

Executive Summary

Surveillance of human cases, birds and mosquitoes in 2005 showed an increase in West Nile Virus (WNV) activity in the Region of Peel and nationally. The information collected in the various surveillance activities continues to be valuable in assessing the risk of human WNV to Region of Peel residents. This information is used to assess the need for enhanced mosquito reduction activities which include larviciding and source reduction. Public education and community outreach are a significant and important component of the program particularly in preventing personal exposure and in eliminating breeding sites on private property.

WNV, first detected in North America in 1999, is transmitted primarily through the bite of infected mosquitoes. The spread across the continent has been rapid with human cases reported in eight provinces/territories in 2005. WNV activity in the Region of Peel first occurred in birds and mosquitoes in 2001. The following year, 2002, marked the year with the greatest number of confirmed human cases in the Region including two deaths.

In keeping with the Region of Peel WNV Prevention Plan, this fourth annual report presents the surveillance information collected in 2005. For the first time, this report presents WNV profiles for each Regional ward. They are intended to provide ward-specific overviews of WNV activity from 2002 to 2005.

Human Case Surveillance

Surveillance of human cases in 2005 showed an increase in West Nile Virus (WNV) activity in the Region of Peel and nationally when compared to the previous year. The rate of human WNV infection remains well below the rates in 2002.

Human cases increased from none in 2004 to three in 2005. Two cases were residents of the City of Mississauga and one case was a resident of the City of Brampton. The onset of the first case was consistent with the timing of the first case in previous years. There were no deaths due to WNV infection in 2005. Of the Health Units reporting cases, the Region of Peel had one of the lowest WNV case rates when adjusted for population size. Eight deaths due to WNV occurred in Ontario. Of particular importance to the Region of Peel is the fact that five of those deaths occurred in the City of Toronto.

Dead Bird Surveillance

In 2005, there was a 48% decrease from 2004 in the number of dead birds (all species) reported to Health Line Peel. Most dead bird reports, 60%, were from the City of Mississauga. Thirty per cent were from the City of Brampton and 10% were from the Town of Caledon.

Despite the fact that the number dead bird reports declined significantly, the number of target birds, crows and blue jays, being reported increased by 40% in 2005 when

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compared to the previous year. Thirty-three birds tested positive for WNV in the Region of Peel. Eighteen birds were positive in the City of Mississauga (16 of them in south Mississauga), 10 in the City of Brampton and five in the Town of Caledon.

The bird infection rate in the Region of Peel was 44% in 2005, which is the highest infection rate in birds observed since 2002. This compares to a provincial rate of 23% and 11% nationally. However, a complete assessment of the infection rate in birds is limited by the capping of bird submissions towards the end of the season.

The first positive bird was reported two weeks prior to the first human case and three weeks after the first positive mosquito batch. This year was the first time that a positive mosquito batch occurred before the finding of a positive bird.

Adult Mosquito Surveillance

Mosquitoes were collected weekly from 30 permanent, fixed-location traps throughout the Region of Peel. Two temporary traps were used at various locations throughout the season, as needed. A total of 90,769 female adult mosquitoes were collected in the Region of Peel; 57% in the City of Mississauga, 32% in the City of Brampton and 11% in the Town of Caledon.

Thirteen of the permanent traps were positive for WNV in 2005, for a total of 24 positive mosquito batches (some traps were positive multiple times). The number of mosquito batches testing positive increased by 500% over 2004. However, this number is equivalent to the number of positive batches in 2003. This increase can be attributed to the hotter summer temperatures in 2005 compared to 2003 and 2004.

In 2005, forty-two different mosquito species were found in the Region of Peel. The *Culex* species, *Culex pipiens* and *Culex restuans*, are associated with a greater risk of WNV transmission. This year, the *Culex* species were responsible for all of the positive mosquito batches in the Region of Peel. This finding notwithstanding, the abundance of the *Culex* species continued to decrease from a high of 30% in 2002 to approximately 5% in 2005. The decrease in *Culex* species is likely attributed to a successful larviciding program targeted to eliminate the *Culex* species, and a reduction in breeding sites preferred by the *Culex* species. Without taking preventive actions against the *Culex* species, the Region of Peel may well have seen an increase in their abundance from 2004 to 2005, as evidenced by the increases seen *Coquillettidia perturbans* and *Aedes vexans vexans*, the two most abundance species. However, weather conditions are a significant contributor to mosquito abundance.

This year marked the first time the Asian Tiger (*stegomyia albopicta*) mosquito was found in the Region of Peel and in two other Ontario health units. This mosquito species is a known carrier of WNV and other viruses. A provincially sponsored pilot study assessing the presence of this mosquito in Ontario is being conducted by the provincial government. The Region of Peel is participating in the study in 2006.

Larval Surveillance

Mosquito larval surveillance was undertaken at 2,138 potential breeding sites in the Region of Peel. Fifty-three per cent of the sites were in the City of Mississauga, 30% in the City of Brampton and 16% in the Town of Caledon. Mosquito larvae were found at 32% of the breeding sites monitored; 26% of all sites had vector larvae present. Ditches and culverts were the most common habitat where larvae were found. Thirty-nine per cent of the breeding sites with larvae were ditches, 15% were culverts.

In 2005, a total of 3,074 mosquito larvae were identified compared to 12,981 in 2004. This significant decline was due to modifications in the laboratory procedures where a representative sample of larvae was taken rather than identifying each larva in a given sample. Forty-seven per cent (1,453) of the larvae identified were *Culex pipiens* and *Culex restuans*. Larvae first emerged in week 21 (May 22 to 28) and peaked in week 27 (July 3 to 10), approximately six weeks prior to the first WNV positive mosquito batch.

Larval Mosquito Reduction

As in previous years, the larval mosquito reduction activities involved several concurrent approaches. Four rounds of methoprene pellets were applied in more than 300,000 roadside catch basin applications between mid-June to mid-September. Limited post-treatment monitoring indicated that the methoprene pellets were effective for up to 21 days with 100% mortality. An additional 1,942 catch basins on Peel-owned and/or operated properties, private backyards and public parks were treated with methoprene briquets which were effective up to 85 days.

There was limited use of Larvasonic equipment (33) and Vectolex® (462) in catch basins draining to Environmentally Sensitive Areas. In the previous year, Larvasonic was used more often. With the availability of *Bacillus sphaericus*, Larvasonic use became less cost-efficient since *Bacillus sphaericus* is effective for a longer period of time.

A total of 107 surface water sites were treated with *Bacillus sphaericus* and *Bacillus thuringiensis var. israelensis*. Some locations required multiple treatments. This represents a slight decrease in number of sites when compared to the previous year, possibly due to the hot dry weather that resulted in greater evaporation of standing water. Across the Region of Peel, ditches and storm water retention ponds were the surface water sites most often larvicided, 65% and 13% of the time, respectively.

Conclusion

There is no information suggesting that the spread of WNV has stopped. While WNV activity, as measured by the three main surveillance factors, will vary from year to year, it is reasonable to assume that the disease has established itself in North America.

A number of factors influence the risk of human WNV infection requiring the implementation of multiple surveillance and risk reduction strategies to minimize the risk

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of human WNV infection. The surveillance systems implemented in the Region of Peel suggest that the prevention and reduction activities are resulting in reduced risk of human WNV infection in the Region of Peel.

The mosquito surveillance data for 2005 shows a decrease in the percentage of *Culex* species relative to other mosquito species. Given that the *Culex* species was exclusively responsible for the WNV mosquito pools in the Region of Peel in 2005 targeted mosquito vector reduction focussing on the *Culex* species must continue.

The results of the 2005 WNV surveillance program suggest that the 2006 WNV Prevention Plan should continue to focus on surveillance, mosquito reduction and public education and community outreach.