

Introduction

WNV is a mosquito-borne virus that first made its appearance in the North America during the summer of 1999, when an outbreak occurred in New York City. Since that time WNV has spread across the continent. In 2004, the virus was found in five Canadian provinces (Quebec, Ontario, Manitoba, Saskatchewan and Alberta) and all of the continental United States with the exception of Washington State.¹

In 2001, WNV was detected for the first time in Peel Region in birds and mosquitoes. The following year locally acquired human illness occurred for the first time in Peel. There were 112 residents of Peel who had laboratory evidence of WNV infection from the 2002 season (55 suspect cases, 20 probable cases and 37 confirmed cases, including two deaths).² The vast majority of these confirmed cases were in Mississauga (34), the remaining three confirmed cases were Brampton residents, and there were no reported cases in Caledon. Most of these cases occurred in August and September. The first reports of human cases in 2002 were preceded by a sharp increase in crow deaths in late July and early August. By the end of the year Peel Public Health documented over 1,400 dead crows in the region. Other indicators of extensive WNV activity in Peel during 2002 included positive tests for WNV in 20 crows and 128 mosquito batches.

In 2003, there were only 10 human cases and no deaths reported in Peel. Four of the 10 cases required hospitalization: 9 cases presented predominantly with fever and one case presented with WNV neurological manifestations. In 2003, the onset date for the first human case was August 13th. Mississauga continued to be the area in Peel with the highest WNV risk as all the cases of WNV in people were Mississauga residents. The number of positive mosquito batches dropped dramatically to 24 in 2003. Sixteen positive batches were collected from traps in Mississauga and the remaining eight positive batches were located in Brampton. The first positive batch was not collected until July 24. A total of 12 crows tested positive for WNV in 2003. Brampton and Mississauga each had five positive crows reported and there were two positive crows found in Caledon. The first positive crow was found on July 4 in Caledon.

WNV Transmission Cycle

Evidence suggests that WNV remains in an area over the winter in infected adult mosquitoes and/or birds. Hence, a small number of infected mosquitoes and/or birds are present within the region during the early spring months. At this time, the virus begins its amplification cycle. In Peel, two mosquito species that feed primarily on birds, *Culex pipiens* and *Culex restuans*, are the main enzootic vectors of the WNV. As these mosquitoes species feed on birds, the virus is transmitted back and forth between the vector (mosquitoes) and the reservoir host population (birds) allowing an increasing number of birds and mosquitoes to

become infected. If environmental conditions are optimum for transmission, the virus amplifies to a theoretical point of “spill over”. At this point in the amplification cycle, the virus bridges out of the enzootic, bird-mosquito cycle via bridge vectors. Bridge vectors are mosquito species such as *Aedes vexans* and *Coquillettidia perturbans* that readily feed on humans and other mammals in addition to birds. It is at this point in the season, generally from late July to early autumn, that the transmission to humans is most likely to occur. Recent evidence suggests that *Culex* mosquitoes may play a larger role in the transmission of WNV to people than previously thought.³

West Nile Virus Legislation

In 2003, the Government of Ontario enacted Ontario Regulation 199/03, “Control of West Nile Virus.” Under Ontario Regulation 199/03 (Appendix A), the local Medical Officer of Health (MOH) is required to conduct a risk assessment of the conditions pertaining to West Nile Virus (WNV) in the Health Unit. The risk assessment identifies the probability of human infection from West Nile Virus using surveillance information based upon human cases, birds, mosquito and equine infections as well as a number of other pertinent information elements. Conducting the risk assessment in accordance with the Regulation offers guidance to the MOH regarding appropriate WNV reduction activities, and if needed, provides a review of appropriate mosquito reduction activities (i.e., larviciding or adulticiding) and their effective application. The Regulation requires the local municipality to undertake those measures necessary for mosquito reduction when directed to do so by the Medical Officer of Health.⁴

The Medical Officer of Health is also required under Ontario Regulation 199/03 to record, investigate, and report any confirmed, likely adverse or unintended human health effects attributed to mosquito reduction actions, and to report any non-human environmental adverse effects to the Ministry of the Environment and/or other relevant local or provincial authorities.⁴

In 2003, the Ministry of Health and Long-Term Care (MOHLTC) amended legislation regarding WNV to make it both a reportable and communicable disease under Ontario Regulation 558/91 (Appendix B) and 559/91 (Appendix C). Physicians and laboratories must report human cases of WNV to the local Medical Officer of Health.

In 2003, Peel Public Health developed a WNV Prevention Plan. The goal of this plan was to minimize the impact of WNV through region-wide surveillance that directed integrated pest management based mosquito reduction activities at a level commensurate to the risk of human illness. In 2004, Peel Public Health’s WNV Prevention Plan continued to follow the blueprint developed the previous season. Surveillance activities and a mosquito larvae reduction program continued to be conducted in all of the three local municipalities in Peel Region.

During the summer of 2004, Peel Public Health's West Nile Virus Working Group carried out a weekly risk assessment based on surveillance information collected that week to identify the relative risk of human infection in Peel Region. Analyses were undertaken based on week of collection. The numbers used throughout this report to describe the weeks of the year in 2004 can be found in Appendix D. The WNV Working Group was made up of representatives from the Office of the Medical Officer of Health, Communicable Disease Division, Environmental Health Division, Epidemiology and Communications Services. The risk assessment protocol (Appendix E) looked at several surveillance factors, including: seasonal temperature; abundance of vector mosquitoes; minimum mosquito infection rates; positive birds; positive mosquito batches; presence of human cases in neighbouring provinces or US states; local/provincial WNV activity in birds, horses, and mosquitoes; time of year; and proximity of WNV activity to urban or built up areas in Peel. Based on the risk assessment the Medical Officer of Health could consider intensifying WNV prevention activities to reduce the risk of human infections of WNV in Peel Region.

This report is the third report in which WNV surveillance information has been compiled and published by Peel Public Health. The previous reports dealt with surveillance information collected in 2002 and 2003. This report describes the findings of our surveillance program in 2004. Comparisons between findings from the 2002 and 2003 WNV seasons are provided when appropriate. In addition, activities relating to the larval reduction program are reviewed. Analyses of these data sources will assist in evaluating Peel Public Health's West Nile Virus surveillance and reduction programs.