



## INTRODUCTION

West Nile Virus (WNV) is a mosquito-borne “flavivirus”. Transmission of this disease in North America was first recognized in 1999. It is a human, horse and bird neuropathogen<sup>1</sup> that can result in encephalitis, meningitis and even death.

“West Nile” Virus is so named because it was first isolated and identified in an infected person from the West Nile Province of Uganda in 1937.<sup>2</sup> There have since been reported outbreaks of WNV in Africa, Asia, the Middle East and Europe. There was no known transmission of WNV in the Western Hemisphere until reports of humans with the mosquito-acquired infection occurred in New York City in 1999.

There are several theories as to how the virus arrived in North America. One theory suggests that the virus arrived in an infected migratory or imported bird; another suggests that mosquitoes infected with the virus were accidentally transported to North America with other cargo.<sup>3</sup>

WNV was detected for the first time in Canada in 2001 in birds and mosquitoes from Ontario, including those from Peel. In 2002, Canadian health authorities documented WNV activity in five provinces: Nova Scotia, Quebec, Ontario, Manitoba and Saskatchewan.<sup>3</sup> By the end of 2002, there were 319 confirmed and 86 probable human cases of WNV in Ontario, with an additional 21 confirmed human cases across the rest of Canada.<sup>4</sup> Cases of locally acquired human illness occurred for the first time in the Region of Peel in 2002.

In 2003, the disease spread westward across Canada, causing 1,335 probable and confirmed cases, nearly all of which occurred in Manitoba (141), Saskatchewan (792) and Alberta (272).<sup>5</sup> Ontario had 89 confirmed cases of WNV in 2003, British Columbia and the Yukon Territory combined for 21 human cases and only 20 cases occurred in all of Quebec and the eastern provinces.<sup>5</sup> However, cases reported in Nova Scotia, New Brunswick, British Columbia and the Yukon were likely related to travel outside of that province or territory.

### ***The WNV Transmission Cycle***

Evidence suggests that WNV can remain in an area over the winter months in infected birds, adult mosquitoes<sup>6</sup> or in unhatched mosquito eggs.<sup>7</sup> A relatively small number of infected mosquitoes and/or birds would therefore be present within the region in early spring. This is when the virus begins to amplify. As certain types of female mosquitoes (*Culex pipiens* and *restuans*) feed on birds to get their blood meal in order to breed, the



virus is transmitted back and forth between the “vector” (the mosquito) and the reservoir “host” population (the bird), causing an increasing number of both birds and mosquitoes to become infected.

Towards mid- to late summer, certain other mosquito species, such as *Aedes vexans* and *Coquillettidia perturbans*, that feed on both birds and mammals become important in the transmission of WNV to people. By this time, there has been significant “amplification” of the virus among the bird population. These “bridge vector” mosquitoes that have fed on a WNV-infected bird become infected with WNV themselves. When they subsequently bite a person, they can infect them with WNV as well. Hence, the period of greatest risk to humans and other mammals is in late summer or early fall when the level of WNV in birds and mosquitoes is at its highest.<sup>2</sup>

### ***The WNV Prevention Plan 2003***

In 2003, to ensure a coordinated approach in preventing mosquito-borne disease outbreaks in the Region of Peel, Peel Health worked closely with local municipalities and conservation authorities, the Ontario Ministry of Health and Long-Term Care (MOHLTC), the Ontario Ministry of the Environment (MOE), Health Canada and neighbouring public health departments.<sup>6</sup>

Peel Health’s approach to WNV control emphasizes disease prevention and protection of the environment. The goal of the 2003 WNV Prevention Plan was to minimize impact of WNV through region-wide surveillance that directed integrated pest management-based mosquito control activities at a level commensurate with the risk of human illness. This meant an emphasis on public education, source reduction and larviciding.<sup>6</sup>

Peel Health enhanced surveillance and education activities (for the public and health care providers) in 2003. Also new for 2003 was a region-wide effort to reduce mosquito breeding through source reduction and larviciding in urban and suburban areas of Peel. Source reduction and larviciding focused on *Culex pipiens* and *Culex restuans* mosquitoes, the main vectors of WNV and the most common mosquito species in Peel.

This report is the second report in which WNV surveillance data have been compiled and published by Peel Health. It describes findings from the WNV surveillance activities conducted in Peel Region in 2003 involving dead birds, adult mosquitoes, larval mosquitoes and human cases. Comparisons between findings from the 2002 and 2003 WNV seasons are provided, where appropriate. In addition, activities relating to the larval mosquito control program are also described. Analyses of these data sources informed an evaluation of Peel Health’s 2003 West Nile Virus surveillance and control initiatives, as well as the West Nile Virus Prevention Plan 2004.