

Larval Mosquito Surveillance

Larval Surveillance Highlights for 2006

- Mosquito larval surveillance was undertaken at 2,233 potential breeding sites in the Region of Peel
 - 70% of the sites were in the City of Mississauga, 18% in the City of Brampton and 12% in the Town of Caledon
- Mosquito larvae were found at 25% of the breeding sites monitored (551 of 2,233)
- Sites with vector larvae only were found in 2.3% of all breeding sites, vector and non-vector larvae were found in 22% of breeding sites
- Ditches and culverts were the most common habitat where larvae were found
 - 42% of the breeding sites with larvae were ditches, 14% were culverts and woodland pools
- A total of 2,205 mosquito larvae were identified in 2006 compared to 3,074 in 2005
- 56% (1,227) of the larvae identified were *Culex pipiens* and *Culex restuans*
- The larvae first emerged in week 20 (May 14 to 20) and peaked in week 30 (July 23 to 29)

Larval surveillance is useful in guiding WNV prevention and reduction activities. It is used to determine the location, species and population densities of mosquitoes. Larval surveillance activities are vital for predicting adult emergence and establishing optimal times for implementation of larval reduction measures.

From early May to early September, seasonal staff surveyed a variety of aquatic habitats for the presence of mosquito larvae. These potential breeding sites were identified by referring back to breeding site information collected in previous years and by stagnant water complaints received through the Customer Contact Centre or from the on-line reporting form. This information is maintained in a computerized database that allows for easy access and reference.

Sampling for the presence of larvae involved the use of a standard dipper. Quantification of the larval density was ranked as nil, low, moderate or high based on threshold amounts for each category in a fixed number of dipsⁱⁱⁱ

ⁱⁱⁱ Larval density categories: a) nil – no larvae b) low – 1 to 6 larvae in 10 dips c) moderate – 7 to 30 larvae in 10 dips d) high – greater than 31 larvae in 10 dips or greater than 51 larvae in 5 dips

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Breeding site details such as dimensions and larval count information were entered into a handheld computer in the field. This handheld computer was equipped with a Global Positioning System (GPS) that recorded the exact location by latitude and longitude.

Larval samples were sent to one of the two “in-house” laboratories for species identification by Peel Public Health staff. The species identification results were used in conjunction with the adult mosquito species information to determine species distribution, habitat preferences, abundance and seasonal occurrence.

The larval surveillance data were managed using a geographical information system (GIS) called GeoMedia (version 5.1). The GIS was used to generate maps of all the potential breeding sites, the locations where larvae were found previously, particularly those sites where WNV vector larvae were found previously and the types of breeding site habitats.

In 2006, larval surveillance was undertaken at 2,233 potential mosquito breeding sites on publicly owned lands in Peel Region (Map 10). Table 20 breaks down the number of surface water sites monitored by municipality and compares it to previous years. The total number of sites monitored across Peel Region is consistent with the previous three years – over 2,000 sites. Also, as in previous years, the greatest number of sites monitored was located in the City of Mississauga (70%) followed by the City of Brampton (18%) and the Town of Caledon (12%). However, the overall proportions amongst the municipalities shifted from the previous year. In 2005, a greater number of sites were monitored in both the City of Brampton and the Town of Caledon, 30 and 16%, respectively.

Table 20 Number of Surface Water Sites Monitored by Municipality - Region of Peel, 2002-2006

Year	Peel Region	Mississauga	Brampton	Caledon
2002	278	152	106	20
2003	2,103	1,627	304	172
2004	2,296	1,726	383	187
2005	2,138	1,135	651	352
2006	2,233	1,567	392	274

In 2006, mosquito larvae were found at 25% (551 of 2,233) of the breeding sites monitored in the Region of Peel compared to 32% (674 of 2138) in 2005. Site with vector larvae only were identified in 2.3% (51 of 2,233) of all breeding sites,

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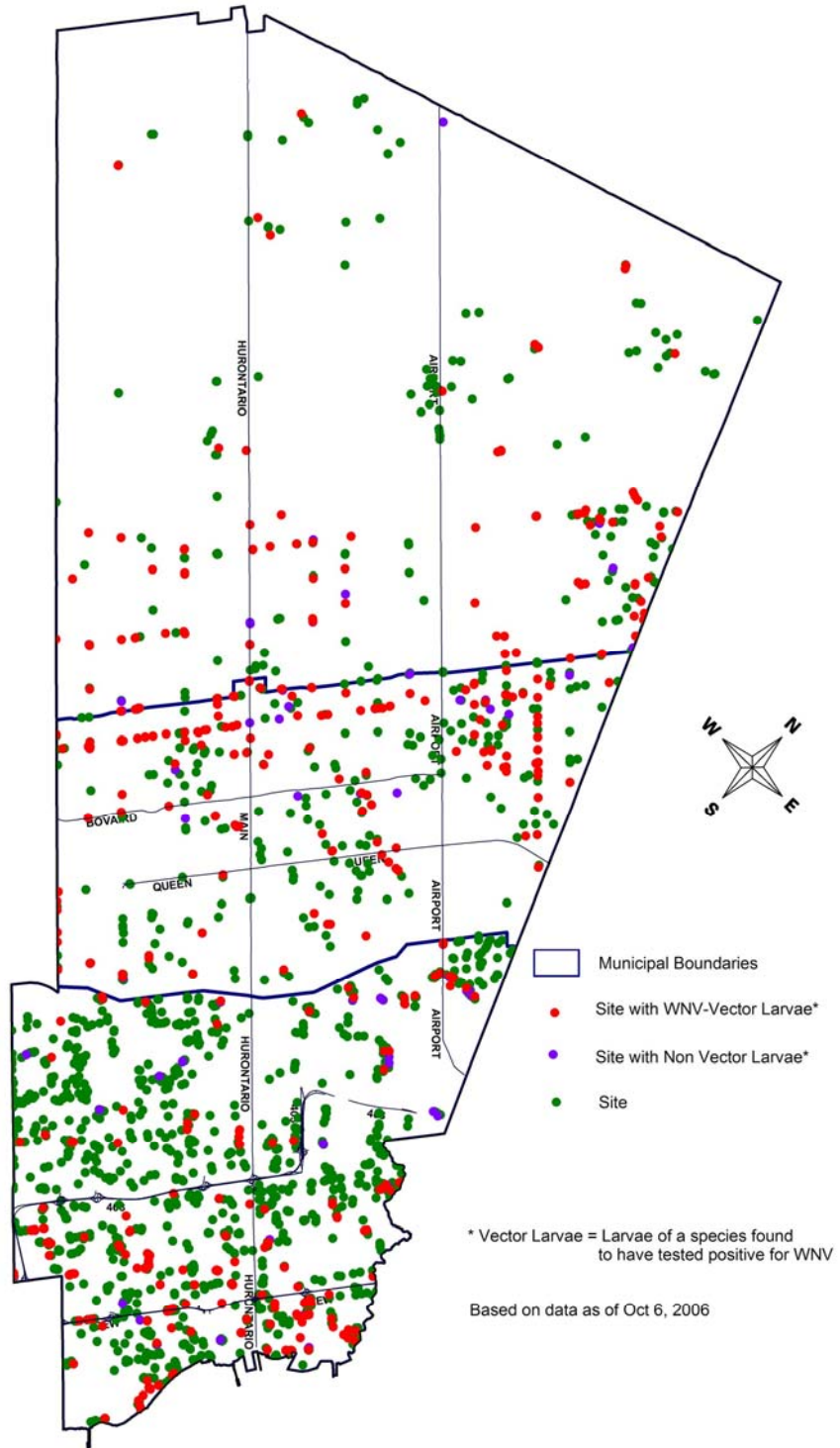
similar to 2005 with 2%. There were 486 sites with both vector and non-vector larvae representing 22%.

As in the previous years, ditches, culverts and woodland pools were the most common habitats where mosquito larvae were found across the Region of Peel (Figure 22). Forty-two per cent of the breeding sites found to contain larvae were ditches. Woodland pools and culverts each accounted for 14% of the breeding sites with larvae present.

Figures 23 through to 25 present the larval surveillance results by breeding site type (habitat) in each local municipality. There is some minor variability across municipalities with respect to percentage of sites within a breeding site type that were found to have larvae. This may be a function of inconsistent sample sizes within each breeding site across the three municipalities (e.g. only two marsh locations in Brampton versus 12 and 115 in Caledon and Mississauga, respectively). In 2006, there was a general decrease in the number of storm water management ponds that were positive for mosquito larvae, especially the wet ponds. In the Town of Caledon, 16% of the wet storm water management ponds were found to have larvae present compared 79% in 2005.¹¹ In Mississauga it went from 50% to 9% and stayed at 8% in Brampton. The decrease in the number of storm water management ponds treated can likely be attributed to lower mean monthly air temperatures being recorded in June and July of 2006 compared to 2005. As a result of the cooler weather, the water temperatures of these large bodies of water did not reach levels that were conducive for mosquito breeding as early as they were in 2005.

Map 10

**Surveyed Locations of Mosquito Breeding Sites,
Sites with Larvae and Vector Larvae*, Region of Peel, 2006**



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Figure 22 Types of Sites Found to Contain Mosquito Larvae – Region of Peel, 2006

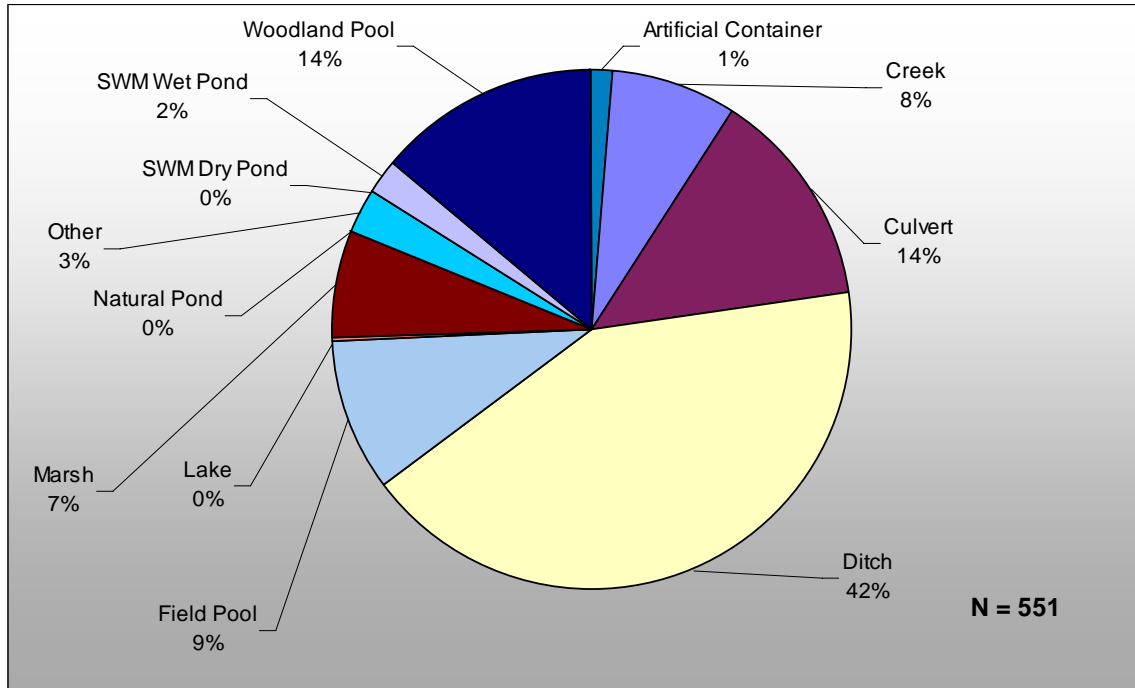
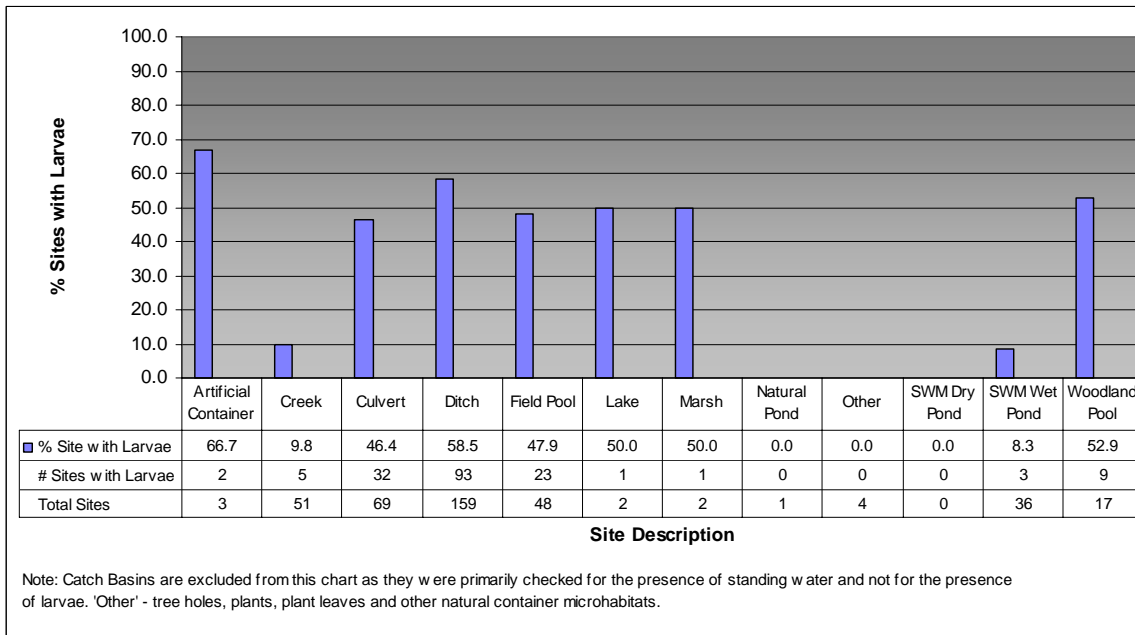


Figure 23 Proportion of Potential Surface Water Mosquito Breeding Sites with Larvae, by Type of Site - Brampton, 2006



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Figure 24 Proportion of Potential Surface Water Mosquito Breeding Sites with Larvae, by Type of Site - Caledon, 2006

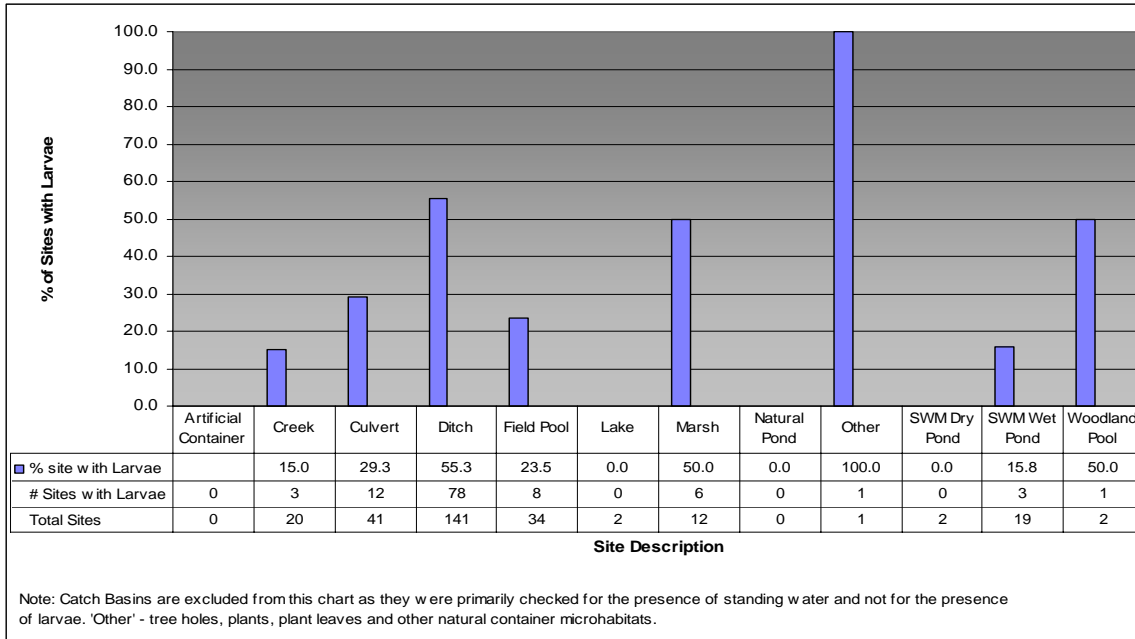
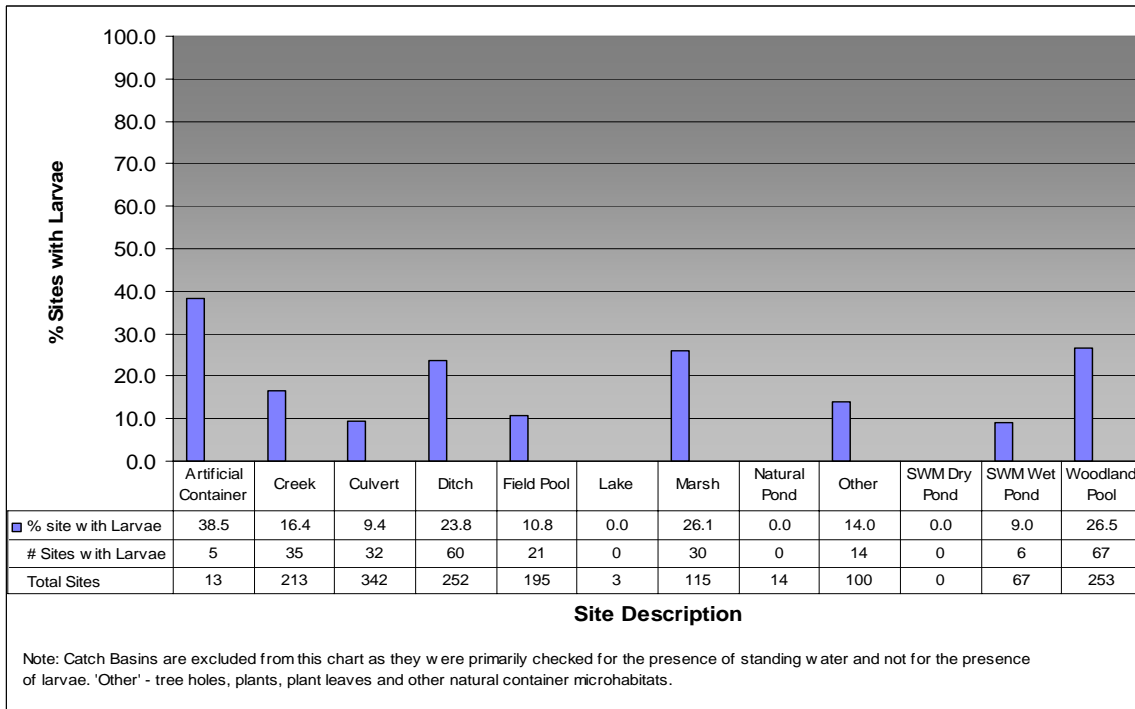


Figure 25 Proportion of Potential Surface Water Mosquito Breeding Sites with Larvae, by Type of Site - Mississauga, 2006



Species Identification – Larval Analysis

A total of 2,205 mosquito larvae were identified from mid-May to the beginning of September in 2006. This represents a 72% decline from 2005 (3,074).

Twenty-four different species were identified; 56% (1227) were the two *Culex* species, *pipiens* and *restuans*. This represents an increase in percentage of the identified larvae from these two species – up from 47% in 2005.

In 2006, these two species emerged around the same time – week 20 (May 14 to 20) for *Culex pipiens* and week 22 (May 28 to June 3) for *Culex restuans*. The first larval emergence occurred during week 21 in 2005. *Culex pipiens* was present in greater numbers starting in week 21 and remained the predominant of the two species throughout the season (Figure 27) with the exception of week 23 where *Culex restuans* outnumbered *Culex pipiens*. *Culex pipiens* larvae peaked in weeks 27 to 33 (July 2nd to August 19th) with the greatest number being identified in week 30 at 122. This is similar to 2005 where the peak was observed during week 27 with 133 larvae identified. When compared to 2004, this represents an approximate 10-fold decrease from the peak of 1,124 larvae identified in week 31.

In addition, 2006 marked the first year that a limited number of tire traps were used for larval identification. Five tire traps were set up at three separate locations to study the Asian tiger mosquito (Figure 26). While no larvae for the Asian tiger mosquito were collected, 21 *Culex pipiens*, 36 *Culex restuans* and 2 *Oc. japonicus* larvae were collected. This was the first time *Oc. japonicus* larvae have been collected in Peel – although adults from this species have been found in CDC light traps in Peel since 2003.



Figure 26 Tire Trap used in the Asian tiger mosquito pilot study

Source: Region of Peel - Public Health, 2006

Figure 27 Numbers of *Culex pipiens* and *Culex restuans* Larvae by Week of Collection - Region of Peel, 2006

