Larval Mosquito Surveillance

Larval Surveillance Highlights for 2005

- Mosquito larval surveillance was undertaken at 2,138 potential breeding sites in the Region of Peel
    - 53% 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 (674 of 2,138)
- Vector larvae were found at 26% of the sites
- Ditches and culverts were the most common habitat where larvae were found
    - 39% of the breeding sites with larvae were ditches, 15 % were culverts
- A total of 3,074 mosquito larvae were identified in 2005 compared to 12,981 in 2004
- 47% (1,453) of the larvae identified were *Culex pipiens* and *Culex restuans*
- The larvae first emerged in week 21 (May 22 to 28) and peaked in week 27 (July 3 to 10)

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 Health Line Peel 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 dips[2]. 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.

[2] 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

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 2005, larval surveillance was undertaken at 2,138 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 two previous years – just over 2,000 sites. Also, as in previous years, the greatest number of sites monitored was located in the City of Mississauga (53%) followed by the City of Brampton (30%) and the Town of Caledon (16%). However, the overall proportions amongst the municipalities shifted from the previous year. In 2005, a greater number of sites was monitored in both the City of Brampton and the Town of Caledon, from 17% and 8% in 2004 to 30 and 16% in 2005, respectively.

Table 20 Number of Surface Water Sites Monitored by Municipality - Region of Peel, 2002-2005

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

In 2005, mosquito larvae were found at 32% (674 of 2,138) of the breeding sites monitored in the Region of Peel. This same finding was observed in 2004. Vector larvae were identified in 26% (555 of 2,138) of all breeding sites.

As in the previous years, ditches and culverts were the most common habitats where mosquito larvae were found across the Region of Peel (Figure 17). Thirty-nine per cent of the breeding sites found to contain larvae were ditches and 15% were culverts.

Figures 18 through to 20 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 one marsh location in Brampton versus 18 and 70 in Caledon and Mississauga, respectively). In 2005, there was a general

increase in the number of storm water management ponds that were positive for mosquito larvae, especially the wet ponds. In the Town of Caledon, 79% of the wet storm water management ponds were found to have larvae present compared to 50% in Mississauga and 8% in Brampton. This compares to 57, 23 and 9% respectively, in 2004.

Map 10 Surveyed Locations of Mosquito Breeding Sites, Sites with Larvae and Vector Larvae*, Region of Peel, 2005

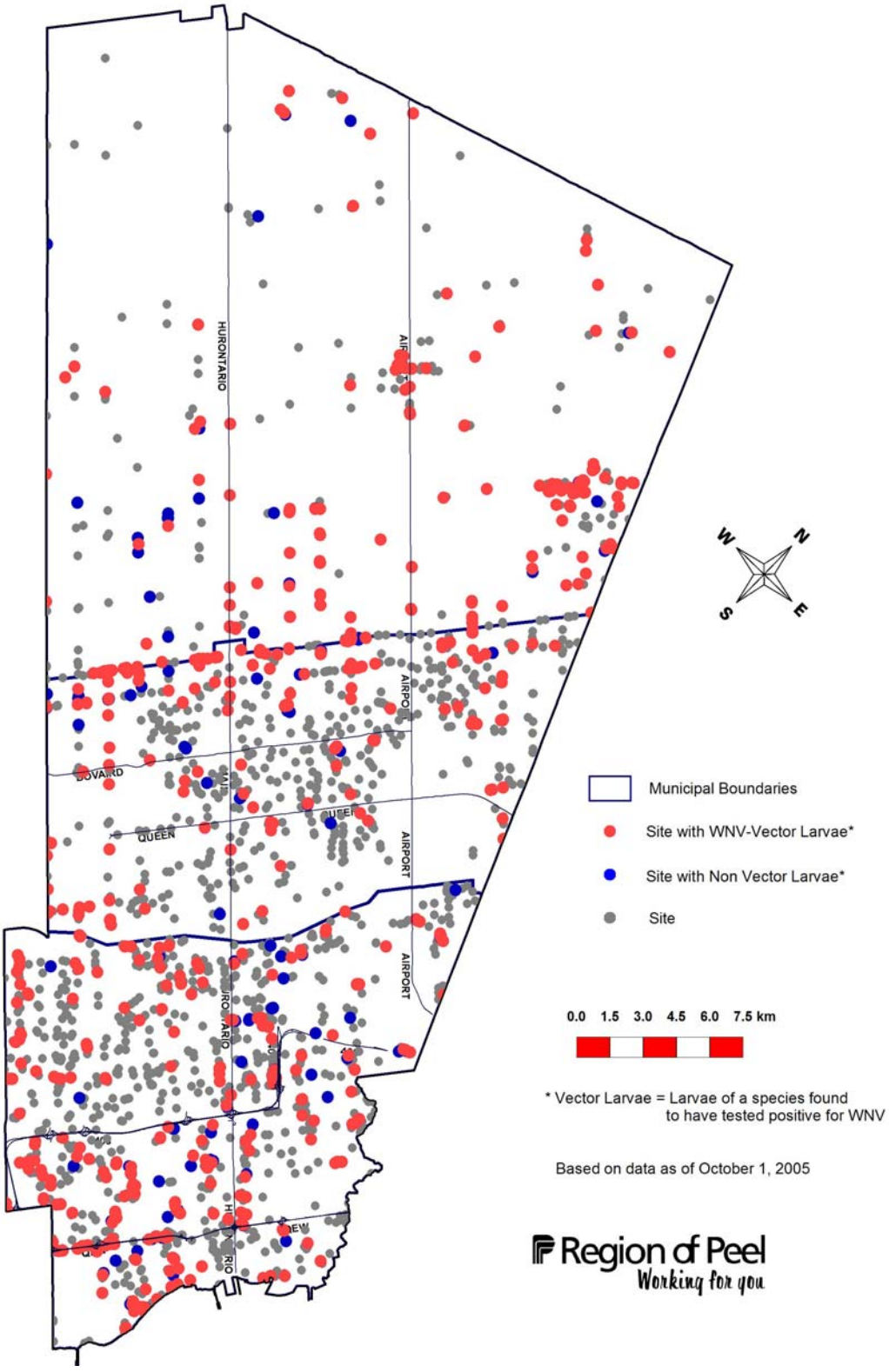


Figure 17 Types of Sites Found to Contain Mosquito Larvae - Region of Peel, 2005

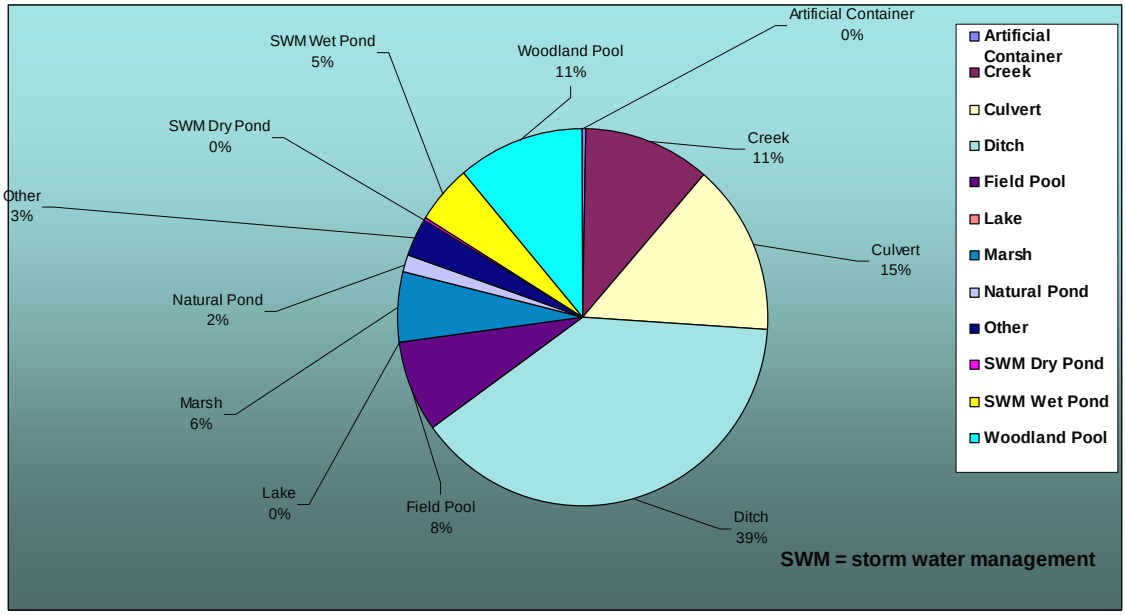
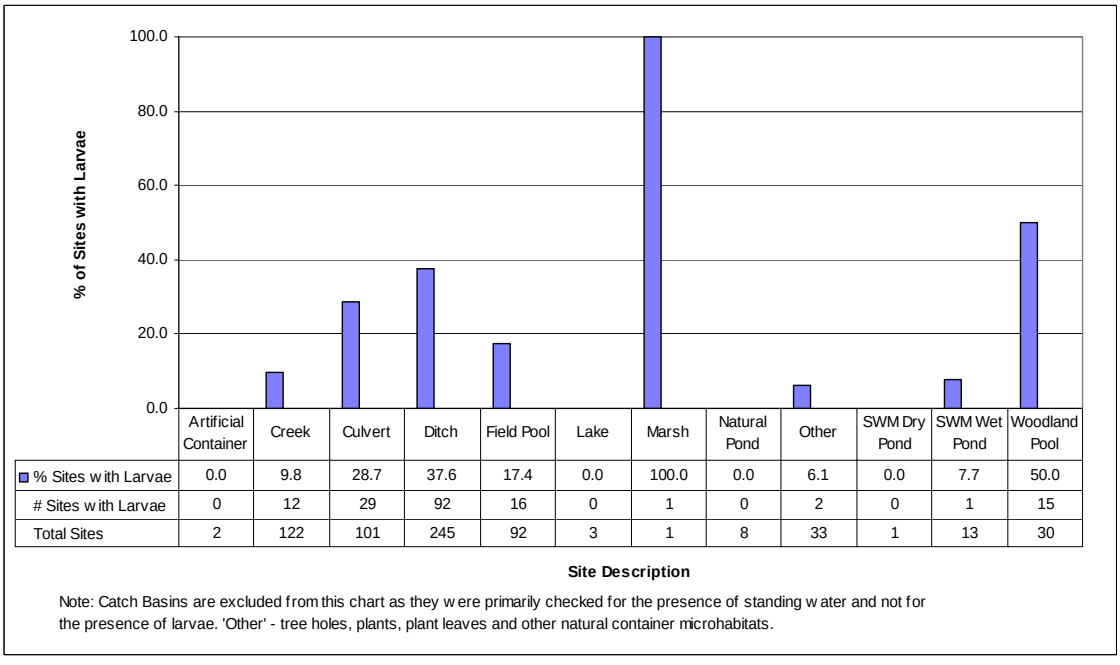


Figure 18 Proportion of Potential Surface Water Mosquito Breeding Sites with Larvae, by Type of Site - Brampton, 2005

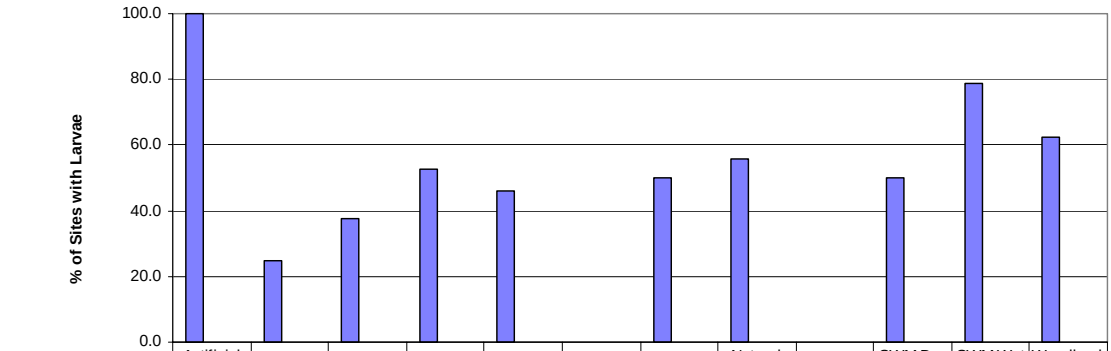


	Artificial Container	Creek	Culvert	Ditch	Field Pool	Lake	Marsh	Natural Pond	Other	SWM Dry Pond	SWM Wet Pond	Woodland Pool
% Sites with Larvae	0.0	9.8	28.7	37.6	17.4	0.0	100.0	0.0	6.1	0.0	7.7	50.0
# Sites with Larvae	0	12	29	92	16	0	1	0	2	0	1	15
Total Sites	2	122	101	245	92	3	1	8	33	1	13	30

Site Description

Note: Catch Basins are excluded from this chart as they were primarily checked for the presence of standing water and not for the presence of larvae. 'Other' - tree holes, plants, plant leaves and other natural container microhabitats.

Figure 19 Proportion of Potential Surface Water Mosquito Breeding Sites with Larvae, by Type of Site - Caledon, 2005

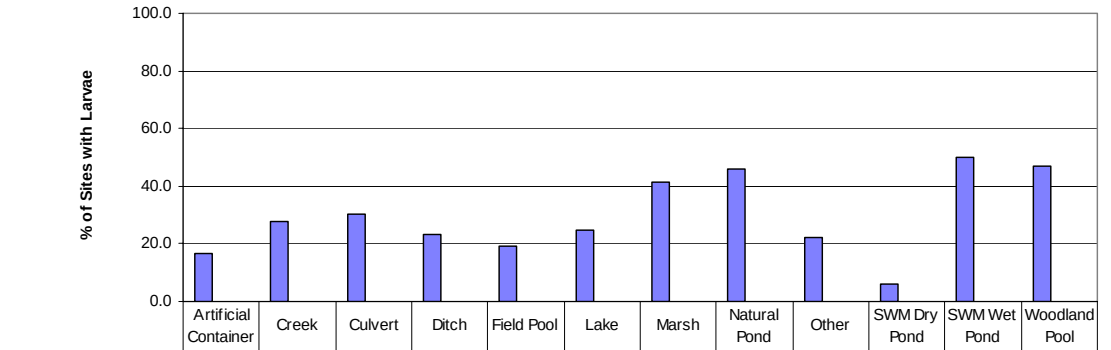


	Artificial Container	Creek	Culvert	Ditch	Field Pool	Lake	Marsh	Natural Pond	Other	SWM Dry Pond	SWM Wet Pond	Woodland Pool
% Sites with Larvae	100.0	25.0	37.5	52.8	46.2	0.0	50.0	55.6	0.0	50.0	78.9	62.5
# Sites with Larvae	1	5	15	112	6	0	9	5	0	2	15	10
Total Sites	1	20	40	212	13	0	18	9	0	4	19	16

Site Description

Note: Catch Basins are excluded from this chart as they were primarily checked for the presence of standing water and not for the presence of larvae. 'Other' - tree holes, plants, plant leaves and other natural container microhabitats.

Figure 20 Proportion of Potential Surface Water Mosquito Breeding Sites with Larvae, by Type of Site - Mississauga, 2005



	Artificial Container	Creek	Culvert	Ditch	Field Pool	Lake	Marsh	Natural Pond	Other	SWM Dry Pond	SWM Wet Pond	Woodland Pool
% Sites with Larvae	16.7	27.8	30.4	23.2	19.0	25.0	41.4	46.2	22.4	6.3	50.0	47.2
# Sites with Larvae	1	58	55	57	31	1	29	6	19	1	17	51
Total Sites	6	209	181	246	163	4	70	13	85	16	34	108

Site Description

Note: Catch Basins are excluded from this chart as they were primarily checked for the presence of standing water and not for the presence of larvae. 'Other' - tree holes, plants, plant leaves and other natural container microhabitats.

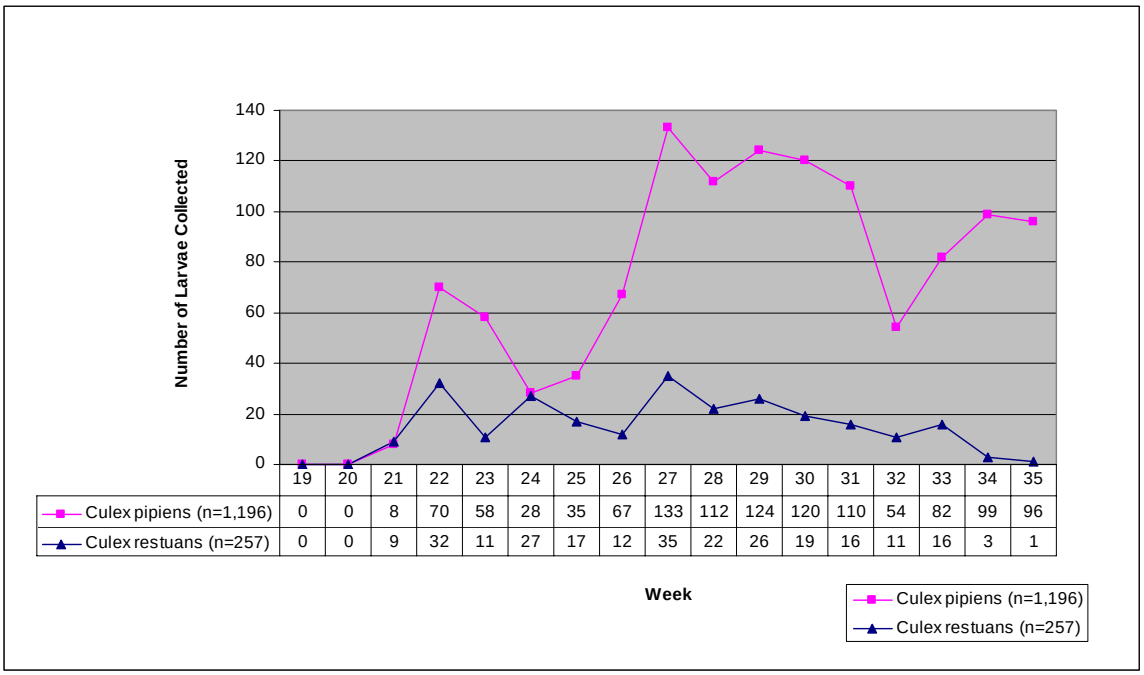
Species Identification – Larval Analysis

A total of 3,074 mosquito larvae were identified from mid-May to the beginning of September in 2005. This represents 24% of the 12,981 larvae identified in 2004, a significant decline. This is likely a result of modifications to the laboratory procedures. In 2004, each larvae in the sample was identified, while in 2005 a representative number of larvae were selected for identification.

Eighteen different species were identified; 47% were the two *Culex* species, *pipiens* and *restuans*. In 2005, a total of 1,453 *Culex pipiens* and *Culex restuans* larvae combined were identified in Peel Region (82% *Culex pipiens* and 18% *Culex restuans*). This represents a significant decrease from 2004 where there were 9,912 *Culex pipiens* and *Culex restuans* larvae identified.

In 2005, these two species emerged at the same time and were first detected in week 21 (May 22 to 28), a couple of weeks later compared to their emergence in 2004. *Culex pipiens* was present in greater numbers starting in week 22 and remained the predominant of the two species throughout the season (Figure 21). *Culex pipiens* larvae peaked in weeks 27 to 31 (July 3rd to August 6th) when the number of larvae identified exceeded 100 in each of those weeks with the greatest number being identified in week 27 at 133. This represents a 10-fold decrease from the peak of 1,124 identified in week 31 in 2004.

Figure 21 Numbers of *Culex pipiens* and *Culex restuans* Larvae by Week of Collection - Region of Peel, 2005



	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
Culex pipiens (n=1,196)	0	0	8	70	58	28	35	67	133	112	124	120	110	54	82	99	96
Culex restuans (n=257)	0	0	9	32	11	27	17	12	35	22	26	19	16	11	16	3	1