



Lisle Township

2021 Mosquito Management Program Annual Service Report

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A Global Environmental Products and Services Company



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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

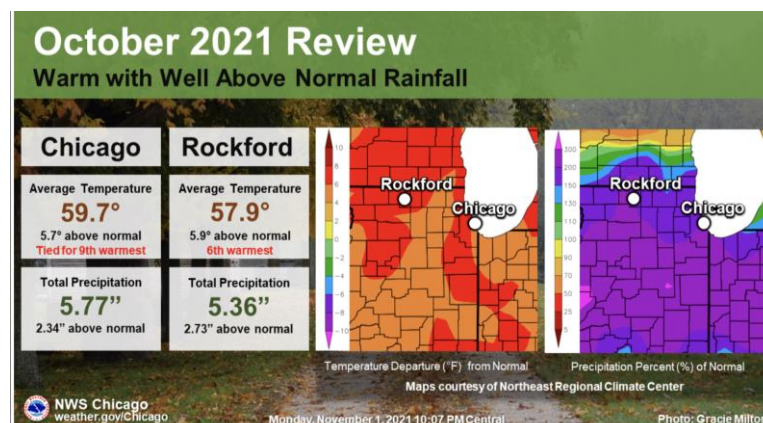
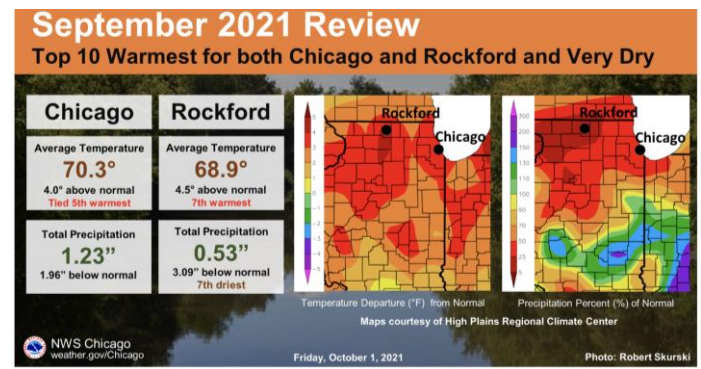
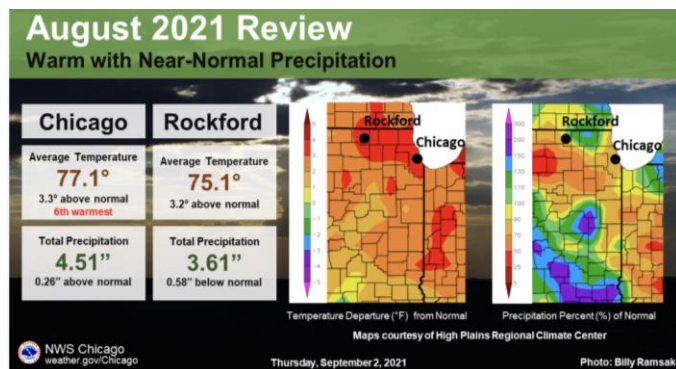
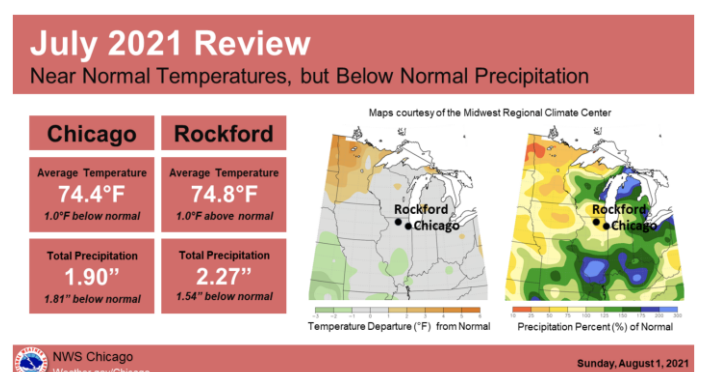
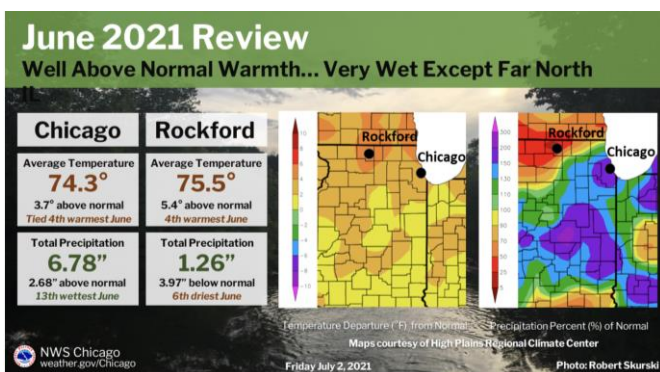
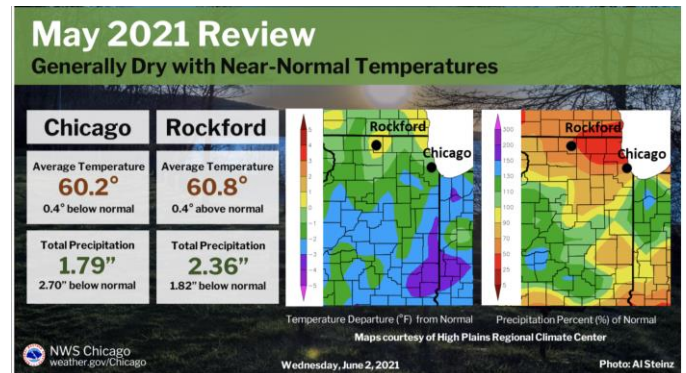
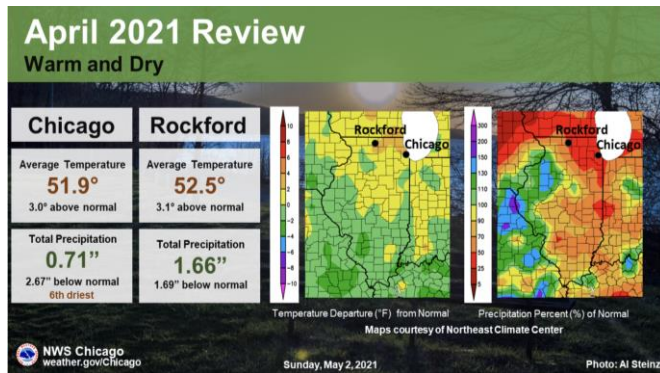
“Warm and generally dry” was the go-to phrase for 2021 weather in the Chicago region. With the exception of June, which ranked as the 13th wettest, most of spring and summer were at or below average precipitation, skewing drier for most months in 2021.

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



Annual Report





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.

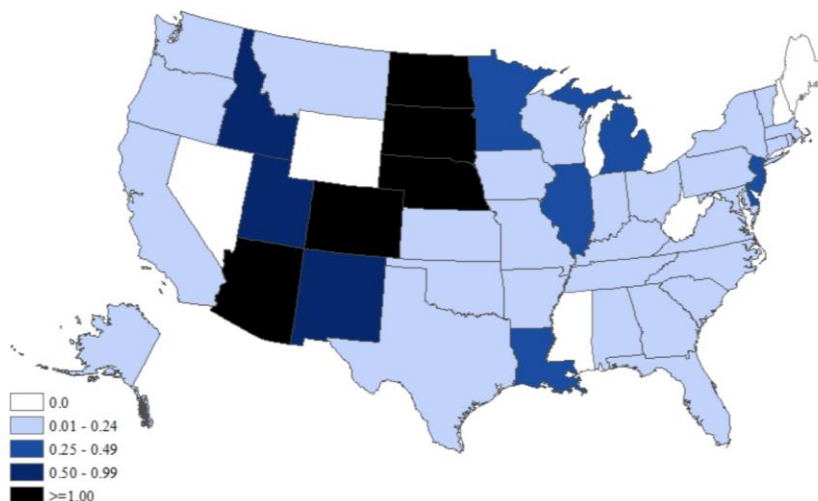
West Nile Virus has spread rapidly across North America since it was discovered in the Western hemisphere, reports the U.S. Geological Survey. West Nile Virus swept from the New York City region in 1999 to almost all of the continental U.S., seven Canadian provinces and throughout Mexico and parts of 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

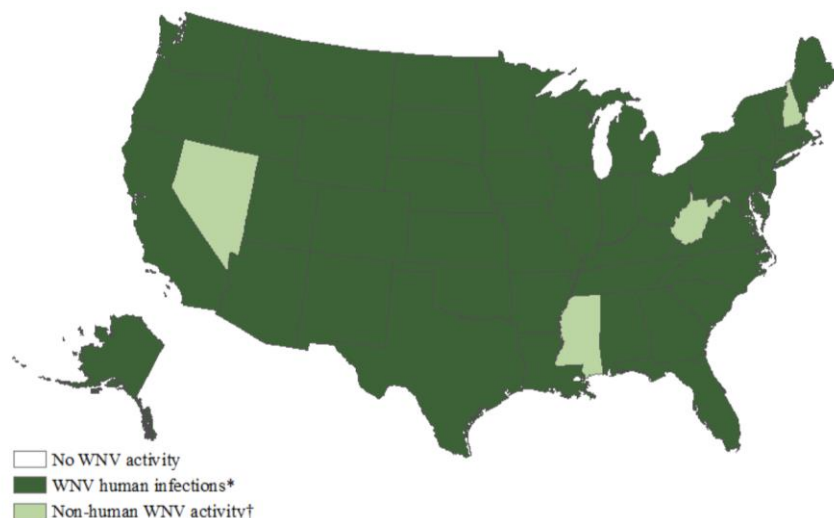
West Nile Virus Neuroinvasive Disease Incidence by State – United States, 2021 (as of November 16, 2021)



<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

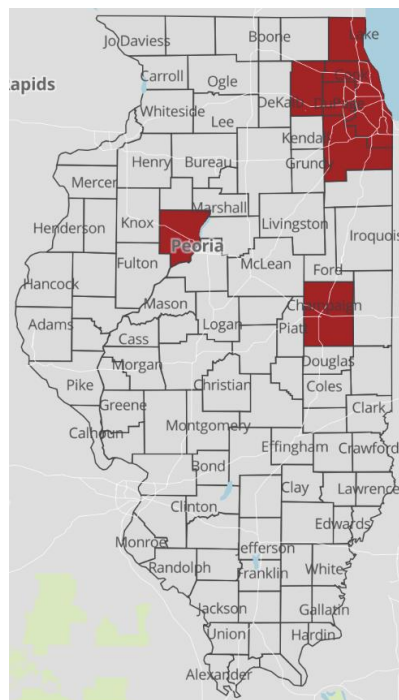
As of November 8, 2021, Illinois has reported 56 human cases and 2 deaths.

- 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 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 |
|----------------------------------|---------------|----------|-------------|------------------|-------|---------------|
| <u>ADAMS</u> | 0 | 0 | 0 | 2 | 0 | 0 |
| <u>BOONE</u> | 0 | 0 | 0 | 4 | 0 | 0 |
| <u>BUREAU</u> | 0 | 0 | 0 | 1 | 0 | 0 |
| <u>CARROLL</u> | 0 | 0 | 0 | 2 | 0 | 0 |
| <u>CHAMPAIGN</u> | 1 | 0 | 1 | 4 | 0 | 0 |
| <u>CLAY</u> | 0 | 0 | 0 | 3 | 0 | 0 |
| <u>COOK</u> | 0 | 0 | 1 | 2077 | 0 | 0 |
| <u>DEKALB</u> | 0 | 0 | 0 | 18 | 0 | 0 |
| <u>DOUGLAS</u> | 0 | 0 | 0 | 0 | 2 | 0 |
| <u>DUPAGE</u> | 1 | 0 | 0 | 178 | 0 | 0 |
| <u>FAYETTE</u> | 0 | 0 | 0 | 1 | 0 | 0 |
| <u>GALLATIN</u> | 0 | 0 | 0 | 2 | 0 | 0 |
| <u>GREENE</u> | 0 | 0 | 0 | 6 | 0 | 0 |
| <u>GRUNDY</u> | 0 | 0 | 0 | 3 | 0 | 0 |
| <u>HANCOCK</u> | 0 | 0 | 0 | 1 | 0 | 0 |
| <u>IROQUOIS</u> | 1 | 0 | 0 | 0 | 0 | 0 |
| <u>JACKSON</u> | 0 | 0 | 1 | 3 | 0 | 0 |
| <u>JOHNSON</u> | 0 | 0 | 0 | 1 | 0 | 0 |
| <u>KANE</u> | 0 | 0 | 0 | 25 | 0 | 0 |
| <u>KANKAKEE</u> | 1 | 0 | 0 | 5 | 0 | 0 |
| <u>KENDALL</u> | 0 | 0 | 0 | 5 | 0 | 0 |
| <u>KNOX</u> | 0 | 0 | 0 | 1 | 0 | 0 |

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



| | | | | | | |
|--------------------|-----------|----------|----------|-------------|----------|----------|
| <u>LAKE</u> | 0 | 1 | 0 | 218 | 0 | 0 |
| <u>LASALLE</u> | 3 | 0 | 0 | 1 | 0 | 0 |
| <u>LIVINGSTON</u> | 1 | 1 | 0 | 0 | 0 | 0 |
| <u>LOGAN</u> | 0 | 1 | 0 | 0 | 0 | 0 |
| <u>MACON</u> | 0 | 0 | 0 | 2 | 0 | 0 |
| <u>MACOUPIN</u> | 0 | 1 | 0 | 1 | 0 | 0 |
| <u>MADISON</u> | 0 | 0 | 0 | 3 | 0 | 0 |
| <u>MASSAC</u> | 0 | 0 | 0 | 2 | 0 | 0 |
| <u>MCDONOUGH</u> | 0 | 0 | 0 | 3 | 0 | 0 |
| <u>MCHENRY</u> | 2 | 0 | 0 | 35 | 0 | 0 |
| <u>MCLEAN</u> | 4 | 0 | 0 | 5 | 0 | 0 |
| <u>MERCER</u> | 0 | 0 | 0 | 1 | 0 | 0 |
| <u>MONTGOMERY</u> | 0 | 0 | 0 | 6 | 0 | 0 |
| <u>MOULTRIE</u> | 1 | 0 | 0 | 0 | 1 | 0 |
| <u>POPE</u> | 0 | 0 | 0 | 2 | 0 | 0 |
| <u>RICHLAND</u> | 0 | 0 | 0 | 0 | 1 | 0 |
| <u>SAINT CLAIR</u> | 0 | 0 | 0 | 2 | 0 | 0 |
| <u>SANGAMON</u> | 0 | 0 | 0 | 3 | 0 | 0 |
| <u>TAZEWELL</u> | 0 | 1 | 1 | 1 | 0 | 0 |
| <u>VERMILION</u> | 1 | 0 | 1 | 3 | 0 | 0 |
| <u>WASHINGTON</u> | 0 | 0 | 0 | 1 | 0 | 0 |
| <u>WILL</u> | 0 | 0 | 0 | 31 | 0 | 0 |
| <u>WINNEBAGO</u> | 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

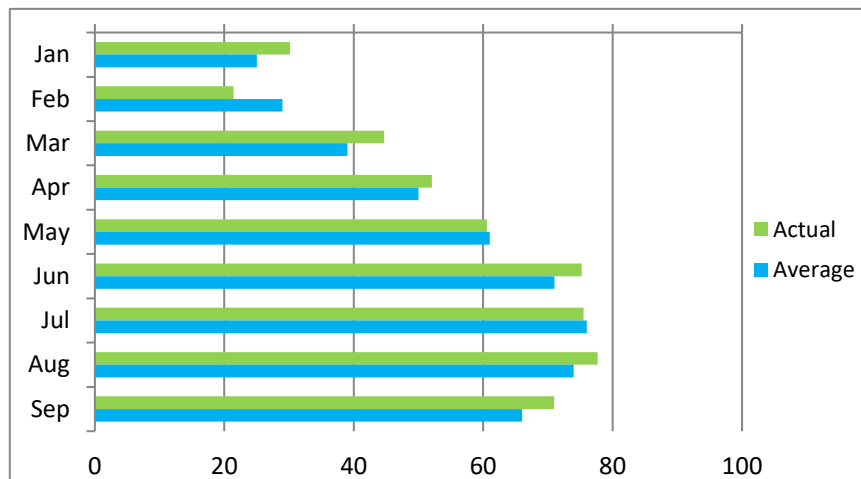
The weather dramatically impacts mosquito breeding and population. Special attention should be paid to weather conditions as weather has a huge impact on mosquito populations – with floodwater mosquitoes, rainfall determines if mosquito eggs will hatch, fierce storm can wash away egg rafts and variations 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

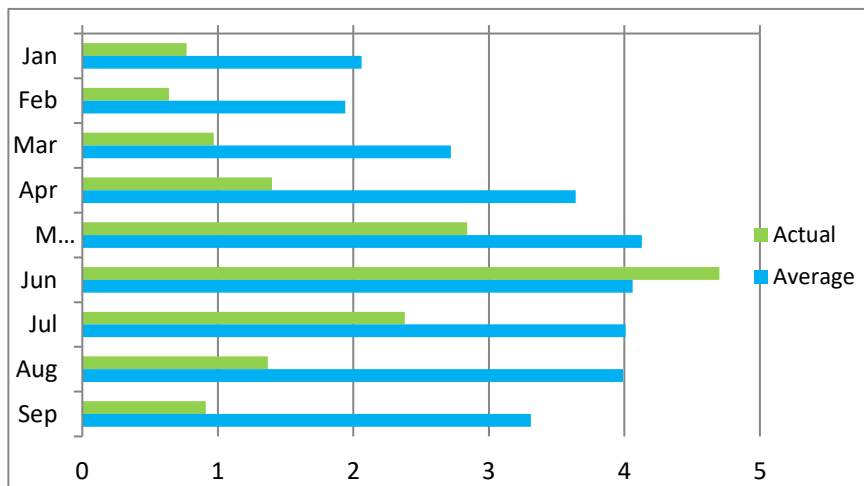
Temperature (degrees Fahrenheit)

| | 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 |

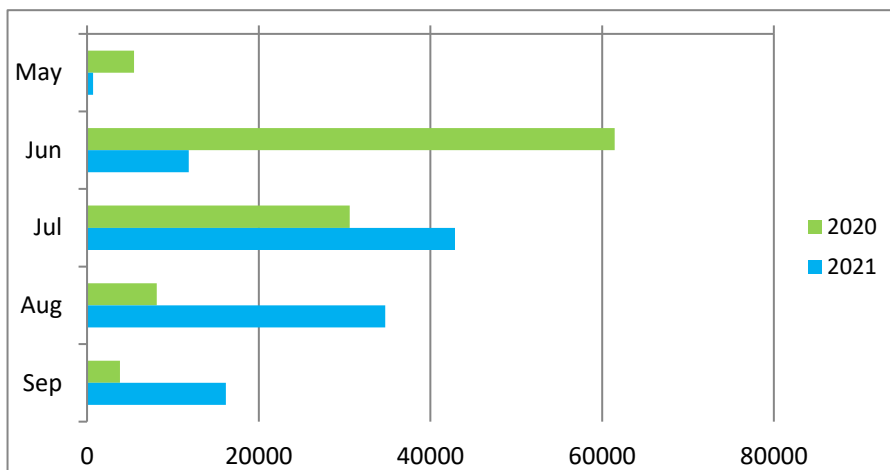




2021 Mosquito Light Trap Network Target Species Comparison

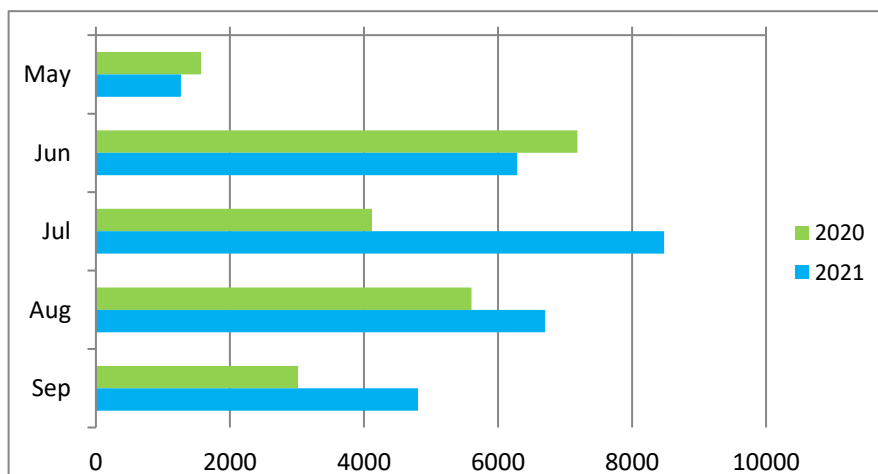
Aedes vexans

| | 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.

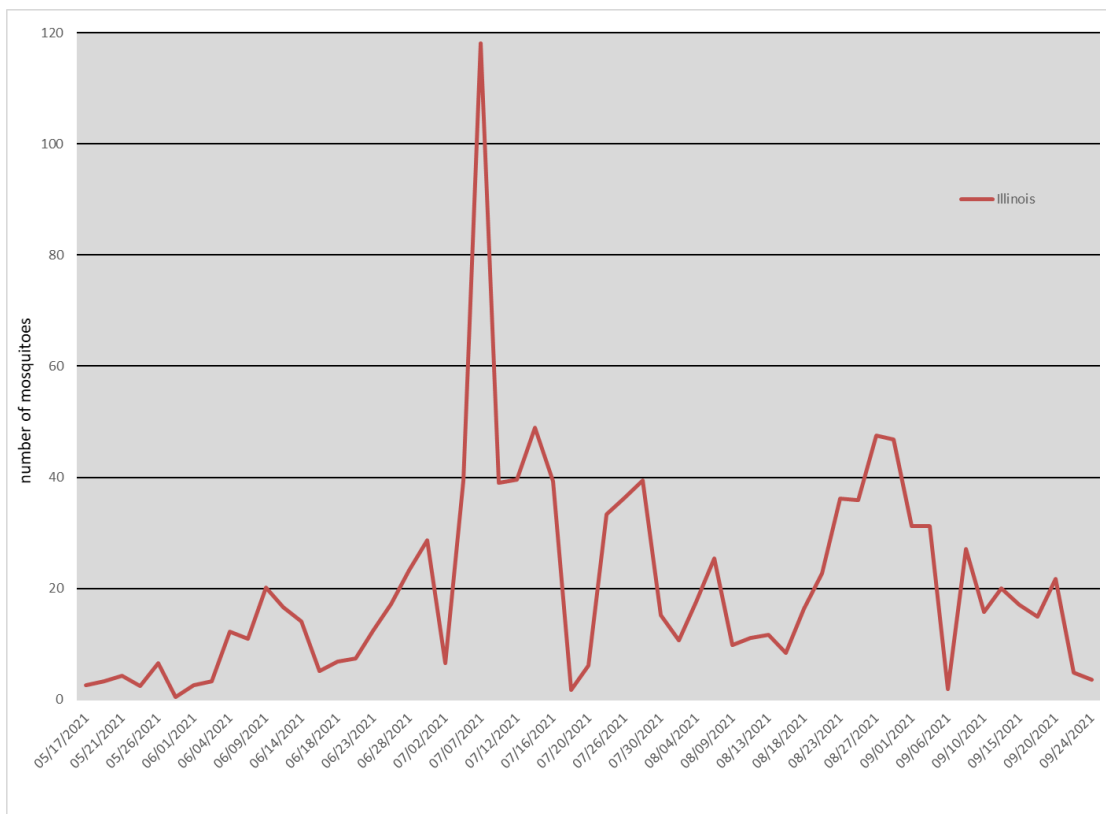
| Light Trap Species Summary | | | | |
|-----------------------------------|----------------|----------------|---------------|----------------|
| Species | Females | Percent | Males | Percent |
| <i>Ae cinereus</i> | 315 | 0.17% | 106 | 0.26% |
| <i>Ae vexans</i> | 106360 | 58.55% | 17569 | 43.01% |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

Total Number of Mosquitoes: 222,496



Light Trap Counts by Region, County and Community

Light Trap Comparison Chart



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 |
|--------------------------------|------------|
| Natular XRT BYCB Bike | 04/26/2021 |
| Censor 5#/Acre Hand | 05/04/2021 |
| Targeted Site Larval Insp Serv | 05/04/2021 |
| Mosquitofish (G. Affinis) Stck | 05/05/2021 |
| Mosquitofish (G. Affinis) Stck | 05/05/2021 |
| Natular G30 Bike CB (WSP) | 05/11/2021 |
| Censor 5#/Acre Hand | 05/18/2021 |
| Targeted Site Larval Insp Serv | 05/18/2021 |
| CENSOR 40 LB BAG | 06/01/2021 |
| Complete Site Larval Insp Serv | 06/01/2021 |
| Natular G30 Bike CB (WSP) | 06/11/2021 |
| Targeted Site Larval Insp Serv | 06/14/2021 |
| NatularG30 Helicopter Prehatch | 06/16/2021 |
| Censor 5#/Acre Hand | 06/28/2021 |
| Targeted Site Larval Insp Serv | 06/28/2021 |
| Anvil Truck ULV Application | 07/01/2021 |
| CENSOR 40 LB BAG | 07/12/2021 |
| Complete Site Larval Insp Serv | 07/12/2021 |
| Natular G30 Bike CB (WSP) | 07/12/2021 |
| Anvil Truck ULV Application | 07/19/2021 |
| Targeted Site Larval Insp Serv | 07/26/2021 |
| NatularG30 Helicopter Prehatch | 08/02/2021 |
| Natular G30 Bike CB (WSP) | 08/06/2021 |
| CENSOR 40 LB BAG | 08/09/2021 |
| Targeted Site Larval Insp Serv | 08/09/2021 |
| Anvil Truck ULV Application | 08/17/2021 |
| NatularG30 Helicopter Prehatch | 09/02/2021 |
| Censor 5#/Acre Hand | 09/03/2021 |
| Complete Site Larval Insp Serv | 09/03/2021 |

Services Invoiced Per Contract:

Services Invoiced Year-to-Date: \$50,850.00