West Nile Virus

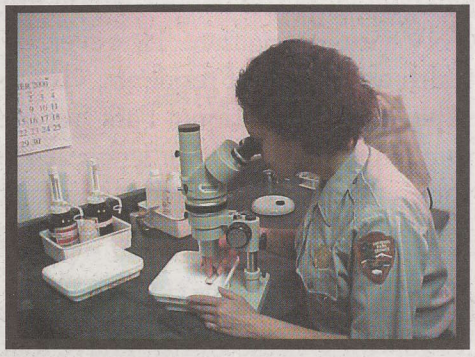
In 1999, a mosquito-borne disease new to our shores appeared in the New York metropolitan area. West Nile Virus is a viral disease carried by several species of fresh-water mosquitoes, including the common house mosquito *Culex pipiens*. Most people bitten by infected mosquitoes do not get sick; however, people with lowered immune systems, such as elderly or ill people, are at a higher risk if they are bitten by an infected mosquito. The Centers for Disease Control reports that West Nile Virus is a rare disease.

In the summer of 1999, 62 cases of encephalitis arose from West Nile Virus infections in the New York City area. In very rare cases (seven in 1999), West Nile Virus can lead to death. To date, there is no treatment for West Nile virus, except to treat symptoms.

The common house mosquito is usually found near people's homes. It breeds where there is stagnant, dirty or polluted water, or water containing decaying plant or animal matter. To protect your home and family, look for and eliminate any sources of standing fresh water. Small pools of water, such as those found in birdbaths, toys, gutters, near hoses and pipes, in auto parts, and in any septic systems, may breed house mosquitoes.

NATIONAL PARK SERVICE

Mosquitoes and People



at Fire Island National Seashore

Welcome to Fire Island National Seashore

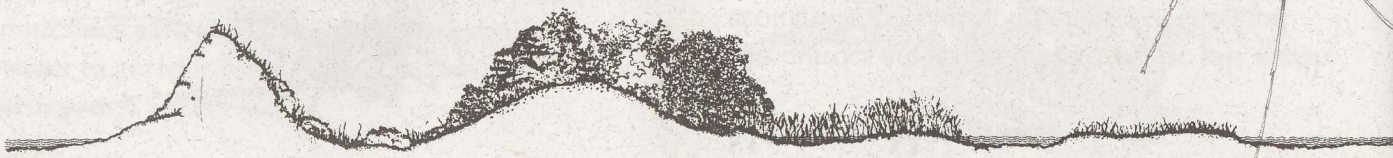
Fire Island National Seashore is a special place. It is made up of several ecosytems or zones of life interwoven together to form a beautiful mosaic. Ocean, beach, dune, forest, salt marsh, thicket, and bay make up the barrier island's natural environment. The mission of the National Park Service is to preserve this environment, including the wildlife that live there.

Any visitor to Fire Island quickly realizes that mosquitoes are abundant. Mosquitoes and other insects are an important part of the natural environment. The National Park Service would like to help you understand these insects and minimize your concerns about them. This brochure will explain mosquito habits so you can protect yourself while in or near the National Seashore, and will also discuss current concerns with Eastern Equine Encephalitis and West Nile Virus.

Only Females Bite

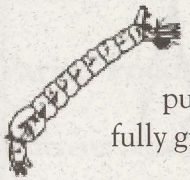
Mother Nature has charged female mosquitoes with one task: Go forth and multiply! To do so, females need protein and cholesterol to form their eggs. That source of protein is the blood of animals (called hosts). The preferred host depends on the species of mosquito. Fire Island mosquitoes generally prefer to feed on rabbits and deer, but the female mosquito may choose any warm-blooded animal. Some species even prefer reptiles or birds.

Male mosquitoes, which eat only plant nectar, are crucial in helping to pollinate plants. They mate and die within 10-20 days. Female mosquitoes live about 3 weeks. During this time, they need to eat blood to produce eggs. A female will deposit 1-6 batches of eggs over her lifetime.

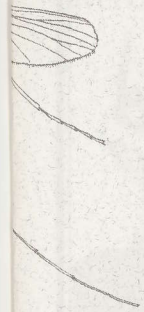


Mosquito Life Cycle

Mosquitoes begin their lives as tiny eggs, deposited in wet or moist areas such as puddles, marshes, mud flats, old tires, or irrigation ditches. One local species, the salt marsh mosquito (*Aedes sollicitans*), hatches just after a flood tide occurs. Eggs hatch into tiny, legless larvae. Hanging upside down just under the water's surface, the larvae extend breathing tubes up for air and dine on even smaller suspended microorganisms. Some prey on other mosquito larvae. If disturbed, the larvae close up their breathing tubes and quickly dive down into the shadows for safety. After 3-14 days, the legless larvae move into a 1-3 day aquatic pupal stage, a period of transformation from larvae to adult. Pupae breathe, but do not eat. Inside the pupae, the legless larvae transform.



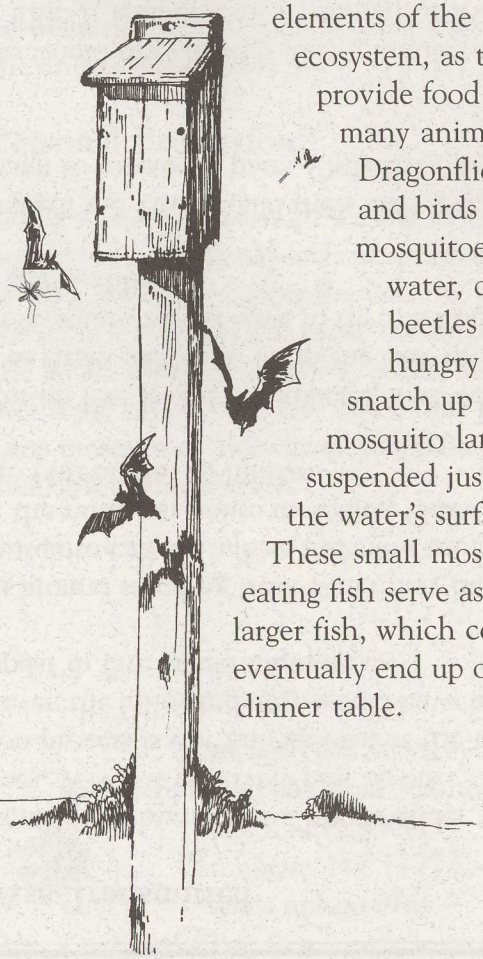
When temperature and moisture levels are just right for the individual species, the pupal case opens and out steps a fully grown adult mosquito.



Born Hungry

The adults emerge from the pupal stage hungry. The blood of human beings and other mammals are full of essential protein, so mammals are natural targets for mosquitoes.

The Food Chain



Mosquitoes are valuable elements of the ecosystem, as they provide food for many animals. Dragonflies, bats, and birds eat mosquitoes. In the water, diving beetles and hungry fish snatch up tiny mosquito larvae suspended just below the water's surface. These small mosquito-eating fish serve as food for larger fish, which could eventually end up on your dinner table.

The Bite

The mosquito has an unusual bite. Its mouth is in the form of a sharp tube, called a proboscis, which it uses to pierce a host's skin. The female mosquito injects saliva down a tiny tube into the puncture hole. The saliva, which causes the familiar itch we experience when bitten, serves as a blood thinner, preventing blood from clotting so the mosquito can suck it up. Some mosquito species hurt when they bite, while others' bites are unnoticeable.

The Next Generation

The female mosquito, now gorged with a blood meal, prepares to find a suitable site to deposit her eggs. She must first escape becoming a meal herself. Danger is everywhere. She dodges predators: dragonflies, frogs, and swallows. If successful, she lays her eggs and the cycle of life begins again.

Managing Mosquitoes

Mosquitoes are a natural part of the salt marsh ecology. Important components of the food chain, mosquito larvae and adults provide food for many kinds of wildlife, including other insects, fish, birds, and bats. A natural area is considered healthy when many kinds of plants and animals thrive there. This condition is called biodiversity.

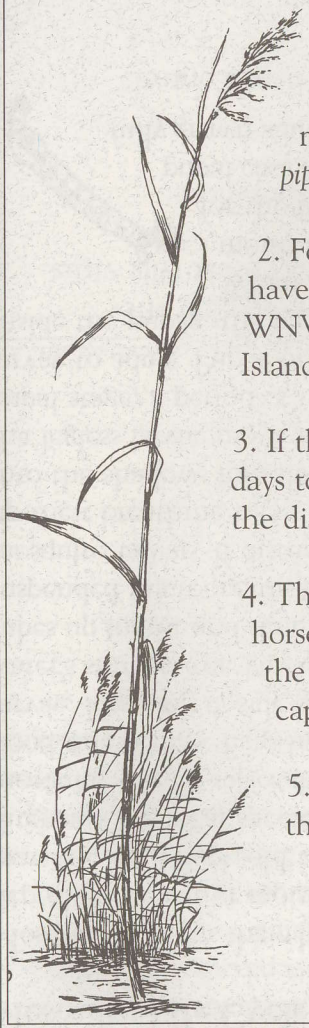
Due to their ecological importance, mosquitoes and other native species are not managed in national park wilderness areas, such as parts of Fire Island National Seashore. However, under specific conditions, when mosquitoes are a threat to public health, the National Park Service will take action to protect the public.

What is EEE?

Eastern Equine Encephalitis, or EEE, is a serious disease that can be carried by mosquitoes. The disease can infect many animals, including horses, birds, deer, and humans. Also known as sleeping sickness, the staggers, and brain fever, EEE causes swelling of the brain. Symptoms can include drowsiness and even paralysis and coma.

How Mosquito-Borne Diseases Are Transmitted

EEE and WNV can only be transmitted to humans and horses under specific and unusual circumstances. WNV is relatively new to our shores, so the entire transmission process is not fully known at the time of this writing. Generally, however, the following steps would have to occur for EEE or WNV to appear in Fire Island mosquitoes.



1. Birds that live or feed in or around standing fresh water may harbor EEE and WNV. A freshwater mosquito called *Culiseta melanura* transmits EEE from bird to bird, while the northern house mosquito, *Culex pipiens*, transmits WNV from bird to bird or bird to human.

2. For mosquito-borne disease to occur on Fire Island, an infected bird would have to be bitten by a mosquito such as *Aedes sollicitans*, or, in the case of WNV, *Culex pipiens*. OR, a Fire Island mosquito would have to fly to a Long Island freshwater wetland and bite an infected bird.

3. If this mosquito were to become infected, the virus would then take several days to move from the mosquito's stomach to its mouth parts. Only then could the disease be transmitted.

4. The mosquito now carrying the virus would next have to bite a human or horse for that animal to get WNV or EEE. It is important to remember that the mosquito must first have bitten an infected bird before it would be capable of infecting a person.

5. Humans and horses are considered a dead end for EEE. They cannot pass the virus on to other uninfected people, horses, or mosquitoes.

Again, it is highly unlikely that these steps would occur.

What Is the Risk?
Fire Island & Mosquito-Borne Diseases

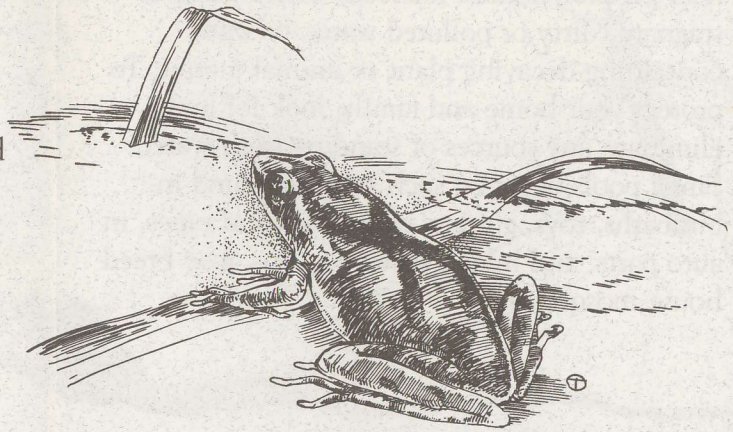
The risk of EEE or WNV existing in mosquitoes on Fire Island National Seashore or being transmitted to people is very low.

Although several species of mosquitoes live at Fire Island National Seashore, the risk of contracting EEE or WNV at the park is extremely low. Fire Island National Seashore generally lacks the habitat where EEE and WNV viruses originate. However, to ensure the health and safety of residents, visitors and employees, the National Park Service has installed a monitoring program at Fire Island National Seashore to detect any incidence of EEE or WNV in the mosquito population.

The State of New York and the United States Centers for Disease Control have found that **backyards** are the primary sources for the breeding grounds for the mosquitoes that transmit diseases to humans. On Fire Island National Seashore, the greatest breeding potential for disease-bearing mosquitoes is found in developed areas in the park and incommunities. Park staff regularly search for and empty sources of standing water, such as in buckets, tarpaulins, and puddles formed after rainfall. **It is recommended to regularly police your backyard for the presence of standing water in gutters, birdbaths, septic systems, and other such areas.**

Protecting the Public

The National Park Service has developed a mosquito surveillance and response procedure for Fire Island National Seashore to detect and monitor the incidence of EEE and WNV. This procedure has been reviewed and approved by the U.S. Centers for Disease Control. In cooperation with Suffolk County, the State of New York, and the U.S. Fish and Wildlife Service, park biologists collect mosquitoes throughout Fire Island National Seashore to test for the presence of WNV and EEE virus. If the tests indicate disease, the public and local government agencies will be notified. If virus is found in a potential carrier on Fire Island National Seashore or detected within five miles of the park, the park will initiate an appropriate response which may include insecticide spraying, if necessary. Copies of the procedure are available by contacting the park at (631) 289-4810 or *www.nps.gov/fiis*.



How To Outsmart a Mosquito - Avoid Becoming a Meal

Around your home, you can lessen the chance for mosquitoes to breed by ensuring that there are no places where standing water can collect. Empty or remove any containers that have filled with rainwater. When you are planning to take a trip outdoors, think a few moments about mosquito habits. If you know how mosquitoes locate their meals, you can take steps to protect yourself.

Varied Feeding Behaviors

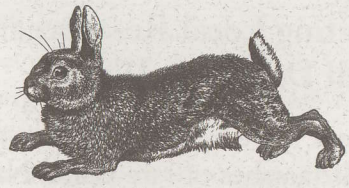
Each species of mosquito prefers a particular time to seek its host, but most species are active at dawn and dusk. The time you choose to go outdoors will affect the number of mosquitoes you see.

Varied Food Sources

Different mosquitoes look for different food. Mosquito species that dine on deer fly at the level of a person's head. Mosquitoes that prefer smaller hosts, such as rabbits or other small animals, hunt around ankle height.

Carbon Dioxide Detection

The most important cue mosquitoes use when locating a host is



the detection of carbon dioxide (CO_2). All animals, including humans, exhale CO_2 when they breathe. Mosquitoes easily detect this gas and the moist warm air around a potential host. They also seem to be able to tell the difference between one animal and another, and choose the animal they prefer.

Personal Protection

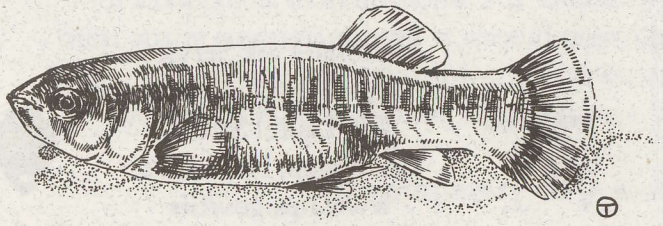
You can protect yourself by using EPA-registered insect repellents such as sprays containing 28-30% DEET or citronella. Use the product as intended by closely following the directions on the label. Wear long sleeves, pants, and socks. Net suits, called "bug out" suits, that physically keep mosquitoes away from your skin, are available at camp stores.

National Park Service
Fire Island National Seashore
120 Laurel Street
Patchogue, NY 11772
www.nps.gov/fiis

Protecting Local Resources: We All Drink the Water!

The salt marshes of Fire Island National Seashore and those along the south shore of Long Island support increasingly rare ecosystems. Fish and shellfish lay their eggs in salt marshes, and the young begin life in these rich, nutrient-filled places. Young fish such as killifish eat mosquito larvae. Higher up in the marsh food chain, wading birds prey on fish, while swallows and bats feast on insects like salt marsh mosquitoes. Fish that begin life in the salt marsh eventually grow up to live in the adjoining bay. The use of any pesticide in or over the salt marshes would affect the entire food chain of the ecosystem, as well as the neighboring ecosystems of the Great South and Moriches Bays.

Meanwhile, on mainland Long Island, the soil is so sandy that insecticides and surface runoff from chemicals such as fertilizers filter very quickly through the soil, eventually reaching the water table and infiltrating the water we drink.



Decisions concerning insecticide use must be carefully thought out. Everybody should be aware of the risks associated with mosquito management. Area-wide use of insecticides must be well planned to balance the public health risks of either spraying or not spraying. Millions of people use Fire Island and the Great South Bay for recreation every year. The health of fish and other wildlife is an important consideration in decisions on the use of chemicals that will end up in the water.

Several government websites offer further information on West Nile virus.

Fire Island National Seashore:
www.nps.gov/fiis

U.S. Centers for Disease Control:
www.cdc.gov

U.S. Geological Survey: **www.usgs.gov**

New York State Department of Health:
www.health.state.ny.us

Suffolk County (NY) Vector Control:
www.co.suffolk.ny.us.