

WEST NILE STORY

By Dr. Dale Wrubleski



We've all heard
the incessant buzzing
of mosquitoes. In the silence
of the night, that buzz can be
downright deafening regardless
of whether you're in a pup tent
or penthouse. And nothing
grabs your attention
quicker than when the
buzzing suddenly stops. That
is the signal that somewhere —
most likely on your body — the
beast has landed. We've all
thrashed blindly in hopes
of squashing the now-
silent pest before
it takes its first
taste of blood.



Their irritating nature aside, we've all taken some comfort from the fact Canada's mosquitoes rarely carry the deadly diseases that ravage much of the Third World. But that was before the West Nile virus showed up unexpectedly in North America four years ago.

West Nile virus first appeared in New York City in the summer of 1999. Officials knew something was wrong after hundreds of dead crows were found in the borough of Queens. Soon after, several local hospitals began admitting patients with encephalitis symptoms. By the end of the summer, 62 people were hospitalized and seven were dead. Among the dead was one Canadian who had visited New York during the outbreak. Health officials confirmed soon after that West Nile virus had arrived in North America.

Before that, the West Nile virus had been found in Africa, Europe, the Middle East, and west and central Asia. The virus was first isolated in the West Nile district of Uganda in 1937. Its life cycle was described in Egypt in the 1950s, and the first recognized outbreak occurred in Israel in 1957. More recent outbreaks of West Nile disease in humans have occurred in Algeria, the Czech Republic, Romania, southern Russia and Israel.

Since its arrival in North America, the virus has spread across much of the United States and Canada. It has been recorded in five provinces (Saskatchewan, Manitoba, Ontario, Quebec, and Nova Scotia) and 44 states. Recent news reports indicate that the virus is now in Mexico and the Dominican Republic. No one knows for sure how it crossed the Atlantic Ocean. But now that it is here, it is here to stay. We will all need to start taking extra precautions when spending time outside during mosquito season.

West Nile is normally a bird virus, and at last count at least 138 species of birds have been found to carry it. For most birds, the virus does no harm. However, in North America, members of the Corvidae (crow) family — crows, ravens, magpies and jays among others — suffer high mortality when infected with the virus. No one knows why this group of birds is affected so severely, but the appearance of dead crows is now used by health agencies as an 'early warning system' to identify areas in which the virus has become active. Long-term impacts of the virus on corvids are not yet known, but there are reports of reduced crow populations in some regions of the United States.

The virus usually cycles between birds and mosquitoes. The rapid spread of West Nile virus across North America is thought to be due primarily to transport by infected birds. A recent study has found that several bird species, including the blue jay, common grackle, house finch, house sparrow and American crow, are competent hosts for the virus. That



West Nile is normally a bird virus, and at last count at least 138 species of birds have been found to carry it. In North America, members of the Corvidae family – including blue jays (top) and American crows (above) – suffer high mortality when infected with the virus.



is, they develop high levels of virus in their blood and are capable of infecting mosquitoes that feed on them.

Most mosquitoes feed on one type of animal, but some species may change their feeding behaviour depending on what hosts are available. When an infected mosquito feeds on a human or other mammal, it can transmit the virus. These mosquitoes are called 'bridge vectors', as they are responsible for moving the virus from birds to mammals and people, which in turn are referred to as 'dead-end hosts' – because they do not build up enough virus in their blood to pass the virus on to other mosquitoes. Though people and mammals are not important in the life cycle of the virus, the virus can cause severe health problems for these 'accidental' hosts.

There is now growing evidence that predatory birds such as hawks and owls, as well as scavengers such as crows and magpies, may also get the virus by feeding on infected prey. Other studies have also found that infected crows can spread the virus to other crows through close contact. Researchers are actively looking at these modes of transmission to determine how important they are in the spread of the virus.

Many mosquito species have been found to carry the virus, but members of the *Culex* genus are thought to be most responsible for spreading the virus among birds, and from birds to humans and mammals. In eastern and southern parts of North America, *Culex pipiens* (northern house mosquito) and *Culex quinquefasciatus* (southern house mosquito) are important vectors of the disease. At present, mosquito research has not yet identified the important species in the west, but *Culex tarsalis* has been implicated. This mosquito is known to spread western equine encephalitis, another virus with a life cycle similar to West Nile.

Most people who are bitten by an infected mosquito are unaware that they have acquired the virus and will show no symptoms. Their immune systems appear to successfully fight the virus, and it is generally believed that they will be immune for life. Others may show only mild, flu-like symptoms, including fever, headache and body ache. But for about one in 150 people infected, the virus can result in serious medical problems or death. It is in these extreme cases that people are likely to experience encephalitis (an inflammation of the brain) or meningitis (an inflammation of membranes that surround the brain and spinal cord). Symptoms include neck stiffness, stupor, disorientation, tremors, convulsions, muscle weakness, paralysis, and coma. Symptoms are usually evident three to 14 days after a person has been infected.

At this time, there is no specific treatment for West Nile disease. The risk of a severe infection is believed to be greatest for people over the age of 50 and also those with weakened immune systems. Last year in Canada, it is believed that 11 people died from West Nile in Ontario and Quebec, while 384 people required hospitalization. In the U.S., more than 4,000 people were hospitalized, of which 254 died. Many of those hospitalized developed polio-like...*(continued on page 36)*

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paralysis and require extensive rehabilitation. There is ongoing work to develop a human vaccine, but it may be several years away.

Preventing mosquito bites is the most important and effective way to prevent contraction of West Nile virus. *Culex* mosquitoes are most active at dawn and dusk, so it is wise to limit your outdoor activity during these periods. If you must be outside then, use mosquito repellent on exposed skin. Wearing long-sleeved shirts, long pants and light-colored, loose fitting clothing with a tight weave will also reduce the possibility of being bitten. Screens on windows and doors should be checked and repaired to prevent mosquitoes from getting into the home.

Culex mosquitoes often breed in close association with humans. They particularly like small, container-type wet habitats that are often found around the home and yard. Clogged rain gutters, used tires, untended bird baths and rain barrels, and virtually any other rain-filled container can provide habitat for *Culex* larvae. It is important to regularly check (at least weekly) and empty containers to ensure that mosquitoes are not being produced in your own yard.

In and around major urban centres, comprehensive mosquito control programs can be effective in reducing their numbers. Such programs rely on insecticides to kill larvae and adults. Larval control is best done through new biological control agents such as the larvicide Bti (*Bacillus thuringiensis israelensis*) – a naturally occurring soil bacterium that is very effective at controlling larval mosquitoes and has little impact on the rest of the aquatic community. Adult mosquito control may be required when larviciding is unable to control mosquito numbers and public health officials recognize an imminent danger to human health.

In rural settings, it is virtually impossible to eliminate all potential *Culex* breeding sites that are present on the landscape. Adult mosquitoes are quite capable of moving great distances. Therefore, applications of insecticides to individual aquatic habitats will not effectively reduce mosquito populations with respect to controlling the spread of West Nile. Personal protection is the only effective means of preventing exposure to West Nile virus in rural areas.

West Nile virus is new to North America and there are still many unknowns. In 2002, the virus spread further and was more deadly than anyone thought possible the previous year. Its impact as it spreads across the rest of the continent and into Central and South America is unknown. We do not know the full impact on wildlife populations, particularly among birds. Mosquito control efforts are being increased, but we must ensure that the methods used are properly targeted.

With up to 70 percent of Canada's wetlands having already been removed from the Canadian landscape, West Nile virus brings another concern to Ducks Unlimited Canada. With wetlands being one of many identified mosquito-breeding habitats, misguided attempts to control mosquito populations have the potential to degrade or destroy wetland habitats. It is crucial that people obtain as much information as possible before making short-term decisions that could have negative ramifications for years to come. ✈

Dr. Dale Wrubleski has been involved in wetland and waterfowl research for more than 20 years, the last four as a member of DUC's Institute for Wetland and Waterfowl Research. Specializing in wetland ecology, Dale's entomology expertise provides us with a valuable insight into the West Nile virus.

West Nile facts



- At present, horses are the only livestock that appear susceptible to West Nile virus. In 2002, an estimated 356 horse cases were reported in Canada. A vaccine is available for horses, and horse owners are strongly advised to have animals vaccinated.

- There is currently no indication that West Nile virus can be acquired through consumption of infected meat. There are, however, at least two reports of laboratory workers becoming infected when their skin was cut while handling infected birds. Hunters are advised to not harvest or handle sick birds. When cleaning game

or handling live or dead birds, use rubber gloves in order to prevent blood-to-blood contact.

- Sandhill cranes, mallards, wood ducks, Canada geese, ruffed grouse, wild turkeys, mourning doves and ring-necked pheasants are among the game birds reported to carry West Nile virus. There are only a few reports of mortality among game birds due to the virus, but more observations are needed.



- Ensure proper cooking temperatures to kill any viruses that may be present. Freezing does not kill the virus. Most importantly, hunters and other nature enthusiasts should take precautions to prevent mosquito bites, the most likely way that they could become infected.

- Dogs and other pets are also exposed to West Nile virus through mosquitoes. Surveys in the eastern United States have found dogs to be infected with the virus, but there are few reported cases of animals becoming sick and dying. It is still wise to take precautions to ensure that your dog stays healthy. This would include using a repellent designated for animal use (do not use DEET), limiting outdoor activity during dawn and dusk and screening outdoor kennels.

