ANNOUNCEMENT

National Mosquito Control Awareness Week
June 22 – June 28, 2014

The week of **June 22 – June 28, 2014** is declared as **"National Mosquito Control Awareness Week"** to educate the general public about the significance of mosquitoes in their daily lives and the important service provided by mosquito control workers.

In observance of the event, *Middlesex County Mosquito Commission* is urging residents to take a proactive approach to controlling mosquitoes in the community and guarding against bites during this week and throughout the year.

Tips to make your yard safer and more pleasant this summer:

PREVENT:

- Eliminate or manage all sources of standing water to discourage mosquito breeding.
- Make sure doors and windows have tight-fitting screens. Repair or replace screens that have tears or holes.
- Cut down weeds, trim and maintain shrubs and grass to reduce adult mosquitoes harboring in vegetation.

PROTECT:

- Stay inside at dawn, dusk and early evening when mosquitoes are most active.
- If you must be outdoors during these times, wear long-sleeved shirts and long pants.
- Apply insect repellent containing EPA-registered active ingredients such as DEET, Picaridin, IR3535, and Oil of lemon eucalyptus (PMD). Always apply according to label instructions.

REPORT:

- Contact the Mosquito Commission (732-549-0665) if there is a significant mosquito problem or need additional information.

Middlesex County Mosquito Extermination Commission
200 Parsonage Rd. Edison NJ-08837.

Mosquito Prevention and Protection

Always remember the 3 D's of protection from mosquitoes

Drain

Many mosquito problems in your neighborhood are likely to come from water-filled containers that you, the resident, can help to eliminate. All mosquitoes require water in which to breed. Be sure to drain any standing water around your house.

- Dispose of any tires. Tires can breed thousands of mosquitoes.
- Drill holes in the bottom of recycling containers.
- Clear roof gutters of debris.
- Clean pet water dishes regularly.
- Check and empty children's toys.
- Repair leaky outdoor faucets.
- Change the water in bird baths at least once a week.
- Canoes and other boats should be turned over.
- Avoid water collecting on pool covers.
- Empty water collected in tarps around the yard or on woodpiles.
- Plug tree holes.
- Even the smallest of containers that can collect water can breed hundreds to thousands of mosquitoes. They don't need much water to lay their eggs. (bottles, barrels, buckets, overturned garbage can lids, etc.)

Dress

Wear light colored, loose fitting clothing. Studies have shown that some of the 174 mosquito species in the United States are more attracted to dark clothing and most can readily bite through tight-fitting clothing of loose weave. When practical, wear long sleeves and pants.

Defend

Choose a mosquito repellent that has been registered by the Environmental Protection Agency. Registered products have been reviewed, approved, and pose minimal risk for human safety when used according to label directions. Four repellents that are approved and recommended are:

- DEET (N,N-diethyl-m-toluamide)
- Picaridin (KBR 3023)
- Oil of lemon eucalyptus (p-methane 3,8-diol, or PMD)
- IR3535

Here are some rules to follow when using repellents:

- Read the directions on the label carefully before applying.
- Apply repellent sparingly, only to exposed skin (not on clothing).
- Keep repellents away from eyes, nostrils and lips: do not inhale or ingest repellents or get them into the eyes.
- The American Academy of Pediatrics (AAP) suggests that DEET-based repellents can be used on children as young as two months of age. Generally, the AAP recommends concentrations of 10% or less, unless disease risk is imminent, then concentration can be increased to 30% or less.
- Avoid applying repellents to portions of children's hands that are likely to have contact with eyes or mouth.
- Repellents can be used by pregnant or nursing women. The EPA does not recommend any additional precautions for repellent use by pregnant or nursing women.
- Never use repellents on wounds or irritated skin.
- Use repellent sparingly and reapply as needed. Saturation does not increase efficacy.
- Wash repellent-treated skin after coming indoors.
- If a suspected reaction to insect repellents occurs, wash treated skin, and call a physician. Take the repellent container to the physician.

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mosquito.org
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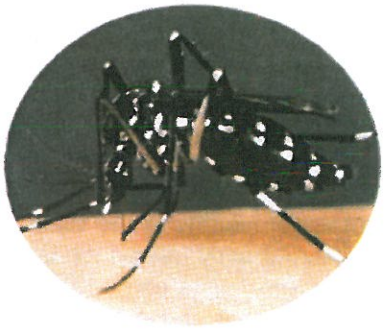
MOSQUITO-BORNE VIRUSES OF NEW JERSEY



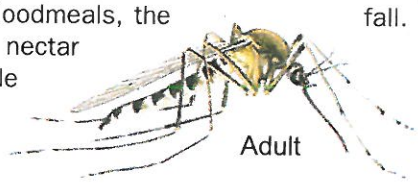
This pamphlet provides basic information on mosquito biology, the diseases they transmit in New Jersey, and the various strategies that are utilized to reduce mosquito populations and lessen the risk of humans or animals contracting mosquito-borne diseases.

Outbreaks of mosquito-borne disease are relatively rare in New Jersey due to the State's considerable mosquito surveillance and control efforts. New Jersey's mosquito control program, in existence since 1912, is one of the most comprehensive in the nation, involving a coordinated State, county and local approach. These efforts are carried out through a coordinated approach by the State Mosquito Control Commission (SMCC), the State Departments of Environmental Protection (NJDEP), Agriculture, and Health and Senior Services (NJDHSS), Rutgers University, and the 21 county mosquito control agencies. Extensive efforts are made to reduce mosquito breeding habitats and the development of immature mosquitoes. Consequently, adult mosquito populations are diminished. Each county in New Jersey conducts regular mosquito surveillance to measure mosquito populations. The State's surveillance program consists of regularly capturing and testing adult mosquitoes for the presence of viruses that are transmissible to humans or livestock. When abundant populations and/or mosquito-borne viruses are detected, appropriate control actions are taken.

MOSQUITO BIOLOGY

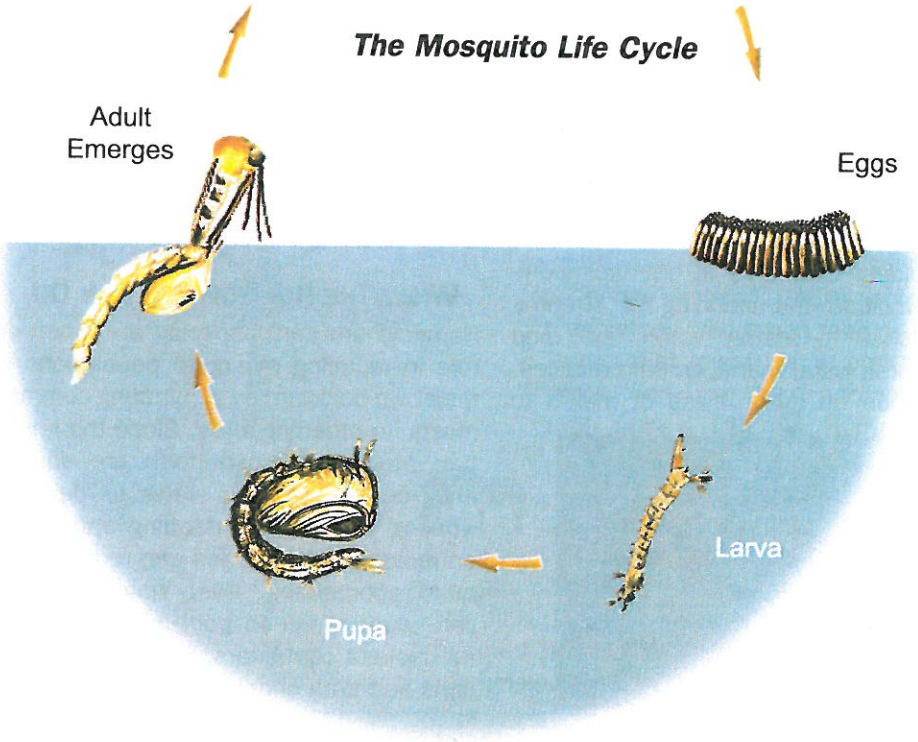
About 2600 species of mosquitoes exist throughout the world, with 160 species found in North America and 63 species in New Jersey. Fortunately, most of the mosquitoes which exist in the United States pose more of a nuisance problem than a disease threat.

Mosquito Life Cycle: Despite the many different species of mosquitoes, they all have a life cycle that requires water. To complete their life cycle, they pass through 4 developmental stages: *egg, larva, pupa,* and *adult.* The female mosquito lays her eggs on the water's surface, or at or near it's edge, depending on the species. The **eggs** hatch into **larvae**, which spend most of their time feeding on decaying plant material in the water. Larvae then develop into pupae, which also live in the water, but do not feed. Both larvae and pupae must frequently return to the water's surface to breathe. The **pupa** is mainly a resting stage in which the larvae transforms into an adult. After the **adult** mosquito emerges from the pupal case, it rests for a time to allow its 'skin' to harden. Within a week of hatching, adults mate and the females fly off to seek a bloodmeal. After feeding, the female develops and lays between 100 and 300 eggs. Between bloodmeals, the females feed on plant nectar only, which is what male mosquitoes always feed on. This mating and egg development cycle is repeated at 2 week intervals for a month or more during the warm weather season. The amount of time it takes this cycle, from egg to adult mosquito, varies with the mosquito species, temperature, humidity, rainfall and other such factors, and may range from several weeks to months.



Mosquitoes become inactive with the onset of cold weather, and must enter hibernation to survive the winter. Many species have winter-hardy eggs and hibernate in the egg stage, while a few species overwinter in the larval stage. Other species overwinter by hibernating in the adult stage after mating in the fall. In the spring, these female mosquitoes emerge, take a bloodmeal and lay eggs to start the next generation.

The Mosquito Life Cycle



Mosquito Surveillance

Larval Surveillance

Larval surveillance involves sampling a wide range of aquatic habitats for the presence of pest species during their developmental stages. Most counties have a team of inspectors that collect larval specimens on a regular basis. A mosquito identification specialist normally has the task of identifying the various larval species. Properly trained mosquito identification specialists can separate mosquito species that cause nuisance and disease from those that are non-pests or beneficial species. Responsible control programs target pest populations for control and avoid managing habitat that supports benign species.

Adult Surveillance

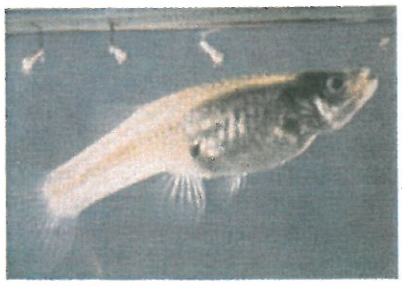
Adult surveillance measures mosquito populations that have successfully developed and emerged from aquatic habitats. The New Jersey light trap has been the standard for collecting adult mosquitoes. Most county agencies operate these traps from early May through October. Portable traps baited with carbon dioxide are useful in areas where electricity is not available. Not all mosquitoes are attracted to light; therefore, other forms of adult surveillance are frequently employed. In certain areas, 'landing rates' or 'bite counts' are used to assess the comparative size of host seeking mosquito populations. Resting boxes are used to measure populations of *Culiseta melanura*, a bird-feeding mosquito that functions in the amplification of eastern equine encephalitis (EEE) virus. Gravid traps are employed to measure *Culex* mosquitoes that amplify St. Louis encephalitis (SLE) virus and West Nile virus. (WNV)

Disease Surveillance

Since 1975, the State Mosquito Control Commission has funded a virus surveillance program that measures the size of disease-carrying mosquito populations during the summer season. Specimens are tested for virus on a weekly basis. Mosquito collections are made at permanent study sites by staff from the New Jersey Agricultural Experiment Station (NJAES). A wide range of assistance and support is provided by local mosquito control agencies in this effort. Mosquitoes are tested for virus at the NJDHSS laboratories by immunoflourescent antibody (IFA) and polymerase chain reaction (PCR) technology. With the emergence of WNV as a concern, wild birds (especially crows) will also be monitored and 'sentinel' chicken flocks will be placed in each county and their blood tested for WNV. Such surveillance programs provide an early warning system for detecting mosquito-borne viruses. When detected, control measures can be enhanced to prevent any human infections.

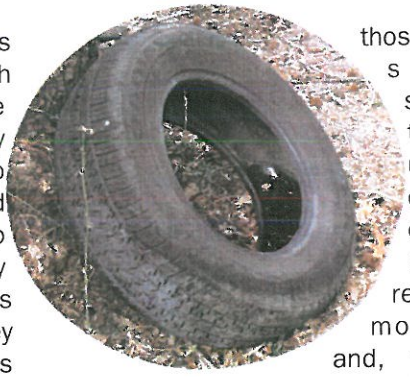
Mosquito Control

Professional mosquito control in New Jersey is perhaps one of the best examples of successful integrated pest management (IPM). Today's IPM programs include a variety of control strategies, including habitat management, the use of natural predators, and the careful use of insecticides. In New Jersey, mosquito control agencies are constantly working to eliminate or modify mosquito breeding sites. Mosquito larvae are also controlled using special larvae-eating fish and insecticides. This integrated approach serves to reduce adult mosquito populations and consequently minimize the application of insecticides. Examples of habitat modification include the cleaning of streams and ditches to restore water flow, and open marsh water management practices, which open up more areas of marsh to tidal flow. The latter method increases access to mosquito breeding sites by fish that eat larval mosquitoes. In some cases, it may be necessary to apply insecticides to reduce larval mosquito populations. If such techniques are used to control the larval stages, spraying to kill adult mosquitoes is either greatly reduced, or unnecessary. All products used for mosquito control in New Jersey are registered by the United States Environmental Protection Agency (USEPA) and NJDEP and recommended by the NJAES. All applications are performed in compliance with the recommendations listed on the manufacturer's label.



What The Homeowner Can Do

Homeowners can also play an important role in reducing mosquito populations in their own backyard by eliminating common mosquito breeding sites. Since the immature stages of mosquitoes are aquatic and require standing water to develop, working to eliminate standing water sites on residential properties can reduce mosquito populations. Over watering lawns can cause water to pool in some areas. All useless containers, such as buckets, cans and tires should be disposed of and those that are saved should be turned upside down or covered. Fish will readily eat mosquitoes and, therefore, should be placed in ornamental ponds. Roof gutters and drainage ditches should be maintained and cleared of debris on a regualr basis.



Personal Precautions

To protect themselves from mosquito bites, people should make sure their window and door screening is in good repair so that mosquitoes cannot enter the home. When going outside at times when mosquitoes are most likely to be biting (dawn or dusk), wear protective clothing such as long-sleeved shirts and pants. Mosquito repellents can be very effective in preventing insect bites and should be applied to your clothing or skin. When using repellents, always read and follow the manufacturer's directions carefully.

Three mosquito-borne viruses are medically important in New Jersey:

Eastern Equine Encephalitis (EEE)

EEE reaches its highest levels in the southern half of the state. EEE is a severe disease with headache, stiff neck, high fever, stupor, disorientation, tremors, convulsions, and coma. It has a high fatality rate (usually 50% or greater) and persons who recover are often left with permanent disabilities. The virus circulates between wild birds and mosquitoes in freshwater swamp environments. The birds involved in this cycle have adapted to the virus so they do not become ill from it. When viral activity levels are very high, the disease may spread out from the swamp and become a threat to man, horses, and certain species of domestic birds which are susceptible to the virus. This virus caused New Jersey's first recorded outbreak of a mosquito-borne disease in 1959, causing 32 cases with 21 deaths. A smaller outbreak (12 cases with 6 deaths) occurred in 1968. Sporadic cases have occurred since 1968, including a suspect case in 1989. However, we know the disease still exists in New Jersey. In fact, EEE virus is isolated every year in mosquitoes and a year without a horse case is rare. There is a vaccine that will protect horses from the disease. All New Jersey horse owners are urged to have their horses vaccinated every year in the late spring.

Saint Louis Encephalitis (SLE)

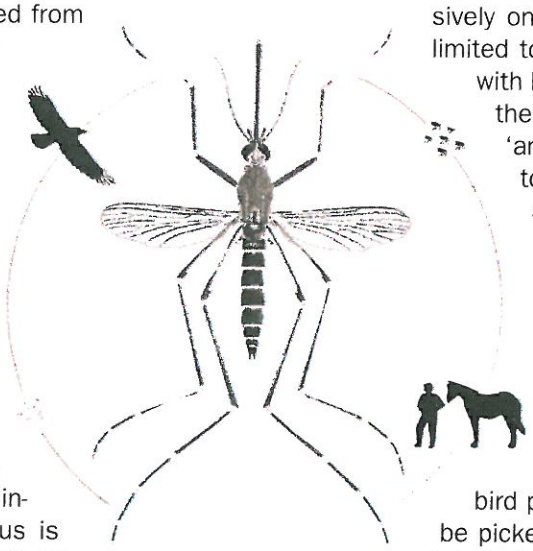
SLE is generally a less severe disease than EEE, causing anywhere from a mild fever and headache to symptoms similar to EEE. People over age 60 are the most likely to become more severely ill, but the case fatality rate is lower (5 to 10%) than that of EEE. The SLE virus also circulates between wild birds and mosquitoes. However, it is more commonly detected in urban and suburban settings. The primary mosquito vector, *Culex pipiens*, is called the northern house mosquito or the rain barrel mosquito. This mosquito likes to lay its eggs in standing water, no matter how stagnant it may be. These mosquitoes reach their highest densities in stagnant water that is polluted with organic waste, such as catch basins. There are 2 recorded outbreaks of SLE in New Jersey, the first in 1964 resulted in 97 cases with 10 deaths, and the second in 1975 resulted in 29 cases with 3 deaths. No animals other than man are known to become ill from this virus, and with the absence of human cases since 1975, it is thought that this virus exists only in extremely low levels in New Jersey in most years.

West Nile Encephalitis (WNV)

WNV causes a very similar disease to SLE and also affects primarily elderly people. Approximately 10 to 15% of the clinical cases are fatal. WNV was first discovered in Uganda in 1937. Since that time there have been sporadic outbreaks throughout Africa, Eastern Europe and parts of Asia. Similar to SLE, it appears to exist in a mosquito-bird cycle, with the same type of mosquito vectors *(Culex pipiens)* involved. WNV was first recorded in North America in the fall of 1999, causing illness in 63 people in New York City and the surrounding area. No documented human cases occurred in New Jersey in that year, but the virus was isolated from 73 dead crows and 2 groups (or pools) of mosquitoes collected in New Jersey. Crows, in particular, have a high mortality rate when exposed to WNV. Generally, WNV is not lethal to birds; however, many of the bird species native to North America have not previously existed with the virus. Therefore, the virus causes disease in them, much like it does in humans. Introduced birds, such as the European starling, have a "built-in" immunity to the virus and consequently show no signs of illness when infected. It is these types of birds that are thought to be important in the natural transmission cycle of WNV.

DISEASE TRANSMISSION

Many types of viruses have been isolated from mosquitoes in nature. Fortunately, only several are of concern in the United States and only 3 are of significant health importance in New Jersey. It should be noted that mosquitoes cannot transmit all viruses. For example, the Human Immuno-deficiency Virus (HIV), which causes AIDS in humans, doesn't survive in mosquitoes, and therefore cannot be transmitted when they bite. In general, mosquito-borne virus transmission cycles are complicated and may involve birds and/or other animals. For example, Eastern Equine Encephalitis (EEE) virus is maintained in a bird-mosquito cycle. The virus is transmitted among birds, principally by *Culiseta melanura*, a mosquito species that feeds exclusively on birds. Normally, viral transmission is limited to this natural cycle. However, in years with large populations of *Culiseta melanura*, the amount of viral infection in birds 'amplifies' and the virus gets transmitted to mammals via mosquitoes that serve as "bridge vectors". Bridge vectors are mosquitoes with broad feeding preferences that might bite a bird for one meal, and later take another blood meal from a mammal. Human cases of mosquito-borne viruses typically occur late in the season; it takes time for mosquito populations to increase, for the virus to build up in bird populations to the point where it might be picked up by bridge vectors, and finally for infected mosquitoes to transmit the virus to mammals.



Mosquitoes cause more human suffering and economic loss than any other insect or animal.

Contact your County's mosquito control agency to reduce your risk of contracting mosquito-borne viral diseases.

State Mosquito Control Commission
609-292-3649

Atlantic County
Atlantic County Mosquito Control Unit
609-645-7700

Bergen County
Bergen County Division of
Mosquito Control
201-599-6141

Burlington County
Burlington County Division of
Mosquito Control
609-265-5064

Camden County
Camden County
Mosquito Extermination Commission
856-566-2945

Cape May County
Cape May County
Mosquito Extermination Commission
609-465-9038

Cumberland County
Cumberland County
Mosquito Control Division
856-453-2195

Essex County
Essex County Mosquito Control
973-239-0342

Rutgers Mosquito Research and Control
732-932-9437

Gloucester County
Gloucester County Division of
Mosquito Control
856-468-0100

Hudson County
Hudson County Mosquito Control
201-915-1376

Hunterdon County
Hunterdon County
Mosquito and Vector Control
908-788-1351

Mercer County
Mercer County Division of
Mosquito Control
609-530-7501

Middlesex County
Middlesex County
Mosquito Extermination Commission
732-549-0665

Monmouth County
Monmouth County
Mosquito Extermination Commission
732-542-3630

Morris County
Morris County
Mosquito Extermination Commission
973-538-3200

Ocean County
Ocean County
Mosquito Extermination Commission
609-698-8271

Passaic County
Passaic County Division of
Mosquito Extermination
973-305-5754

Salem County
Salem County
Mosquito Extermination Commission
856-769-3255

Somerset County
Somerset County
Mosquito Extermination/Drainage
908-722-0040

Sussex County
Sussex County Division of
Mosquito Control
973-579-0410

Union County
Bureau of Mosquito Control
908-654-9834

Warren County
Warren County
Mosquito Extermination Commission
908-453-3585

Contact your local Health Department to learn more about the human aspects of mosquito-borne infections.

Homeowners can reduce mosquitoes on their property:

- Dispose of unwanted containers that can hold water (tires, bottles, cans, buckets, barrels, etc)
- Store unused containers in an upside-down position
- Empty or cover swimming or wading pools when not in use
- Change water in bird baths and troughs weekly
- Keep roof gutters and drainage ditches cleared out so water does not collect and sit in them
- Properly grade property and eliminate any areas where water can collect, such as tire ruts
- Contact your local mosquito control agency for more information related to reducing mosquito breeding sites on your property

Produced and distributed by:

New Jersey State Department of Health and Senior Services

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New Jersey Mosquito Control Association

Monmouth County Mosquito Extermination Commission