

Clause 17 in Report No. 6 of Committee of the Whole was adopted, without amendment, by the Council of The Regional Municipality of York at its meeting held on April 21, 2016.

17

Vector-Borne Disease Program 2015/2016 Annual Update

Committee of the Whole recommends adoption of the following recommendation contained in the report dated March 10, 2016 from the Medical Officer of Health and the Commissioner of Community and Health Services:

1. The Regional Clerk circulate this report to the local municipalities for information.
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Report dated March 10, 2016 from the Medical Officer of Health and the Commissioner of Community and Health Services now follows:

1. Recommendation

It is recommended that:

1. The Regional Clerk circulate this report to the 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 2015 Vector-Borne Disease Program and outlines activities planned for 2016.

3. Background

Vector-Borne diseases in Ontario include West Nile virus, 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 virus, 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 upon 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 through the Public Health Branch's mosquito 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.

Zika virus, chikungunya, dengue and yellow fever are spread through the bite of infected mosquitoes in other parts of the world. The mosquito species responsible for the spread of these illnesses has not been found in Ontario. Travel health notices for the Zika virus have been issued by the Public Health Agency of Canada and Centers for Disease Control and Prevention for a number of countries in Central and South America, as well as Mexico. The Public Health Agency of Canada recommends that all travellers protect themselves from mosquito bites when travelling to areas where the Zika virus is circulating. There is no vaccine or medication that protects against Zika virus infection.

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

To respond to vector-borne disease of public health importance, Ontario public 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,

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, as was seen in 2012.

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.

One human case of West Nile virus in York Region was reported in 2015

In 2015, the York Region Public Health Branch continued surveillance activities to monitor West Nile virus in mosquito and human populations. Seasonal normal temperatures and precipitation were recorded in southern Ontario throughout the spring and summer of 2015. West Nile virus activity remained low, with one human case reported and three mosquito pools testing positive in 2015. 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 2011 to 2015.

Table 1
York Region West Nile Virus Summary 2011 – 2015

	2011	2012	2013	2014	2015
West Nile virus confirmed human cases	1	17	1	0	1
West Nile virus positive mosquito pools	4	43	16	2	3
West Nile virus standing water complaint investigations	63	57	75	88	70

There were 82 confirmed human cases of West Nile virus in Canada in 2015, and 1,996 cases reported in the United States. No deaths were associated with West Nile virus in Canada; however 111 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 form, 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 13 years by York Region as the primary method for mosquito control.

Lyme Disease

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

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. The range of the blacklegged tick will continue to expand northward in the coming decades. 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.

To measure the local distribution and incidence of ticks and Lyme disease cases in York Region, 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 2015, passive tick surveillance resulted in seventeen blacklegged ticks being identified. Six blacklegged ticks were associated with travel to areas outside of York Region, including endemic areas. Eleven blacklegged ticks were found in York Region and submitted for laboratory testing. Passive tick submissions to the lab are used to assist in determining areas of risk. All eleven locally acquired ticks tested negative for the bacterium that causes Lyme disease.

Blacklegged ticks found in Joker's Hill (King Township) and Rouge Valley (City of Markham) through active tick surveillance

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, provincial parks, Regional forest tracts and ravines). 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.

Through active tick surveillance, the Public Health Branch found one blacklegged tick in King Township in the vicinity of Joker's Hill in the spring and four blacklegged ticks in the City of Markham's eastern portion of the Rouge Valley in the fall. All ticks subsequently tested negative for the Lyme disease bacteria.

The Rouge Valley has been identified as a risk area for blacklegged ticks after confirming the presence of blacklegged ticks for a second consecutive fall. Risk areas are zones defined around locations where blacklegged ticks have been identified through active tick surveillance and where humans have the potential to come into contact with infected ticks.

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.

Public Health's response to detection of blacklegged ticks focuses on notification of the public and raising awareness

York Region Public Health collaborated with Public Health Ontario, Toronto Public Health and Durham Region Public Health, Toronto and Region Conservation Authority, Lake Simcoe Region Conservation Authority, local municipalities and the Koffler Scientific Reserve for a coordinated response to the discovery of blacklegged ticks through active tick surveillance. This included timely notification of the public through media releases and partner agencies' communications.

Fight the Bite! permanent signs were posted on the trailheads in areas where the ticks were discovered in York Region. The signs identify blacklegged ticks have been found in the vicinity and provide information for the public on how to protect themselves from ticks. In addition to the signs, letters were sent to the school boards about the discovery of blacklegged ticks that was circulated to parents/guardians of school age children in York Region. Personal protection messaging was also updated on the York Region website, promoted through social media as well as newspaper ads in the York Region Media Group and multicultural publications in the spring and fall.

York Region, Durham Region, Toronto Public Health Units and Public Health Ontario coordinated additional response activities, including education and outreach to physicians practicing in the three health units. This was achieved by planning and hosting webinars through the Continuing Medical Education initiative, accredited by the College of Family Physicians of Canada to provide physicians information on blacklegged ticks and Lyme disease risk. An article on Lyme disease was also published in the York Region Public Health Matters e-newsletter that was circulated to all York Region physicians.

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

Seven confirmed human cases of Lyme disease were reported to York Region Public Health in 2015. 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 2011-2015.

Table 2
York Region Lyme Disease Summary 2011 - 2015

	2011	2012	2013	2014	2015
Lyme disease confirmed human cases *	3	2	13	5	7
<i>Borrelia burgdorferi</i> positive blacklegged ticks found locally through passive or active surveillance	1	0	0	1	0
Blacklegged ticks found locally through active tick surveillance	0	0	0	2	4

* all confirmed cases of Lyme disease are travel-related

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

In 2015, 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
- Social media messages on vector-borne disease personal protection
- Media interviews on West Nile virus and Lyme disease conducted with various media outlets to reinforce personal protection messaging
- 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 Region Matters spring newsletter ad on ticks and personal protection 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
- Blacklegged ticks and personal protection letter sent to school boards and circulated to all parents and guardians of school age children
- Healthy Schools newsletter article and information insert made available to principals for inclusion in individual school newsletters to parents

- West Nile virus and Lyme disease personal protection messaging available in school board and day care centre guides
- *Fight the Bite!* display at various community events

2016 Vector-Borne Disease Program

Objectives for 2016 will continue to focus on surveillance, public awareness and mosquito population control

The 2016 York Region Vector-Borne Disease Program will be very similar to the 2015 program.

- The Public Health Branch will continue surveillance related to West Nile virus, 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 2016 will continue to provide personal protection information to residents through various means, including print and social media.
- Leading up to March Break, education for residents travelling abroad has been enhanced on the York Region website and through social media to include links on mosquito-borne illnesses such as the Zika virus circulating in travel destinations and personal protection from mosquito bites.
- Mosquito control through larviciding will continue at the same levels as 2015, as will reduction of mosquito breeding sites through investigation of standing water complaints.

Link to key Council-approved plans

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

5. Financial Implications

Regional expenditures for the Vector-Borne Disease Program in 2015 totaled \$527,005. This was offset by 75% provincial subsidy of \$395,254, and Regional

share being \$131,751. The program was managed within the Regional and provincial budget allocations.

The Regional budget for this program for 2016 is \$546,926. Provincial funding is anticipated to continue at 75% cost-share; however, provincial allocations have not yet been confirmed for 2016. 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 Vector-Borne Disease 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 virus and Lyme disease, although the local mosquito population is also being monitored for Eastern Equine Encephalitis.

In 2016, 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 10, 2016

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Accessible formats or communication supports are available upon request