

Program/Service Information Report

Vector-borne Disease Program – Ticks and Mosquitoes 2022

To:	Chair and Members of the Board of Health
Meeting Date:	March 1, 2023
Report No.:	BH.01.MAR0123.C05
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Key Points

Mosquito Surveillance and Control Program:

- The annual surveillance and control program is our region's main mosquito control initiative and serves as an early warning system for West Nile virus (WNV)
- Positive mosquito samples identified through routine trapping and reported human cases of West Nile virus have remained low over the past decade
- Climate change and urbanization have increased mosquito habitats and populations in other parts of Ontario, suggesting the importance of maintaining a robust mosquito surveillance and control program over the summer months

Tick Surveillance Program:

- Wellington-Dufferin-Guelph Public Health (WDGPH) will be launching a digital (online and mobile-friendly) tick submission process which will broaden the reach of the passive tick surveillance program this summer
- Digital submissions support data collection and will aid in identifying tick exposures in the community for future targeted health promotion and collaboration with partner agencies

Program Requirements

Compliance with OPHS and Accountability Indicators:

- In compliance
 Not in compliance

Highlights

Mosquito Surveillance and Control Program

The Mosquito Surveillance and Control Program involves a combination of surveillance activities with the application of environmentally-friendly larvicide for mosquito control. The Canadian Centre for Mosquito Management Inc. (CCMM) supports the program through catch basin (storm drain) and surface water treatments, mosquito surveillance, responds to standing water complaints referred from WDGPH and municipal partners, and provides species identification and viral testing of adult mosquitoes collected through mosquito trapping.

Mosquito Control

Larvicide treatments are applied by Ministry of Environment, Conservation and Parks (MECP) certified technicians. Larvicide reduces or eliminates mosquito populations that transmit WNV and other mosquito-borne diseases. Larvicide is applied to breeding sites where standing water cannot be eliminated or is more difficult to control, including municipal catch basins, stormwater management ponds and roadside ditches. Table 1, shows the number of treatments applied in the 2022 season. Standing water complaints within the City of Guelph are supported by the City of Guelph Property Standards Inspection Department (By-law Number (2003) – 1719). Complaints outside the City of Guelph are addressed by the WDGPH service provider.

Table 1: Mosquito Control data from 2022 season in WDG Region

Roadside catch basins treatments	<ul style="list-style-type: none">• 25,761 catch basins and storm drains treated• Four (4) rounds of treatment applied from 6 June – 24 August 2022
Stagnant surface water inspections and treatments	<ul style="list-style-type: none">• 115 stagnant surface water sites identified and treated.• 1873 site inspections and 83 treatments from 19 May – 25 Sept 2022• 0.3328 hectares of stagnant surface waters treated

Mosquito Surveillance

Surveillance activities in 2022 included collecting both adult and larval life stages of the mosquito species such as *Culex restuans* and *Culex pipiens*, which are considered vector

species known to transmit WNV. Mosquitoes collected in the WDGPH surveillance program are identified, and viral analysis is conducted for the presence of WNV (Table 2).

Table 2: Mosquito Surveillance Data from 2022 season in WDG Region	
Mosquito trapping	<ul style="list-style-type: none"> • 14 trap site locations selected • 206 traps deployed • 251 trap samples were analyzed
Mosquito pools (samples)	<ul style="list-style-type: none"> • 3,214 adult mosquitoes trapped • 63% of adult mosquitoes trapped were vector species • 251 pools collected and tested • 0 pools positive for WNV

The number of positive mosquito pools has remained low over the past decade ranging between 0-3 positive pools most years and five positive pools in 2013. Local human infections of WNV remain low, fluctuating between 0-2 cases annually over the past decade (Table 3).

Table 3 Ten-year mosquito data extracted from a iPHIS November 23, 2022		
Year	positive mosquito pool counts	human case counts ^a
2012	2	2
2013	5	0
2014	0	1
2015	0	0
2016	0	1
2017	3	1
2018	2	0
2019	0	1
2020	0	2
2021	1	1
2022	0	0

Media and Public Education

Public education convey simple steps that the public can take to reduce their risk of contracting the WNV. Key messages include measures to prevent mosquito bites, eliminating standing water on the property to reduce mosquito breeding areas and raising awareness about local larviciding efforts. In 2022, a media release was issued that resulted in 13 media mentions. Social media metrics are summarized in Table 4.

Table 4: Media data for WNV Program 2022			
Webpage	Unique page views ^b	Social media posts (Total across all platforms ^a)	
		Impressions	Engagement
Webpage	233	n.a.	n.a.
Blog	413	9451	151

^a Platforms include Facebook, Twitter and Instagram.

^b Unique page views – number of individual users who visited the webpage

Tick Surveillance Program

Lyme disease is caused by the bacterium *Borrelia burgdorferi*, transmitted to humans by the bite of infected female or nymphal stage of Black-Legged Ticks (BLTs). An infected BLT must be attached and feeding for at least 24 hours to transmit the bacterium. Public Health's Lyme disease prevention program focuses on BLT surveillance and public education.

Passive Tick Surveillance

Passive surveillance involved accepting ticks submitted by the public, found on human and animal hosts for identification. The tick submission process was modified in 2020 because of the COVID-19 pandemic. Public Health shifted from accepting physical specimens from the public to accepting emailed photographs of ticks for identification as the Public Health Agency of Canada's (PHAC) National Laboratory stopped accepting BLTs for testing. When a tick is identified as a BLT by a Public Health Inspector, education is provided to prevent future exposure. The individual is advised to consult a primary healthcare provider for clinical advice on whether to begin treatment with antibiotics.

The volume of tick submissions has increased since 2017 which is attributable to increased public awareness from education campaigns. It is important to note that after 2019, many of the ticks submitted did not have data collected to identify where the tick was acquired.

Consequently, the numbers reported in Table 5 below for ticks and BLTs acquired locally in 2020 and 2021 may be underestimated due to the COVID-19 pandemic. To manage the increase in tick submission volumes, improve data collection and reach within the community, a digital mobile-friendly tick submission process will be launched for the 2023 season.

Year	Ticks Submitted (acquired locally)	BLT Submitted (acquired locally)	Positive ^a BLT (acquired locally)
2012	7 (4)	3 (2)	1 (1)
2013	13 (3)	8 (2)	2 (0)
2014	16 (6)	14 (5)	2 (1)
2015	85 (50)	28 (19)	3 (0)
2016	72 (41)	26 (20)	2 (2)
2017	234 (131)	94 (41)	9 (3)
2018	192 (107)	82 (52)	2 (1)
2019	371 (225)	197 (123)	10 (3)
2020^b	118 (45)	56 (25)	n.a.
2021^b	218 (63)	74 (21)	n.a.
2022^b	113 (n.a.)	66 (n.a.)	n.a.

^aRefers to BLTs that tested positive for *Borrelia burgdorferi*.

^bSurveillance methods and capacity changed after 2019 as a result of the COVID-19 pandemic. After 2019, many of the ticks submitted did not have data collected on where the tick was acquired and numbers for ticks and BLTs acquired locally is likely underestimated.

Active Tick Surveillance

Active tick surveillance uses a sample method called *tick dragging*. This method consists of dragging a white cloth over and around vegetation and the habitat of certain tick species. In past years, active surveillance was supported by the Ontario Veterinary College at the University of Guelph. Resources were unavailable in 2022 to conduct a robust active tick surveillance program. However, limited tick-dragging activities took place at Belwood Conservation Area in East Garafraxa and Preservation Park in Guelph which yielded one tick.

Lyme Disease Risk Areas

Each year, Public Health Ontario (PHO) releases an [Ontario Lyme Disease Map](#) showing the estimated risk areas of Lyme disease across Ontario (Figure 1). Prior to 2018, WDGPH was not part of the risk areas identified by PHO. In recent years, risk areas have grown, and in 2022 southern and northwestern portions of Wellington-Dufferin-Guelph (WDG) are included. It is important to note that BLTs can still be found outside of the identified higher-risk areas.

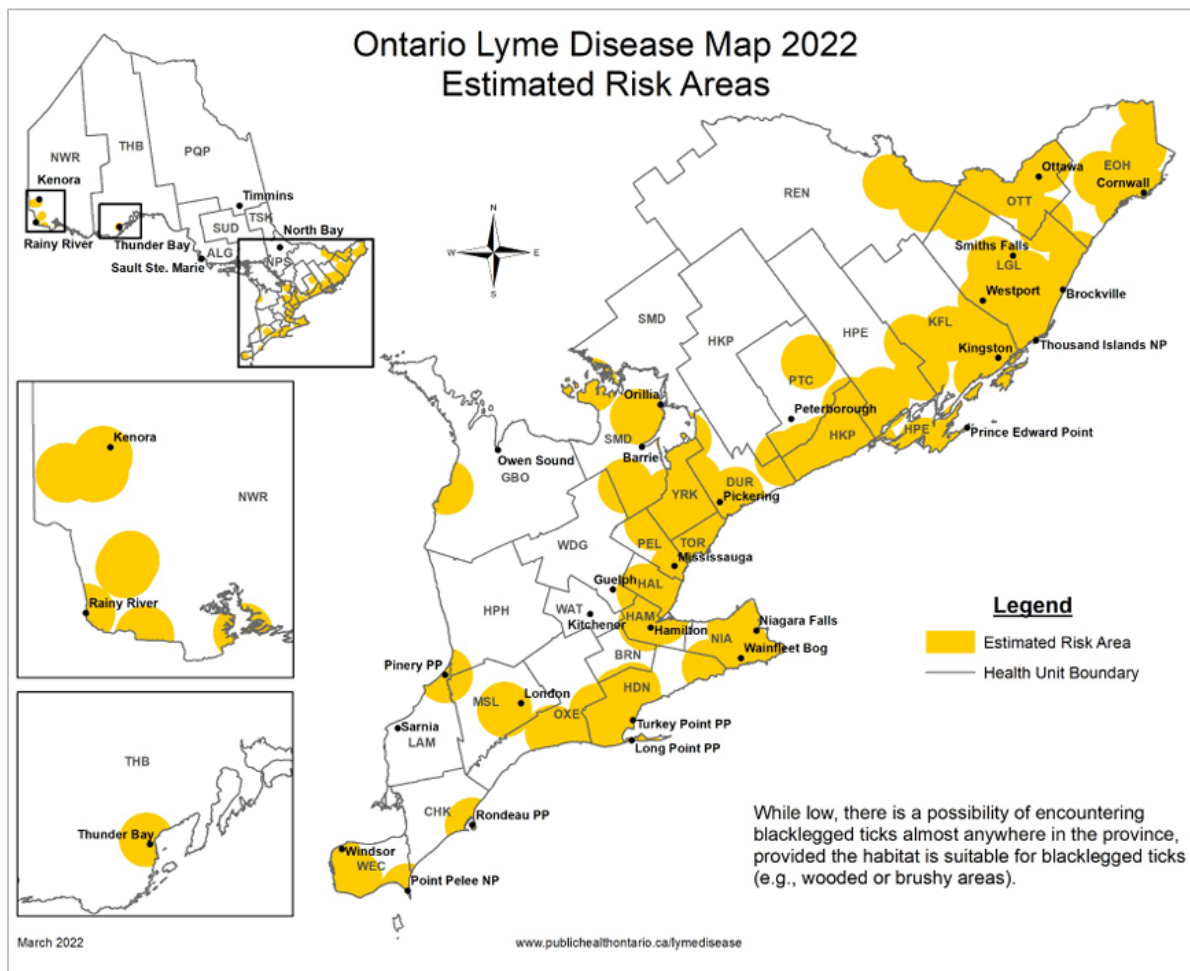


Figure 1 Ontario Lyme Disease Map 2022 Estimated Risk Areas Source: [Public Health Ontario – Surveillance Report. Ontario Lyme Disease Map 2022: Estimated Risk Areas](#)

Local cases of Lyme disease have remained relatively stable, with some evidence of a slight increase in recent years. It is important to note that cases reported locally may have been travel-related and many with an unknown exposure location.

Table 5 Five-year Human Cases Counts of Lyme Disease reported in WDG	
Year	human case counts ^a
2018	8
2019	10
2020	6
2021	12
2022	14

^a PHO Infectious Disease Query (extracted November 24, 2022)

Media and Public Education

Public education continued and included a blog highlighting the PHO risk area map, prevention and preparedness, and the series of steps to follow if you find a tick. Social media metrics are summarized in the table below.

Table 6: Medica and Public Education data for Ticks in WDG 2022			
Webpage	Unique page views ^b	Social media posts (Total across all platforms ^a)	
		Impressions	Engagement
Webpage	1,498	n.a.	n.a.
Blog	825	10,245	414

^a Platforms include Facebook, Twitter and Instagram

^b Unique page views – number of individual users who visited the webpage

Vector-borne Disease and Climate Change

The risk of West Nile virus and Lyme disease is projected to increase due to climate change. Warmer winters and increasing precipitation are likely to impact mosquito survival and reproductive rates, the length of the activity season, and an expansion of the range of vectors northwards. A warmer climate extends tick survival and activity period and has the potential to increase the range of *tick hosts*, such as deer and mice, increasing the likelihood of human exposure. Local surveillance, control, public education and prevention measures have proven to play a significant role in reducing the risk of vector-borne diseases within WDG communities.

Related Reports

- Climate Change and Health Vulnerability Assessment Report and associated knowledge products (wdgpublichealth.ca/climatechangeandhealth)