reported 23 human cases of West Nile virus.

- 2015 – 77 human cases
- 2016 – 154 human cases
- 2017 – 90 human cases
- 2018 – 137 human cases
- 2019 – 23 human cases

2019 Human Case Data



Retrieved from: http://dph.illinois.gov/topics-services/diseases-and-conditions/west-nile-virus/surveillance/2019/human-cases on November 14, 2019

Illinois West Nile Virus statistics in 2019 (reported to-date) are:

- 23 human cases (down from 137 in 2018)
- 1 fatality (down from 11 in 2018)
- 45 counties reporting West Nile activity (down from 73 in 2018)
- 4 positive birds (down from 34 in 2018)
- 1,202 positive mosquito batches (down from 3,012 in 2018)

Illinois identified the first human West Nile virus case in in a resident of Chicago on August 14.

Below are the specific county West Nile virus statistics as of November 14, according to the Illinois Department of Public Health[1]

2019 Positive Birds, Mosquitoes, Horses and other Animals

County	American Crow	Blue Jay	Other Birds	Mosquito Batches	Horse	Other Mammals
ADAMS	0	0	0	1	0	0
BUREAU	0	0	0	2	0	0
CLAY	0	0	0	2	0	0
COOK	1	0	0	900	0	0
DEKALB	0	0	0	1	0	0
DUPAGE	1	0	0	112	0	0
FRANKLIN	0	0	0	1	0	0
FULTON	0	0	0	1	0	0
GALLATIN	0	0	0	4	0	0
GRUNDY	0	0	0	3	0	0
HAMILTON	0	0	0	1	0	0
HENDERSON	0	0	0	1	0	0
HENRY	0	0	0	4	0	0
JACKSON	0	0	0	1	0	0
KANE	0	0	0	15	0	0
KENDALL	0	0	0	3	0	0
LAKE	0	0	0	60	0	0
LASALLE	0	0	0	1	0	0
MACON	0	0	0	2	0	0
MACOUPIN	0	0	0	5	0	0
MADISON	0	0	0	7	0	0

[1] http://public.dph.illinois.gov/wnvpublic/wnvsurveillance_data.aspx, retrieved Nov 5, 2018

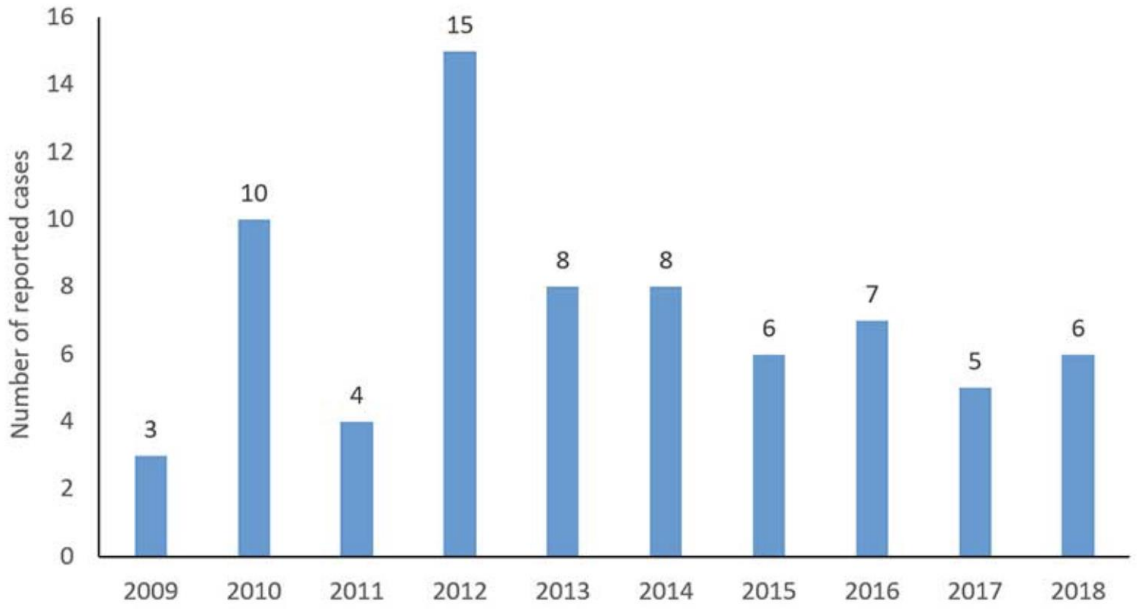
County	American Crow	Blue Jay	Other Birds	Mosquito Batches	Horse	Other Mammals
MARION	0	0	0	2	1	0
MARSHALL	0	0	0	1	0	0
MASSAC	0	0	0	2	0	0
MCHENRY	0	0	0	3	0	0
MENARD	0	0	0	3	0	0
MERCER	0	0	0	3	0	0
MONROE	0	0	0	5	0	0
MONTGOMERY	0	0	0	1	0	0
OGLE	0	0	0	3	0	0
PERRY	0	0	0	1	0	0
ROCK ISLAND	0	0	0	1	0	0
SAINT CLAIR	0	0	0	3	0	0
SANGAMON	0	0	0	2	0	0
SCOTT	0	0	0	1	0	0
TAZEWELL	0	0	0	2	0	0
WARREN	0	0	0	21	0	0
WAYNE	0	0	0	0	1	0
WHITE	0	0	0	2	0	0
WHITESIDE	0	0	0	1	0	0
WILL	0	0	0	13	0	0
WILLIAMSON	0	0	0	1	0	0
WINNEBAGO	1	0	0	4	0	0
WOODFORD	1	0	0	0	0	0
TOTAL	**4**	**0**	**0**	**1202**	**2**	**0**

About Eastern Equine Encephalitis

Eastern Equine Encephalitis is a mosquito-borne disease primarily vectored by the *Culiseta melanura* which lives in freshwater hardwood swamps, generally on the Atlantic coast and around the Great Lakes. The disease is one of the most dangerous mosquito-borne diseases; one in three patients diagnosed will die from Eastern Equine Encephalitis.

While the U.S. averages about seven (7) cases of EEE each year, 2019 had more than 30 cases reported, with significant outbreaks in states including Massachusetts, Michigan, Indiana, New Jersey and Connecticut.

Eastern equine encephalitis virus neuroinvasive disease cases reported by year, 2009–2018



Source: ArboNET, Arboviral Diseases Branch, Centers for Disease Control and Prevention

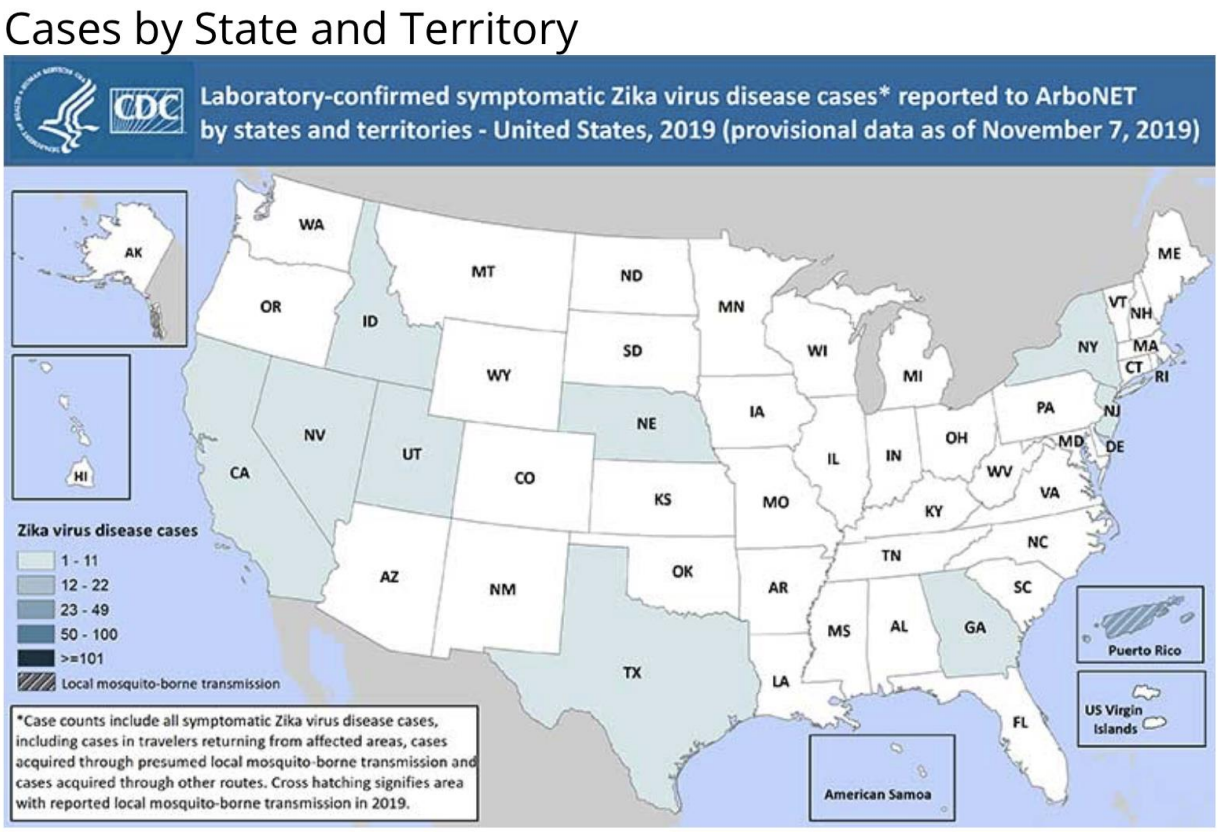
Eastern Equine Encephalitis in Illinois

While Illinois does not have a recent history of EEE cases, the proximity of the cases in both Indiana and Michigan and historic cases in Wisconsin call for continued vigilance.

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. This year, the number of traveler-contracted Zika cases has dwindled to 14, plus one laboratory-contracted incidence.

Zika Virus in the United States 2019



Source: https://www.cdc.gov/zika/reporting/2019-case-counts.html Retrieved 11-14-19

Zika Virus in Illinois

Illinois does not have a significant population of *Aedes aegypti* mosquitoes, so local transmission risk is small. Illinois reported no travel-related human cases in 2019.

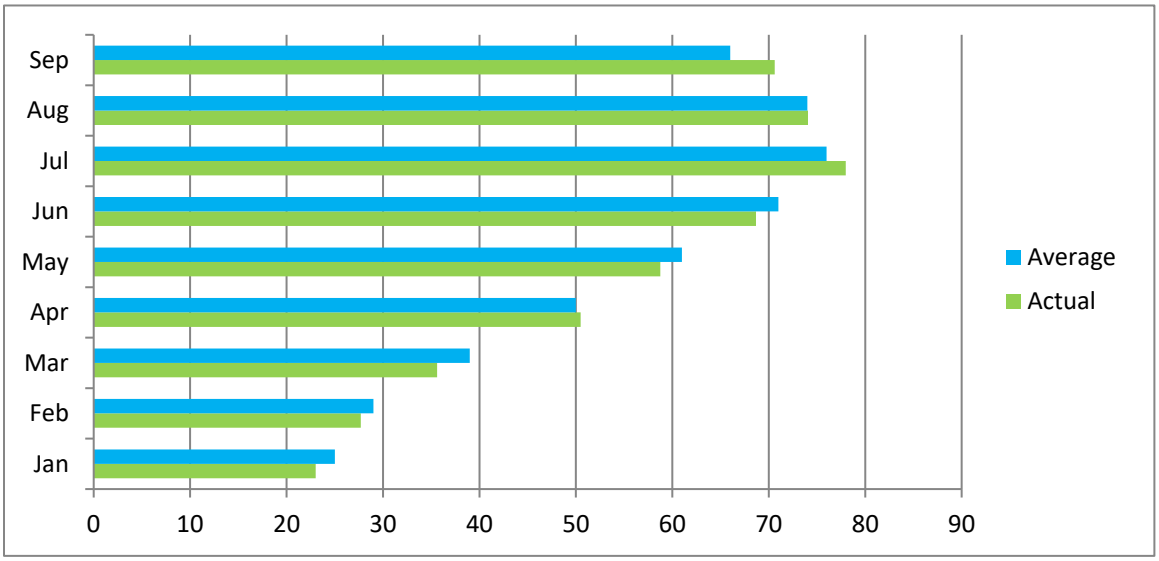
Climatology and Mosquito Overview

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.

2019 O'Hare International Airport (Chicago) Weather Survey

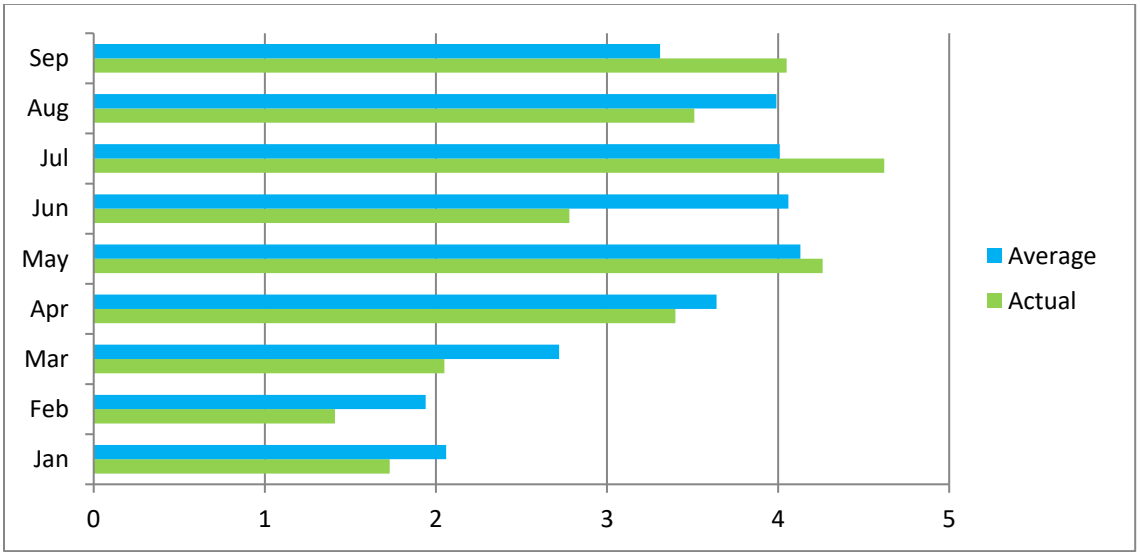
Temperature (degrees Fahrenheit)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Actual	23.02	27.7	35.61	50.5	58.75	68.68	77.98	74.07	70.61
Average	25	29	39	50	61	71	76	74	66



Precipitation (inches)

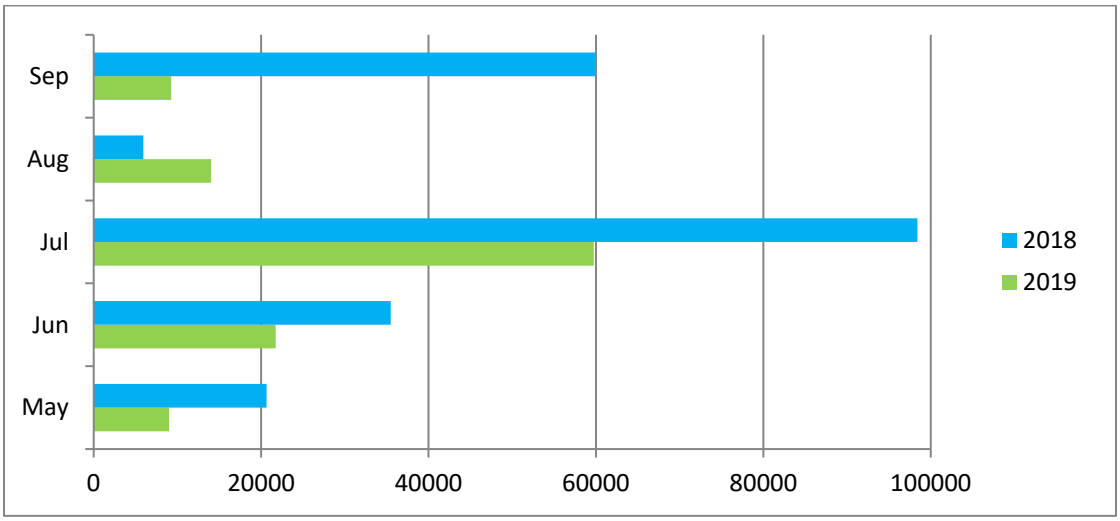
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Actual	1.73	1.41	2.05	3.4	4.26	2.78	4.62	3.51	4.05
Average	2.06	1.94	2.72	3.64	4.13	4.06	4.01	3.99	3.31



2019 Mosquito Light Trap Network Target Species Comparison

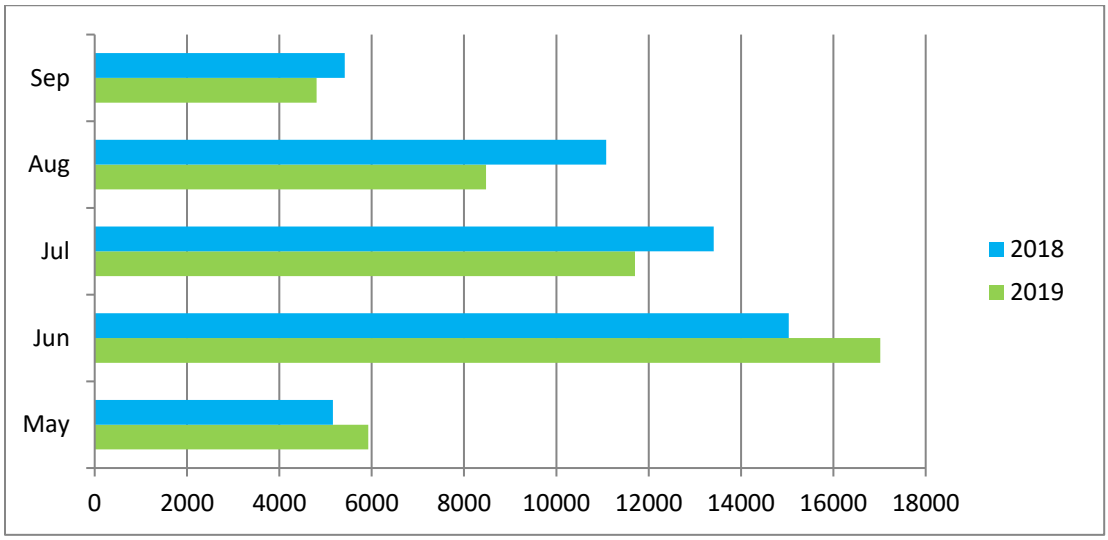
Aedes vexans

	May	Jun	Jul	Aug	Sep
2018	20649	35493	98413	5935	60003
2019	9005	21742	59736	14030	9252



Culex pipiens and *Culex restuans*

	May	Jun	Jul	Aug	Sep
2018	5161	15033	13407	11081	5415
2019	5927	17018	11703	8477	4808



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.

Light Trap Species Summary				
Species	*Females*	*Percent*	*Males*	*Percent*
Ae cinereus	771	0.36%	509	0.98%
Ae vexans	114492	52.73%	20682	39.87%
Ae misc	4389	2.02%	2798	5.39%
An punctipennis	2140	0.99%	187	0.36%
An quadrimaculatus	5638	2.60%	316	0.61%
An walkeri	389	0.18%	3	0.01%
An species	179	0.08%	46	0.09%
Cq perturbans	19068	8.78%	668	1.29%
Cx erraticus	710	0.33%	86	0.17%
Cx pipiens	567	0.26%	15	0.03%
Cx restuans	1109	0.51%	45	0.09%
Cx species	47179	21.73%	23997	46.26%
Cx tarsalis	117	0.05%	4	0.01%
Cx territans	561	0.26%	43	0.08%
Cs inornata	319	0.15%	100	0.19%
Cs minnesotae	299	0.14%	1	0.00%
Cs species	33	0.02%	49	0.09%
Mosquito, Misc.	283	0.13%	46	0.09%
Oc excrucias	34	0.02%	3	0.01%
Oc grossbecki	31	0.01%	30	0.06%
Oc japonicus	169	0.08%	100	0.19%
Oc canadensis	365	0.17%	7	0.01%
Oc stimulans	16	0.01%	3	0.01%
Oc triseriatus	582	0.27%	496	0.96%
Oc trivittatus	15156	6.98%	310	0.60%
Oc. species	29	0.01%	14	0.03%
Or signifera	60	0.03%	10	0.02%
Ps ciliata	15	0.01%	6	0.01%
Ps ferox	121	0.06%	30	0.06%
Ps columbiae	2	0.00%	0	0.00%
Ps misc	14	0.01%	0	0.00%
Ur sapphirina	2312	1.06%	1266	2.44%
Total	217,149	100.00%	51,870	100.00%
	Total Number of Mosquitoes:	269,019		

Light Trap Species Summary

The following table summarizes the species composition from the light trap network operating in Plainfield Township.

Light Trap Species Summary				
Species	*Females*	*Percent*	*Males*	*Percent*
Ae cinereus	0	0.0%	3	0.4%
Ae species	252	8.6%	97	13.3%
Ae vexans	1838	62.7%	311	42.5%
An punctipennis	39	1.3%	1	0.1%
An quadrimaculatus	228	7.8%	5	0.7%
An species	5	0.2%	0	0.0%
Cq perturbans	2	0.1%	2	0.3%
Cx erraticus	5	0.2%	2	0.3%
Cx pipiens	0	0.0%	0	0.0%
Cx restuans	5	0.2%	2	0.3%
Cx salinarius	0	0.0%	0	0.0%
Cx species	477	16.3%	268	36.6%
Cx tarsalis	0	0.0%	0	0.0%
Cx territans	10	0.3%	3	0.4%
Cs inornata	2	0.1%	1	0.1%
Cs species	0	0.0%	0	0.0%
Mosquito, Misc.	4	0.1%	0	0.0%
Oc canadensis	0	0.0%	0	0.0%
Oc fitchii	0	0.0%	0	0.0%
Oc grossbecki	0	0.0%	0	0.0%
Oc japonicus	1	0.0%	1	0.1%
Oc stimulans	0	0.0%	0	0.0%
Oc triseriatus	3	0.1%	2	0.3%
Oc trivittatus	17	0.6%	4	0.5%
Oc. species	0	0.0%	0	0.0%
Or signifera	1	0.0%	0	0.0%
Ps ciliata	2	0.1%	0	0.0%
Ps columbiae	0	0.0%	0	0.0%
Ps ferox	0	0.0%	0	0.0%
Ur sapphirina	42	1.4%	30	4.1%
Total	**2,933**	**100.0%**	**732**	**100.0%**

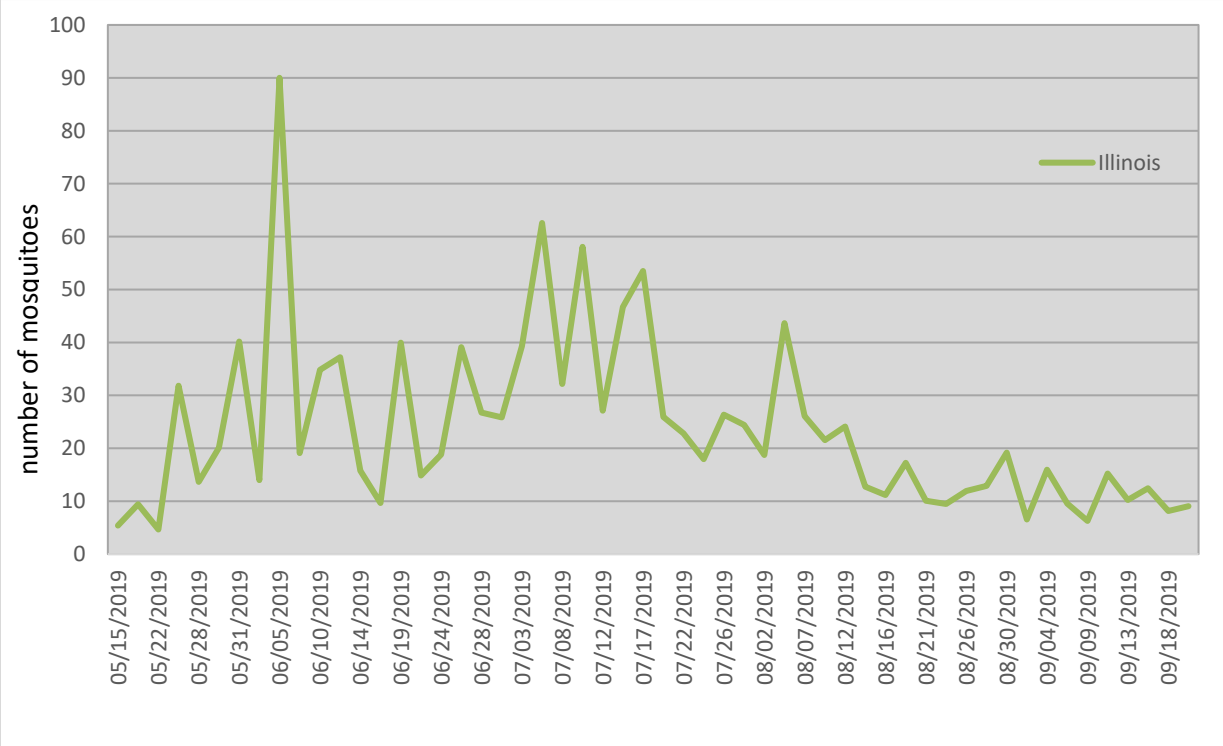
Total Number of Trap:1 Average Number of Females/Trap Night: 54.31

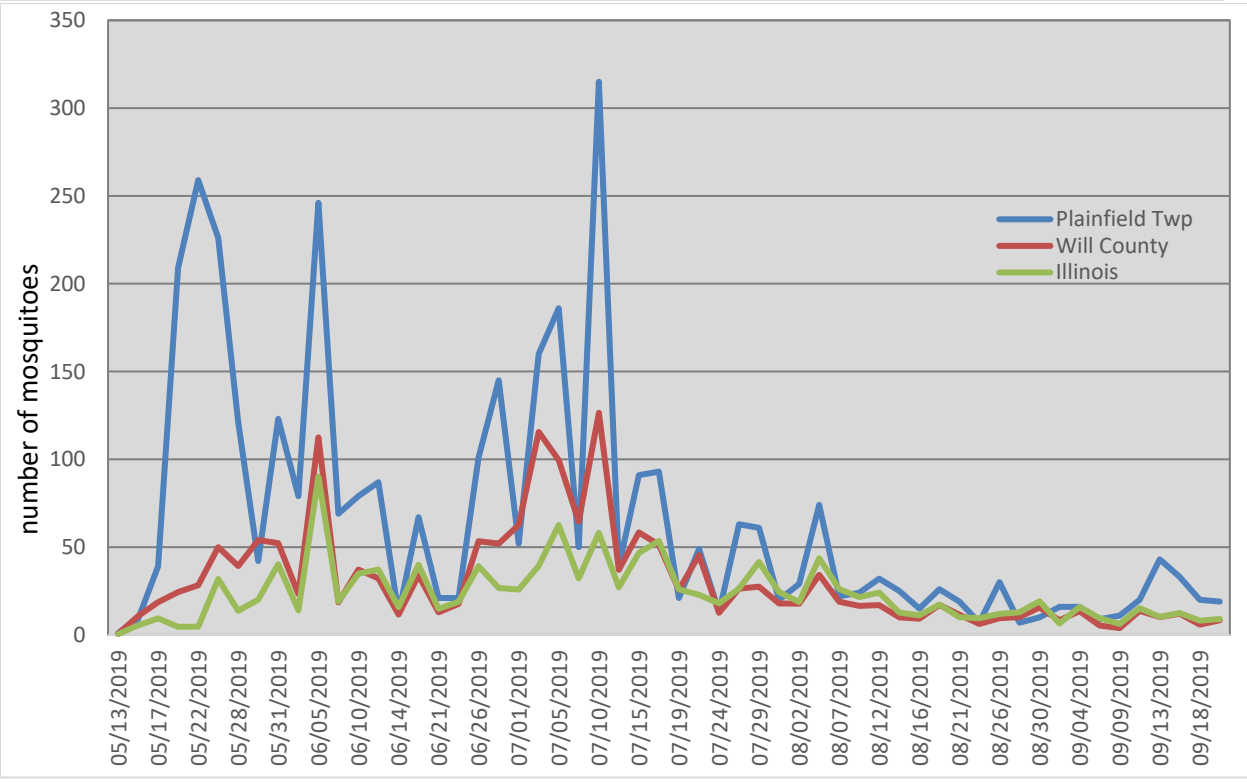
Total Number of Trap Nights: 54

Total Number of Mosquitoes: 3,665

Light Trap Counts by Region, County and Community

Light Trap Comparison Chart





Services Performed Year-to-Date

Service Item	Start Date
ROS0952 - N.J. Light Trap Seasonal Serv	04/26/2019
ROS1999 - Natular G 5#/Acre Hand	05/10/2019
ROS2000 - Natular Backpack Larviciding	05/10/2019
ROS1302 - Targeted Site Larval Insp Serv	05/10/2019
ROS1302 - Targeted Site Larval Insp Serv	05/30/2019
ROS2000 - Natular Backpack Larviciding	06/10/2019
ROS1302 - Targeted Site Larval Insp Serv	06/17/2019
ROS2888 - Biomist 3+15 Truck ULV	06/26/2019
ROS1302 - Targeted Site Larval Insp Serv	07/01/2019
ROS2888 - Biomist 3+15 Truck ULV	07/09/2019
ROS2009 - Natular XRT CB Bike	07/10/2019
ROS1302 - Targeted Site Larval Insp Serv	07/16/2019
ROS1302 - Targeted Site Larval Insp Serv	07/30/2019
ROS1302 - Targeted Site Larval Insp Serv	08/13/2019
ROS1999 - Natular G 5#/Acre Hand	08/27/2019
ROS1302 - Targeted Site Larval Insp Serv	08/27/2019
ROS2888 - Biomist 3+15 Truck ULV	09/06/2019
ROS1302 - Targeted Site Larval Insp Serv	09/13/2019

Services Invoiced Per Contract:

Services Invoiced Year-to-Date: $46,920.00