

**Dead Bird Surveillance**

**Introduction**

The sudden die-off of crows in New York City in the summer of 1999 was not immediately connected to the appearance of a virus that had never been seen before in North America. It wasn't until weeks after human cases of encephalitis appeared that the illnesses were diagnosed as West Nile Virus. Since that time, the sudden appearance of dead birds in the early summer has signalled the possible presence of West Nile Virus (WNV). Testing of dead birds, especially crows, has been used as an indicator of the presence of WNV in a community and the risk of human infection. Since August 2001, a dead bird testing positive for WNV has been the first indicator that the virus was present in Peel (Table 1).

**Table 1: Date and Location of First Positive Crow, Region of Peel, 2001-2004**

Year	Date	Location
2001	August 10, 2001	Mississauga
2002	May 19, 2002	Mississauga
2003	July 4, 2003	Caledon
2004	July 6, 2004	Brampton

While over 200 North American native bird species have been infected with WNV, the corvid bird species (crows, jays, and ravens) have been found to most likely die from the virus.<sup>5</sup> Crows (Figure 1) in particular will demonstrate an almost 100% mortality rate once infected with WNV. Crows continue to be the bird species of choice for most dead bird surveillance programs in Canada and the USA.



**Figure 1: American Crow**

Source: Canadian Cooperative Wildlife Health Centre  
<http://wildlife.usask.ca/WestNileAlertHTML/WestNileAlertBirdPage.htm>

In addition to crows, blue jays (Figure 2), the other main corvid species found in Peel, were submitted for testing in 2004. Blue jays were included in the provincial dead bird surveillance program, in part due to low crow population

levels in some parts of Ontario. The agency that conducted the viral testing in the province, the Canadian Cooperative Wildlife Health Centre (CCWHC), also requested the submission of hawk carcasses for study purposes. Crows, blue jays, and hawks are particularly useful, since they have high mortality rates when infected with WNV, are conspicuous and easily recognized by the public, and are relatively common where they are naturally present. The submission of dead birds for testing for WNV has been a reliable surveillance tool for determining the presence of WNV in our community.

## Methods

As part of Peel Public Health's 2004 WNV education program, members of the public were asked to report dead crows to the health department. The public also contacted the health department to report other dead bird species. When the public identified the location of a dead crow, blue jay or hawk, Animal Control Services staff in Brampton, Caledon, and Mississauga were dispatched to pick up the carcass. Information such as location, species of bird and date of the call was entered into a geographic information system. Peel Public Health staff sent the carcasses that were suitable for analysis to the CCWHC in Guelph for viral testing.



Figure: 2 Blue Jay

Source: Canadian Cooperative Wildlife Health Centre  
<http://wildlife.usask.ca/WestNileAlertHTML/WestNileAlertBirdPage.htm>

In previous years, the CCWHC would stop accepting dead bird submissions for a period of time from a health unit once a total of four positive birds had been identified in that particular area of the health unit. Testing would not resume until sometime in the fall to observe the seasonal extent of the WNV infection in birds. In 2004, Peel Public Health arranged for continued bird testing during the entire dead bird surveillance season by paying an additional fee for each extra bird tested. This was recommended in the 2003 West Nile Virus Prevention and Control Plan Evaluation Report.<sup>6</sup> This provided additional surveillance data to assist in monitoring WNV activity in Peel Region throughout the season.

The CCWHC conducted a rapid test of dead birds for WNV using a VecTest®. The first four WNV positive birds from a given health unit found to be positive using the VecTest® underwent further confirmatory testing using the Reverse Transcriptase-Polymerase Chain Reaction (RT-PCR) test. For 2004, dead birds were collected and submitted from early May to the end of October. Crows and other corvid species which were not fit for testing and other

non-corvid species were recorded as sightings and also entered into the geographic information system data base.

## Results

In 2004, the first WNV-positive bird in Ontario was a blue jay found on May 7<sup>th</sup> in Grey Bruce Health Unit near the town of Hanover.<sup>7</sup> At least one positive bird was reported in every health unit in Ontario with the exception of the Kingston, Frontenac and Lennox and Addington Health Unit.<sup>8</sup> A total of 1,403 target species birds were tested in Ontario for the presence of the virus at the CCWHC laboratory.<sup>8</sup> In the target species group, 250 birds were found to be positive (217 crows; 32 blue jays; and one raven).<sup>8</sup> The positive hawk found in Peel was not included in the provincial totals as hawks are not one of primary target testing species for WNV testing. A comparison of the number of WNV positive target species birds found in all Ontario health units in 2004 is shown in Table 3. Only Toronto, with 18 positive birds, had higher numbers than Peel.

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**Table 2: Dead Bird Test Results by Health Unit, Ontario, 2004**

<b>Health Unit</b>	<b>Total Submitted</b>	<b>Tested</b>	<b>Not Tested</b>	<b>Total Positive</b>
Algoma	39	36	3	9
Brant	18	18	0	5
Chatham - Kent	22	22	0	6
Durham	54	52	2	8
Eastern Ontario	28	28	0	3
Elgin - St. Thomas	16	16	0	4
Grey - Bruce - Owen Sound	20	20	0	3
Haldimand - Norfolk	9	9	0	6
Haliburton - Kawartha	43	43	0	6
Halton	48	48	0	13
Hamilton - Wentworth	42	42	0	7
Hastings, Prince Edward	69	68	1	7
Huron County	24	24	0	4
Kingston, Frontenac	38	38	0	0
Lambton	24	23	1	5
Leeds, Grenville, Lanark	36	36	0	1
Middlesex - London	17	17	0	6
Muskoka - Parry Sound	45	45	0	10
Niagara Area	63	59	4	4
North Bay	53	49	4	8
Northwestern	57	57	0	8
Ottawa - Carleton	38	38	0	6
Oxford County	27	26	1	5
Peel Regional	60	60	0	16
Perth District	26	26	0	5
Peterborough	38	35	3	9
Porcupine	53	51	2	3
Renfrew District	45	44	1	9
Simcoe County	51	50	1	5
Sudbury	60	59	1	5
Thunder Bay	45	45	0	13
Timiskaming	23	23	0	2
Toronto	49	49	0	18
Waterloo	20	19	1	4
Wellington - Dufferin - Guelph	35	31	4	5
Windsor - Essex County	21	21	0	11
York Regional	84	76	8	11
<b>Total</b>	<b>1,440</b>	<b>1,403</b>	<b>37</b>	<b>250</b>

CCWHC last update 2004-11-19

Source: Canadian Cooperative Wildlife Health Centre

<http://wildlife1.usask.ca/ccwhc2003/portal/provReports.php>

Over half the positive birds that tested positive in Canada for the virus in 2004 were found in Ontario (Table 3). Four other provinces (Quebec, Manitoba, Saskatchewan and Alberta) had positive birds found within their provincial boundaries.<sup>7</sup> These five provinces also had positive bird activity in 2003. Two provinces (New Brunswick and Nova Scotia) that had positive birds in 2003 did not have any confirmed positive birds in 2004.<sup>7</sup>

**Table 3  
Dead Bird Test Results by Province, Canada, 2004**

Province/Territory	No. tested	No. of confirmed positive dead birds
Newfoundland and Labrador	85	0
Prince Edward Island	105	0
Nova Scotia	455	0
New Brunswick	509	0
Quebec	866	112
Ontario	1,403	250
Manitoba	316	16
Saskatchewan	364	29
Alberta	670	9
British Columbia	1,437	0
Yukon Territory	11	0
Northwest Territories	10	0
Nunavut	2	0
<b>Canada - Total</b>	<b>6,233</b>	<b>416</b>

Source: Public Health Agency of Canada  
[http://dsol-smed.phac-aspc.gc.ca/wnv/map600\\_e.phtml](http://dsol-smed.phac-aspc.gc.ca/wnv/map600_e.phtml)

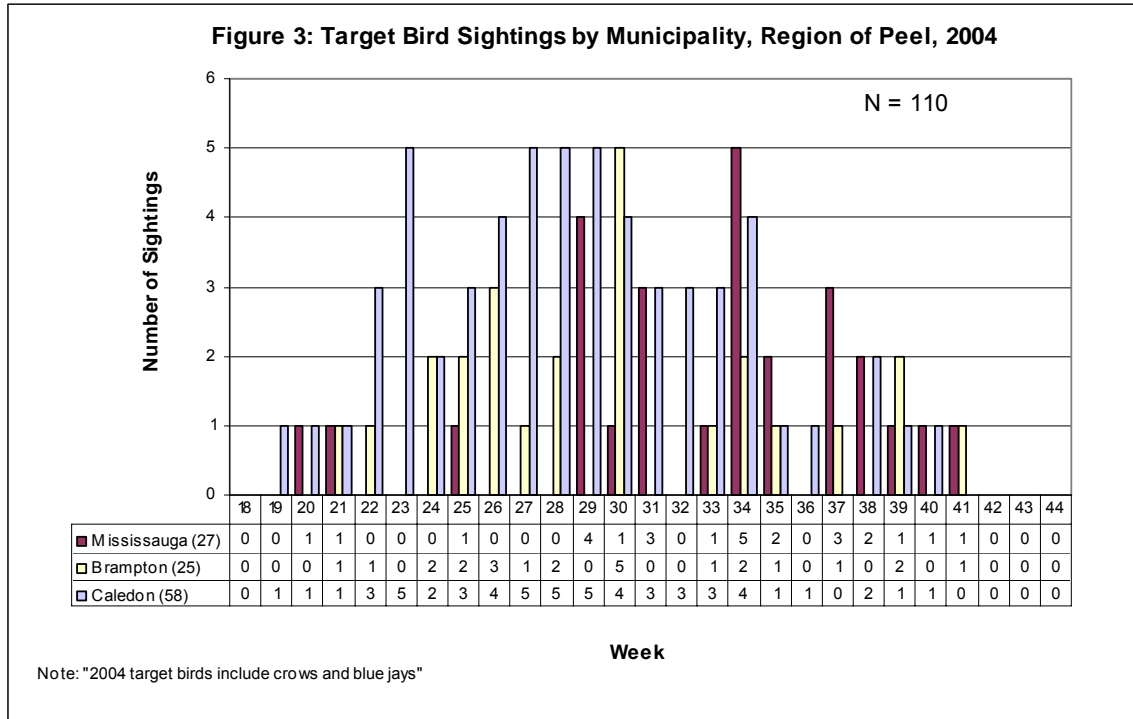
A total of 2,086 calls concerning dead birds were received from the public by Peel Public Health in 2004. These calls resulted in 1,832 bird sightings other than blue jays or crows being reported. A combined total of 110 confirmed blue jays or crows (Figure 3) were reported with a total of 60 carcasses from two species being submitted to the CCWHC for testing. The dead bird surveillance program ran from May 10 to October 31, 2004. In Peel, 32% (13/41) of the crows and 16% of blue jays (3/19) submitted for testing proved positive for WNV. In addition, 33% of hawks (1/3) were positive. This brought the Peel total to 17 positive birds -16 from the primary target species and one hawk.

Peel's first positive bird was a crow found in Brampton on July 6 (Week 27) and the last positive bird was another crow found in Mississauga on September 22

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(Week 38). In 2003, a crow found on July 4 in Caledon was the initial positive bird in Peel. A crow found in Mississauga on May 19, 2002 was the first WNV infected bird found in Canada during that year.

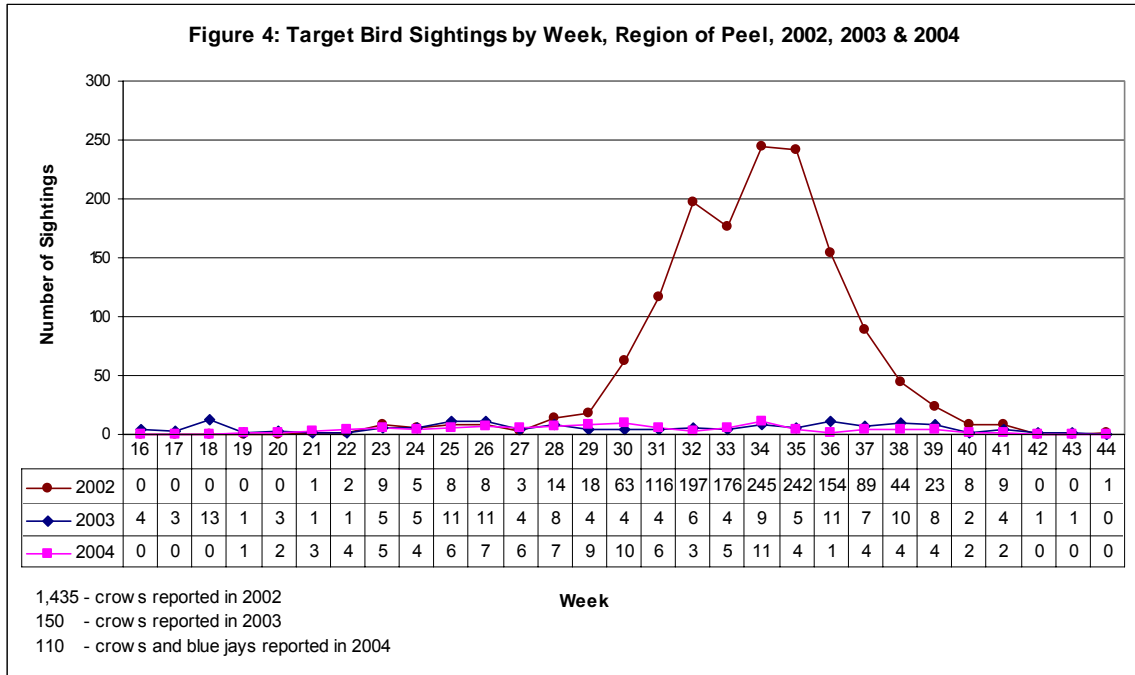
All three municipalities reported positive dead birds in 2004. Five positive crows were found in Caledon, four in Brampton and four in Mississauga. Two positive blue jays were found in Mississauga and one in Caledon. The positive hawk was found in Mississauga.



In 2002, a sharp increase of dead crow sightings began in the third week of July (Week 30) and peaked during the last two weeks of August (Weeks 34 and 35) with nearly 250 sightings in each of these two weeks (Figure 4). Contrary to the findings from 2002, there were no large increases or peaks seen in the dead bird surveillance numbers in 2003 or 2004 (Figure 4). In 2004, the CCWHC expanded the target species that they would test from Southern Ontario health units to include blue jays. In 2004, the combined number of dead blue jay and crow sightings in Peel totalled 110 (33 blue jays and 77 crows). Despite the inclusion of blue jays in the 2004 dead bird surveillance program, the number of target dead bird sightings decreased from the 150 reported in 2003 and the 1,436 reported in 2002 when only dead crows were noted as sightings (Table 4). The reduction of the number of sightings was probably a result of two factors: lower WNV activity in Peel in 2004; and the fact the two main corvid populations in Peel (blue jays and crows) have not fully recovered from the large die-off in 2002 when there was a high level of WNV activity in Mississauga and Brampton. This is supported by local observations of low crow and blue jay numbers in

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Brampton and Mississauga. A study in an area in Illinois that had high WNV activity in 2002 estimated as much as 82% of the crow population died in 2002, largely as result of WNV.<sup>9</sup>



**Table 4: Number of Dead Crows by Municipality, Region of Peel, 2002-2004**

Year	Peel	Mississauga	Brampton	Caledon
2002	1,436	903	485	48
2003	150	59	37	54
2004	77	14	21	42

Locations of the crow and blue jay sightings by Forward Sortation Area (FSA - the first three digits of the postal code) are shown in Figure 5. In 2004, over 50% of the target dead bird sightings occurred in the Town of Caledon, despite Caledon having only five per cent of Peel’s human population. Caledon crow and blue jay numbers were not impacted to the same degree as those in the other two local municipalities as the surveillance data revealed lower levels of WNV activity in Caledon in 2002, 2003 and 2004.

Densities of dead crows and blue jays reported per square kilometre were mapped by FSA and are shown in Figure 6. In 2004, the highest densities were

found in L6S located in the central area of Brampton and L4Y and L5K located in south Mississauga. This distribution follows the same general pattern as 2002 and 2003 when only crow sightings were mapped. In 2002, the highest crow densities were almost 10 crow sightings per square kilometre; the highest crow density in 2003 was one crow per square kilometre. This year, even with crow and blue jay sightings combined, the highest density per square kilometre was substantially less than one bird per square kilometre. This is consistent with high crow mortality in Mississauga and Brampton in 2002 and 2003 depleting the local population.

Figure 5: Locations of Dead Crow & Blue Jay Sightings by Forward Sortation Area (FSA), Region of Peel, 2004

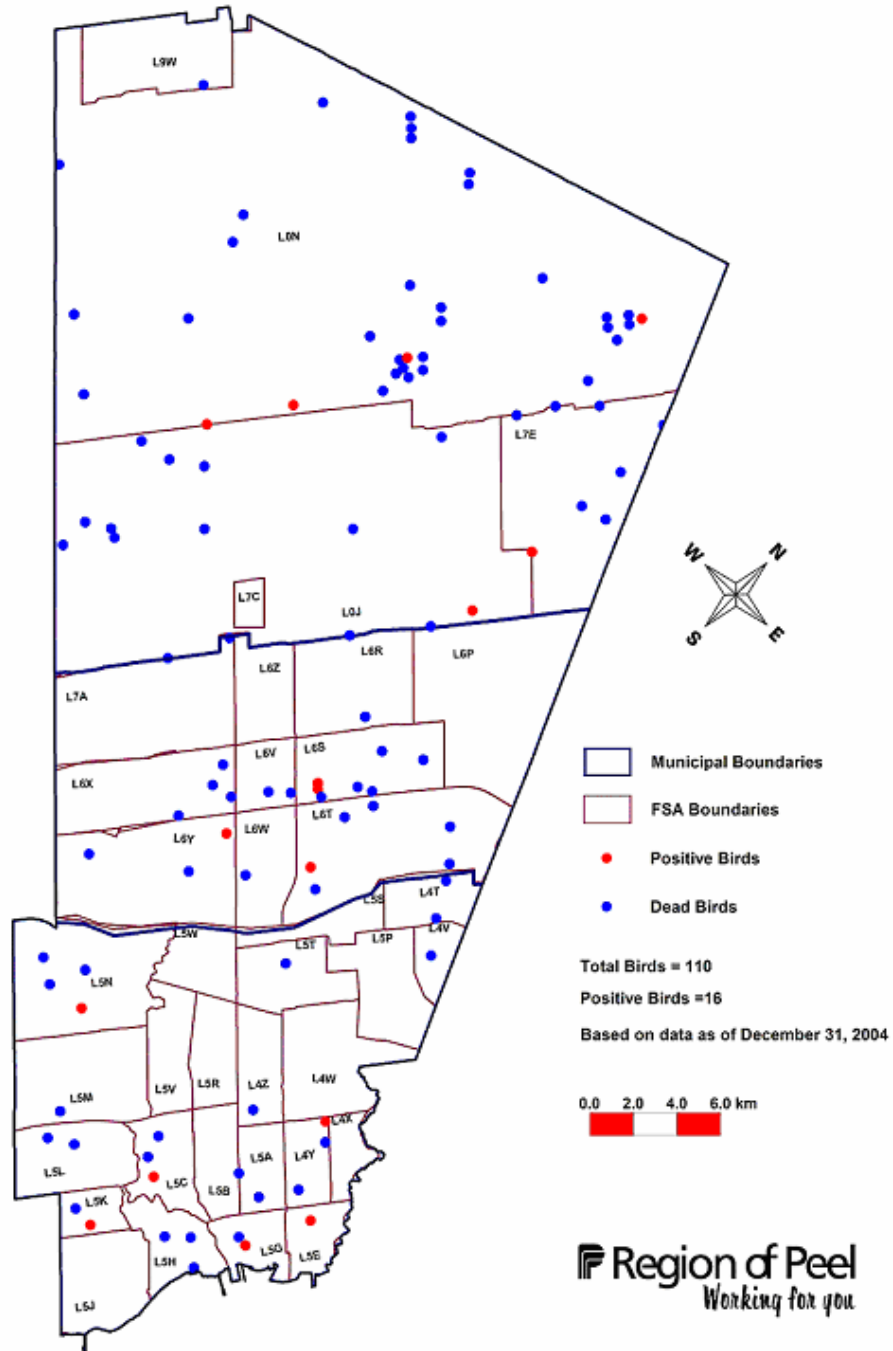
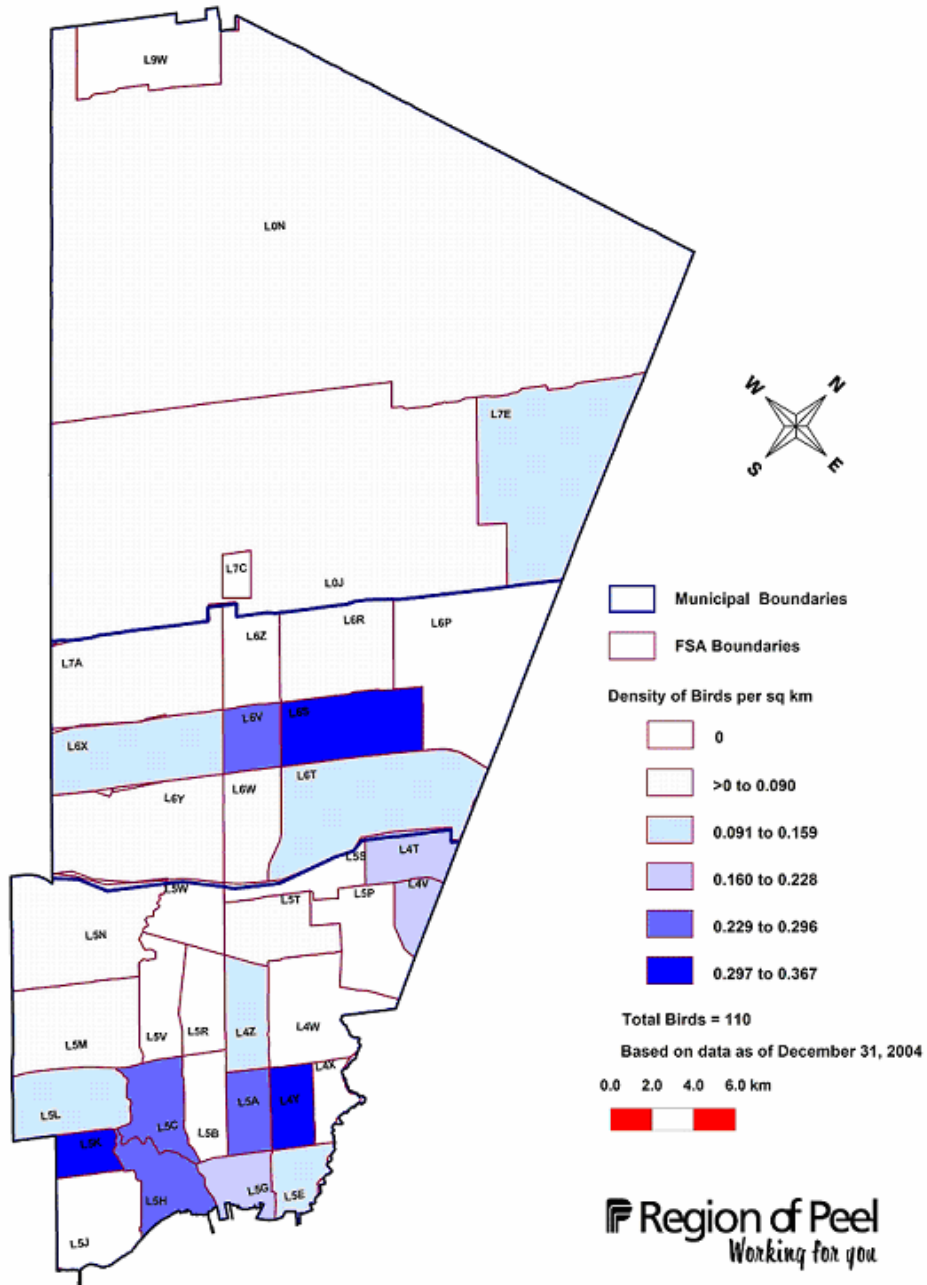


Figure 6: Density of Dead Crows & Blue Jays Reported by Forward Sortation Area (FSA), Region of Peel, 2004



## Summary

The earliest indicator of WNV activity in a jurisdiction is by the detection of the virus in birds. This surveillance information can serve as an early warning of risk to human health. Dead bird surveillance is an important part of Peel's WNV monitoring program.

In 2004, a crow found in Brampton on July 6th was Peel's first positive bird. The previous year a crow found on July 4<sup>th</sup> in Caledon was the initial positive bird in Peel. A crow found on May 19, 2002 in Mississauga was the first WNV infected bird found in Canada during that year.

In total, 110 dead blue jays or crow sightings were reported to Peel Public Health in 2004, of which 60 were tested and 16 were found positive. Thirty-two per cent of the crows (13/41) and 16% of blue jays (3/19) tested positive. In addition, 33% of hawk carcasses (1/3) submitted were positive for the virus.

The increase of WNV positive birds from 12 in 2003 to 17 in 2004 can be attributed to Peel continuing to submit bird carcasses throughout the entire WNV season for the first time in 2004. In previous years, the CCWHC would suspend testing from a health unit when four WNV positive birds were identified in a jurisdiction; later in the fall they would permit additional submissions.