York Region

Clause No. 20 in Report No. 7 of Committee of the Whole was adopted, without amendment, by the Council of The Regional Municipality of York at its meeting held on April 17, 2014.

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VECTOR-BORNE DISEASE PROGRAM 2013/2014 ANNUAL UPDATE

Committee of the Whole recommends adoption of the following recommendation contained in the report dated March 20, 2014 from the Commissioner of Community and Health Services and Medical Officer of Health:

1. RECOMMENDATION

1. It is recommended that the Regional Clerk circulate this report to local municipalities for information.

2. PURPOSE

This report is prepared for 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 York Region Public Health's 2013 vector-borne disease program and outlines activities planned for 2014.

3. BACKGROUND

Vector-borne diseases in Ontario include West Nile virus, Lyme disease, and Eastern Equine Encephalitis virus

Vector-borne diseases are diseases that are transmitted to humans through the bite of an infected insect or arthropod such as a mosquito or tick. In Ontario, vector-borne diseases of public health importance include West Nile virus, Lyme disease and Eastern Equine Encephalitis virus.

West Nile virus is spread through the bite of an infected mosquito. It was first detected in North America in 1999 and emerged in York Region in 2002. West Nile virus has since become established in Ontario. The number of confirmed human cases and

mosquito traps that test positive for West Nile virus vary from year to year, depending on the weather's influence on mosquito breeding conditions.

Lyme disease is an illness caused by the *Borellia burgdorferi* bacteria, which is spread through the bite of an infected blacklegged tick. Ticks infected with the bacteria that causes Lyme disease can be found in temperate forested areas of North America, Europe and Asia. Areas of the province where blacklegged ticks are more commonly found include the north shores of Lake Erie, Lake Ontario and the St. Lawrence River.

Eastern Equine Encephalitis virus is spread through the bite of an infected mosquito. In Ontario, the virus has been detected in horses, emus and, more recently, in mosquitoes. No human cases have been reported in Ontario, or in other parts of Canada. Eastern Equine Encephalitis virus has not been detected in mosquitoes trapped in York Region.

York Region continues to provide a provincially-mandated vector-borne disease management strategy consisting of prevention and control measures

To respond to vector-borne diseases of public health importance, health units deliver a disease management strategy in accordance with the *Health Protection and Promotion Act* and the Ontario Public Health Standards. It includes surveillance (i.e., monitoring disease activity in vectors and humans), education on personal protection measures, and vector control programs where required. York Region's vector-borne disease program, which is based on local risk assessment and scientific evidence, is presently focused on West Nile virus and Lyme disease. The program could expand to include other diseases if they are detected in the Region.

4. ANALYSIS AND OPTIONS

WEST NILE VIRUS

Temperature has a direct and significant effect on West Nile virus activity levels from year to year

Temperature plays a role in the variation of the number of West Nile virus cases from year to year. Research shows that increased air temperature is the strongest predictor of increased infection in mosquitoes that transmit West Nile virus. Higher temperatures can decrease the required time for mosquito development. As the mosquito population increases, the virus amplifies within the population, impacting the rate of human infection.

Public Health Ontario monitors temperatures across Ontario in relation to the level of risk for West Nile virus activity. This helps health units with risk assessments and timing of response activities.

West Nile virus activity in 2013 was significantly lower than experienced in 2012, with only one confirmed human case

In 2013, York Region Public Health Branch continued surveillance activities to monitor the West Nile virus in mosquito and human populations. Below-normal temperatures were recorded in southern Ontario in 2013, contrasting with warmer-than-average winter temperatures, an early spring, and record-breaking summer temperatures in 2012. As a result, West Nile virus activity was much lower in 2013 than experienced in 2012. York Region had one confirmed human case in 2013, and sixteen positive mosquito pools. Table 1 provides an overview of York Region West Nile virus surveillance findings from 2002 to 2013.

Table 1
York Region West Nile virus summary 2002 – 2013

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
West Nile virus confirmed human cases	7	2	0	5	3	1	1	0	0	1	17	1
West Nile virus positive mosquito pools	14	5	1	14	10	0	2	1	0	4	43	16
West Nile virus standing water complaint investigations	25	992	379	222	232	106	111	78	49	63	57	75

There were 108 confirmed human cases of West Nile virus in Canada in 2013, and 2,374 cases reported in the United States. Four deaths were associated with West Nile virus in Canada and 114 deaths in the United States. No deaths were reported in York Region.

Larviciding remains the primary method of mosquito control

The control of mosquitoes through larviciding at the weakest point in their life cycle remains the most effective method of reducing mosquitoes that could potentially carry West Nile virus. The Ministry of Health and Long-Term Care has found that the occurrence of the West Nile virus vector species has been declining in Ontario since 2003, when widespread larval control in catch basins started throughout the province. The Ontario Ministry of the Environment has authorized the use of three larvicides under approved permits:

- Methoprene in pellet format is applied to roadside catch basins four times during the mosquito season. At the beginning of each mosquito season, a one-time application of methoprene briquettes are applied to rear-yard catch basins, long-term care homes (on a request basis) and all municipally-owned properties and parks.
- *Bacillus sphaericus (B. sphaericus)* is approved for use in environmentally-sensitive catch basins.
- *Bacillus thuringiensis (Bti)* is approved for use in standing surface water and sewage lagoons.

These products have been used for 11 years by York Region as the primary method for mosquito control.

Public Health response to positive mosquito pools and human cases focuses on further reducing the risk of West Nile virus in areas with recent activity

In response to West Nile virus positive mosquitoes and human cases, York Region Public Health staff conduct environmental scans to identify and remediate any unreported mosquito breeding locations in the area where virus activity has been detected. Additional mosquito traps may be set up if enhanced mosquito surveillance is required based on activity levels.

LYME DISEASE

Tick surveillance suggests blacklegged tick populations are increasing and expanding into new areas of the province

As outlined in the *Technical Report: Update on Lyme Disease Prevention and Control, 2010* published by Public Health Ontario, a number of factors may be responsible for the relatively recent increase in the range of blacklegged ticks in Ontario. These factors include:

- natural range expansion of ticks, aided in part by climate warming
- lengthening summer and fall seasons
- possible changes in the range of key hosts for ticks, such as the white-tailed deer

Additionally, migratory birds can transport blacklegged ticks from endemic areas in the United States and Canada to localities across Canada. The risk of Lyme disease is usually much greater in tick endemic areas because the probability of bites from infected ticks is much greater. However, bird-borne ticks create the theoretical possibility of persons being bitten by an infected tick almost anywhere in Ontario. All tick surveillance indicators suggest that the current range of blacklegged tick populations is expanding and will likely continue to do so in the future.

Surveillance is used to determine the level of community risk from Lyme disease

To monitor the local distribution and incidence of ticks and Lyme disease cases, the Public Health Branch uses a number of surveillance techniques to help determine the level of risk in the community.

Passive and active tick surveillance is used to assess the establishment of blacklegged tick populations:

- **Passive tick surveillance** involves residents submitting ticks to the health unit for identification and subsequent testing if the tick is identified as a blacklegged tick. York Region Public Health encourages residents to submit ticks to help determine if they have come in contact with an infected blacklegged tick and to monitor the locations where ticks were encountered. An additional form of passive surveillance is the voluntary notification of tick submission results from physicians and veterinarians to the health unit.
- **Active tick surveillance** involves collecting ticks from their habitat by dragging a flannel cloth over and around vegetation where ticks may be waiting for a passing host.

Human case surveillance is another important method to determine the level of risk in the community. Lyme disease is a reportable disease in Ontario. Once a report of Lyme disease is received, a case investigation is conducted to confirm diagnosis, collect epidemiological information and identify the location where the individual may have encountered a Lyme disease-bearing tick.

Local tick surveillance findings indicate York Region is not an established area for blacklegged ticks

In 2013, 27 ticks found on humans were submitted to York Region Public Health through passive tick surveillance. Of these, eight specimens were identified as blacklegged ticks. Four blacklegged ticks were associated with travel to endemic areas and four blacklegged ticks were locally acquired. No blacklegged ticks submitted to York Region Public Health by residents tested positive for the bacteria that causes Lyme disease. One locally-acquired blacklegged tick removed from a cat was reported and tested positive for the bacteria that causes Lyme disease.

As an extra precaution, active tick surveillance was performed throughout York Region. Public Health conducted 16 tick dragging sessions in natural public spaces (i.e. municipal parks, Provincial Park, conservation areas, Regional forest tracts and ravines) in the spring and fall. No ticks were found through active tick surveillance.

Based on surveillance findings, the ticks collected in York Region are considered to be adventitious ticks—that is, ticks found sporadically. Therefore, York Region is not considered to have an established blacklegged tick population. Public Health will continue various forms of surveillance to assess community risk.

Lyme disease cases reported to York Region Public Health in 2013 can be attributed to travel in endemic areas

Twelve confirmed human cases of Lyme disease were reported to York Region Public Health in 2013. These were determined through case investigations to be travel-related rather than locally acquired. The exposures took place in endemic areas, including:

- the north shores of Lake Erie (1 case)
- eastern Ontario (5 cases)
- Nova Scotia (1 case)
- northeastern United States (4 cases)
- central Europe (1 case)

Table 2 provides a summary of York Region Lyme disease surveillance findings from 2002 to 2013.

Table 2
York Region Lyme disease summary 2002 – 2013

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Lyme disease confirmed human cases*	4	1	5	3	0	4	2	1	1	3	2	12
Borrelia burgdorferi positive blacklegged ticks (locally acquired)	NA	NA	NA	NA	NA	NA	NA	NA	NA	1	0	0

*All confirmed cases of Lyme disease are travel-related, or exposure location is unknown.

Education and awareness are key to reducing the risk of vector-borne diseases

In 2013, West Nile virus and Lyme disease awareness activities continued to focus on personal protection. This was done through a variety of strategies, such as:

- media releases
- information on Regional and municipal websites

- pamphlets and/or posters in municipal and Regional offices, libraries, community and recreation centres, garden centres, golf courses, Sibbald Point Provincial Park and conservation areas
- newspaper ads in York Region Media Group publications and in multicultural newspapers
- personal protection ads in municipal recycling calendars
- articles in the Healthy Schools newsletter
- information inserts made available to principals for inclusion in individual school newsletters to parents

Community outreach opportunities included *Fight the Bite!* displays at various special events, information packages for recreation and municipal day camps, and an appearance on Rogers Daytime television.

Social media was used to communicate personal protection information on the Region's Facebook page and twitter account and a West Nile virus public service announcement video is accessible through York Region's YouTube Channel. Media interviews on West Nile virus and Lyme disease were also conducted with various media outlets to reinforce personal protection messaging.

2014 VECTOR-BORNE DISEASE PROGRAM

Objectives for 2014 will continue to focus on surveillance, public awareness and mosquito population control

The 2014 York Region vector-borne disease program will be very similar to the 2013 program.

- The Public Health Branch will continue surveillance activities related to West Nile virus, Lyme disease and Eastern Equine Encephalitis virus. Since so many factors, including temperature and precipitation, have an effect on vector-borne diseases, it is not possible to predict virus activity for the coming season with any degree of accuracy. However, the Public Health Branch will monitor the presence, location, time and intensity of vector-borne disease activity, which will inform decision-making on additional prevention and response activities as the season unfolds.

  According to Public Health Ontario, based on the low number of Eastern Equine Encephalitis virus vectors and virus activity province-wide, Eastern Equine Encephalitis virus testing is not required, but may be conducted by health units voluntarily. York Region will reevaluate the need for Eastern Equine Encephalitis virus testing for 2015.

- Education activities in 2014 will continue to provide personal protection information to residents through various means, including print and social media.

- Mosquito control through larviciding will continue at the same levels as 2013, as will reduction of mosquito breeding sites through investigation of standing water complaints.

Link to key Council-approved plans

York Region Public Health's ongoing work in relation to vector-borne diseases speaks to the goal area "A Place Where People Achieve Optimal Health" in *Vision 2051*.

5. FINANCIAL IMPLICATIONS

Regional expenditures for the Vector-Borne Disease program in 2013 totaled $489,207. This was offset by 75% provincial subsidy of $366,905, resulting in a net tax levy impact of $122,302. The program was managed within the Regional and provincial budget allocations.

The Regional budget for this program for 2014 is $543,639. Provincial funding is anticipated to continue at 75% cost-share; however, provincial funding allocations have not yet been confirmed for 2014. The program will be managed within approved Regional and provincial funding allocations.

6. LOCAL MUNICIPAL IMPACT

As in previous years, the Region will continue to collaborate with local municipalities through the West Nile Virus Liaison Committee. This group meets throughout the year to discuss vector-borne disease resources and updates. Local municipalities also participate in West Nile virus control measures through enforcement of local standing water by-laws.

7. CONCLUSION

York Region Public Health is responsible for responding to any vector-borne disease of public health importance. The Vector-Borne Disease program presently focuses on West Nile virus and Lyme disease, although the local mosquito population is also being monitored for Eastern Equine Encephalitis virus

In 2014, the Public Health Branch will continue the mandated activities of the Vector-Borne Disease program, including disease surveillance, public education and awareness, mosquito vector control programs, and human case investigations.

For more information on this report, please contact Dr. Karim Kurji, Medical Officer of Health at Ext. 74012.

The Senior Management Group has reviewed this report.