

# Tick Borne Diseases Response Plan

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# Nova Scotia Tick Borne Disease Response Plan - 2010

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# Nova Scotia Tick Borne Diseases Response Plan

## 1.0 INTRODUCTION

The NS Tick Borne Diseases Response Plan was developed in order to respond to evidence that Lyme disease (Ld) and its vector, Ixodes scapularis or Blacklegged ticks (BLTs) are present in the province. BLT's have been confirmed to be established/endemic in 3 areas of the province. Isolated BLT's that have tested positive for Borrelia burgdorferi (bacteria that can cause Lyme disease) have been found in many other areas of Nova Scotia. Lyme disease is caused by infection with the spirochete Borrelia burgdorferi (Bb).

The Plan also incorporates other tickborne diseases such as Human Granulocytic Anaplasmosis (HGA) which is caused by infection with Anaplasma phagocytophilum (Ap). Ap can also be transmitted to humans by the BLT. There are other tick borne diseases as well that are briefly mentioned including Babesiosis.

An interagency, interdisciplinary group, the Nova Scotia Vector Borne Diseases Working Group (NSVBDWG), was set up and is chaired by Nova Scotia Health Promotion and Protection (NSHPP). The Working Group developed, maintains and implements the plan with support from NS Health Promotion and Protection (HPP) and other partners. The key components of the plan include:

- Surveillance for human tick borne illnesses
- Surveillance of distribution and infection of vectors for tick borne diseases
- Prevention and control of human infection of tick borne diseases
- Communication to public, media and health care professionals

## 2.0 GOALS AND OBJECTIVES OF PLAN

### Goal:

To monitor and reduce the risk of infection with tick borne diseases (Lyme disease, Human Granulocytic Anaplasmosis and other tick borne diseases) in Nova Scotia.

### Objectives:

- To assess the presence and spread of ticks and tick borne disease in NS.
- To assess the risk of human infection from tick borne disease in NS.

- To assess the incidence of infection of humans with tick borne diseases in NS.
- To increase the awareness of the public and health care professionals (HCP's) about where, in NS, the risk for being infected with a tick borne disease is increased.
- To increase awareness of the public and HCP's about typical symptoms and signs of tick borne diseases.
- To provide information to the public and HCP's about effective ways to prevent exposure to and infection with tick borne diseases.
- To identify and implement strategies to control the spread of vectors of tick borne disease if possible.

### **3.0 BACKGROUND**

*Ixodes Scapularis* (Blacklegged ticks) are the primary source for vector borne diseases in Nova Scotia, including human anaplasmosis and Lyme disease. Blacklegged ticks were first identified in Nova Scotia in 2002 and the first human cases of Lyme disease were confirmed as well. Migrating birds can carry BLT's which may be brought into areas of NS. Blacklegged ticks often do not become established/endemic as the appropriate climate and habitat are not always present. BLT's have become established/endemic in a few areas in NS. An area is considered established/endemic when Blacklegged ticks reproduce from year to year and can be found at all stages, from nymph to adult. Adult Blacklegged ticks normally feed on deer while nymphs primarily feed on small rodents such as mice and squirrels.

Humans may become infected through the bite of an infected nymphal, larval or adult BLT. People may be exposed to BLT's that are often present in long grass or shrubbery in areas where they have become established/endemic. The risk of infection is very low if the tick is removed within 24 hours of attachment.

The risk of Lyme disease, Anaplasmosis and other tick borne diseases is generally low but increases in areas with established/endemic populations of Blacklegged ticks. Other ticks in NS, such as the common dog tick, cannot transmit Lyme disease or Anaplasmosis.

Human cases of Lyme disease and Anaplasmosis rarely cause death. Transmission of bacteria from BLT's to humans usually occurs after the infected nymphal, larval or adult BLT has been attached for 24 hours or more.

#### **3.1 Lyme Disease Clinical Picture**

The symptoms are manifested in stages: early localized, early disseminated and late disease.

**Early localized:**

A distinctive rash occurs at the site of a recent tick bite. The rash, erythema migrans (EM), appears 3-32 days after the tick bite (mean of 7-10 days) as a red macule or papule and expands over days to weeks to form a large, annular, erythematous lesion that is usually 5 cm or more in diameter. Lesions less than 5 cm in diameter are less likely to represent EM and may be local reactions to the tick saliva. The lesion may have a partial central clearing and is usually painless and not pruritic. Localized EM can vary greatly in shape and size and may have necrotic or vesicular areas in the centre. With or without EM other symptoms may include fever, malaise, headache, fatigue, stiff neck, and myalgia and arthralgias. 70-80% of those infected with Lyme disease have an EM rash. Not all patients who develop Lyme disease present with initial EM.

**Early disseminated:**

15% of patients present with multiple erythema migrans. This rash often occurs several weeks after the tick bite. Rash consists of secondary annular, erythematous lesions, usually smaller than, the primary lesion. Other symptoms in this stage may include palsies of the cranial nerves, lymphocytic meningitis, and conjunctivitis. Arthralgia, myalgia, headache and fatigue may also be seen. Rarely, various degrees of heart block can be seen.

**Late disease:**

Most commonly seen is relapsing arthritis usually in large joints, particularly knees. Peripheral neuropathy and central nervous system symptoms can rarely occur.

Late disease is rarely, if ever, fatal. Many symptoms and signs can resolve spontaneously and are effectively treatable with antibiotics. Non-cutaneous signs and symptoms are usually prevented with prompt antibiotic treatment.

**HUMAN GRANULOCYTIC ANAPLASMOSIS (HGA)****Clinical Illness**

Typical symptoms of HGA include acute self limited fever, headache, malaise, thrombocytopenia, leucopenia, and increased hepatic transaminases. Illness can range from mild to severe, with less than 1% case-fatality.

People with underlying immuno-suppression are at a greater risk of severe disease. Antibiotic therapy can reduce the risk for developing serious illness or death.

The incubation period for HGA ranges from 5 – 14 days. (Heyman 2008 and American Academy of Pediatrics 2009)

## **BABESIOSIS**

### **Clinical Illness**

Human cases are often asymptomatic or associated with mild symptoms that may include fever, nonspecific flu-like symptoms, and hemolytic anemia. Common findings include fever, chills, myalgia, fatigue and jaundice that may occur secondary to hemolytic anemia and can last from several days to a few months.

### **3.2 Epidemiology**

Sampling of BLT's submitted by the public, veterinarians and health care professionals has sporadically shown the presence of isolated BLT's that test positive for tick borne diseases, in several locations in the province. However, it does not appear that BLT's or Ld have become established/endemic in all areas. To date, only 3 areas have been confirmed to have established/endemic Blacklegged tick populations; Areas in and around Lunenburg, Admiral's Cove area in Bedford, and Gunning Cove in Shelburne county.

BLT's in all three established/endemic BLT areas have tested positive for *Borrelia burgdorferi* (Lyme) The infectivity rate varies. As well, all three established/endemic BLT areas have had low rates of Anaplasmosis detected in BLTs. Babesiosis has only been detected in a small mammal sample in Lunenburg area to date.

The risk for human infection with Ld or other tick borne diseases in areas where BLT's are not established/endemic is considered to be very low.

Human cases of Lyme disease and Anaplasmosis are reportable under the Health Protection Act to NS Health Promotion and Protection. Lyme disease has been confirmed in humans in NS. There have been no human cases of Anaplasmosis to date. One horse was confirmed with Anaplasmosis in 2009. No cases of Babesiosis have been reported in NS.

## **4.0 KEY ELEMENTS OF TICK BORNE DISEASES RESPONSE PLAN**

### **4.1 Nova Scotia Vector Borne Diseases Working Group**

The Nova Scotia Vector Borne Diseases working group was established in 2010 but originated from the Tick Borne Diseases working group which initiated in 2002. The group consists of experts in vectors and human health

related to vector borne diseases. The group works together to ensure a consistent and coordinated approach to protecting Nova Scotians from vector borne diseases, including those transmitted by ticks. This group of experts is responsible for developing and implementing this Tick Borne Diseases Response Plan and for the ongoing assessment of risk to Nova Scotians. Members represented on the working group have different roles and responsibilities.

The working group meets regularly to monitor all activities related to the response plan.

## **4.2 Human Surveillance**

### **Objectives:**

- To assess the incidence of infection of humans with tick borne disease in NS.

National case definitions are available for human Lyme disease. Health care workers are required to notify Public Health of all human cases of Lyme disease and Human Granulocytic Anaplasmosis. Public Health will determine if the case meets the case definition and will then initiate investigation of the case.

Details on Public Health investigation and management, as well as case report forms are found in the Communicable Disease Prevention and Control Manual. Also, please refer to section 4.6 for information on laboratory diagnostics.

## **4.3 Vector/Other surveillance**

### **PASSIVE SURVEILLANCE**

#### **Objectives:**

- To monitor geographic location and spread of black legged ticks (BLTs) in NS over time.
- To identify the percentage of BLTs positive for Lyme disease, babesiosis and/or Anaplasmosis (Ap).
- To inform decisions concerning where to conduct active surveillance.

NSHPP invites members of the public, physicians and veterinarians to submit ticks that have been found to be attached to people or pets for identification. Samples can be sent to local offices of Department of Natural Resources

(DNR) or can be mailed to the Museum of Natural History in Halifax. Ticks other than dog ticks are forwarded by DNR to the National Microbiology Laboratory (NML) for further identification and testing for *Borrelia burgdorferi*, Ap and Babesiosis.

## **ACTIVE SURVEILLANCE**

### **Objectives:**

- To identify locations within NS where BLTs and Ld are established.

Dragging for Blacklegged ticks (a process to collect BLT's) to assess the presence of various life stages of BLT's and testing of small mammals to assess the presence of *Borrelia burgdorferi* and Ap is conducted in areas where there is reason to suspect that BLT's, Lyme or Ap may be prevalent. Suspicion about establishment may be based on clusters of BLT's submitted as part of the passive surveillance system, the reporting of confirmed human cases in an area, surveillance for BLT's on deer or reports from veterinarians about dogs that test positive for Ld with the IDEXX test.

Active surveillance is conducted by DNR and the Public Health Agency of Canada (PHAC). Serological samples from small mammals and all collected BLT's are tested for, *Borrelia burgdorferi*, Ap and *Babesia microti* at the NML in Winnipeg.

BLT's are determined to be established/endemic in an area when all three feeding stages of the tick (larva, nymph, adult) are present on resident animals or in the environment for at least two consecutive years.

## **DEER SURVEILLANCE**

Staff of DNR has inspected deer killed on highways in western NS and the Halifax area during the spring and fall for the presence of BLT's. Samples of deer killed by hunters have been inspected in the Lunenburg area for the presence of BLT's. Continuation of this initiative will be determined with analysis of passive and active surveillance initiatives by the Vector Borne Diseases working group. These activities are designed to complement active and passive surveillance activities.

### **4.4 Public Awareness and Education Campaign**

Actions taken by the general public play an important role in preventing human cases of Lyme disease, HGA and other vector borne diseases. The public is provided information on Lyme disease and other vector borne diseases

including risks, symptoms and how to prevent the spread of tick borne and vector borne diseases.

Key messages include:

- Cover skin when walking, working, or playing in areas where ticks are found.
- Wear enclosed shoes, tucking shirt in pants and pant legs in socks
- Walk on well-traveled paths, avoiding high grass and vegetation.
- Use an insect repellent (DEET) following label directions carefully.
- Check yourself, children and pets after walking in grassy or wooded areas, particularly where BLT's have become established/endemic. Check clothing and inspect skin including arm pits, groin and scalp.
- Remove ticks as soon as they are found. Carefully grasp ticks with tweezers as close to the skin as possible and pull the tick straight out. Clean the area where the tick was attached to the skin.
- See a health care professional if symptoms of Lyme disease or other tick borne disease develops after exposure to a Blacklegged tick..
- Use simple landscaping techniques to reduce the number of BLT's around homes and parks ([www.gov.ns.ca/hpp/cdpc/lyme.asp](http://www.gov.ns.ca/hpp/cdpc/lyme.asp)).

See Section 8.0 for a more detailed communications plans. Information on Lyme disease is a part of a comprehensive 'Enjoy the Outdoors Safely' campaign, which currently includes West Nile virus, and Rabies.

The Nova Scotia Department of Health Promotion and Protection website is continually updated to include information on Lyme disease. The public can receive further information from their local Public Health Services.

Press releases and media interviews will keep the public updated during the spring, summer and fall months as needed.

#### **4.5 Information for Health Professionals**

Physicians and health care providers are informed that human cases of specific vector borne diseases are reportable in Nova Scotia under the Health Protection Act. In addition, physicians and other health professionals are provided with information on the risk assessment for Lyme disease (and other vector borne diseases as needed) and the need to contact public health services when suspecting human cases. This is done through letters, newsletter articles, webinars and videoconferences. Please refer to section 8.0.

## 4.6 Diagnostic Testing for Human Illness

Testing in humans for Lyme disease is performed at the Queen Elizabeth Health Sciences Centre in Halifax. Positive specimens will be forwarded to the National Microbiology laboratory (NML) for further confirmation. Recommended testing for Lyme disease includes a 2 tier approach involving an approved screening enzyme immunoassay (EIA) and more specific confirmatory testing by Western Blot. NS employs testing recommended by the Canadian National Microbiology Laboratory in Winnipeg, the Canadian Public Health Laboratory Network (CPHLN) and the U.S. Centers for Disease Control. Other UNVALIDATED, unapproved tests may be unreliable and are NOT recommended. Specimens submitted for Anaplasmosis diagnostic testing are sent directly to the NML.

For further information on testing please refer to the NS Communicable Disease Prevention and Control Manual – Chapter 9 Lyme Disease  
[http://www.gov.ns.ca/hpp/publications/cdc\\_section\\_9.pdf](http://www.gov.ns.ca/hpp/publications/cdc_section_9.pdf)

For further information on laboratory please refer to the Provincial Public Health Lab Network: Users Manual. - 2009

## 4.7 Vector Control Measures

There are various landscaping techniques that can be recommended to reduce the number of ticks around homes. References for landscaping techniques can be found on the HPP website at:  
<http://www.gov.ns.ca/hpp/cdpc/lyme.asp>

Currently there are no approved acaracides available in Canada to use to reduce Blacklegged ticks. The Public Health Agency is working in conjunction with the Pest Management Regulatory Agency of Canada to establish regulation for use of acaracides used in reduction of Blacklegged ticks in Canada.

## 5.0 ROLES AND RESONSIBILITIES OF ORGANIZATIONS AND AGENCIES RELATED TO TICK BORNE DISEASES

### 5.1 Nova Scotia Health Promotion and Protection

- Conducts surveilliance for human infection with Ld.
- Provides program response to public health case management of humans with tick borne diseases.
- Assesses risk of tick and vector borne diseases to the health of Nova Scotians.

- Recommends interventions based on health risk assessment in consultation with other NS government departments, Vector Borne Diseases Working Group, and PHAC.
- Provides support to those involved in the provincial response plan.
- Provides communication support for provincial vector borne diseases prevention initiatives, media, news releases, issue management, print materials and others as required.
- Assesses environmental health issues as related to control of vectors
- Coordinates and chairs the NS Vector borne Diseases Working Group.
- Receives the data from DNR and NML regarding Blacklegged tick passive surveillance in NS and disseminates the results to Public Health Services in each District Health Authority.
- In conjunction with PHAC, reviews and analyzes Blacklegged passive tick surveillance data and recommend active surveillance initiatives.

## **5.2 Nova Scotia Department of Natural Resources (DNR)**

- Conducts active tick surveillance in collaboration with PHAC as required.
- Conducts surveillance for ticks from road and hunter killed deer as required.
- Receives ticks submitted by the public, health care workers and veterinarians and identifies species.
- Forwards BLT's to the National Microbiology Laboratory (NML) in Winnipeg for testing for infection with Bb and Ap.
- Sends BLT data (those ticks sent to the NML for testing) to HPP.
- Works in collaboration with HPP and NML to analyze tick data.

## **5.3 Public Health Agency of Canada/National Microbiology Laboratory**

- Conducts active tick surveillance in collaboration with DNR as required.
- Tests BLT's and other ticks submitted from DNR and Museum of Natural History for *Borrelia burgdorferi*, *Anaplasma phagocytophilum* and Babesiosis.
- In conjunction with NSHPP, reviews and analyzes Blacklegged passive tick surveillance data and recommends active surveillance initiatives.
- Provides laboratory confirmation testing of human EIA positive or indeterminate samples sent from QEII laboratory.
- Provides Anaplasmosis testing on human samples.
- Sends reports on human diagnostics to QEII lab (QEII lab sends final results to appropriate provincial health professionals).
- Provides direction on standards for laboratory testing of suspect Ld cases.

- Coordinates and chairs the National Non Enteric Zoonosis Issue Group and Tick Borne Diseases Sub Issue Group.

#### **5.4 Public Health Services**

- Investigates all reported probable and confirmed cases of Lyme disease and Anaplasmosis (as per the National case definitions) and submits reports to HPP.
- Determines area where infection most likely occurred.
- Educates about vector borne diseases and measures to prevent disease.
- Provides advice to the public and health care professionals regarding tick borne diseases.
- Establishes links with local communities where established/endemic Blacklegged tick populations occur and work with communities to promote awareness to decrease the risk of vector borne diseases.
- Provides communication support for local public health Lyme disease and other tick borne diseases prevention initiatives, media, news releases, issue management, print materials and others as required.
- Provides information to individuals who submitted ticks for ticks that test positive for a tick borne disease or those that are negative from human exposures, as soon as possible once the tick surveillance data is received (can be weeks to months after tick was first submitted to DNR).

#### **5.5 Nova Scotia Museum of Natural History**

- Receives ticks submitted by public, health care workers and veterinarians.
- Forwards BLT's to DNR for shipment to the National Microbiology Lab for testing for tick borne diseases.

#### **5.6 Nova Scotia Department of Agriculture**

- Provides link to veterinarian community.
- Works with NML in following up reports of dogs infected with Ld.
- Provides education information to veterinarians.

#### **5.7 First Nations and Inuit Health (FNIH)**

- Provides link to First Nations communities.

## 5.8 QEII Health Sciences Centre

- Provides expertise in human infectious diseases and link to infectious diseases specialist group.
- Provides timely and appropriate human diagnostic laboratory services for Lyme disease.
- Works in collaboration with the National Microbiology Lab (NML) for human diagnostic testing and reports results from the NML to appropriate District Health Authority.
- Reports all confirmed positive tests to the MOH in the District Health Authority where the physician who orders the test, works.
- Responds to questions from physicians and public health staff on laboratory diagnosis issues.

## 5.9 Nova Scotia Department of Environment

- Provides recommendations and advice on the use of tick control measures

## 6.0 RISK ASSESSMENT

The NSVBDWG and NSHPP support surveillance for BLT's and the presence of *Borrelia burgdorferi* (Lyme), Ap and Babesiosis in ticks throughout the province. The distribution and prevalence of the tick vectors and the agents that cause Ld, HGA and Babesiosis are monitored by the surveillance system.

While BLT's infected with *Borrelia burgdorferi* (Lyme) have been found sporadically in several areas of Nova Scotia, the risk for human infection is greatest in areas where infected BLT's have become established/endemic and are more common. The reporting of probable and confirmed human cases of Ld to NSHPP by laboratories and physicians is required as per the Health Protection Act. Several cases of confirmed Ld have been reported from the area near Lunenburg since 2002, and more recently, the Bedford area.

BLT's have been found to be established/endemic in the general area around Lunenburg, and Gunning Cove in Shelburne County. Additionally, BLT's have become established/endemic in the vicinity of Admirals Cove in Bedford.

BLT's testing positive for Ap have been found on occasion in the area around Lunenburg and Bedford.

NSHPP shares information about the distribution and presence of BLT's, Lyme disease, Ap and Babesiosis with the public, media and health care professionals

on a regular basis. The information is used to provide guidance about the risk of infection from Lyme disease, Ap and Babesiosis in Nova Scotia.

## **7.0 RISK REDUCTION AND MANAGEMENT**

To reduce the risk of tick borne diseases such as Lyme disease, and Human Anaplasmosis in NS, a number of steps can be considered:

- Maintain a surveillance system for vectors (Blacklegged ticks), mammals and human illness to detect the level of activity in NS.
- Educate the public on measures to reduce exposure to Blacklegged ticks
- Reduce BLT habitat in and around homes by recommending key landscaping techniques.
- Educate health care professionals and veterinarians to be aware and recognize symptoms of tick borne diseases.
- Consider Blacklegged tick control measures as regulated within NS and Canada, as necessary.

## **8.0 COMMUNICATION STRATEGY**

### Objectives

- To raise awareness of Lyme disease within Nova Scotia.
- Provide Nova Scotians with consistent, up to date and reliable information about tick borne diseases including Lyme disease.
- Ensure health care providers and the public have access to information regarding Lyme disease.
- Counter misinformation provided in media reports on Lyme disease and other tick borne diseases as required.
- Emphasize the importance of individual responsibility in preventing the spread of tick borne diseases such as Lyme disease.

### Target Audiences

- General public
- Media
- Health care professionals
- Municipalities
- Tourists/Outdoor recreationalists

NSHPP provides information and resources about the presence of Ld in NS as well as recommendations to prevent exposure to BLT's and infection with Ld and

Ap to the public, media and health care workers. The tools used to provide information include:

- NSHPP Ld pamphlet
- NSHPP Ld poster (intended for areas where BLT's and/or Ld or Ap are established/endemic)
- Annual NSHPP letters to NS health care providers
- NSHPP updates provided to Doctors NS
- Media articles and press releases from NSHPP
- NSHPP website

The pamphlets and posters are distributed by PH staff to various community and health care setting (hospitals, clinics, physician offices, school boards, community and recreation centres, municipal offices, visitor information centres, campgrounds, golf courses, parks, etc.).

Communication strategies can be implemented at any time as necessary with an emphasis on the early spring/summer season when vectors become more active. Additional messaging can be implemented as needed depending upon climate, season and activity of vectors.

The key messages provided include:

- Information about where BLT's and Ld are known or suspected to be established/endemic.
- Common symptoms and signs of Ld and importance of obtaining medical advice.
- Inspection of people for attached BLT's and advice about prompt removal (infection is unlikely if BLT attached for < 24 hours).
- Use of protective clothing and insect repellants.
- Maintenance of property to reduce BLT infestation.
- Recommendation to submit ticks for identification and testing.
- Local meeting with District Health Authorities (Public health services) and communities as required.

Information provided on NSHPP vector borne disease website:

- General information about tick borne diseases and their prevention.
- Updated information on the location of areas where tick borne diseases are established/endemic in Nova Scotia.
- Updated information on the prevalence, distribution and risk of exposure to tickborne disease in areas where BLT's are established/endemic.

## 9.0 RESOURCES

American Academy of Pediatrics and Committee on Infection Diseases (2009). *Red Book: 2009 Report of the Committee on Infectious Diseases*, 28<sup>th</sup> ed. Elk Grove Village, IL: American Academy of Pediatrics.

Heymann, David (2008). *Control of Communicable Diseases Manual*, 19<sup>th</sup> ed. Washington, D.C.: American Public Health Association.

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Ogden, NH., Lindsay, LR., Morshed, M., Sockett, P., Artsob, H. *The Rising Challenges of Lyme Borreliosis in Canada*. Canadian Communicable Disease Report, January 1, 2008. Volume 34, Number 01.

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