

Vector-Borne Diseases

Annual Report 2010

Grey Bruce Health Unit



EXECUTIVE SUMMARY

The purpose of the Vector-borne disease (VBD) program is to prevent or reduce the burden of infectious diseases of public health importance including, but not limited, to West Nile Virus, Lyme disease and Eastern Equine Encephalitis virus in Grey and Bruce counties.

In 2010, there were no human cases of West Nile Virus reported in Grey and Bruce counties. There was one laboratory confirmed case of Lyme disease. It was determined that exposure was travel related to Eastern Europe. There was one equine fatality due to Eastern Equine Encephalitis virus. The results of the tick surveillance program indicated no Lyme disease activity in Grey Bruce.

An obstacle identified this year was the inability to conduct mosquito surveillance activity as a result of the positive Eastern Equine Encephalitis virus equine case as it was too late in the season to yield effective results.

Our partners include local health care providers in the early screening and diagnostic testing of potential human cases; local veterinarians who submit passive tick surveillance information from dogs; Ontario Ministry of Agriculture, Food and Rural Affairs for informing the health unit on equine cases, and the Canadian Cooperative Wildlife Health Centre for screening and testing non-corvids and small mammals with neurological symptoms.

The Grey Bruce Health Unit (GBHU) has a West Nile Virus Management plan which is updated annually.

The various components of the VBD program addressed in this report fall under the topic areas outlined in the Ministry of Health and Long-term Care (MOH<C) West Nile Virus Preparedness and Prevention Plan:

- ❖ West Nile Virus
 - Human Case Surveillance
 - Wildlife Surveillance
 - Vector Surveillance
- ❖ Lyme Disease Surveillance
- ❖ Eastern Equine Encephalitis
- ❖ Public Communications
- ❖ Conclusion

WEST NILE VIRUS

HUMAN CASE SURVEILLANCE

The mosquito vector is the most common mode of transmission of West Nile Virus (WNV). Mosquitoes become infected when they bite a WNV positive bird. The virus is not spread by person-to-person contact through touching, coughing, sneezing, or drinking from the same cup. Since 2002, non-vector modes of transmission were identified including human blood transfusions, organ transplants, maternal milk, intrauterine transmission, and transmission via occupational hazards for laboratory and turkey ranch workers. Risk of transmission to hunters is also noted because of contact from infected animal tissues.

The incubation time ranges from 3 to 14 days. WNV illness is characterized and based on provincial surveillance case definitions. There are currently two clinical manifestations, *WNV Non-Neurological Syndrome* and *WNV Neurological Syndrome*. There is also a case definition for *WNV Asymptomatic Infection* in which people infected do not show any symptoms. Ontario's case definition is based on Public Health Agency of Canada's case definition and is updated as needed to remain consistent.

Clinical symptoms of *West Nile Virus Non-Neurological Syndrome* (previously known as West Nile fever) include a sudden onset of one or more of the following: fever, headache, malaise, eye pain, myalgia, nausea, vomiting, anorexia, photophobia, arthralgia, and maculopapular rash. About 20% of people infected develop this clinical manifestation.

Clinical symptoms of *West Nile Virus Neurological Syndrome* may include those of *WNV Non-Neurological Syndrome* as well as change in mental state, severe muscle weakness, acute flaccid paralysis, myelitis, seizures, polyradiculitis and cranial nerve abnormalities. Approximately 0.7% of people infected develop this clinical manifestation.

People of any age or health status can be infected with WNV. Those over 50 years of age and those with weakened immune systems are at greatest risk for developing symptomatic illness. A vaccine is not available to prevent human illness from WNV. There is no specific treatment for WNV. Hospitalization is often necessary for severe cases to provide supportive therapy and rehabilitation.

West Nile Virus is a reportable disease under the Health Protection and Promotion Act. Laboratories and physicians are required to report cases of WNV to the local health unit.

WNV cases are diagnosed serologically from blood samples processed at the Ontario Central Public Health Laboratory in Toronto. Results are usually available within a few days. This virus can sometimes be isolated from cerebrospinal fluid and other tissues or body fluids.

GBHU gathers medical information such as demographics, symptoms and travel history on possible, probable, or confirmed cases of WNV. It is important to determine if the person received or donated any blood, plasma, tissue, or organs in the past eight weeks. If so, the Health Unit would immediately notify Canadian Blood Services.

A confirmed case has had a positive result on an additional confirmatory lab test. Once a region in the province has had at least three confirmed cases; all cases are generally considered confirmed. Reminders were sent to all hospital infection control practitioners regarding the maintenance of heightened surveillance for patients presenting to hospital emergency rooms with signs and symptoms potentially related to West Nile Virus.

In 2010, there were no human cases of West Nile Virus reported in Grey Bruce. In the province of Ontario, there were 3 human cases of West Nile virus in 2008, and 3 cases in 2009, 2 of which may have been travel related. There was 1 case in 2010.

GREY BRUCE CASES 2002-2009

- 2002 – 1 case, likely acquired outside of Grey Bruce
- 2003 – No cases
- 2004 – No cases
- 2005 – 3 cases, 2 of these likely acquired outside of Grey Bruce and the third result was inconclusive
- 2006 – No cases
- 2007 – No cases
- 2008 --No cases
- 2009 -- No cases
- 2010—No cases

WILDLIFE SURVEILLANCE

The objectives of the MOHLTC dead bird surveillance program are to establish the temporal presence and geographic distribution of WNV activity. Bird mortality surveillance is conducted because it appears to be the most sensitive early detection method for WNV activity. It signifies local transmission and serves as an early warning of the potential risk to human health. Positive bird cases usually preceded positive human cases in the majority of health units in Ontario.

The 2010 dead bird surveillance program was not delivered in the same format as previous years due to the discontinuation of funding for dead bird viral testing. There were no birds submitted during the 2010 season.

Table 1: Species, Submission Date and Location of WNV Positive Birds in 2001-2010

Date	Total Sightings	Total Tested	Species of Bird	Submission Date	Location
2001	48	32	No positive birds		
2002	75	26	Crow Crow Crow	July 25 August 12 August 15	Walkerton Hanover Normanby Township
2003	43	34	Crow Crow Crow Crow	July 9 July 18 July 21 September 16	St.Vincent Tara Durham Owen Sound
2004	20	20	Blue jay Crow Crow	May 20 September 4 September 22	Hanover Lion's Head Hepworth
2005	35	35	Crow Blue jay	August 15 August 22	Owen Sound Bentick

2006	33	29	Crow Crow Crow Crow Crow Crow Crow Crow	July 27 July 28 July 31 August 4 August 9 August 10 August 10 August 14	Ayton Hanover Walkerton Paisley Owen Sound Proton Station Durham Dundalk
2007	37	14	Crow	August 31	Owen Sound
2008	17	17	Loggerhead Shrike Blue Jay Blue Jay	August 7 September 12 September 12	Dyer's Bay Southgate Southgate
2009	1	1	No positive birds		
2010	0	0	No positive birds		

SMALL MAMMAL AND NON-CORVID BIRD SPECIES SURVEILLANCE

Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA) monitor equine health including WNV infection. In 2008 two horses in Grey Bruce were positive for WNV.

The Canadian Cooperation Wildlife Health Centre (CCWHC) requests health units to submit birds of any species and small mammals if they exhibit neurological symptoms. In 2009, a red-tailed hawk was submitted for testing and found negative for WNV. There were no submissions in 2010.

VECTOR SURVEILLANCE

Mosquito surveillance began in Grey Bruce during the summer of 2003. The main objectives of the program were to determine the distribution of mosquito populations relative to human density and to establish or project the need for intervention strategies (larviciding or adulticiding) to reduce or control mosquito populations.

Entomogen Inc. in St. Catherines, Ontario conducted mosquito quantification and identification and performed WNV testing on submitted mosquitoes. The GBHU staff trapped and identified mosquitoes. No WNV positive mosquito pools were found in Grey Bruce since trapping was started in 2003. As a result, the focus of the mosquito trapping program changed in 2008. In 2008, there was a targeted mosquito surveillance program in areas identified as hotspots due to positive bird activity. Risk assessment analysis did not indicate for a mosquito surveillance program in 2009 or 2010.

LARVAL DIPPING

Larval dipping is a method used to identify mosquito breeding sites which consists of taking water samples from roadside ditches, permanent bodies of water, or catch basins. A dipper is used to gather the water samples and a visual assessment is made to locate mosquito larvae. The number of larvae is counted and an average number of larvae per sample are determined. The purpose of larval dipping is to use the data to predict the

pattern of future adult mosquito populations. In 2008, the focus of the larval dipping program changed to a targeted larval dipping program in areas identified as hotspots. Risk assessment analysis did not indicate for a larval dipping program in 2009 or 2010.

DEGREE DAYS FOR 2010

A Degree Day is one day (24 hours) in which the temperature is above or below the fixed reference temperature. Degree Days are the amount of heat that is needed for an organism to develop within a certain life stages. The temperature for *Culex pipiens/restuans* to develop is 18.3°C. Therefore, if the temperature is 19.3 °C for 24 hours then one Degree Day is accumulated. West Nile Virus mosquito activity does not usually occur until more than 100 ADD (accumulated degree day) are measured. For human cases to occur more than 200 ADD are required.

The ADD calculation is a component of the human risk analysis for Ontario and the Grey Bruce Health Unit. The mosquito, bird, and human activity must all be considered in the risk analysis. From May 24 to September 30, 2010 the mean day temperatures recorded by Environment Canada were used for calculating the ADD. The ADD's for Wiarton, Kincardine and Mount Forest (located south of the Grey county border) were calculated. These locations were included because they have Environment Canada weather stations (Thornbury weather station only measures the amount of rainfall therefore this location was not included in our calculations). For the summer of 2010, Wiarton and Mount Forest did not accumulate enough Degree Days to initiate major development for *Culex pipiens/restuans*. Kincardine accumulated 100 ADD by August 14, 2010; however, did not reach the 200 ADD mark by the end of September.

LYME DISEASE SURVEILLANCE

Lyme disease (LD) 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*.

Early symptoms of LD 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 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). Not all patients with Lyme disease will develop the bull's eye rash.

Lyme disease is a reportable disease under the Health Protection and Promotion Act. The prevalence of Lyme disease is relatively low in the Grey Bruce region. The white tailed deer is a potential reservoir of LD because they harbour ticks. Since Grey and Bruce counties have a large number of deer, surveillance is warranted to monitor any potential cases of LD.

Passive Surveillance

Ticks found on a human or suspected of biting a human are submitted to the Public Health Laboratory for species identification and testing for *Borrelia burgdorferi*. The health unit submitted 10 ticks for testing in 2010. Two were identified as *Ixodes scapularis* and were negative for *Borrelia burgdorferi*.

Dogs are at risk of tick exposure and clinical manifestations of Lyme disease. Dogs are closer to the ground and more likely to be attractive to ticks as potential hosts for feeding supporting the utility of dogs as a sentinel for Lyme disease in an area. Veterinarians

within the health unit use Idexx laboratories SNAP 4Dx ELISA-based test for routine screening of dogs for heartworm disease, anaplasmosis, ehrlichiosis and *Borrelia burgdorferi* exposure. This diagnostic screening tool is more sensitive and specific than the human ELISA test but false positives remain a problem in non-endemic areas: 1-2 false positive tests would be expected for every 100 tests performed. By establishing a baseline of positive test results for *Borrelia burgdorferi* exposure, an increase in the percentage from the baseline value would likely reflect an increase in actual exposures. Two veterinarian clinics within Grey Bruce volunteered to report tick specimen laboratory submissions, ELISA test totals and results to the health unit on a biannual basis. In 2010, 302 test results were received with no positive results for *Borrelia burgdorferi*.

Active Surveillance

This method actually involves going out to areas where ticks are known to inhabit and human interaction is likely to occur to perform drag sampling. The purpose of drag sampling is to catch as many ticks as possible for species identification and testing. Drag sampling consists of dragging a flannel cloth over and around vegetation where ticks may be waiting for a passing host.

During May and June 2010, 9 sites were surveyed within Grey Bruce for a total of 37 person-hours of drag time. Six ticks were recovered at 3 sites and a single *Ixodes scapularis* (unfed adult female) was found. Previous drag sampling was conducted on August 16 and 24, 2007, at provincial parks and escarpments in Grey and Bruce counties. The *Ixodes scapularis* tick was not isolated in the drag sampling.

Human Cases

There was one laboratory confirmed case of Lyme disease in 2010. It was determined that exposure was travel related to Eastern Europe. The last reported case was in 2005 and was also determined to be travel related.

EASTERN EQUINE ENCEPHALITIS VIRUS

While Canada has had a history of Eastern Equine Encephalitis virus (EEEV) infections in horses and exotic birds, there have been no human cases reported to date. In 2009 there was a significant increase in EEEV activity in mosquito populations throughout eastern USA, especially in the enzootic vector, *Culiseta melanura*, and in bridge vectors such as *Culex erracticus*. This increase in EEEV activity was accompanied by increases in bird, equine, and human cases throughout the USA.

The Grey Bruce Health Unit was notified by OMFRA of an equine death as a result of EEEV infection in October 2010. A mosquito surveillance program was not initiated as it was too late in the mosquito season to ensure trapping of vector mosquitoes. In 2008, there was an equine death due to EEEV within 4.9 km of the 2010 equine case. Both equine cases are located within a 14 km radius of the Greenock Swamp Wetland complex. In 2004, in Derby township, a flock of emus was infected with EEEV and 7 out of 15 birds died. A mosquito surveillance program was conducted but did not find any mosquito vectors related to EEEV.

PUBLIC COMMUNICATIONS

Public complaints and inquiries are documented through the Public Health Inspector helpdesk line which is staffed Monday to Friday during regular business hours. Typical complaints and inquiries received in 2010 included dead bird sightings, standing water complaints, Lyme disease and tick identification.

Throughout 2010, the VBD public education campaign was comprised of several types of communication methods as outlined below:

1. The Grey Bruce Health Unit website provides up to date information as well as links to a variety of additional information sites. The messages focus on encouraging residents to reduce and repel mosquitoes as well as provide information regarding Lyme disease.
2. A display was put up in the GBHU Owen Sound lobby during the summer. This featured information on reducing and repelling mosquitoes and reminded parents that a children's story book on the topic of WNV is available in libraries and Early Years Centres in Grey and Bruce counties.
3. In June 2010, local physicians were advised on Lyme disease diagnosis, testing and treatment.
4. In early June 2010, handouts on Lyme disease and tick prevention and submission procedures were distributed following a presentation to the Owen Sound Field Naturalists. The same informational materials were also distributed to the Saugeen Field Naturalists and Bruce Birders groups.
5. Grey Bruce Health Unit took advantage of prescheduled media articles and interviews to inform the public on various VBD related topics. These media items were cost free and included:
 - a. June 23, 2010: Media release – Tick talk. There's a lot of "outdoors" in Ontario and good weather leads to camping, hiking, picnics or even a day at the beach. A little bit of preparation will make sure that Lyme disease doesn't sideline your summer outdoor adventure".
 - b. June 25, 2010 – Meaford Independent. Electronic newspaper article "Tick Talk".
 - c. June 27, 2010 - myFM Radio. Increase in cases of Lyme disease in Ontario.
 - d. June 28, 2010 - Rogers TV. Lyme disease.
 - e. June 29, 2010 - CFOS Radio. Lyme disease.
 - f. July 2, 2010 – Hanover Post. Newspaper article " Your summer health: Let's talk about ticks"
 - g. July 4, 2010 – CFOS Radio. "Take steps to prevent tick bites".
 - h. July 12, 2010 - Country 93 Radio. Lyme disease.

CONCLUSION

The cost for all activities for 2010 in total was \$256,897.00. This total includes staffing, travel, supplies, and surveillance costs.

The Grey Bruce Health Unit VBD Program for 2010 was less robust than in previous years due to the discontinuation of funding from the Ministry of Health & Long-Term Care for bird testing and media campaigns, lower than normal summer temperatures, and the absence of any indication of WNV or LD in the Grey Bruce area.

Plans for 2011

Below is a brief summation of the VBD Program activities the Grey Bruce Health Unit plans to accomplish in 2011.

Public Education

- Provide general information to the public through a variety of media strategies to increase their awareness of vector-borne diseases (WNV, EEEV & LD) and prevention strategies.
- Encourage the reduction of mosquito breeding sites.
- Encourage the submission of ticks by the public and healthcare providers.
- Update the Grey Bruce Health Unit's web site throughout the season.

Surveillance

- Continue to coordinate surveillance and incorporate any changes as required by the Ministry of Health and Long Term Care or Health Canada.
- Continue with surveillance activities in accordance with the Ministry of Health and Long Term Care and Canadian Cooperative Wildlife Health Centre.
- Map the exact locations of bird sightings and bird, animal, mosquito and tick submissions using a computerized GPS/GIS system.
- Continue with passive and active tick surveillance.
- Map results of any positive human cases of West Nile Virus and Lyme disease.
- Increase surveillance program by setting light traps in the vicinity of both equine cases to trap for EEEV vector mosquitoes according to the MOHLTC testing order of preference.

RESOURCES

Ontario Ministry of Health and Long-Term Care. *West Nile Virus Preparedness and Prevention Plan*, June 2, 2010.

Ontario Ministry of Health and Long-Term Care. *Publications Lyme Disease*. Retrieved from <http://www.health.gov.on.ca/en/public/publications/disease/lyme.aspx>