

**City of Hamilton
Public Health Services
2010 Vector Borne Disease Report**

**For: City of Hamilton, Public Health Services and the Ontario Ministry
of Health and Long-Term Care**

February 2011



Hamilton

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Public Health Services
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VECTOR BORNE DISEASE PROGRAM

EXECUTIVE SUMMARY

The West Nile virus (WNV) program (which is also known as the Vector Borne Disease – VBD- program) for the City of Hamilton continued to conduct many activities in order to assess risk to control West Nile virus locally. The goal in Hamilton’s WNV program has always been to reduce the risk of WNV transmission to humans. In 2010, Hamilton had one positive mosquito pool and no human cases and the area remained at low risk for the season.

The VBD program also includes monitoring Lyme disease and other reportable vector borne diseases as defined by *Ontario Regulation 559/91* made under the *Health Protection and Promotion Act* including malaria, , plague, tularemia, and yellow fever as well as other disease surveillance as directed by the Ontario Ministry of Health and Long-Term Care.. There was one case of Lyme disease reported in Hamilton but it was likely acquired in Ontario, outside of Hamilton. There were no *Ixodes scapularis* (“black legged ticks”) submitted to Hamilton for identification in 2010. There were no locally acquired cases of malaria, plague, tularemia, or yellow fever.

Both West Nile virus and Lyme disease program elements are outlined in this report with a brief review of the other reportable vector borne diseases.

Although by the end of 2010 season there was limited West Nile activity in Ontario and Canada (Ontario had one (1) human case and Canada had five (5) human cases in total), the City of Hamilton continued its baseline surveillance work and community outreach/education to remain prepared and ready to respond to positive results throughout the season. The City of Hamilton adult mosquito registry was also populated with names of anyone wishing to be contacted in the event the City were ever to adulticide; those listed on the registry would be contacted prior to any treatment event although none were required in 2010.

The general public supports the standing water enforcement component of the program by lodging standing water complaints on both public and private lands. In 2010 there were 120 private land complaints and 19 public land complaints and all were investigated by the WNV program staff. Public land complaints were either resolved through referral to Public Works for remediation or sites were referred to the larviciding contractor, Pestalto, for assessment for ongoing treatment. The Standing Water By-Law is enforced within the urban boundary and settlement areas from April 1st – October 31st each year.

Cosray Labs, the contractor for adult mosquito identification and viral testing, summarized from the data that the most abundant mosquito species collected from 42 weekly traps from June to October were two floodwater species, *Aedes vexans* and *Ochlerotatus trivittatus*.. See Table 1 for Cosray Lab’s collection results of the thirteen WNV vector species that the Ministry of Health and Long-Term Care outlined to vendors and health units to identify and viral test, in order of preference.

Table 1: WNV Vector Species Collected in Hamilton 2010 and Results – Cosray Lab

WNV Vector Species (Listed by MOHLTC - Testing Order of Preference)	Number of Female Specimens Identified	% of Total Vectors Identified	Viral Testing Results for Season
<i>Cx. pipiens/restuans</i>	3823	14.2	Positive (1)
<i>Cx. salinarius</i>	4	0.01	Negative
<i>Oc. japonicus</i>	392	1.5	Negative
<i>Cx. tarsalis</i>	0	0	Negative
<i>Ae. vexans vexans</i>	11327	42.1	Negative
<i>Oc. triseriatus</i>	265	1.0	Negative
<i>An. punctipennis</i>	418	1.6	Negative
<i>Oc. trivittatus</i>	10023	37.3	Negative
<i>An. walkeri</i>	12	0.04	Negative
<i>Oc. stimulans</i>	384	1.4	Negative
<i>An. quadrimaculatus</i>	216	0.8	Negative
<i>Oc. canadensis</i>	30	0.1	Negative
<i>St. albopicta</i>	0	0	Negative
Total Number of Female Specimens	26894	100%	1 Positive Pool

The 2010 year marked higher temperatures compared to previous years. The accumulated Degree Days (ADD is the amount of heat required to raise the viral infectivity rate and is taken as the temperature measured above 18 °C for *Culex* species) was used as a potential measure of increased risk for WNV human cases to occur, dependent on accompanying positive WNV results occurring in adult mosquitoes. According to Cosray’s 2010 report to Hamilton, “The ADD observed in the City of Hamilton this summer closely follows that of 2007 (a year with 3 WNV-positive mosquito pools) but is more than double the ADD of what was seen in 2009 (zero WNV-positive mosquito pools). It is also important to note that the specimens from this year’s positive mosquito pool were trapped during the warmest week of the summer in Hamilton.” Although the ADD was higher for 2010 and at a level where there is a higher potential for human cases to occur, there were no human cases identified in Hamilton.

A large proportion of *Ae. vexans* and *Oc. trivittatus* mosquitoes were collected from the Bow Valley area in the north eastern part of Hamilton. These mosquitoes were captured both in the designated trap for viral testing and from the four other traps set locally to collect additional mosquito data on the variation in species and abundance among the traps. Collectively, the five Bow Valley traps caught over one third of all vector mosquitoes trapped in the City of Hamilton. Bow Valley is an area of concern because of its geography and proximity to residents. In 2010 to enhance control measures a change was made in July, from using *Bacillus thuringiensis* var. *israelensis* (*B.t.i.*) to using *Bacillus sphaericus* as it has an increased residual effect. *B. sphaericus* shows environmental persistence for two to four weeks where Bti has virtually no residual.

For the mosquito populations across Hamilton, Cosray also noted in their report that, “Special consideration should be given to *Oc. japonicus*, a highly competent WNV vector. This species has been found in larger numbers and over a wider range in Southern Ontario. Although the numbers were lower this summer at 392 specimens (compared to 464 in 2009),

its ability to expand is worth monitoring.” The concern for *Oc. japonicus* is that is a relatively new species for Ontario and can transmit WNV so it is important to know if numbers are increasing locally.

Cosray Labs also stated that, “three specimens (three pools in total) of *Culiseta melanura* were also collected from Hamilton this year, and tested negative when subjected to Cosray Labs' standardized test for Eastern Equine Encephalitis (EEE).” Eastern Equine Encephalitis, sometimes referred to as ‘Triple E’, may potentially be transmitted to humans in Ontario and as the mortality rate is much higher for those severely infected with EEE than WNV (~35% for EEE versus <1% for WNV), Hamilton will continue to monitor known vector species and test for this virus.

In 2010 the City of Hamilton investigated seven (7) persons that were ruled to be “Does Not Meet Case Definition” for West Nile virus. In Ontario, one (1) confirmed case of human West Nile Virus was reported and no human cases were reported in Hamilton. Figure 1 compares the onset of human cases to the WNV infectivity rate among the adult vector *Culex* species mosquitoes. The trend in mosquito WNV infectivity rate since the introduction of the virus is very similar to the trend in the onset of human cases.

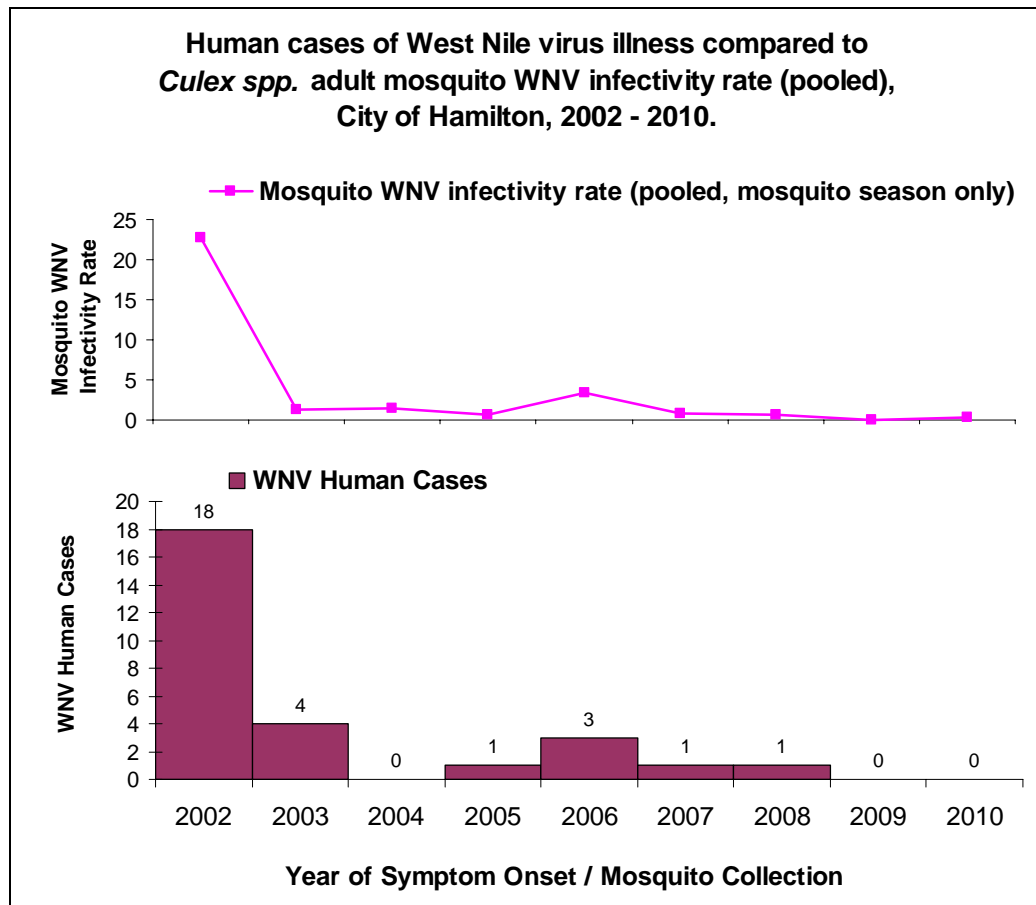


Figure 1: Onset of human cases to the WNV infectivity rate among the adult vector *Culex* species mosquitoes, 2002 - 2010.

Overall efforts in the WNV program should help control the virus and reduce the risk to residents and others within our community of acquiring West Nile virus locally. Pestalto

Environmental Health Services Inc, Hamilton Public Health Services larviciding contractor, submitted their report to Hamilton noting that,

“The 2010 program was an effective and broad-based comprehensive mosquito control strategy. This Mosquito Control mosquito abatement program reduced the productivity of mosquitoes significantly in larval habitats. One may conclude that, once again, the City of Hamilton Public Health Services’ (CHPHS) mosquito abatement program contributed to reducing the risk of people contracting West Nile Virus”.

PHS made 84 referrals to Pestalto for treatment (the number of surface water sites referred was actually 75 based on some duplicate reports and some sites being catch basins that were missed during regular treatment rounds and required special referral). The referrals were for sites mainly from four of the ten characterized habitat types: woodland pool, forest, ditches and cattail marsh. A larval sample consisted of a group of one or more dips to a maximum of 10 dips, into the water with a dipper (container to capture the larvae), as per the Ministry of Environment sampling protocol. Each mosquito larval sample was characterized as *low* (1-6 larvae), *moderate* (7-30 larvae), or *high* (>31 larvae). Pestalto conducted treatment and subsequent monitoring/treatment once a referral was made. For the 2010 season a “high threshold” count (greater than 31 larvae) was used as the trigger to refer sites to Pestalto.

For Lyme disease, the City of Hamilton investigated 10 persons in 2010; three persons were actually symptomatic in 2009; 9 persons were ruled as “Does Not Meet Case Definition” for Lyme disease (Figure 2). One case was listed as “Probable” and was likely acquired locally (within the province). This particular case most likely acquired Lyme disease visiting the area near Presqu'île Provincial Park.

A passive tick surveillance program remains in place for the City of Hamilton. There were 38 ticks submitted for identification by Hamilton residents for 2010. None of the ticks were identified as *Ixodes scapularis* (“black legged ticks”), the vector species for Lyme disease. Most ticks submitted were dog ticks.

A contingency plan for Lyme disease was developed in 2010. . In the plan, (see Appendix A), criteria were established to trigger various levels of surveillance. To date Hamilton has not met any of the triggers to require active tick surveillance.

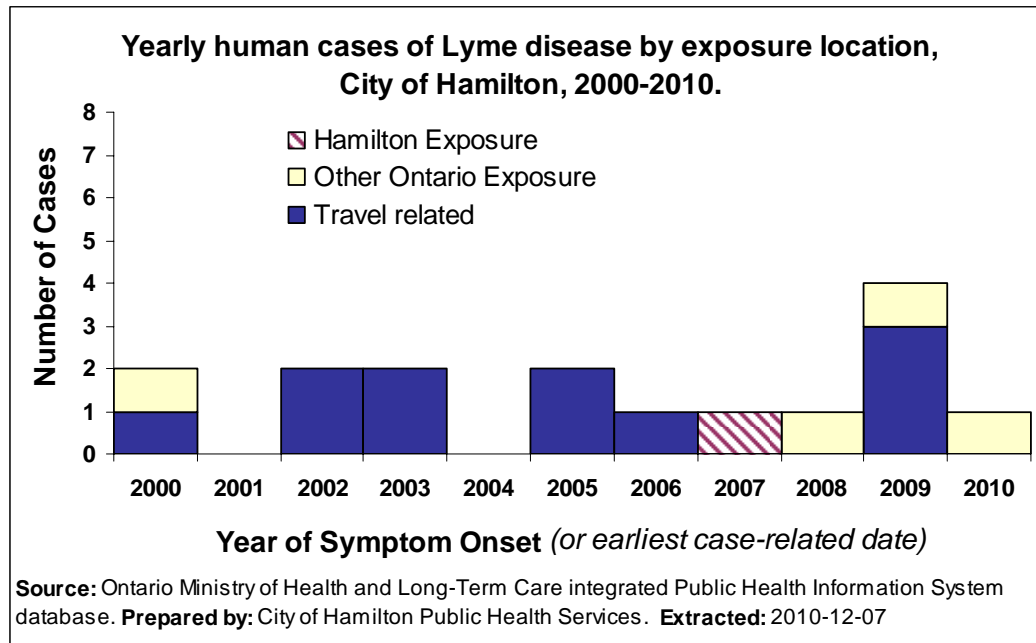


Figure 2: Yearly Human Cases of Lyme Disease

In Hamilton, Lyme disease is included as a standing item during WNV risk assessment meetings. Separate meetings with respect to Lyme disease were not held. During the 2010 season risk and issues pertaining to Lyme disease were discussed at all scheduled WNV risk assessment meetings as a standing item.

The Manager of Infectious Diseases or her staff provided verbal updates on any human cases at the WNV (VBD) risk assessment committee meetings. Tick submission information and results were also shared at these meetings. If surveillance or control measures were being considered they would also be discussed for subsequent action by the Manager of West Nile Virus and Rabies Control and her team.

Currently the risk of human infection with Lyme disease in Hamilton remains low. As a result, there have been no actions for field surveillance at the local level. In addition, no control measures were required for Hamilton in 2010 based on surveillance data.

The Lyme disease portion of the VBD program has not yet been evaluated. Consideration will be given to conducting an evaluation in future years when active surveillance has been established.

A simple tool to determine general knowledge about Lyme disease and ticks was used at three of the four festivals in Hamilton during the summer, 2010. The results from the tool are provided in the main *Communication* section of this report. The tool is attached as Appendix B.

Community outreach for West Nile virus and Lyme disease was conducted throughout the season via print, radio, and in person at community events or for special presentations. Print ads were run in newspapers or guides; radio spots were run late August/September, and staff made selected presentations throughout the year and worked at four festivals in the summer

months. The aim in 2010 was to provide a combined message through all communication avenues about West Nile virus and Lyme disease so that the public would have increased awareness about how the diseases are spread and how people can protect themselves:

- Messaging to prevent West Nile virus and Lyme disease was disseminated through a publication called the Seniors Review to target the older adult because of their increased risk of severe illness from WNV.
- Radio spots focused on promoting personal protection using DEET as both ticks and mosquitoes are controlled using this repellent.
- Presentations focused on the general aspects of the vector borne disease program and how the mosquito is controlled and what measures people can take to protect themselves
- At the festivals, information was provided on both WNV and Lyme disease and repellents were offered for use while at the festival booth.
- Other communication avenues to public were through:
 - media requests or coverage from media releases
 - passively through the Public Health Services website pages for West Nile virus and Lyme disease. On the website staff provided local surveillance statistics, links to other sites or resources and the public could also submit their contact information to be added to the adult mosquito registry (for contingency adulticiding).

Funding remained consistent in 2010 from the previous funding reduction in 2009 so activities were similar to 2009 in that only three catch basin treatment rounds occurred, standing water sites on public lands were only triggered for treatment if a high threshold was met versus a low or medium trigger level (to reduce the number of sites requiring referral for treatment) and communication outreach was also limited with less radio and print advertising than in past seasons. The 2010 Vector Borne budget for Hamilton Public Health Services was \$1,017,726. Actuals will be reported through regular reporting channels.

Although surveillance results appear low for 2010 at one positive mosquito pool result, the Vector borne disease program remains a complex and time consuming program within Public Health. Each year the program involves many external and internal partners and requires ongoing coordinated efforts to monitor and reduce the risks of West Nile virus, Lyme disease and other vector borne diseases of concern.

INTRODUCTION

The City of Hamilton has monitored the progression of West Nile virus (WNV) in North America ever since it was first detected in New York City in 1999. The City of Hamilton's West Nile virus (WNV) surveillance program began in 2000 when basic dead bird surveillance began late in the summer at the request of the MOHLTC. In the many years that have followed, this program has matured, from the simple collection of birds for WNV testing, to what has become a complex program involving communication outreach, a geographic information services (GIS) based surveillance system for mosquito larvae, mosquitoes, and humans, and a seasonal mosquito control program.

In addition to the WNV program, Lyme disease surveillance has expanded over the last two years. Ticks are received for submission and identification in a bid to find infected *Ixodes scapularis* (black legged ticks/deer ticks) locally. Part of the 2010 Vector Borne Disease Program saw the development of the Lyme Disease Contingency plan which lays out requirements that would trigger active tick surveillance in the field. The Lyme disease portion of the VBD program may grow further as global warming threatens to push the boundaries for endemic areas within Ontario.

Of further interest in 2010 was the second positive mosquito pool in Ontario of the Eastern Equine Encephalitis (EEE) virus which was reported in Simcoe which falls within the geographic boundary of the Simcoe Muskoka District health unit. In 2010 Hamilton found three specimens of *Cs. melanura* in two different traps. We await further direction from the Ministry of Health and Long Term Care on how best to proceed with surveillance measures in Hamilton for 2011.

For the WNV and Lyme disease programs any data provided by independent contractors was imported into the City of Hamilton Public Health Services' MS Access database (WNV Master Database). The data was analyzed using Microsoft Access 2002 and Microsoft Excel 2002. All maps were made using Intergraph Corporation's GeoMedia Professional 6.0.

The independent contractors who provided data for mosquito identification and viral testing for West Nile virus in 2010 were: Cosray Labs for mosquito identification and viral testing, Pestalto Environmental Health Services for larviciding, and two other contractors, independent consultant Annette Tavares and the McMaster Institute of Environment and Health (MIEH), who assisted with the provision of training or communication materials/evaluation services for the program. The list of contractors for the last six years is provided below in Table 2. For a full list since 2003, consult past annual reports.

Table 2. List of Recent Contractors for Hamilton’s WNV Program 2005 to 2010

Contract	2005	2006	2007	2008	2009	2010
Eco-mapping	In 2004 GDG Environmental began a habitat analysis and ecological mapping exercise which they completed in 2005	-	-	-	-	-
Evaluations (WNV program/communication campaign)	MIEH*	MIEH	MIEH	MIEH	MIEH	MIEH
GIS mapping software	Geomedia Professional	Geomedia Professional	Geomedia Professional	Geomedia Professional	Geomedia Professional	Geomedia Professional
Larval identification/surveillance training	Annette Tavares	Annette Tavares	Annette Tavares	Annette Tavares	Annette Tavares	Annette Tavares
Larviciding	CCMM	CCMM	CCMM	Pestalto	Pestalto	Pestalto
Mosquito ID and viral testing	Cosray Labs	Cosray Labs	Cosray Labs	Cosray Labs	Cosray Labs	Cosray Labs

*McMaster Institute of Environment and Health

Other vector-borne diseases of concern that are reportable and may affect Hamilton in future, include tularemia, malaria, yellow fever, or plague, as mentioned in the Ontario Ministry of Health and Long-Term Care April 2008 letter sent to health units in Ontario. Measures will be taken, as appropriate, by City of Hamilton Public Health Services if and when these diseases emerge locally. Staff will continue to review surveillance data and information globally for any information indicating an increased likelihood that these diseases may be acquired within Ontario.

The current mosquito surveillance and control program serves as a baseline program to ready Hamilton to respond to new vector borne diseases including Eastern Equine Encephalitis which may move into Ontario. The program is reviewed at the outset and conclusion of each season (April and October/November, respectively) in order to maintain systems and to plan for, or implement improvements to the program including the ability to add new areas for control (for example, to add controls for rural water sites if a mosquito species of concern emerges in rural areas versus urban).

Information is also gathered by program staff and McMaster Institute of Environment and Health (MIEH) on a regular basis to keep abreast of links between climate change and what issues may be on the horizon that have the potential to involve vector borne disease including the potential for locally acquired malaria, as has occurred in the past in Ontario.

The major goals and accomplishments for 2010 are presented in Table 3. These details provide a snapshot of the work involved in the program. For more information on various aspects of the program, please see the body of the report.

Table 3. VBD Program Goals and Accomplishments 2010

Goal	Accomplishment
WEST NILE VIRUS	
Reduce risk of WNV transmission to humans	Surveillance, monitoring and control of water sites, enforcement of the Standing Water by-law, ongoing risk assessment, communication, education and outreach were all conducted. We believe these major activities reduced human risk; Hamilton recorded no human cases and one positive mosquito pool (adult mosquito trap result).
Operate with a smooth transition with eight (8) new seasonal staff and WNV program secretary changes	Trained new seasonal staff to complete expected tasks including larval surveillance using Blackberry technology, geo-coding bird data, assisting with lab operations, updating the referral process to the larviciding contractor, tick identification, and methods of tick trapping and other specialized tasks. The program secretary role had recurring vacancy through 2010 and other support staff were required to assist with the program to complete all tasks.
Maintain intensified surveillance for adult mosquitoes	Surveillance and monitoring of 42 adult mosquito traps throughout the season from June to October (weekly) which continues to be amongst the highest number of traps among Central East and Central West area Health Units
Update and increase number of standing water sites/breeding habitats on public lands	At least 411 sites were monitored for larval activity by Public Health Services staff which resulted in 1,176 surveillance visits and 84 sites referred to the larviciding contractor. There were 329 treatments covering a total area of 509,733 square metres, by Pestalto Environmental Health Services (Pestalto) using VectoBac5 200G, VectoLex CG or VectoBac 1200L. Site information including GPS coordinates, high resolution ortho photographs, site classification etc., was sent with every referral to Pestalto
Investigate and respond to public and private land standing water complaints for the enforcement period under the by-law. Take enforcement action using the Standing Water By-law 03-173. Public lands remediated if feasible and within budget constraints or those sites would be treated.	<p>Public Health Inspectors investigated 139 complaints from April 1 to October 31st, 2010.</p> <p>No tickets were issued or charges laid in 2010.</p> <p>Referrals were made to Public Works and sites were remediated where possible although this was limited in 2010. Pestalto Environmental Health Services Inc treated all other sites that could not be remediated.</p>
Enhance the West Nile virus database and capabilities	City of Hamilton GIS Services assisted with the expansion of the WNV database. New water sites were continually added as the result of complaints and/or habitat layer analysis. Blackberries were again used to input larval surveillance in the field with 'actual time' upload capabilities.
Maintain catch basin treatment with three rounds to provide control in June, July, August and September. Weekly risk assessments will be used to determine need for a fourth round of treatment.	The majority of catch basins were larvicided at approximately 21 day intervals with methoprene pellets as per label directions. Three rounds were conducted for a total of 115,777 treatments (approximately 38,000 per round) . Selected catchbasins were treated with methoprene briquets for extended treatment (due to access and safety issues). Only three rounds occurred based on treatment plans and risk assessments decisions.
Maintain and update local website for West Nile virus	<p>Routine additions to the websites were conducted on a monthly basis or as needed. Additions included but were not limited to:</p> <ul style="list-style-type: none"> • West Nile virus larval treatment information and completion dates

Goal	Accomplishment
	<ul style="list-style-type: none"> • Surveillance statistics (positive mosquito traps) • Invitation to be added to the adult mosquito registry
<p>Data review, monitoring, mosquito control and targeted WNV awareness education (if needed) for Hamilton's 'Bow Valley', a perennial area of concern.</p>	<ul style="list-style-type: none"> • This area of Hamilton lies in East Hamilton/ Stoney Creek and is referred to as 'Bow Valley' which has a mixture of habitats including being naturally forested with high grasses and a confluence of both Battlefield Creek and Stoney Creek. The creeks can spill over during heavy rain events causing some ponding. Some areas are also bog-like with cattails. • This area is located within a residential area and has pedestrian pathways through the wooded area. • The Bow Valley area has five mosquito traps placed in strategic areas to compare species and abundance • One trap which is viral tested has had repeat positive mosquito traps –within a season and for most years although not for the past three (2008 to 2010). • In 2010, these same five traps, once again, captured high numbers of mosquitoes in various weeks – often in the thousands. After consultation with Pestalto Environmental Services Inc., treatment changed to using VectoLex CG from Vecto Bac at approximately Week 31. This resulted in a substantial reduction in the numbers of mosquitoes captured for the duration of the season.
<p>Communication and outreach campaign and evaluation.</p>	<p>In 2010 the WNV team (management and staff) participated in summer events, fairs and presentations, radio messaging, knowledge transfer, and continued website development and McMaster Institute of Environment and Health (MIEH) analyzed traffic on the VBD website. Presentations by staff combined both West Nile Virus and Lyme disease information and included mosquito control, how to reduce the risk of acquiring disease, tick identification, risk behaviours, indicators of disease, and the importance of early detection. Staff developed a simple knowledge and awareness tool for festivals to evaluate public awareness about ticks and Lyme disease.</p>
<p>Continued upkeep of electronic adult mosquito registry to track all persons within the City who wish to be notified in the event that we undertake spraying/adulticiding for adult mosquito control</p>	<p>The City of Hamilton continued to offer and maintain a registry, displayed on our website, for any interested persons to request special notification in the event that we adulticide. Phone, fax, or e-mail can be selected as their preferred method of correspondence. This registry is promoted at the start of each West Nile virus season. No adulticiding has occurred in Hamilton to date including 2010.</p>
<p>Ongoing reclassification of all water sites/breeding habitats on public lands using GDG's habitat classifications as a basis for all habitats.</p>	<p>This remained an ongoing exercise and one that was reviewed on a daily basis - as all standing water sites on public lands were reviewed at each visit for accuracy using habitat criteria set forth by GDG Environmental Ltd. from their 2004/2005 eco-mapping project. All sites were re-classified into the 11 habitat types.</p>
<p>Continued surveillance and treatment within the Red Hill Creek Expressway storm water management ponds</p>	<p>The ponds were monitored and treated as necessary. No ponds were of concern in 2010.</p>
<p>LYME DISEASE</p>	
<p>Lyme disease tick collection and identification</p>	<p>Staff received ticks for identification and shipped them to the</p>

Goal	Accomplishment
	Central Public Health lab is likely to be a black legged tick (deer tick). 39 ticks were received by the program however none were black legged ticks.
Maintain and update local website for Lyme Disease information.	Routine additions to the websites were conducted on a monthly basis or as needed.
Creation of Lyme Disease Response Plan	In the spring, under the direction of the then lead Associate Medical Officer of Health to create a plan, staff developed a Lyme Disease Response Plan. The Plan can be activated if active surveillance is anticipated to be required. The Plan is attached as Appendix A.
Improvements to the data collection system for tick identification for the purpose of Lyme Disease Management	The existing database used to collect information about tick identification in Hamilton was evaluated and categories were eliminated or renamed to ensure better use of the data collected. Further updates are expected in 2011.
OTHER VECTOR BORNE DISEASES	
Program staff were to monitor for other emerging vector borne diseases including the potential for locally acquired malaria	Staff received and reviewed internal surveillance unit reports on diseases reported and investigated by the Infectious Disease team. No locally acquired malaria cases occurred. MIEH created a report on the history of malaria in Ontario to provide an historical review of malaria and the potential for locally acquired malaria occurring in Hamilton or Ontario in the future.

HUMAN CASE SURVEILLANCE

West Nile Virus

Highlights

Since May 1st 2003, when the Ontario Ministry of Health and Long-Term Care first deemed WNV a reportable and communicable disease under the Health Protection and Promotion Act, R.S.O 1990, Regulations 559/91 and 558/91, the biggest predictor for severe human illness continues to be advanced age and immuno-suppression due to underlying illness.

WNV illness continues to be based on the national case definition provided by the Public Health Agency of Canada (PHAC) for reporting the disease and presents as two clinical pictures, “WNV Non-Neurological Syndrome” and “WNV Neurological Syndrome”.

In Hamilton, all family physicians, walk-in clinics, acute care hospital and laboratories are faxed a package in early June advising of the upcoming WNV season and any updates or changes for the upcoming season. Also included are copies of the “Clinical presentation with recommended laboratory testing protocol”, “Mock laboratory requisition form” and “WNV patient reporting tool”. This package is generally well received by our local physician group as it serves as a reminder of the upcoming season and need for increased surveillance.

Methods

As with all reportable communicable diseases, any health care professional suspecting such illness must report to the local Medical Officer of Health. Reportable diseases in Hamilton are reported by a physician based on clinical suspicion or by laboratories based on the positive results of diagnostic tests.

In Hamilton surveillance activities include:

1. Practicing physicians in private practice/clinics and hospitals report all suspect, probable and confirmed cases to our local MOH Infectious Disease program.
2. Canadian Blood Services tests blood and blood product donations for WNV and reports any positive results to us.
3. The Ontario Public Health Laboratory (OPHL) reports positive WNV clinical results to the respective physician and the local MOH.

Diagnostic testing for WNV is performed on sera or cerebrospinal fluid by the Ontario Public Health Laboratory. The ELISA test continued to be used as a diagnostic test in 2010. However, plaque reduction neutralization testing (PRNT) was introduced as the standard WNV diagnostic test for WNV IgM and IgG positive results.

For the purpose of recording human WNV illness the categories of Human WNV cases are

- Suspect Case
- Probable Case

- Confirmed Case

Results, Trends and Comparisons

Since the introduction of WNV into the local area, the City of Hamilton experienced a high of 15 confirmed and 3 probable cases in 2002 (including one death). Treatment of catch basin vector breeding areas began in June of 2003. This same year, there was a dramatic decrease to four (4) human cases followed by a few cases in subsequent years, as illustrated in Figure 3. The local trend of decreasing cases mirrors that of the province. There were no human cases of West Nile virus illness reported to Public Health in 2010.

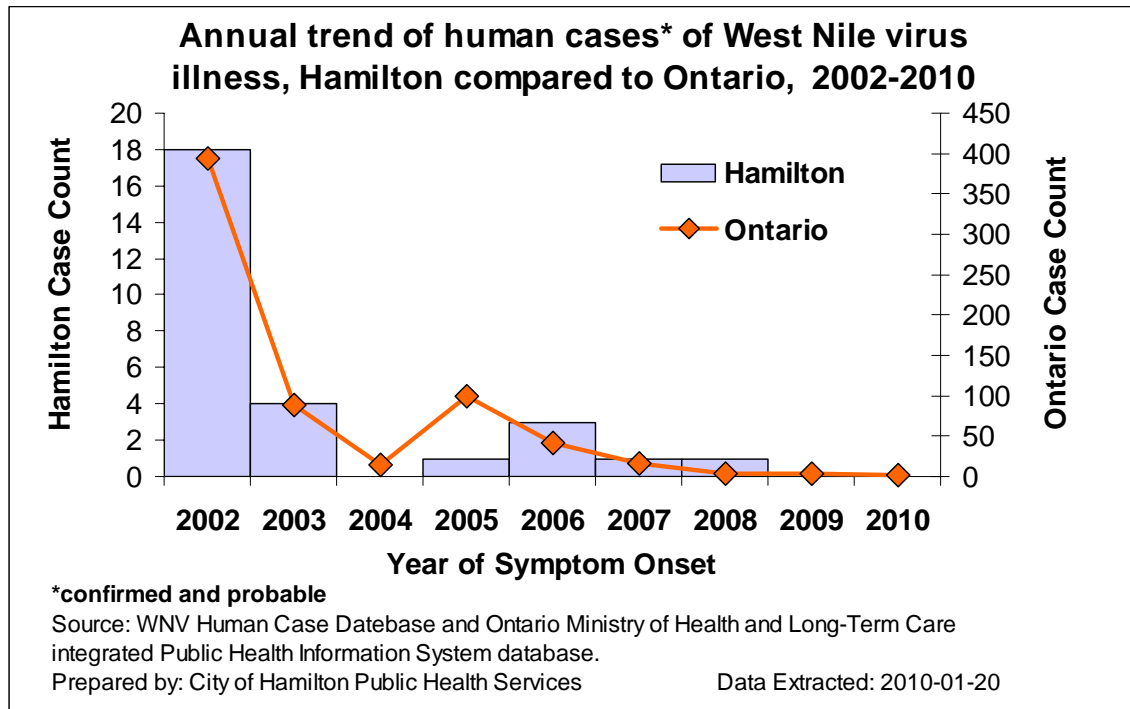


Figure 3: WNV human cases 2002-2010, City of Hamilton compared to Ontario

Hamilton’s Public Health Services, Infectious Disease Program, receives a written report by area physicians, using the required WNV patient reporting tool, of any suspect cases of WNV. In 2010, seven (7) individuals were investigated for WNV (WN Non-NS and WNV illness unspecified). Of these:

- 7 did not meet case definition
- 0 were classified as suspect or probable cases
- 0 were confirmed as cases of West Nile virus

Lyme Disease

Highlights

In Hamilton, Lyme disease is included as a standing item during WNV risk assessment meetings and was discussed at all 2010 meetings; separate meetings with respect only to Lyme disease were not held.

The Manager of Infectious Diseases or her staff provided verbal updates on any human cases of Lyme disease at the WNV (VBD) risk assessment committee meetings. Tick submission information and results were also shared at these meetings by WNV program staff. If surveillance or control measures were being considered they would also be discussed for subsequent action by the Manager of West Nile Virus and Rabies Control and her team.

Currently the risk of human infection with Lyme disease in Hamilton remains low. As a result, there have been no actions for field surveillance at the local level.

Methods

As with all reportable communicable diseases, any health care professional suspecting such illness must report to the local Medical Officer of Health. Reportable diseases in Hamilton are reported by a physician based on clinical suspicion or by laboratories based on the positive results of diagnostic tests.

In Hamilton surveillance activities include:

1. Practicing physicians in private practice/clinics and hospitals report all suspect, probable and confirmed cases to our local MOH Infectious Disease program.
2. The Ontario Public Health Laboratory (OPHL) reports positive WNV clinical results to the respective physician and the local MOH.

Diagnostic testing for Lyme disease in Canada follows a two-step procedure. The sensitive ELISA test is first used as a screen and, if the results are positive, it is followed with the Western Blot test. If Lyme disease is suspected, this approach is advised.

Results, Trends and Comparisons

In 2010, the City of Hamilton investigated 10 individuals for Lyme Disease:

- 9 did not meet case definition
- 1 was classified as a probable case and was likely acquired locally (within the province)

Figure 2 illustrates the trend in confirmed and probable Lyme disease over the past 11 years by the exposure location. There has been only one case of Lyme disease acquired in the Hamilton area over this time period, however, in each of the past three years there has been a single Hamilton resident who acquired Lyme disease from an Ontario exposure. The 2010 case most likely acquired Lyme disease while visiting the area near Presqu'ile Provincial Park.

Other Vector Borne Diseases

Highlights

While many vector borne diseases exist globally, only those reportable under Regulation 559/91 under the Health Protection and Promotion Act are discussed. These include malaria, yellow fever, plague and tularemia. Other mosquito borne vector borne diseases, such as Eastern Equine Encephalitis (EEE) would also be reportable under the regulation as an Encephalitis (Primary, viral), or if the disease caused Meningitis, acute (viral).

Eleven cases of Malaria were reported to Hamilton Public Health Services during 2010. All cases were reported as travel related to other countries. There were no cases of plague, tularemia, or yellow fever reported in Hamilton for 2010.

Methods

As with all reportable communicable diseases, any health care professional suspecting such illness must report to the local Medical Officer of Health. Reportable diseases in Hamilton are reported by a physician based on clinical suspicion or by laboratories based on the positive results of diagnostic tests.

In Hamilton surveillance activities include:

1. Practicing physicians in private practice/clinics and hospitals report all suspect, probable and confirmed cases to our local MOH Infectious Disease program.
2. The Ontario Public Health Laboratory (OPHL) reports positive, reportable Vector borne disease clinical results to the respective physician and the local MOH.

Results, Trends and Comparisons

The Manager of Infectious Diseases, or her staff provide verbal updates on any human cases at the WNV (VBD) risk assessment committee meetings. Cases identified in Table 4 were travel related (all were malaria). As there were no locally acquired cases of malaria, plague, tularemia, or yellow fever, there were no actions taken for field surveillance at the local level for these diseases.

Table 4: Confirmed Reports of Other Reportable Vector-borne Diseases, City of Hamilton, 2010

Disease	Agent	Number of Confirmed Reports
Malaria	<i>Plasmodium falciparum</i>	9*
	<i>Plasmodium vivax</i>	1*
	Malaria unspecified	1*
Plague	<i>Yersinia pestis</i>	0
Tularemia	<i>Francisella tularensis</i>	0
Yellow Fever	yellow fever virus	0
Total		11*
Data Source: Ontario Ministry of Health and Long-Term Care integrated Public Health Information System (iPHIS) database. Data Extracted: 9-Dec-2010		

*All malaria cases were travel related outside of Canada

WILDLIFE SURVEILLANCE

West Nile Virus

Highlights

As stated in Hamilton's 2009 Vector Borne Disease annual report, 2009 marked the end of funding for viral testing for West Nile Virus in dead wild corvids. Hamilton continued with dead bird sighting monitoring in 2009 however it was discontinued in 2010. Since the beginning of the West Nile virus program dead bird testing was used in conjunction with dead bird sightings as a seasonal "marker" of WNV activity in an area. However, in some health units and in some years, testing was stopped after a set number of positive results were obtained so a comparable picture of positives for an area was never determined. In short, it was difficult to judge risk by bird WNV testing data alone, or to make comparisons from one health unit to another or over time.

Methods

In addition, although dead bird sighting patterns have proven to be both temporally and spatially sensitive in detecting WNV activity, it did have its limitations. Sampling was not consistent between health units, as some collected data on all birds while others collected only corvidae and the degree of program promotion has varied across health units. Given the inconsistency for receiving the dead bird sightings, the City of Hamilton ceased mapping dead bird sightings at the start of the 2010 season and discontinued tracking any dead bird sightings reports received from the public. If the public did call to report a dead bird sighting the information was referred to the Canadian Cooperative Wildlife Health Centre (CCWHC) or the caller was provided with the CCWHC's contact information.

Results, Trends and Comparisons

Dead bird testing is no longer required by the Ministry of Health and Long-Term Care as an early indicator of West Nile Virus in Ontario because information collected over the past few years across the province has confirmed when and where the virus will most likely appear. The CCWHC still invites the public or any agency to submit dead birds for possible WNV testing, potentially with costs attached if submitted by a health unit. Hamilton had no reports of positive dead birds from any testing performed by the CCWHC from any submissions of dead birds from the public or other agencies.

Lyme Disease

Highlights

There have been no established black-legged tick populations in Hamilton to date; therefore, pre-established triggers by the Ministry of Health and Long-Term Care have not been met for active Lyme disease surveillance. Small mammal collection would be the second phase of an active surveillance program.

Methods

The methods should meet the guidelines set out by in house policies and procedures adopted from *Methods for Trapping & Sampling Small Mammals for Virologic Testing*, CDC September 1995.

Results, Trends and Comparisons

At this time, there is no data available to compare.

Other Vector Borne Diseases

Highlights

At this time there are no wildlife surveillance programs for the four reportable vector borne diseases in Regulation 559/91 under the Health Protection and Promotion Act including malaria, plague, tularemia, and yellow fever. Eastern Equine Encephalitis (another VBD not listed specifically as a Reportable disease in the Regulation) also did not require any wildlife surveillance in 2010.

Methods

Not applicable.

Results, Trends and Comparisons

Not applicable.

VECTOR SURVEILLANCE

West Nile Virus

Adult Mosquito Surveillance

Highlights

Since 2003, the City of Hamilton has actively been identifying standing water sites that have the potential to breed mosquito species, especially those conducive to the West Nile virus vector mosquitoes. The 2010 locations of the 42 adult mosquito traps are shown on the map in Figure 3. This map also shows traps in relation to the mosquito breeding habitat types, the other land classifications and the 2010 public land standing water sites that were treated by the City of Hamilton.

Adult mosquito surveillance systems allow tracking of adult mosquito densities, species, and infection rates over time and space.

Most mosquito species are active at sunrise and sunset due to low winds, moderate temperatures and high humidity. During the day, most mosquitoes rest in dense vegetation, culverts and catch basins but may be active throughout the day in areas with sufficient shade. Females require the blood meal to obtain the necessary protein for egg development and will feed on a broad range of hosts including both birds and mammals (including humans).

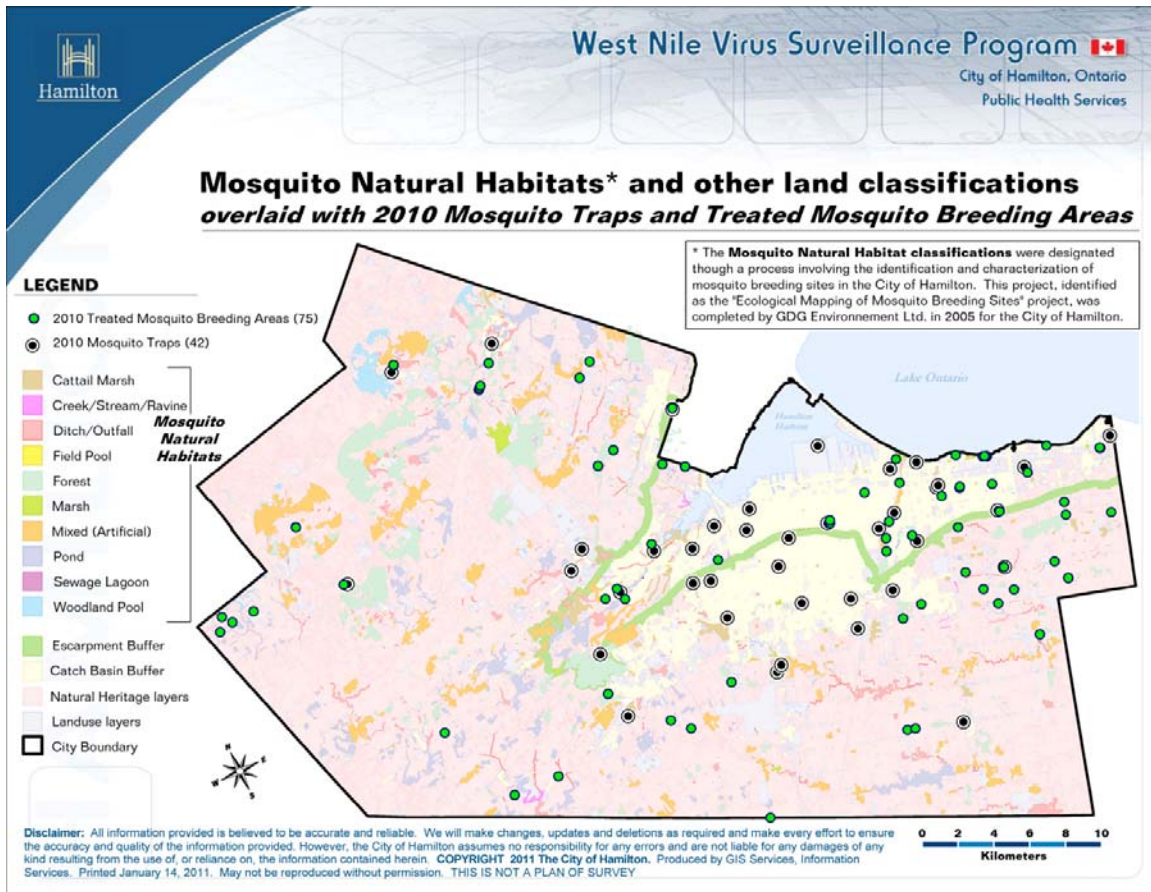


Figure 4: Mosquito Natural Habitats and other land classifications overlaid with 2010 Mosquito Traps and Treated Mosquito Breeding Areas*

* The treated mosquito breeding areas, also known as water sites, were treated in 2010 by Pestalto Environmental Health Services based on a high threshold finding of >31 larvae during dipping. Sites that had larvae below the threshold amount were not referred to Pestalto for further treatment.

The following are the GDG Mosquito Natural Habitat Classifications represented in Figure 4. Note that the classifications were slightly modified in 2008 and 2009, as indicated below:

GDG Mosquito Natural Habitat Classifications

1. Cattail Marsh - Marsh with cattail plants, generally shallow waters or highly water saturated soils.
2. Ditch/Outfall - Roadside ditches, field drainage ditches, sewer network outfalls, small *streams* or clogged culverts. These will produce the same types of species.
3. Field pool - Meadow marsh, fallow land, seasonally flooded with graminoids.
4. Forest - Habitats that are seasonally flooded or easily flooded with rains; Silver Maple, Ash, Elm, Red Maple or Cedar wood.
5. Marsh - Sites with emergent plants (Sedges, Bullrushes, Arrowhead), floating leaf plants (water lilies), or submergent plants (pondweeds).
6. Mixed (*Artificial*) - Mixture of different habitats.
7. Pond - *Ravines*, quarries, retention ponds, rivers edge, rockpools or lakeshore.

8. Sewage Lagoon - Sewage treatment plants, lagoon perimeter and catwalks.
9. Woodland Pool - Same as forest but with permanent pool.
10. Creeks/Streams/Ravines – a new category drawn from GDG habitat types of Ditches (streams) and Pond (ravines) was created in 2009 to organize types of moving or likely to be moving water into one habitat type

The following are other land classifications also represented in Figure 5:

- Escarpment Buffer - The line denoting the crest of the escarpment was buffered below the line feature by 300m and above the line feature by 100m.
- Catch Basin Buffer - The catch basin points were buffered by 100m.
- Natural Heritage layers - Contains categories Agriculture, Beach, Forest, Meadow, Successional, Water, Wetlands. The Urban category was removed for this analysis replaced by the Landuse layers.
- Landuse layers - Contains categories based on property codes Commercial, Industrial, Institutional, Mixed Use, Office, Open Space, Residential, Storage, and Utilities.

Methods

The number of adult mosquito traps set each season has varied. From 2002 to 2010 the number of traps set each year were: 10, 14, 43, 41, 35, 43, 41, 43, and 42, respectively. In 2010, up to 42 traps were set each week. See Table 5 for adult mosquito trap locations. To maintain a level of confidentiality for trap sites that are located on private properties, the locations in the Table are based on generalized areas such as the former political boundaries (that existed prior to amalgamation in 2000) or by general defining geographic boundary (for example, areas are divided by being on the “Mountain” versus lower city).

Table 5: City of Hamilton Adult Mosquito Trap Locations 2010

Trap Locations by General Area	Trap Code for traps viral tested	# Traps per Area Viral Tested	Trap Code per Area not WNV Viral Tested	Total Number of Traps per Area
Ancaster	12	1		1
Dundas	C1, L1, 26, 38	4		4
Flamborough	D1, 21, 22, 48, 49	5		5
Glanbrook	13, 52, 56	3		3
East Mountain	11,16	2		2
Central Mountain	K1, S1, 41	3		3
West Mountain	B1, 25, 45	3		3
Lower Central Hamilton	J1, M1, 17, 30	4		4
Lower East Hamilton	15, 34, 47, 57, 58	5		5
Lower West Hamilton	44, 54	2		2
Lower Stoney Creek	A1, G1, 14, 29	4	A3, A4, A5, A6	8
Upper Stoney Creek	51, 55	2		2
Total		38	4	42 Traps

Centers for Disease Control (CDC) light traps were used to capture adult mosquitoes using carbon dioxide and light to attract host-seeking adult female mosquitoes. All trap sites in 2010 were electronically mapped. Trapping results were available on a weekly basis. There

was specific emphasis given to *Culex spp* vectors, as well as *Aedes vexans* and *Ochlerotatus trivittatus* (Hamilton had one positive mosquito pool for this species in August 2006).

Vectors of Eastern Equine Encephalitis (EEE or ‘triple E’) were also evaluated weekly and tested as per MOHLTC recommendations. The median trap count per week for *Culex* vectors, other vectors and other mosquitoes were compared to the median trap counts for previous years.

Adult mosquito West Nile virus infection rate (pooled) was calculated by bias-corrected maximum likelihood estimate for point estimation (MLE) using the software package “PooledInfRate v. 4.0” provided by the US Centers for Disease Control and Prevention (<http://www.cdc.gov/ncidod/dvbid/westnile/software.htm>).

Results, Trends, and Comparisons

The trend in three primary vector species groups from 2003 to 2010 is shown in Figure 5 using the median number of mosquitoes per trap from nine (9) traps* that have had a consistent location over this time period. The median count of the *Culex* species dropped dramatically after the inception of the catch basin treatment program in 2003, and was comparatively low across the 2010 season. Weather can also be used to explain mosquito abundance patterns seen this summer. The population of floodwater mosquitoes, *Oc. trivittatus* and *Ae. Vexans*, peaked early in the season following heavy rainfall in June.

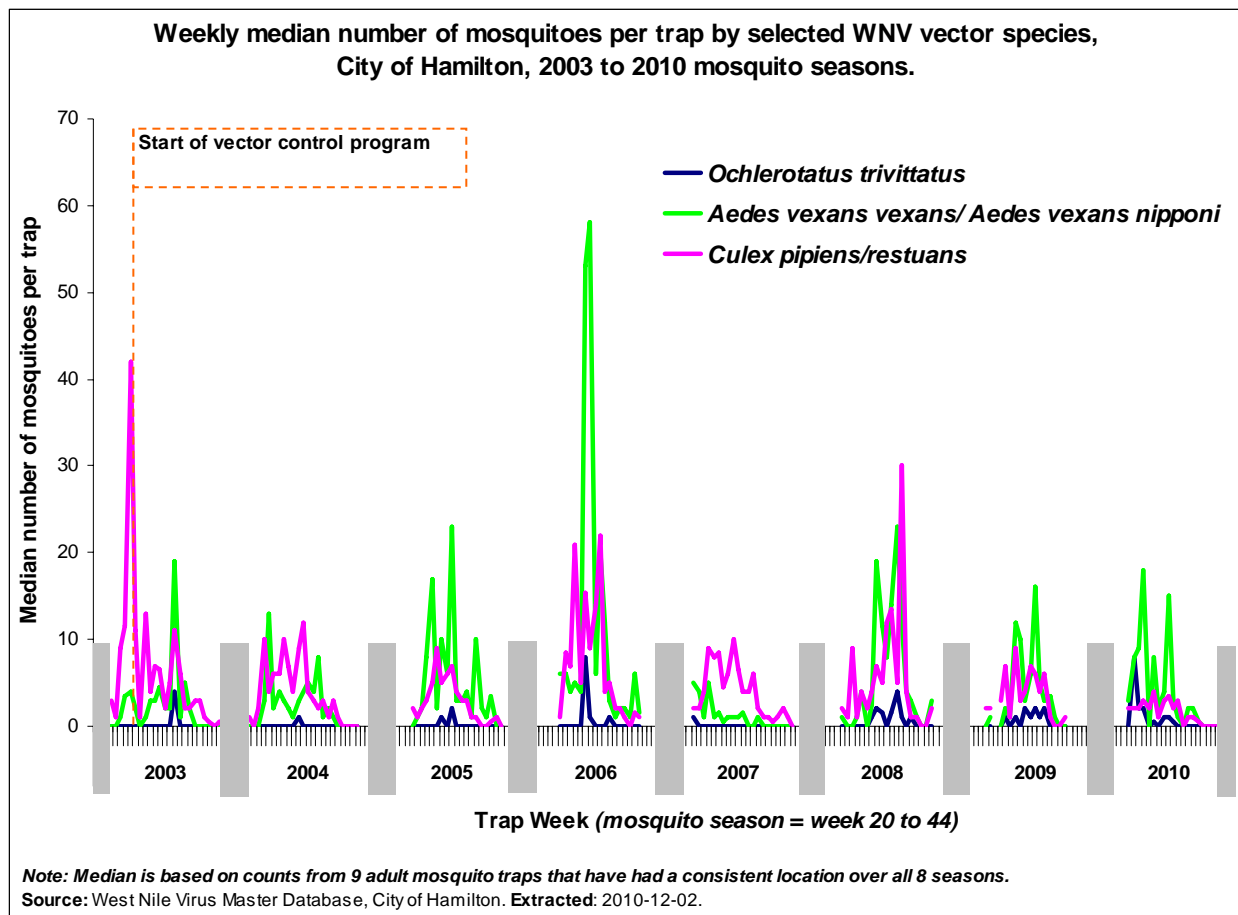


Figure 5: Weekly Median Number of Mosquitoes per Trap

* The 9 traps consistently used during 2003 to 2010 were used for the analysis in Figure 5. They are Trap A1, B1, C1, D1, G1, J1, K1, L1, and M1.

As reported in Cosray Lab's report to Hamilton (*Mosquito Identification and West Nile Virus Testing: 2009 Final Report prepared for: City Of Hamilton Public Health Services*) on their mosquito identification and viral testing results, "It was not surprising to see that the most abundant vector species in HPHS this year were floodwater species, *Aedes vexans* and *Ochlerotatus*

trivittatus. This was also the case in 2008. A large number of these specimens were collected by the experimental 'A' traps in the Stoney Creek region of Hamilton. Special notice should also be given to *Oc. japonicus*, as its numbers were significantly higher this year than in previous years. Large numbers of this species were caught in the early weeks of September, following the peak of the *Culex* population at the end of August.

Three specimens (three pools in total in two different trap locations) of *Culiseta melanura* were also collected from Hamilton this year, and tested negative when subjected to Cosray Labs' standardized test for Eastern Equine Encephalitis (EEE)."

In 2010 a rare species of mosquito, *Psorophora ciliata*, not typically found in Southern Ontario was found in the lower Stoney Creek area in Trap 14 and Trap 29 (total of six mosquitoes were caught). While *Ps. ciliata* is not a competent vector of WNV it is known for its large size and painful bite and may come to the attention of health units across Ontario through public complaint (to date Hamilton has not received any calls however they may occur if numbers of this mosquito increase). See Figure 7 for a comparison of this large mosquito compared to an *Aedes vexans* mosquito (courtesy of Cosray Labs). Neighbouring Niagara Region Health Department reported that, on average, they catch three (3) or four (4) per season however 2010 marks the first year for it being found in Hamilton.

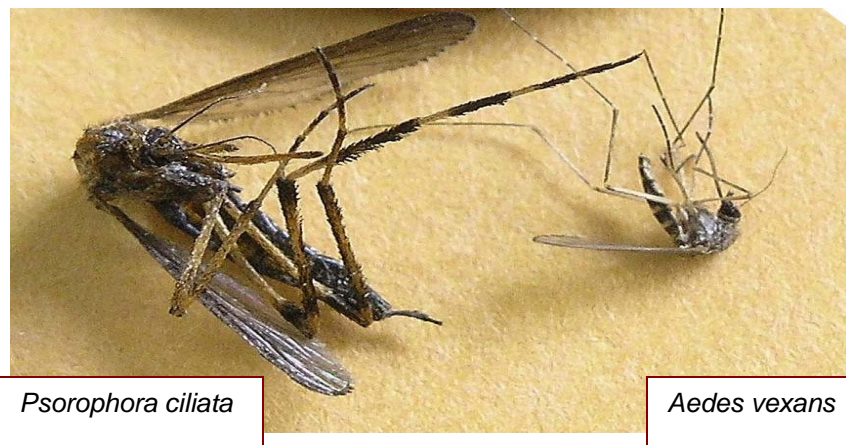


Figure 6: Comparison of *Psorophora ciliata* to *Aedes vexans*

The mosquito WNV pooled infectivity rate per year is shown in Figure 8. In 2002 the peak monthly infectivity rate was substantially higher than in any of the following seasons. In 2010 there was one (1) WNV-positive pool of adult mosquitoes. See Table 7 for the number of positive mosquito pools in past seasons, including repeat positives in a trap in a season or over seasons.

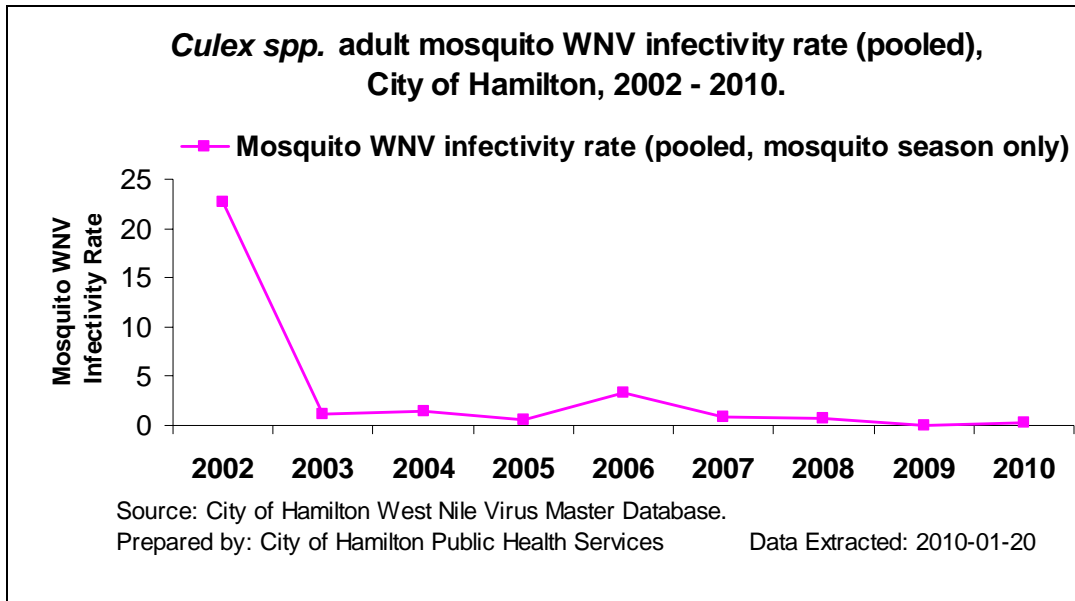


Figure 7: WNV Pooled Infectivity Rate, City of Hamilton, 2002- 2010

Larval Mosquito Surveillance

Highlights

Management of mosquito breeding areas and control of larval populations decreases the number of adult vector mosquitoes. Fewer potentially infectious adult mosquitoes in turn reduce the risk of humans being bitten by infected mosquitoes. Almost any natural or artificial container that will hold water for about a week or more can serve as a mosquito-breeding site. Man-made sources such as storm water catch-basins are one such container type. City of Hamilton catch basins are found within the urban boundary and in some of the settlement areas. *Culex pipiens*, the primary mosquito, for both the amplification cycle and the spread of West Nile virus to the human population, has been found in City catch basins as well as other standing water sites.

Methods

Surveillance for developing mosquito populations began in Hamilton during the 2003 season, and continues to date. There remain three primary components to this surveillance: storm-water catch basin monitoring, routine monitoring of other surface waters on public lands including roadside ditches, and targeted monitoring/ground-truthing in response to complaint

All water sites have been identified through a combination of public complaints, field surveillance and GIS mapping techniques to identify where water has been found to be standing or where it may collect and stand for a period of time (assessed by topography and soil type to predict water accumulation). Once a site is validated through a field visit it remains active in our monitoring system until the source is either eliminated or further action is taken through referral to our contractor for treatment.

There were 411 water sites under surveillance in 2010. Seasonal Field and laboratory students (“WNV Techs”) were trained at the beginning of 2010 to ensure proper sampling

and site identification techniques were practiced. Breeding site characterization training included learning and capturing data on: presence of water, vegetation assessment, temperature, water quality, pool size, and categorization into one of the habitat types.

A larval sample consisted of a group of one or more dips to a maximum of 10 dips, into the water with a dipper (container to capture the larvae), as per the Ministry of Environment sampling protocol. Each mosquito larval sample was characterized as *low* (1-6 larvae), *moderate* (7-30 larvae), or *high* (>31 larvae). Pestalto, the larviciding contractor, conducted treatment and subsequent monitoring/treatment once a referral was made. Since 2005, Hamilton used a low count as the trigger to treat to achieve maximum use of the larviciding contractor's services as well as to further control mosquito breeding. A "high threshold" count (greater than 31 larvae) was used in 2009 and 2010.

In 2010, when a site presented with larvae, the sample was collected and returned to our WNV laboratory for microscopic speciation. An outside contractor, Annette Tavares provided initial training for larval speciation and then performed three Quality Assurance "spot checks" through the season whereby she would visit our lab and verify the accuracy of the larvae identified by our seasonal students. She would then prepare a report noting the species and any errors – if any. The overall performance was graded for accuracy and the seasonal staff achieved 85%, 82% and 88% on Q and A reports conducted in June, July and August, respectively.

Results, Trends, and Comparisons

Locations of potential vector breeding areas monitored in 2010 are shown in Figure 8. These monitored sites are widely distributed across the City of Hamilton. The 75 water sites referred to Pestalto are indicated with a green dot. An additional small number of sites referred for treatment were excluded from the map as they were not part of the monitoring program.

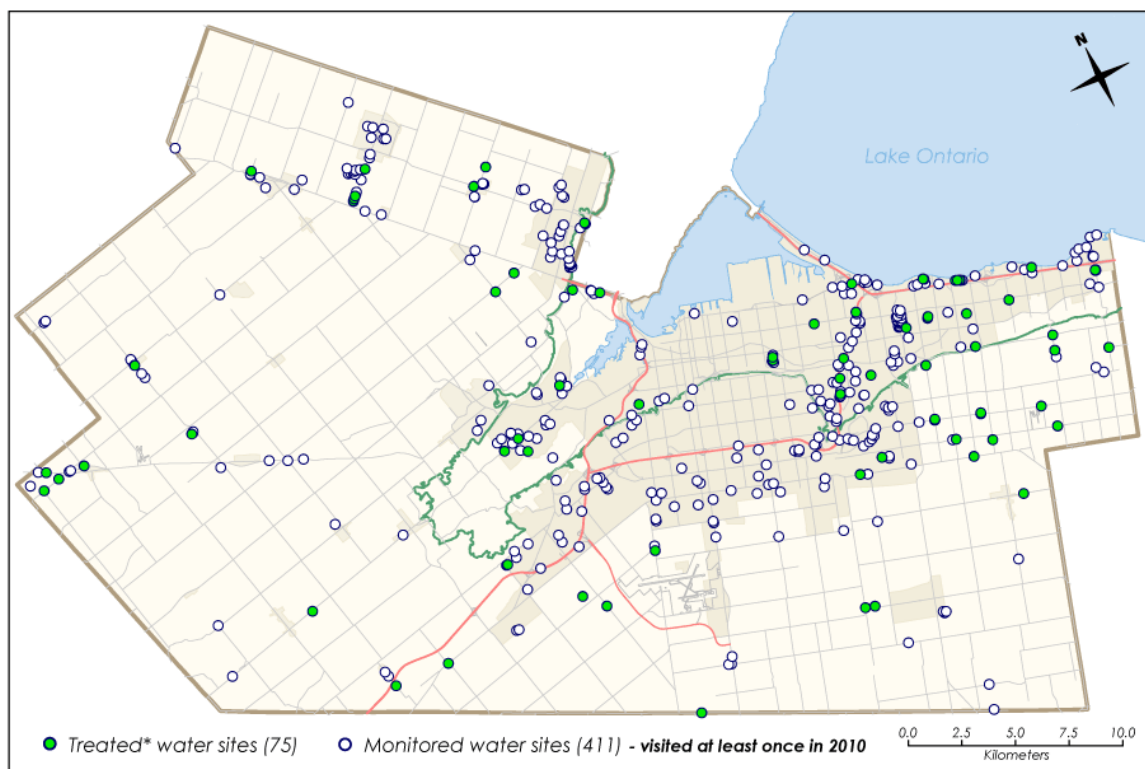


Figure 8: Potential Mosquito Breeding Areas (water sites) Monitored and Treated* in 2010

** The treated mosquito breeding areas, also known as water sites, were treated in 2010 by Pestalto Environmental Health Services based on a high threshold finding of >31 larvae during dipping. Sites below the threshold amount were not referred to Pestalto for treatment.*

The monitored water sites were characterized into the habitat types when visited. The proportion of the monitored sites for each habitat type is described in Table 6. Among the monitored sites, forest, ditches, field pools and woodland pools were the most likely to have mosquito counts in sufficient numbers to be referred for treatment.

Table 6: Monitored potential mosquito breeding sites and proportion of sites treated, City of Hamilton, 2010.

Habitat Type (10)	Number of Sites	Number of Sites Treated	Proportion of Sites Treated
Forest	2	1	50%
Ditch/Outfall	209	54	26%
Field Pool	41	9	22%
Woodland Pool	16	3	19%
Pond	46	4	9%
Marsh	12	1	8%
Cattail Marsh	19	1	5%
Creek/Stream/Ravine	56	2	4%
Mix	8	0	0%
Sewage Lagoon	2	0	0%
Totals	411	75	-

Bow Valley Area Surveillance

The City of Hamilton has identified the Bow Valley Area as a naturalized valley with a high population of adult biting mosquitoes. Geographically, this area is located in the north eastern portion of lower Hamilton and is surrounded by residential properties. The Bow Valley accounts for 23 hectares of treed, lush, woodland ponds, cattail marshes and field pools with high grasses and reeds and the majority of soil is clay based leading to pockets of standing water given the low lying area.

The area was identified by the WNV risk assessment committee as high risk in 2002 when the area adult mosquito trap was positive for West Nile Virus three times in that season. From 2002 to 2010, the Bow Valley area has had twice as many adult mosquito positive pools for West Nile Virus than any other trap location in the City although there have been no positive trap results since 2007. See Table 7 for the history of positive mosquito pools in the Bow Valley Area compared to the rest of Hamilton from 2002 to 2010.

Table 7: Hamilton Positive Traps – 2002-2010*.

	2002	2003	2004	2005	2006	2007	2008	2009	2010	Repeat positive in a season	Repeat positive in multiple seasons	Positive once only	Total positive
A1**	3	1	1		1	2				√	√		8
B1	4									√			4
C1	1											√	1
D1	1											√	1
F1	1											√	1
G1	1	1			1						√		3
M1			1		1		1				√		3
S1				1								√	1
10Y***			1									√	1
11					2		1			√	√		3
15			1	1							√		2
17					2					√			2
18			1		1						√		2
19			1									√	1
20			1									√	1
28			1									√	1
29							1					√	1
34					1	1	1				√		3
40					1							√	1
41					3					√			3
44					1							√	1
47									1			√	1
Total	11	2	8	2	14	3	4	0	1	5	7	11	45

*This table does not include all trap sites per season - only those with positive results

**Trap A1 is within the Bow Valley Area

*** 10Y was only used in 2004 for hot spot trapping.

For the 2010 season, the vector borne disease team monitored the twenty (20) sites within the Bow Valley area. In conjunction with larval surveillance monitoring, five traps were set in Bow Valley (four to track abundance and species composition in addition to the fifth trap – A1 – that is also viral tested). The five traps set were: A1, A3, A4, A5, and A6 (A2 was discontinued in a previous season). Figure 9 presents the median number of mosquitoes in the five traps in each week by three WNV vector species: *Culex*, *Aedes*, and *Ochlerotatus trivittatus*. In June and July, high numbers of *Oc_trivittatus* and *Aedes* were observed.

In an effort to better control the area a change in pesticide was undertaken mid way through the treatment season (June to October). In early August treatment changed from *Bacillus thuringiensis* var. *israelensis* (Bti) to *Bacillus sphaericus* with the rationale that *B. sphaericus* shows environmental persistence for two to four weeks where Bti has virtually no residual.

After the treatment change in week 31 (Aug 1-7, 2010) there was a reduction in trap numbers especially *Oc_trivittatus*. However, at week 36 (Sep 5-11, 2010) a large spike in *Oc_trivittatus* was seen again. Pestalto was consulted for a rationale for this spike and they provided the following explanation:

“Adult mosquitoes will move from the site of emergence for several reasons, 1. the innate capacity to disperse, 2. flying against light breezes that carry CO₂ and other attracting chemicals from a potential food source or 3. being blown in from an emergence site up to a kilometre or more away. The latter phenomenon is in fact called ‘blow in’ and mosquito populations that are blow in, for whatever reason, tend to decline rapidly.”

Bow Valley is protected by the Hamilton Conservation Authority and physical remediation or increased treatment, such as adulticiding, could alter the natural environment which would not fit within the scope of the Conservation Authority’s mission. The valley is also an environmentally sensitive area making additional treatments debatable or more problematic. In Canada, the Pest Management Regulatory Agency recommends overspray or spray drifts of mosquito adulticide be prevented from coming in contact with ponds, rivers, streams, lakes, and wetlands (Health Canada, Consumer Product Safety, Use of Malathion in Mosquito Control Programs, <http://www.hc-sc.gc.ca/cps-spc/pubs/pest/fact-fiche/malathion/index-eng.php> Visited July 9, 2009.).

As Bow Valley has its own unique geography in Hamilton and it is an area that has had repeat mosquito pool results within a season and across seasons, WNV program staff will continue to focus attention on this area to ensure surveillance and all available control measures for the area occur to best control mosquitoes and the potential for West Nile virus transmission to humans.

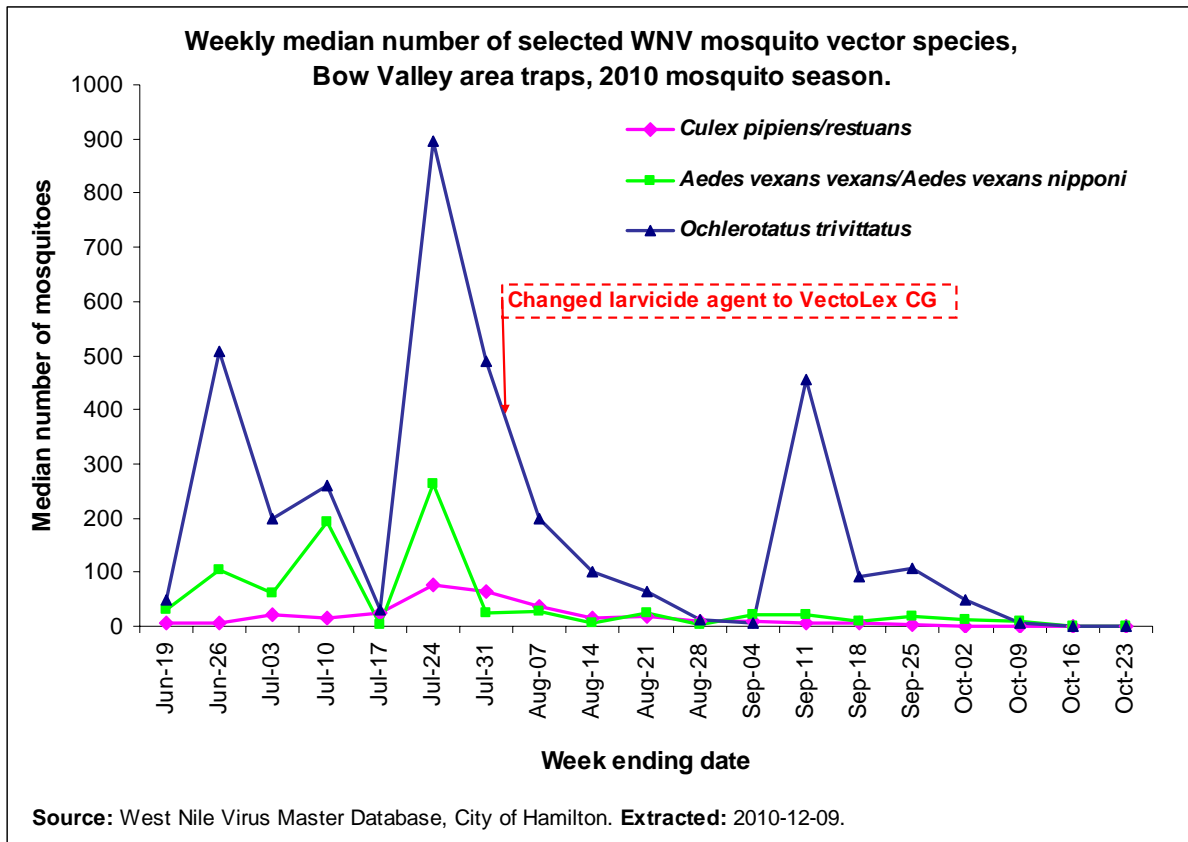


Figure 9: Bow Valley Adult Mosquito traps 2010

Lyme Disease Surveillance

Ticks

Highlights

In 2010, there were no *Ixodes scapularis* ticks submitted for identification to City of Hamilton Public Health Services.

Without the presence of human cases or the finding of any areas within the City Of Hamilton found to have populations of *Ixodes scapularis*; active vector surveillance was not practiced in 2010.

Methods

- Passive Surveillance
- Public Awareness of Program
- Public – human versus other host
- Initial identification
- Submission to CPHL for formal identification and bacterial testing

Passive surveillance was conducted. Hamilton accepted any tick from the public although only ticks found on humans were submitted to the Central Public Health Laboratory for identification as per the Ministry of Health and Long-Term Care's direction.

Results, Trends, and Comparisons

In 2010 there were 38 ticks submitted to the health unit by the public. One of the ticks submitted was not found on a human host (identified by local staff as a dog tick). Of the 37 ticks submitted from Hamilton to the Central Public Health Laboratory for formal identification, none were the vector species *Ixodes scapularis* (or black legged tick) and therefore no ticks submitted in 2010 had the potential to transmit Lyme disease. Figure 10 describes the monthly submissions of ticks found on *human* hosts to Hamilton Public Health Unit from 2007 to 2010. As expected, submission of ticks is seasonal with the peak of submissions in May and June of each year and markedly decreased by August. As the tick surveillance is passive, it is likely that submissions are influenced by public awareness of Lyme disease. It is interesting that the tick submission in 2009 were relatively slight, corresponding to the pandemic influenza time period.

There have only been two ticks submitted to Hamilton Public Health since 2007 that have been identified as the vector species; one in late 2007 and the other in early 2008. The black-legged tick submitted in 2008 was not from the Hamilton area and was negative for Lyme disease, however, the 2007 vector species tick was from the Freelon area and was found to be positive for Lyme disease. The only Hamilton acquired case of Lyme disease also occurred in 2007.

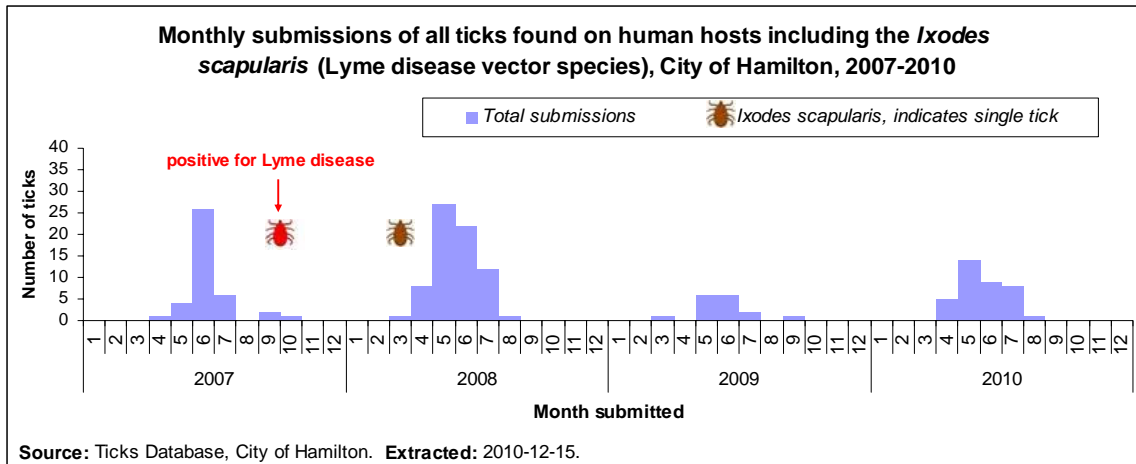


Figure 10: Tick submissions found on human hosts, City of Hamilton, 2007 – 2010

Other Vector Borne Diseases

Highlights

Active surveillance for vectors related to malaria, plague, tularemia, or yellow fever were not undertaken in 2010.

Mosquitoes caught in the adult mosquito traps were viral tested for Eastern Equine Encephalitis (EEE) if the mosquito species, *Culiseta melanura* was found, as per the MOHLTC testing protocol.

Methods

Vector surveillance for EEE followed the same methods for WNV adult mosquito surveillance.

Results, Trends, Comparisons

Three pools of *Cs. melanura* were negative for EEE viral testing. With the recent announcement from the Ministry of Health and Long-Term Care of new guidelines for EEE surveillance to be released in the spring of 2011, it is likely that vector surveillance targeting EEE vectors will commence in the 2011 season.

CONTROL MEASURES

West Nile Virus Control

Highlights

The City of Hamilton uses an integrated pest management (IPM) model for the control of mosquitoes known to transmit WNV. This means that in addition to larviciding where necessary, other WNV prevention strategies such as public education and breeding site

reduction and enforcement are used. For larviciding, the three pesticides used in 2010 were: methoprene, *Bacillus sphaericus* and *Bacillus thuringiensis* var. *israelensis* (Bti).

The City of Hamilton began treating mosquito breeding sites with surface and catch basin treatments in 2003. From 2003 to 2010 four companies conducted larviciding under contract. See Table 2 in the Introduction section for all company names. In 2010, Pestalto Environmental Health Services Inc (“Pestalto”), was retained for a third season, by the City of Hamilton, to supply and apply larvicides (as directed by WNV staff) and to obtain permits necessary for the application of larvicides to public lands within the City of Hamilton. It is anticipated that Pestalto will complete the fourth and final year of their contract in 2011.

As outlined in the Bow Valley section, Pestalto and City of Hamilton Public Health Services staff worked together to improve larviciding control in a localized area in 2010 by changing from Bti to *Bacillus sphaericus*.

Methods

Pre and Post Treatment Studies

For catch basins, pre-treatment studies begin each season with WNV staff monitoring selected catch basins in the spring from a pre-set grid pattern of 39 areas. Each season, once larvae are found, based on a general program policy threshold of finding larvae across the city versus in concentrated sections, the first round of treatment occurs.

For post treatment, in 2010, a post treatment check of the 39 catch basins was performed after the third round principally to decide if a fourth round of treatment would be necessary. A fourth round was to occur based on increased risk levels for human transmission in the City or if efficacy levels were low. A fourth round was not deemed necessary.

The trigger for each surface water treatment (akin to being a pre-treatment study) involves WNV staff finding larvae at the high threshold for treatment at each discrete site. WNV seasonal staff who monitor known water sites or sites via complaints make the referrals to Pestalto for treatment and their subsequent ongoing monitoring.

Standing Water Complaints

The general public supports the standing water enforcement component of the program by lodging standing water complaints on both public and private lands. The Standing Water By-Law 03-173 (officially called, *A By-Law to Prohibit and Regulate the Accumulation of Standing Water at Specified Times of the Year*) is enforced within the urban boundary and settlement areas from April 1st – October 31st each year.

In 2010, the Customer Contact Centre, a centralized phone line for the residents of Hamilton to report/inquire about all programs and services, recorded 120 private and 19 public land complaints. All complaints were investigated by either WNV seasonal staff or public health inspectors. Of the 120 private land complaints, three complaints required Orders under the By-law however none resulted in charges.

For public land complaints, any requiring control were either referred to Public Works for assessment to permanently remediate, or sites were referred to Pestalto for treatment and the site was created as permanent water site in the database.

All standing water complaints were mapped for the first time in 2009 and 2010. See Figure 11 for 2010 results. Mapping will continue in future seasons to see if any patterns emerge to help inform future communication and education outreach plans. If a particular area is a concern ('concern' will be defined through discussion of the risk assessment committee) then a pilot door to door campaign to raise awareness may occur to educate residents about standing water and mosquito development or another strategy will be developed to focus on standing water control for that area. In 2010 no pattern appeared evident for any targeted intervention.

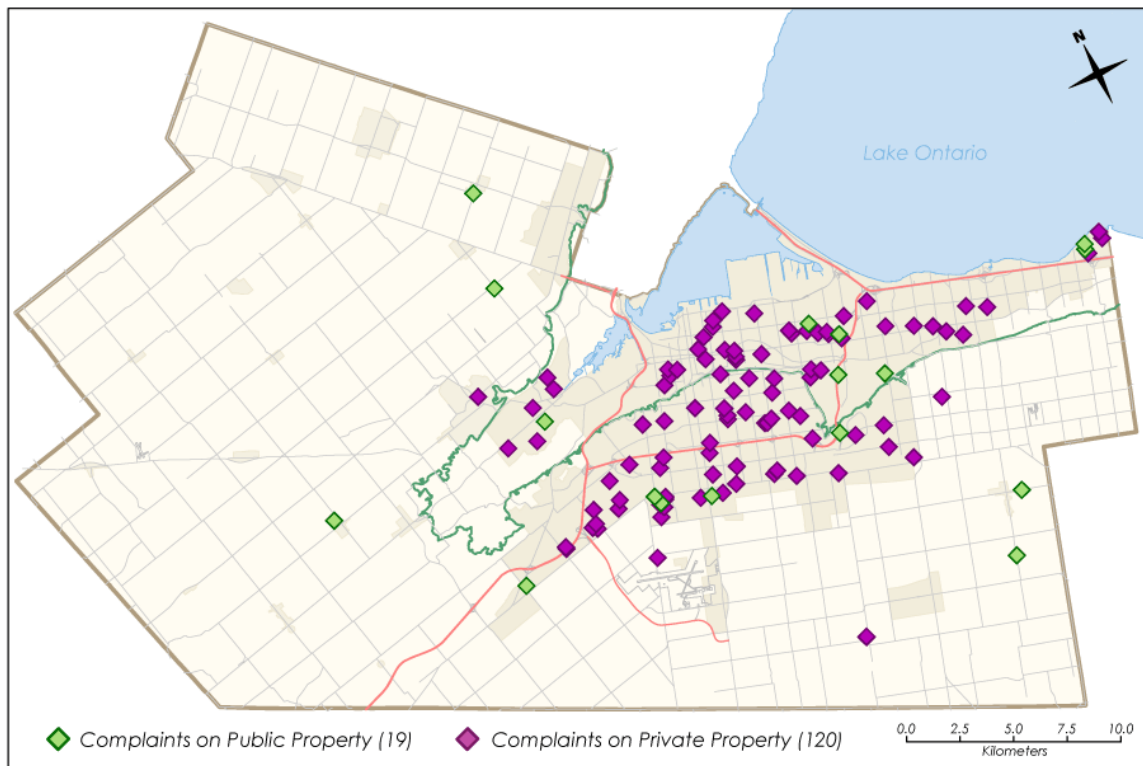


Figure 11: WNV Public and Private Standing Water Complaints 2010

Treatment

Permits and Notification

In Ontario, the Ministry of the Environment (MOE) is responsible for regulating the use of mosquito larvicides. Permits were obtained by Pestalto Environmental Health Services Inc., from the MOE (West-Central Region) before larviciding operations began for both surface water and catch basins. Permit numbers were:

Catch basins:

- #5142-84ZLQH

Surface waters:

- # 0286-85NGLT allowed up to 30 treatments totaling up to 100 hectares of surface water with Vectobac 1200L (liquid formulation of *Bacillus thuringiensis* var. *israelensis* - *B.t.i.*). Treatment was permitted to occur between May 21, 2010 to October 31 2010, inclusive.

- # 4407-7S9MN3 was issued to include treatment of up to 100 hectares with Vectobac 200G (granular formulation). Treatment was permitted to occur between May 21, 2010 to October 31, 2010 inclusive.
- # 4407-7S9MN3 was issued to include treatment of up to 100 hectares with Vectolex CG Biological Larvicide (Bacillus Sphaericus). Treatment was permitted to occur between May 21, 2010 and October 31, 2010 inclusive.

In compliance with the MOE permit public notification requirements, as per MOE's document, "Public Notification of a Water Extermination for the Control of Immature Stages of Mosquitoes (Larviciding Programs for WNV)" the larviciding notification ran in the daily newspaper, The Hamilton Spectator, on April 30, 2010.

Catch basins

The catch basin permit allowed up to four (4) treatment rounds to approximately 41,000 catch basins along city streets with Altosid pellets (4.25% methoprene) between May 21, 2010 to October 31, 2010 inclusive. Non roadside catch basins were also to be treated, and were included in the permit to use Briquets. Pestalto's 2010 report to Hamilton, *Mosquito Abatement Program for Vector Reduction of West Nile Virus- Final Report for City Of Hamilton Public Health Services*, states that, "Non-roadside catch basins, such as catch basins located within or around backyards, parks, cemeteries government buildings and long-term care facilities were also treated. Such catch basins tend to be sparsely and widely distributed. Altosid® Briquets, reputed to have a 120-day residual activity, were used to treat the majority of these catch basins." The catch basin treatment areas for Hamilton catch basin treatment program are provided in Figure 12. Geographic positioning system (GPS) coordinates were collected to compile an inventory of catch basin treatments.

Once treatment commenced, treatment rounds were repeated based on MOE's recommendation and label directions for methoprene that being waiting 21 to 30 days for treatment efficacy.

Hamilton performed three rounds of catch basin treatments in 2010: June 16 – June 25, July 7 to 20, and July 28- August 09. Most municipal catch basins were larvicided at approximately 21-day intervals. Coloured paint was used in conjunction with each round to signify treatments occurred. Paint colours were blue, white, and pink for the three rounds of treatment, and red for catch basins treated with Briquets.

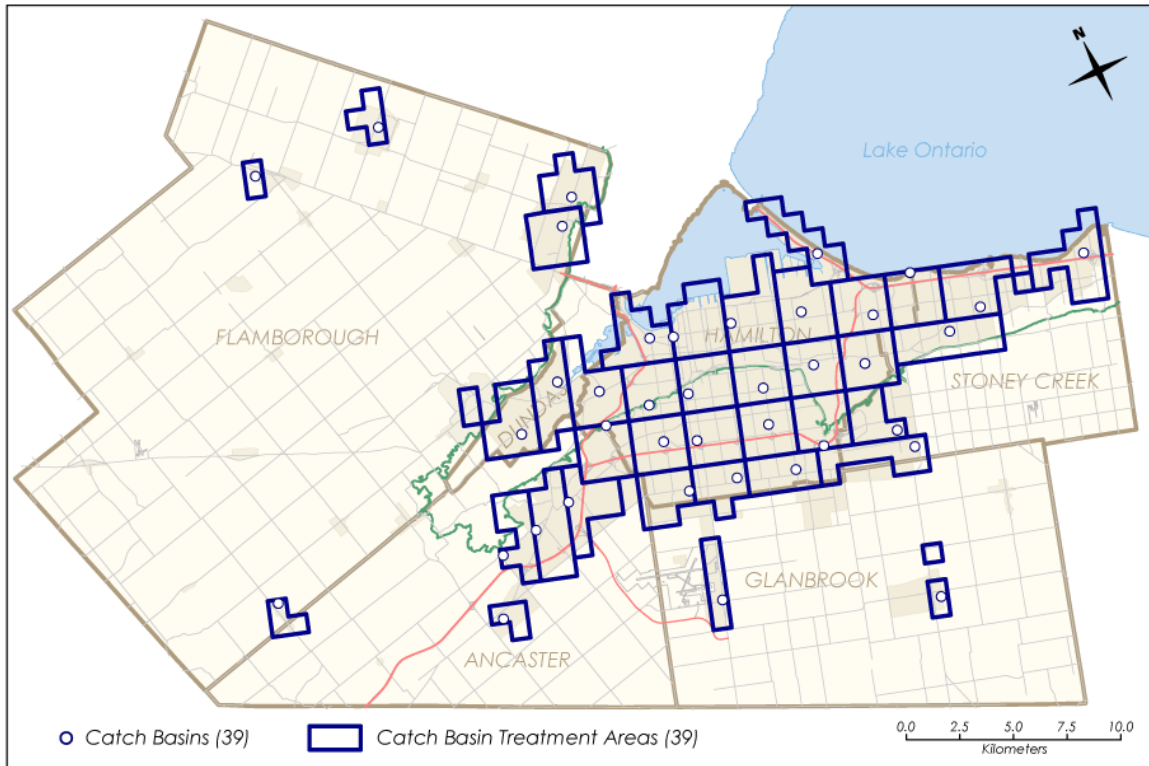


Figure 12: Catch Basin Treatment Areas

Table 8 provides all catch basin treatment dates while Table 9 outlines specific non-roadside catch basin treatment locations.

Table 8. Roadside and Non-Roadside Catch Basin Treatments, Dates and Product Use for the City of Hamilton in 2010.

All Catch Basin Treatments						
Location	Product	Phase/Round	Start Date	End Date	Quantity	Treatments (# of catch basins)
Roadside	Altosid® Pellets	1	Jun 16	Jun 29	26.69 kg	38, 132
		2	Jul 07	Jul 20	26.93 kg	38, 467
		3	Jul 28	Aug 09	26.93 kg	38, 468
Non-Roadside*	Altosid® XR Briquets	1	Jun 05	Aug 06	710 Briquets	710
Overall treatment timeline and total # of catch basins			Jun 05	Aug 09	-----	115, 777

Table 9. Non-Roadside Catch Basin Treatments, Dates and Product Use for the City of Hamilton in 2010.

Non-Roadside Catch Basin Treatments			
Location	Start Date	End Date	Treatments
Backyard	July 05	July 06	30
Government Building	June 08	July 22	120
Long-Term Care	June 08	June 08	28
Park	May 31	August 06	532
Overall treatment timeline and total # of catch basins	May 31	August 06	710

Table 10 provides a comparison of treatment dates from recent years, 2006 to 2010 (treatment program inception was 2003). In 2009 and 2010 the fourth rounds were not performed in response to the 2009 budget reduction and seasonal risk assessments.

Table 10. Recent Catch basin Treatments 2006 - 2010

Round	2006	2007	2008	2009	2010	Catch basin Marking
1st	June 8 - 15	June 13 - 20	June 13 - 25	June 22- July 3	June 16-June 25	Blue
2nd	July 6 - 13	July 11 - 18	July 2 - 15	July 13- 23	July 7 – July 20	White
3rd	Aug 3 - 10	Aug 8- 16	July 23 - Aug 6	Aug 4 - 13	July 28 – Aug 09	Pink
4th	Sept 1 - 8	Sept 1-8	Aug 13 - 26	Not Conducted	Not Conducted	Green

** Colour Scheme: Dot on catch basin indicates treatment. Colour per round matches same colour scheme in most surrounding health units

Surface Waters

In 2010, Bti was used for surface water treatments in all areas except Bow Valley (*Bacillus sphaericus* was used from early August onward for better residual). At all other surface water sites where treatment was warranted, Bti was applied on an average of every seven days. Some sites required fewer treatments if, upon a visit, there were no larvae, or if a site dried up. The City of Hamilton refines the surface water site inventory and identifies new sites through the following information sources:

- Existing municipal records – the City’s Public Works department provided a list of known storm water management ponds (SWMP) and updates to the list as needed.
- GIS data – digital elevation modeling (DEM) data allows for maps to be generated that provide hundreds of potential surface sites that can be verified and assessed by field checks.
- Public complaints – the WNV program is promoted to the public through various communication outlets. The public is invited to call to report concerns regarding WNV calls including standing water on public or private lands. Only City owned public lands are treated by the City. The Customer Contact Centre (CCC) receives all incoming calls.
- Staff surveillance where they may observe a new site while visiting others nearby

Public surface water sites were monitored for mosquito larvae routinely and included descriptive data (dimensions of site, vegetation, temperature of water). The MOE document *Permit Applicant Guide for Municipalities and Health Units: Controlling Mosquito Larvae for Prevention and/or Control of West Nile Virus* provided the larval surveillance protocol used by WNV staff to assess surface water sites for WNV.

In the early spring, seasonal WNV staff were trained to properly assess, define and locate the various water sites into the appropriate City of Hamilton habitat classifications: field pools, ditches/outfalls forests, marsh, mixed (artificial), cattail marshes, ponds, sewage lagoons, woodland pools and creeks/streams/rivers. The staff of 2010 utilized GPS units to locate the standing water sites. The GPS units provided several advantages to the program including accurate referral of sites to Pestalto for treatment, enhanced mapping ability, and quality assurance checks with respect to managing surveillance data.

If mosquito larvae were observed at a water site, dip counts were recorded and if the high threshold was met (> 31 larvae) the site was referred to Pestalto for treatment and subsequent monitoring for the remainder of the season.

In 2010, West Nile Virus staff had approximately 411 water sites under surveillance for WNV vector activity which resulted in 85 sites referred to Pestalto for treatment with *B.t.i* commencing on May 11th. Note that in Figure 5 only 75 sites are listed versus 85 as some referrals were duplicates (some sites were referred twice to Pestalto likely following an additional public complaint that required a staff visit). All referred sites first met the “high threshold” larval count of > 31 before referral.

Table 11 provides the treatment and monitoring summary for 2010.

Table 11: 2010 Pestalto Treatment and Monitoring Summary

2010			
Breeding Sites Referred to Pestalto	Total Number of Surveillance Visits by Pestalto	Total Number of Treatments	Total Area Treated (m ²)
85 (75 when duplicates removed)	1, 176	329	509, 733

Lyme Disease Control

Not applicable as Hamilton has not met any of the triggers to require active tick control.

Other Vector Borne Disease Control

At this time there are local no control measures specifically required for malaria, plague, tularemia, or yellow fever,

RISK ASSESSMENT

Number Conducted

The risk assessments performed included assessing the risks for West Nile virus, Lyme disease, Eastern Equine Encephalitis, and would have included any other VBD of local concern as identified by committee members or the Medical Officer of Health or external agency (Public Health Agency of Canada or Ministry of Health and Long-Term Care).

As mandated by Ontario Regulation – O.R. 199/03, “The Control of West Nile Virus, the City of Hamilton’s Medical Officer of Health, members of the Vector Borne Disease team and various internal partners conduct regular risk assessments of the conditions pertaining to West Nile virus and Lyme Disease within the City of Hamilton. The risk assessment is based on surveillance, control, and education related factors (local, national, and U.S. surveillance information of mosquitoes, humans and to a lesser extent birds, local control information including standing water complaints, areas that require remediation or larviciding treatment, and public education/community outreach to raise awareness and encourage the public to practice personal protection measures and to remove or control private land standing water sites.

The Vector Borne Disease risk assessment (RA) committee met prior to the surveillance season, during the surveillance season and in the fall to wrap up the season with a final meeting. The meetings held during the adult mosquito trapping surveillance period -June to October- are held to consider and weigh the various factors for the Medical Officer of Health (MOH) to then determine the local risk.

Committee membership includes:

- One member from the Office of the Medical Officer of Health (either the MOH or an Associate Medical Officer of Health attends or is made aware of the risk assessment information and confirms the weekly recommended risk level). In 2010 the first Associate Medical Officer of Health lead was Dr. Julie Emili. Through Public Health Services restructuring plan in 2010, Dr. Chris Mackie assumed the lead role as of September 1, 2010.
- One Director, Health Protection Division
- Three Managers in Health Protection Division:
 - Infectious Diseases Manager
 - Surveillance Unit Manager
 - Vector Borne Disease Manager (lead Manager for the VBD Program)
- One or more Health Analyst reps, Surveillance Unit, Health Protection Division
- One GIS Technologist, GIS Services, Corporate Services
- Public Health Inspectors from two teams: the VBD team and the Infectious Diseases Team

Epidemiologists and other Health Analysts on the Surveillance Unit are ad hoc members and act as consultants to the risk assessment committee as needed.

In 2010 the risk assessment committee meetings were scheduled to run from May to October. Some meetings were cancelled or were not able to be attended by the Associate

Medical Officer of Health. For any cancelled or missed meetings the VBD Manager or VBD Environmental Health Coordinator sent out summaries to the AMOH to confirm the local risk and to endorse any response or preventive measures discussed at the meetings. There were a total of seven (7) meetings held and five summaries sent to the AMOH and committee members.

Meeting Schedule and Outcome

- May – May 20 (meeting)
- June – June 6 (meeting cancelled), 24 (meeting)
- July – July 8 (summary only), 15 (summary only), 22 (meeting), 29 (meeting)
- August – August 5 (meeting), 12 (summary only), 19 (summary only), 26 (summary only)
- September – September 16 (meeting)
- October – October 28 (meeting)

Reasoning, Conclusion and Actions

The intent of the risk assessment meetings is to present and evaluate all surveillance information to determine the related risk level to the community and to consider possible interventions to lessen the risk where feasible. The specific display of the information has been in response to how the virus is circulating in the community. For example, in past years with the indication of high WNV activity, risk assessment meetings have included surveillance for potential clusters of dead bird sightings, interpolated surface maps for each vector species, and infectivity rate among vectors, as well as epidemic curves and point location maps for suspect and confirmed human WNV cases.

In 2010, the program and surveillance information presented for West Nile virus for mosquitoes, humans and standing water, and for Lyme disease have followed a routine agenda format. The 2008 and 2009 VBD Annual reports and related appendices provided examples of the risk assessment components. Please refer to those reports for more details or contact City of Hamilton Public Health Services for a copy of either report.

The general information presented at the meetings includes:

- **Program Updates**
Manager of WNV and Rabies Control provides information regarding communication, education and outreach and operational details to update committee members
- **Mosquitoes - Adult Trap Surveillance**

Mosquito Graph

Weekly counts of mosquitoes trapped by *Culex spp.*, other vector species and non-vectors compared to previous years and the results of vector testing for WNV are used together to evaluate the potential for transmission of WNV to humans in the community.

Mosquito Map

A map displaying the numbers of *Culex spp.*, *Aedes spp.*, other vector species and non-vectors trapped in the previous week for each trap location is used in conjunction with a table of current and historical WNV positive vector pools to assess localized areas of increased transmission risk.

Bar Chart/Pie Charts

The relative number of vectors in each trap and the vector species caught in each trap. The proportion of each mosquito species caught in each trap.

- **Human Surveillance**

Verbal Report of Cases/Suspects

Verbal reports given of any human cases and suspect cases with evaluation of potential exposure locations.

Graph

Human Cases epi-curve, if present

- **Neighbouring Jurisdictions**

A summary of the surveillance information from neighbouring jurisdictions is reviewed in order to place Hamilton in a broader context including. Information in this section included some adjacent health units, some Greater Toronto Area health units, States bordering Ontario, and the MOHLTC Vector report data including the Accumulated Degree Day information.

- **Summary:**

Risk Statement- Low, Medium or High local risk.

Background to the Risk Categories

In 2008, the Ministry of Health and Long Term Care (MOHLTC) provided an Accumulated Degree Days (ADD) tool. By definition, ADDs are the continuous addition of consecutive degree days from a set starting point. A degree day is simply a unit of measurement for temperature. Degree days are the amount of heat required for an organism to develop within certain life stages. A degree day is one day (24 hours) with which the temperature is above or below a fixed reference temperature. The temperature for *Cx pipiens/restuans* has been set at 18.3 C; therefore, if the average temperature for one day was at 20.3 C then two degree days would be accumulated.

The MOHLTC suggests that an increase in WNV does not usually happen until there are more than 100 accumulated degree days and human cases do not usually occur until greater than 200 ADDs.

Risk Categories:

The following represents City of Hamilton Public Health Services “Risk Categories” – note the period from October 15 through March 31 of the preceding year is deemed to be “off season” with no risk level assigned.

- **No Risk**

- Off Season –October 15 to March 3
- **Low Risk**
 - WNV risk will be categorized as low as of April 1.
- **Medium Risk**
 - The move to medium risk is intended to communicate an increasing risk of WNV. Because WNV is a seasonal, expected presence in the community, the decision to move to medium risk would be informed by two or more of the following event
 - More than 100 ADDs
 - First WNV-positive mosquito pool
 - Other considerations indicating increasing risk of human WNV infection
- **High Risk**
 - The move to high risk is intended to communicate what is expected to be the year's period of highest risk of human WNV infection. The decision to move to human risk would be informed by such events
 - Multiple WNV-positive mosquito pools in areas of significant human a
 - First human WNV case in Hamilton
 - Pattern of human cases in adjacent health
 - Other considerations indicating peak risk for human WNV infection, including more than 200 ADD

A risk level decision is made at the conclusion of each Vector Borne Disease meeting by either the Associate Medical Officer of Health or the Medical Officer of Health if present, or by the designate (Manager of West Nile Virus and Rabies Control), with confirmation of the risk level from the AMOH or MOH once a summary of the meeting has been shared with them.

Based on the risk levels, Hamilton remained at Low risk for the entire 2010 WNV season.

A second purpose of the VBD weekly risk assessment meetings is to direct targeted vector control activities, most commonly the identification of mosquito breeding areas for remediation and treatment. The information used to inform this process includes:

- the map of trapped adult mosquitoes described above
- the relative number of vectors in each trap and the vector species caught in each trap
- the proportion of each mosquito species caught in each trap
- a map of the mosquito habitat areas (see Figure 5)
- land parcel information to describe public and private ownership and ortho-imagery contained within our corporate GIS system,
- treatment information from the contractor
- tick and human case Lyme disease surveillance findings that may indicate a need for active tick surveillance and/or subsequent control measures in specified areas of the city

PUBLIC COMMUNICATION & EVALUATION

Public Communication

Under the mandate of the Ministry of Health and Long Term Care (MOHLTC) the goal of the Hamilton Public Health Services' WNV/VBD program is to reduce the risk of transmission to humans through the implementation of Public Education/Outreach Activities, Media Communications, and a Comprehensive Surveillance and Control program for WNV, Lyme Disease, and any other VBD that may arise within Hamilton. In terms of tracking and evaluating these activities for efficacy with the goal of prioritizing the distribution of program resources Hamilton PHS has collaborated with the McMaster Institute of Environment and Health (MIEH) from 2004 to 2010 on various evaluative tools and measures.

In 2010 several key messages were delivered through a mix of media formats and were combined with messages for Lyme disease.

Delivery included:

- The Public Health website www.hamilton.ca/westnile. This section of the report includes an analysis of website usage by the public.
- Public service announcements and paid advertising broadcast on local radio stations. Past analysis and evaluation illustrated the efficacy of radio versus other media to deliver messaging to the public.
- Media releases as relevant new information became available throughout the season with related media interviews taking place.
- Assigning staff to community events in order to make them available and accessible to the public in order to address individual concerns and raise awareness regarding WNV protection and control measures at both an individual and program level.

Festivals

In 2010 Hamilton Public Health Services participated in four festivals:

1. Buskerfest
2. The Hamilton Turkish Festival
3. It's Your Festival
4. Winona Peach Festival.

Messaging regarding personal protection and the recommendation to use DEET were combined for West Nile virus and Lyme disease for the first time at the festivals.

The goal was to:

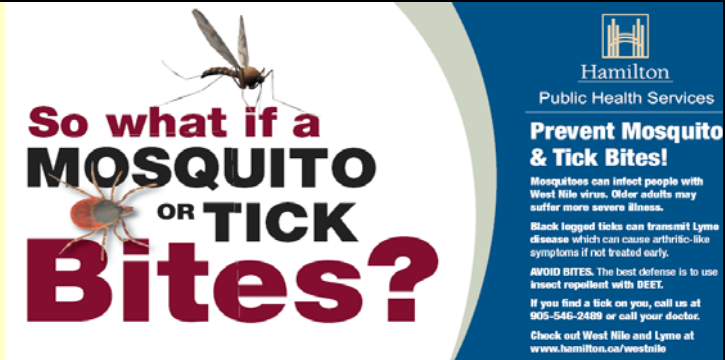

- Educate the public of the risk from exposure to West Nile virus and Lyme
- Emphasize the recommendation to use mosquito repellent for both ticks and mosquitoes to prevent or reduce the risk of infection from WNV or Lyme Disease
- Provide DEET and alternative repellents for festival visitors to use during the festivals

- To gather information about ticks using a simple evaluation tool developed by the Vector Borne Disease team (collected at the last three of the four festivals)

A complete list of the 2010 outreach activities in chronological order is provided in Table 12.

Table 12: 2010 Chronological Order of Communication Campaign- Education and Outreach Activities

WNV/VBD 2010	EDUCATION & OUTREACH ACTIVITIES	CAMPAIGN/OUTREACH
January 26, 2010	Vector Borne Disease Program presentation	Presented to School of Geography class, McMaster Course- Community and Public Health- Topic – Epidemiology
April 1-Oct. 31 Standing Water By-Law In effect	Part of the Control and Surveillance activities for the WNV city wide prevention plan.	West Nile virus technicians and public health inspectors on the Vector Borne Disease team respond to public and private land complaints
April 30	Notification ad in the Hamilton Spectator	To notify the public about the treatment program for the season to treat catch basins and surface waters on City lands (Appendix C)
Summer	Hamilton Community News- Story	<p>The City of Hamilton's West Nile virus control program is in motion again this summer for its tenth season. It's now an expanded program that includes Lyme disease. The overall program is about controlling mosquitoes to reduce the transmission risk of West Nile virus to humans, and keeping tabs on ticks in Hamilton to help people avoid Lyme disease.</p> <p>For West Nile virus control, the City has a standing water by-law (in effect every season from April 1st until October 31st). The intent of the by-law is for everyone to control standing water so that mosquitoes cannot develop in the water into adult mosquitoes. Adult mosquitoes pick up the virus from bird populations and then can infect other animals and humans. Ways to control standing water include removing the water or creating ongoing movement as mosquitoes do not lay eggs in moving water.</p> <p>The City also helps people avoid infection through prevention messages (on the radio and at festivals). People are encouraged to protect themselves from bites- using mosquito repellent containing DEET or DEET alternatives (always read the label for use on children), by avoiding mosquitoes or covering up with light coloured long sleeves and pants in areas known to have mosquitoes.</p> <p>The City treats catch basins along roadways three times a year- in June, July, and August, and also treats areas of standing water on city land from May until October as ongoing ways to control mosquito populations.</p> <p>For the Lyme disease program the City accepts any tick for identification and will send away any black legged ticks (also called deer ticks) found on people as these ticks are the ones that carry Lyme disease (dog ticks are the most common ticks found in Hamilton but they do not cause Lyme disease). The Ontario Ministry of Health and Long-Term Care have a new education and awareness campaign about Lyme disease this season that the City is</p>

		also promoting. Check out Let's Target Lyme at http://www.health.gov.on.ca/en/ms/lyme/ and the City of Hamilton's West Nile virus website at: www.hamilton.ca/westnile for more details about their programs.
<p>June 4-6 Buskerfest, Dundas</p> <p>June 13, 2010 Hamilton Turkish Festival, Gage Park, East end Hamilton</p> <p>July 1 – 4, 2010 It's Your Festival, Gage Park</p> <p>Aug 27 – 29, 2010 Winona Peach Festival, Stoney Creek</p>	<p>Festivals Booths across city and/or to reach diverse community</p>	<ul style="list-style-type: none"> o To provide a forum for knowledge exchange o To provide materials about West Nile virus and Lyme disease o At three of the festivals, to evaluate the knowledge and awareness level of festival visitors about Lyme disease and ticks as well as determine if any areas within Hamilton were flagged as a particular area of concern o Each booth also provided mosquito repellent to apply while at the festivals.
<p>August/September</p>	<p>Seniors Review August/September Issue. Serves the Hamilton area and Grimsby/Burlington areas</p> <p>1/2 page horizontal 10.25" wide X 5.75" high.</p>	
<p>August 9 to September 3</p>	<p>Hamilton Bus ads- exterior sides</p>	<p>15 'King' posters displayed on sides of buses across Hamilton</p> 
<p>August 16 to September 12</p> <p>By radio company:</p> <ol style="list-style-type: none"> 1. Aug 16 - Aug 22- (Corus Radio) AM 900 CHML 2. Aug 23 - Sept 5- (Astral Radio) CKOC Oldies 1150 am KLite 102.9 fm 3. Sept 6 to 12- 	<p>Summer radio campaign</p> <p>10 second and 30 second ads ran on stations at various times through each day including morning and afternoon traffic and weekends.</p>	<p>AD Content West Nile virus and Lyme disease personal protection and prevention messaging.</p> <p>Rationale The messaging was broadened this season to include Lyme disease as DEET is recommended for both mosquitoes and ticks. The stations chosen were based on providing messaging across the three major radio networks in Hamilton (Corus, Astral, and Wave) as well as targeting the older adult as they are most at risk of severe illness from WNV infection.</p> <p>Messages:</p> <p>Aug 16 - Aug 22- AM 900 CHML (Corus Radio)</p>

<p>Durham Radio Inc Wave 94.7 fm -</p>		<p>V1: So what if a mosquito or a tick bites you? (Dramatic pause) V2: Don't kid yourself! Mosquitoes can cause West Nile virus. And deer ticks can cause Lyme disease. The City of Hamilton reminds you... If you're out hiking, camping, golfing, gardening; or, just heading out to a sports field to watch a game from the sidelines, avoid being bitten by mosquitoes or ticks. Please, use bug repellent with DEET. For more information, visit Hamilton dot ca, backslash west Nile. A reminder from the City of Hamilton.</p> <p>Aug 23 - Sept 5- CKOC Oldies 1150 am KLite 102.9 fm (Astral Radio)</p> <p>Ever ask yourself, SO WHAT if a mosquito or tick bites? What's the <i>big deal</i>? THE CITY OF HAMILTON reminds you that mosquitoes can carry the West Nile virus... and deer ticks can cause Lyme Disease. (FX: SWAT/SQUISH) That's a VERY big deal. (MUSIC: FUN, BOUNCY) So when you're out hiking, camping, golfing, gardening or just enjoying the outdoors use bug repellent with DEET to protect yourself from ticks and mosquitoes. For more information visit Hamilton dot ca backslash west Nile.</p> <p>Sept 6 to 12- Wave 94.7 fm -Durham Radio Inc "Hamilton asks, 'so what if a Mosquito or Tick bites – don't kid yourself?'" Mosquitoes can cause WNV and Deer Ticks can cause Lyme Disease. Remember if you're out hiking, camping, golfing, gardening or just heading out to the sports field to watch a game – Avoid being bitten by Mosquitoes and Ticks. Please use Bug Repellant with DEET. For more information, visit Hamilton.ca/westnile. A reminder from the City of Hamilton.</p>
<p>September 7, 2010</p>	<p>Media Release</p>	<p>"First Positive Test Results for West Nile Virus in 2010"</p>

Evaluation

Lyme Disease

The evaluation tool used at three festivals (Appendix B) sought to find basic information about the public's knowledge and awareness level of Lyme disease, the disease's connection to ticks, and whether people saw ticks of any kind within the City of Hamilton. The results from the festivals are provided in Table 13.

Table 13: Tick Evaluation Results, City of Hamilton 2010.

Tick Evaluation Results for Three Summer Festivals, Hamilton 2010									
Questions on Tick Evaluation Sheet	1. Have you heard of Lyme Disease?		2. What causes Lyme Disease?			3. Do you know what a tick looks like? If no, show tick		4. Have you seen any ticks in Hamilton this year?	
	Yes	No	Tick	Doesn't know	Said something other than tick	Yes	No	Yes- if yes where? Name intersection or place or address?	No
FESTIVAL NAME									
Hamilton Turkish Festival June 13, 2010	18	24	15	25	-	21	18	0	36
It's Your Festival July 1 – 4, 2010	185	152	170	163	3	159	166	Not documented	272
Winona Peach Festival Aug 27 – 29, 2010	271	117	251	100	32	243	142	47	336
Totals	474	293	436	288	35	423	326	47	644
Percentages	62%	38%	57%	38%	5%	56%	44%	7%	93%
Total responses	767		759			749		691	

Summary results of the three evaluations were:

- 62% of those polled have heard of Lyme disease
- 57% stated Lyme disease is caused by ticks
- 56% stated they know what a tick looks like
- 93% said they have not seen ticks in Hamilton

Of those who did see ticks in “Hamilton” which includes six areas that came together under amalgamation in 2000 (Hamilton, Ancaster, Dundas, Flamborough, Glanbrook, and Stoney Creek), the areas mentioned included:

- Ancaster
- Dundas
- Flamborough (including Waterdown)
- Glanbrook (only Binbrook mentioned specifically for this old area)
- Hamilton (Hamilton Mountain area)
- Stoney Creek (including Winona)

The one area mentioned the most often was Stoney Creek. This information will be considered during 2011 to see if ticks are submitted from that area more than other parts of Hamilton. If predictions were being made about black legged tick populations in Hamilton, Stoney Creek would not necessarily be at the top of the list as deer populations are more prevalent in the Ancaster, Dundas, and Flamborough areas. It could be that more of the visitors at the festivals who responded to the evaluation form were from the Stoney Creek especially the Winona Festival which is located in that area. Future evaluations may ask where a visitor resides to help improve the tool.

This simple evaluation provides some local information about the knowledge and awareness about ticks and Lyme disease for festival visitors. The high percentage of respondents who stated they have not seen ticks in Hamilton has an association with the lack of any black legged ticks being submitted to Hamilton Public Health. It may be that ticks, including black legged ticks, may not yet be abundant in Hamilton to be noticed by most people in the community. Further evaluations may be done in future to help inform communication messages to the public about Lyme disease and its prevention.

Website

Another aspect of evaluating the public education and community outreach mandate of the program is to examine website usage, the ‘traffic’ occurring at the local WNV website www.hamilton.ca/westnile. The analysis of the site usage (‘traffic’) for 2010 was performed by MIEH staff and included an analysis of targeted pages. In 2010 the ‘WNV’ website also included Lyme disease for the first time.

The site is composed of multiple pages offering information on:

- surveillance statistics (WNV)
- program information (WNV and Lyme)
- general information on WNV and children
- larviciding notification (WNV)
- Q/A larviciding and adulticiding and the adult mosquito registry (WNV)
- reporting activity of standing water (WNV)
- protection and prevention information (WNV and Lyme)

The total number of hits to the WNV/Lyme website in 2010 was 14,011 hits with targeted hits at 10224. The traffic per targeted pages for 2009 and 2010 is listed in Table 14. The activity per month for the targeted pages for 2010 compared to 2009 is listed in Table 15. Predictably, traffic was highest during the WNV season however there was also a notable spike in November.

Table 14: Targeted Web Pages within WNV Website, 2009 & 2010

WEBSITE ADDRESS	Description	2009	2010
PublicHealth/WestNileVirus/ index .htm	WNV Home page (default)	4236 (53%)	4617 (45%)
PublicHealth/WestNileVirus/ Reduce-Exposure .htm	Reduce exposure to mosquito bites including personal protection information	143 (2%)	481 (5%)
PublicHealth/WestNileVirus/ WNV-in-Hamilton .htm	Prevention plans in Hamilton/reducing the risk to WNV	630 (8%)	530 (5%)
PublicHealth/WestNileVirus/ History .htm	Surveillance statistics	567 (7%)	563 (6%)
PublicHealth/WestNileVirus/ Important-Facts .htm	Transmission /symptoms/City of Hamilton plans for reduction/Malathion	561 (7%)	519 (5%)
PublicHealth/WestNileVirus/ QA-General .htm	Transmission/ Symptoms/Type of mosquito/time of day, etc	735 (9%)	778 (8%)
PublicHealth/WestNilevirus/ Reports .htm	Documents/reports to council	N/A	2 (0.2%)

	/notices/brochures		
PublicHealth/WestNilevirus/ qa-wnv-and-children.htm	Outlines information on WNV and children including prevention, protection and treatment options	675 (8%)	739 (7%)
PublicHealth/WestNilevirus/ links.htm	Various website links to public health and other agencies involved with WNV includes provincial, national and international links	492 (6%)	491 (5%)
PublicHealth/WestNilevirus/ adultmosquitoregistry.htm	The public can register with PHS to be contacted if when any adulticiding were to occur in Hamilton	157 (.02%) <i>Posted August</i>	473 (5%)
PublicHealth/WestNilevirus/ lymedisease.htm	Offers information on the prevention and control of Lyme Disease. As well as guidance for 'tick' identification	N/A	1031 (10%)
Total of Targeted pages		8039	10,224
Grand Total of All Hits (Targeted and Non-Targeted)		13,362	14,011

Table 15: Number of Targeted Hits by Month in 2009 - 2010

MONTH	Percentage and Number of Targeted Hits WNV 2009		Percentage and Number of Targeted Hits WNV 2010	
	Percentage	Number	Percentage	Number
January	8%	665	7%	698
February	9%	716	5%	542
March	11%	850	7%	704
April	8%	638	6%	648
May	11%	871	8%	821
June	11%	847	17%	1738
July	10%	811	12%	1269
August	9%	755	7%	699
September	7%	593	6%	596
October	7%	530	5%	528
November	2%	195	14%	1400
December	7%	568	6%	581
Total		8039		10,224

Popular Targeted Website Pages

In 2010 Lyme disease information was added to the WNV website (now referred to as the VBD website) and this targeted page became the most popular among the VBD site. Previously in 2009 the top three pages visited were the WNV General question and answer section, WNV information related to children, and WNV specific information about

Hamilton. Table 16 illustrates the top three (3) most popular ‘targeted’ pages in 2009 and 2010

Table 16: Annual Top Three Targeted Hamilton WNV Pages, 2009 to 2010

Top Three Targeted Pages 2009 - 2010		
	2009	2010
1	General Q/A	Lyme Disease
2	WNV and Child	General Q/A
3	WNV in Hamilton	WNV and Child

Adult Mosquito Public Registry on the Website

The Adult Mosquito Public Registry was first posted to the Public Health website in late July 2009. See Table 17 for hits to the registry in 2009 and 2010. The registry allows members of the public to contact the WNV/VBD program to add their personal contact information for advanced notification if there are plans to apply Malathion in their residential area or to parts of the City of Hamilton.

If it was determined that adulticiding were necessary to control the spread of WNV, Hamilton Public Health Services would be committed to notifying residents in the affected areas a minimum of forty eight (48) hours in advance of the application. Adulticiding has not been performed to date.

Table 17: Adult Mosquito Public Registry Website Hits 2009 and 2010

Adult Mosquito Public Registry			
2009 (Registry launched in late July)	Hits	2010	Hits
January	N/A	January	32
February	N/A	February	22
March	N/A	March	33
April	N/A	April	31
May	N/A	May	48
June	N/A	June	102
July	N/A	July	29
August	31	August	23
September	43	September	28
October	28	October	56
November	13	November	25
December	42	December	32
Total	157	Total	473
Percentage of all hits to targeted WNV pages	2%	Percentage of all hits to targeted WNV	5%

Website ‘traffic’ data was first collected for analysis in 2006 and continues to date to allow for analysis and to establish patterns which reveal a continuing public interest in WNV, Lyme disease and the work of the VBD program. In 2010 there was an interest in the Lyme disease information which was posted for the first time and the adult mosquito public registry continued to garner interest. The VBD website provides the public with helpful information about WNV and Lyme and continues to receive traffic to its pages.

Based on the findings detailed in the preceding report, the McMaster Institute of Environment and Health (MIEH) recommends that financial resources permitting:

- Hamilton Public Health Services continue to track website ‘traffic’ activity and have the McMaster Institute of Environment and Health (MIEH) analyze the data for patterns, in order to review “consumer need” for WNV and Lyme disease information and subsequently to prioritize the distribution of program resources.
- Hamilton Public Health Services base any re-design of their VBD website on evidence collected annually by the Hamilton Public Health IT department and analyzed by the McMaster Institute of Environment and Health (MIEH) on website usage and patterns.

PROGRAM COSTS

Communication Costs

The 2010 Communication Campaign cost approximately \$19,000 dollars and included radio and print advertising. Staffing costs for presentations or participation in other outreach activities such as working at four festivals in the summer (Buskerfest, Turkish, It’s Your Festival, and the Winona Peach) were not included in this amount. Actuals for the overall VBD program, including staff time (salary and wages) will be submitted to the Ministry of Health and Long-Term Care through routine reporting.

Adult and Larval Mosquito Costs

The adult mosquito surveillance program involved staffing, training, mileage, and related equipment costs for permanent and seasonal Public Health staff who performed adult mosquito trapping and submission, and other related activities. Costs are reported via routine reporting to the MOHLTC.

The external contract for adult mosquito surveillance involved the identification and viral testing of mosquitoes submitted to Cosray Labs. The final cost for 2010 was \$41,580.00.

Mosquito Control Costs

The larval mosquito control program costs included costs for Public Health Services (PHS) staff to monitor standing water sites, identify larvae in the lab, and for the larviciding contractor, Pestalto, to treat sites once they were referred by PHS staff.

The larviciding treatment contract by Pestalto Environmental Health Services was a total of \$181,477. Larviciding in Hamilton began in 2003. See Table 18 for a comparison of costs per season, to date.

Table 18: Comparison of Treatment Costs, 2003-2010

Year	Cost	Number of Catch Basin Rounds and Surface Area Treated	Contractor
2003	\$~550,000	Three Rounds & 14 Surface Waters sites treated	Orkin PCO
2004	\$516,120	Four rounds & > 100 ha. Surface Waters	GDG
2005	\$283,540	Four rounds & > 62 ha. Surface Waters	CCMM
2006	\$308,929	Four rounds & > 68 ha. Surface Waters	CCMM
2007	\$287,213	Four rounds & <5 ha. Surface Waters	CCMM
2008	\$176,652	Four rounds & ~6 ha. Surface Waters	Pestalto
2009	\$147,458	Three rounds & >65 ha. Surface Waters	Pestalto
2010	\$181,477	Three rounds & >115 ha. Surface Waters	Pestalto

CONCLUSION

In 2010 there were 56 positive adult mosquito pools in Ontario, including one in Hamilton. There was one human case in Ontario and none in Hamilton. The low surveillance findings resulted in Hamilton remaining at low risk for the season. Although the accumulated Degree days reached a level where human cases could likely occur in Hamilton none were identified.

West Nile virus remains a difficult disease to forecast in terms of the risk level that will exist for human health from season to season. Although the virus has been present in Ontario for close to ten years it is still a challenge to try to predict the level of viral activity that will occur in a season -in the bird reservoir, in mosquitoes and ultimately cause human infection. In order to meet the challenge of unpredictable patterns of disease, health units must continue to maintain a comprehensive mosquito monitoring, control, and education program.

For Lyme disease surveillance, Hamilton did not confirm any evidence (only one locally acquired human 'probable' case, no positive black legged ticks) to conduct active field tick surveillance in 2010. In 2011 the VBD program will determine if field surveillance should occur, either in the spring (for practice), or in the fall (based on surveillance and tick submission results for the season).

The focus of the VBD program in 2011 will also be on Eastern Equine Encephalitis (EEE) as the Ministry of Health and Long-Term Care plans to share guidelines for enhanced surveillance. With the increase in positive adult mosquito traps and human cases in the United States EEE may be a disease of concern in 2011 for Hamilton and Ontario.

Appendix A.

The City of Hamilton Lyme Disease Preparedness Plan (sent electronically to MOHLTC under separate file).

Appendix B



HAMILTON PUBLIC HEALTH SERVICES
Vector Borne Disease Program 2010
Let's Target Lyme!

Festival Name: _____

Date of Interview: Month/Day _____

FOUR QUESTIONS

	1. Have you heard of Lyme Disease?		2. What causes Lyme Disease?			3. Do you know what a tick looks like? If no, show tick		4. Have you seen any ticks in Hamilton this year?	
	Yes	No	Tick	Doesn't know	Said something other than tick	Yes	No	Yes- if yes where? Name intersection or place or address?	No
1.									
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Appendix C

Notification Ad for Larviciding Catch Basins and Surface Waters, The Hamilton Spectator At Your Service Page



Friday, April 30, 2010

905-546-CITY
(2-889)
519 AREA RESIDENTS
CALL 519-647-2577
CAMPBELLVILLE RESIDENTS
CALL 905-634-2071

需要中文咨询, 请拨打如下电话 • Pour des informations en français, s'il vous plaît composez le 905.546.2489 • Per informazioni in italiano per favore chiama 905.546.2489
Para informações em português, por favor ligue 905.546.2489 • Po informacja z języka polskiego, proszę dzwonić 905.546.2489

NOTICES

NOTICE OF APPLICATION TO LARVICIDE CITY OF HAMILTON SURFACE WATERS FOR WEST NILE VIRUS MOSQUITO CONTROL

The City of Hamilton, Public Health Services is conducting ongoing monitoring of mosquito larvae (immature mosquitoes) in standing surface water within the City of Hamilton boundaries on City land. When such monitoring indicates that there is a need for mosquito control, application of larvicide may be required in order to prevent larval development into vectors of West Nile Virus. Application of larvicide may commence as early as May 3, 2010 and end as late as October 31, 2010.

The larvicide *Bacillus thuringiensis subsp. israelensis* - BTI (product names: VectoBac 2000 - reg. no. 18158 and VectoBac 1250L - reg. no. 21062) and the larvicide *Bacillus sphaericus* strain 2552 - Bs (product name: VectoLarv GS - reg. no. 28908) will be applied to identified standing surface water. The application of these products will be carried out under permit from the Ontario Ministry of the Environment.

NOTICE OF APPLICATION TO LARVICIDE PUBLIC CATCH BASINS FOR WEST NILE VIRUS MOSQUITO CONTROL

As early as May 3rd, 2010 and as late as September 30, 2010 the City Of Hamilton will be conducting a larviciding program under the authority of the local Medical Officer of Health to control larval mosquitoes in order to prevent their development into vectors of West Nile Virus. The mosquito growth regulator methoprene, pellet formulation (product name: Altorid Pellets - methoprene 4.25%, reg. no. 21809) and briquette formulation (product name: Altorid XR - reg. no. 27694) will be placed into catch basins of storm drains on city streets and on selected publicly owned properties within the City of Hamilton. The application of these products will be carried out under permit from the Ontario Ministry of the Environment.

All control products will be applied by licensed applicators or trained technicians of Pestabo Environmental Products Inc., under contract with the City of Hamilton. For more information about the West Nile virus program, including dates of completed treatment rounds throughout the summer, please visit our web site www.hamilton.ca/westnile.

For more information call 905 546-CITY (2489);
519 residents call 519 647-2577;
Campbellville residents call 905 634-2071.

NOTICES

EXPROPRIATIONS ACT

NOTICE OF APPLICATION FOR APPROVAL TO EXPROPRIATE LAND

IN THE MATTER OF an application by
CITY OF HAMILTON

For approval to expropriate land being composed of part of Lot 14, Concession 1, in the Geographic Township of Glanford, now in the City of Hamilton designated as Part 12, Plan 62R-17987, being part of PIN 17084-0013 (LT), known municipally as part of 5738 Twenty Road, Glanbrook, Ontario for infrastructure, roadway and municipal purposes.

NOTICE IS HEREBY GIVEN that application has been made for approval to expropriate the land in fee simple described as follows:

ALL AND SINGULAR those lands and premises being composed of part of Lot 14, Concession 1, in the Geographic Township of Glanford, now in the City of Hamilton, designated as Part 12, Plan 62R-17987 being part of PIN 17084-0013 (LT), known municipally as part of 5738 Twenty Road, Glanbrook, Ontario.

Any owner of lands in respect of which notice is given who desires an inquiry into whether the taking of such land is fair, sound and reasonably necessary in the achievement of the objectives of the expropriating authority shall so notify the appropriate authority in writing.

(a) In the case of a registered owner, served personally or by registered mail, within thirty days after the registered owner is served with the notice, or, when the registered owner is served by publication, within thirty days after the first publication of the notice;

(b) In the case of an owner who is not a registered owner, within thirty days after the first publication of the notice.

The approving authority:
City of Hamilton
71 Main Street West
Hamilton, Ontario
L8P 4Y5

Dated at Hamilton, this 30 day of April, 2010.

CITY OF HAMILTON
Rose Gatarini, City Clerk

NOTES:

- The *Expropriations Act* provides that,
 - where an inquiry is requested, it shall be conducted by an inquiry officer appointed by the Attorney General;
 - the inquiry officer,
 - shall give every party to the inquiry an opportunity to present evidence and argument and to examine and cross-examine witnesses, either personally or by his counsel or agent, and
 - may recommend to the approving authority that a party to the inquiry be paid a fixed amount for his costs of the inquiry not to exceed \$200.00 and the approving authority may in its discretion order the expropriating authority to pay such costs forthwith.
- "owner" and "registered owner" as defined in the Act as follows:
"owner" includes a mortgagee, tenant, execution creditor, a person entitled to a limited estate or interest in land, a committee of the estate of a mentally incompetent person or of a person incapable of managing his affairs, and a guardian, executor, administrator or trustee in whom land is vested.
"registered owner" means an owner of land whose interest in the land is defined and whose name is specified in an instrument in the proper land registry or sheriff's office, and includes a person shown as a tenant of land on the last revised assessment roll.
- The expropriating authority, each owner who notifies the approving authority that he desires a hearing in respect of the lands intended to be expropriated and any owner added as a party by the inquiry officer are parties to the inquiry.

This Notice first published on the 30 day of April 2010

Saturday, May 1st, 2010

ONE DAY RAIN BARREL SALE

Mohawk College Fennell Campus
Open: 8:00 a.m.
Limited quantities. One barrel per household
FIRST COME FIRST SERVE
Cost \$35, *(including rebate)* - CASH ONLY -
Customers must bring their own fill or water fill to verify rainfall.



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