

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 19, 2018.

11

Vector-Borne Disease Program 2017/2018 Annual Update

Committee of the Whole recommends adoption of the following recommendation contained in the report dated March 23, 2018 from the Medical Officer of Health and the 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 23, 2018 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 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 2017 Vector-Borne Disease Program and outlines activities planned for 2018.

3. Background

To respond to vector-borne diseases 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

Vector-Borne diseases are diseases 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.

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 York Region Public Health'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 warmer climatic zones. 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 North America, Central Africa and West Africa. It is recommended residents monitor travel health notices prior to travel.

Mosquitoes responsible for spread of Zika virus have been found in Windsor

Two mosquito species that can spread the Zika virus, *Aedes albopictus* and *Aedes aegypti*, have been discovered in Windsor. The *Aedes aegypti* is thought

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to be responsible for the majority of human cases of Zika virus infection worldwide. The discovery was made during enhanced surveillance for invasive mosquito species in the Windsor-Essex County Health Unit. All the mosquitoes captured tested negative for Zika virus disease. These exceptional findings of *Aedes albopictus* and *Aedes aegypti* are likely due to adventitious insects entering via cross-border vehicular traffic and trade.

The mosquitoes responsible for the spread of Zika virus and illnesses such as chikungunya, dengue, and yellow fever are not established in Ontario. According to Public Health Ontario, the relatively cooler temperatures of Ontario cannot support establishment and spread of these vector mosquito species in the province. The Windsor-Essex County Health Unit will continue enhanced surveillance for these mosquitoes over the next few years.

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

Winter temperatures were unseasonably warm leading into 2017, allowing more overwintering mosquitoes to survive. Greater numbers of mosquitoes that survive the winter increase the potential for amplification of the number of mosquitoes the following West Nile virus season.

While the summer months were relatively cool compared to previous years, the spring and summer months were among the 10 wettest since recording started in 1948. The wet conditions provided ample amounts of standing water available for mosquito breeding, which leads to increased mosquito numbers. The increase in mosquito populations and warmer temperatures late in the summer contributed to an increase in West Nile virus activity.

In 2012, unprecedented West Nile virus activity was likely due to warmer than average winter temperatures, an early spring, and record-breaking summer temperatures. The increase of the mosquito population and virus occurred relatively early in the summer of 2012 compared to other years. Higher temperatures decreased the required time for mosquito development leading to more infected mosquitos which has a direct impact on the rate of human infection.

In contrast, from 2013 to 2016 various ecological factors such as below normal temperatures or drought like conditions may have contributed to lower levels of West Nile virus activity.

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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 throughout the season.

Twelve West Nile virus human cases reported in 2017

In 2017, York Region Public Health continued surveillance activities to monitor West Nile virus in mosquito and human populations. 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 2017.

West Nile virus activity increased in 2017, with twelve human cases reported and fourteen mosquito traps testing positive.

Table 1
West Nile Virus Surveillance Summary, 2012 to 2017, York Region

	2012	2013	2014	2015	2016	2017
Confirmed human cases	17	1	0	1	3	12*
Probable human cases	0	0	1*	0	0	0
Positive mosquito pools	43	16	2	3	2	14
Standing water complaint investigations	57	75	88	70	73	122

* One case reported travel outside Ontario

There were 190 confirmed human cases of West Nile virus in Canada in 2017, and 2,002 cases reported in the United States. Eight fatal cases were reported in Canada and 121 deaths were reported in the United States. There were no deaths in York Region.

Larviciding is 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

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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 fifteen years by York Region as the primary method for mosquito control.

LYME DISEASE

Surveillance is 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. While the probability is low, it is possible to encounter an infected tick almost anywhere in Ontario.

To measure the local distribution and incidence of ticks and Lyme disease cases in York Region, 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. Residents are encouraged 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. Locally acquired passive tick surveillance results are further investigated through active tick surveillance. 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 to determine Lyme disease risk areas. 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.

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York Region Public Health has conducted active tick surveillance throughout the region since 2011.

- **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.

Blacklegged ticks found through passive tick surveillance increased in 2017

Passive tick submissions are used to assist in determining where additional surveillance (tick dragging) is required to identify Lyme disease risk areas. In 2017, one hundred and thirteen ticks were submitted through passive tick surveillance to the Ontario Public Health Lab for identification, double the number of ticks submitted in 2016. Of the 113 submitted:

- fifty-three were identified as blacklegged ticks
- sixty were identified as other tick species (e.g. dog tick) which do not spread Lyme disease
- thirty-five 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, one locally acquired tick has tested positive for the bacterium that causes Lyme disease.

Two new Lyme disease risk areas have been identified in York Region through active tick surveillance

York Region Public Health conducted tick dragging sessions at 33 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). Attachment 1, York Region's Active Tick Surveillance 2017 map outlines the locations of active tick surveillance and

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where blacklegged ticks were found. The locations selected for active tick surveillance were based primarily on passive tick surveillance findings.

In the 2017 spring and fall tick dragging sessions, ten blacklegged ticks were found:

- King Township in the vicinity of Joker's Hill
- the Town of Whitchurch-Stouffville in the vicinity of the York Regional Forest North Tract

As a result, two new Lyme disease risk areas have been identified by Public Health Ontario in the areas surrounding Joker's Hill and the York Regional Forest North Tract. The Rouge Valley area was identified by Public Health Ontario as a Lyme disease risk area in 2015.

Public Health Ontario Lyme disease maps are updated on a yearly basis and assists clinicians in the diagnosis and/or treatment of Lyme disease, with potential exposures in risk areas. Attachment 2, Public Health Ontario's, Lyme Disease Map 2017 outlines estimated risk areas in Ontario. Risk areas are calculated as a 20 kilometre radiuses from the centre of a location where blacklegged ticks were found through drag sampling. This map currently does not include York Region's new locations in King Township or Town of Whitchurch-Stouffville, which will be noted in the 2018 map release.

Additionally, blacklegged ticks were found in the Boyd and Kortright Conservation Areas in the City of Vaughan in the fall. One blacklegged tick found in the Kortright Conservation Area tested positive for the bacterium that causes Lyme disease. Active tick surveillance will continue to monitor if this is an emerging risk area.

Confirmed and probable cases of Lyme disease increased in 2017

Before 2016, there were very few cases that were locally acquired. In 2016/2017 there were significantly more cases of Lyme disease in York Region, compared to previous years. This could be due to the expanding risk areas within York Region's geographic boundaries and the identification of black legged ticks through tick dragging.

Lyme disease activity in York Region increased in 2017, with seventeen confirmed human cases and four probable cases reported. Ten of these 21 confirmed and probable cases may have been acquired in York Region, nine were likely acquired outside of York Region, and two were unknown.

Table 2 provides an overview of York Region Lyme disease surveillance findings from 2012 to 2017.

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Table 2
Lyme Disease Surveillance Summary, 2012 to 2017, York Region

	2012	2013	2014	2015	2016	2017
Confirmed human cases	2	13	6	8	5 ¹	17 ³
Probable human cases	2	3	3	2	5 ²	4 ⁴
Blacklegged ticks found locally through passive tick surveillance	1	4	7	11	15	35
Blacklegged ticks found locally through active tick surveillance	0	0	2	4	0	10
Positive blacklegged ticks found locally through passive or active surveillance	0	0	1	0	1 ⁵	2

Notes:

¹ Cases likely acquired outside York Region

² Cases possibly acquired in York Region

³ Eight cases possibly acquired in York Region, nine cases likely acquired outside York Region

⁴ Two cases possibly acquired in York Region, two cases unknown acquisition

⁵ Passive tick submission with reported local travel and to a known risk area outside York Region

Vector-Borne disease management and treatment

Prevention is the best defence against West Nile virus and Lyme disease. There are no vaccines to prevent or medications to treat West Nile virus. Fortunately, most people infected with West Nile virus do not have symptoms. About one in five people who are infected develop a fever and other symptoms. About one out of 150 infected people develop a serious, sometimes fatal, illness.

For Lyme disease, there are no vaccines to prevent the illness. Early detection of infection is important to help reduce the risk of developing long-term health effects. People treated with appropriate antibiotics in the early stages of Lyme disease usually recover rapidly and completely.

Residents can reduce the risk of Vector-Borne diseases by utilizing personal protection measures.

Personal protection communications were enhanced in 2017 due to increased West Nile virus and Lyme disease risk

Education and awareness are necessary to reduce the risk of vector-borne disease because 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. In 2017, West Nile virus and Lyme disease awareness was achieved through strategies, such as:

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- 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
- Creation of a new YouTube educational video on Lyme disease, blacklegged ticks and personal protection
- *Fight the Bite!*
 - permanent tick signs posted at risk area trailheads and timely notification of blacklegged tick surveillance findings to the public through media releases and communications in collaboration with York Region Forestry, local municipalities and conservation authorities
 - display and presentations at community events on Vector-Borne diseases, surveillance efforts and personal protection messaging
- *What's Bugging You?* child storybook about mosquitoes and ticks provided to all libraries
- West Nile virus and Lyme disease ads in York Region Media Group publications, multicultural newspapers and municipal recycling calendars
- Personal protection messaging published in school board and day care centre guides and Take a Hike Trail Guide

2018 VECTOR-BORNE DISEASE PROGRAM

Objectives for 2018 include continued focus on surveillance, public awareness and mosquito population control

The vector and human case trends experienced in York Region are reflective of the environmental and ecological influences. The 2018 York Region Vector-Borne Disease Program is very similar to the 2017 program in that it will also focus on both prevention and response activities.

- Surveillance related to West Nile virus, Eastern Equine Encephalitis and Lyme disease will continue. Since so many factors have an effect on vector-borne diseases (such as temperature, precipitation and climate change), it is not possible to predict virus or disease activity for the coming season with any degree of accuracy. However, Public Health 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 2018 will continue to provide information about personal protection to residents through various means, including print and social media.
- Mosquito control through larviciding will continue at the same levels as 2017, 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 2017 totaled \$550,113 gross (\$138,113 net). The program was managed within the approved Regional budget for Public Health.

The Regional budget for this program for 2018 is \$551,606 gross (\$139,606 net), although provincial allocations have not yet been confirmed for 2018.

Additional resources within the mandatory programs of Public Health support the Vector-Borne Disease program to ensure compliance with the Ontario Public Health Standards.

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

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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

Under the Health Protection and Promotion Act and the Ontario Public Health Standards, 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. The local mosquito population is also being monitored for Eastern Equine Encephalitis.

In 2018, Public Health 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 1-877-464-9675 ext.74025.

The Senior Management Group has reviewed this report.

Approved for Submission:

Bruce Macgregor
Chief Administrative Officer

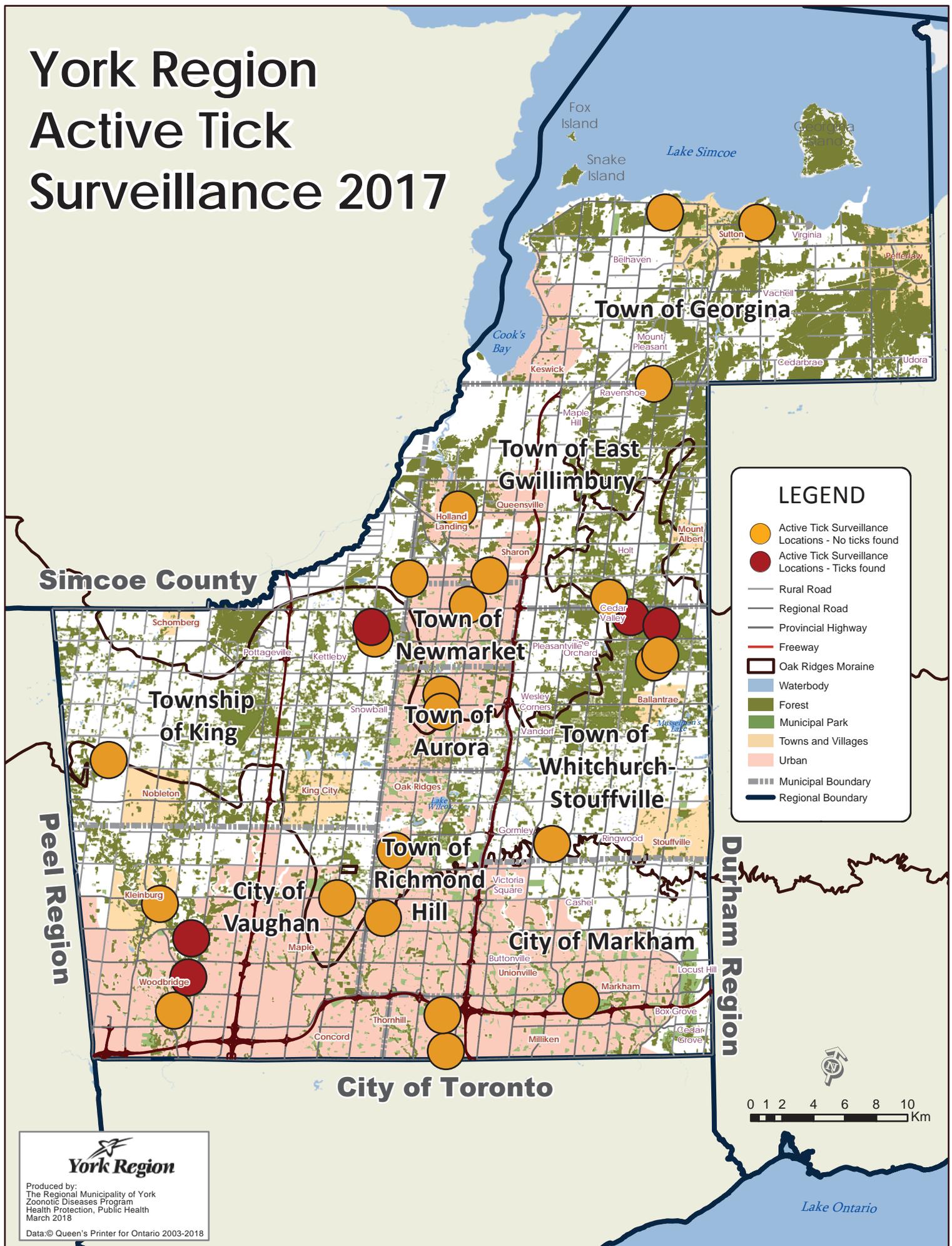
March 23, 2018

Attachments (2)

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Accessible formats or communication supports are available upon request

York Region Active Tick Surveillance 2017

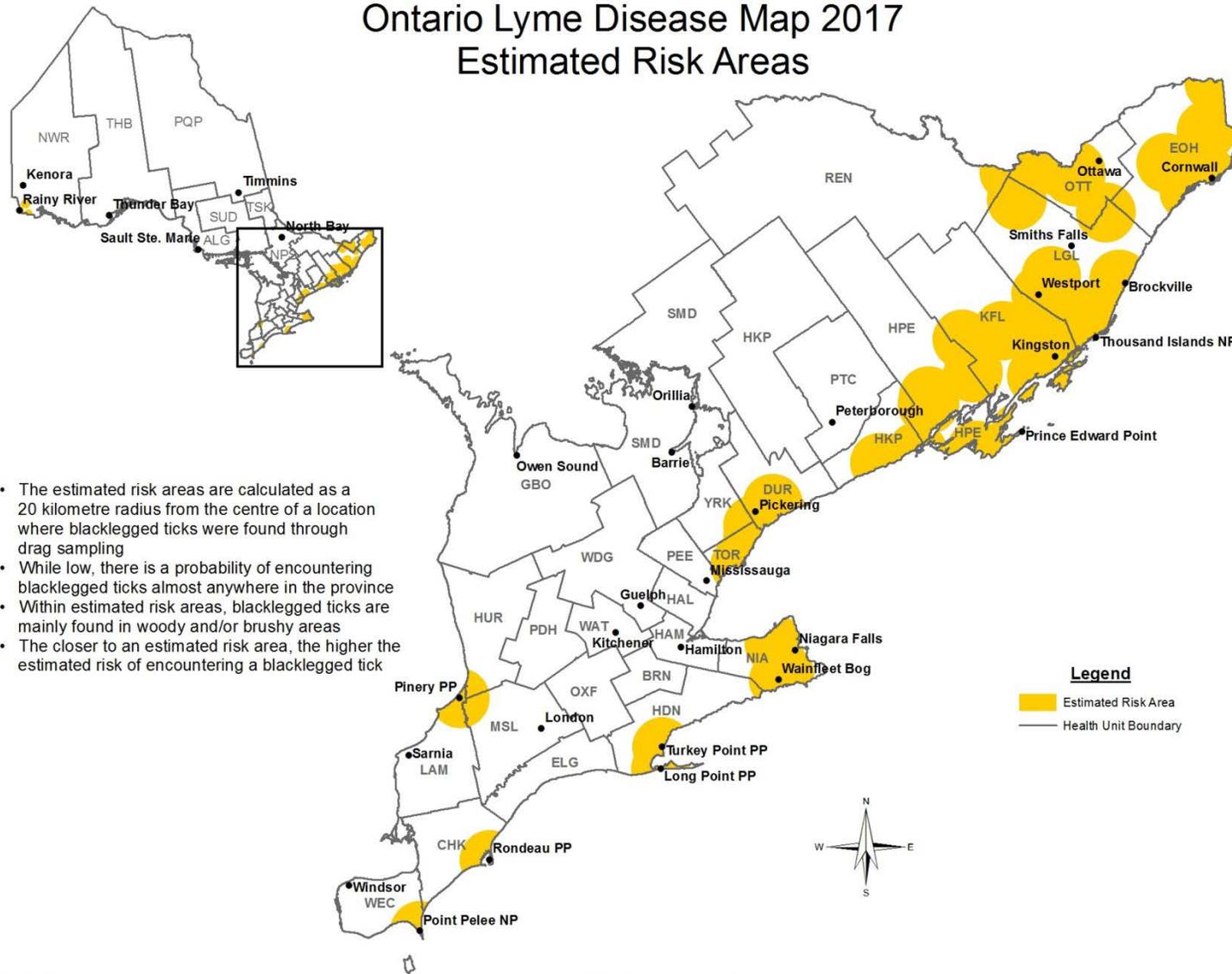


York Region

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Ontario Lyme Disease Map 2017 Estimated Risk Areas



- The estimated risk areas are calculated as a 20 kilometre radius from the centre of a location where blacklegged ticks were found through drag sampling
- While low, there is a probability of encountering blacklegged ticks almost anywhere in the province
- Within estimated risk areas, blacklegged ticks are mainly found in woody and/or brushy areas
- The closer to an estimated risk area, the higher the estimated risk of encountering a blacklegged tick

Legend
 Estimated Risk Area
 Health Unit Boundary

For more information, please visit www.publichealthontario.ca/lymedisease