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VECTOR-BORNE DISEASE PROGRAM 2009/2010 ANNUAL ACTIVITY UPDATE

The Community and Health Services Committee recommends the adoption of the recommendation contained in the following report dated March 25, 2010, from the Commissioner of Community and Health Services for Approval by the Board of Health.

1. RECOMMENDATION

It is recommended that:

1. The Regional Clerk circulate this report to local municipalities.

2. PURPOSE

This report is prepared for Regional Council in order for it to carry out its legislative duties and responsibilities as the Board of Health under the *Health Protection and Promotion Act*. It summarizes the Public Health Branch's Vector-Borne Disease program activities in 2009 and outlines activities planned for 2010, with a focus on West Nile virus control actions.

3. BACKGROUND

West Nile virus activities and Lyme disease surveillance are now conducted under the Vector-Borne Disease program

Since 2002, when West Nile virus was first detected in York Region, the Public Health Branch has conducted public awareness, surveillance and mosquito population control activities as part of its West Nile virus program. As of 2009, to ensure consistency with the *Ontario Public Health Standards*, the York Region West Nile virus program became part of a larger Public Health Branch Vector-Borne Disease program. In line with the Standards, this program relies on surveillance data and emerging trends to develop a local response to mitigate the risks of diseases that are transmitted by vectors (such as mosquitoes) from one host to another.

Lyme disease, which is transmitted by ticks, is another example of a vector-borne disease. The York Region Vector-Borne Disease program conducts Lyme disease surveillance in partnership with the Ministry of Health and Long-Term Care (the Ministry).

West Nile virus, Lyme disease and Eastern Equine Encephalitis are vector-borne diseases of significance in Ontario. Other vector-borne diseases, such as malaria, dengue and yellow fever, pose a considerable health risk to people living in and travelling to endemic areas in the tropics and subtropics. Although these diseases are relatively rare in temperate zones, climate change could create conditions suitable for their emergence in temperate regions.

Human cases of West Nile virus in Canada and Ontario significantly decreased in 2009

Human cases of West Nile virus reported in Canada have significantly decreased in 2009. According to the latest available data from the Public Health Agency of Canada (October 3, 2009), there were eight human cases of West Nile virus in Canada in 2009 compared to 38 in 2008 and 2,355 in 2007.

As of December 31, 2009, there were three human cases of West Nile virus in Ontario. Two of these cases were reported in Windsor-Essex (one may have been travel related) and one was in Middlesex-London. There were no human cases reported in York Region.

Weather plays a role in the variation of West Nile virus each year

Weather plays a role in the variation of the number of West Nile virus cases from year to year as it influences mosquito breeding conditions. According to studies published in the *Journal of Vector Ecology* and *Environmental Health Perspectives*, higher temperatures, precipitation levels and humidity are linked to mosquito population increases, spread of West Nile virus in mosquitoes and rate of human infection.

Lyme disease, which is spread from the bite of an infected tick, is a reportable disease in Ontario

Lyme disease is transmitted to humans through the bite of an infected tick. In Ontario, it is spread by blacklegged ticks. Typical symptoms include fever, headache, fatigue, and a characteristic skin rash. If left untreated, infection can spread to joints, the heart, and the nervous system.

Lyme disease is a reportable disease under Ontario's *Health Protection and Promotion Act*. Public health units investigate cases of Lyme disease and forward reports of cases meeting provincial case definitions to the Ministry.

According to the Ministry, there is a low potential risk of contracting Lyme disease anywhere in Ontario. In areas of Ontario where there are established populations of blacklegged ticks, however, the risk is greater. These areas include Long Point Provincial Park, Point Pelee National Park, Prince Edward Point National Wildlife Area, Rondeau Provincial Park, Turkey Point Provincial Park, and in the St. Lawrence Islands National Park area.

4. ANALYSIS AND OPTIONS

VECTOR-BORNE DISEASE PROGRAM 2009

The York Region Vector-Borne Disease program continued to incorporate a multifaceted approach to planning and response

To ensure a standardized response to West Nile virus activity, the *York Region West Nile Virus Response Plan* is reviewed annually and updated in accordance with the *Health Protection and Promotion Act*, Ontario Regulation 199/03 (Control of West Nile virus), the *Ontario Public Health Standards*, and guidelines set out in the Ministry's *West Nile Virus Preparedness and Prevention Plan*. Various committees and working groups also coordinate program activities. These include the West Nile Virus Operations Committee, with representatives from local municipalities, and the Central East West Nile Virus Working Group, whose membership consists of health unit representatives from Central East Ontario and the Greater Toronto Area.

Surveillance of West Nile virus and Lyme disease provided information for informed decision-making

Ongoing surveillance of West Nile virus was conducted through the collection of data on virus activity in mosquito and human populations and on influential factors such as temperature. The 2009 data was used to delineate areas of interest and track emerging trends for localized response delivery according to the *York Region West Nile Virus Response Plan*, as well as for general program delivery.

The Ministry initiated a secondary adult mosquito vector surveillance program in 2009 that focused on the mosquito species that transmit Eastern Equine Encephalitis. Although Eastern Equine Encephalitis has only been found in horses across Ontario, it remains a mosquito-borne disease of concern for humans. The Ministry has incorporated the surveillance of these vectors into the species identification and viral testing program across Ontario.

The Ministry provided updates to health units on Lyme disease trends in Ontario, based on monitoring of blacklegged tick populations throughout the province and field investigations. Passive tick surveillance was used to assess the possible risk of Lyme disease infection to humans. People who found ticks on themselves were encouraged to submit the ticks to their local health unit or physician. These ticks were then sent for identification and testing. Additionally, positive human cases reported by health units to the Ministry were tracked and investigated to identify the geographic area of exposure.

York Region recorded the lowest year of West Nile virus activity in 2009

In 2009, there was a decrease in West Nile virus activity within York Region compared to 2008. One mosquito pool tested positive for West Nile virus in the Region, and 14 mosquito pools were identified province-wide. This was largely due to the weather in 2009. Temperatures did not reach sufficient levels for amplification of the mosquito population and virus. Table 1 summarizes West Nile virus detected in York Region from 2002 to 2009.

Table 1
York Region West Nile Virus Summary 2002 - 2009

	2002	2003	2004	2005	2006	2007	2008	2009
Confirmed human cases	7*	2	0	5	3	1	1	0
Suspect human cases investigated	29	81	0	44	3	2	1	0
Positive mosquito pools	14	5	1	14	10	0	2	1
Number of mosquito trap sites	10	41	30	40	40	38	37	34
Dead bird sightings (calls)	2,286	3,533	2,014	1,372	1,604	763	889	NA [†]
Birds picked up	127	813	1,647	1,098	1,328	968	757	NA [†]
Birds sent	55	48	64	53	34	24	14	NA [†]
Positive birds**	8	8	11	22	10	1	2	NA [†]
Complaints/Investigations	25	992	379	222	232	106	111	78

* 4 cases probable.

** Number of positive birds does not reflect the intensity of the virus. Once a municipality has positive results, submission of specimens from that municipality ceases.

[†] Dead bird pick-up, testing and reporting was discontinued province wide in 2009.

Relatively low Lyme disease activity was reported in York Region

In 2009, there was one case of Lyme disease reported in York Region. Table 2 summarizes Lyme disease detected in York Region residents from 2005 to 2009. Of these cases, seven have been determined to be acquired outside of Canada and three cases were from exposure within Ontario. None of these cases were from exposure to infected ticks in York Region.

Table 2
York Region Lyme Disease Summary 2005 - 2009

	2005	2006	2007	2008	2009
Confirmed human cases	3	0	4	2	1

Personal protection from West Nile virus was enhanced through education and communication

In 2009, public awareness of West Nile virus continued to be raised through education and communication initiatives focusing on personal protection (including use of insect repellent and proper clothing) and reduction of mosquito breeding sites through removal of stagnant water. This was achieved through press releases, local newspaper ads, pamphlets, displays, information posted on the York Region website, a Rogers Television spot, the York Works newsletter, Recycling and Waste Calendars and investigation of complaints.

Mosquito populations were controlled through application of larvicide

Control of the mosquito population is an important component of West Nile virus management. Larviciding, or control of the immature stage of these mosquito populations, is a particularly effective pre-emptive control strategy. Larvicide product approved by the Ontario Ministry of the Environment is applied on a scheduled basis to control mosquito populations in target areas. The following highlights larviciding activities in 2009:

- 81,266 municipal and regional catch basins were treated with methoprene pellets four times during the mosquito season. Methoprene prevents mosquito larvae from developing into adult mosquitoes, with no identified risk to wildlife, people or the environment.
- 95 private rear yard catch basins were larvicided upon request.
- 852 catch basins in parks, grounds of long-term care and residential facilities (upon request), and municipally-owned properties were treated once a season with long lasting methoprene briquettes (with the exception of the Town of Markham, which provided screens for public park catch basins).
- Standing surface water in road side ditches and sewage treatment lagoons was treated as required, using *Bacillus thuringiensis israelensis* (Bti). Bti is a naturally occurring bacterium found in soil and water that targets and kills mosquito larvae. It has been found to have no effect on other aquatic organisms or the environment.

- 6,520 catch basins in environmentally-sensitive areas were larvicided twice a season using *Bacillus sphaericus* (B. sphaericus). B. sphaericus is a naturally occurring bacterium found in soil and water which targets and kills mosquito larvae with no impact on other aquatic organisms or the environment.

In conjunction with municipalities across Ontario, York Region discontinued dead bird pick-up, testing and reporting in 2009

The Ministry has identified dead bird surveillance and testing as an ineffective early risk indicator of West Nile virus. As a result, the province discontinued the pick-up and testing of dead birds in 2009. Comprehensive communications, coordinated with other Greater Toronto Area jurisdictions, were launched in spring 2009 to inform residents why the bird surveillance program was discontinued and to advise them what to do if they found a dead bird.

An evaluation was conducted to gauge West Nile virus program delivery and processes

Staff conducted a program evaluation to review West Nile virus program deliverables and expenditures, and to identify the best use of resources. This evaluation reports and analyses program delivery through a suite of 20 indicators, which provide information about mosquito control efforts, surveillance and positive virus activity. Many of these indicators are summarized in this report (e.g. number of catch basins treated and number of positive cases). In line with the results of international studies, a review of local surveillance information shows a strong relationship between positive cases and certain weather trends during the West Nile virus season.

The evaluation also included a review of communications to ensure the information provided to the community was delivered in an effective and cost efficient manner.

Results of the program evaluation will inform 2010 program activities.

VECTOR-BORNE DISEASE PROGRAM 2010

West Nile virus control objectives for 2010 are based on program evaluation and will focus on public awareness, surveillance, and mosquito population control

Public awareness will continue to be a fundamental component of York Region's Vector-Borne Disease program in 2010. Key messages will focus on personal protection and reduction of mosquito breeding sites. Surveys will be conducted at West Nile virus special event displays to gauge the public's knowledge of West Nile virus and personal protection.

York Region Public Health will continue West Nile virus surveillance activities as prescribed by the Ministry in 2010. Mosquito-based surveillance remains the primary tool for quantifying the intensity of West Nile virus transmission in an area. Eastern Equine Encephalitis surveillance in the mosquito population will also continue in 2010. As in 2009, dead bird surveillance will not take place in 2010.

York Region larviciding efforts will continue at current levels in 2010. York Region's neighbouring health units (Peel, Durham, Toronto and Halton) also plan to carry out a larviciding program for 2010, to the same extent as in 2009. It is important that a consistent approach is taken by neighbouring municipalities. Reduction of mosquito breeding sites (standing water) through investigation of standing water complaints will also continue in 2010.

Lyme disease surveillance will continue and a public education component will be introduced in 2010

Lyme disease surveillance will continue in partnership with the Ministry. Beginning in 2010, the Public Health Branch will provide information on Lyme disease to the residents of York Region, with a focus on personal protection.

5. FINANCIAL IMPLICATIONS

Regional expenditures for the Vector-Borne Disease program totalled \$528,474, offset by 75% provincial subsidy of \$396,348. The program was managed within the Regional and provincial budget allocations.

6. LOCAL MUNICIPAL IMPACT

The Region and local municipalities will continue to work collaboratively through the West Nile Virus Operations Committee. Meetings will be held throughout the West Nile virus season in 2010 and municipalities plan to continue participation in West Nile virus control measures through enforcement of local standing water by-laws.

7. CONCLUSION

West Nile virus is established throughout the majority of provinces and states across North America. It is important to continue the West Nile virus component of the Vector-Borne Disease program in 2010, utilizing the three components of education, surveillance and mosquito population control. While there is a low potential risk of contracting Lyme disease in Ontario, surveillance activities will continue and personal protection education will be introduced in 2010. The Public Health Branch will also continue to work collaboratively with local municipalities, the Ministry and surrounding health units.

For more information on this report, please contact Dr. Karim Kurji, Medical Officer of Health at Ext. 4012.

The Senior Management Group has reviewed this report.