

Annual Report 2005

North Shore Mosquito Abatement District

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NORTH SHORE MOSQUITO ABATEMENT DISTRICT

2005 ANNUAL REPORT

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PREFACE

The 2005 season saw a dramatic increase in the number of human West Nile Virus (WNV) cases from the previous two seasons. The Illinois Department of Public Health reports that there were 248 human cases of WNV in 2005. In Cook County there were 133, with 99 in the suburbs and 34 in Chicago. The NSMAD had 38 confirmed human cases of WNV in 2005. The IDPH believes the case count did not approach the levels of 2002 (634) in part, because of increased surveillance, larviciding, and public awareness. However, the higher incidence of WNV is very much a function of weather. Culex mosquitoes (WNV carriers) are more active and in greater abundance in hot weather.

Weather conditions and human behavior played a significant role in the rise in human illness. This past summer's hot and dry weather provided ideal conditions for West Nile Virus to be more prevalent than in the previous two years. The dry weather conditions may have lulled many people into a false sense of security. Many people assumed that the lack of rain meant fewer mosquitoes. This was only partially true. There was a substantial reduction in the number of floodwater mosquitoes, the type that rely more heavily on rainfall to help them reproduce. The floodwater mosquitoes are a more aggressive species and bite humans more readily. People didn't experience many, if any, mosquito bites, let alone see them in the early summer.

As the season progressed into the stages where the Culex species became more prevalent, many people were not taking precautions to avoid being bitten by mosquitoes. Furthermore, our research determined the infection rate among the Culex population was twice as high as formerly believed. In the course of the season, the NSMAD entered into a cooperative effort with the Illinois Natural History Survey to research infection rates among the Culex population. The results indicated the WNV infection rate among Culex mosquitoes was 40 percent, about double previously reported levels.

You can find details of the NSMAD surveillance and collection data in this 2005 Annual Report. There is also a discussion of the steps the NSMAD took to control mosquitoes and to alert the public to use personal protection measures. Using repellents and eliminating mosquito breeding sources continues to be a key element residents of the district can do to help in the fight against West Nile Virus.

Introduction To The North Shore Mosquito Abatement District

The enactment of the *Mosquito Abatement District Act* (Chap. 111 ½, Illinois Revised Act) by the Illinois legislature in 1925 prompted a group of citizens to work for the establishment of a Mosquito Abatement District Program in the North Shore of Cook County. On December 8, 1927, the North Shore Mosquito Abatement District (NSMAD) was officially chartered. This year, with support of the citizens of our district, we have successfully completed our 78th year of public health service. We are looking forward to continuing our success into our 79th year of public health service to the communities of the North Shore.

Area Served

The District serves the Townships of Evanston, Niles, New Trier, a part of Northfield (east of Pfingsten Road), and a section of Maine Township (east of Washington Street in Morton Grove). These townships include the villages of Evanston, Glencoe, Glenview (east of Pfingsten Road), Golf, Kenilworth, Lincolnwood, Morton Grove, Niles (east of Harlem Avenue), Northbrook (east of Pfingsten Road), Northfield, Skokie, Wilmette, and Winnetka.

The area covered by the NSMAD consists of 79 square miles of Cook County's North Shore. This sprawling and diverse area includes over 900 miles of streets, 26.9 miles of rivers, 31.8 miles of railroad rights of way, 2.9 miles of ravines, 21.8 miles of bike trails, 17.8 miles of Forest Preserve District horse trails, and approximately 3,500 acres of Forest Preserve District land.

Organization

A five person Board of Trustees governs the North Shore Mosquito Abatement District. The Trustees are residents of the District and are appointed by the Cook County President and Board and serve without compensation. Operation of the District is supported by taxes levied on property located within the boundaries of the member townships.

The NSMAD has 10 full-time employees and between 15-20 seasonal employees. The Superintendent, who is responsible for the overall daily operation of all District matters, is accountable to the Board of Trustees and reports to them on a monthly basis. The Chief Field Inspector and the Field Supervisor direct summer seasonal employees to insure that proper mosquito control methods are conducted in the field and report to the Operations and Laboratory Director. The staff also includes a shop supervisor responsible for the keeping and maintaining vehicles and spray equipment and a Community Relations Manager who is responsible for educating the public about mosquito borne illness and preventative measures as well as, the control methods utilized by the NSMAD.

The District office, laboratory and maintenance garage is located at 117 Northfield Road, Northfield, Illinois. Both permanent and seasonal personnel are dispatched from the headquarters to investigate and treat mosquito problems within the district.

Mission Statement

The North Shore Mosquito Abatement District works to reduce and control the regional mosquito population so as to:

1. Reduce the probability of mosquito borne disease and
2. Minimize annoyance from nuisance mosquitoes.

Public Health and Mosquitoes

Mosquitoes are vital links in the transmission cycle of many potentially deadly diseases such as malaria, yellow fever, dengue, filariasis, and many forms of viral encephalitis. These diseases are transmitted through the bite of an infected female mosquito.

In the United States mosquito borne viral encephalitis is the primary health concern of public health agencies like the NSMAD. West Nile Virus (WNV), St. Louis Encephalitis (SLE), Eastern Equine Encephalitis (EEE), Western Encephalitis (WE), and La Crosse Encephalitis, are serious diseases with symptoms ranging from mild, flu-like symptoms, to severe, including paralysis, coma and death. Recovery from these diseases can be long and painful, with some infected persons never fully recovering. There are no vaccines for humans for any of these diseases at this time.

West Nile Virus

In 1999, New York was affected by the first outbreak of West Nile Virus. The disease has quickly spread across the country. According to the Centers for Disease Control, every state has reported WNV activity in 2004 with the exception Alaska, Hawaii and Washington.

The NSMAD is particularly concerned with West Nile Virus. In 2002, Illinois experienced the worst outbreak of WNV in the country. There were a total of 884 human cases and 66 deaths that year. Cooler temperatures in 2003 and 2004 are believed to have contributed to fewer human cases in Cook County. Cook County had 634 human cases in 2002 and 41 deaths. In 2003, Cook County had 20 human cases and one death. In 2004, Cook County had 21 human cases reported and two deaths.

As of December 20, 2005, the CDC reported 2,799 people were infected with 102 deaths. In Illinois, the incidence of WNV was up substantially from the previous year. At the time of this report, 248 cases of WNV have been reported with 12 deaths. For the most current information please check the websites of the CDC at www.cdc.gov and the Illinois Department of Public Health at www.idph.state.il.us.

There are no projections for 2006 as several variables are unknown, such as temperature, rainfall, and infection rates among birds and mosquitoes. Early surveillance by NSMAD will help to determine the risk factors for contracting WNV the 2006 mosquito season.

Mild cases of West Nile infections may cause a slight fever or headache. More severe infections are marked by a rapid onset of a high fever with head and body aches, disorientation, tremors, convulsions and, in the most severe cases, paralysis or death. Symptoms typically occur within three to 14 days after the bite from an infected mosquito. Persons 50 years of age or older are at the highest risk for serious illness.

The best way to prevent West Nile encephalitis and other mosquito-borne illnesses is to reduce the number of mosquitoes around your home and neighborhood and to take personal protection measures to avoid mosquito bites.

St. Louis Encephalitis

St. Louis Encephalitis, once the most common mosquito borne encephalitis in the United States, is particularly dangerous in the elderly and young. During 1975, the U.S. experienced a major outbreak of SLE. In the past, St. Louis Encephalitis has been found in all of the United States west of the Mississippi River, as well as, the Ohio River Valley and Florida. Birds are considered the main reservoir of St. Louis Encephalitis virus and species of *Culex pipiens* and *Culex quinquefasciatus* are the chief urban vectors. *Culex tarsalis* is the chief vector in rural areas in Western States.

Other Arboviral Encephalitides

In addition to SLE and WNV, viruses such as Eastern Equine Encephalitis and Western Encephalitis can cause serious human disease. These diseases are found primarily on the eastern and western coasts of the United States. Normally these viruses are transmitted harmlessly from bird to bird,

however sometimes they are transmitted to horses and humans. Eastern Equine Encephalitis is found along the Atlantic and Gulf coasts and inland in the Mississippi River Valley, including Illinois in limited areas. *Culiseta melanura* is the vector in the bird-to-bird cycle. *Aedes sollicitans*, *Aedes vexans*, and *Mansonia perurbans* are vectors in the disease-transmission cycle. Western Encephalitis can be found in all of the states west of the Mississippi River and in Wisconsin and Illinois. The *Culex tarsalis* mosquito is the most important vector of this disease.

La Crosse Encephalitis is found primarily in the Great Lakes region although there has been an increase in the incidence of cases in the Mid-Atlantic States.

Malaria

Malaria, a disease caused when protozoan parasites in the genus *Plasmodium* infect the red-blood cells of humans, continues to devastate many countries both financially and health-wise throughout the world. The malaria parasites are transmitted from human to human via the bite of the *Anopheles* mosquito. Although there are approximately fifteen *Anopheles* species in the United States, only two are important in malaria transmission. These are *Anopheles quadrimaculatus* and *Anopheles freeborni*.

Take precautionary steps to avoid being bitten by an infected mosquito:

- **Apply mosquito repellent with DEET when outside**
- **Avoid outdoor activity during peak mosquito activity, particularly dusk and early evening**
- **Wear long sleeves and pants**
- **Eliminate all areas of standing water in and around the home, including birdbaths and ornamental water ponds.**

Dengue Fever

Dengue, also known as break-bone fever, is a serious mosquito-borne virus that has spread throughout the world in a dramatic fashion. Dengue and Dengue Hemorrhagic Fever (first recognized in the 1950's) are currently endemic in over 100 countries. The sudden and explosive expansion of Dengue can be partly attributed to the geographic expansion of the disease's mosquito vector: the *Aedes aegypti*. Endemic areas include the southeastern U.S., Central and South America, sub-Saharan Africa, India, Australia and Southeast Asia. In the United States, *Aedes sp.* mosquitoes such as *Aedes albopictus* and *Aedes aegypti* are vectors of the disease. Neither *Aedes albopictus* nor *Aedes aegypti* were found in a NSMAD mosquito trap this summer.

Dog Heartworm

Dog heartworm is another mosquito-transmitted disease that concerns the NSMAD. The causative agent, *Dirofilaria immitis*, is a nematode whose microfilariae (the immature but infective stage of the worm) are picked up and transmitted from dog to dog by mosquitoes. The transmission cycle first begins when a hungry female mosquito feeds on an infected dog and picks up the infective microfilariae. When the mosquito takes another blood meal, she transmits the microfilariae via her proboscis from the infected dog to the skin of another dog. Once on the surface of the dog's skin, the worm penetrates the dog's dermis and enters its bloodstream. Then, once in the dog's body, the worms begin to grow and mature. Mature worms, which can sometimes grow to lengths of 8-13 inches, can infect a dog's heart and cause life threatening pathology. Prevention includes a vigilant mosquito abatement program and veterinarian prescribed medication for your dog.

A Final Note Regarding Mosquito Borne Illness

It is important to understand that the United States is not immune to diseases that are historically found in other countries and /or other continents. The endemic presence of these diseases coupled with (1) the tremendous growth of urban populations, and (2) the expansion of pesticide resistant mosquitoes and drug resistant parasites into these areas, has contributed to the continued expansion of mosquito-borne diseases.

Diseases like West Nile Virus, St. Louis Encephalitis, as well as other viral encephalitides, may be named after their unique geographical place of discovery, but they are not limited to them. The diseases and their carriers do not know nor respect political borders. They are not local phenomenon threatening only the original areas of endemicity. WNV existed outside the U.S. for at least 60 years before infections occurred in New York during 1999. Rather, they can pose a potentially serious threat to the people and pets of any town or city where the conditions and environment are suitable. Therefore, we at North Shore Mosquito Abatement District will continue to collect, sample and survey our neighborhoods, park and forest preserves for mosquitoes and their diseases. We must continue to work with residents and local health officials in order to remain pro-active and retain our preventative approach to mosquito control.

Illinois Mosquito Biology

Two different kinds of mosquitoes plague Illinois—the floodwater mosquito and the vector mosquito.

Floodwater or temporary pool mosquitoes lay their eggs singly in low-lying areas that will be flooded later. Under normal summer temperatures, large numbers of these biting mosquitoes will emerge about two weeks after heavy rain and will remain a major nuisance problem for several weeks. The most common of these in Illinois is the inland floodwater mosquito or *Aedes vexans*. Viscous bitters, these medium sized, brown mosquitoes have narrow rings of white scales on the hind tarsi. They are also further distinguished by a distinct V-shaped notch in the middle of each band of white scales on the upper surface of their abdomen. These mosquitoes breed in rain pools, floodwater sites, roadside puddles, and practically all other temporary pools of water. They lay their eggs on the ground and hatching occurs when flooding waters cover them. *Aedes vexans* produce several broods each year and adults will travel long distances, sometimes up to 10 miles from their breeding places. These biters and are found to be annoying after dark and at dusk. During the day, they will rest in the grass and other vegetation.

Vector mosquitoes carry diseases and lay their eggs in anything that will hold water. This includes stagnant ditches, sewage treatment ponds, tree holes, old tires, clogged gutters, old tin cans and even bottle caps. Eggs are laid on or just above the water surface, where they usually hatch within two to three days. Two of the more common vector mosquitoes in Illinois are the house mosquito and the tree-hole mosquito.

The northern house mosquito is the *Culex pipiens*. They are brown mosquitoes of medium size with cross bands of white scales on the abdominal segments but without other prominent markings. They breed primarily in rain barrels, tanks, gutters, birdbaths, fishponds, and other types of artificial containers. These mosquitoes lay their eggs in rafts of 40 to 400 eggs. The rafts float on the water surface and hatching occurs within a day or two in warm weather. This species does not migrate far from its breeding habitat and is active only at night. During the day they may be found in houses, around chicken coops and various other shelters near their breeding places. They are very attracted to both carbon monoxide and light traps. This mosquito is of particular public health importance since it is able to transmit various mosquito borne diseases, such as St. Louis Encephalitis and West Nile Virus.

Aedes triseriatus, another important public health vector, is known as the “tree-hole” mosquito. This mosquito is blue-black in appearance with silvery white scales at the sides of the thorax. This mosquito breeds in tree holes, old tires, tin cans, barrels and other artificial containers. The adult *Aedes triseriatus* does not fly far from their breeding habitats, but they can transmit La Crosse Encephalitis.

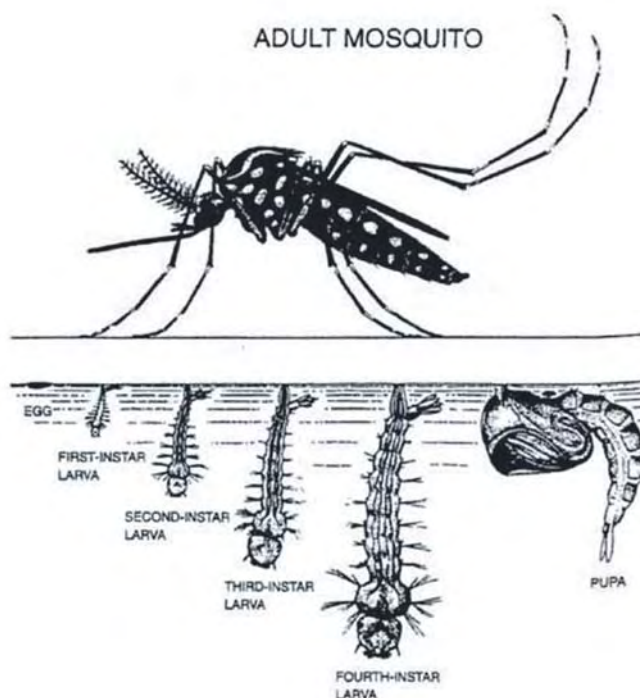
The Mosquito Life Cycle

I. The Egg Stage. Eggs are laid by the adult female: 1) singly on the water surface (*Anopheles*, the malaria mosquito); 2) singly above the water line (*Aedes*, the floodwater mosquito); 3) or in groups (egg rafts) on the waters' surface (*Culex*, the house mosquito). Floodwater mosquito species survive the winter as eggs.

II. The Larval Stage. Mosquito larvae must develop in standing water, but they breathe through an air tube at the rear of their bodies. Larvae (wriggles) feed on detritus and microorganisms. They undergo 4 stages of development called instars. Between each instar the larvae feed, shed their skins, and become larger. During the warm days of summer larvae can complete development in 5 to 7 days. *Anopheles* larvae develop in permanent ponds and marshes. *Aedes* larvae develop in temporary woodland pools and intermittently flooded ditches. *Culex* larvae are found in catch basins and polluted water.

III. The Pupal Stage. After completing growth, larvae shed their skins and they become pupae (tumbler). During the pupal stage, the mosquito undergoes development into the adult. Pupae, like larvae, breathe air but they do not feed. After 2 to 4 days the skin of the pupa splits and the adult mosquito emerges on the surface of the water.

IV. The Adult. After 15-20 minutes, the adult male or female mosquito is ready for flight. Both males and females feed on sugar from plant juices and nectar, which they use for flight energy. The female uses the protein found in red blood cells to manufacture eggs. Males do not need blood and do not bite animals or humans. Adult mosquitoes usually do not fly further than 1 to 4 miles, but some species such as *Aedes vexans* can fly 20 miles if weather conditions are right. *Culex* and *Anopheles* mosquitoes over-winter as adults.



Methods of Mosquito Control

The foundation of our abatement program is based on the principles of integrated pest management (IPM). IPM is a mosquito control effort that minimizes deleterious effects on the environment and non-target organisms while utilizing the most efficient means of mosquito control available. Through the IPM program we reduce and control the local mosquito populations by employing a combination of various control methods such as scouting, monitoring, larviciding, adulticiding, and source reduction (the physical reduction of mosquito breeding sites). The NSMAD's IPM program also includes an education program for both employees and the public. This education program helps the District teach residents how they can help reduce breeding sites on their property and thereby help control our local mosquito population.

There are three principal methods of control the NSMAD uses to manage the mosquito population:

- **Source Reduction**
- **Larviciding**
- **Adulticiding/Barrier control**

Source reduction (commonly known as the elimination and/or reduction of breeding sites) is one of the most effective methods of mosquito control carried out by the NSMAD. NSMAD employees inspect and clear debris from culverts, ditches, and stagnant streams. This labor-intensive process ensures rapid drainage of the standing water, thereby preventing the development of mosquito larvae. Even with an effective source reduction program in place, adult mosquito populations will periodically reach intolerable and unsafe population densities-especially in higher-than-average rainfall years. During these periods larviciding and adulticiding together, prove to be the most efficient and effective method of control in addition to source reduction.

Larviciding is aimed at controlling mosquito larvae at the source of reproduction where it is most concentrated and vulnerable. *Approximately 80-90% of the District's field program is focused on controlling mosquito larvae in an average season, thus larviciding is the major operational program of the District.* We treated approximately 5,000 sites and over 50,000 catch basins. Swampy lowland areas, new construction sites, ditches along roadways, railroad right-of-ways, flooded yards, storm sewers, and other small temporary impoundments of water, were all potential sources of mosquito reproduction when the water was stagnant for approximately 6-10 days without treatment. Fishponds and ornamental pools were also inspected periodically for the presence of mosquito larvae. Treatment of these mosquito-breeding sites is the primary objective of the larviciding program. The inspection of these areas continues throughout the summer on a weekly basis.

When larviciding, the NSMAD uses pellets and briquettes containing methoprene (an insect growth-regulator that is similar to that found naturally in mosquito larvae) as the primary means of control used to treat small enclosures of water such as poorly-maintained ornamental ponds, abandoned swimming pools and catch basins. These breeding hotspots continuously produce *Culex* mosquitoes. These chemical briquettes, when placed in these breeding sites, slowly release methoprene into the water and prevent mosquito larvae from developing past the pupae stage. It is a mosquito specific treatment; therefore other organisms in the environment (such as insects, waterfowl, and mammals) do not suffer deleterious effects.

The North Shore Mosquito Abatement's Integrated Pest Management approach of surveillance, source reduction and larviciding has proven to be the most efficient and environmentally sound method of controlling the local mosquito population. The North Shore Mosquito Abatement District is proud of its IPM program and its concern for our residents and the environment. Our goal is to make the North Shore as mosquito free as possible while protecting the public health and the environment. If residents have any questions they can visit our web site (www.nsmad.com) or contact us at (847) 466-9434 or via email at nsmad@nsmad.com.

The NSMAD also uses two types of bacterial larvicides. These larvicides are mosquito specific and are safe to humans and other mammals. In order to treat small marshes and catch basins, the district may apply *Bacillus thuringiensis var. israelensis (BTI)*. *BTI*, used in either granular, liquid, or briquette formulations, is spread over flooded land or in depressions that periodically flood or in catch basins that are not completely flushed after a heavy rain.

The District also uses *Bacillus sphaericus (B.s.)*. *B.s.* is similar to *BTI* in respect to its mosquito specificity and ability to be used in wastewater, drainage systems, tire dumps, rice fields, coastal areas, and natural or manmade aquatic sites. However, in contrast to *BTI*, *B.s.* can be applied in stagnant and polluted water-areas where the encephalitis transmitting *Culex sp.* breeds.

Supplementing the larviciding program are both the **barrier** and **adulticiding** programs. The barrier control program was initiated during the 2000 season. Based on its successful trial in 2000, it became an integral part of the annual mosquito control campaigns. The barrier control program is a mosquito control project that aims to protect a specific and limited area. Heavily vegetated areas that will attract or harbor mosquitoes are treated. The treatment consists of an application of permethrin by either a hand-held ULV sprayer or a backpack sprayer. The permethrin is applied directly to bushes, tall grasses, and/or extreme ground cover creating a repellent barrier. The applications have been successful and have resulted in control that lasted up to four weeks.

The **adulticiding** program is a highly regulated and last-ditch effort to control mosquitoes. It is initiated only in the evening and only when mosquito populations pose a health threat to the community. If adulticiding is embarked upon, then depending on the data, NSMAD puts into place a program to either cover the District's hot spots or begin a systematic sweep of the entire district. The NSMAD's most experienced employees, who are licensed by the Illinois Department of Agriculture, perform the adulticiding. Misting operations are conducted in a systematic section-by-section (section=1 square mile) manner for control of adult mosquitoes. This effort is undertaken to reduce or interrupt the adult mosquito population from a rapid reproductive cycle or multiplier mode. NSMAD trucks are equipped with either a LECO CV/VF Flow Control or a Clarke SmartFlow unit that produce a non-thermal and ultra-low volume mist of Anvil insecticide. The control units maintain a uniform discharge of 6 - 7 fluid ounces of Anvil per minute at a vehicle speed of ten miles per hour, which results in an output of 0.0012 - 0.0018 lbs. of active ingredient per acre as recommended by the product label and the State of Illinois Department of Agriculture guidelines.

The NSMAD only conducts adulticiding at night when mosquitoes are most active and other insects are not. This minimizes exposure to non-target insects (i.e. bees).

The NSMAD maintains a Prior Notification List of residents who either wish to be notified or do not want their property treated. When the District is going to adulticide in the immediate neighborhood of these residents, a telephone call is made by a NSMAD employee to each resident on the list to notify them of when spraying will be performed. This allows the residents to take any precautions they may deem necessary. In addition to making the telephone calls, every operator of an adulticiding truck is issued a map with the locations of persons who are on the list, and upon the request of the resident, the truck operator shuts the misting pump off when passing their property. This list is continuously checked and updated throughout the year for corrections, revisions and/or additions. Any individual or family may be placed on this list by contacting the District office via telephone during normal business hours or through the NSMAD web site (www.nsmad.com).

Alternative Mosquito Control

There are few alternatives to using pesticides for controlling adult mosquitoes. One of the more successful alternatives to pesticides for controlling mosquitoes is the use of *Gambusia*, also known as mosquito fish, which can eat large numbers of mosquito larvae. Caution is advised when using these fish so as to not upset native species.

The Citrosa plant will, when the leaves are moved, release citronella, a natural and well-known, but not always effective, mosquito repellent. You may find citronella in lotions, but more commonly you will find it sold as candles. However, there are no known plants that prevent mosquitoes from biting or entering a house.

Bug zappers will not effectively reduce the number of mosquitoes found around homes and in fact may act to attract more to the property. Products known as “mosquito magnets” may be effective for residents with large pieces of property. They have been shown to attract mosquitoes. However, it is not known if they are attracting more mosquitoes than would normally appear. Placement of these devices is very important; they should be as far away from areas where people will congregate or you are only inviting mosquitoes to bite you.

The most effective method to prevent mosquito bites is to wear loose clothing that covers all parts of the skin in combination with an insect repellent that contains DEET. The best commercial repellent you can buy should contain 7% to 30% DEET. DEET repels mosquitoes, no-see-ums, fleas, ticks, gnats, horse flies, deer flies, yellow flies, and chiggers.

Bats and Purple Martins are not effective options for adult mosquito control. Research conducted in the 1950s indicated that bats released in a room filled with mosquitoes could catch up to 10 mosquitoes per minute. The research was conducted to measure the effectiveness of echolocation in insectivorous bat species. The results have been extrapolated to suggest that wild bats can consume 600 mosquitoes per hour. Using that figure, a colony of 500 bats will remove 250,000 mosquitoes each hour and theoretically afford mosquito control for an entire neighborhood.

Research since that time has shown that insectivorous bats are opportunistic feeders and that mosquitoes make up a very small percentage of their natural diet. Bats' behavior when locked in a room with nothing to feed upon but mosquitoes has no bearing on their behavior in the wild. Bats feed on the same insects that turn up in bug zappers and are no more effective for controlling mosquitoes than their electronic equivalent. Providing habitat to enhance bat populations is an admirable activity for conservation purposes. Using mosquito control as the reason to initiate public interest is misleading at best.¹ Additionally, bats are known to carry rabies, a very serious health threat to both humans and other mammals.

Purple Martins, like all swallows, are aerial insectivores. They eat only flying insects, which they catch in flight. Their diet is diverse, including dragonflies, damselflies, flies, midges, mayflies, stinkbugs, leafhoppers, Japanese beetles, June bugs, butterflies, moths, grasshoppers, cicadas, bees, wasps, flying ants, and ballooning spiders. Martins are not, however, prodigious consumers of mosquitoes as is so often claimed by companies that manufacture martin housing. An intensive 7-year diet study conducted at PMCA headquarters in Edinboro, PA, failed to find a single mosquito among the 500 diet samples collected from parent martins bringing beakfuls of insects to their young. The samples were collected from martins during all hours of the day, all season long, and in numerous habitats, including mosquito-infested ones. Purple Martins and freshwater mosquitoes rarely ever cross paths. Martins are daytime feeders, and feed high in the sky; mosquitoes, on the other hand, stay low in damp places during daylight hours, or only come out at night.²

**A Note Regarding Repellents:
The entire label should be read before choosing what is best for you. You should be sure to read and follow the directions before applying repellent. Contact your physician before applying any repellents or insecticides.**

1 <http://www.rci.rutgers.edu/~insects/propprom.htm>

2 The Purple Martin Conservation Association web site (<http://www.purplemartin.org>)

The Laboratory

The function of the laboratory is to evaluate the local mosquito population density, evaluate the season's control techniques, and implement the larviciding and adulticiding programs. Mosquito population evaluations are based on adult mosquito samples collected by 26 traps (12 permanent light traps, 14 gravid) located throughout the district.

Since the philosophy of the District emphasizes the utmost importance of the proper use of mosquito larvacides and adulticides, the laboratory personnel instruct the part time employees with hands-on-training techniques. Through the hands-on training program, the laboratory teaches the District's seasonal employees in obtaining their licenses through instruction in the following areas: safety procedures, equipment use, proper application techniques and rates and field training. After the training workshops, all workers are required by the NSMAD conditions of employment and Illinois law, to take and pass state insecticide operator or applicator exams. The exams are developed by the Illinois Department of Health and administered by the Illinois Department of Agriculture. All workers are encouraged to bring any special problems or questions to the laboratory during the summer mosquito season.

The laboratory is responsible for monitoring the truck mounted Ultra Low Volume (ULV) misting units, hand held ULVs, and backpack sprayers. A number of calibration tests are conducted throughout the year to insure that the proper discharge amounts and droplet size are being applied.

Record keeping is an important part of the season-to-season operation of our District. Laboratory personnel update and modify new data with the use of the District's computer systems for review and evaluation of the progress of the program both during the season and at the end of each season. They also create and change area maps as new developments through out the District change its landscape. District personnel also change and modify the maps, documenting new larvicide sites and adulticide routes while deleting those that no longer exist.

Winter provides a time to review and plan for the next mosquito season. This upcoming winter our projects include:

1. Updating district road maps.
2. Revising and amending larviciding maps that were extensively resurveyed during the summer.
3. Implementation of a Geographic Information System (GIS) program.
4. Completing the District's annual records and reports.
5. Updating the larviciding log records.
6. Equipment maintenance, repair and set-up of vehicles.
7. Complete breakdown of ULV equipment.
8. General maintenance of offices and shop areas.
9. Updating the prior notification list.
10. Surveillance of new *Culex sp.* breeding sites.
11. Larviciding and monitoring of adult mosquitoes in the Water Reclamation District in Skokie.
12. Further development of community outreach and educational programs.

Trap Report

Monitoring of mosquitoes is accomplished by examining counts brought in from the 26 traps distributed geographically throughout our district. The 12 permanent light traps are set up in residential yards where they run off electricity and a light bulb triggered by a photocell. Mosquitoes are attracted to the light and a fan blows the mosquito into a jar that contains a pest kill strip. The 14 gravid and three

During the 2005 season, a total of 52,035 adult mosquitoes were captured. Of the adult mosquitoes captured, 49,366 were female. This reflects a 16% increase in the number of mosquitoes captured in 2005 as compared to 2004.

Overall, 1484 mosquito pools were tested for West Nile Virus, of which 422 were positive a 300% increase from 2004.

CO2 traps were set up at different sites throughout the season and collections from all these were taken many times a week throughout the season. Counts of *Culex* mosquitoes from these traps not only gives an indication of the mosquito populations, but they also help the NSMAD and the Illinois Department of Public Health (IDPH) test for St. Louis Encephalitis, Eastern Equine Encephalitis, and West Nile

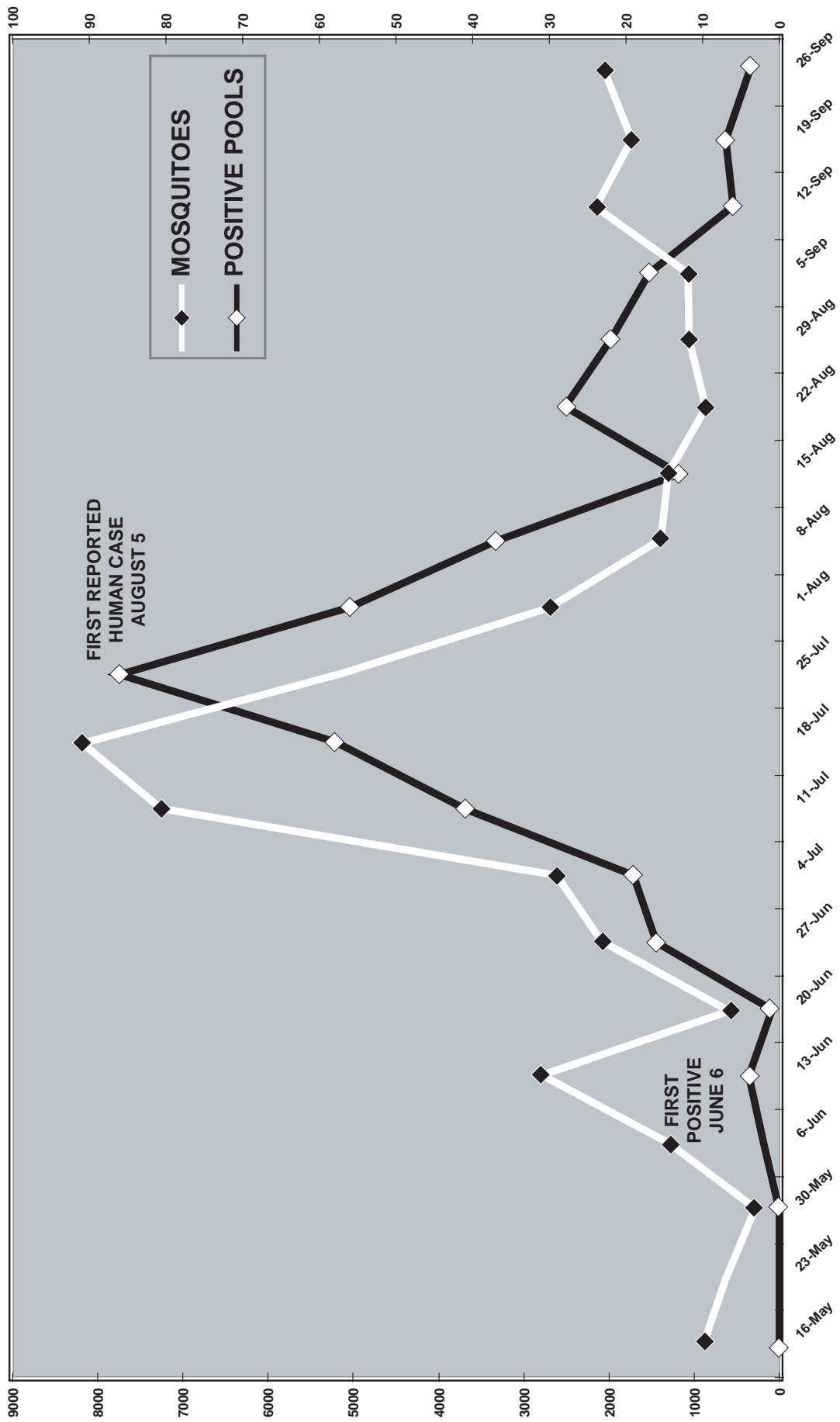
Virus.

Mosquito pools were tested in the laboratory for WNV, SLE and EEE via VecTest. Pools of *Culex* mosquitoes were also sent to the University of Illinois Natural History Survey Medical Entomology Annex (INHS) in Champaign, Illinois for analysis via a more sensitive testing procedure known as a RT-PCR test.

In early August of 2005, the INHS requested that the NSMAD reduce the amount of mosquitoes in a sample pool to 30 from 50. This was done to obtain a more accurate picture of infection rates in the local mosquito population. For instance, if a pool of 50 mosquitoes tests positive for WNV, it would be said that 1:50 mosquitoes were positive. When the pool is reduced to 30mosquitoes, the ratio becomes 1:30 mosquitoes testing positive for WNV. This shows a more accurate infection rate among the mosquito population and the risk of transmission to humans.

2005 WNV POSITIVE POOLS BY VILLAGE	
EVANSTON	72
GLENCOE #2	6
GLENVIEW/GOLF	54
KENILWORTH	40
LINCOLNWOOD	27
MORTON GROVE	5
NILES	42
NORTHBROOK	22
NORTHFIELD	92
SKOKIE	40
WILMETTE	0
WINNETKA	22
TOTAL WNV POSITIVE POOLS	422

2005 TRAP COUNTS and WNV POSITIVE POOLS



Education and Public Information

The District instructs full and part-time employees on the measures that homeowners should participate in to reduce potential mosquito breeding sites on private property. One such educational effort resulted in the door-to-door distribution of an informational brochure that described types of potential breeding sites, remedies for reducing those breeding sites and the importance of wearing repellents.

Members of NSMAD visited with Public Health officials from within our district and the state to keep them apprised of our activities. A weekly status report was delivered via email with updates about mosquito testing. During the season, media interviews were conducted to cover timely topics such as repellent usage, WNV, trap counts, testing data, and when adulticiding was conducted in the District. In addition, the District had a 24-hour "Hot Line" to enable the residents in the District to call in and determine the status of our program and inform us of matters that we can address (i.e. larviciding, and high adult mosquito activity in a specific area).

In May, the NSMAD hosted its first annual West Nile Virus Symposium at the Morton Grove Village Hall. Public health, park district, public works, and elected officials were invited to attend. The numerous attendees were treated to presentations by some of the leading experts in the field of mosquitoes and vector borne diseases.

In 2004, the NSMAD distributed copies of a video about WNV by the Centers for Disease Control to every public library and public health official in the district. As the risk of WNV infection began to increase in the 2005 season, the NSMAD strongly encouraged the broadcast of this video through cable access and other local opportunities. NSMAD employees attended numerous public events throughout the season with our public information booth. The NSMAD appears at these events to speak with residents and answer questions. The public information booth visited Northbrook's Earth Day celebration again this year. The NSMAD information booth is available to appear at community events upon request.

The Superintendent spoke to various organizations throughout the course of the year: The North Shore Senior Center, the Lincolnwood Board of Trustees, the Northwest Municipal Conference of Public Health Officials.

Employees also attended many meetings with Federal, State, and local health officials throughout the summer and into December regarding WNV. These meetings allow the local MADs and health agencies to come together, cooperate and exchange ideas and knowledge regarding mosquito borne diseases.

Improvements made to the NSMAD web site (www.nsmad.com) in 2004, were refined and expanded to include mosquito pool testing results. In addition to a new look, the site has been streamlined for ease of use and to further inform the public on a more timely basis. Residents can use the web site to find out where and when adulticiding will be taking place, reporting dead birds, catch basins and standing water.

2005 COMBINED BUDGET AND APPROPRIATIONS

PURCHASE OF EQUIPMENT & SUPPLIES	\$ 141,300.00
BUILDING MAINTENANCE & REPAIRS	\$ 3,000.00
UTILITIES	\$ 27,870.00
LEGAL & AUDIT	\$ 47,000.00
SALARIES & WAGES	\$ 558,114.00
SOCIAL SECURITY & IMRF	\$ 57,000.00
INSURANCE & SURETY BONDS	\$ 178,925.00
CONTINGENCY	<u>\$ 2,000.00</u>
	\$ 1,015,209.00

PESTICIDE USAGE

Larvicides

Agnique MMF 30 gallons

Altosid 30 Day 250 lbs

Altosid 150 Day 514 lbs

Vectolex CG 720 lbs

Adulticides

Anvil 2+2 ULV 330 gallons

Permethrin 13+3 1 gallons

2005 VEHICLE AND EQUIPMENT REPORT

VEHICLES

- 1 1986 Chevy 1500 Pick-Up Truck**
- 1 1989 Chevy S-10 Pick-Up Truck**
- 1 1990 Chevy 1500 4x4 Pick-Up Truck**
- 2 1993 Chevy S-10 Pick-Up Trucks**
- 3 2000 GMC Sonoma Pick-Up Trucks**
- 1 2001 GMC Sonoma Pick-Up Truck**
- 1 2001 GMC Sierra Pick-Up Truck**
- 2 2002 GMC Sonoma Pick-Up Trucks**
- 1 2003 Mazda Tribute SUV**
- 3 2004 GMC Canyon Pick-Up Trucks**

EQUIPMENT

- 4 LECO ULV CF**
- 3 Cougar ULV**
- 11 Solo Pump Sprayers**
- 25 New Jersey Light Traps**
- 20 Gravid Traps**
- 1 Aero Gun Larviciding Applicator**
- 4 Maruyama Backpack Misters**
- 8 Co2 Traps**
- 2 LECO Handheld ULV**

Updated Information Regarding Insect Repellents from the Centers for Disease Control, April 22, 2005

Repellents are an important tool to assist people in protecting themselves from mosquito-borne diseases. A wide variety of insect repellent products are available. CDC recommends the use of products containing active ingredients that have been registered with the U.S. Environmental Protection Agency (EPA) for use as repellents applied to skin and clothing. EPA registration of repellent active ingredients indicates the materials have been reviewed and approved for efficacy and human safety when applied according to the instructions on the label.

Of the active ingredients registered with the EPA, two have demonstrated a higher degree of efficacy in the peer-reviewed, scientific literature. Products containing these active ingredients typically **provide longer-lasting protection than others:**

- DEET (N,N-diethyl-m-toluamide)
- Picaridin (KBR 3023)

Oil of lemon eucalyptus [p-menthane 3,8-diol (PMD)], a plant based repellent, is also registered with EPA. In two recent scientific publications, when oil of lemon eucalyptus was tested against mosquitoes found in the US it provided protection similar to repellents with low concentrations of DEET.

These recommendations are for domestic use in the United States. See [CDC Travelers' Health website](#) for specific recommendations concerning protection from insects when traveling outside the United States.

In addition, certain products, which contain permethrin, are recommended for use on clothing, shoes, bed nets, and camping gear, and are registered with EPA for this use. Permethrin is highly effective as an insecticide and as a repellent. Permethrin-treated clothing repels and kills ticks, mosquitoes, and other arthropods and retains this effect after repeated laundering. The permethrin insecticide should be reapplied following the label instructions. Some commercial products are available pretreated with permethrin.

Length of protection from mosquito bites varies with the amount of active ingredient, ambient temperature, amount of physical activity/perspiration, any water exposure, abrasive removal, and other factors. For long duration protection use a long lasting (micro-encapsulated) formula and re-apply as necessary, according to label instructions.

EPA recommends the following precautions when using insect repellents:

- Apply repellents only to exposed skin and/or clothing (as directed on the product label.) Do not use repellents under clothing.
- Never use repellents over cuts, wounds or irritated skin.
- Do not apply to eyes or mouth, and apply sparingly around ears. When using sprays, do not spray directly on face—spray on hands first and then apply to face.
- Do not allow children to handle the product. When using on children, apply to your own hands first and then put it on the child. You may not want to apply to children's hands.
- Use just enough repellent to cover exposed skin and/or clothing. Heavy application and saturation are generally unnecessary for effectiveness. If biting insects do not respond to a thin film of repellent, then apply a bit more.

- After returning indoors, wash treated skin with soap and water or bathe. This is particularly important when repellents are used repeatedly in a day or on consecutive days. Also, wash treated clothing before wearing it again. This precaution may vary with different repellents—check the product label.
- If you or your child get a rash or other bad reaction from an insect repellent, stop using the repellent, wash the repellent off with mild soap and water, and call a local poison control center for further guidance. If you go to a doctor because of the repellent, take the repellent with you to show the doctor.

Note that the label for products containing oil of lemon eucalyptus specifies that they should not be used on children under the age of three years. Other than those listed above, EPA does not recommend any additional precautions for using registered repellents on pregnant or lactating women, or on children. For additional information regarding the use of repellent on children, please see CDC's Frequently Asked Questions about Repellent Use.

[http://www.cdc.gov/ncidod/dvbid/westnile/qa/insect_repellent.htm]

DEET-based repellents applied according to label instructions may be used along with a separate sunscreen. No data are available at this time regarding the use of other active repellent ingredients in combination with a sunscreen.

See <http://www.epa.gov/pesticides/factsheets/insectrp.htm> for additional information on using EPA-registered repellents.

Homeowner/Resident Tips

The following are recommendations from the Illinois Department of Public Health as preventive measures that can be taken against mosquitoes:

1. Clean and properly maintain catch basins that hold water.
2. Cut, remove, and properly discard excess overhanging vegetation along or over the banks of drainage ditches or stagnant slow-moving streams, especially those that receive effluent from sewage treatment plants or where other waste may enter a stream.
3. Cut, remove, and properly discard excess vegetation and weeds around the margins of cannery waste lagoons, hog lagoons, sewage lagoons, and similar operations, so that a shaded canopy of vegetation is not allowed to provide an ideal environment for the development of the mosquito.
4. Clean out debris, broken tree limbs, and objects that impede the normal stream flow so polluted pockets of water do not remain. Also, remove discarded containers.
5. Prevent drainage of improperly treated sewage effluent into drainage ditches and other low areas by assuring that private sewage systems are installed in compliance with applicable local, state, and federal codes.
6. Stack pails, barrels, tubs, vases, wheelbarrows, and similar containers upside down so water does not accumulate in them.
7. Fill or drain any low places where water may stand for more than a week.
8. Inspect and clean rain gutters and downspout if leaves or other debris blocks them.
9. Collect and properly discard all useless artificial containers and old tire casings.
10. Properly maintain backyard swimming pools to discourage the development of mosquitoes by draining and covering any pool not in use.
11. **WEAR REPELLENT!** Wearing repellent is the most effective way to prevent mosquito bites. Studies have shown that wearing repellent may reduce the chance of acquiring a mosquito borne illness by as much as 50%.