

Clarendon-Blackhawk
Mosquito Abatement
District

Established 1968

OPERATIONS
REPORT

2023

Clarendon Blackhawk Mosquito Abatement District

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Est. 1968
Member
Illinois Mosquito &
Vector Control Assoc.

December 4, 2023

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Dr. Vohra:

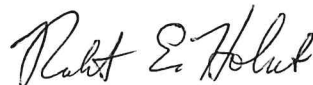
The following report summarizes the operations of the Clarendon Blackhawk Mosquito Abatement District during 2023.

The District regularly maintains an aggressive mosquito larval inspection and control program to prevent adult mosquito emergence. This effort was started in early May and *rigorously* maintained throughout the season against both *nuisance* and *vector* mosquitoes.

SB2879 enacted during 2004 requires mosquito abatement districts to conduct routine surveillance for the presence of mosquito-borne diseases. The DuPage County Health Department operated a network of gravid traps throughout the county during 2023, including one trap within our District, to monitor mosquito viral activity. The Health Department collected and tested samples throughout the season, and informed us of any positives produced from the traps within our District. The District thanks the DuPage County Health Department for their assistance in compliance with this legislation.

The Clarendon Blackhawk Mosquito Abatement District is one of the smallest mosquito abatement districts within Illinois, yet it provides a comprehensive, environmentally conscious program for its residents. The District is equipped to cope with any mosquito problems encountered and is constantly on the alert for these occurrences. The District will continue to provide an economical, environmental, and efficient control program in the future, and to work with state and local agencies to prevent mosquito-borne diseases.

Respectfully submitted,



Robert E. Holub
President, Board of Trustees

2023 OPERATIONS REPORT *****

AREA AND ORGANIZATION

The Clarendon Blackhawk Mosquito Abatement District encompasses a 2.4 square mile area located in Downers Grove Township of DuPage County, Illinois. The District has experienced four expansions since its formation, with a major expansion in 1977 through the annexation of approximately a half square mile of territory. The current District is bound overall by Ogden Avenue (Route 34) on the north, 59th Street on the south, IL 83 (Kingery Highway) on the east, and Richmond Avenue, Hiawatha Drive, Blackhawk Drive, and Western Avenue on the west. The District is comprised of the Village of Clarendon Hills, a portion of unincorporated Downers Grove Township, and parts of Westmont and Willowbrook. The area has a current population of 12,000 people.

Property within the District consists primarily of residential homes. In addition, the District includes all parks within the Village of Clarendon Hills, which encompass over 50 acres, and the Hinsdale Country Club with 130 acres. Primary sources of mosquito breeding include two major swamps, roadside ditches/culverts, catch basins, floodwater retention ponds, low areas subject to water retention, and approximately 2 acres of ponded water.

The Clarendon Blackhawk Mosquito Abatement District is an independent municipality, established according to the "Mosquito Abatement Districts Act of 1927" which provided for the organization of tax-supported mosquito abatement districts within the State of Illinois. The District was established in 1968 by voter referendum and became operational in 1969. The District stemmed from the Clarendon Hills Mosquito Control Association which began in the early 1950's and served the area through 1968. The District is administered by a five member Board of Trustees who serve without compensation. Operations are financed from a tax on real estate within the District. According to law, the District is authorized to levy taxes up to and including 0.0250 per hundred dollars of assessed valuation of property. Since the establishment of the District, the tax rate has been well below the legal maximum with an average of 0.0060 including two years where no tax was levied due to a surplus from the previous year. The actual rate experienced for taxes collected from the 2022 tax year was 0.0045.

WEATHER AND MOSQUITO POPULATIONS

The weather is the primary factor controlling mosquito populations. All mosquitoes spend their larval and pupal stages of development in water, consequently rainfall is critical to their existence. In addition, temperature influences the mosquito's rate of development and is a secondary variable in their life cycle. In general, heavy rains followed by warm temperatures create the potential for a significant annoyance mosquito (*Aedes vexans*) infestation. The opposite climatic conditions create the potential for large numbers of vector-related mosquitoes (*Culex pipiens* and related species).

The District monitors its own rainfall totals at one location, and in addition obtains weather data from the National Weather Service based at O'Hare Airport. The following tables summarize the data for 2023:

	<u>Normal Temperature</u> (°F)	<u>O'Hare Temperature</u> (°F)	<u>Deviation from</u> <u>Normal (°F)</u>
April	48.9	51.8	+2.9
May	59.1	62.4	+3.3
June	68.9	70.8	+1.9
July	74.0	75.7	+1.7
August	72.4	74.3	+1.9
September	64.6	69.5	+4.9

	<u>Normal Rainfall</u> (")	<u>O'Hare Rainfall</u> (")	<u>Deviation</u> <u>from Norm</u>	<u>CBMAD Rainfall</u> (")
April	3.38	2.02	-1.36	1.79
May	3.68	0.71	-2.97	0.59
June	3.45	2.36	-1.09	1.17
July	3.70	7.61	+3.91	8.84
August	4.90	1.33	-3.57	2.77
September	3.21	3.36	+0.15	3.11

Adult mosquito populations within the District are monitored by the use of a standard New Jersey light trap and a gravid trap. The light trap operates on a seven day basis and is capable of providing individual samples over a multiple day period. The light trap operated from May 12 through September 30 during the hours of 7:00pm to 6:00am. All samples collected were classified as to gender and sex as summarized below:

2023 CBMAD MOSQUITO LIGHT TRAP RECORDS

Time Period of Collection - 7:00pm to 6:00am

Collection Span - 7 days/week from 5/12 to 9/30

<u>SPECIES</u>	<u>MALE</u>	<u>FEMALE</u>
<i>Aedes vexans</i>	341	853
<i>Anopheles punctipennis</i>	7	17
<i>Anopheles quadrimaculatus</i>	5	6
<i>Culex pipiens</i>	76	424
<i>Culex restuans</i>	4	23
<i>Culex tarsalis</i>	0	3
<i>Culex territans</i>	0	3
<i>Culiseta inornata</i>	1	14
<i>Ochlerotatus trivittatus</i>	11	11
<i>Psorophora ciliata</i>	0	4
<i>Uranotaenia sapphirina</i>	3	16
	<u>448</u>	<u>1,374</u>

As observed in the previous table, the *Aedes vexans* and *Culex pipiens/restuans* are the primary species of mosquito found within the District. The *Aedes vexans*, or floodwater mosquito, is the most common mosquito and the greatest annoyance to humans and warm-blooded animals due to the female's fierce biting habits. This mosquito is prevalent after heavy rainfall which results in standing water in fields, swamps, ditches, and retention ponds. This species is also an aggressive flier with a migratory flight range of 20-25 miles!

The *Culex pipiens*, or northern house mosquito, and related species *Culex restuans* breed primarily in stagnant waters. These mosquitoes are most abundant in periods lacking rainfall, when areas of stagnant water prevail. Stormwater catch basins and roadside ditches/culverts are the primary sources for these mosquitoes within the District. The *Culex pipiens/restuans* are not aggressive biters, and have a limited flight range of under one-half mile. The *Culex pipiens* is capable of disease transmission, with specific details summarized in the following section.

A graph on the last page of this report shows the distribution of *Aedes vexans* and *Culex pipiens/restuans* adult female mosquitoes during 2023 based on light trap collection.

During 2023, the DuPage County Health Department continued to operate a gravid trap within the District as part of a county-wide network to monitor West Nile Virus (WNV) activity within the adult mosquito population. Gravid traps are highly selective mosquito traps collecting adult mosquitoes which have had a blood meal and potential exposure to WNV. The trap within our District operated from May 3 through October 10 on a 24/7 basis with collection, and subsequent testing of collected samples on a weekly basis. The samples were tested using the RAMP (Rapid Analyte Measurement Platform).

Test results from the gravid trap operated within our District are summarized as follows:

<u>Sample Test Date</u>	<u>RAMP Test Results/Value</u>	<u>Test Pool Size (# mosquitoes)</u>
5-9	Neg -	50
5-17	Neg -	50
5-23	Neg -	50
5-31	Neg -	50
6-6	Neg -	50
6-13	Neg -	50
6-21	Neg -	50
6-27	Neg -	50
7-5	Neg -	50
7-11	Neg -	50
7-18	POS 142.4	50
7-25	Neg -	50
8-1	POS 135.1	50
8-8	POS 640+	50
8-15	POS 640+	13
8-23	POS 640+	17
8-30	Neg -	46
9-5	Neg -	13

<u>Sample Test Date</u>	<u>RAMP Test Results/Value</u>	<u>Test Pool Size (# mosquitoes)</u>
9-12	---	0
9-19	---	0
9-26	---	0
10-3	---	0
10-10	---	0

MOSQUITO-BORNE DISEASES

In northern Illinois, two primary mosquito-borne diseases are of concern to the District. These are St. Louis Encephalitis and West Nile Virus. During 2002, West Nile Virus reached epidemic proportions within the state. Fortunately, this year the virus never amplified into epidemic proportions. Both viruses are closely related with details following. Three other forms of encephalitis are found within Illinois, although at this time are not considered a serious problem in our area. Finally, canine heartworm is transmitted by mosquitoes and is a current problem in the state.

St. Louis Encephalitis (SLE)

SLE is caused by a virus that cycles between mosquitoes and birds, with occasional spill-over into humans. Humans are a dead-end host for the virus, which cannot be transmitted from person to person. The virus has little effect on birds that are infected, however can lead to death in 2-20% of severe human infections. SLE affects the central nervous system causing an inflammation of the brain. Most human infections are subclinical (mild and not diagnosed) exhibiting flu-like symptoms. More severe cases can exhibit high fever, nausea, headache, personality changes, paralysis, or death. The elderly are most susceptible to SLE. SLE occurred in northern Illinois in epidemic proportions during 1975 with additional confirmed cases during 1977, 1980, 1988, 1993, 1995, and 2016. The 1988 confirmed case occurred in northern DuPage County, and cases in 1993/1995 within Cook County.

Mosquitoes from the genus *Culex*, in particular the species *Culex pipiens*, are the vector of SLE from birds to birds and birds to humans. These mosquitoes deposit their eggs in raft clusters of 50-400 eggs directly on the water's surface. They are well adapted to many habitats including stormwater catch basins, discarded tires, buckets/artificial containers, rain gutters, bird baths, unused swimming pools, ditches, ponds, etc. Anywhere that water can stand for more than a week can become a potential breeding source for *Culex* mosquitoes. The *Culex* mosquitoes can have many over-lapping generations each season, and over-winter as adults.

West Nile Virus (WNV)

WNV was first discovered in the United States in New York City during 1999. It has since spread south and west with confirmation in northern Illinois during 2001. Its recurrence in Illinois during 2002 was classified as an epidemic by the Illinois Department of Public Health with 884 confirmed human cases and 67 deaths. Illinois ranked as the highest number of WNV deaths within the United States. The following years of 2003 produced 54 confirmed human cases with 1 death, 2004 produced 60 confirmed human cases with 4 deaths, 2005 produced 252

confirmed human cases with 12 deaths, 2006 produced 215 cases with 10 deaths, 2007 produced 101 cases with 4 deaths, 2008 produced 20 cases with 1 death, 2009 produced 5 cases with no deaths, 2010 produced 61 cases with 4 deaths, 2011 produced 34 cases with 3 deaths, 2012 produced 290 cases with 12 deaths, 2013 produced 117 cases with 12 deaths, 2014 produced 44 cases with 3 deaths, 2015 produced 77 cases with 9 deaths, 2016 produced 155 cases with 8 deaths, 2017 produced 90 cases with 8 deaths, 2018 produced 176 cases with 17 deaths, 2019 produced 28 cases with 1 death, 2020 produced 42 cases with 4 deaths, 2021 produced 64 cases with 5 deaths, and 2022 produced 33 cases with 7 deaths. During 2023, the state experienced 115 confirmed human cases with 6 deaths (thru 11/15/23). As with SLE, WNV cycles between birds with humans being a dead-end host. WNV cannot be transmitted from person to person. Unlike SLE, WNV can have a high mortality in certain bird species. Crows are extremely susceptible to the virus, as are eagles, hawks, and other raptors. Most human infections are mild and subclinical. Symptoms associated with mild cases of WNV are low fever, headache, body aches, and swollen lymph glands. In more severe cases, symptoms can be high fever, neck stiffness, muscle weakness, stupor, coma, tremors, paralysis, and death. Less than 1% of those infected with WNV will develop severe illness.

WNV can lead to death in 3-15% of severe human infections. Unlike SLE, WNV can affect all age groups. The mosquito vectors for WNV are the same as SLE, with description under that category.

Other Encephalitis Viruses

LaCrosse Encephalitis (LAC) is caused by a virus that cycles between mosquitoes and small mammals as chipmunks and ground squirrels. Humans are considered a dead-end host. LAC is endemic in Illinois with 5-15 cases per year, primarily occurring in local foci in central and northwestern regions of the state. The majority of LAC cases are mild and subclinical. Less than 1% fatality occurs in cases severe enough to be diagnosed. Children under the age of 16 are most susceptible to this virus. As with other mosquito-borne encephalitis, LAC cannot be transmitted from person to person. The eastern tree hole mosquito, *Ochlerotatus triseriatus*, is the vector of this disease. This mosquito normally develops in water-filled rot cavities in trees (tree holes), but has adapted well to many man-made habitats as discarded tires, buckets, and other artificial containers. The *Ochlerotatus triseriatus* adult mosquito lays its eggs singly on the inside wall of the tree hole or artificial container just above the waterline. The adult mosquito is an aggressive biter with feeding all day long, generally staying within the vicinity of its source. This species has one generation each season, and over-winters in the egg stage.

Western Equine Encephalitis (WEE) is similar to SLE, cycling between birds and mosquitoes with rare spill-over to the human population. WEE primarily affects horses, and is typically found west of the Mississippi River, but has also been found in Illinois. Human cases severe enough to be diagnosed can have a 2-5% fatality. The primary vector of WEE is *Culex tarsalis*, and possibly *Culex pipiens*. The *Culex tarsalis*, like other *Culex*, lay eggs in rafts directly on the water's surface. The mosquito can be found in sunlit sources with high organic content as ditches and artificial containers. The mosquito seldom travels more than 1 mile from its source, however has been known to travel up to 10 miles. This species has continuous generations each season, and over-winter as adults.

Eastern Equine Encephalitis (EEE) is another virus that cycles between birds and mosquitoes with horses and humans as dead-end hosts. Human infections of EEE can range from mild to severe, with 50-75% of diagnosed severe cases resulting in death. Fortunately, human cases of EEE are rare with only 150 cases throughout the United States from 1964-1998. No human cases of EEE have been reported in Illinois, although the virus has been found regularly in bird populations. The primary vector of EEE is *Coquillettidia perturbans*, a mosquito found in wetlands. They lay their eggs in rafts directly on the water's surface. The mosquito is an aggressive biter, strong flier, feeding during the evening or night. This species usually has one generation each season, and over-winters as larvae attached to the stems of cattails or similar aquatic plants.

Other Mosquito-Borne Diseases

Malaria is a disease caused by a protozoan parasite transmitted from person to person via the mosquito. At one time, malaria was prevalent in Illinois, with concentration in the southern part of the state. Mosquito control efforts in the 1920's have eliminated the risk of malaria in Illinois, although the mosquito which carries the disease, *Anopheles quadrimaculatus*, is still found in the area.

Denque and Yellow Fever are both diseases caused by viruses that are transmitted by mosquitoes. They are common in the Caribbean, South America, Asia, and Africa, but are unlikely to occur in Illinois.

Canine (Dog) Heartworm is a disease affecting dogs that is transmitted by mosquitoes. It is caused by a roundworm, *Dirofilaria imitus*. The *Culex pipiens* and possibly *Aedes vexans* are the vectors in our area. The disease is ongoing and best controlled by prevention. Veterinarians typically prescribe drugs to prevent the roundworm larvae development in dogs.

Chikungunya virus (CHIK-V) is new to the United States with cases first reported in 2013. The virus is typically not fatal, however causes high fever with severe joint pain lasting from several weeks to months. The virus is spread by *Aedes aegypti* and *Aedes albopictus* which are prevalent in the southeast regions of the United States. This area is currently under watch for the virus.

Zika virus is new to the United States with cases first reported in 2016. *Aedes aegypti* is the primary carrier with *Aedes albopictus* being a secondary carrier. No locally transmitted cases have occurred in Illinois. Only 1 in 5 people who are infected with this virus will show symptoms with typical recovery within a week. Zika virus within adults is mild, with primary concern on the development of babies in pregnant women.

HIV in Mosquitoes

Mosquito-borne viruses must be able to multiply and infect the salivary glands of the mosquito. This does not occur when HIV is ingested by mosquitoes. Studies have concluded that mosquitoes are not a factor in HIV transmission.

MOSQUITO LARVAL/PUPAL CONTROL

The mosquito, being an insect, has four distinct stages in its life cycle: egg, larva, pupa, and adult. During the larval and pupal stages, mosquitoes are confined to water and as such are concentrated in numbers. Once mosquitoes reach the adult stage, they become dispersed and difficult to effectively control.

Hence the control of mosquitoes while in their larval or pupal stages of development within water is the primary method of mosquito control utilized by the Clarendon Blackhawk Mosquito Abatement District.

All potential sources within the District are inspected for mosquito breeding on a regular basis, with subsequent treatment to only those sources actually found to contain mosquito larva or pupa. This inspection/treatment cycle conforms to the mosquito's development time cycle to ensure desired control before reaching the adult stage. During 2023, eleven inspection/treatment cycles were completed.

Any sources found breeding are treated by hand-toss or motorized backpack sprayer. During 2023, the District utilized one biological larvicide and one insect growth regulator in its larval/pupal control program. The biological larvicide is derived from the bacterium *Bacillus thuringiensis*, variety *israelensis*, which is commonly known as BTI. The active ingredient in BTI larvicide is an extract (crystal toxin) of fermented cultures, which is ingested by mosquito larvae. The BTI larvicide is selective against mosquito and blackfly larvae only, and is deemed as the environmentally safest insecticide available for mosquito larval control. The BTI utilized by the District consisted of a granular form.

The insect growth regulator used by the District for the first time in 1994 consists of methoprene. Methoprene interferes with the physiological development of the mosquito's metamorphosis, and does not control mosquito larvae by direct toxic action. Hence, the larvae are prevented from a complete metamorphosis and subsequent emergence as an adult mosquito.

A summary of respective larval/pupal control data for 2023 is summarized below.

<u>INSECTICIDE</u>	<u>AMOUNT USED</u>	<u>AREA TREATED</u>	<u>OPERATION</u>
Vectobac G BTI (1)	62.3 lbs	6.2 acres	Larval
Altosid Briquets (2)	1,604 pcs	1,604 basins	On/Off Road Basins
Altosid XR Briquets (3)	1,621 pcs	1,621 basins	On/Off Road Basins

- (1) Vectobac G *Bacillus thuringiensis israelensis* (BTI) granular larvicide as produced by Valent Biosciences with an application rate of 7.0-10.0 lbs/acre
- (2) Altosid Briquets (30 Day) as produced by Central Life Sciences with an application rate of 1 briquet/100 sq ft of surface area for shallow water, or 1 briquet/10 cu ft of water for deeper water or water subject to flow, or 1 briquet/catch basin
- (3) Altosid XR Extended Residual Briquets (150 Day) as produced by Central Life Sciences with an application rate of 1 briquet/200 sq ft of surface area, or 1 briquet/catch basin

Stormwater catch basins are significant mosquito production sources within the District. These basins are situated in streets, parking lots, and off-road areas including parks, schools, and public right-of-ways. Catch basins are the

primary source for *Culex pipiens*, and related species with regular treatment maintained during 2023. All catch basins in streets, parking lots, and off-road areas were treated on May 30-June 1 with Altosid XR Briquets. A follow up treatment was completed on August 28-September 1 with Altosid 30-Day Briquets.

In addition to larval/pupal control operations within the District, several mosquito breeding areas outside the District were inspected/treated as required to reduce potential mosquito migrations into the District. These sources consisted of roadside ditches and floodwater retention ponds, and were treated with BTI larvicide.

CONTINGENCY ADULT CONTROL

The Clarendon Blackhawk Mosquito Abatement District does *not* conduct routine adult control operations as a part of its control program. Adult control is the least effective approach to mosquito control with only localized, temporary benefits at best. However, adult control is the only "*tool*" available to use against an adult mosquito population which is involved in a disease transmission cycle. The District will only implement adult control operations as a contingency measure for vector related mosquitoes.

The District will utilize guidelines established by the Illinois Department of Public Health (IDPH) in their publication entitled "IDPH Surveillance and Response Procedures for Mosquito-borne Arbovirus Emergencies" and Center for Disease Control criteria in consideration of adult control operation initiation. Operations would be utilized against specific populations of *Culex pipiens* in effort to minimize or break the SLE or WNV transmission cycle. Adult control measures would further only be conducted when environmental constraints of ambient air temperature between 65-85°F and wind speeds in the 2-8 mph range would be satisfied to optimize effectiveness.

Adult control operations would utilize the ultra-low volume (ULV) aerosol insecticide application process. An EPA registered and approved adulticide would be dispersed at a mid label level application rate.

Specifically for WNV, criteria considered to initiate adult control operations would include the following:

Primary Triggers

- a) *Dead Birds* - Numbers of dead crows/blue jays/raptors and the time of year they are found. Subsequent confirmation by the IDPH of WNV within the dead birds.
- b) *Positive Mosquito Pools* - Confirmation of viral activity within the adult mosquito population. Results obtained from the DuPage County Health Department and adjacent major mosquito abatement district using the RAMP system test are monitored for regional viral activity. Both entities use gravid traps, which are highly selective in collecting *Culex species* mosquitoes having had a blood meal and potential exposure to WNV/SLE/EEE, giving immediate results for specific viral presence.
- c) *Time of Season* - The point in any given mosquito season when initial positive bird and mosquito pool samples are confirmed. Positive samples early in the season set the stage for a developed viral amplification and transmission cycle, whereas initial positive samples late in the season would minimize this cycle.

- d) *Surrounding State Data* - Viral activity in adjacent states, particularly early in the season, is a precursor to activity in our state.
- e) *Equine Cases* - Confirmed equine cases are an indicator that a spillover from the bird population has occurred. Viral activity has amplified and escalated to a level where this occurs.
- f) *Human Cases* - Confirmed human cases or fatalities are the ultimate indicator that a spillover from the bird population has occurred, and likely to continue.

Secondary Triggers

- a) *Vector Population Level* - A larger than normal vector population level poses a greater risk for spillover disease transmission to humans. But a low vector population does *not* imply that disease transmission will be minimal or disappear. Under the circumstances of a high infection rate, spillover transmission *will* occur even with a low vector population.
- b) *Weather: Rain & Temperature* - Rainfall can directly affect vector population levels. Water is required for all mosquito development, with rainfall totals influencing the number of potential breeding sources. Temperature on the other hand can affect both vector population levels and the viral amplification/transmission cycle. Above normal temperatures also can increase the viral transmission rate.

During 2023, criteria for adult control were met with contingency adult control operations utilized as summarized below:

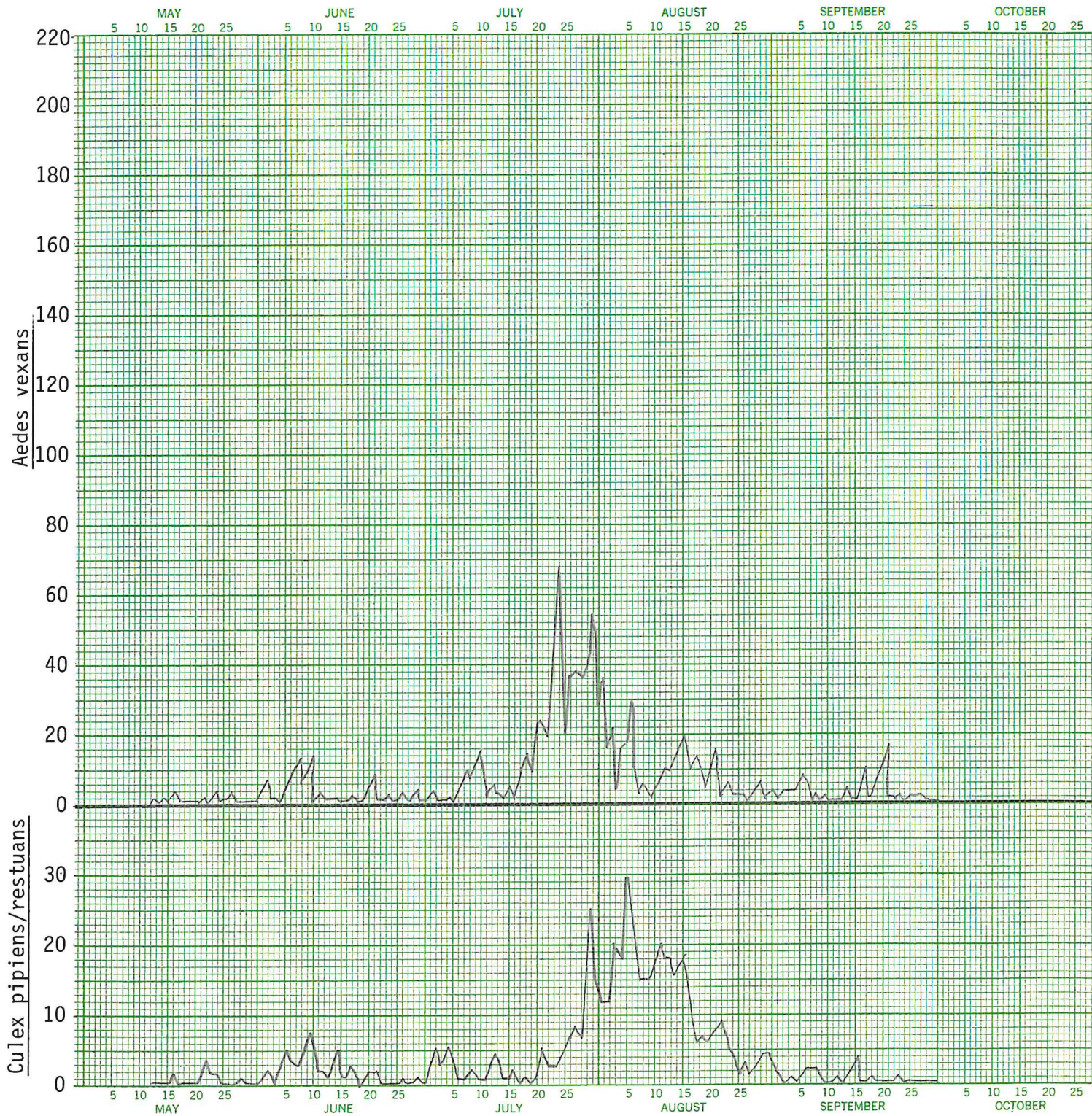
<u>ULV APPLICATION DATE</u>	<u>AMOUNT USED(4)</u>	<u>AREA TREATED</u>
August 18	12.0 gal	1,069.2 acres
August 31	12.5 gal	1,076.0 acres

- (4) Zenivex E4 RTU mosquito adulticide as manufactured by Central Life Sciences with a *nominal* application rate of 0.00350 pounds of active ingredient per acre.

PUBLIC RELATIONS

As in previous years, the District trustees were available to answer any questions about the District's control program. The District routinely receives telephone inquiries on mosquito related problems, and attempts to promptly resolve concerns in a timely manner. The District also keeps the Village of Clarendon Hills' staff apprized of potential mosquito problems, since Village staff is typically the front line recipient of mosquito related complaints. The Village's cooperation in reception of these calls is acknowledged and sincerely appreciated by the District.

2023 LIGHT TRAP DATA



Total Trap Counts - Females Only - 1 Trap Operated 7 Days/Week