York Township

2021 Mosquito Management Program
Annual Service Report

Submitted by:
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December 2021

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clarke

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Clarke Environmental Mosquito Management
2021 Annual Report

Introduction

As the world began a slow return to post-COVID-19 conditions, 2021 also saw a return of more typical mosquito control activities. Last year, only four counties reported West Nile Activity, but that number increased more than ten-fold in 2021. In addition, rains in June produced nuisance mosquito brood hatchings that resulted in the highest July mosquito activity in three years.

As always, Clarke is dedicated to helping the residents of your community 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 carefully examine the impact that local weather had on mosquito breeding and the responsive control undertaken by Clarke in your community. 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 your community to conduct mosquito surveillance and interventional methods to reduce mosquito populations, especially when the risk of disease is present.

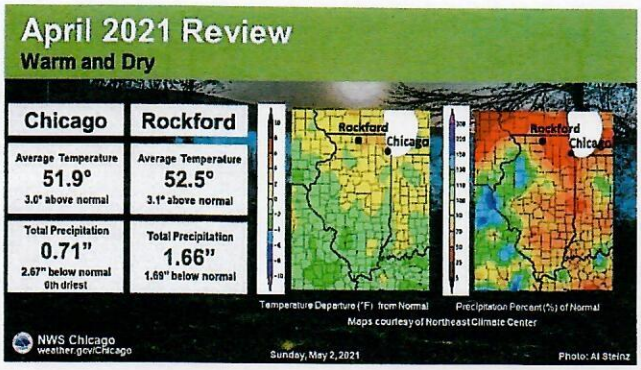
Seasonal Overview

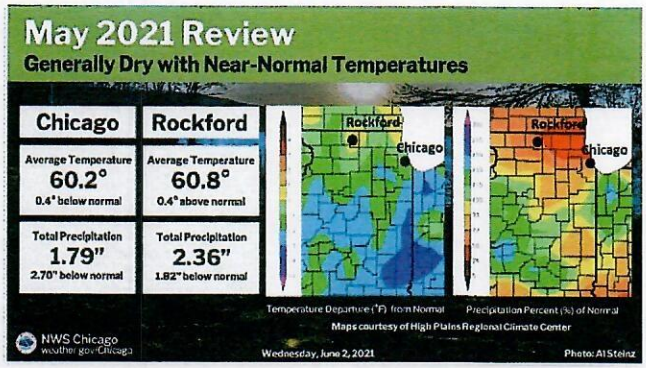
Warm Spring, Summer and Fall

"Warm and generally dry" was the go-to phrase for 2021 weather in the Chicago region. With the exception of June, which ranked as the 13th wettest, most of spring and summer were at or below average precipitation, skewing drier for most months in 2021.

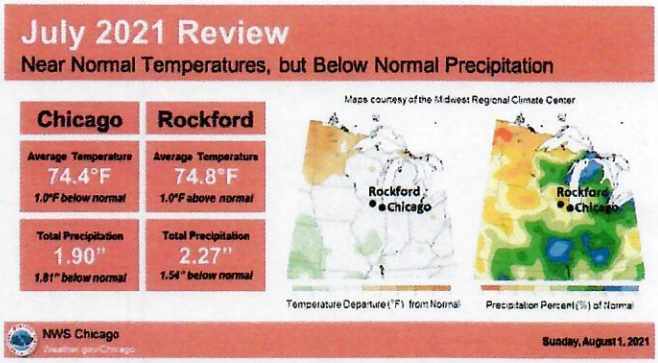
But with that drier climate came excessive warmth. Chicago experienced its 4th warmest June, 5th warmest September and 6th warmest August in 2021. This early warmup and extended summer weather created conditions conducive to mosquito breeding.

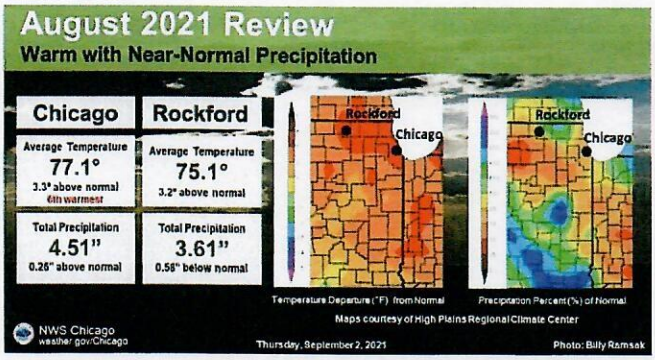
The summaries below provided by the National Weather Service showcase the headlines from each month for weather

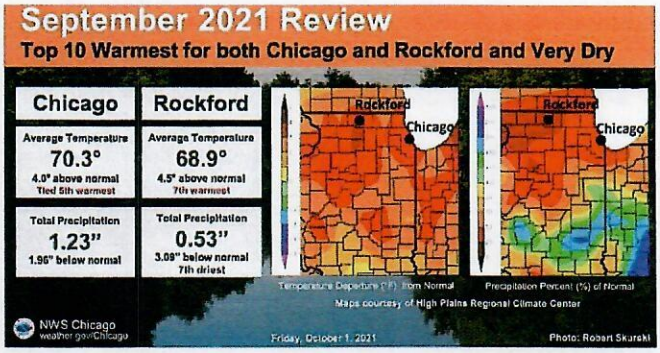

April 2021 Review
Warm and Dry
Chicago
Average Temperature
51.9°
3.0° above normal
Total Precipitation
0.71"
2.67" below normal
9th driest
Rockford
Average Temperature
52.5°
3.1° above normal
Total Precipitation
1.66"
1.69" below normal
Rockford
Chicago
Temperature Departure (°F) from Normal
Precipitation Percent (%) of Normal
Maps courtesy of Northeast Climate Center
NWS Chicago
weather.gov/Chicago
Sunday, May 2, 2021
Photo: Al Steinz

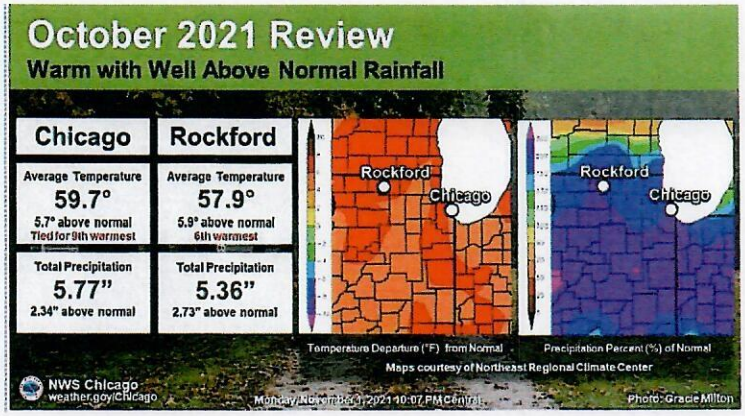

May 2021 Review
Generally Dry with Near-Normal Temperatures
Chicago
Average Temperature
60.2°
0.4° below normal
Total Precipitation
1.79"
2.70" below normal
Rockford
Average Temperature
60.8°
0.4° above normal
Total Precipitation
2.36"
1.82" below normal
Rockford
Chicago
Temperature Departure (°F) from Normal
Precipitation Percent (%) of Normal
Maps courtesy of High Plains Regional Climate Center
NWS Chicago
weather.gov/Chicago
Wednesday, June 2, 2021
Photo: Al Steinz


June 2021 Review
Well Above Normal Warmth... Very Wet Except Far North
Chicago
Average Temperature
74.3°
3.7° above normal
Tied 4th warmest June
Total Precipitation
6.78"
2.68" above normal
13th wettest June
Rockford
Average Temperature
75.5°
5.4° above normal
4th warmest June
Total Precipitation
1.26"
3.97" below normal
6th driest June
Rockford
Chicago
Maps courtesy of High Plains Regional Climate Center
NWS Chicago
weather.gov/Chicago
Friday July 2, 2021
Photo: Robert Skurski


July 2021 Review
Near Normal Temperatures, but Below Normal Precipitation
Chicago
Average Temperature
74.4°F
1.0°F below normal
Total Precipitation
1.90"
1.81" below normal
Rockford
Average Temperature
74.8°F
1.0°F above normal
Total Precipitation
2.27"
1.54" below normal
Maps courtesy of the Midwest Regional Climate Center
Rockford
Chicago
Temperature Departure (°F) from Normal
Precipitation Percent (%) of Normal
NWS Chicago
Sunday, August 1, 2021


August 2021 Review
Warm with Near-Normal Precipitation
Chicago
Average Temperature
77.1°
3.3° above normal
6th warmest
Total Precipitation
4.51"
0.26" above normal
Rockford
Average Temperature
75.1°
3.2° above normal
Total Precipitation
3.61"
0.58" below normal
Rockford
Chicago
Temperature Departure (°F) from Normal
Precipitation Percent (%) of Normal
Maps courtesy of High Plains Regional Climate Center
NWS Chicago
weather.gov/Chicago
Thursday, September 2, 2021
Photo: Billy Ramsak


September 2021 Review
Top 10 Warmest for both Chicago and Rockford and Very Dry
Chicago
Average Temperature
70.3°
4.0° above normal
Tied 5th warmest
Total Precipitation
1.23"
1.95" below normal
Rockford
Average Temperature
68.9°
4.5° above normal
7th warmest
Total Precipitation
0.53"
3.09" below normal
7th driest
Rockford
Chicago
Temperature Departure (°F) from Normal
Precipitation Percent (%) of Normal
Maps courtesy of High Plains Regional Climate Center
NWS Chicago
weather.gov/Chicago
Friday, October 1, 2021
Photo: Robert Skurski


October 2021 Review
Warm with Well Above Normal Rainfall
Chicago
Average Temperature
59.7°
5.7° above normal
Tied for 9th warmest
Total Precipitation
5.77"
2.34" above normal
Rockford
Average Temperature
57.9°
5.9° above normal
6th warmest
Total Precipitation
5.36"
2.73" above normal
Rockford
Chicago
Temperature Departure (°F) from Normal
Precipitation Percent (%) of Normal
Maps courtesy of Northeast Regional Climate Center
NWS Chicago
weather.gov/Chicago
Monday, November 1, 2021 10:07 PM Central
Photo: Gracie Milton

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.

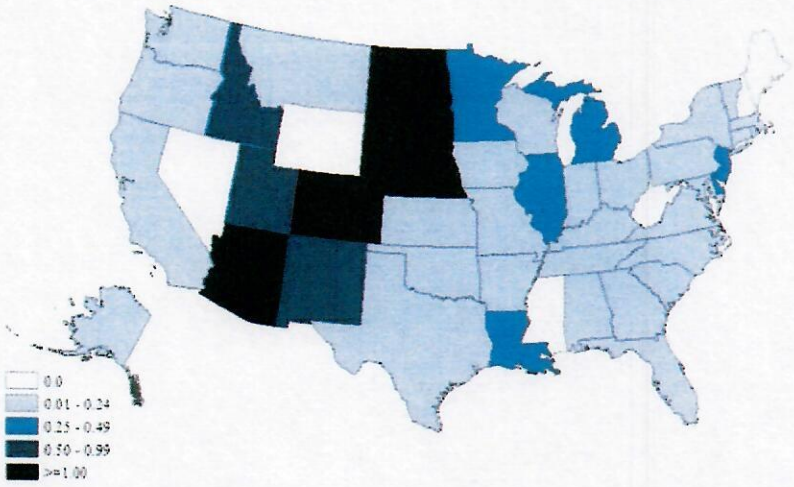
West Nile Virus has spread rapidly across North America since it was discovered in the Western hemisphere, reports the U.S. Geological Survey. West Nile Virus swept from the New York City region in 1999 to almost all of the continental U.S., seven Canadian provinces and throughout Mexico and parts of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

As of November 16, 49 states have reported West Nile virus infections in people, birds or mosquitoes. To date, 1,974 cases of West Nile have been reported to the CDC, less than half of the number of human cases at this time in 2019 (which was already sharply lower than the previous several years).

West Nile in the United States 2021

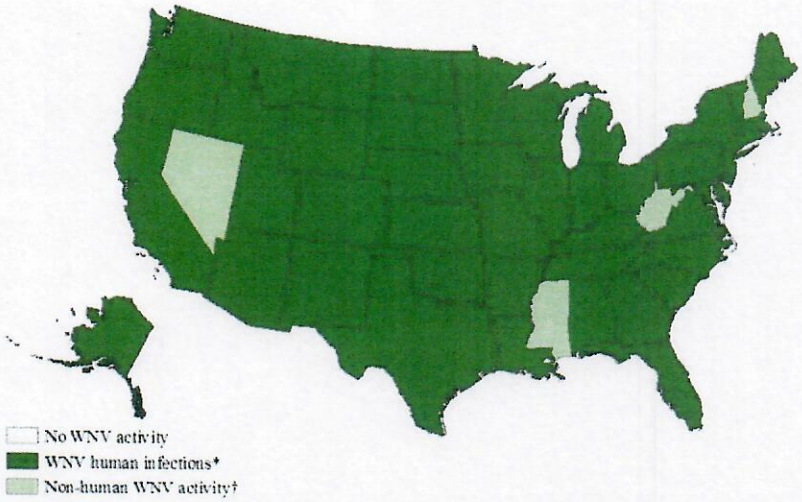
- 2016: 2,149 cases
- 2017: 2,097 cases
- 2018: 2,647 cases
- 2019: 958 cases
- 2020: 664 cases
- 2021: 1,974 as of November 18, 2021

West Nile Virus Neuroinvasive Disease Incidence by State – United States, 2021 (as of November 16, 2021)



https://www.cdc.gov/westnile/statsmaps/preliminarymapsdata2021/incidencestate-2021.html
retrieved November 18, 2021

West Nile Virus Activity by State – United States, 2021 (as of November 16, 2021)



https://www.cdc.gov/westnile/statsmaps/preliminarymapsdata2021/activitybystate2021.html
Retrieved on November 18, 2021

West Nile in Illinois 2021

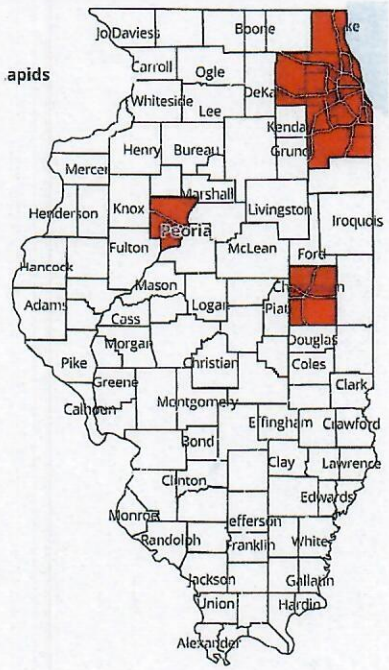
As of November 8, 2021, Illinois has reported 56 human cases and 2 deaths.

- 2017 – 90 human cases
- 2018 – 137 human cases
- 2019 – 28 human cases
- 2020 – 42 human cases
- 2021 – 56 human cases

Illinois West Nile Virus statistics in 2021 (reported to date) are:

- 56 human cases (up from 42 in 2020)
- 2 fatalities (down from 4 in 2020)
- 46 counties reporting West Nile activity (up drastically from 4 in 2020)
- 27 positive birds (up from 10 in 2020)
- 2,662 positive mosquito batches (up from 2,345 in 2020). Illinois identified the first human West Nile virus case in in a resident of Cook County on August 4.

2021 Human Case Data



2021 Positive Birds, Mosquitoes, Horses, Other Animals (as of 11/8/21)[3]

County	American Crow	Blue Jay	Other Birds	Mosquito Batches	Horse	Other Mammals
ADAMS	0	0	0	2	0	0
BOONE	0	0	0	4	0	0
BUREAU	0	0	0	1	0	0
CARROLL	0	0	0	2	0	0
CHAMPAIGN	1	0	1	4	0	0
CLAY	0	0	0	3	0	0
COOK	0	0	1	2077	0	0
DEKALB	0	0	0	18	0	0
DOUGLAS	0	0	0	0	2	0
DUPAGE	1	0	0	178	0	0
FAYETTE	0	0	0	1	0	0
GALLATIN	0	0	0	2	0	0
GREENE	0	0	0	6	0	0
GRUNDY	0	0	0	3	0	0
HANCOCK	0	0	0	1	0	0
IROQUOIS	1	0	0	0	0	0
JACKSON	0	0	1	3	0	0
JOHNSON	0	0	0	1	0	0
KANE	0	0	0	25	0	0
KANKAKEE	1	0	0	5	0	0
KENDALL	0	0	0	5	0	0
KNOX	0	0	0	1	0	0

[3] http://public.dph.illinois.gov/wnvpublic/wnvsurveillance_data.aspx, retrieved Nov 2, 2020

LAKE	0	1	0	218	0	0
LASALLE	3	0	0	1	0	0
LIVINGSTON	1	1	0	0	0	0
LOGAN	0	1	0	0	0	0
MACON	0	0	0	2	0	0
MACOUPIN	0	1	0	1	0	0
MADISON	0	0	0	3	0	0
MASSAC	0	0	0	2	0	0
MCDONOUGH	0	0	0	3	0	0
MCHENRY	2	0	0	35	0	0
MCLEAN	4	0	0	5	0	0
MERCER	0	0	0	1	0	0
MONTGOMERY	0	0	0	6	0	0
MOULTRIE	1	0	0	0	1	0
POPE	0	0	0	2	0	0
RICHLAND	0	0	0	0	1	0
SAINT CLAIR	0	0	0	2	0	0
SANGAMON	0	0	0	3	0	0
TAZEWELL	0	1	1	1	0	0
VERMILION	1	0	1	3	0	0
WASHINGTON	0	0	0	1	0	0
WILL	0	0	0	31	0	0
WINNEBAGO	1	0	0	0	0	0
TOTAL	**17**	**5**	**5**	**2662**	**4**	**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 Illinois does not have a recent history of EEE cases, the proximity of recent cases in Indiana, Michigan and 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 a single case.

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 2021.

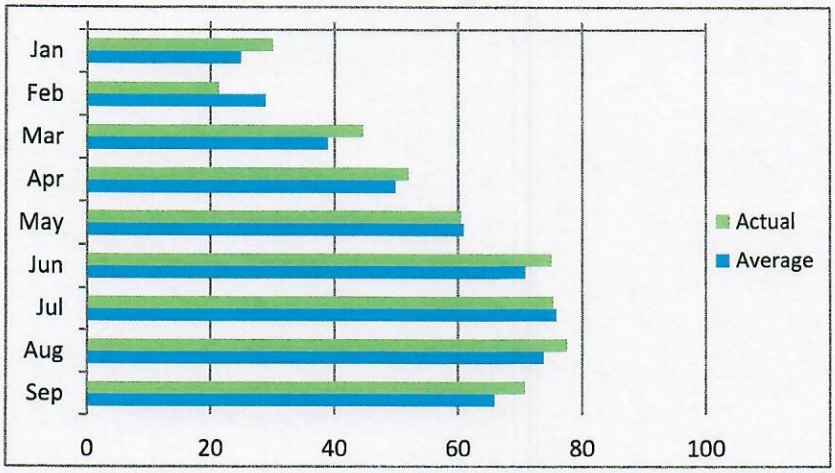
Climatology and Mosquito Overview

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.

2021 O'Hare International Airport (Chicago) Weather Survey

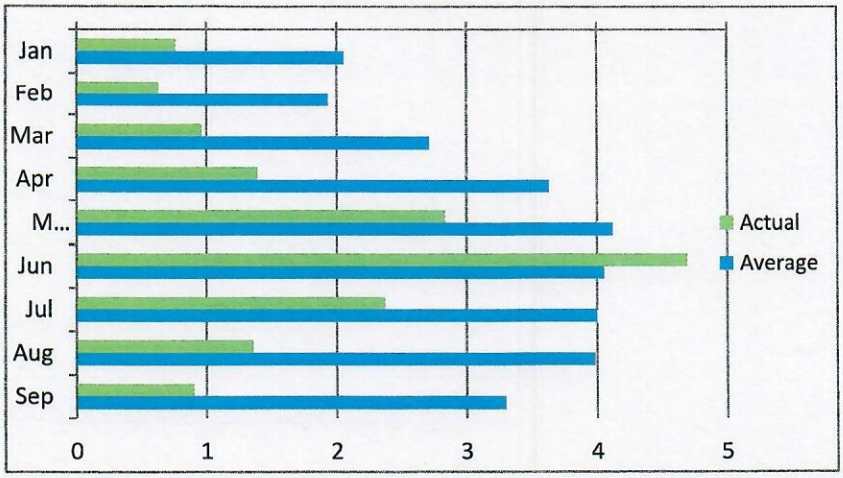
Temperature (degrees Fahrenheit)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Actual	30.18	21.43	44.71	52.06	60.59	75.19	75.49	77.7	70.98
Average	25	29	39	50	61	71	76	74	66



Precipitation (inches)

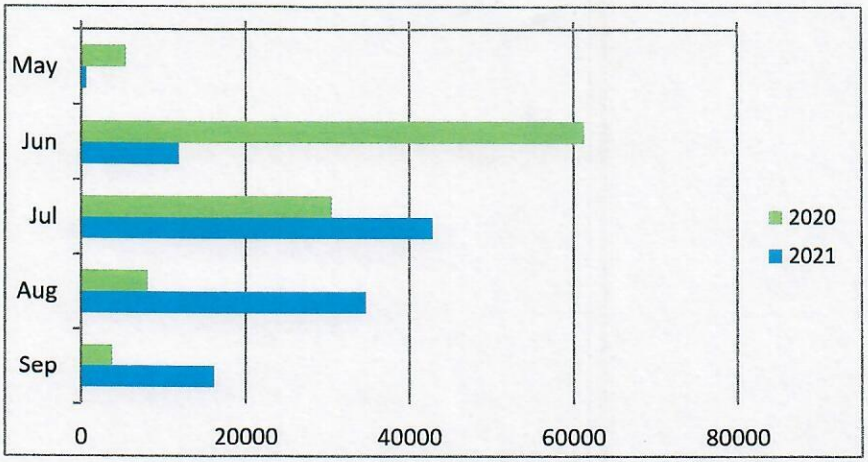
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Actual	0.77	0.64	0.97	1.4	2.84	4.7	2.38	1.37	0.91
Average	2.06	1.94	2.72	3.64	4.13	4.06	4.01	3.99	3.31



2021 Mosquito Light Trap Network Target Species Comparison

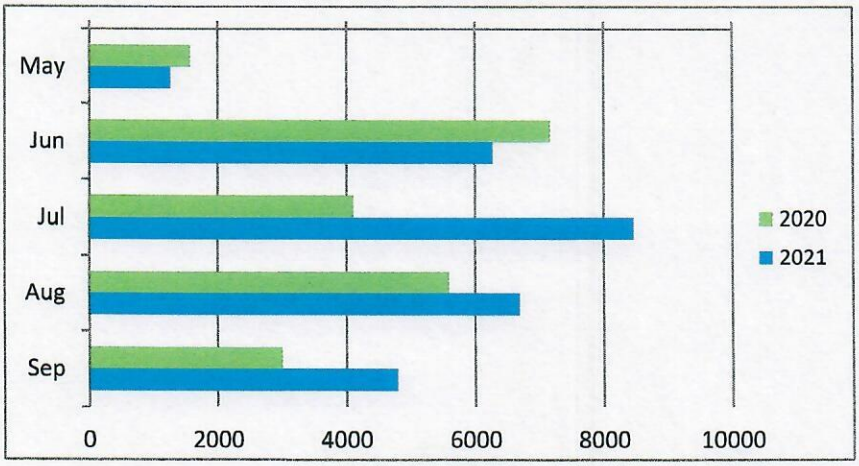
Aedes vexans

	May	Jun	Jul	Aug	Sep
2021	706	11865	42878	34740	16165
2020	5457	61447	30583	8136	3824



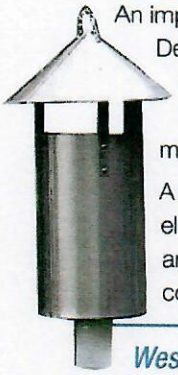
Culex pipiens* and *Culex restuans

	May	Jun	Jul	Aug	Sep
2021	1267	6287	8477	6704	4807
2020	1571	7183	4118	5604	3015



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	315	0.17%	106	0.26%
Ae vexans	106360	58.55%	17569	43.01%
Ae misc	506	0.28%	881	2.16%
An punctipennis	2100	1.16%	286	0.70%
An quadrimaculatus	10845	5.97%	556	1.36%
An walkeri	95	0.05%	0	0.00%
An species	158	0.09%	107	0.26%
Cq perturbans	8760	4.82%	713	1.75%
Cx erraticus	4819	2.65%	628	1.54%
Cx pipiens	8999	4.95%	3843	9.41%
Cx restuans	1360	0.75%	120	0.29%
Cx species	16739	9.22%	14850	36.35%
Cx tarsalis	28	0.02%	14	0.03%
Cx territans	850	0.47%	173	0.42%
Cs inornata	80	0.04%	76	0.19%
Cs minnesotae	9	0.00%	0	0.00%
Cs species	3	0.00%	8	0.02%
Mosquito, Misc.	212	0.12%	14	0.03%
Oc excrucias	2	0.00%	0	0.00%
Oc grossbecki	2	0.00%	0	0.00%
Oc japonicus	192	0.11%	99	0.24%
Oc canadensis	10	0.01%	10	0.02%
Oc triseriatus	294	0.16%	224	0.55%
Oc trivittatus	13197	7.27%	288	0.70%
Oc. species	1	0.00%	2	0.00%
Or signifera	12	0.01%	1	0.42%
Ps ciliata	20	0.01%	4	0.01%
Ps ferox	4208	2.32%	35	0.09%
Ps howardii	13	0.01%	4	0.01%
Ps columbiae	6	0.00%	0	0.00%
Ps misc	1	0.00%	3	0.01%
Ur sapphirina	1447	0.80%	239	0.59%
Total	**181,643**	**100.00%**	**40,853**	**100.00%**

Total Number of Mosquitoes: 222,496

Light Trap Species Summary

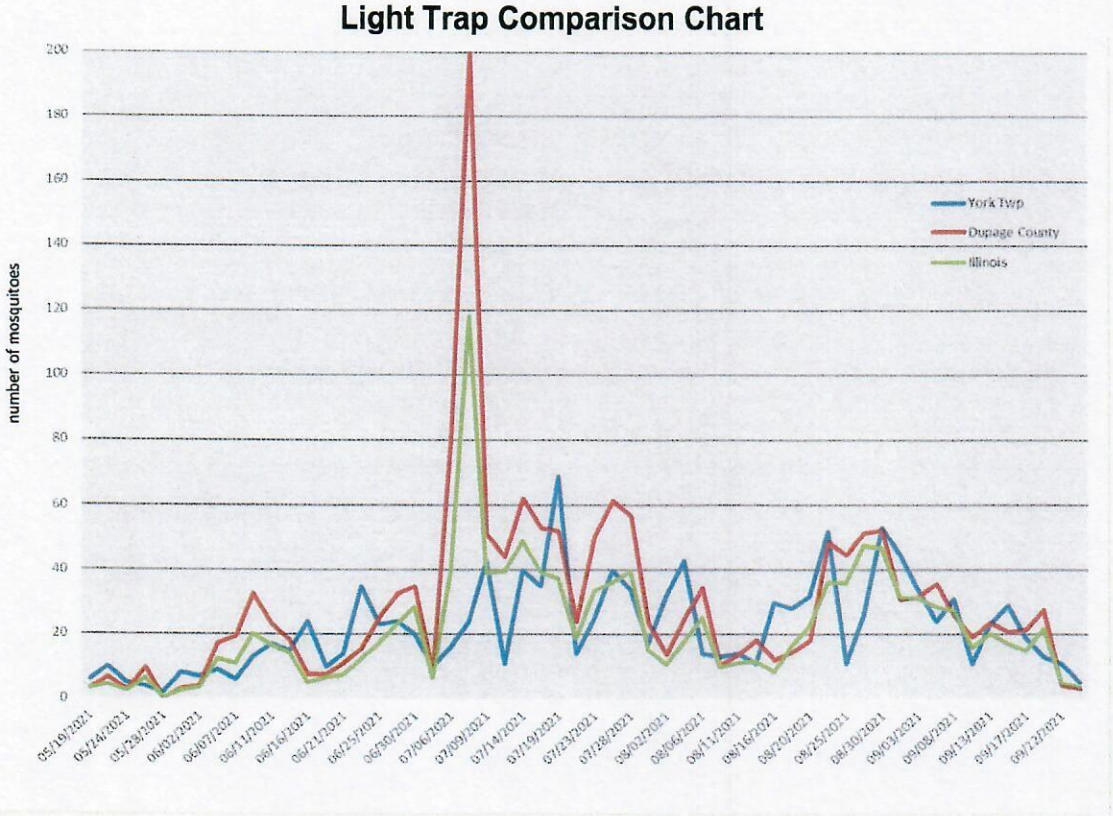
The following table summarizes the species composition from the light trap network operating in York Township.

Light Trap Species Summary				
Species	***Females***	***Percent***	***Males***	***Percent***
Ae cinereus	0	0.0%	0	0.0%
Ae species	3	0.2%	10	1.9%
Ae vexans	225	18.2%	88	16.8%
An punctipennis	21	1.7%	1	0.2%
An quadrimaculatus	47	3.8%	3	0.6%
An species	0	0.0%	2	0.4%
Cq perturbans	0	0.0%	0	0.0%
Cx erraticus	58	4.7%	8	1.5%
Cx pipiens	394	31.9%	138	26.3%
Cx restuans	42	3.4%	0	0.0%
Cx salinarius	0	0.0%	0	0.0%
Cx species	375	30.4%	252	48.1%
Cx tarsalis	0	0.0%	0	0.0%
Cx territans	20	1.6%	3	0.6%
Cs inornata	0	0.0%	0	0.0%
Cs species	0	0.0%	0	0.0%
Mosquito, Misc.	1	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	3	0.2%	4	0.8%
Oc stimulans	0	0.0%	0	0.0%
Oc triseriatus	1	0.1%	5	1.0%
Oc trivittatus	22	1.8%	9	1.7%
Oc. species	0	0.0%	0	0.0%
Or signifera	1	0.1%	0	0.0%
Ps ciliata	0	0.0%	0	0.0%
Ps columbiae	0	0.0%	0	0.0%
Ps ferox	2	0.2%	0	0.0%
Ur sapphirina	19	1.5%	1	0.2%
Total	**1,234**	**100.0%**	**524**	**100.0%**

Total Number of Trap: 1 Average Number of Females/Trap Night: 20.57
Total Number of Trap Nights: 60

Total Number of Mosquitoes: 1,758

Light Trap Counts by Region, County and Community



Operations and Surveillance Reports

Attached is a report outlining all services performed year-to-date. These services may include the following:

- **N J Light Trap Service (5 Days/Wk-WMAD):** *Seasonal New Jersey Light Trap service for adult mosquito population monitoring (5 day per week operation).*
- **Complete Site Larval Inspection Service:** *Inspection service of all potential mosquito larvae development sites*
- **Targeted Site Larval Inspection:** *Inspection of all targeted larval development sites*
- **Culex Site Inspection Service:** *Inspection of culex mosquito larval development sites for the prevention of West Nile Virus and other mosquito-borne diseases.*
- **Larval Site Service Call:** *Special inspection of standing water for mosquito breeding per hot line request*
- **Hand Larvicide:** *Hand equipment application for control of mosquito larvae*
- **Backpack Larvicide Trmt.:** *Backpack application for control of mosquito larvae*
- **Catch Basin Treatment.:** *Catch basin treatment with a sustained-release biological insecticide for larval control*
- **30 day Altosid Briq CB Treatment:** *Catch basin treatment for larval control*

Services Performed Year-to-Date

Service Item	Start Date
N.J. Light Trap Seasonal Serv	04/29/2021
Censor 5#/Acre Hand	05/05/2021
Targeted Site Larval Insp Serv	05/05/2021
Targeted Site Larval Insp Serv	05/17/2021
Complete Site Larval Insp Serv	05/24/2021
Natular G30 Bike CB (WSP)	05/25/2021
Censor 5#/Acre Hand	06/10/2021
Targeted Site Larval Insp Serv	06/10/2021
NatularG30 Helicopter Prehatch	06/16/2021
Anvil Truck ULV Application	06/16/2021
Complete Site Larval Insp Serv	06/21/2021
Natular G30 Bike CB (WSP)	06/22/2021
Anvil Truck ULV Application	06/30/2021
Targeted Site Larval Insp Serv	07/06/2021
Targeted Site Larval Insp Serv	07/19/2021
Anvil Truck ULV Application	07/19/2021
Natular G30 Bike CB (WSP)	07/20/2021
Complete Site Larval Insp Serv	08/02/2021
NatularG30 Helicopter Prehatch	08/02/2021
Anvil Truck ULV Application	08/04/2021
Anvil Truck ULV Application	08/17/2021
Targeted Site Larval Insp Serv	08/18/2021
Natular G30 Bike CB (WSP)	08/23/2021
NatularG30 Helicopter Prehatch	08/27/2021
Culex Site Inspection Service	08/30/2021
Anvil Truck ULV Application	09/01/2021
Culex Site Inspection Service	09/13/2021
Censor 5#/Acre Hand	09/20/2021
Culex Site Inspection Service	09/20/2021

Services Invoiced Per Contract:

Services Invoiced Year-to-Date: $59,956.00