

Clause 17 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 23, 2015.

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Vector-Borne Disease Program
2014/2015 Annual Update

Committee of the Whole recommends adoption of the following recommendation contained in the report dated March 25, 2015 from the Commissioner of Community and Health Services and Medical Officer of Health:

1. Recommendation

It is recommended that:

1. 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 2014 Vector-Borne Disease Program and outlines activities planned for 2015.

3. Background

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

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, Lyme disease and Eastern Equine Encephalitis.

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. It 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.

Eastern Equine Encephalitis is spread through the bite of an infected mosquito and has a high mortality rate. In Ontario, the virus has been detected in horses, emus and mosquitoes. No human cases have been reported in Canada. Eastern Equine Encephalitis virus has not been detected in horses in York Region or in mosquitoes through the Public Health Branch's surveillance program.

Lyme disease is caused by the *Borellia burgdorferi* bacteria, which is spread through the bite of an infected blacklegged tick. Since its emergence in North America in the 1970s, Lyme disease has become one of the most frequent vector-borne diseases in the temperate world. Ticks infected with the bacterium 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; however, their habitat is expanding.

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, public health units deliver a disease management strategy in accordance with the *Health Promotion and Protection 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, Eastern Equine Encephalitis and Lyme disease. This program could expand to include other diseases if they are detected in or near York 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 temperatures are 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.

No human cases of West Nile were reported in 2014

In 2014, the York Region Public Health Branch continued surveillance activities to monitor West Nile virus in mosquito and human populations. Below-normal temperatures were recorded in southern Ontario for a second year in a row, contrasting with warmer-than-average winter temperatures, an early spring, and record breaking temperatures in 2012. As a result, West Nile virus activity declined further from the previous year, with no human cases reported and two mosquito pools testing positive in 2014. Public Health surveillance activities have been maintained at the same levels each year. Table 1 provides an overview of York Region West Nile virus surveillance findings from 2010 to 2014.

Table 1
York Region West Nile Virus Summary 2010 – 2014

	2010	2011	2012	2013	2014
West Nile virus confirmed human cases	0	1	17	1	0
West Nile virus positive mosquito pools	0	4	43	16	2
West Nile virus standing water complaint investigations	49	63	57	75	88

There were 21 confirmed human cases of West Nile virus in Canada in 2014, and 2,122 cases reported in the United States. No deaths were associated with West Nile virus in Canada; however 85 deaths were reported in the United States.

Larviciding remains the primary method of mosquito control in Ontario

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 the Environment and Climate Change has authorized the use of three larvicides to control mosquito populations under approved permits:

- Methoprene in pellet format is applied to roadside catch basins four times during the mosquito season to provide consistent larval control. 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 israelensis* (*Bti*) is approved for use in standing surface water and sewage lagoons.

These products have been used for 12 years by York Region as the primary method for mosquito control.

Lyme Disease

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

The blacklegged tick (*Ixodes scapularis*), the primary vector of the Lyme disease pathogen *Borrelia burgdorferi* has expanded its range northward from the United States into new regions in southern Canada. This is likely due to ticks being dispersed from established Lyme disease – endemic areas in Canada and the United States by migratory birds and other hosts.

Studies suggest that the blacklegged tick (*Ixodes scapularis*) will continue to expand its range northward in the coming decades. The growth of tick populations across southern Canada, where human populations are concentrated, is likely to result in an increase in human contact with ticks carrying Lyme disease.

Surveillance used by health units help determine the level of community risk from Lyme disease

To measure 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. This includes passive and active tick surveillance, and confirmed human case surveillance.

- **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. Locally acquired passive tick surveillance results are further investigated through active tick surveillance to determine if a blacklegged tick population is becoming established.
- **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.

Locally acquired ticks found through passive surveillance helps identify areas where active tick surveillance takes place

In 2014, passive tick surveillance resulted in fifteen blacklegged ticks being identified. Eight blacklegged ticks were associated with travel to areas outside of York Region, including endemic areas. Seven blacklegged ticks were locally acquired. Three blacklegged ticks submitted to York Region Public Health tested positive for the bacterium that causes Lyme disease. One of the positive ticks was locally acquired on Georgina Island, while the other two were acquired from outside of the Region. Health Canada, First Nations and Inuit Health were notified of the positive tick for follow-up.

York Region Public Health conducted tick dragging sessions at 20 locations throughout the spring and fall in natural public spaces (i.e. municipal parks, conservation areas, Regional forest tracts and ravines). Tick dragging was also conducted at Sibbald Point Provincial Park by Parks Ontario staff. The locations selected for active tick surveillance were based primarily on passive tick surveillance findings and, in absence of tick sightings in particular areas, based on locations with woodland habitat frequented by residents. No ticks were found at 19 of the 20 locations.

Active tick surveillance findings indicate blacklegged ticks are becoming established in the Rouge Valley

The Public Health Branch, accompanied by Public Health Ontario, conducted active tick surveillance in the eastern portion of the Rouge Valley in the fall. Two blacklegged ticks were found and subsequently tested negative for the Lyme disease bacteria. Tick dragging sessions conducted by Toronto Public Health and Durham Region Public Health, discovered an additional nine blacklegged ticks, and some ticks tested positive for *Borrelia burgdorferi*. This new information

suggests blacklegged ticks and Lyme disease are becoming established in the Rouge Valley. No ticks were found in the Rouge Valley during prior searches by all three public health units.

Public Health's response to the discovery of blacklegged ticks in Rouge Valley is based on a coordinated and collaborative approach

There are no control options for tick populations. Knowledge of the locations of emerging blacklegged tick populations and personal protection messaging to the public is critical in reducing the potential of locally acquired Lyme disease cases.

With the size and location of the Rouge Valley, the York Region Public Health Branch collaborated with Public Health Ontario, Toronto Public Health and Durham Region Public Health, Toronto and Region Conservation Authority, and Parks Canada for a coordinated response. This included the development of a joint media release by all three health units to notify the public of the establishing blacklegged tick population. The joint media release garnered comprehensive media coverage fielded by all three health units. All local municipalities were notified of the surveillance findings through the West Nile Virus Liaison Committee prior to the publication of the joint media release.

Fight the Bite! posters were posted on the trailheads in the park where the ticks were discovered in York Region and information was updated on the York Region website. Personal protection messaging was posted through York Region social media and a newspaper ad in the York Region Media Group publications.

Additional coordinated response activities between York Region, Durham Region, Toronto Public Health Units and Public Health Ontario include the notification and education of physicians in the area of the Lyme disease risk. Also, strategies for localized notification of the public will be explored and includes the development of standardized signs. These signs may be posted at locations where blacklegged ticks have been found through active tick surveillance - notifying the public to protect themselves from ticks.

Lyme disease cases reported to York Region Public Health in 2014 can be attributed to travel in endemic areas

Four confirmed human cases of Lyme disease were reported to York Region Public Health in 2014. Through case investigations, they were determined to be travel-related rather than locally acquired.

Table 2 provides a summary of York Region Lyme disease surveillance findings from 2010-2014.

Table 2
York Region Lyme Disease Summary 2010 - 2014

	2010	2011	2012	2013	2014
Lyme disease confirmed human cases*	1	3	2	12	4
<i>Borrelia burgdorferi</i> positive blacklegged ticks found locally through passive or active surveillance	NA**	1	0	0	1
Blacklegged ticks found locally through active tick surveillance	NA**	0	0	0	2

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

** No data available.

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

In 2014, 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 to municipal and Regional offices, libraries, community and recreation centres, garden centres, golf courses, Sibbald Point Provincial Park and conservation areas
- York Works newsletter ad distributed to every household in York Region
- West Nile virus and Lyme disease newspaper ads in York Region Media Group publications and multicultural newspapers
- Personal protection ads in municipal recycling calendars
- Information insert made available to principals for inclusion in individual school newsletters to parents and Healthy Schools newsletter article
- Being Well magazine article
- School board and day care centre guides
- *Fight the Bite!* display at various community events

Social media messages were increased from the previous year and vector-borne disease personal protection messaging provided by other health agencies such as Health Canada and Ministry of Health and Long-Term Care were retweeted and posted to York Region followers expanding the viewing audience. Media

interviews on West Nile virus and Lyme disease were also conducted with various media outlets to reinforce personal protection messaging throughout the season.

2015 Vector-Borne Disease Program

Objectives for 2015 will continue to focus on surveillance, public awareness and mosquito population control

The 2015 York Region Vector-Borne Disease Program will be very similar to the 2014 program.

- The Public Health Branch will continue surveillance related to West Nile, Eastern Equine Encephalitis and Lyme disease. Since so many factors, including temperature, precipitation and climate change have an effect on vector-borne diseases, it is not possible to predict virus or disease 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 enhanced response activities as the season unfolds.
- Education activities in 2015 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 2014, as will reduction of mosquito breeding sites through investigation of standing water complaints.

Link to key Council-approved plans

This report directly contributes to supporting the *2015-2019 Strategic Plan* objectives to “support community health and well-being” and “protecting public health”.

5. Financial Implications

Regional expenditures for the Vector-Borne Disease Program in 2014 totaled \$522,294. This was offset by 75% provincial subsidy of \$391,720, and Regional share being \$130,574. The program was managed within the Regional and provincial budget allocations.

The Regional budget for this program for 2015 is \$544,655. Provincial funding is anticipated to continue at 75% cost-share; however, provincial allocations have not yet been confirmed for 2015. 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 and conservation authorities through the West Nile Virus Liaison Committee. This group meets throughout the year to discuss vector-borne disease resources, surveillance trends, program updates and positive activity notification. 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 and Lyme disease, although the local mosquito population is also being monitored for Eastern Equine Encephalitis.

In 2015, the Public Health Branch will continue the mandated activities of the Vector-Borne Disease Program, including vector and disease surveillance, public education and awareness, mosquito vector control programs, and human case investigations.

For more information on this report, please contact Joe La Marca, Director, Health Protection at ext. 74025 or Joe Mancuso, Manager, Health Protection at ext. 74569.

The Senior Management Group has reviewed this report.

March 25, 2015

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