2017 Tick and Lyme Disease Summary

TO:	Chair and members of the Board of Health
MEETING DATE:	April 4, 2018
REPORT NO:	**BH.01.APR0418.R09** Pages: 13
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Recommendations

It is recommended that the Board of Health:

1. **Receive this report for information.**

Key Points

- Lyme disease is transmitted through the bite of an infected blacklegged tick and in recent years Ontario has seen an increase and expansion of blacklegged tick populations.
- In 2017, there were eight confirmed cases and one probable case of Lyme disease reported within Wellington Dufferin Guelph (WDG) (3.1 cases per 100,000 people), which is an increase from previous years.
- Passive surveillance involved accepting ticks from human and animal hosts for identification purposes. Throughout 2017, a total of 234 ticks were submitted to Wellington-Dufferin-Guelph Public Health (WDGPH) and approximately 40% were identified as blacklegged ticks. This a sharp increase from the number of submissions in previous years. Four blacklegged ticks acquired within the borders of Wellington and Dufferin Counties tested positive for *Borrelia burgdorferi*, the bacteria that causes Lyme disease.
- Active surveillance continued in 2017. Passive surveillance, combined with knowledge of suitable tick habitat, was used to identify priority areas for tick dragging. No blacklegged ticks were found through active surveillance.
- WDGPH's prevention and control program for Lyme disease focused on passive and active surveillance for blacklegged ticks, as well as education and communication efforts focused on the cause and symptoms of Lyme disease, characteristics of blacklegged ticks, preventing tick bites and tick removal.

Discussion

Lyme disease is a bacterial infection that is transmitted through the bite of an infected blacklegged tick. It is the most commonly reported vector-borne disease in North America. While there are several different species of ticks found in Ontario, only the blacklegged tick is capable of transmitting Lyme disease. The majority of reported human cases occur as a result of exposure to areas known to harbour infected blacklegged ticks.[1] In recent years, Ontario has seen an increase and expansion of blacklegged tick populations, which is at least partially attributable to climate change.[2]

Blacklegged Ticks

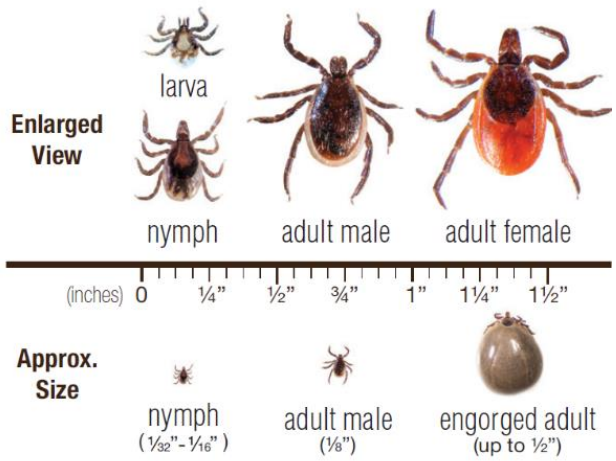


Figure 1: *Blacklegged ticks at different stages of development and after feeding.*

Blacklegged ticks have a two-year life cycle, first hatching from an egg and then developing through the larval, nymph and adult stages. Blood is the tick's only source of nutrition and is required to pass from one stage of development to the next.[3] Ticks are not infected with *Borrelia burgdorferi*, the bacteria that causes Lyme disease, upon hatching. However, the bacteria can be transmitted to them when they feed on infectious animal hosts, such as small rodents.[4] **Figure 1** shows how different blacklegged ticks look at different stages of development and after a blood meal. A recent study concluded that the prevalence of infected blacklegged ticks is increasing in Ontario.[5] A detailed diagram of the blacklegged tick life cycle can be found in **Appendix A**.

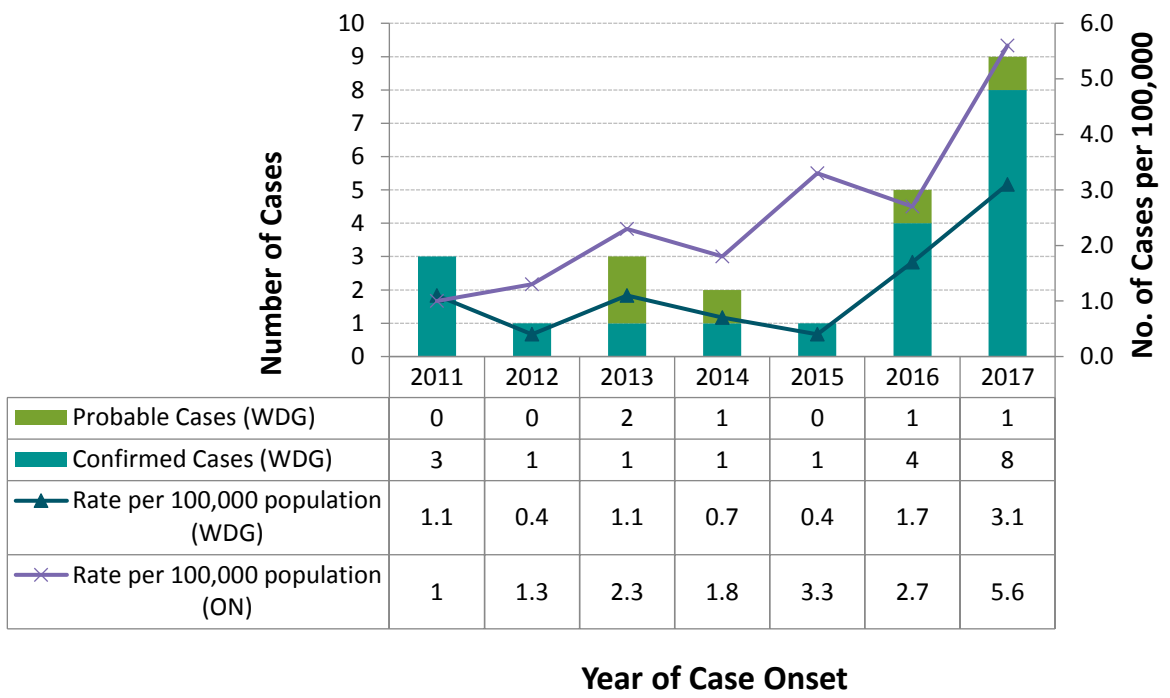
Public Health Ontario updates a Lyme disease risk area map annually (**Appendix B**). Estimated risk areas on this map are identified through passive and active surveillance. They are defined as locations where blacklegged ticks have been identified or are known to occur and where humans have the potential to come into contact with infected ticks. In Ontario, most estimated risk areas are found on the north shores of Lake Ontario and Lake Erie and the St. Lawrence River. Just prior to the completion of this report Hamilton was added to the 2018 risk map. Since the province uses a 20 kilometer radius around risk areas, a small portion of Puslinch is now included in the 2018 estimated risk map. While the risk is still low, the possibility of encountering a blacklegged tick almost anywhere in the province exists as they feed on and are transported by migratory birds. Climate change (more specifically, the increase in mean annual degree days above 0°C) is a driving force behind the recent expansion of the blacklegged tick population in Ontario.[3]

Lyme Disease

Lyme disease can be difficult to diagnose and early signs and symptoms typically begin between three and 30 days after being bitten by an infected blacklegged tick. Most infected people experience mild, flu-like symptoms shortly after exposure including fever, headache, fatigue, muscle and joint aches and swollen lymph nodes. Some people experience a bulls-eye rash at the site of the tick bite. Most cases of Lyme disease can be effectively treated with two to four weeks of antibiotics. Untreated individuals may experience more severe symptoms that can last from months to years. These include severe headaches, facial paralysis, heart and neurological disorders and arthritis. In rare cases, Lyme disease can lead to death.[6] There is currently no human vaccine available for the disease.[7]

Lyme Disease in WDG and Ontario

Lyme disease is reportable in Ontario. In 2017, there were eight confirmed cases and one probable case of Lyme disease reported within WDG. Taking into account population size, there were 3.1 cases of Lyme disease per 100,000 people. Note that local rates are based on a very low number of cases and need to be interpreted with caution. In comparison, in Ontario there were 5.6 cases per 100,000 people in 2017. This is an increase from previous years, as can be seen in Figure 2.



	2011	2012	2013	2014	2015	2016	2017
Probable Cases (WDG)	0	0	2	1	0	1	1
Confirmed Cases (WDG)	3	1	1	1	1	4	8
Rate per 100,000 population (WDG)	1.1	0.4	1.1	0.7	0.4	1.7	3.1
Rate per 100,000 population (ON)	1	1.3	2.3	1.8	3.3	2.7	5.6

Data source: iPHIS, 2011 – 2017 Case counts and crude rates of reportable diseases by year. Date extracted: Jan 10, 2018.

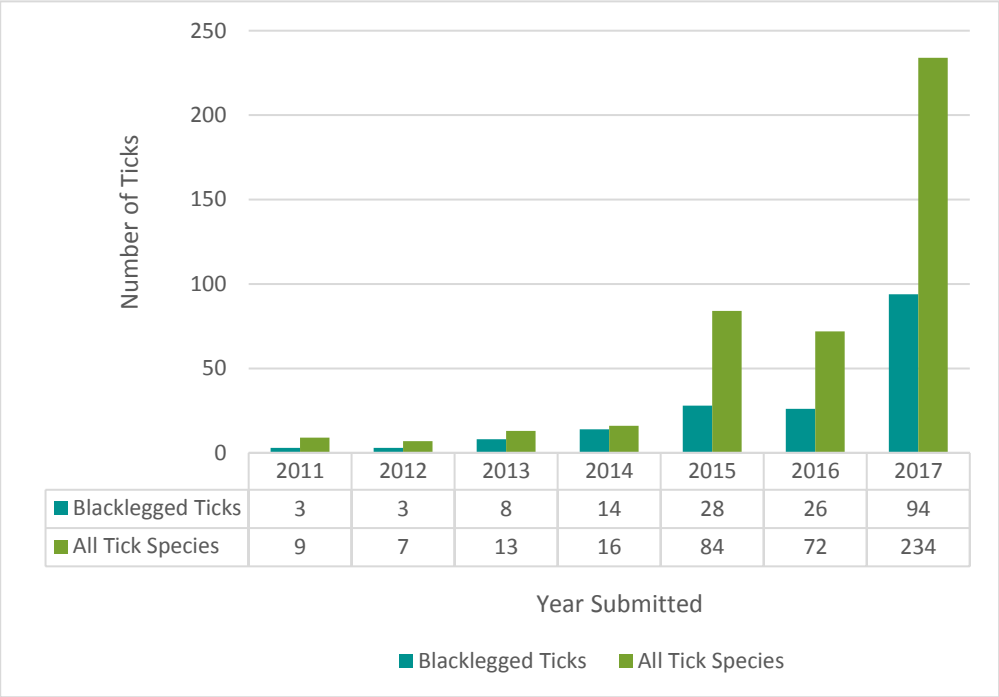
***Figure 2**: Reported Cases of Lyme disease in WDG, 2011-2017*

WDGPH's Prevention and Control Program

With the continued expansion of the range of blacklegged ticks in Ontario, Lyme disease has the potential to become a more serious public health threat. WDGPH's prevention and control program for Lyme disease focuses on passive and active surveillance for blacklegged ticks, as well as stakeholder communication and education.

Passive Surveillance

Prior to 2011, tick inquiries were rare. WDGPH began recording the number and type of ticks that were submitted by the public in 2011 and has seen a steady increase in tick inquires. Throughout 2017, a total of 234 ticks were submitted and 91 of them were identified as blacklegged ticks. This represents a sharp increase from the number of submissions in previous years (Figure 3).



	2011	2012	2013	2014	2015	2016	2017
Blacklegged Ticks	3	3	8	14	28	26	94
All Tick Species	9	7	13	16	84	72	234

***Figure 3**: Tick Submissions to WDGPH, 2011-2017*

Of the 91 blacklegged ticks that were submitted (three were returned to the submitter), 43 were reported as having been acquired within the borders of Wellington and Dufferin Counties. Tick submissions via WDGPH did not represent the total of all ticks reported from within the health unit. Health Canada's National Microbiology Laboratory recorded a further 34 blacklegged ticks submitted by private laboratories and veterinary hospitals bringing the total number of blacklegged ticks submitted within the borders of Wellington and Dufferin Counties to 77. Of ticks tested, seven percent tested positive *B. burgdorferi*, the bacteria that can cause Lyme disease. See **Appendix C** for a graphical summary of the above numbers.

Active Surveillance

Considering the blacklegged tick's expanding range and population numbers, and the corresponding increase in tick-human encounters, WDGPH began active surveillance in 2015 in partnership with the University of Guelph. Active surveillance was conducted by "tick dragging" in areas with suitable habitat for blacklegged ticks, preferred hosts, and the bacteria. Standard operating procedures based on Public Health Ontario guidelines were adopted [8].

Tick dragging involves "dragging" a 1m x 1m square of white flannel fabric attached to a wooden pole through a potential tick habitat so "questing" ticks will attach to the material. Each of the

following locations were dragged twice in 2017, once in spring/early summer, and once in late summer/early fall:

- Island Lake Conservation Area, Orangeville
- Luther Marsh, Grand Valley
- Smith Loop Property, Puslinch
- Belwood Conservation Area, East Garafraxa
- Preservation Park, Guelph
- Guelph Lake Conservation Area, Guelph-Eramosa

In 2017, no blacklegged ticks were found through active surveillance initiatives.

Communication and Education

Tick Identification Workshops

In the summer of 2017, WDGPH hosted five tick identification workshops in partnership with the University of Guelph's Department of Environmental Biology. This was the first time that this type of workshop has been offered. The workshops were designed and led by a public health inspector with an expertise in entomology, and extensive fieldwork in tick and Lyme disease research. Four workshops were offered to external partners and one workshop was conducted for public health inspectors at WDGPH. There were a total of 69 external workshop participants, primarily comprised of public health inspectors from other health units and registered veterinary technicians. These workshops were a capacity-building opportunity to strengthen knowledge about the species of ticks in our environment, as well as skills in tick identification and risk assessment and communication regarding human-tick encounters. Evaluation results indicated that the workshops were well received and the knowledge and skills learned by participants were later applied at their home organizations.

Communication with Physicians

In May 2017, a detailed physician's advisory was distributed with information about blacklegged ticks, the tick submission process, signs and symptoms of Lyme disease and treatment guidelines. A second physician's advisory was distributed in August 2017 that focused on the process for submitting ticks to WDGPH for identification in an effort to build baseline data for the health unit and to decrease wait times for patients submitting ticks for identification. Due to the significant increase in tick submissions to the Public Health Laboratory of Ontario, wait times for identifications grew to 8-10 weeks, or longer, during peak season for adult blacklegged ticks.

Public Education

In 2017, several strategies were used to raise awareness among the community regarding Lyme disease and steps for preventing tick bites:

- Approximately 1,100 tick identification cards (**Appendix D**) were distributed to veterinary offices, physician offices, College Royal, community events and WDGPH offices.
- The tick and Lyme disease webpage was updated and had over 1,600 unique page views in 2017. This is an increase from 477 unique page views in 2016.
- In March 2017, WDGPH had a table at College Royal and provided information on ticks and Lyme disease to approximately 900 people over two days.
- A blog was posted on the WDGPH website. This blog had 124 unique page views.
- Key messages were tweeted and posted on Facebook.
- The tick ID submission form was re-designed and made available online.

Conclusion

In 2017, WDGPH saw an increase in tick submissions, as well as an increase in the rate of Lyme disease, which corresponds to increases seen provincially. This may be due in part to increased awareness of ticks and Lyme disease among the public. However, it is known that population numbers of blacklegged ticks are increasing and the geographic range of blacklegged ticks is expanding in Ontario and is expected to continue with WDG's favorable habitat. This reinforces the importance of and need for WDGPH's tick and Lyme disease program to focus on active and passive surveillance, as well as stakeholder communication and education.

Ontario Public Health Standard

Infectious and Communicable Disease Prevention and Control

The board of health shall develop a local vector-borne management strategy based on surveillance data and emerging trends in accordance with the *Infectious Diseases Protocol, 2018.*

WDGPH Strategic Direction(s)

☐ **Health Equity:** We will provide programs and services that integrate health equity principles to reduce or eliminate health differences between population groups.

☒ **Organizational Capacity:** We will improve our capacity to effectively deliver public health programs and services.

☒ **Service Centred Approach:** We are committed to providing excellent service to anyone interacting with WDG Public Health.

☒ **Building Healthy Communities:** We will work with communities to support the health and well-being of everyone.

Health Equity

People who work outside or enjoy outdoor activities like hiking, camping, or hunting are at higher risk for tick bites, particularly those people who work in or visit provincial parks.[9] Anecdotally, a large number of tick submissions come from people who have recently spent time at their cottages, highlighting another population at risk for tick bites. Given these factors, WDGPH accepts and identifies ticks acquired from areas outside of WDG, so as to allow WDG residents who may have acquired the tick outside of WDG, the opportunity to confirm the tick's identification and risk of carrying *Borrelia burgdorferi,* the bacteria that causes Lyme disease.

References

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10. Ontario Agency for Health Protection and Promotion (Public Health Ontario). [Internet]. Backlegged Tick Life Cycle. [updated 2016; cited 2018 February 2]. Available from:

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11. Ontario Agency for Health Protection and Promotion (Public Health Ontario). [Internet]. Ontario Lyme Disease Map 2016: Estimated Risk Areas. [updated 2017 June; cited 2018 February 2]. Available from: https://www.publichealthontario.ca/en/eRepository/Lyme_disease_risk_areas_map.pdf

Appendices

Appendix A – Blacklegged tick life cycle[10]

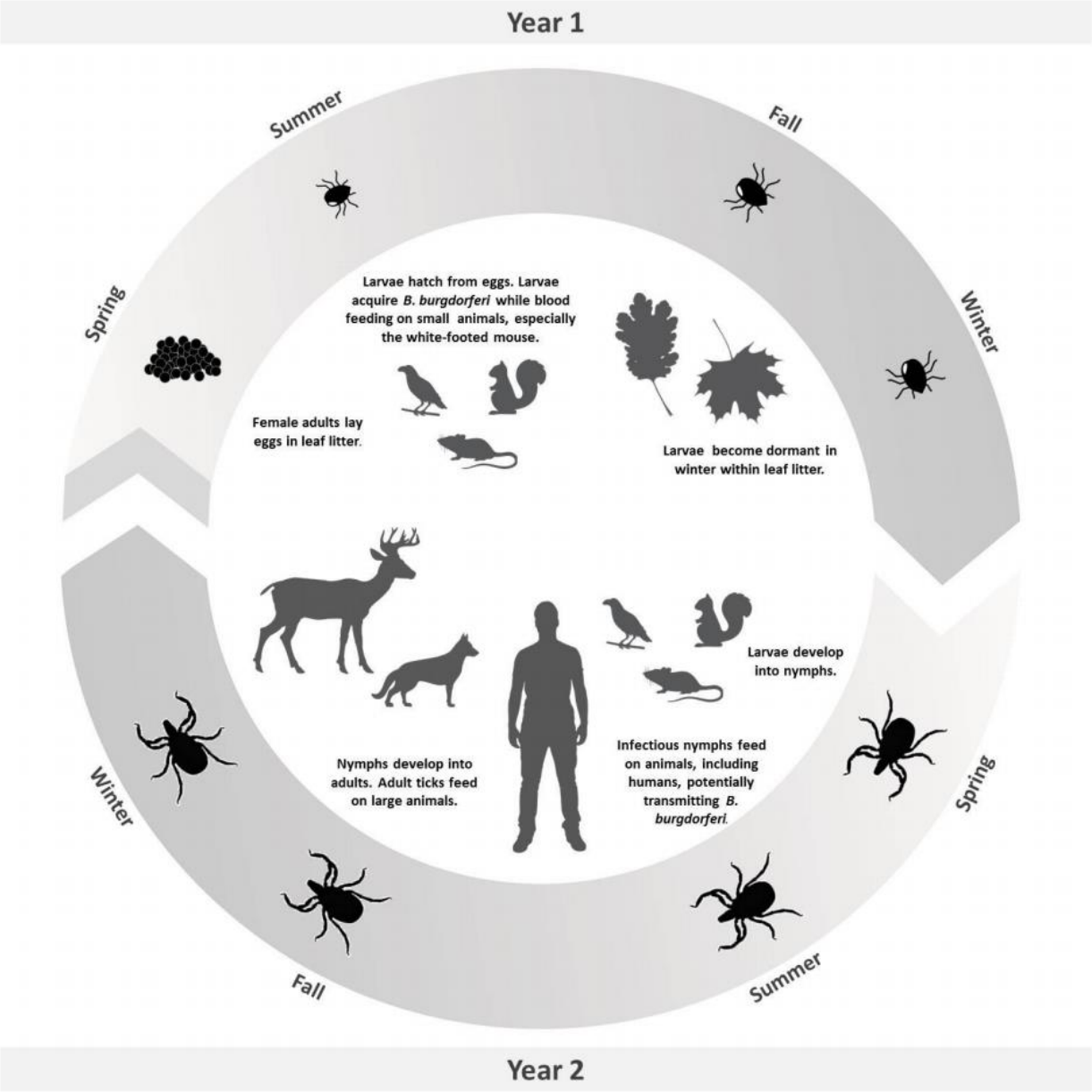
Appendix B – Public Health Ontario map of estimated risk areas for Lyme disease in Ontario[11]

Appendix C – 2017 Summary of Tick Submissions by Passive Surveillance for WDG

Appendix D – WDGPH's Tick Identification Card

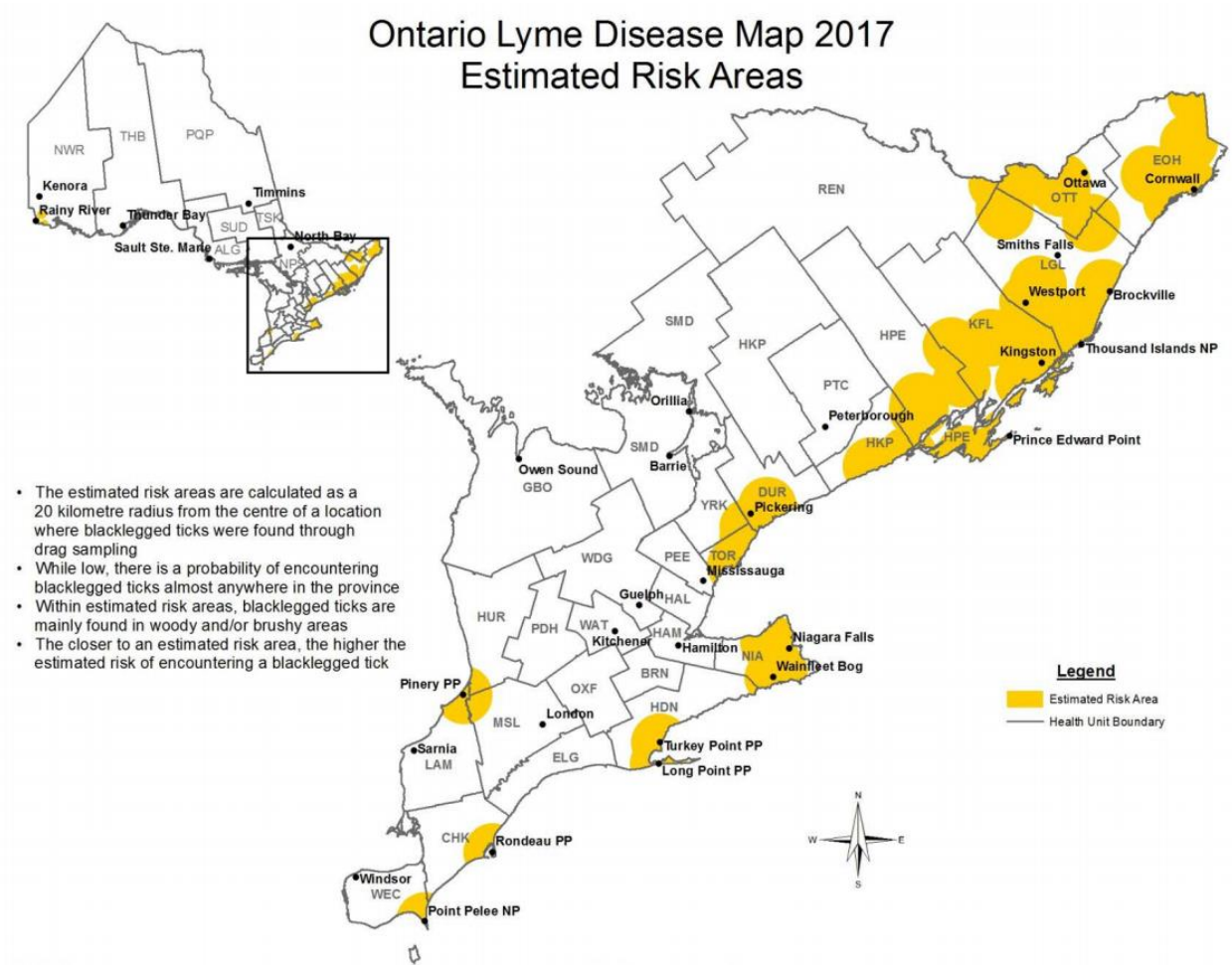
Appendix A

Blacklegged tick life cycle [10]

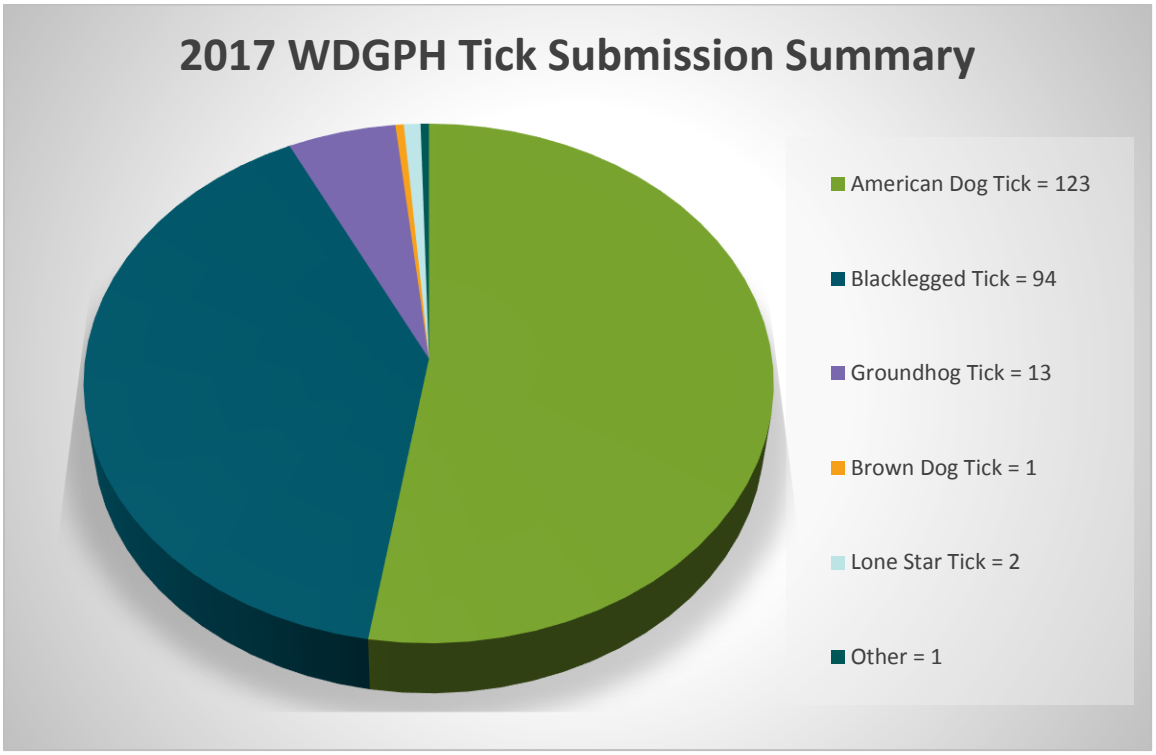


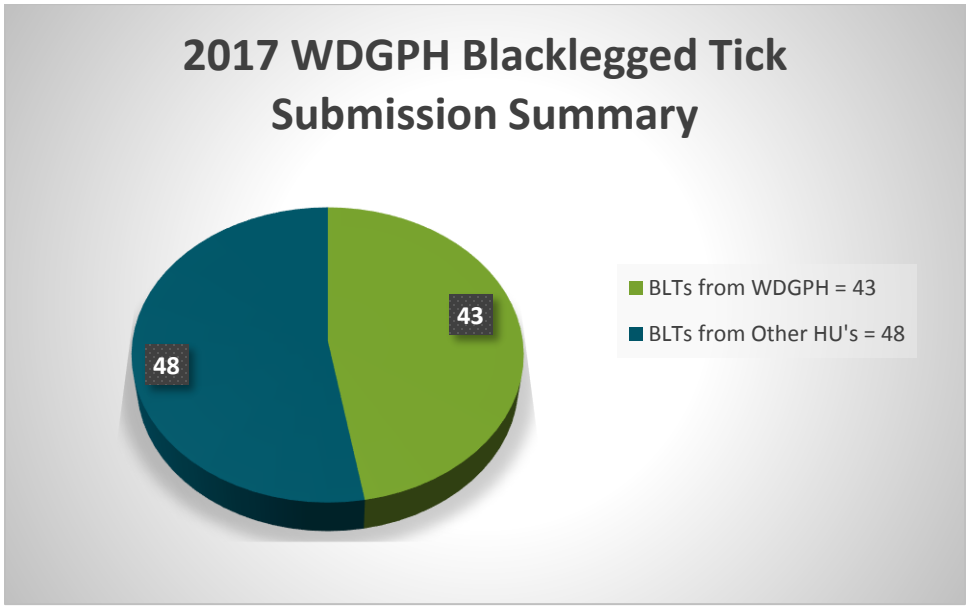
Appendix B

Public Health Ontario map of estimated risk areas for Lyme disease in Ontario [11]



Appendix C


2017 WDGPH Tick Submission Summary
American Dog Tick = 123
Blacklegged Tick = 94
Groundhog Tick = 13
Brown Dog Tick = 1
Lone Star Tick = 2
Other = 1


2017 WDGPH Blacklegged Tick Submission Summary
43
48
BLTs from WDGPH = 43
BLTs from Other HU's = 48

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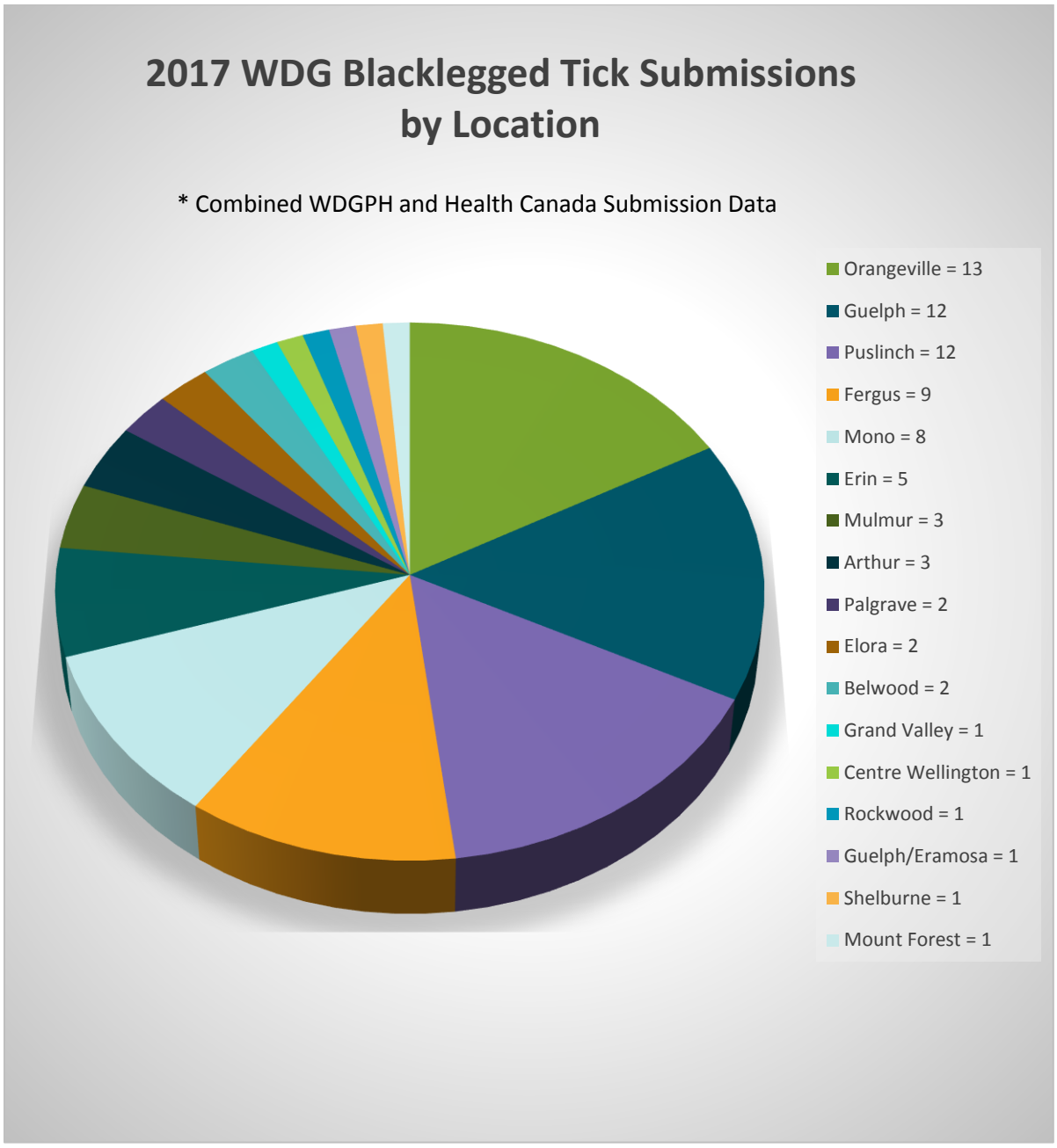

Appendix D

WDGPH's Tick Identification Card