



Table of Contents

Introduction	Pg. 2
Seasonal Overview	Pg. 3
About West Nile Virus	Pg. 4
West Nile in the United States 2014	Pg. 4-5
West Nile in Illinois 2014	Pg. 6-9
Climatology and Mosquito Overview	Pg. 10
2014 O'Hare International Airport (Chicago) Weather Survey	Pg. 11
2014 Mosquito Light Trap Network Target Species Comparison	Pg. 12
Surveillance Network	Pg. 13
Light Trap Species Summary	Pg. 14
Light Trap Counts by Region, County and Community	Pg. 15
Services Performed Year-To-Date & Services Invoiced per Contract	Pg. 16-18



Clarke Environmental Mosquito Management 2014 Annual Report

Introduction

The 2014 season came on the heels of one of the coldest and snowiest winters on record – and the rest of the summer followed suit, with cooler temperatures and significant precipitation, resulting in a sluggish West Nile season in most parts of the state.

While West Nile was present in Illinois, the numbers were far below the last two years, both in human cases and number of counties reporting the presence of the disease. West Nile is endemic to the area, so weather (temperature and precipitation) directly impact the prevalence and spread of the disease. Clarke remains committed to Lisle Township as its partner in working to suppress West Nile infection rates for the community now and in the future.

Service Contracts

Protecting the health and comfort of the residents of Lisle Township is our foremost mission at Clarke. Together with Lisle Township, Clarke has created and implemented an integrated pest management program specifically designed for the environment, concerns and needs of its residents. This annual report provides context for the various challenges faced by mosquito control professionals in Lisle Township, with detailed statistics on the weather, mosquito breeding habits and control efforts undertaken by Clarke in the area for use in evaluating the program and enhancing it in the future.

Innovation, Community, Sustainability

In everything we do, Clarke's goal is to preserve our environment for today and future generations. Through our work with Lisle Township, and in partnerships with research institutions and collaborators around the globe, we are committed to innovation that maintains the health and comfort of residents with a greener approach to protocols, products and technology. In 2012, Clarke was awarded the Illinois Governor's Sustainability Award for advancements in environmental protection through its work with cities like Lisle Township. Today, that partnership helps us achieve our goal of making communities more livable, safe and comfortable.



Seasonal Overview

3rd Snowiest Winter, Cool and Rainy Summer

From “Polar Vortexes” to a summer that came and went without much heat but plenty of rainfall, Illinois was definitely in a cooler, wetter cycle of weather. As mosquitoes are weather-dependent creatures, rainfall totals and area temperatures can significantly impact mosquito populations and the amplification of mosquito-borne disease.

Though large amounts of winter snow melt and significant early spring rains had officials anticipating above normal mosquitoes, cooler temperatures suppressed the impact of mosquito hatch-offs and kept mosquito activity below anticipated levels. This cycle of wet and cooler weather continued throughout the spring and early summer.

Despite July tying the record for coolest average temperatures (70.3 degrees), and unseasonal cold fronts moving through in August and September, 2014 will primarily be remembered as one of the rainiest (9th wettest on record).

Some weather highlights:

- From March to May, 60 percent of temps were below normal
- June rainfall 100 percent above normal
- July average temperature was 70.3 degrees, tying the record for coolest July.
- First recorded snowfall in Chicago on October 4.



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.

West Nile in the United States 2014

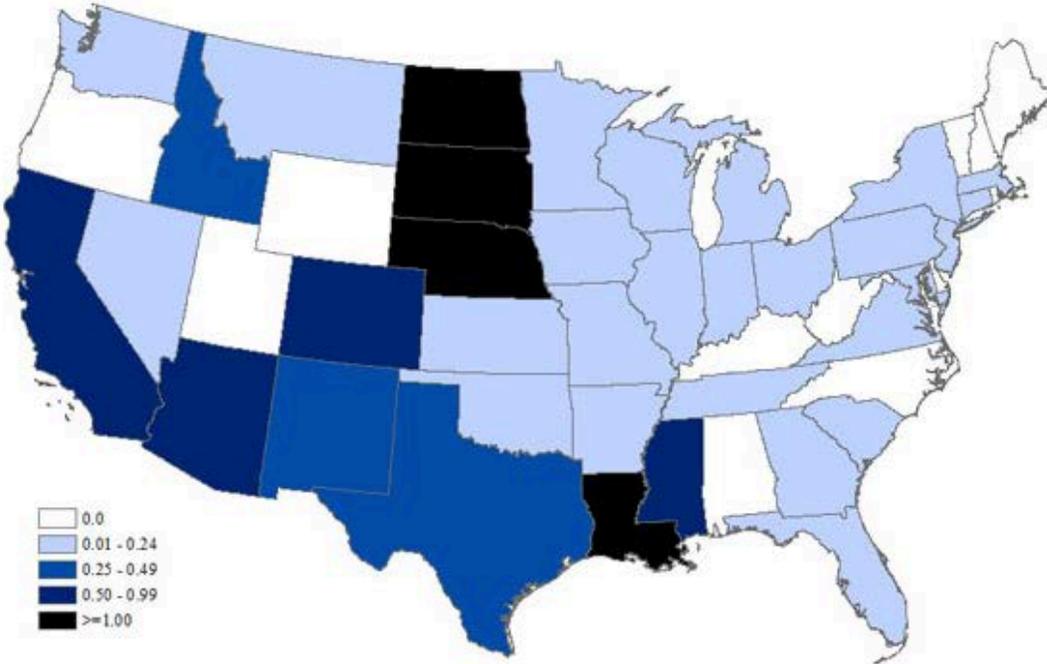
West Nile remained steady in the U.S. in 2014, with national human cases reaching 1,177, up slightly from 1,135 cases in 2013.

Illinois identified 19 cases of West Nile, down substantially from 74 human cases in 2013.



West Nile in the United States 2014

West Nile Virus (WNV) Neuroinvasive Disease Incidence reported to ArboNET, by state, United States, 2014 (as of September 30, 2014):



West Nile virus (WNV) activity reported to ArboNET, by state, United States, 2014 (as of September 30, 2014)

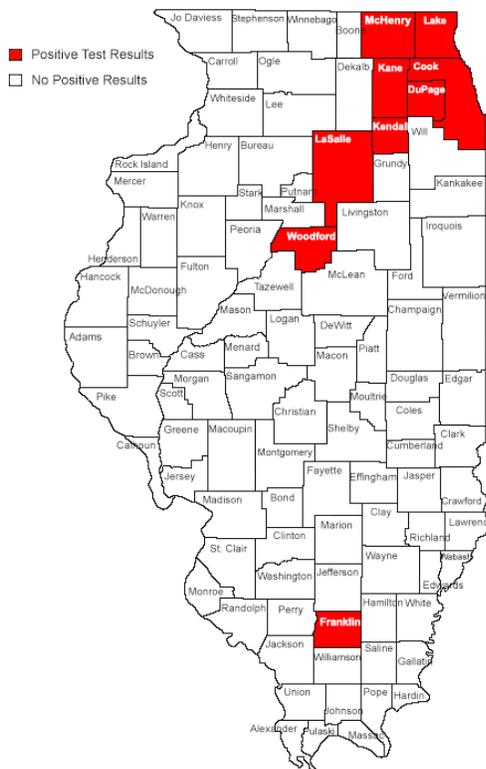




West Nile in Illinois 2014

Though West Nile was present in about three-quarters of Illinois of counties in 2013, its presence was detected in half of counties in 2014. Weather conditions in 2014 put a damper on most West Nile Virus amplification, as no prolonged hot, dry spells (prime West Nile Virus weather) were able to get a foothold. Fewer counties reported West Nile activity and significantly fewer cases of West Nile were detected.

2014 HUMAN CASE DATA



<i>Counties with Lab Confirmed Cases of West Nile</i>	
Cook	
DuPage	
Franklin	
Kane	
Kendall	
Lake	
LaSalle	
McHenry	
Woodford	
Total Case Count	39

This year's statistics to-date are:

- 39 human cases (down from **91** in 2013)
- 3 fatalities (down from 8 in 2013)
- 48 counties reporting West Nile activity (down from 74 in 2013)
- 38 positive birds (down from 108 in 2013)
- 1,248 positive mosquito batches (down from 2,697 in 2013)
- no positive horses (down from 7 in 2013)



Annual Program Update

Below are the specific county West Nile virus statistics as of October 29, 2014 according to the Illinois Department of Public Health¹

2014 Positive Birds, Mosquitoes, Horses and Other Mammals

County	American Crow	Blue Jay	Other Birds	Mosquito Batches	Horse	Other Mammals
BOONE	0	0	0	2	0	0
CHAMPAIGN	0	0	1	6	0	0
CLINTON	0	0	0	3	0	0
COOK	7	0	2	879	0	0
CUMBERLAND	0	0	1	0	0	0
DEKALB	0	0	0	13	0	0
DUPAGE	0	1	0	93	0	0
FRANKLIN	0	0	0	4	0	0
FULTON	0	0	1	3	0	0
GALLATIN	0	0	0	7	0	0
GRUNDY	0	0	0	6	0	0
HENRY	0	0	1	0	0	0
JACKSON	1	0	0	4	0	0
JERSEY	0	0	0	2	0	0
JOHNSON	0	0	0	1	0	0
KANE	2	0	0	23	0	0
KANKAKEE	1	0	0	6	0	0
KENDALL	0	0	1	14	0	0
KNOX	2	0	0	0	0	0
LAKE	1	0	0	29	0	0
LASALLE	0	0	0	1	0	0
LOGAN	1	0	0	0	0	0
MACON	0	0	0	19	0	0
MACOUPIN	0	0	0	7	0	0
MADISON	0	0	1	14	0	0
MCDONOUGH	0	0	0	2	0	0
MCHENRY	0	0	0	15	0	0
MCLEAN	2	0	0	7	0	0
MERCER	0	0	0	1	0	0

Reported by Illinois Department of Public Health on October 29, 2014



Annual Program Update

2014 Positive Birds, Mosquitoes and Other Mammals

County	American Crow	Blue Jay	Other Birds	Mosquito Batches	Horse	Other Mammals
MONROE	0	0	0	7	0	0
PEORIA	0	0	1	0	0	0
PERRY	0	1	0	1	0	0
PULASKI	0	0	0	1	0	0
ROCK ISLAND	0	0	0	1	0	0
SAINT CLAIR	0	0	0	22	0	0
SALINE	0	0	0	5	0	0
SANGAMON	0	0	0	4	0	0
SCHUYLER	0	0	0	1	0	0
STEPHENSON	1	0	0	0	0	0
TAEWELL	0	0	0	5	0	0
UNION	0	0	0	1	0	0
WARREN	0	0	0	1	0	0
WASHINGTON	0	0	1	4	0	0
WHITE	0	0	0	3	0	0
WHITESIDE	1	0	1	1	0	0
WILL	0	0	2	27	0	0
WINNEBAGO	3	0	0	3	0	0
WOODFORD	0	0	1	0	0	0
TOTAL	22	2	14	1248	0	0



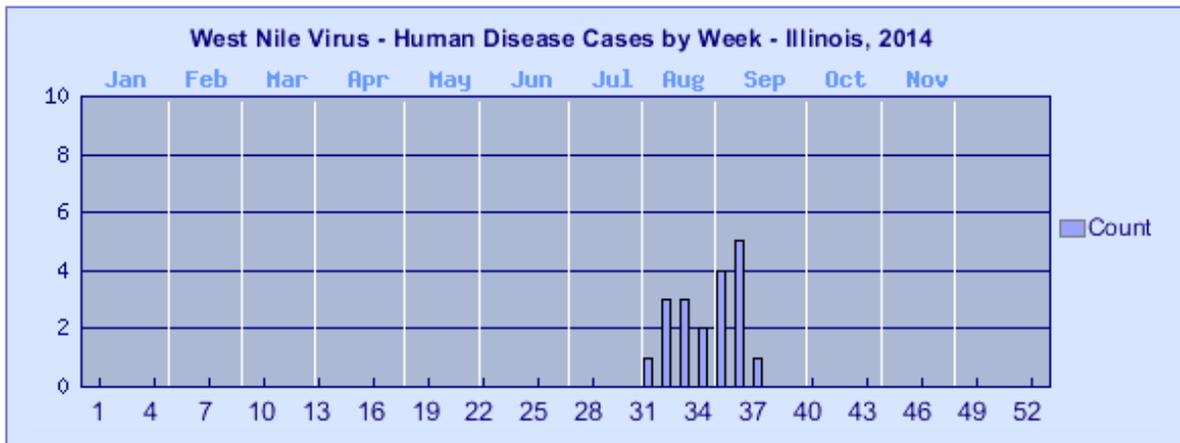
West Nile in Illinois 2014, cont.

Illinois first identified West Nile virus this year on May 29, with a positive bird in Henry County and a positive mosquito batch was identified in Madison County on May 30.

On August 8, the first human case of West Nile virus was reported in Cook County. The first human death was announced on September 18.

2014 West Nile Virus Illinois Human Disease Cases By Week (Reported to CDC as of October 21, 2014)

2014 Positive Birds, Mosquitoes, Horses, Human Cases and Human Fatalities





Climatology and Mosquito Overview

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.

2014 weather highlights:

- April – Heavy rains, flooding, cool
- May -- Mild weather, below average rain
- June -- Cool temperatures, very wet
- July: Dry and cool temperatures
- August: Dry, very few 90+ temps
- September: Dry, unseasonable cool snaps

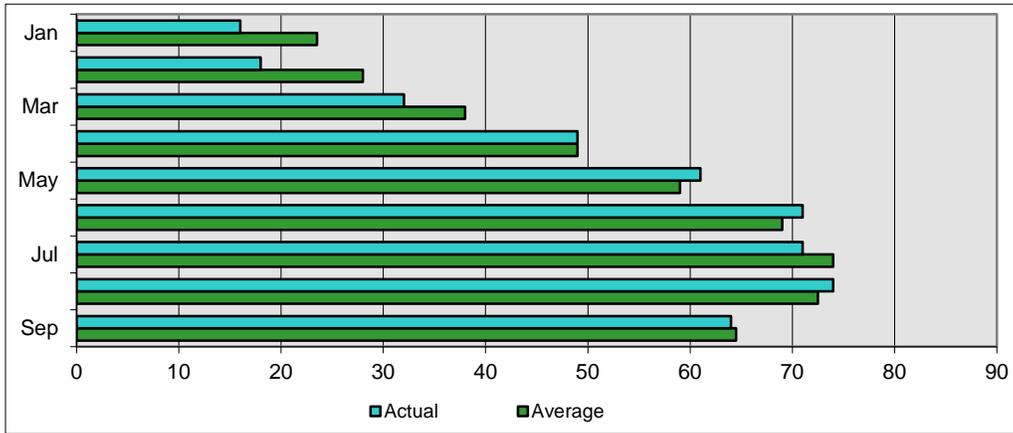


Annual Program Update

2014 O'Hare International Airport (Chicago) Weather Survey

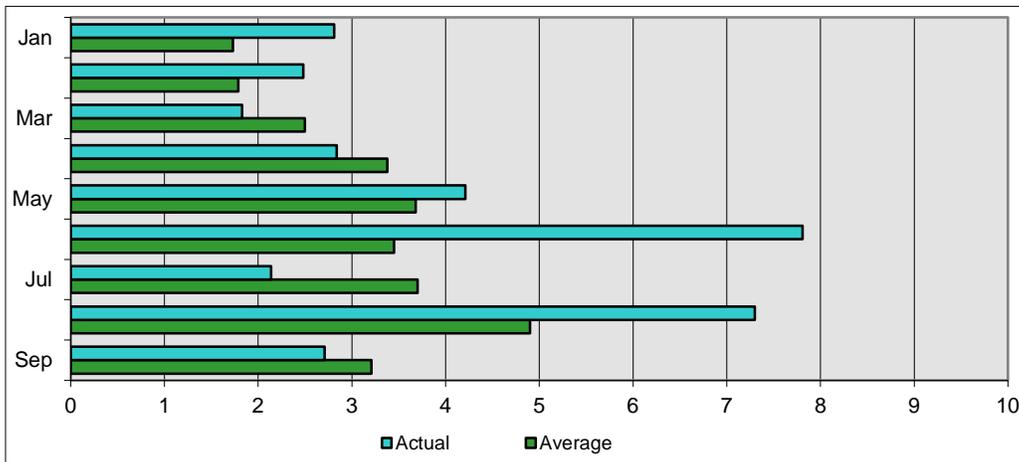
Temperature (degrees Fahrenheit)

	Sep	Aug	Jul	Jun	May	Apr	Mar	Feb	Jan
Actual	64	74	71	71	61	49	32	18	16
Average	64.5	72.5	74	69	59	49	38	28	23.5



Precipitation (inches)

	Sep	Aug	Jul	Jun	May	Apr	Mar	Feb	Jan
Actual	2.71	7.3	2.14	7.81	4.21	2.84	1.83	2.48	2.81
Average	3.21	4.9	3.7	3.45	3.68	3.38	2.5	1.79	1.73

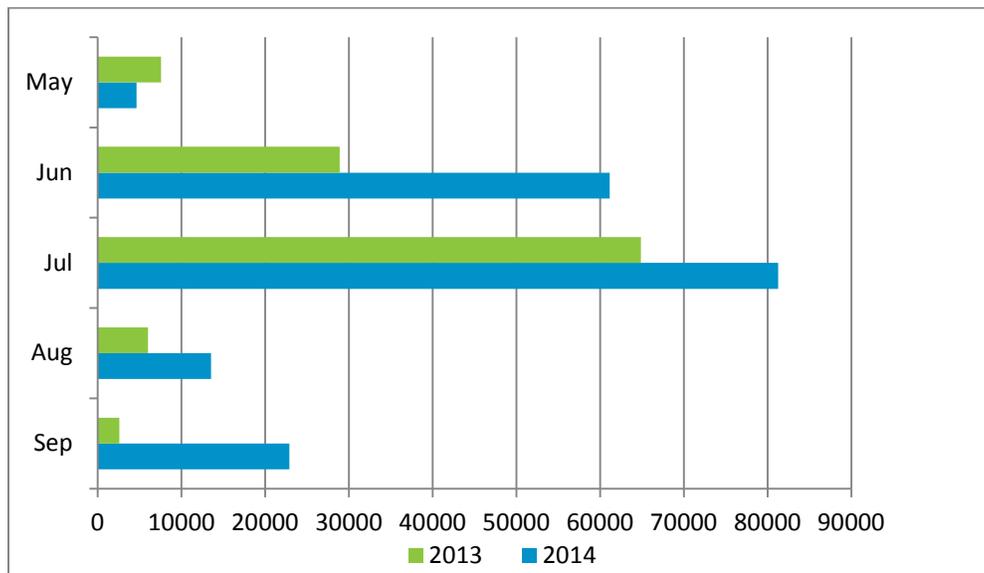




2014 Mosquito Light Trap Network Target Species Comparison

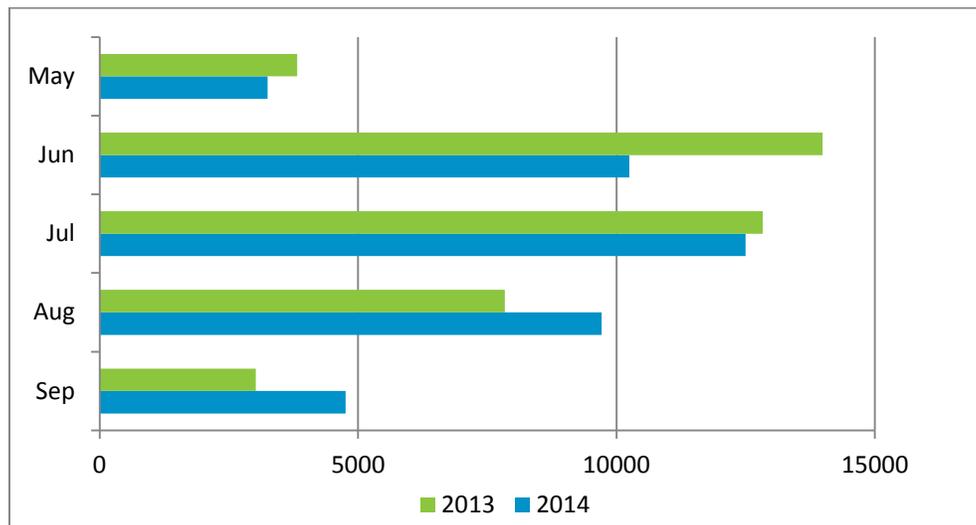
Aedes vexans

	Sep	Aug	Jul	Jun	May
2013	2587	5977	64851	28883	7536
2014	22883	13526	81264	61123	4618



Culex pipiens and Culex restuans

	Sep	Aug	Jul	Jun	May
2013	3023	7839	12828	13990	3821
2014	4760	9716	12501	10249	3248





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				
<i>Species</i>	<i>Females</i>	<i>Percent</i>	<i>Males</i>	<i>Percent</i>
<i>Ae cinereus</i>	1297	0.46%	957	1.15%
<i>Ae vexans</i>	180281	64.53%	24402	29.26%
<i>Ae misc</i>	5922	2.12%	25801	30.94%
<i>An punctipennis</i>	3916	1.40%	296	0.35%
<i>An quadrimaculatus</i>	7100	2.54%	169	0.20%
<i>An species</i>	272	0.10%	447	0.54%
<i>Cq perturbans</i>	1378	0.49%	166	0.20%
<i>Cx erraticus</i>	691	0.25%	33	0.04%
<i>Cx pipiens</i>	1055	0.38%	17	0.02%
<i>Cx restuans</i>	9889	3.54%	1044	1.25%
<i>Cx salinarius</i>	7	0.00%	0	0.00%
<i>Cx species</i>	29531	10.57%	24388	29.25%
<i>Cx tarsalis</i>	90	0.03%	3	0.00%
<i>Cx territans</i>	2188	0.78%	1442	1.73%
<i>Cs inornata</i>	441	0.16%	153	0.18%
<i>Cs species</i>	35	0.01%	4	0.00%
<i>Mosquito, Misc.</i>	773	0.28%	658	0.79%
<i>Oc ftichii</i>	206	0.07%	53	0.06%
<i>Oc grossbecki</i>	91	0.03%	19	0.02%
<i>Oc dorsalis</i>	7	0.00%	0	0.00%
<i>Oc japonicus</i>	229	0.08%	73	0.09%
<i>Oc canadensis</i>	57	0.02%	2	0.00%
<i>Oc stimulans</i>	39	0.01%	0	0.00%
<i>Oc triseriatus</i>	515	0.18%	84	0.10%
<i>Oc trivittatus</i>	28564	10.22%	905	1.09%
<i>Oc. species</i>	229	0.08%	41	0.05%
<i>Or signifera</i>	23	0.01%	1	0.00%
<i>Ps ciliata</i>	23	0.01%	3	0.00%
<i>Ps ferox</i>	758	0.27%	65	0.08%
<i>Ps misc</i>	11	0.00%	5	0.01%
<i>Ur sapphirina</i>	3740	1.34%	2154	2.58%
Total	279,358	100.00%	83,385	100.00%

Total Number of Trap: 110
 Total Number of Trap Nights: 101

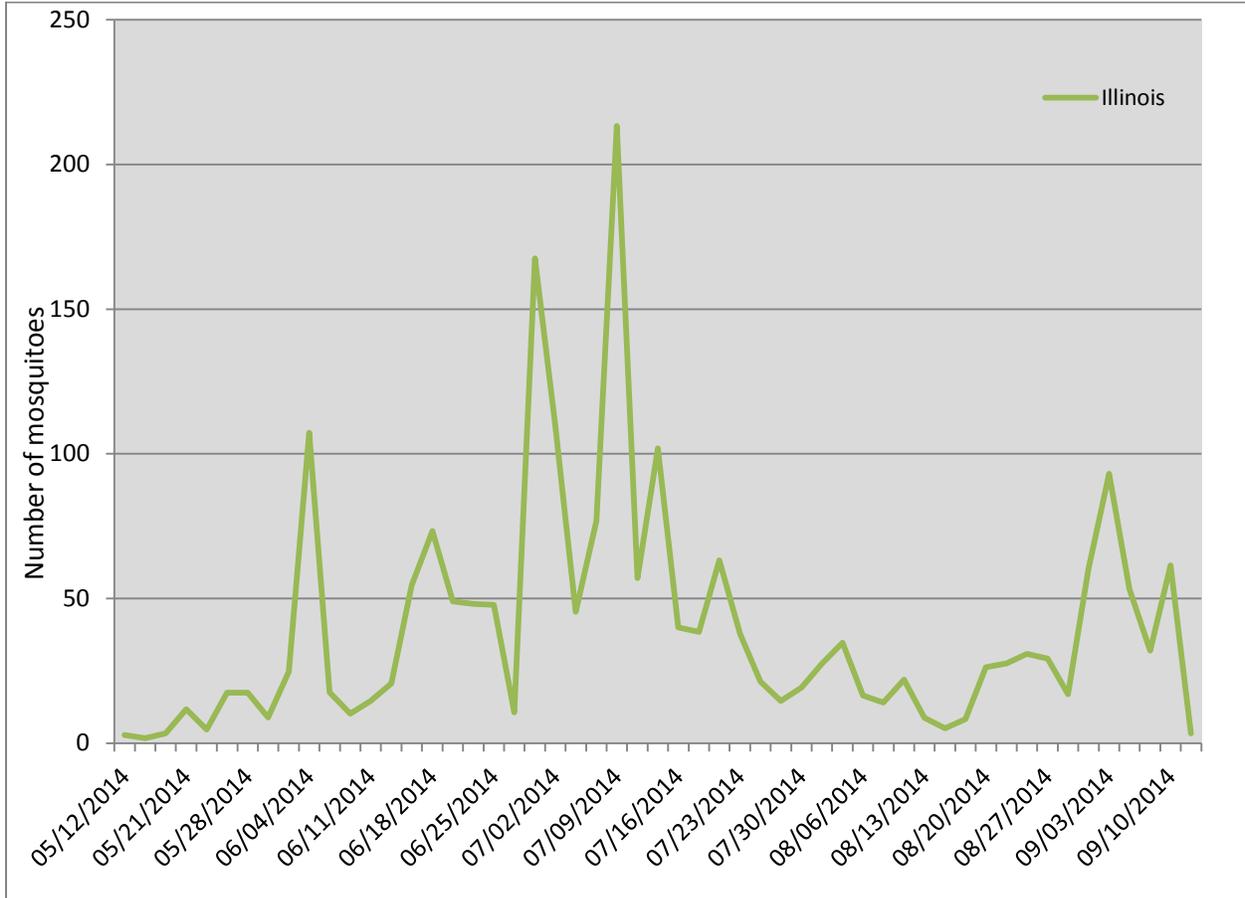
Average Number of Females/Trap Night: 25.14
 Number of Trap Malfunctions: 24

Total Number of Mosquitoes: 362,743



Light Trap Counts by Region, County and Community

Light Trap Comparison Chart





Services Performed Year-to-Date

Service Item	Service Description	Start Date
ROS0952 N.J. Light Trap Seasonal Serv	Seasonal Light Trap Service for adult mosquito population monitoring.	05/22/2014
ROS1302 Targeted Site Larval Insp Serv	Inspection of all targeted larval development sites.	05/27/2014
ROS1252 Complete Site Larval Insp Serv	Inspection service of all potential mosquito larvae development sites.	06/11/2014
ROS1302 Targeted Site Larval Insp Serv	Inspection of all targeted larval development sites.	06/17/2014
ROS2802 Anvil Truck ULV Application	Truck ULV application for adult mosquito control	06/17/2014
ROS1302 Targeted Site Larval Insp Serv	Inspection of all targeted larval development sites.	06/23/2014
ROS2802 Anvil Truck ULV Application	Truck ULV application for adult mosquito control	07/01/2014
ROS2786 Anvil ULV Festival Touch-Up	Truck ULV "touch-up" application for community festival mosquito control.	07/01/2014
ROS2786 Anvil ULV Festival Touch-Up	Truck ULV "touch-up" application for community festival mosquito control.	07/02/2014
ROS2786 Anvil ULV Festival Touch-Up	Truck ULV "touch-up" application for community festival mosquito control.	07/03/2014
ROS1252 Complete Site Larval Insp Serv	Inspection service of all potential mosquito larvae development sites.	07/10/2014
ROS1352 Larval Site Service Call	Special inspection of standing water for mosquito breeding per hot line request.	07/14/2014
ROS2802 Anvil Truck ULV Application	Truck ULV application for adult mosquito control	07/15/2014
ROS1302 Targeted Site Larval Insp Serv	Inspection of all targeted larval development sites.	07/23/2014
ROS2802 Anvil Truck ULV Application	Truck ULV application for adult mosquito control	07/29/2014
ROS1252 Complete Site Larval Insp Serv	Inspection service of all potential mosquito larvae development sites.	08/04/2014



Annual Program Update

Service Item	Service Description	Start Date
ROS2902 0.5% FLIT (Permethrin) BP Barr	Backpack barrier strip application to reduce adult mosquito reinfestation.	08/06/2014
ROS2902 0.5% FLIT (Permethrin) BP Barr	Backpack barrier strip application to reduce adult mosquito reinfestation.	08/12/2014
ROS1852 Mosquitofish (G. Affinis) Stck	Stocking of mosquitofish for biological larval control.	08/14/2014
ROS1852 Mosquitofish (G. Affinis) Stck	Stocking of mosquitofish for biological larval control.	08/14/2014
ROS1302 Targeted Site Larval Insp Serv	Inspection of all targeted larval development sites.	08/19/2014
ROS2902 0.5% FLIT (Permethrin) BP Barr	Backpack barrier strip application to reduce adult mosquito reinfestation.	08/19/2014
ROS2902 0.5% FLIT (Permethrin) BP Barr	Backpack barrier strip application to reduce adult mosquito reinfestation.	08/25/2014
ROS1305 Culex Site Inspection Service	Inspection of culex mosquito larval development sites for the prevention of West Nile Virus and other mosquito-borne diseases.	08/27/2014
ROS2802 Anvil Truck ULV Application	Truck ULV application for adult mosquito control	08/27/2014
ROS2902 0.5% FLIT (Permethrin) BP Barr	Backpack barrier strip application to reduce adult mosquito reinfestation.	09/02/2014
ROS1305 Culex Site Inspection Service	Inspection of culex mosquito larval development sites for the prevention of West Nile Virus and other mosquito-borne diseases.	09/08/2014
ROS1752 Vectobac (B.T.I.) BP Larv	Backpack larviciding for biological control of mosquito larvae sites.	09/08/2014
ROS2802 Anvil Truck ULV Application	Truck ULV application for adult mosquito control	09/08/2014
ROS2902 0.5% FLIT (Permethrin) BP Barr	Backpack barrier strip application to reduce adult mosquito reinfestation.	09/09/2014
ROS1305 Culex Site Inspection Service	Inspection of culex mosquito larval development sites for the prevention of West Nile Virus and other mosquito-borne diseases.	09/15/2014



Annual Program Update

Services Invoiced Per Contract:

Services Invoiced Year-to-Date: \$49,120.00