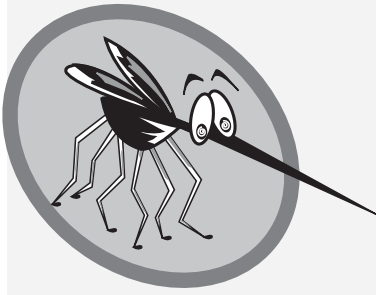


# West Nile Virus

## A FACT SHEET ON MOSQUITO HABITAT



The spread of West Nile Virus (WNV) in Ontario has attracted the attention of public health officials, the media and Ontario residents. At this time, the human health risk of West Nile Virus remains minimal compared to other human

health risks. However, knowledge of the scope and severity of illness is growing as this newly emerging virus extends across North America.

West Nile Virus is a public health issue. The Ontario Ministry of Health and Long-Term Care, in association with local health units and municipalities across the province, has the primary responsibility for research and public education about West Nile Virus. As with other public health issues, these agencies have requested the assistance of the people of Ontario and other institutions, such as Conservation Authorities, to help deal with the virus.

### WHAT IS WEST NILE VIRUS?

#### Human Illness from West Nile Virus

Human illness from the West Nile Virus (WNV) is still rare, even in areas where the virus has been reported. According to the Centers for Disease Control (CDC), the chance that any one person will become seriously ill from an infected mosquito bite is low. Many people who have contracted WNV do not even know it. About 20% of those infected will have a mild illness with flu-like symptoms (mild fever, headache, muscle aches, stiff neck, swollen glands, skin rash) within 3 to 15 days following the bite of an infected mosquito. Less than 1% of those infected will develop encephalitis (swelling of the brain) and may experience prolonged muscle and neurological problems. Personal preventative measures are the most effective way of protecting yourself against WNV. Once you have WNV and recover, it is believed that you are immune for life.

#### Mosquitoes and West Nile Virus

West Nile Virus is usually spread to people through the bite of infected mosquitoes. Mosquitoes acquire the virus when feeding on infected birds. The virus is stored in the salivary glands of the mosquito and transmitted to humans and animals when the mosquito takes a blood meal. The virus as a single dose is not powerful; several mosquitoes infected with the virus must bite before the virus will infect a human.

According to the CDC, very few mosquitoes are infected with the virus, even in areas where the virus is circulating. There are approximately 50 species of mosquitoes in Southern Ontario. Approximately 18 species can carry the virus but not all mosquito species are capable of transmitting it. At present, the mosquito species of most concern in the transmission of the West Nile virus to humans are the Culex species or catch basin mosquito. They are active from May to August. They prefer stagnant waters with lots of nutrients for breeding (i.e. water in ditches, eaves troughs, bird baths and roadside catch basins) and are more common in urban rather than rural areas. These species tend to be more active throughout the night between dusk and dawn. The other species of concern are the Aedes species. These species prefer temporary wet areas such as flood plains for breeding and feed throughout the day or night. Both species are relatively weak fliers, so they will not travel far from their birth place. Therefore, the primary method for reducing mosquito populations is to eliminate mosquito habitat in backyards.

### WEST NILE VIRUS AND MOSQUITO HABITAT

One misconception is that any type of standing water, such as wetlands and waterways, may produce large numbers of virus-infected mosquitoes and that all potential sites should be drained, filled, sprayed or managed to eliminate the possibility of WNV transmission. However, not only is it impossible to eradicate all mosquitoes, but not all water bodies are home to the mosquito species that propagate WNV. Instead, mosquito-producing habitats vary depending on the mosquito species. Since not all mosquito species that feed on humans transmit WNV, control measures for West Nile Virus will vary depending on the habitat.

In general, activities that encourage the presence of natural mosquito predators and reduce the amount of artificial or disturbed habitat will assist in reducing the mosquito species that carry West Nile Virus.



Healthy wetlands are not the preferred habitat of mosquito species that are primarily responsible for transmitting WNV.

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## *Natural Environments*

### **Wetlands**

Mosquitoes are common in natural wetlands. However, results from monitoring studies conducted in southwestern Ontario (Essex and Perth County) in the summer of 2002 found that the mosquito species primarily responsible for transmitting West Nile Virus (i.e. the *Culex* species) is not commonly found in natural wetlands.

Healthy wetlands have features that reduce the number of mosquitoes. Mosquitoes are an important part of the food chain and healthy wetlands are home to hundreds of mosquito-eating aquatic insects (beetles, back swimmers, water striders, dragonflies, etc.), birds, frogs, fish, turtles and bats. This balanced predator-prey relationship provides natural mosquito control. In addition, water levels naturally fluctuate in wetlands or are stirred by the wind, which helps reduce the number of mosquitoes.

Recognizing the valuable role of wetlands in water purification, reducing the severity of flood and erosion events and providing habitat for wildlife and recreation, their preservation is extremely important. If a wetland is disturbed by humans or if other life forms are eliminated through the incorrect use of pesticides, it is possible that the number of mosquitoes in a wetland may actually increase. Therefore, it is important to preserve the natural balance in a wetland. Wetland restoration and preservation decreases the mosquito population by providing habitat for the natural enemies of mosquitoes and by reducing or preventing flooding in areas that aren't normally wet (i.e. areas that will support mosquitoes but not their predators).

### **Flood Plains**

*Culex* mosquito species are not common in natural flood plains but *Aedes* species are. Flood plains are also home to a variety of other species that prey on mosquitoes, and altering these areas to eliminate mosquitoes will also affect these species as well as increase sedimentation, erosion, etc., downstream. Altering fish habitat is strictly regulated under the Federal Fisheries Act. Since *Culex* and *Aedes* are relatively weak fliers, the best preventative measure is to avoid these areas.



Floodplains are home to many species that prey on mosquitoes.

Note: Before undertaking any activity within wetlands or flood plains, consult with your local municipality and Conservation Authority.

## *Man-Made Environment*

### **Storm Water Management Ponds**

Storm water management ponds are designed to hold and treat runoff (i.e. rain or melting snow) from nearby land. In some cases, they filter the water (runoff may be contaminated with soil, salt, oil and other residues) and lockup some of the harmful substances carried in runoff. In the storm water management pond, pollutants are treated by settling and biological processes. If left untreated, pollutants in the runoff may be harmful to the receiving environment. Storm water management ponds are often constructed in subdivisions and help to keep sediments and contaminants out of rivers and streams as well as reducing erosion and flooding during storm events. Thus, they provide a great number of benefits to the community as a whole.

Storm water management ponds are generally not breeding areas for the virus-transmitting mosquito species. In fact, the chance of finding a significant number of *Culex* species in a storm water pond is much, much smaller than of finding them in artificial containers in your backyard. There are several reasons for this:

- Wet Ponds are constructed to hold large volumes of water to improve water quality. These types of ponds are designed to contain water most of the time. Current studies have shown that very few wet ponds are significant mosquito breeding sites. One reason is that the *Culex* species primarily breed in shallow areas. Wet ponds tend to be deep and some are designed with steep banks along the sides. Another reason is that *Culex* species will not lay eggs in areas exposed to wind, since the wind will destroy their egg rafts. Wet ponds tend to have a large surface areas and are regularly cleaned out, which effectively disrupts the life cycle of the *Culex* mosquito.

Wet storm water ponds are not normally habitat for WNV mosquitoes because of their depth and exposure to wind.



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- Dry Ponds are designed to help reduce flooding during wet periods but otherwise lack ponded water. These areas usually have channels that water flows through during a storm (Culex will not breed in moving water), but then slowly dries



Dry storm ponds are not normally habitat for WNV mosquitoes because they regularly dry up.

up. These types of ponds should not hold water for more than 48 hours as the potential for mosquitoes using them will increase. Some of these areas are more naturalized with vegetation that may attract mosquitoes (as well as their predators).

Storm water management ponds that are perceived to be mosquito breeding areas should be monitored for the mosquito species responsible for transmitting West Nile Virus. If the local Medical Officer of Health decides that a storm water management pond has raised the risk of West Nile Virus spreading, the pond may be treated to control mosquito larvae. It is also recommended that the pond design should be reviewed to ensure it is functioning as intended.

## Catch Basins

Catch basins are one of the main breeding sites for Culex species. The depth of the catch basin does not appear to affect mosquito population numbers, but organic material is very important (i.e. putting grass clippings, leaves and other plant material into sewers will increase the number of mosquitoes). Catch basins in newer subdivisions have fewer Culex species because of the lack of vegetative material, while older neighbourhoods have higher numbers of these mosquitoes.



Catchbasins with lots of vegetative material are prime breeding sites for WNV mosquitoes.

Catch basins in older neighbourhoods with dense population and/ or retirement homes nearby should be monitored for the mosquito species responsible for transmitting West Nile Virus. Municipalities are reviewing local situations and some,

including London, have already initiated a program to apply larvicide in catch basins.

## Irrigation and Drainage Ditches, Municipal Drains and Small Private Ponds

Drainage ditches provide prime mosquito producing habitat because these areas typically contain warm, standing water that is loaded with nutrients. Sites can be made unsuitable for mosquitoes to lay eggs in by:

- running a narrower and deeper ditch through centres of broader ditches,
- designing steep slopes and gravelled shore lines,
- manipulating water levels,
- controlling emergent vegetation,
- improving drainage,
- infilling small wet pockets.



Warm, stagnant water in drainage ditches can be prime WNV mosquito breeding habitat.

Developers and home builders are aware of the possibility that mosquito larva could be located in construction swales and ditches and are implementing programs to monitor these situations. Some firms have already applied larvicide in construction swales.

## Golf Courses and Gravel Pits

In semi-natural environments (such as golf courses and gravel pits), there may be a mixture of natural and artificial water features. Each area should be examined separately for its potential to breed mosquitoes. The primary defence measure is to encourage personal protection



There are several options for reducing mosquito breeding habitat in semi-natural environments.

measures (i.e. long sleeved shirts, DEET on skin or clothing, avoiding dawn and dusk) for people using the area to reduce the risk of exposure to West Nile Virus.

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Secondarily, mosquito populations can be reduced or discouraged from laying eggs by:

- stocking ponds with fish,
- adding a fountain or aeration unit to create surface (wave) movement,
- redesigning ponds to discourage Culex species (i.e. steep banks, deep water, mow vegetation to the edge of the water feature),
- regularly skimming the surface along the edges (where water tends to be stagnant) to remove mosquito larvae,
- using larvicide in ponds where there is no drainage off the site.

**Personal protection measures are a key factor in reducing your risk of contacting WNV.**

## TAKE ACTION TO PROTECT YOURSELF!

### Monitor the Spread of West Nile Virus

Crows, blue jays and ravens usually die as a result of having contracted West Nile Virus:

- Report all sightings of dead crows and any large numbers (i.e. five or more) of bird deaths to your local health unit

### Personal Protection

Mosquitoes prefer dark places rather than direct sun, so dawn, dusk and early evening are peak mosquito-biting times:

- Limit your outdoor activity during dawn and dusk
- Wear long sleeved, light colored clothing and long pants
- Use insect repellent containing DEET on skin or clothes

### Reduce the Spread of West Nile Virus

Mosquitoes prefer stagnant, nutrient rich water and temporary wet areas for breeding:

- Empty all standing water from small containers at least once a week (e.g. flower pots, buckets, plastic containers, discarded tires, etc.)
- Clear eaves troughs and down spouts
- Add an aerator to fish ponds
- Screen windows and doors
- Store wheelbarrows, etc. upside down
- Clear out dense shrubbery where mosquitoes breed and rest

- Fill in small low spots on your property so water cannot collect
- Refer to the Health Unit pamphlet for other tips

Note: Vitamin B, vegetable oil and ultrasonic bug-zapping devices are NOT effective in preventing mosquito bites or reducing mosquito populations. In fact, they may harm the environment or discourage the presence of natural mosquito predators.

## FOR MORE INFORMATION:

Middlesex London Health Unit

Tel: 519-663-5317

Web: [www.healthunit.com/diseaseprevention.htm](http://www.healthunit.com/diseaseprevention.htm)

Oxford County of Health

Tel: 519-539-9800

Web: [www.county.oxford.on.ca/publichealth](http://www.county.oxford.on.ca/publichealth)

Perth District Health Unit

Tel: 519-271-7600

Web: [www.pdhu.on.ca](http://www.pdhu.on.ca)

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Financial Assistance by:



The information provided in this fact sheet is current as of July 2003 and every effort has been made to ensure accuracy. However, as the West Nile Virus is new to North America and subject to a variety of environmental influences you should always check with current sources of information.