

Clause 11 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 20, 2017.

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## Vector-Borne Disease Program 2016/2017 Annual Update

Committee of the Whole recommends adoption of the following recommendation contained in the report dated March 24, 2017 from the Medical Officer of Health and Commissioner of Community and Health Services:

1. The Regional Clerk circulate this report to the Clerks of the local municipalities.
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Report dated March 24, 2017 from the Commissioner of Community and Health Services now follows:

### 1. Recommendation

It is recommended that:

1. The Regional Clerk circulate this report to the Clerks of the local municipalities.

### 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 2016 Vector-Borne Disease Program and outlines activities planned for 2017.

### 3. Background

Vector-Borne diseases of importance to Ontario residents include West Nile virus, Eastern Equine Encephalitis, Lyme disease and Zika 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, Eastern Equine Encephalitis and travel related Zika virus infections.

**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 varies from year to year, depending upon the weather and its 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** is spread through the bite of infected mosquitoes in other parts of the world. The mosquito species responsible for the spread of Zika virus and other illnesses such as chikungunya, dengue and yellow fever is not established in Ontario. According to Public Health Ontario, the relatively cooler temperatures of Ontario cannot support the establishment and spread of these vector mosquito species in the province. On rare occasions the vector of Zika virus (*Ae. Albopictus*) has been detected in Ontario. These exceptional findings of *Ae. albopictus* are due to adventitious insects likely entering via cross-border vehicular traffic and trade. Further research is currently underway at Brock University to determine if other mosquito species that are native to Ontario are capable of transmitting the virus.

Travel health notices for the Zika virus have been issued by the Public Health Agency of Canada for a number of locations including the Caribbean, Central America and Mexico, South America, Southeast Asia, Ocean Pacific Islands, and limited areas in West Africa and mainland United States in South Florida. It is recommended residents monitor travel health notices prior to travel.

As of February 7, 2017, the Ontario Ministry of Health and Long-Term Care reported 284 cases of travel-associated Zika virus infection in Ontario, with four cases classified as non-travel related e.g. through sexual transmission or fetal infection. Zika virus is not a reportable disease and the geographic breakdown of where residents who contract Zika virus are from is not available beyond provincial numbers.

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 Implications

##### West Nile Virus

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

Temperature and precipitation 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 if an adequate amount of standing water is available for mosquito breeding habitat.

Winter temperatures were unseasonably warm leading into 2016 and the summer months were warmer than normal. The Ministry of Agriculture and Agri-Food Canada reported moderate to severe drought conditions in the Greater

Toronto Area throughout the season. Drought conditions negatively impact the development cycle of the West Nile virus vector mosquitoes, accounting for low positive mosquito activity.

Public Health Ontario continues to monitor 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 week to week throughout the West Nile virus season.

Three human cases of West Nile virus in York Region were reported in 2016

In 2016, the York Region Public Health Branch continued surveillance activities to monitor West Nile virus in mosquito and human populations.

West Nile virus activity remained low, with three human cases reported and two mosquito pools testing positive in 2016. 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 2012 to 2016.

**Table 1**  
**West Nile Virus Surveillance Summary, 2012 to 2016, York Region**

	2012	2013	2014	2015	2016
Confirmed human cases	17	1	0	1	3
Probable human cases	0	0	1*	0	0
Positive mosquito pools	43	16	2	3	2
Standing water complaint investigations	57	75	88	70	73

\* Travel related

There were 100 confirmed human cases of West Nile virus in Canada in 2016, and 1,789 cases reported in the United States. Seven fatal cases were reported in Canada and 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 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 fourteen 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.

To measure the local distribution and incidence of ticks and Lyme disease cases in York Region, the York Region Public Health uses three surveillance techniques to help determine the level of risk in the community:

- **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 (tick dragging) 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.

Passive tick surveillance offers important information in regions with newly established and/or expanding blacklegged tick populations

Passive tick submissions are used to assist in determining where additional surveillance (tick dragging) is required to identify Lyme disease risk areas. In 2016, fifty-eight ticks were submitted through passive tick surveillance to the Ontario Public Health Lab for identification. Of the fifty-eight ticks submitted:

- Twenty-nine (50%) were identified as blacklegged ticks
- Twenty-nine (50%) were identified as other tick species (e.g. dog tick) which do not spread Lyme disease.
- Fifteen blacklegged ticks were locally acquired in York Region

The locally acquired ticks were found by residents with reported travel to woodland habitat mostly within: the City of Markham's eastern portion of the Rouge Valley and extending northward into The Town of Whitchurch-Stouffville; King Township in the vicinity of Joker's Hill; and the Humber Valley in the City of Vaughan. To date, all locally acquired ticks tested negative for the bacterium that causes Lyme disease. There are currently two ticks pending results from the National Microbiology Lab. While the probability is low, it's possible to encounter an infected tick almost anywhere in Ontario.

Active tick surveillance concentrates on locations where passive tick surveillance indicates areas of emerging blacklegged tick populations

York Region Public Health conducted tick dragging sessions at 22 locations throughout the spring and fall in natural, forested public spaces (e.g. municipal parks, conservation areas, provincial parks, Regional forest tracts, Rouge and Humber River valley systems). 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. Since 2011, York Region Public Health has conducted active tick surveillance throughout the region.

While York Region Public Health did not find blacklegged ticks through active tick surveillance in 2016, blacklegged ticks were found in King Township in the vicinity of Joker's Hill and in the City of Markham's eastern portion of the Rouge

Valley in previous years. All ticks subsequently tested negative for the Lyme disease bacteria. Active tick surveillance will continue to concentrate on areas where passive tick surveillance indicates potential emerging tick populations.

The southeast portion of York Region, including the Rouge Valley has been identified by Public Health Ontario as a Lyme disease risk area. Risk areas are defined as wooded or brushy areas within a 20 kilometre radius zone around locations where blacklegged ticks have been found through drag sampling, during two dragging events (once in spring and again in the fall; from May through October). It is within these areas 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 collaborates 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 if blacklegged ticks are discovered through active tick surveillance. This includes 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 through active tick surveillance 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 areas where passive surveillance indicates the presence of blacklegged ticks, but active tick surveillance has not verified an established tick population, personal protection information was posted for the public.

Confirmed and probable cases of Lyme disease are reportable

Under the *Health Protection and Promotion Act*, public health units are required to report a specific list of reportable diseases to the Ministry of Health and Long-Term Care for local and provincial disease surveillance. For Lyme disease, all confirmed and probable cases are reportable.

While conducting case investigations, it may be determined some cases have weaker laboratory evidence. If these cases were exposed to ticks in a risk area where Lyme disease is known to circulate, the cases are classified as confirmed,

if not, they are probable. Therefore, a probable case of Lyme disease may suggest new locations where Lyme disease transmission could be occurring and where active tick surveillance is used to confirm establishing blacklegged tick populations. In York Region in 2016, there were six confirmed cases of which two cases were locally acquired and one probable case that was also locally acquired.

**Table 2**  
**Lyme Disease Surveillance Summary, 2012 to 2016, York Region**

	2012	2013	2014	2015	2016
Confirmed human cases	2	13	6	7	6 <sup>1</sup>
Probable human cases	2	3	3 <sup>2</sup>	2	1 <sup>3</sup>
Blacklegged ticks found locally through passive tick surveillance	1	4	7	11	15
Blacklegged ticks found locally through active tick surveillance	0	0	2	4	0
<i>Borrelia burgdorferi</i> positive blacklegged ticks found locally through passive or active surveillance	0	0	1	0	1 <sup>4</sup>

Notes:

<sup>1</sup> Two locally acquired cases

<sup>2</sup> Two locally acquired cases

<sup>3</sup> One locally acquired case

<sup>4</sup> Passive tick submission with reported local travel and to a known risk area outside York Region

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

In 2016, 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
- Twitter Check-up Chat on Vector-Borne diseases conducted in the spring

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- 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
- West Nile virus and Lyme disease information in the Take a Hike Trail Guide and York Regional Forest materials
- Healthy Schools newsletter article and personal protection messaging posted by school boards for school staff
- West Nile virus and Lyme disease personal protection messaging available in school board and day care centre guides
- Presentations to community groups on Vector-Borne diseases, surveillance efforts and personal protection messaging
- *Fight the Bite!* display at various community events

## 2017 Vector-Borne Disease Program

Objectives for 2017 will continue to focus on surveillance, public awareness and mosquito population control

The vector and human case trends experienced in York Region are reflective of the activity levels associated with various environmental and ecological influences and are mitigated by the pre-emptive and response activities of York Region Public Health. As a result, the 2017 York Region Vector-Borne Disease Program will be very similar to the 2016 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 2017 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 2016, as will reduction of mosquito breeding sites through investigation of standing water complaints.

## 5. Financial Considerations

Regional expenditures for the Vector-Borne Disease Program in 2016 totaled \$549,326. This was offset by provincial subsidy of \$407,800, and Regional share being \$141,526. The program was managed within the approved Regional budget for Public Health.

The Regional budget for this program for 2017 is \$549,243. Provincial funding is anticipated to continue at the same level as 2016; however, provincial allocations have not yet been confirmed for 2017. The program will be managed within approved Regional budget for the Public Health Branch.

## 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 2017, the Public Health Branch will continue the mandated activities of the Vector-Borne Disease Program, including vector and disease surveillance, public

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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 1-877-464-9675 ext.74025.

The Senior Management Group has reviewed this report.

March 24, 2017

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Accessible formats or communication supports are available upon request