Annual Report 2009

North Shore Mosquito Abatement District

117 Northfield Road
Northfield, IL 60093
www.nsmad.com
P: (847) 446-9434
F: (847) 446-0248

NORTH SHORE MOSQUITO ABATEMENT DISTRICT

2009 ANNUAL REPORT

TRUSTEES

WILLIAM ZIMMER, President
CAROL BLUSTEIN, Vice-President
JOHN M. ZBESKO, Treasurer
OTTO CESARIO, Vice- Treasurer
NELSON HOWARD, Secretary

SUPERINTENDENT

ROBERT BERRY

ATTORNEY

NORMAN ROSEN

Report prepared under the direction of Superintendent Robert Berry with the assistance of the staff of the NSMAD.

TABLE OF CONTENTS

PREFACE

The economy played an important role in mosquito control this past year. The amount of foreclosures, neglected properties and homes on the market for an extended period of time increased dramatically within the boundaries of the NSMAD. These types of properties require the additional use of NSMAD resources that would otherwise not be required. The cost in product alone to treat one home that had been neglected due to foreclosure was close to $90.00.

Weather also played an important role in the progression of the mosquito season in 2009. In fact, 2009, was the coolest summer in many years. Below normal temperatures in July and August helped to minimize West Nile virus infections. Several heavy rain events, favorable for flushing out catch basins, a predominant environment for *Culex* breeding, led to another floodwater mosquito boom earlier in the season. While the floodwater type mosquitoes found in the area are not known to carry WNV, they are aggressive biters, even during daytime hours.

There were no human incidences of WNV within the NSMAD this year as compared to three confirmed cases in 2008. The Illinois Department of Public Health reported that there were five human cases statewide in 2009, with no deaths. Reasons for the fewer human cases may be due to more people being aware of the dangers related to mosquito bites. Continued public information campaigns by the NSAMD as well as media coverage play a role in the education of the public at large.

Unsettling is the fact that since 2004, the average age of victims of WNV in Illinois has decreased dramatically. Since 2003 the average age has declined from 59 years to 51 years of age. Additionally, neuroinvasive or severe, human cases are rising and in many states, including Illinois, occurred more frequently than fever or milder cases. Four of the five human WNV cases occurring in Illinois during 2009, were neuroinvasive.

Recent research indicates that numerous bird species are carriers of WNV and play a major role in the infection cycle. Whereas many crows and blue jays died in 2002 from WNV, it appears that robins and sparrows are now a significant part of the transmission cycle. Although the virus is not always fatal for these species their survival expands the transmission cycle by providing additional opportunities for mosquitoes to feed on infected birds. This is another example of how the virus and the mosquito as a vector of the virus continue to adapt.

You can find details of the NSMAD surveillance and collection data in this 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 vital component residents can do to help in the fight against West Nile Virus.

Introduction To The North Shore Mosquito Abatement District

The passage 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 organization of a mosquito abatement program for the North Shore of Cook County. This led to the establishment of the North Shore Mosquito Abatement District (NSMAD), which was officially chartered on December 8, 1927. This year, with support of the citizens of our district, we have successfully completed our 82nd year of public health service. We are looking forward to continuing our success into our 83rd 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 municipalities 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 more than 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 eight 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 Field Supervisor directs seasonal employees to insure that proper mosquito control methods are being conducted and reports to the Operations and Laboratory Manager. The staff also includes an Office Manager, a Technology Specialist and a Chief Field Inspector. The Shop Supervisor is responsible for maintenance of vehicles and other mechanical equipment while the Communications Manager is responsible for public and media relations, community outreach and educating the public about mosquito borne illness and preventative measures.

The District office, laboratory and maintenance facility 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 or flu-like to severe, including paralysis, coma and death. Recovery from these diseases can be a long and painful process, with some infected persons never fully returning to a healthy status. Unfortunately, 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 then quickly spread across the country. According to the Centers for Disease Control, every state has reported WNV activity with the exception Alaska and Hawaii.

As of December 8, 2009, the CDC reported 663 people were infected with 30 deaths nationwide. In Illinois, the incidence of WNV was considerably less then the previous year. At the time of this report, 5 cases of WNV have been reported with no 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.

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. Cook County had 634 human cases in 2002 and 41 deaths. Cooler temperatures in 2003 and 2004 are believed to have contributed to fewer human cases in Cook County. In 2003, Cook County had 20 human cases and one death. In 2004, Cook County had 21 human cases reported and two deaths. Unfortunately the hot, dry summers of 2005 and 2006 brought an increase in human cases of WNV. There were 252 human cases in 2005 and 12 deaths and 215 human cases with 10 deaths in 2006. In 2007, there were 101 human cases with four fatalities. 2008 and 2009 saw significant reductions in human illness due to continued abatement efforts and climate conditions.

It is very difficult to project human WNV infections from year to year as several variables are unknown, such as temperature, rainfall, and infection rates among birds and mosquitoes. Surveillance by NSMAD will help to determine the risk factors for contracting WNV during the 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, SLE 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 SLE 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.

Mosquitoes testing positive for SLE were found in three Illinois counties this year: Adams, Tazewell and Williamson.

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 of the genus *Plasmodium* infect the red-blood cells of humans - continues to devastate many countries both financially and physically 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 repellant 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 more than 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. Additionally, as the climate continues to change, species of mosquitoes that would normally not be found in the area are beginning to appear. If these species are able to become established in northern latitudes there could be further spreading of mosquito borne illnesses.

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 endemnicity. WNV existed outside the U.S. for at least 60 years before infections occurred in New York during 1999. Mosquitoes and the diseases they may carry 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 The North Shore Mosquito Abatement District will continue to survey and test mosquitoes found in our neighborhoods, park and forest preserves for disease, while working 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 can 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 most annoying after dark and at dusk. During the day, they tend to rest in tall grass and other vegetation but will become extremely aggressive when disturbed.

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 predominately active 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.

Two species that have begun to appear in the area are the Asian Tiger mosquito (*Aedes albopitus*) and the Japanese Rock Pool mosquito (*Ochlerotatus japonicas*). Both species are aggressive daytime biters. The Asian Tiger mosquito first came to the U.S. from Asia in used tires. What effect these two species will have on the potential transmission of various diseases remains to be fully discovered.

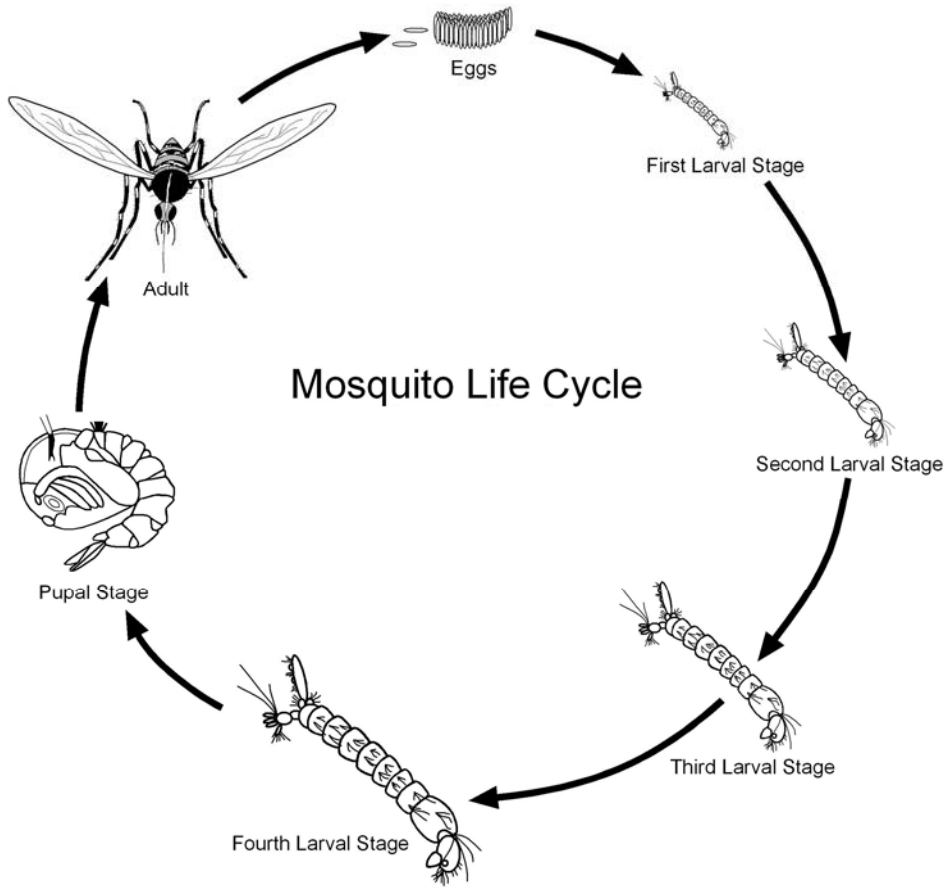
The Mosquito Life Cycle

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 can survive the winter as eggs.

II. The Larval Stage. Mosquito larvae must develop in standing water. They breathe through an air tube at the rear of their bodies. Larvae (wrigglers) 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 the fourth instar, larvae shed their skins and become pupae (tumblers). 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 a blood meal and do not bite. 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.



Operations: 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.

Since the IPM philosophy of the District emphasizes the utmost importance of the proper use of mosquito control methods and products, employees are instructed in the following areas: safety procedures, equipment use, proper application techniques, rates and field training. After the completion of training, 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 were 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.

Methods of Mosquito Control

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

- **Source Reduction**
- **Larviciding**
- **Adult Mosquito 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. ***During an average season, approximately 80-90% of the District's field program is focused on controlling mosquito larvae.*** We treat approximately **5,000** off-road sites and more than **50,000** catch basins every year. Swampy lowland areas, new construction sites, ditches along roadways, railroad right-of-ways, flooded yards, storm sewers, and other small temporary impoundments of water, are all potential sources of mosquito reproduction when the water was stagnant for approximately 6-10 days without treatment. Fishponds and ornamental pools are 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.

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.

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 NSMAD also uses two types of bacterial larvicides *Bacillus sphaericus* (*B.s.*) or *Bacillus thuringiensis var. Israelensis* (*BTI*). These larvicides are mosquito specific and pose very little risk to humans and other animals. In order to treat small marshes, wastewater, drainage systems, tire dumps, and natural or manmade aquatic sites and catch basins, the district may apply either of these bacterial larvicides in either granular or liquid formulations. *Bacillus sphaericus* can be applied to stagnant and polluted water-areas where the encephalitis transmitting *Culex sp*. breeds and flood prone areas swhere nuisance mosquitoes may breed.

Supplementing the larviciding program is the **adult mosquito control** program**.** The adult mosquito control program is comprised of barrier and truck mounted insecticide applications. The barrier control program was initiated during the 2000 season. Based on its successful trial in 2000, it became an integral part of adult mosquito control. Barrier control is utilized in order 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 repellant barrier. The applications have been successful and have resulted in control that lasted up to four weeks depending on weather conditions.

The use of the NSMAD's truck mounted ULV sprayers is a highly regulated and last-ditch effort to control adult mosquitoes. It is initiated only in the evening and only when mosquito populations pose a health threat to the community. If truck mounted ULV control operations is embarked upon, then depending on the data, the 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, operate the truck mounted ULVs. Truck mounted ULV 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. The NSMAD's trucks are equipped with GPS enabled Clarke SmartFlow control units. Based on the speed of the vehicle, these control units constantly adjust the flow of the insecticide Anvil 2+2 in order to maintain the proper application rate of 0.0018 - 0.0024 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 conducted. 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. Residents who wish to have their property skipped during adulticiding operations should provide the NSMAD with a physician's note supporting a medical reason for such action. Please contact the NSMAD via telephone during normal business hours for further information.

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.

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.

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 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]

1 http://www.rci.rutgers.edu/~insects/proprom.htm

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

Operations: Off-Season

Winter provides a time to review and plan for the next mosquito season. Off-season projects typically 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. General maintenance of offices and shop areas.
8. Updating the prior notification list.
9. Identifying potential new mosquito breeding sites.
10. Larviciding and monitoring of adult mosquitoes in the Water Reclamation District in Skokie.
11. Further development of community outreach and educational programs.
12. Attending industry and public health meetings to maintain best practice standards.

Laboratory Report

The function of the laboratory is to monitor the local mosquito population for density, potential diseases and recommend the appropriate control methods. Monitoring of mosquitoes is accomplished by examining specimens brought in from the 25 traps distributed geographically throughout our district. The 11 light traps were set up in residential yards where access to electricity runs 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. Floodwater mosquitoes are typically captured in light traps.

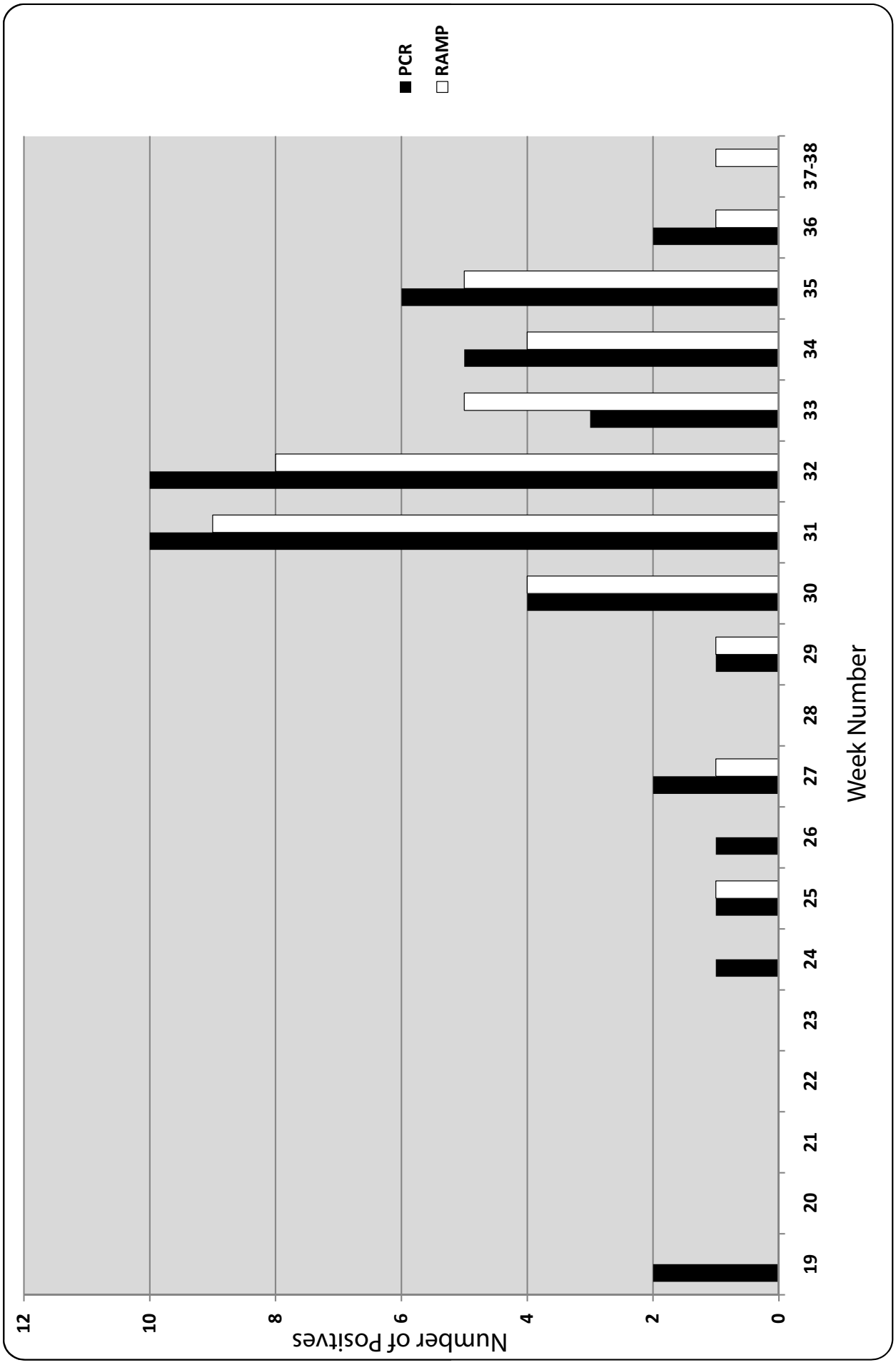
During the 2009 season, 1027 mosquito pools were tested for West Nile Virus, of which 54 were positive. While 5.25% of the total number of mosquitoes tested positive for WNV this year, the NSMAD saw a spike of 22% in early August, initiating an adult control response. Experts consider a level of 10% positive mosquitoes to be of greater risk for transmission to humans.

The 14 gravid and three CO2 traps were set up at different sites throughout the season and collections were made three times per week. Gravid and CO2 traps are used to capture *Culex* mosquitoes, the vector of WNV and other potential diseases in this area. 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 via RAMP Test/VecTest. These sample pools of 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 addition to WNV, the INHS also tests mosquitoes for SLE and EEE.

2009 WNV POSITIVE POOLS BY VILLAGE	
EVANSTON	15
GLENCOE	0
GLENVIEW/GOLF	13
KENILWORTH	1
LINCOLNWOOD	1
MORTON GROVE	9
NILES	3
NORTHBROOK	3
NORTHFIELD	0
SKOKIE	0
WILMETTE	6
WINNETKA	3
TOTAL WNV POSITIVE POOLS	**54**

Positive Mosquito Pools By Week



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 is the door-to-door distribution of an informational door hanger that describes remedies for reducing breeding sites and the importance of wearing repellents.

Members of the NSMAD visit with public health officials from within our district and the state to keep them apprised of our activities. A weekly status report is delivered via email with updates about operations and mosquito testing. During the season, media interviews are conducted to cover timely topics such as repellent usage, WNV, trap counts, testing data, and when adult mosquito control operations are to be conducted in the District. In addition, the District has a 24-hour hotline 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).

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. This season, the public information booth visited the Glencoe Public Works open house and participated in the Fourth of July parades in Evanston, Glenview, Morton Grove and Winnetka. The Communications Manager and Field Supervisor presented to the Evanston EcoExplorers Camp. The NSMAD information booth is available to appear at community events upon request.

The NSMAD was featured in several news media outlets this past year. The Communications Manager provided The Chicago Tribune, Chicago Sun-Times, Pioneer Press and several community newspapers information for stories about mosquitoes and personal protection measures throughout the season. The Superintendent, Communications Manager and lab personnel were interviewed by ABC-7 TV regarding mosquito problems affecting the Chicago area early in the season. The Communications Manager was interviewed by John Cody of WBBM-AM 78 in June.

The NSMAD continues to make improvements to our web site (www.nsmad.com) by including more information and links. This season, we utilized Google Maps providing a better visual reference for residents when the NSMAD conducts adult mosquito control operations. Minutes from the Board of Trustee's meetings can be found at our web site. Residents are encouraged use the web site to find out where and when adulticiding will be taking place, report dead birds, catch basins and standing water.

2009 COMBINED BUDGET AND APPROPRIATIONS

PURCHASE OF EQUIPMENT & SUPPLIES	**$ 331,626.00**
BUILDING MAINTENANCE & REPAIRS	**$ 10,000.00**
UTILITIES	**$ 38,600.00**
LEGAL & AUDIT	**$ 43,000.00**
SALARIES & WAGES	**$ 652,689.00**
SOCIAL SECURITY & IMRF	**$ 87,000.00**
INSURANCE & SURETY BONDS	**$ 182,000.00**
CONTINGENCY	**$ 63,051.00**
	$ 1,407,966.00

2009 PESTICIDE USAGE

Larvicides

Agnique MMF	25 gallons
Altosid	4,884 lbs
Vectolex CG	3,050 lbs

Adulticides

Anvil 2+2 ULV	488 gallons
Permethrin 13+3	0.5 gallons

2009 VEHICLE AND EQUIPMENT REPORT

VEHICLES

1	1986 Chevy 1500 Pick-Up Truck
1	1990 Chevy 1500 4x4 Pick-Up Truck w/ Snow Plow
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
1	2006 GMC Canyon 4x4 Pick-Up Truck
1	2007 GMC Canyon 4x4 Pick-Up Truck
1	2009 GMC Canyon 4x4 Pick-Up Truck
1	2010 Ford F150 Extended Cab Pick-Up Truck

EQUIPTMENT

2	LECO ULV CF
6	Cougar ULV
11	Solo Pump Sprayers
23	New Jersey Light Traps
30	Gravid Traps
2	Aero Gun Larviciding Applicator
4	Maruyama Backpack Misters
8	Co2 Traps
1	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 to 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%.