VECTOR BORNE DISEASE
FINAL REPORT 2011

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DISTRICT HEALTH UNIT

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Vector Borne Disease Final Report 2011

EXECUTIVE SUMMARY

This report provides a summary of the Simcoe Muskoka District Health Unit (SMDHU) Vector Borne Disease (VBD) program activities including highlights and surveillance information collected during the 2011 season. The purpose of the VBD program is to prevent or reduce the burden of infectious diseases of public health importance including, but not limited to, West Nile virus (WNv), Eastern Equine Encephalitis virus (EEEV) and Lyme disease in the health unit jurisdiction.

There were detections of both WNv and EEEV in Simcoe Muskoka in 2011. WNv was detected in two humans, two equines, and one mosquito pool and EEEV was detected in 1 donkey. There were no detections of Lyme disease in 2011.

Local risk assessments are undertaken each season (and throughout the season) to direct VBD program activities. A local risk assessment process was used to identify areas for mosquito control activities relating to WNv. As an outcome of this process, a catch basin larviciding program was implemented to control WNv amplification vector populations in one municipality. An additional 8 municipalities were identified for heightened surveillance activities and advised to be prepared to implement a catch basin larviciding program should ongoing local surveillance data indicate an increased risk. Ongoing local risk assessments for Lyme disease have not detected an established tick population in the health unit jurisdiction. Therefore, passive surveillance is the preferred approach to Lyme disease surveillance in Simcoe Muskoka.

Public education to encourage the public to take personal protective measures continued to be a critical component of the VBD program. Key messages regarding personal protection were communicated to the public through media interviews, media releases, public service announcements, presentations and displays, and distribution of public education materials.

This report provides a summary of VBD program activities and surveillance data collected during the 2011 season. Additional information on VBD is available on-line at www.simcoemuskokahealth.org

1.0 INTRODUCTION

West Nile virus/Eastern Equine Encephalitis virus

West Nile virus (WNv) is a mosquito-borne virus that is transmitted in nature through a bird-mosquito-bird cycle. Mosquitoes that bite an infected bird may transmit the virus to other birds, or to other mammals such as humans and horses. Most people who contract WNv will be asymptomatic or will experience only mild flu-like symptoms. However in some individuals, WNv infection can cause severe illness, and sometimes death. Since its introduction into North America in 1999, over 650 human cases have occurred in Ontario. However, it is important to note that the number of human cases per year in Ontario has been highly variable, with a range of 1 to 394 cases per year over the past 10 years.

Surveillance strategies focusing on the reservoir (birds), the vectors (mosquitoes) and incidental hosts (humans and horses) may be used to identify the presence or extent of WNv in a geographic area. There are two types of mosquito vectors involved in the WNv transmission cycle: 1) Enzootic vectors – which feed primarily on birds and 2) Bridge vectors – which feed on both birds and mammals, but primarily on mammals. Mosquito surveillance provides information on the presence and abundance of mosquito species of concern and may identify geographic areas of high risk. Surveillance data is also useful in assessing the need for timing of interventions and may provide information related to the use and effectiveness of control measures. Human surveillance programs provide information on the impact and trends of WNv morbidity and mortality in the human population.

The major WNv enzootic vectors in Ontario are *Cx. pipiens* and *Cx. restuans*. They are both competent vectors of WNv however; *Cx. restuans* is an early season species and is replaced later in the season by *Cx. pipiens*. Research indicates that *Cx. pipiens* may also serve as a bridge vector since it may be attracted to humans as well as to birds near the end of the season. Surveillance data has repeatedly shown that the risk of human disease increases in areas with large numbers of Culex mosquitoes throughout the season. *Cx. pipiens* is potentially responsible for up to 80% of human cases in Ontario.

In Ontario, the adult mosquito surveillance program provides an opportunity to conduct a secondary surveillance program focusing on *Culiseta melanura* mosquitoes, the vector for Eastern Equine Encephalitis virus (EEEV). This program component provides information to

support the Medical Officer of Health in decision-making on control strategies, as well developing a local understanding of the entomology around EEEV.

Most people who contract EEEV will be asymptomatic or will experience only mild flu-like symptoms. However in some individuals, EEEV infection can cause severe illness, and sometimes death. In Ontario, the risk of being infected with Eastern equine encephalitis is very low. Infections in people have been reported in several U.S. states bordering Ontario; however, no human cases in Ontario have been confirmed to date. In Ontario, occasional outbreaks of EEEV have taken place among horses. The Eastern equine encephalitis virus was found in mosquitoes in Ontario for the first time in 2009 in Wahta First Nations Community where mosquito pools tested positive for the virus. Since the virus is now in Ontario, individuals should be encouraged to practice personal protective measures.

The 2011 WNv surveillance program in Simcoe Muskoka was based on the program developed in previous seasons. The surveillance program continued to focus on monitoring for WNv activity in mosquito populations and in incidental hosts such as humans and horses. The health unit was responsible for the surveillance activities relating to mosquito and human populations. The Ontario Ministry of Agriculture and Food and Rural Affairs (OMAFRA) were responsible for equine surveillance.

In 2008, the health unit conducted a critical review and evaluation of the WNv program, and developed a mosquito control decision-making framework which included more detailed analysis of local surveillance data in determining areas for larviciding. The need for larviciding programs in a municipality in the 2011 season was assessed using amplification vector trap indices, frequency of positive indicators, and by considering key background information about WNv. Local risk of West Nile virus transmission was assessed and monitored on an ongoing basis throughout the season. Local risk assessment inputs included presence of positive indicators, weather conditions, and local vector trap index results.

As a result of this evaluation municipalities were assigned to one of three tiers for control actions. The three tiers are: Larviciding Actions; Heightened Surveillance – Larviciding Standby; and Ongoing Monitoring. Additional information regarding this risk assessment is provided later in this report.

Municipalities which received notice to larvicide in catch basins had the option of using a single treatment of the briquet formulation of methoprene or three treatments of the pellet formulation

of methoprene. The briquet formulation provides up to 150 days efficacy and the pellet formulation provides 21 days efficacy.

Larviciding of surface waters, such as ditches and storm water management ponds, is a component of contingency planning for WNv if a local risk assessment indicates increased risk of human infections in an area and larvae surveillance data indicated a prevalence of WNv vectors in local sites. To date, the Medical Officer of Health has not directed larviciding of surface waters for WNv control in Simcoe or Muskoka. Municipalities may submit permit applications to larvicide surface water each season as a contingency planning strategy.

Lyme disease

Lyme disease is an infection caused by the corkscrew-shaped bacteria, *Borrelia burgdorferi*. In Ontario, these bacteria are spread by the bite of blacklegged ticks (formerly called deer ticks), *Ixodes scapularis*. The blacklegged tick can be found sporadically throughout the province. Early symptoms of Lyme disease usually occurs within one to two weeks, but can occur as soon as three days or as long as a month, after a tick bite. Symptoms generally include fever, headache, muscle and joint pains, fatigue and a skin rash, especially one that looks like a red bull's eye (called erythema migrans).

In Ontario, blacklegged ticks are more commonly found in areas along the north shores of Lake Erie, Lake Ontario, and the St. Lawrence River. Locations with established blacklegged tick populations infected with the Lyme disease agent, include: Long Point Provincial Park, Turkey Point Provincial Park, Rondeau Provincial Park, Point Pelee National Park, Prince Edward Point National Wildlife Area, Wainfleet Bog Conservation Area, and in the St. Lawrence Islands National Park area. The precise boundaries of these established tick populations are difficult to define but it is anticipated that some of these populations will continue to expand into neighbouring areas. Blacklegged ticks are also known to feed on migratory birds and as a result, they can be transported throughout the province. Therefore, while the potential is low, it is possible for people to encounter blacklegged ticks, or to be infected with Lyme disease from the bite of an infected blacklegged tick, almost anywhere in the province. In general, blacklegged ticks infected with Lyme disease are much more common in the United States along the Atlantic seaboard from Maine to Virginia and in Minnesota and Wisconsin than they are in Ontario.

SMDHU participates in passive tick surveillance to understand the risk of Lyme disease infection in the local area. The information collected can help identify establishing tick

populations. An important aspect of passive surveillance is having multiple tick submissions from a specific area, over multiple years. Finding multiple ticks from a single location may be indicative of an established or establishing population and should be monitored. Passive surveillance is also used as a guide to assess the need for, timing of and location of active surveillance.

2.0 HUMAN CASE SURVEILLANCE

2.1 WNv

Highlights

In the 2011 season, Ontario experienced an increase in the level of WNv activity in the province with 71 human cases reported. Of the 71 cases reported provincially, 2 of the cases are residents of Simcoe Muskoka. It is important to note that the number of human cases in Ontario has been highly variable with a range of 1 to 394 cases per year over the past 10 years.

Number of cases

There were 2 confirmed human cases of WNv in Simcoe Muskoka in 2011. The first case occurred in the City of Barrie and is most likely a locally acquired infection. The second case occurred in the Town of Wasaga Beach and, due to a travel history to an area with increased WNv activity, may or may not have been locally acquired. Both cases had onset of symptoms in September and experienced neurological symptoms.

Yearly trends/comparison

In 2011, SMDHU saw an increase in activity with regard to WNv compared with previous seasons. Prior to 2011 SMDHU experienced 2 cases of WNv (1 in 2006 and 1 in 2003).

2.2 EEEV

Highlights

There are no highlights to report on EEEV human surveillance.

Number of cases

There were no confirmed human cases of EEEV in Simcoe Muskoka in 2011. In addition, no case investigations were warranted.

Yearly trends/comparison

Not applicable, SMDHU has not experienced any human cases of EEEV nor has investigated any human cases.

2.3 Lyme disease

Highlights

There are few highlights to report regarding Lyme disease in SMDHU. Numbers for passive tick surveillance were similar to last season. Several *Ixodes scapularis* ticks (associated with humans) were submitted for testing and all returned negative for *Borrelia spp.*

Number of cases

There were no confirmed human cases of Lyme disease in Simcoe Muskoka in 2011. A total of 6 suspect cases were investigated in 2011.

Yearly trends/comparison

In Simcoe Muskoka the number of Lyme disease cases remains relatively low. From 1999-2011, SMDHU experienced 27 Lyme disease cases. The health unit has seen an average of 3 cases of Lyme disease per year for 1999-2011.

3.0 WILDLIFE SURVEILLANCE

3.1 WNv

Highlights

In the 2011 season there were 2 equines and 1 crow positive for the virus.

Number of cases

This season 2 horses were reported positive for WNv to SMDHU by the Ministry of Health and Long-Term Care. Both horses were stabled in SMDHU, however, both had travel history and cannot be confirmed as locally acquired infections.

Bird surveillance was not conducted in Simcoe Muskoka during the 2011 season. However, the health unit received notification from the Canadian Cooperative Wildlife Health Centre that a privately submitted crow tested positive for WNv from the City of Barrie.

Yearly trends/comparison

SMDHU does not undertake wildlife surveillance for WNv. Reports for wildlife surveillance are received by SMDHU from partner agencies and the information is used in local risk assessment.

3.2 EEEV

Highlights
In 2011, 1 donkey tested positive for EEEV in Bracebridge.

Number of cases
In 2011, a donkey infected with Eastern Equine Encephalitis virus (EEEV) was detected in the District of Muskoka and was reported to SMDHU through the Ministry of Agriculture, Food and Rural Affairs (OMAFRA).

Yearly trends/comparison
OMAFRA is responsible for collecting information about equine surveillance in Ontario. Based on records available from OMAFRA, intermittent equine cases of EEEV have been identified in Simcoe Muskoka since 1994 totalling 8 equine cases over that time period. In addition, in 2011 EEEV was identified in a donkey in Muskoka District. The first detection of EEEV from mosquitoes in Ontario was in 2009 in Wahta First Nations Community where mosquito pools tested positive for the virus. The Wahta First Nations Community is bounded by Muskoka District. Although additional mosquito surveillance was conducted in surrounding communities, no additional EEEV positive mosquitoes were collected.

3.3 Lyme disease

Highlights
There have been no established black-legged tick populations identified in SMDHU to date. Therefore, there has been no wildlife testing undertaken.

Number of cases
To date, SMDHU has not received notification of any wildlife testing positive for Lyme disease.

Yearly trends/comparison
To date there is no local data to compare since no wildlife has been reported positive for Lyme disease to SMDHU.

4.0 VECTOR SURVEILLANCE

4.1 WNv/EEEV

Larvae Surveillance

Highlights

Sites capable of holding stagnant water for longer than one week are considered potential breeding sites. Important larval habitats include: roadside ditches, storm water retention basins, catch basins, waste water lagoons, and a broad range of artificial containers found in residential, commercial and industrial yards.

The presence of either bridge vectors or amplification vectors represents a significant input to the risk assessment process. The relative abundance of each vector type is used as a variable in the risk assessment process to determine any appropriate control strategies.

The SMDHU larvae surveillance program provides information on the presence and abundance of mosquito populations and can identify geographic areas of high risk. Larvae surveillance was conducted in selected catch basins, natural sites/ditches, and storm water management ponds in Simcoe Muskoka during the 2011 season.

Duration

Larvae surveillance began in late June 2011 in catch basins, storm water management (SWM) ponds and natural sites such as ditches. Larvae surveillance was discontinued in catch basins in those municipalities where catch basins larvicide treatment programs were initiated in late June. Surveillance in the remainder of catch basin sites continued until late August. Surveillance at SWM ponds and natural sites was discontinued the week of August 29th, 2011.

At SWM ponds and natural sites, samples of a maximum of 20 larvae were collected and submitted to a consulting laboratory for speciation. Speciation of larvae from catch basin sites was not conducted based on historical findings of a predominance of *Culex* species larvae in this setting.

Locations

Sites were selected in consultation with municipal staff to provide geographic representation, proximity to human population and presence of larvae habitat. In addition, the larvae surveillance program has been successfully used as a tool to alleviate public concerns about particular sites and has been a key component of the building of municipal partnerships in the VBD program.

Catch basin surveillance is recommended as a component of the MOE larviciding permit process prior to application of larvicide. To achieve this objective, a small number of catch basins were maintained in municipalities where larviciding programs were anticipated.

Numbers and trends

The majority of the mosquito larvae population (~85%) identified from SMDHU was enzootic and bridge vectors, 82% and 3% respectively. Larvae species which act as amplification vectors were first identified in surveillance sites in Week 25 (June 19 - 25). Larvae species which may act as bridge vectors were first identified in Week 30 (Jul 24 - 30). This is consistent with previous seasons. The total number of larvae found peaked in Week 28 (Jul 10 - 16).

Larvae found at each site were enumerated over a series of dips using a standard larvae dipper. Based on the total number of larvae found, sites were ranked as either high (51 or greater), moderate (26-50) or low (25 or less). Of the total larvae surveillance events (n=334) sites were most frequently ranked as low (318, 95.2%), and rarely ranked as moderate (3, 0.9 %) and high (13, 3.9 %).

i. Catch Basins:

A small number of catch basins were monitored weekly beginning in June and continuing until late August. Larvae surveillance was discontinued in municipalities in which larviciding activities were initiated at the end of June.

ii. Natural Sites and Ditches:

Selected natural sites and ditches, 21 in total, were monitored weekly from June to end of August 2011. Natural sites were monitored a total of 171 times.

iii. Storm Water Management Ponds:

Selected storm water management (SWM) ponds were monitored for larvae weekly from June to August 2011. Additional information including weather conditions, water quality, and pond characteristics were also collected at each visit. A total of 22 SWM ponds were selected for monitoring and a total of 155 monitoring events occurred. SWM ponds ranked low on all but 4 dipping events (1 event ranked moderate, 3 events ranked high).

Mosquito Surveillance

Highlights

An adult mosquito surveillance program provides information on the type, number and distribution of adult mosquito populations and allows for the identification of geographic high-risk areas. In jurisdictions that have active vector control programs, mosquito surveillance can also identify the need for and timing of intervention programs. In addition, female mosquito specimens can be grouped by species and these 'pools' can be tested for the presence of WNv and EEEV

Fixed trap locations allow for the development of a data base over time allowing comparison of mosquito population data to previous years and spatial analysis. Targeted surveillance locations allow for response to natural events, e.g. finding a WNv or EEEV infected horse. Center for Disease Control (CDC) light traps, baited with carbon-dioxide, were used for VBD surveillance in Simcoe Muskoka.

Fixed trap site locations were identified in key populated areas. Factors considered in determining trap placement included presence of mosquito habitat and/or breeding sites, proximity to human population or areas of human activity during peak mosquito activity and trap security. Efforts were made to retain trap sites used in previous seasons to allow for comparisons of mosquito populations between seasons. As in previous seasons, trap sites were predominantly located in residential backyards. Targeted surveillance locations were determined based on surveillance data and were set in areas demonstrating positive dead birds.

Mosquito surveillance data was analyzed to calculate trap index values for bridge and amplification vectors by trap week for the various locations throughout the health unit jurisdictions. The trap index value represents the average number of female mosquitoes of specific species for traps set within a municipality on a given week. This information was used in a local risk assessment process to guide mosquito control decision-making. In particular, the trap index values were monitored on an ongoing basis for presence and persistence of amplification vectors.

Ontario has also initiated a secondary adult mosquito vector surveillance program focused upon *Culiseta melanura* which is the main enzootic vector of EEEV. The surveillance for these vectors is incorporated into the WNv surveillance programming across Ontario.

While Ontario has never had a human case of EEE, sporadic equine and emu incidences have occurred in recent years. EEE is regarded as an important mosquito-borne human disease

because it continues to appear south of the Ontario border in the United States. As a surveillance strategy for EEEV, *Culiseta melanura* mosquitoes collected through WNv surveillance activities were tested for the presence of EEEV during the 2011 season.

Duration

Mosquito traps were set on a weekly basis beginning in Week 26 (June 26 – July 2) and continuing until Week 38 (September 18 – September 24). On average, 20 mosquito traps were set each week in various locations throughout Simcoe Muskoka. The number of traps set varies due to the use of variable trap locations and the inclusion of targeted traps where needed.

Locations

Mosquito trap locations for both fixed and targeted sites were predominantly located in private residential back-yards. Detailed information on trapping site locations has not been provided in this report to respect the confidentiality of the property owners.

Numbers and Trends

A total of 16,854 adult mosquitoes were collected in Simcoe Muskoka from June to September 2011 from 248 trapping events (Table 2). The adult mosquito surveillance program continued to demonstrate the presence of bridge and amplification vectors at sites throughout the health unit jurisdiction.

Table 2: Mosquito Surveillance Testing Summary, 2011

Mosquito Surveillance Item	Total Number
Total Number of Traps	248
Total Number Mosquitoes Collected	16,854
Number of Pools Viral Tested for WNv	219
Number of WNv Positive Pools	1
Number of Pools Viral Tested for EEEV	302
Number of EEEV Positive Pools	0

Adult mosquito counts peaked in Week 28, declined, and then rose again to a lower peak in Week 33. This is similar to previous seasons. There was a low bridge vector population sustained throughout the season with a peak in Week 28. There was also a low amplification vector population sustained throughout the season with a peak in Weeks 30 to 33. The

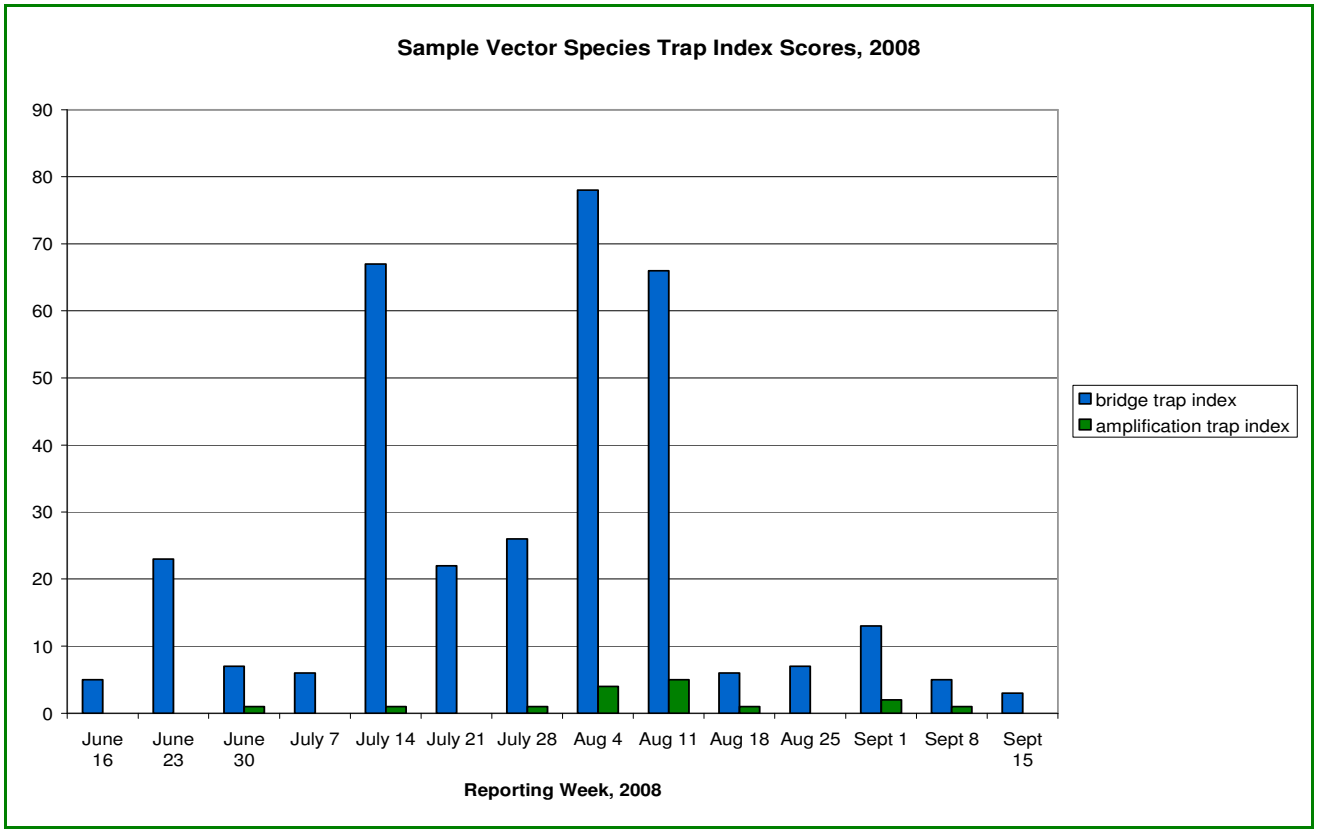
predominant species identified continued to be *Culex pipiens/restuans*, *Aedes vexans vexans* and *Coquilletidia perturbans.*

Table 3: Mosquito Surveillance Results, June – September 2011

Reporting week, 2011	Total # Traps	Total # Mosquitoes	Total Bridge Vector Mosquitoes	Total Amplification Vector Mosquitoes
Week 26	11	1797	1002	5
Week 27	18	3915	1839	21
Week 28	21	4635	2062	21
Week 29	20	1991	1338	50
Week 30	19	921	602	195
Week 31	15	764	449	62
Week 32	18	435	200	193
Week 33	20	980	498	188
Week 34	17	437	205	96
Week 35	20	377	248	84
Week 36	10	91	59	20
Week 37	16	172	74	35
Week 38	15	54	26	9
TOTAL	**248**	**16569**	**8602**	**9581**

Vector species trap index values were calculated for both bridge and amplification vectors by trap week and municipality. The trap index scores were monitored throughout the season as a component of ongoing risk assessment. Figure 1, below, provides an example of trap index scores for one municipality during the 2008 season.

Figure 1: Sample Vector Index Analysis, Simcoe Muskoka 2008



4.2 Lyme Disease

Highlights

SMDHU participates in passive tick surveillance to understand the risk of Lyme disease infection in the local area. The information collected can help identify establishing tick populations. An important aspect of passive surveillance is having multiple tick submissions from a specific area over multiple years. Finding multiple ticks from a single location may be indicative of an established or establishing population and should be monitored. Passive surveillance is also used as a guide to assess the need for, timing of and location of active surveillance.

Duration

SMDHU will accept ticks for passive surveillance year round. In 2011, ticks were submitted from April to December inclusive.

Locations

The majority of the ticks submitted to SMDHU were from within the health unit jurisdiction (17/25). The remaining ticks submitted were from outside SMDHU but within Ontario.

Numbers and Trends

A total of 25 ticks were submitted to the health unit by the public in 2011. Of the 25 ticks submitted only 4 were identified as blacklegged ticks and none tested positive for the Lyme disease agent. This is similar to last seasons' tick submissions. Since the start of the tick surveillance program in 2007, SMDHU has not had a blacklegged tick submitted for identification that was positive for Lyme disease.

5.0 PUBLIC HEALTH RISK ASSESSMENT

5.1 Risk Assessment Foundations

Risk assessment is a process for determining the risk to the public resulting from an exposure to a specific agent. There are two critical variables that must be understood and considered in a risk assessment process*: the characteristics of the agent*, and *the extent or potential of exposure to the agent.* A risk assessment becomes a critical step in determining measures that can be taken to mitigate or manage a risk to the public.

It is important to apply these risk assessment principles while considering WNv strategies. There are characteristics of the virus itself that are critical in a risk assessment:

i. the virus can be transmitted only by an infected mosquito,
ii. the virus is not transmitted from person-to-person except in exceptional circumstances,
iii. the virus is not generally considered to be virulent,
iv. most people exposed to WNv will not experience any symptoms,
v. a few will develop West Nile fever, and only a few of those will develop West Nile encephalitis,
vi. any age group can become infected,
vii. the elderly are most susceptible to the virus.

The other variable to be considered in the risk assessment is the potential for exposure to WNv. It is important to determine whether WNv has been identified in a community. Surveillance data from within the county and from neighbouring jurisdictions is critical information. The time of year will determine the prevalence of different mosquito species. Mosquito life cycles are completed in differing time through the spring, summer and fall. It is important to know which amplification and bridge vector species are prevalent at a given time. The location of human populations in relation to mosquito habitats is also a factor in assessing the risk of exposure.

Entomological, microbiological and environmental information is reviewed in the risk assessment. However, as WNv is a new arbovirus infection in Ontario, there are many variables that remain unknown. For example, the effect of weather, on both the mosquito population and the intensity of viral activity, requires further research. Immunity levels in the bird and mammal population has not been determined. Therefore, a risk assessment is completed using the information and knowledge that is available at that time.

Risk assessments, however, provide the basis to consider what, if any, interventions need to be implemented to control WNv. In this report, the particulars of the SMDHU risk assessment process have been described, as it is has been used as the basis for decision-making for WNV control activities in our health unit area.

5.2 Local Risk Assessment Process

A local risk assessment and decision-making process for the Simcoe Muskoka area was developed in 2006. This framework was reviewed and revised in 2008 following additional analysis of surveillance data and in consultation with the Ministry of Health and Long-Term Care Vector-Borne Disease Unit. The 2008 framework was used to assess the need for larviciding programs in municipalities in the upcoming season. The framework considers the presence and abundance of *Culex pipiens/restuans* mosquito populations in previous surveillance seasons, the presence of multiple WNv positive indicators, excluding avian specimens, within the vicinity in the previous seasons and in consideration of the guiding principles as outlined above.

A study by Andreadis et al. found the incidence of human cases to be closely correlated with the number of viral isolations from mosquitoes. The same study found that the majority of human cases were identified in areas with multiple positive mosquito isolations (Andreadis et al). This evidence, when considered in relation to the infrequent and random level of detection of WNv in Simcoe Muskoka indicates low risk of human infection. Single isolated positive mosquito pools are not considered an indication of increased risk of human outbreaks of West Nile virus.

5.3 Mosquito Control Risk Assessment and Decision-making Framework

The WNv Risk Assessment tier framework was developed in 2008 and applied again as a decision-making tool in the 2011 season. Municipalities were assigned to one of three tiers for control actions.

WNv Risk Assessment Tier Framework, 2008

Tier I – Larviciding Action: Notice to larvicide catch basins will be issued by the Medical Officer of Health to these municipalities. This tier consists of those municipalities which have received direction to larvicide from the Medical Officer of Health in previous seasons and have evidence of:

- sustained Culex pipiens/restuans populations throughout the season, and
- multiple positive WNv indicators in the previous season(s)

Tier II – Heightened Surveillance, Larviciding Standby: Notices to larvicide will not be issued by the Medical Officer of Health at this time. Heightened surveillance activities will be implemented in these municipalities to monitor the presence and abundance of mosquito populations of concern, primarily Culex pipiens/restuans. As a component of WNv contingency planning, these municipalities shall complete the Ministry of Environment Permit application process and be on standby to larvicide catch basins on short notice should the current season surveillance data indicate the need for control measures. This tier consists of those municipalities which have received direction to larvicide from the Medical Officer of Health in previous seasons but do not have:

- sustained Culex pipiens/restuans populations throughout the season, and/or
- multiple positive WNv indicators in the previous season(s)

Tier III – Ongoing Monitoring: This tier consists of those municipalities which have not received direction from the Medical Officer of Health to larvicide in previous seasons. Surveillance strategies will continue in these areas. It is recommended that these municipalities, as a component of their WNv contingency planning, review the MOE permit application guide and gather the necessary information to complete the permit application process on short notice.

5.3.1 Ongoing Risk Assessment

Local risk of West Nile virus transmission was assessed and monitored on an ongoing basis throughout the season. Local risk assessment inputs included presence of positive indicators, weather conditions, and local vector trap index results. In several instances additional surveillance for larvae or mosquitoes was conducted to support a local risk assessment. No additional vector control activities were directed as a result of risk assessments conducted in 2011.

6.0 VECTOR CONTROL

6.1 Pre and post-treatment studies

6.1.1 Pre-treatment studies

The Ministry of Environment permit applicant guide does not require pre-monitoring of catch basins to be treated with methoprene. However, pre-larvicide monitoring of catch basins is recommended to "determine larval counts and evaluate a need to apply methoprene." (Ontario Ministry of Environment, 2008)

In accordance with this recommendation, the Simcoe Muskoka District Health Unit, with assistance from municipal staff, conducts weekly monitoring of selected catch basins in populated areas. In 2010, selected catch basins were monitored weekly during June until larviciding commenced.

6.1.2 Post-treatment studies

Post-treatment studies to assess larval presence in catch basins treated with methoprene are not an effective measure for efficacy of this particular pesticide. In order to assess efficacy of methoprene, pupa must be collected and reared to assess adult emergence. Trials to evaluate the efficacy of methoprene on adult emergence from treated catch basins were conducted by the Ministry of Environment in 2003 and 2004. Selected catch basins from Simcoe County were included in this study. Methoprene efficacy trials were not conducted in Simcoe Muskoka in 2011.

6.2 Treatments Used

A local risk assessment process was utilized to determine need for mosquito control interventions in municipalities in the County of Simcoe and District of Muskoka in 2011. Based on this risk assessment, municipalities were assigned to one of three tiers. Those municipalities assigned to Tier 1 received a 'Notice to Larvicide' from the Medical Officer of Health. These municipalities were directed to commence larviciding of catch basins upon receipt of the Ministry of Environment permit and following the required public notification. If using the pellet formulation of methoprene, three consecutive larviciding treatments were to be conducted, with the first treatment beginning in late June, and subsequent treatments implemented approximately 21 days following the previous larviciding treatment. If the briquet formulation of methoprene was used, a single treatment was to be conducted in late June.

6.3 Treatment Locations

Following the local risk assessment process, the Town of Bradford West Gwillimbury was assigned to Tier 1 – Larviciding Action. In June 2011, the Medical Officer of Health issued a 'Notice to Larvicide' to this municipality to commence larviciding of catch basins within the settlement area of Bradford. Beginning in late June 2011, three treatment rounds of methoprene in pellet formulation were conducted by licensed municipal staff.

The mosquito control portion of the West Nile virus program is conducted in collaboration with local municipalities. Municipal staff assists with pre-treatment larvae surveillance of catch basins, licensed municipal staff conduct catch basin larviciding, and municipalities support an IPM approach to mosquito control by supporting appropriate activities to reduce mosquito breeding habitat.

7.0 PUBLIC COMMUNICATIONS

7.1 Public Education Campaign

As in previous seasons, public education about VBD was accomplished through dissemination of print materials, mass media, presentations, website information and the provision of information to key stakeholders.

2011 West Nile virus Public Education Key Messages

Information about WNv, including the method of transmission and the risk to human health.

Source reduction strategies for reducing mosquito breeding by eliminating standing water sites (tires, buckets, and other water-holding objects); changing the bird bath water weekly; cleaning and chlorinating swimming pools or draining and covering if not in use; preventing water from accumulating in pool-covers; unclogging gutters and down spouts and cutting back brush and growth from around the house.

Personal protective measures that can be taken to avoid mosquito bites, such as ensuring that screens fit tightly in doors and windows and are free of holes, wearing protective clothing (long pants, long-sleeved shirts, and socks) and appropriate use of insect repellents.

Signs and symptoms of WNv: (headache, high fever, muscle pain, weakness and disorientation) and public awareness about the nature of mosquito borne disease.

Mosquito control; larviciding and the product that would be used and how the larviciding procedure is effective.

2011 Lyme disease Public Education Key Messages

Information about Lyme disease, including the method of transmission and the risk to human health.

Personal protective measures that can be taken to avoid contact with ticks, such as wearing protective clothing (long pants, long-sleeved shirts, and socks), checking for ticks on one's person if frequenting an area with ticks, and appropriate use of insect repellents.

Appropriate removal and submission of ticks for laboratory testing when attached to a person.

Signs and symptoms of Lyme disease: (headache, high fever, muscle pain, weakness and disorientation) and public awareness about the nature of mosquito-borne diseases.

The fact sheets, posters, counter cards and pamphlets were distributed to over 450 local businesses including golf courses, general stores, information centres, hardware stores, retirement homes, campgrounds, hospitals and garden centres.

7.2 Media

During the 2011 season, there were 18 calls to the health unit from various print, radio and television media about WNv, 0 calls about EEEV and 2 calls about Lyme disease. A combination of both proactive and reactive strategies were undertaken to raise awareness of VBD issues, reinforce key messages, respond to public concern, correct misunderstandings or misinformation and maintain perspective on the issue. Components included interviews, editorials, a Medical Officer of Health (MOH) column and the direct printing of media releases.

Public Information Services: Health Connection, the health unit's telephone information line, is staffed by public health professionals from 8:30am to 4:30pm. Calls were received ranging from basic VBD questions, complaint of illness, pesticide use and stagnant water complaints.

7.3 Key Stakeholders

A list of key stakeholders is provided in Appendix A.

Municipalities are a critical partner in WNv prevention and control efforts. A WNv informational display board was made available to community groups and organizations for use at community events. A quantity of WNv fact sheets and information materials were provided with the display.

8.0 EVALUATION

Several large-scale formal and multi-sectoral evaluations of the West Nile virus program have been conducted in previous seasons. No formal evaluation was completed this season. However, ongoing program reviews and assessments are conducted to provide inputs into operational planning and implementation decisions. In addition, the risk assessment and decision-making tool is used annually to determine the need for mosquito control programs. To guide program planning decisions for 2009 and 2010, a complete reassessment of all larvae surveillance sites was conducted to ensure optimal efficiencies in program delivery.

9.0 CONCLUSION

It is important to acknowledge the continued support and assistance of the municipalities for their continued active involvement and cooperation in the VBD surveillance program and related activities.

Illnesses transmitted by vectors were detected locally from a number of sources this season. This highlights the importance of the vector surveillance, vector control and educational programs aimed at personal preventive measures for vector borne diseases. Further data analysis will be conducted to gather evidence to guide decision-making regarding the 2012 surveillance and control programs.

Planning for the 2012 VBD season is underway. Guidance and direction will be sought from Public Health Ontario in planning for the coming season due to the increase in local viral activity this past season. The information collected in the surveillance programs in previous seasons will also be used to guide the development of the 2012 surveillance program. Plans and strategies will be communicated as soon as possible to the key partners and municipalities.

REFERENCES

Andreadis TG, Anderson JF, Vossbrinck CR and Main AJ. Epidemiology of West Nile Virus in Connecticut: A Five-Year Analysis of Mosquito Data 1999-2003. Vector-Borne and Zoonotic Diseases. 4:4 360-378 [online] http://environmentalrisk.cornell.edu/WNV/WNVEducDocs/Andreadis-VBZD04.pdf

Hunter, FF, Gasparotto, A. SMDHU 2011 West Nile Virus and Eastern Equine Encephalitis Mosquito Surveillance Report. November, 11th, 2011. Entomogen

Ontario Ministry of Environment. Permit Applicant Guide for Municipalities and Health Units: Controlling Mosquito Larvae for Prevention and/or Control of West Nile Virus, May 2008. [online] http://www.ene.gov.on.ca/envision/gp/6191e.pdf

Ontario Ministry of Health and Long Term Care. Public Health Division. Lyme disease fact sheet. Catalogue # 014253 July/2009

Ontario Ministry of Health and Long-Term Care. West Nile Virus Preparedness and Prevention Plan, June 22, 2009.

Simcoe Muskoka District Health Unit. Eastern Equine Encephalitis virus fact sheet. [online] http://www.simcoemuskokahealth.org/Topics/Environment/westnilevirusEEEV/EEEV.aspx

APPENDIX A

Key Stakeholders

Adjala Tosorontio Township

Canadian Forces Base Borden

Bradford West-Gwillimbury

Entomogen

Canadian Cooperative Wildlife Health Centre

Canadian National Railways

Canadian Pacific Railways

City of Barrie

Clearview Township

Town of Collingwood

Corrections Canada - Beavercreek and Fenbrook Institutions (Gravenhurst)

County of Simcoe

District of Muskoka

Essa Township

Georgian Bay Island National Park

Township of Georgian Bay

Town of Gravenhurst

Health Canada-First Nations and Inuit Health Branch

Town of Huntsville

HydroOne Networks Inc.

Town of Innisfil

Lake Simcoe Conservation Authority

Township of Lake of Bays

Town of Midland

Township of Muskoka Lakes

Ministry of Health and Long-Term Care

Ministry of Natural Resources

Ministry of the Environment

Ministry of Transportation

Town of New Tecumseth

Nottawasaga Valley Conservation Authority

Ontario Reality Corporation

City of Orillia

Oro-Medonte Township

Town of Penetanguishene

Praxair

Ramara Township

Severn Sound Environmental Action

Severn Township

Spills Action Centre

Springwater Township

Tay Township

Tiny Township

Town of Wasaga Beach