



DEAD BIRD SURVEILLANCE

Introduction

Over 130 native species of birds in North America are known to have been infected by WNV.^{8,9,10} In Canada, the birds found to be most susceptible to WNV include crows, ravens, jays, and magpies. American crows (*Corvus brachyrhynchos*) are the most sensitive indicator of WNV activity in Peel. After infection with WNV, nearly all crows die due to inflammation of the brain and other organs.¹⁰

The wild bird WNV surveillance program operated by the Canadian Cooperative Wildlife Health Centre (CCWHC) has been in place since May 2000.² The program tests only members of the crow family (crows, ravens, jays and magpies). In 2000, 2,288 birds were examined from across Canada and none were found to have the WNV present. In 2001, 3,911 birds were tested and 128 (3%) were found to have the virus. In 2002, 3,478 birds were examined; 563 (16%) were found to be WNV-infected. In 2003, 11,323 birds were tested; 1,633 (14%) were found to be positive for WNV.¹¹

Surveillance programs for dead birds entail finding birds that have recently died during the mosquito season, collecting their carcasses and testing them for the presence of the virus.² Factors such as the density of the human population, the types of birds and the size of the remaining bird population in a given area will affect the number of reported dead bird sightings. The purpose of dead bird surveillance is to establish whether or not WNV is present in an area,¹² which can serve as an early warning of risk to human health and aid in the decision-making on WNV control measures.

Methods

In the spring, summer and fall of 2003, members of the public were asked to contact the Peel Health Department if they found dead crows, taking note of the location and condition of the bird. Only crows (and ravens in Northern Ontario) were used for dead bird surveillance of WNV in Ontario. Animal control services in Brampton, Caledon and Mississauga collected the dead crows, which were sent to the CCWHC laboratory in Guelph, Ontario for testing.

Information on the locations of the dead crows was collected from callers and/or by obtaining actual latitude and longitude measures using hand-held global positioning system (GPS) devices, which were accurate to within plus or minus three to five metres. The information, including date collected and test results, was entered into a geographic information system. Analyses were conducted by week of collection. The numbers



used throughout this report to describe the weeks of the year in 2003 can be found in Appendix A.

The CCWHC conducted a rapid test of birds for WNV using a VecTest[®]. The first four WNV-positive birds from a given health unit found to be positive using this test underwent further confirmatory testing by the CCWHC. After the first four birds in a single Ontario health unit were confirmed positive, all those subsequently determined to be positive using the preliminary test were deemed “presumed confirmed” without any further formal testing. Results of bird testing were then reported back to the appropriate public health agencies.¹²

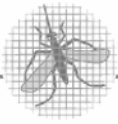
Dead birds were collected from April to October, 2003. Once it was established that WNV activity was present in crows in Peel, testing was discontinued for a period of time through the summer. Testing of dead crows resumed in the fall to observe the seasonal extent of WNV infection in birds. As of September 14, Peel Health resumed submitting a maximum of four dead crows per week to the CCWHC for WNV testing. Dead crow sightings continued to be reported throughout the fall; the last dead crow to be picked up and sent for testing was found on October 22, 2003, after which no further dead crows were reported.

Results

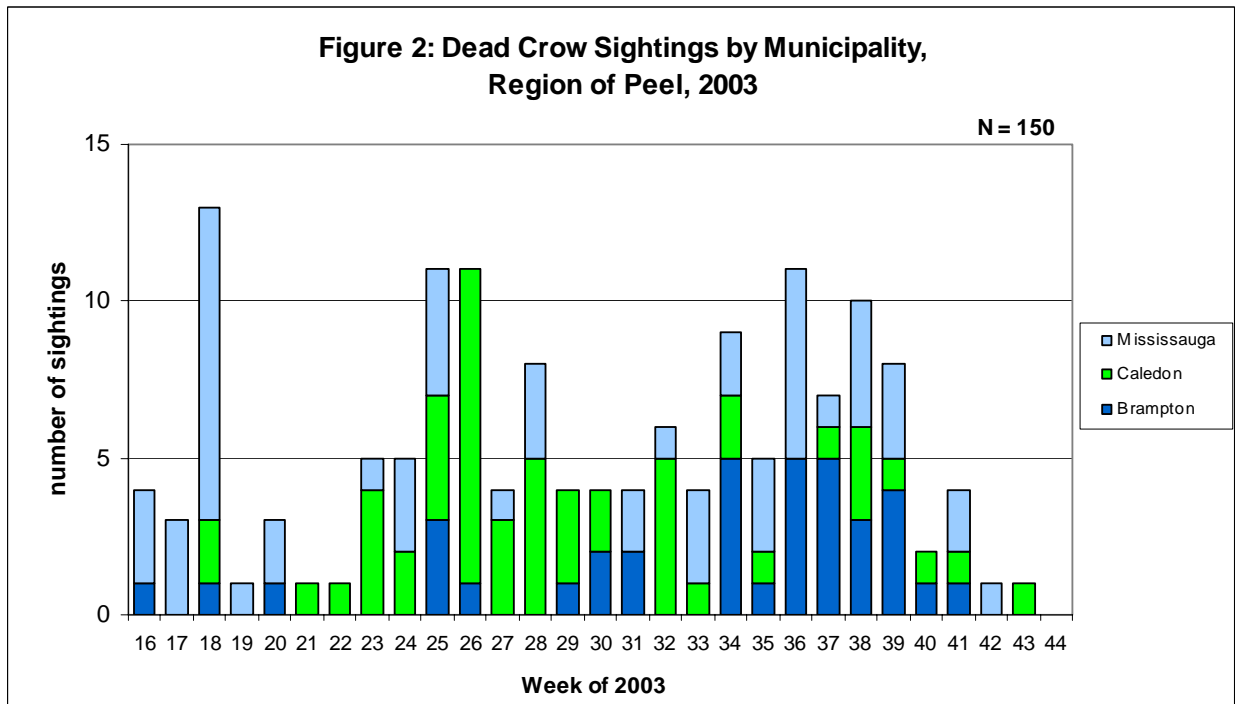
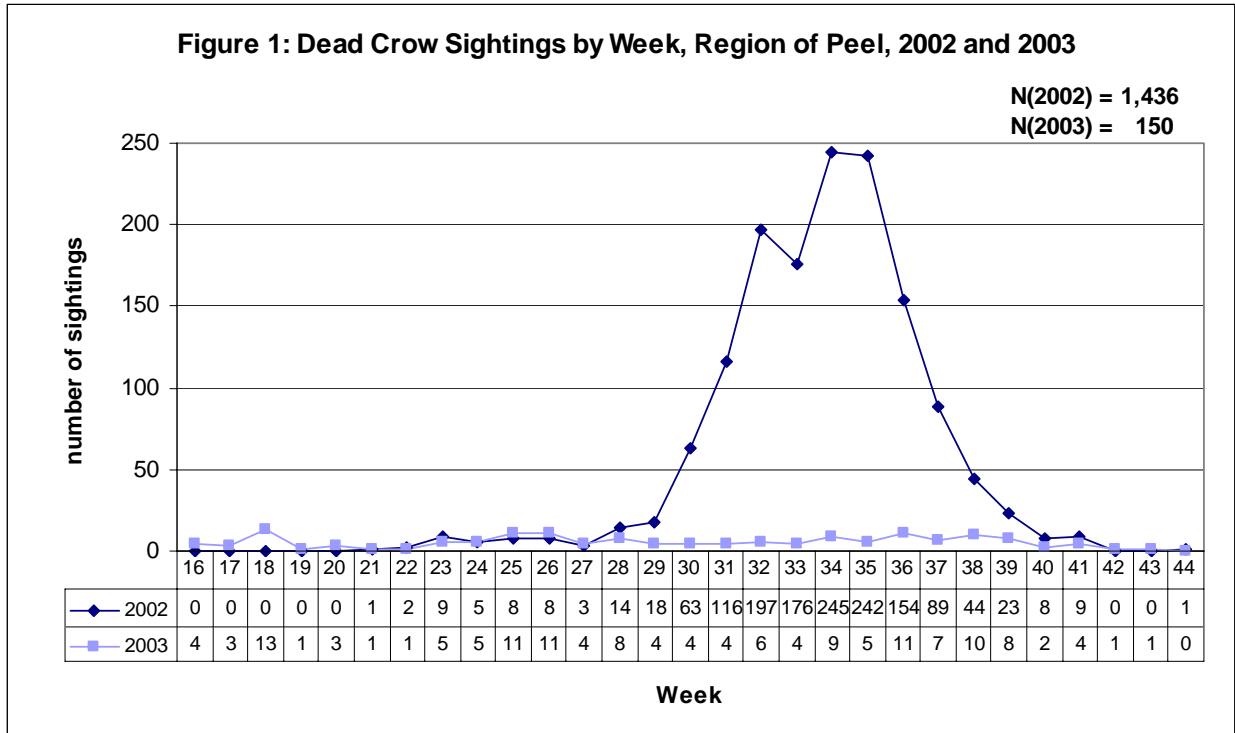
The first WNV-infected dead crow of 2003 in Ontario was found in York Region on April 15, 2003. As of November 21, 2003, at least one positive dead bird had been found in every health unit area across Ontario with the exception of the Porcupine region of northern Ontario.¹³ A total of 1,484 dead crows were tested for the presence of WNV in Ontario, of which 242 (16%) were confirmed to be positive or “presumed confirmed”.^{11,12}

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), of which 71 dead crows were tested and 20 (28%) found to have WNV. The decrease in sightings was not likely due to underreporting, since Peel Health received over 2,500 telephone calls from Peel residents for dead birds other than crows. Peel’s first confirmed positive dead crow was found in Caledon on July 4, 2003, followed by two positive dead crows in south Mississauga on August 2 and August 7. Peel’s fourth positive dead crow was found in Brampton on August 18. The last WNV-positive dead bird in Peel was found on October 6 (Week 41) in south Mississauga.

In 2002, a sharp increase in the number 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. Contrary to the findings from 2002, there were no large increases or peaks seen in the numbers of dead crow



sightings over the course of the 2003 mosquito season, as shown in Figure 1.





In 2003, the greatest number of sightings occurred early on in the season (Week 18), when a total of 13 dead crow sightings were reported, mostly in south Mississauga (Figure 2). This may have been due to a reason other than WNV infection, such as deaths of recently hatched or young birds as they tried to leave their nests. In Caledon, a small increase in dead crow sightings occurring during Weeks 23 through 26 preceded the finding of Peel's first WNV-positive dead crow on July 4th (Week 27).

Most dead crow sightings in Caledon were found to occur during June and July (Weeks 23 to 30), whereas in Brampton, most dead crow sightings took place from mid-August to mid-October (Weeks 34 to 41). In Mississauga, there were two periods of time when the majority of dead crows were sighted: mid-April to mid-May (Weeks 16 to 20), and from the end of July through to the end of September (Weeks 31 to 39).

Locations of dead crow sightings by Forward Sortation Area (FSA – the first three-digits of the postal code) are shown in Figure 3. In 2003, over one-third (36%) of dead crow sightings in Peel occurred in Caledon, despite Caledon only having five per cent of Peel's human population. While in 2002 it was found that more sightings occurred in more populated areas, this was not the case in 2003.

The number of sightings in 2003 in Brampton and Mississauga was likely affected by the large die-off of crows in 2002 as a result of WNV infection. Thus numbers and proportions of sightings in these two municipalities were much lower than in the previous year. This is supported by local observations of low crow numbers in Mississauga and Brampton. A recent study in east-central Illinois estimated that 82% of the crow population died during 2002, largely as a result of WNV.¹⁴ Because of the low crow numbers in Peel, a peak in sightings could not have happened in 2003.

Densities of dead crows reported per square kilometre were mapped by FSA and are depicted in Figure 4. Over the course of the 2003 mosquito season, the highest densities of dead crows occurred in central Brampton (L6V and L6W) and in south Mississauga (L5H, L5B and L4Y). This is roughly the same pattern as found in 2002, except on a much smaller scale. Whereas crow densities ranged upwards to 10 crows per square kilometre in 2002, the highest density of dead crows in 2003 was one crow per square kilometre.

Of the 58 dead crows found in Peel and submitted for testing in 2003, 12 (21%) were WNV-positive – five in Mississauga, five in Brampton and two in Caledon (Figure 3). The largest numbers of WNV-positive dead crows were found in postal code area L6V in Brampton (three), followed by postal code area L5G in south Mississauga (two). In 2002, the largest number of WNV-positive crows found in one postal code area was observed in FSA L5J of Mississauga, where four positive birds were found.



A comparison of numbers of WNV-positive crows found in various Ontario Health Units in 2003 is shown in Appendix B. Only Toronto to the east of Peel and Halton Region to the west had higher numbers of birds found to be WNV-positive (17 and 15, respectively) than Peel (12).

Summary

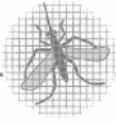
Surveillance programs for dead birds attempt to establish the presence of WNV in the bird population, which can serve as an early warning of risk to human health.

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). Members of the public reported nearly 250 dead crow sightings per week in each of the last two weeks of August in 2002; however, the highest number of sightings in a one-week period in 2003 was just 13, occurring at the end of April and beginning of May (Week 18).

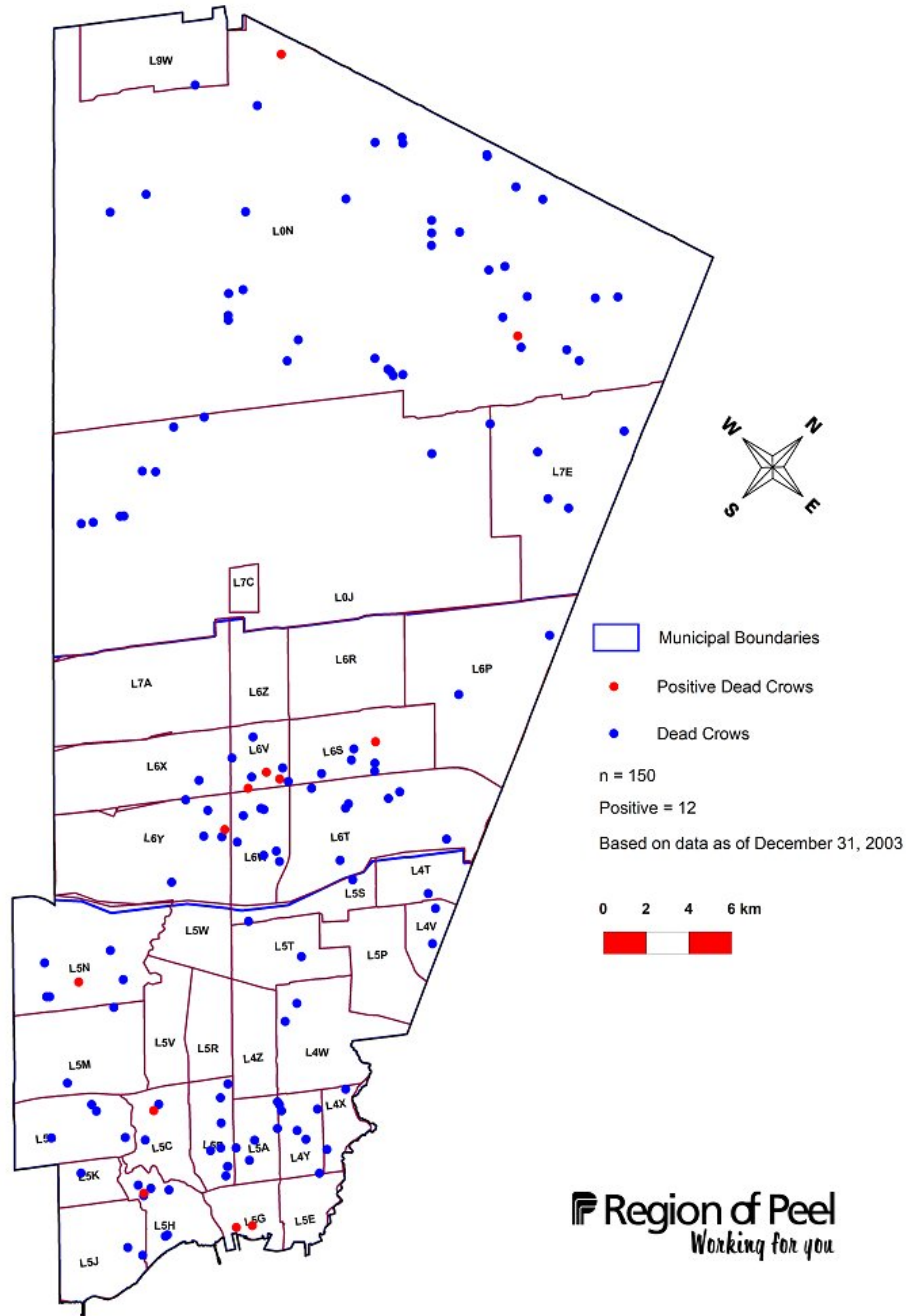
Die-offs of crows in the 2002 mosquito season meant that bird surveillance activities were attenuated in the municipalities of Brampton and Mississauga in 2003. Nevertheless, the testing of dead crow specimens by the CCWHC established that WNV was still present in flocks of birds in Peel.

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.

Research has shown that the presence of dead birds found to be positive for WNV precedes an increased risk for human illness by a period of two to six weeks.¹⁵ A more detailed temporal analysis comparing the timing of dead bird sightings, positive mosquitoes and human cases in one municipality of Peel will be shown in a later section of this report.



**Figure 3 : Locations of Dead Crow Sightings,
Region of Peel, 2003**



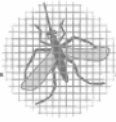


Figure 4 : Density of Dead Crows Reported by Forward Sortation Area, Region of Peel, 2003

