Larval Mosquito Reduction

Larviciding Highlights for 2005

- Four rounds of Altosid® Pellets (methoprene) treatment were applied to roadside catch basins from mid-June to mid-September
  - Up to 79,102 catch basins per round were treated
- There was limited use of VectoLex® (*Bacillus sphaericus*) and Larvasonic in Environmentally Sensitive Areas (approximately 495 catch basins)
- Altosid® Briquets, were applied to 1,942 catch basins. This treatment was effective for up to 85 days.
- 107 surface water sites were treated with VectoLex® (*Bacillus sphaericus*) and VectoBac® (*Bacillus thuringiensis var. israelensis)* – some locations were treated multiple times
- Across the Region, ditches and storm water retention ponds were the surface water sites most often larvicided, 65% and 13% of the time, respectively.

A major tenet of the Region of Peel WNV prevention program is the 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 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 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 the standing or slow-moving water and the presence of decaying organic matter which serves as food for the larvae. Special attention and effort are 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 throughout the

season and organic matter in the form of sediment 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 introduce natural predators can also reduce the potential to breed mosquitoes. Peel Public Health staff work with municipal departments to modify habitats to reducing 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[21]. This supports previous work conducted by the Ministry of 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). Larvasonic, an acoustic device that uses sound to destroy the larvae, was also used in a limited number of catch basins. Methoprene pellets were used in the majority of catch basins. Methoprene briquets were used in a smaller number of catch basins such as those located in public parks and Region of Peel owned or operated buildings. *Bacillus sphaericus* and the Larvasonic device were used in catch basins draining into Environmentally Sensitive Areas (ESA).

Surface water treatment involved the use of *Bacillus sphaericus* (VectoLex® CG) and *Bacillus thuringiensis var. israelensis* (VectoBac®). In 2005, for the first time the Ontario Ministry of the Environment (MOE) permitted the use of *Bacillus sphaericus.* Both *bacillus* species have a lesser impact on non-target organisms but they are not as effective as methoprene. *Bacillus sphaericus* has a longer residual affect than *bacillus thuringiensis var. israelensis* and therefore can provide extended control of mosquito larvae.

Pestalto Environmental Products Inc., on contract with the Region of Peel, conducted the catch basin and surface water larviciding. Permit applications were prepared by Peel Public Health staff, in consultation with Pestalto, and submitted to the MOE. Four permits were issued for catch basin applications and six permits for surface water larviciding.

Catch Basin Treatment

Table 21 summarizes the catch basin treatment activities. Roadside municipal catch basins were treated four times mid-June to mid-September. The majority of catch basins (from 73,517 to 79,102 per treatment round) were treated with Altosid® Pellets. Limited use of VectoLex® and Larvasonic occurred in the latter half of the season, during round three. The number of catch basins treated per round varied due to a number of factors including catch basin cleaning (vacuuming), construction and new subdivisions being added to the program[22].

Table 21 Summary of Catch Basin Treatment - Region of Peel, 2005

Round	Number of Catch basins treated	Cycle dates
1	73,517 (Altosid® Pellets)	June 13 – June 30
2	77,039 (Altosid® Pellets)	July 4 – July 26
3	77,471 (Altosid® Pellets) 462 (VectoLex® WSP) 33 (Larvasonic)	July 21 – August 15
4	79,102 (Altosid® Pellets)	August 15 – September 12
--	1942 (Altosid® Briquets)	Throughout the season

Source: Pestalto, 2005

Approximately 215 kg of Altosid® Pellets were applied in over 300,000 catch basin treatments in the Region of Peel in 2005. This includes 13 catch basin treatments in private backyards and two public parks. This represents a slight increase over 2004 where 209 kg of Altosid® Pellets were used. Limited post-treatment monitoring indicated that the Altosid® Pellets were effective for up to 21 days with 100% mortality[22].

Figure 22 Catch Basin (Source: Region of Peel, 2005)

An additional 495 catch basins in ESA's were treated with VectoLex® and Larvasonic. VectoLex® WSP provided residual activity for up to 40 days[22]. Larvasonic was only used in 33 catch basins, a significant decrease from the 150 catch basins where it was used in 2004. According to Pestalto, this is due to Larvasonic being less cost efficient than VectoLex® which has a longer residual activity[21].

Altosid® Briquets were used in 1,942 catch basins: 1,171 public parks, 83 private backyards, 32 social housing units, 553 government buildings, 46 long-term care facilities, 27 day care facilities and 30 along highways. Post-treatment monitoring indicated that the Altosid® Briquets were effective for up to 85 days with 100% mortality[22].

Surface Water Treatment

In 2005, 107 surface water sites received a total of 191 treatments with *Bacillus sphaericus* (VectoLex® CG) and *Bacillus thuringiensis var. israelensis* (VectoBac®). This is slightly less than the 138 sites treated in 2004 (Table 22). A reduction in the number of breeding sites being treated is likely attributed to fewer breeding sites being identified in 2005, a result of the hot dry weather. Consistent with the previous year, the greatest number of sites were in the City of Mississauga (55%), followed by the Town of Caledon (24%) and the City of Brampton (21%).

Table 22 Summary of Surface Water Treatment by Municipality – Region of Peel , 2003-2005

	Total Sites	Mississauga Sites	Brampton Sites	Caledon Sites	Total Treatments (includes multiple treatments at the same location)
2003	68	23	23	22	128
2004	138	96	16	26	226
2005	107	59	22	26	191

When aggregating all the data for the whole Region of Peel, ditches and storm water retention ponds were the surface water sites most often larvicided at 64% and 12% of the time, respectively (Figure 24). This pattern is the same for the City of Mississauga where ditches and storm water retention ponds accounted for 55% and 20% of the surface sites treated (Figure 25). In the City of Brampton, ditches accounted for 76% of surface sites treated, followed by woodland pools at 14% and storm water retention ponds at 5% (Figure 26). In the case of the Town of Caledon, 80% of the sites treated were ditches and 8% were wetlands (Figure 27). No storm water retention ponds were treated in the Town of Caledon.

Figure 23 Example of Standing Water

(Source: Region of Peel, 2005)

Figure 24 Surface Water Site Types Treated - Region of Peel, 2005

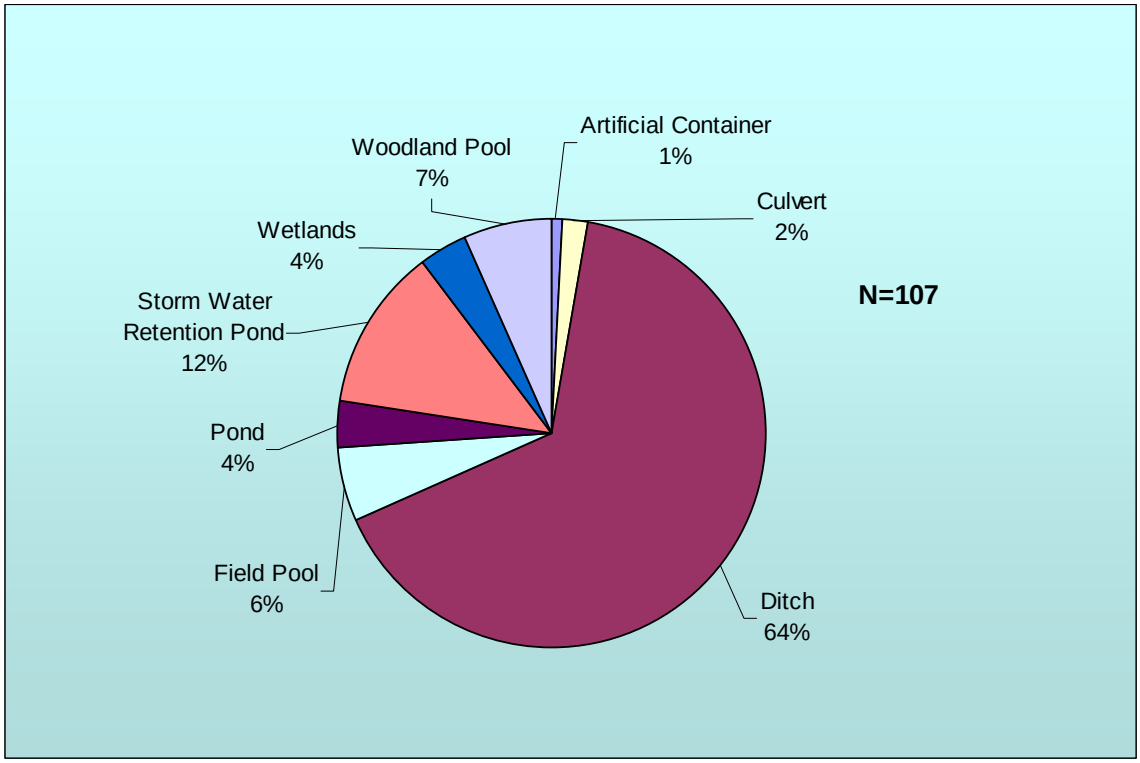

Figure 25 Surface Water Site Types Treated in the Municipality of Mississauga - Region of Peel, 2005

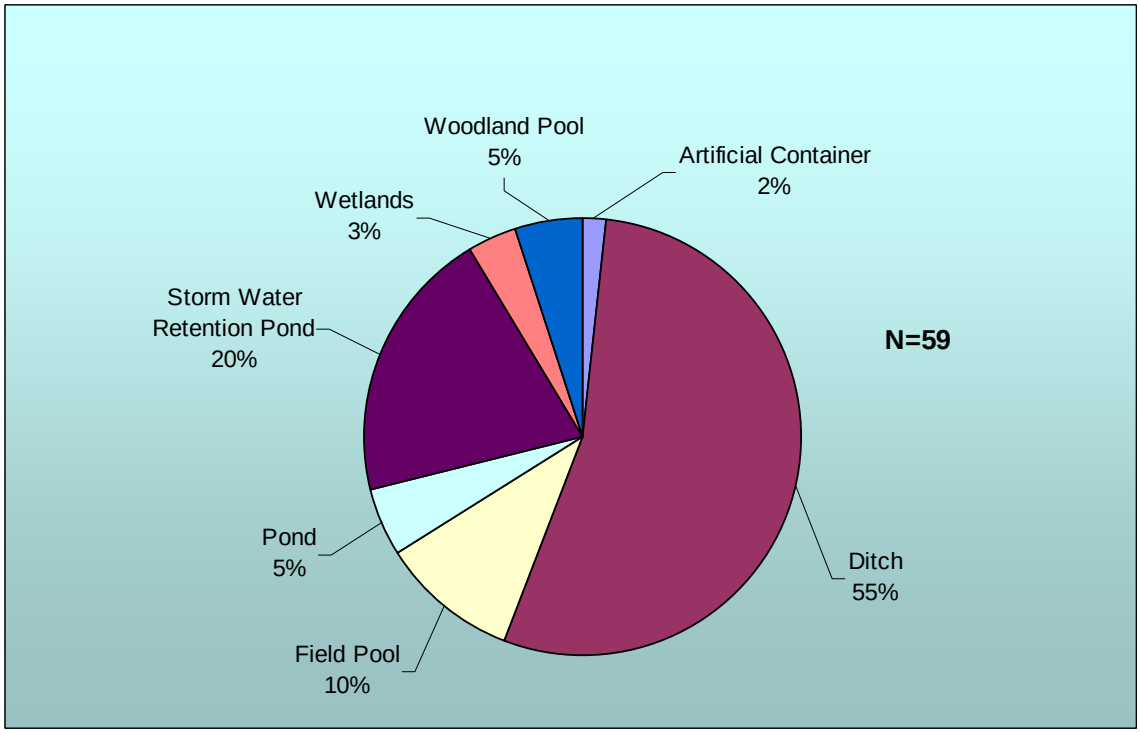

Figure 26 Surface Water Site Types Treated in the Municipality of Brampton - Region of Peel, 2005

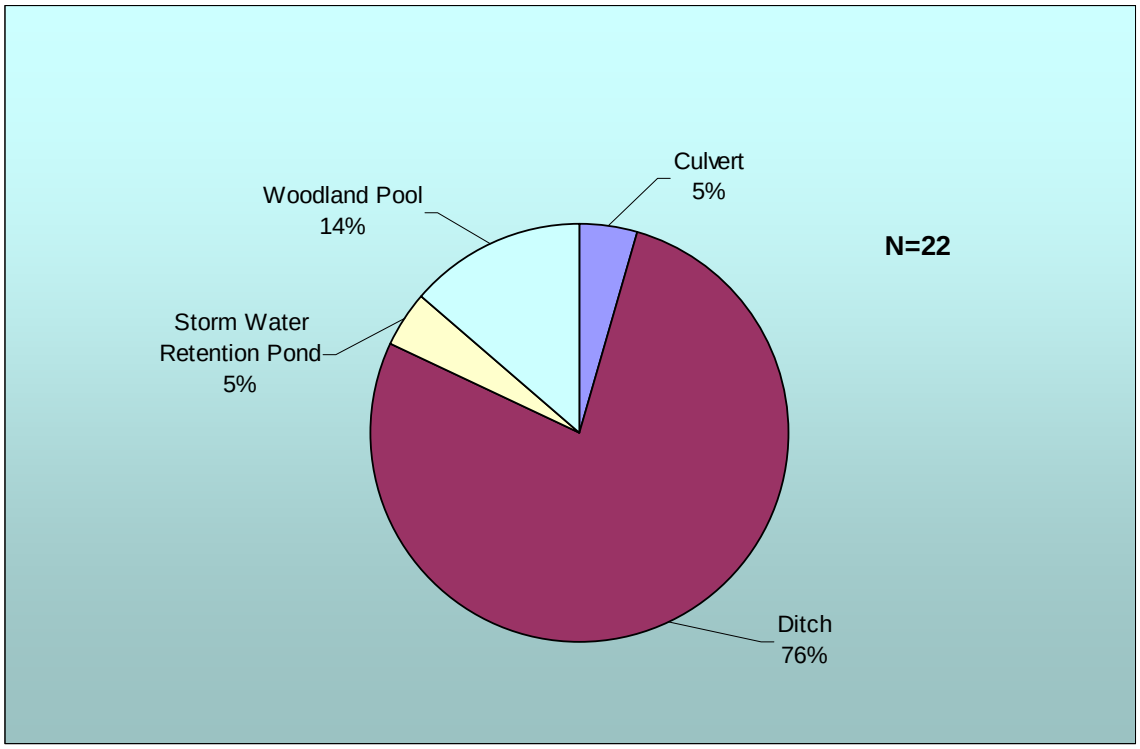

Figure 27 Surface Water Site Types Treated in the Municipality of Caledon - Region of Peel, 2005