

EXECUTIVE SUMMARY

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 that can result in encephalitis, meningitis and even death.

Surveillance information from birds and mosquitoes provides an early warning of risk to human health and helps to guide control and education interventions. In the Region of Peel, WNV was first detected in birds and mosquitoes in 2001, with cases of locally acquired human illness occurring for the first time in 2002.

In 2003, Peel Health conducted surveillance activities in the Region involving dead birds, adult mosquitoes, larval mosquitoes and human cases. A larval mosquito reduction program was also introduced, along with environmental monitoring of pesticide efficacy and effects.

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.

Dead Bird Surveillance

In total, 150 dead crow sightings were reported to Peel Health in 2003, of which 58 were tested and 12 (21%) found to be positive for WNV. This was about one-tenth the number of sightings in 2002 (1,436).

Peel’s first WNV-positive bird in 2003 was found in Caledon on July 4th. There was no dramatic increase in dead crow sightings in 2003 as was the case in 2002.

Adult Mosquito Surveillance

Thirty-nine species of mosquitoes were identified in the Region of Peel in 2003; however, as in 2002, only a small number were likely important in the transmission of WNV to humans. In 2003, four species of mosquitoes were found to be positive for WNV. Mosquitoes from the genus *Culex* were the most important, accounting for an



estimated 13% of the mosquitoes tested and 96% of the WNV-positive batches. *Culex* mosquitoes also exhibited the highest WNV infection rates in Peel. In general, minimum infection rates showed that infection rates were down and that there were far fewer bridge vector mosquito species infected in 2003 compared to 2002.

Culex pipiens/restuans were once again key “amplification” mosquitoes, because they prefer to feed on birds, the main reservoir of WNV, and are more common in urban and suburban settings. As in 2002, very few *Culex* mosquitoes were trapped in the Caledon area compared to Mississauga or Brampton. No WNV-positive batches of mosquitoes were found in Caledon in 2003.

While other species might contribute to human WNV transmission, control of *Culex* mosquitoes is one of the most important strategies to reduce the risk of WNV transmission to humans. An analysis of *Culex* mosquitoes collected in 2002 compared to 2003 showed lower proportions in 2003, possibly as a result of the WNV Prevention Plan efforts, although other factors such as weather and a decreased number of WNV-susceptible birds may have also played a role.

Larval Mosquito Surveillance

Larval surveillance provides crucial information for mosquito control interventions. Potential breeding sites were identified on the basis of complaints from Peel residents, by referencing historical breeding site data collected from 2002 and by conducting field surveys for suitable habitats. In 2003, over 2,100 sites were surveyed for standing water in Peel: 77% were in Mississauga, 15% in Brampton and 8% in Caledon. The presence of mosquito larvae was identified in 28% of the potential breeding sites from which samples were taken, while “vector” larvae were identified in 17%. Ditches and culverts were some of the more numerous breeding sites and often contained mosquito larvae.

Between May and October 2003, a total of 19 different species or groups of mosquito larvae were identified from 3,942 specimens collected at breeding sites. Over 80% of those collected belonged to two *Culex* species: *Culex restuans* accounted for 42% and *Culex pipiens* accounted for 41% of all mosquito larvae that were collected and identified.

Larval Mosquito Control and Environmental Monitoring

Based on findings from larval surveillance activities in 2002, a larval mosquito reduction program involving the inspection and larviciding of 75,516 roadside catch basins across Peel Region was undertaken in 2003. An additional 372 catch basins located at Regional Long-Term Care facilities, parks or in private backyards were also treated.



Over the course of the 2003 mosquito season, a total of 221,342 treatments using the larvicide Methoprene were made in roadside, backyard or other types of catch basins. Methoprene was effective in reducing the emergence of viable adult mosquitoes, with an overall efficacy rate of 74% in Peel and an efficacy of up to 96% during the first 21 days after application, according to a study in Halton conducted by the Ministry of the Environment (MOE).

A total of 128 open surface water sites were identified for monitoring and treatment; those with moderate to high larval densities as per MOE guidelines were treated with Bti. A total of 131 Bti treatments were administered at 68 sites, with a resulting efficacy of 100%.

Treatments of 162 environmentally sensitive catch basins located within 30 meters of bodies of water were conducted using a device called a Larvasonic[®], producing efficacy rates of between 20% and 67%.

A collaborative study done by the MOE and a number of Ontario health departments showed that Methoprene had no impacts on surface water quality, including drinking water.

Human Case Surveillance

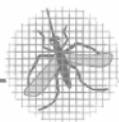
Human illness due to WNV acquired in Peel occurred for the first time in 2002, with 112 residents having laboratory evidence of WNV (55 suspect cases, 20 probable cases and 37 confirmed cases, including two deaths).

As of December 2, 2003, there were 10 residents of Peel who had laboratory evidence of WNV infection stemming from the 2003 season, nine of whom were classified as having West Nile Fever and one having a diagnosis of West Nile Neurological Manifestations. There were no deaths due to WNV in 2003. All of the 10 cases were residents of Mississauga. As in 2002, most cases occurred in the southern areas of Mississauga.

In 2003, half of the WNV confirmed cases in Peel were aged 40 to 59 years. Similarly, in 2002, contrary to initial expectations, about half of the confirmed and probable cases of WNV occurred among the 50 to 69 year age groups as opposed to being limited to older adults or the infirmed.

As in 2002, the most frequently reported symptoms among the confirmed cases in 2003 were fever, headaches and fatigue. Other common symptoms included muscle pain, confusion or forgetfulness and sensitivity to light.

Identification of WNV in humans underscores the importance of active, hospital-based human surveillance programs starting in July through to September, as well as the need



to consider WNV as a possible diagnosis when clinicians encounter patients with encephalitis, meningitis, acute flaccid paralysis or non-specific fevers occurring throughout this time period.

Conclusion

In Peel in 2003, the first indication of WNV activity was a WNV-infected dead bird found in Caledon on July 4th. The first human illness from WNV had an onset of symptoms on August 13th, approximately three weeks following the collection of the first WNV-positive batch of adult mosquitoes on July 24th.

Results from the 2003 mosquito season indicate that WNV activity, including cases of illness in people due to WNV, was substantially reduced compared to 2002.

Detailed analysis of information on Peel mosquitoes shows that *Culex* mosquitoes play a key role in local transmission of WNV as reported for other similar areas in the North American literature. In Peel, in 2003, *Culex* mosquitoes continued to be numerous and were the predominant species having positive WNV testing results. Compared to 2002, the number of *Culex* mosquitoes was substantially decreased, possibly as a result of the larviciding program, although other factors such as weather and a decreased number of WNV-susceptible birds may have also played a role. The larviciding program had no impacts on surface water quality.

Analysis of the Region of Peel's complete surveillance results shows that the monitoring of this information has served as an "early warning system" for human illness from WNV. It is appropriate that the Peel WNV Prevention Plan continue to focus control efforts on *Culex* mosquitoes.