Larval Mosquito Reduction

Larviciding Highlights for 2006

- Four rounds of Altosid® Pellet (methoprene) treatments were applied to 329,469 roadside catch basins from mid-June to the end of August
    - Up to 85,337 catch basins per round were treated
- VectoLex® (*Bacillus sphaericus*) was used in catch basins draining to Environmentally Sensitive Areas (approximately 1,282 catch basins)
- Altosid® Briquets, were applied to 2,261 non-roadside catch basins. This treatment was effective for up to 86 days.
- 201 surface water sites were treated with Aquabac 200G granules (*Bacillus thuringiensis var. israelensis)* – some locations were treated multiple times
- Across the Region, ditches and culverts were the surface water sites most often larvicided.

A major tenet of the Region of Peel WNV prevention program is to employ activities aimed at reducing the number of vector mosquitoes. This goal can be achieved by preventing the emergence of mosquitoes by eliminating or altering habitats (source reduction) to make them less conducive to mosquito breeding and by pesticide treatment at the larval stage to impede their development into viable adult mosquitoes.

Source reduction is important and the Region of Peel's public education and outreach program highlights the need for eliminating stagnant water. However, it is very difficult and cost-prohibitive to eliminate all breeding sites because very little water is required for most female mosquitoes in which to lay their eggs, particularly in the case of the *Culex* species. Therefore, the prevention plan relies heavily on the larviciding program. The purpose of the larviciding program is to reduce mosquito abundance, especially the *Culex* species. It is easier, more efficient and cost effective to control mosquito populations by treating at the larval stage with larvicides before adult mosquitoes emerge and become more widely dispersed.

Habitats of importance because of their potential to become mosquito breeding sites include roadside catch basins, ditches, discarded tires, unused swimming pools and containers left outdoors. These breeding sites are conducive to promoting the emergence of multiple mosquito species because of standing or slow-moving water and the presence of decaying organic matter which serves as food for the larvae. Special attention and effort is directed towards monitoring

catch basins and surface water breeding sites such as ditches, culverts, and ponds. Catch basin networks are extensive in urban and suburban environments. They retain a small amount of water and organic matter in the form of sediment that collects in the sump of the catch basin. The majority of catch basins in the Region of Peel have been found to contain larvae. Surface water breeding sites are many in number and type and can change from year to year requiring a systematic approach to their surveillance and treatment.

Habitat modification, which includes altering the habitat to eliminate standing water or introducing natural predators, can also reduce the potential to breed mosquitoes. Peel Public Health staff work with municipal departments to modify habitats to reduce their potential to breed mosquitoes.

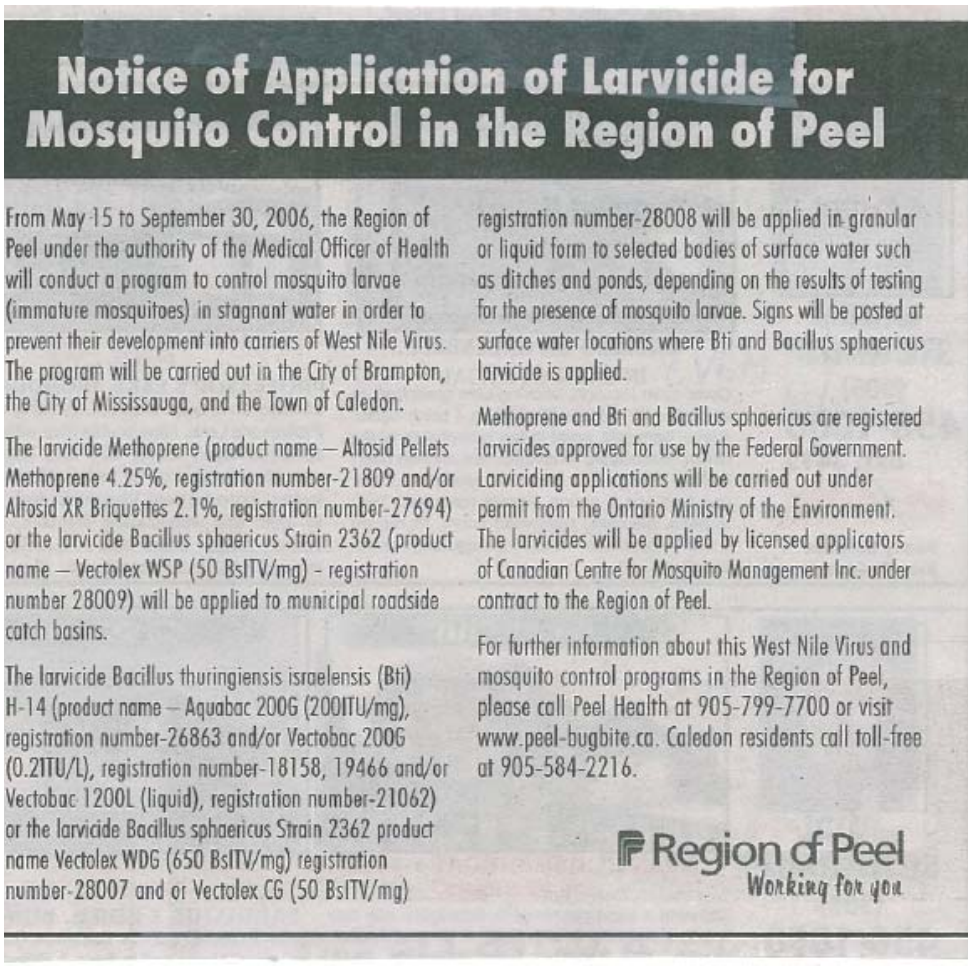
Larvicides

Methoprene, a synthetic insect growth regulator, interferes with mosquito larvae development. It has been approved by Health Canada's Pest Management Regulatory Agency (PMRA) for mosquito larviciding. The non-target species toxicity is low, it is effective against the *Culex* species and it degrades rapidly in water. This characteristic is supported by results of raw and treated drinking water testing which found no detectable levels of methoprene in a Peel Region location in July 2005.[25] This supports previous work conducted by the Ministry of the Environment (MOE) that found that methoprene did not harm streams, rivers and drinking water in treated areas and that it was effective in reducing mosquito larvae (cited in Region of Peel, 2004).

In catch basins, the Region of Peel uses either methoprene pellets/briquets (Altosid®) or *Bacillus sphaericus* (VectoLex® WSP – water soluble pouches). Methoprene pellets were used in the majority of roadside catch basins. Methoprene briquets were used in non-roadside catch basins such as those located in public parks and Region of Peel-owned or operated buildings. *Bacillus sphaericus* was used in catch basins draining into Environmentally Sensitive Areas (ESA). Surface water treatment involved the use of *Bacillus thuringiensis var. israelensis* (Aquabac 200G). *Bacillus sphaericus* has a longer residual effect than *bacillus thuringiensis var. israelensis* and is effective in organic environments.

The Canadian Centre for Mosquito Management Inc. (CCMM), on contract with the Region of Peel, carried out the larviciding of catch basins and surface water sites. Permit applications were prepared by Peel Public Health staff, in consultation with CCMM, and submitted to the MOE. Three permits were issued in 2006 by the MOE to allow treatment for the following site types: catch basins, surface water and sensitive areas. Notices of commencement of larviciding are placed in local newspapers (Figure 28).

Figure 28 Larviciding Notice - Region of Peel, 2006



Notice of Application of Larvicide for Mosquito Control in the Region of Peel

From May 15 to September 30, 2006, the Region of Peel under the authority of the Medical Officer of Health will conduct a program to control mosquito larvae (immature mosquitoes) in stagnant water in order to prevent their development into carriers of West Nile Virus. The program will be carried out in the City of Brampton, the City of Mississauga, and the Town of Caledon.

The larvicide Methoprene (product name – Altosid Pellets Methoprene 4.25%, registration number-21809 and/or Altosid XR Briquettes 2.1%, registration number-27694) or the larvicide Bacillus sphaericus Strain 2362 (product name – Vectolex WSP (50 BsITV/mg) - registration number 28009) will be applied to municipal roadside catch basins.

The larvicide Bacillus thuringiensis israelensis (Bti) H-14 (product name – Aquabac 200G (200ITU/mg), registration number-26863 and/or Vectobac 200G (0.2ITU/L), registration number-18158, 19466 and/or Vectobac 1200L (liquid), registration number-21062) or the larvicide Bacillus sphaericus Strain 2362 product name Vectolex WDG (650 BsITV/mg) registration number-28007 and or Vectolex CG (50 BsITV/mg) registration number-28008 will be applied in granular or liquid form to selected bodies of surface water such as ditches and ponds, depending on the results of testing for the presence of mosquito larvae. Signs will be posted at surface water locations where Bti and Bacillus sphaericus larvicide is applied.

Methoprene and Bti and Bacillus sphaericus are registered larvicides approved for use by the Federal Government. Larviciding applications will be carried out under permit from the Ontario Ministry of the Environment. The larvicides will be applied by licensed applicators of Canadian Centre for Mosquito Management Inc. under contract to the Region of Peel.

For further information about this West Nile Virus and mosquito control programs in the Region of Peel, please call Peel Health at 905-799-7700 or visit www.peel-bugbite.ca. Caledon residents call toll-free at 905-584-2216.

Region of Peel
Working for you

Catch Basin Treatment

Table 21 summarizes the catch basin treatment activities across the Region of Peel. The number of catch basins treated per round can vary due to a number of factors including catch basin cleaning (vacuuming), construction and new subdivisions being added to the program. Figure 29 shows roadside catch basins that have been treated.

Roadside municipal catch basins were treated four times from mid-June to the end of August. Approximately 230 kg of Altosid® Pellets were applied to 329,469 catch basins in the Region of Peel in 2006 (ranged from 81,298 to 85,337 per treatment round).[24] This represents an increase over 2005 and 2004 where 215 kg and 209 kg were used, respectively. Peel Health conducted quality assurance monitoring of roadside catch basins. Altosid® Pellets were found to be 99% effective in controlling mosquito larvae.

Altosid® XR Briquets were applied to 2,261 non-roadside catch basins (one application). Non-roadside catch basins included those located in, along or on:

- municipal green-spaces (1,536)
- Agency owned or operated sites, such as government buildings, social housing units, day cares and long-term care facilities (625)
- rear yards of residential properties (70)
- provincial highways (30)

Figure 29 Catch Basins

a) Larvicided catch basin - painted dots denote treatment round
b) Testing catch basin for larviciding effectiveness
Source: Region of Peel, 2005

Altosid® Briquets were mostly applied early on in the season because of their extended period of residual activity. They were found to be between 71 and 88 per cent effective (assessed between 12 and 86 days post-treatment) [24].

VectoLex® water soluble pellets (WSP) was used in 1282 catch basins draining into ESA (Figure 30). There were two applications of the VectoLex® WSP approximately six weeks apart. VectoLex WSP effectiveness was determined to be between 95 and 100 per cent (assessed between 13 and 31 days post-treatment).[24]

Figure 30 Catch basin draining to an Environmentally Sensitive Area

Source: Region of Peel – Public Health, 2005

Larvasonic was not used in 2006, consistent with the observation made in 2005 that it was less cost efficient than VectoLex®.

Table 21 Summary of Catch Basin Treatment - Region of Peel, 2006

Treatment Round	Number of Catch Basins Treated			Cycle dates
	Roadside (Altosid® Pellets)	Non-Roadside (Altosid® XR Briquets)	Environmentally Sensitive Areas (Vectolex WSP)	
1	85,337	2,234	1,282	June 12th – 28th
2	81,387	6	--	July 4th – 20th
3	81,298	20	1,282	July 24th – Aug. 18th
4	81,447		--	Aug. 21st – Aug. 31st

Source: The Canadian Centre for Mosquito Management Inc., 2006[24]

Surface Water Treatment

In 2006, 201 surface water sites received a total of 249 treatments with *Bacillus thuringiensis var. israelensis* (Aquabac 200G) covering 1.84 hectares of stagnant surface-waters.[24] This represents an 88% increase in the number of sites treated in the Region of Peel in 2006 when compared to 2005. This is the highest number since the larviciding program was established (Table 22). The increase in the number of breeding sites being identified and treated is likely attributed to higher than normal precipitation in May and July and higher than normal average daily temperatures throughout the season (May to Sept) resulting in higher larval densities. Consistent with the previous year, the greatest number of treated sites was in the City of Mississauga (44%) followed by the City of Brampton (36%) and the Town of Caledon (21%). The City of Brampton had the largest percentage increase in the number of sites treated, from 21% (22 sites) in 2005 to 36% (72 sites) in 2006. Figure 31 provides an example of a standing water site.

Table 22 Summary of Surface Water Treatment by Municipality – Region of Peel , 2003-2006

	Mississauga Sites	Brampton Sites	Caledon Sites	Total Sites	Total Treatments (includes multiple treatments at the same location)
2003	23	23	22	68	128
2004	96	16	26	138	226
2005	59	22	26	107	189
2006	88	72	41	201	249

Across the Region of Peel, ditches and culverts were the surface water sites most often larvicided at 54% and 17%, respectively (Figure 32). This varied from 2005 when ditches represented 64% of surface sites treated but storm water retention ponds were the next most common site at 12%. The number of storm water retention ponds treated across the Region of Peel decreased from 12% in 2005 to 1% in 2006.

Figure 31 Example of Standing Water

Source: Region of Peel, 2005

The pattern is similar for the City of Mississauga where ditches and culverts accounted for 37% and 18% of the surface sites treated (Figure 33). In the City of Brampton, ditches accounted for 59% of surface sites treated, followed by culverts at 20% (Figure 34). In the Town of Caledon, 76% of the sites treated were ditches, 10% were field pools and 7% were culverts (Figure 35). No storm water retention ponds were treated in the Town of Caledon.

Figure 32 Surface Water Site Types Treated - Region of Peel, 2006

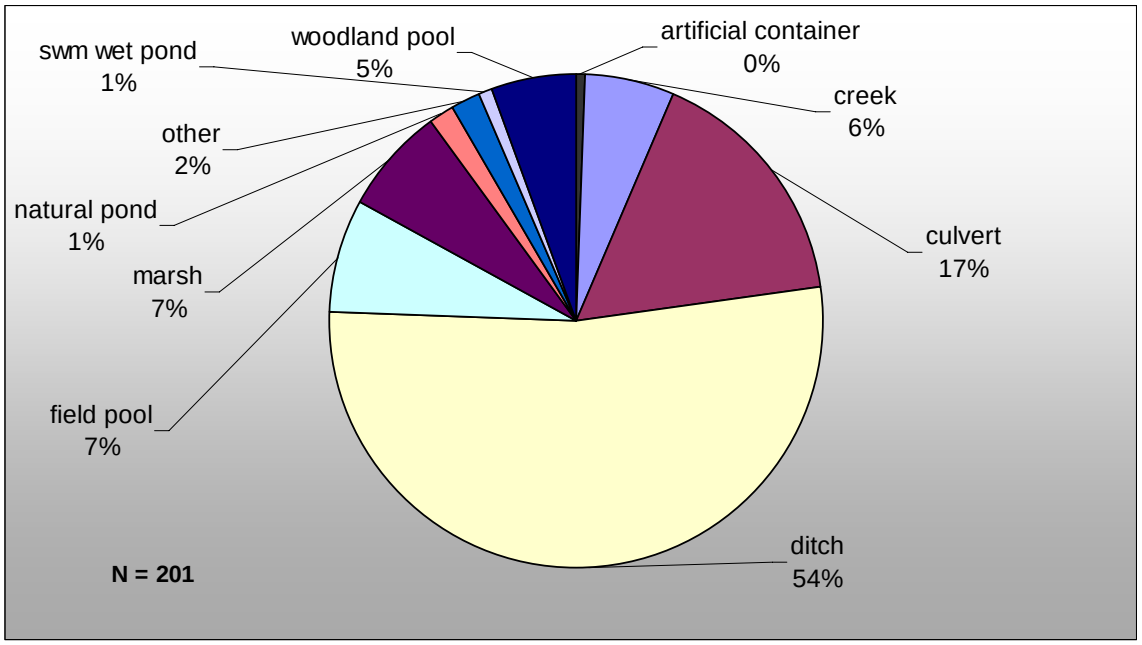


Figure 33 Surface Water Site Types Treated in the Municipality of Mississauga - Region of Peel, 2006

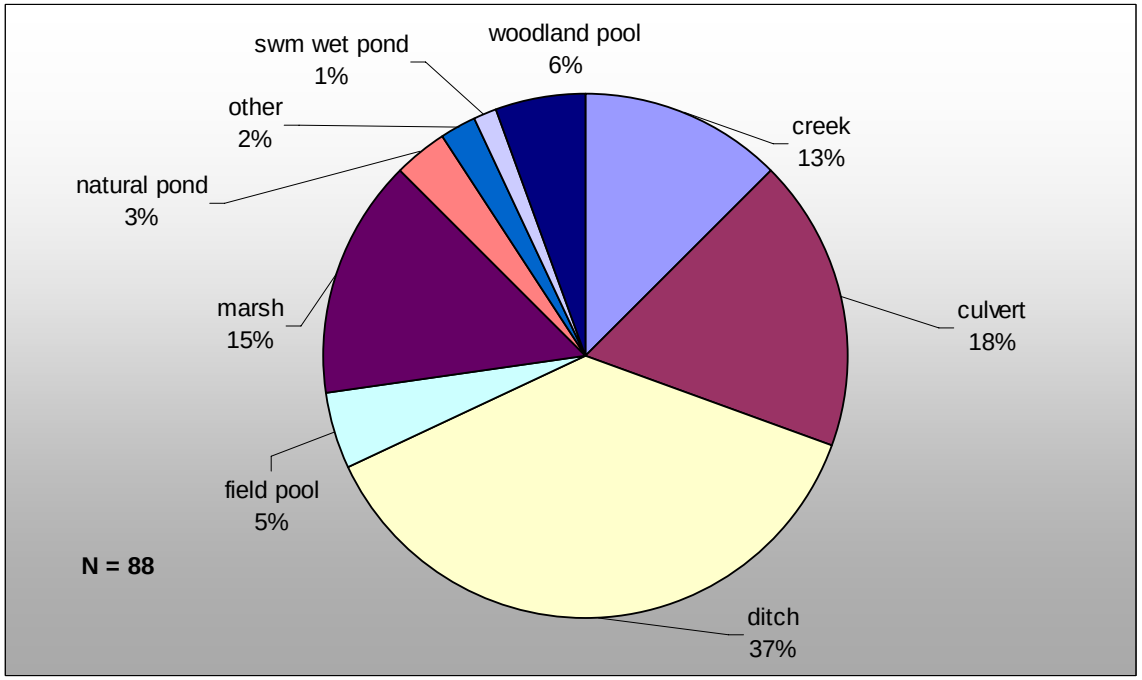


Figure 34 Surface Water Site Types Treated in the Municipality of Brampton - Region of Peel, 2006

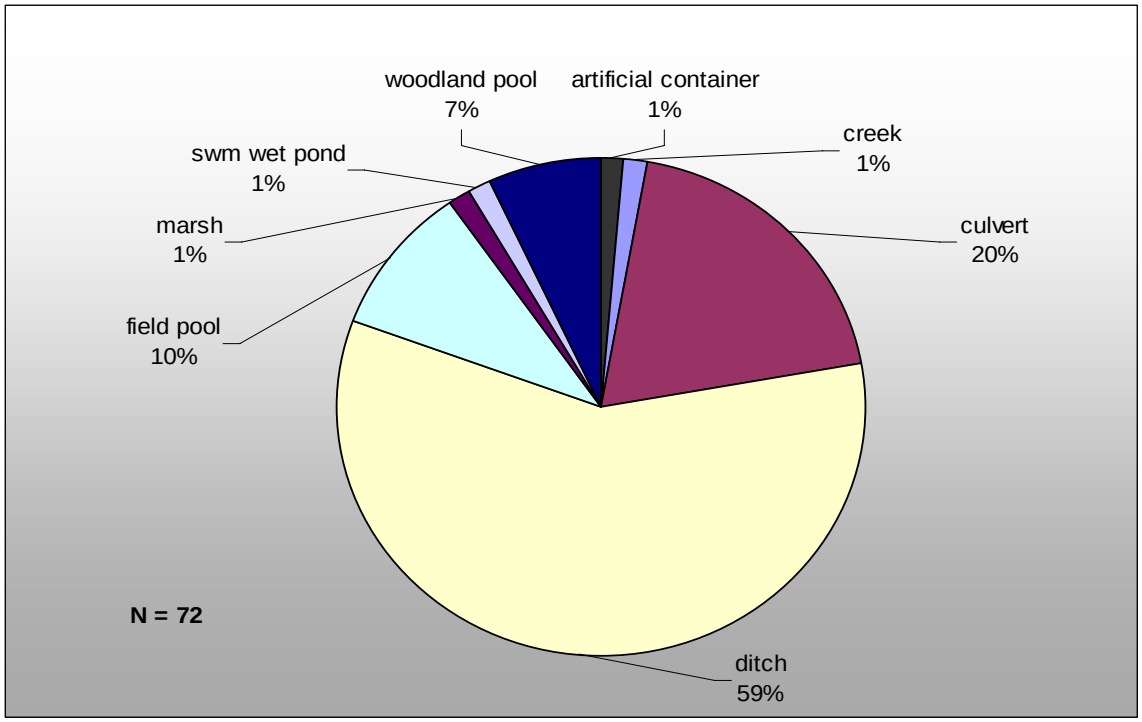


Figure 35 Surface Water Site Types Treated in the Municipality of Caledon - Region of Peel, 2006