

## 2016 New Hampshire Tick-borne Disease Bulletin

### Tick-borne Diseases in New Hampshire

In NH, there are several diseases that can be transmitted to people by the bite of an infected tick. The most common of these diseases are Lyme disease, anaplasmosis, and babesiosis. The only case of locally-acquired Powassan virus infection was noted in NH for the first time in 2013. During the past decade, Lyme disease has become increasingly common in NH, and in recent years, diagnoses of anaplasmosis and babesiosis have also increased, though not to the same magnitude (Table 1). Most NH residents and health care providers are familiar with the risks of Lyme disease, but the health threats posed by anaplasmosis, babesiosis and Powassan virus should also be carefully considered.

Lyme disease, anaplasmosis, babesiosis and Powassan virus are transmitted by the bite of the blacklegged tick (*Ixodes scapularis*), commonly known as the deer tick. Blacklegged ticks have four life stages: eggs, larvae, nymphs and adults.

Humans are often bitten by blacklegged tick nymphs. Nymphs are very small and easy to miss unless they become engorged with blood, and are most active in the late spring-summer months (usually May through August). The importance of the nymph in transmission of tickborne diseases is readily apparent when cases of Lyme disease are examined by month of symptom onset (Figure 1).

Blacklegged ticks are common in NH. All individuals should take precautions to limit

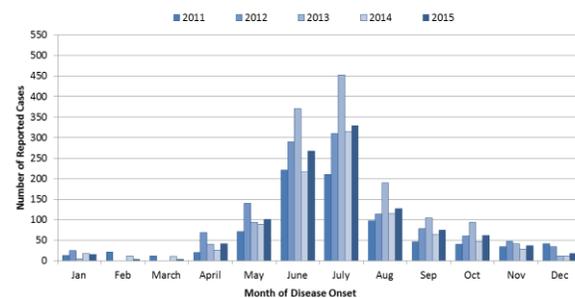
tick bites, especially people who spend time outdoors in possible tick habitat, such as wooded or grassy areas. If you are bitten by a tick, it is important to remove the tick as soon as possible.

**Table 1.** Tickborne disease incidence in New Hampshire by year, 2011-2015.

	2011	2012	2013	2014	2015
<b>Lyme Disease</b>	1321	1456	1691	1416 <sup>1</sup>	1371 <sup>1</sup>
<b>Anaplasmosis</b>	30	52	88	130	110
<b>Babesiosis</b>	14	19	22	40	53
<b>Powassan Virus</b>	0	0	1	0	0

1. Due to staffing vacancies and elimination of positions, suspect cases of Lyme disease reported in 2014 and 2015 could not be investigated to determine whether or not they met the case definition for Lyme disease. The number of cases in 2014 and 2015 was estimated based on the number of reports received and historical data.

**Figure 1.** Number of reported Lyme disease cases by month of symptom onset, New Hampshire, 2011-2015.<sup>1</sup>



### Methods to Prevent Tick-Borne Diseases

Lyme disease, anaplasmosis, babesiosis and Powassan virus disease are preventable. The following guidelines will aid in preventing tick bites and the transmission of these diseases. Since the immature stage (nymph) is very small and often goes unnoticed while attached to people, NH DHHS recommends the simultaneous use of

multiple prevention methods when in areas with ticks.

- Avoid tick-infested areas. If in tick-infested areas, walk in the center of trails to avoid contact with overgrown grass, brush, and leaf litter at trail edges.
- Use insect repellent. Apply insect repellent containing 20% to 30% DEET on clothes and exposed skin. Clothes (especially pants, socks, and shoes) may be treated with permethrin, which kills ticks on contact. Permethrin can also be used on tents and some camping gear. Do not use permethrin directly on skin. Always follow the manufacturer's instructions when applying any repellents. Further information regarding insect repellents can be found at: <https://www.epa.gov/insect-repellents/find-insect-repellent-right-you#search-tool>.
- Wear protective clothing. Long pants and long sleeves help keep ticks off skin. Wearing light-colored clothing will help you spot ticks more easily. Pant legs may be tucked into socks or boots and shirts into pants to keep ticks on the outside of clothing. Tape the area where pants and socks meet so that ticks cannot crawl under clothing.
- After being outdoors, wash and dry clothing at a high temperature to kill any ticks that may remain on clothing.
- Perform tick checks after you or your pets have been outdoors. Early removal of ticks can reduce the risk of infection. Inspect all body surfaces carefully, and remove attached ticks

with tweezers. Grasp the tick firmly and as closely to the skin as possible. With a steady motion, pull the tick's body away from the skin. Avoid crushing the tick's body. DO NOT use petroleum jelly, a hot match, nail polish, or other products. Cleanse the area with an antiseptic after removing the tick.

- If a tick is attached to your skin for less than 36 hours, your chance of getting Lyme disease, anaplasmosis, or babesiosis is extremely small. Powassan virus may be transmitted in a shorter amount of time, so it is important to remove attached ticks promptly. You should monitor your health closely after a tick bite and be alert for signs and symptoms of illness. Contact your physician to discuss testing and treatment.
- Be mindful of the environment you create around your home and in your community. Minimizing areas where hosts for the ticks, such as rodents and deer, can congregate to eat, sleep or feed may be helpful in reducing your exposure to ticks. The Connecticut Agricultural Experiment Station has produced a detailed document on ways that individuals and communities can address these concerns.

It is imperative for responsible adults to assist children in applying repellents and performing tick checks as they are less able to perform these activities safely and effectively.

### **Disease Specific Information**

The tickborne diseases present in NH are also found throughout the northeast and upper midwest in significant numbers

relative to the rest of the country. White footed mice are the main, although not only, reservoir for these pathogens and are common throughout these geographical areas.

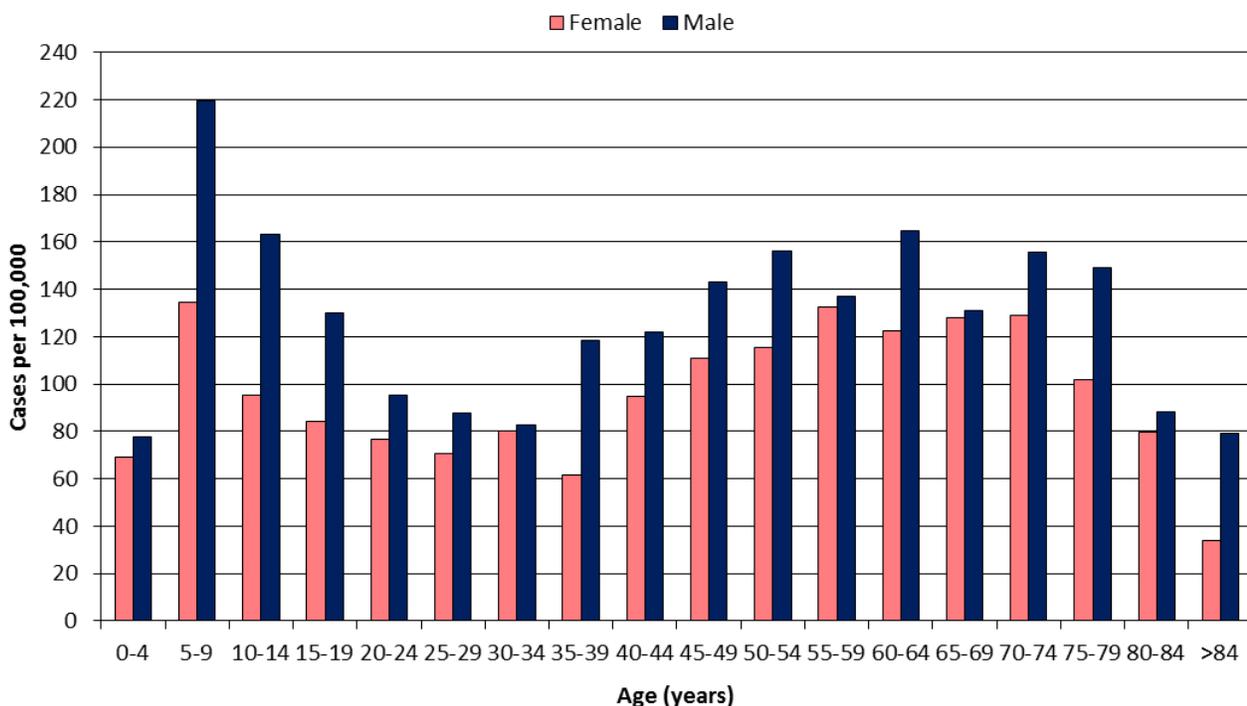
### Lyme Disease

Lyme Disease is caused by the bacterium *Borrelia burgdorferi*, with early symptoms of the disease often including a red, expanding “bull’s-eye” rash at one or more locations accompanied by fever, headache, fatigue, stiff neck and muscle or joint pain. Symptoms usually begin within 30 days after being bitten by an infected tick. If not treated, complications such as nervous system disorders, heart abnormalities, and intermittent episodes of joint swelling and pain may occur. Typically, antibiotics are effective in treating Lyme disease. Early diagnosis improves the outcome of treatment so it is important for individuals to contact their health care provider if they feel sick or develop a rash.

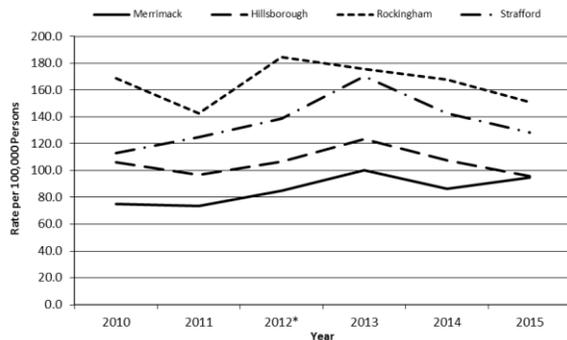
As is expected, there is a clear age and gender risk for Lyme disease, and other tickborne diseases. Children are more likely to spend time outdoors, as are middle-aged to older males due to the nature of work, play and hobby patterns among these populations (Figure 2).

There are significant differences between incidence rates for Lyme disease among counties in NH (Figures 3 and 4). Over time, it has been observed that northern and western counties are experiencing an increase in Lyme disease incidence, whereas incidence rates, though highest, have stabilized in the southeast part of the state. This is a reflection of vector distribution and population densities and behaviors, as well as diagnosing and reporting patterns of healthcare providers. Expansion of the blacklegged tick home range in NH has been documented through tick surveys performed by University of New Hampshire extension specialists.

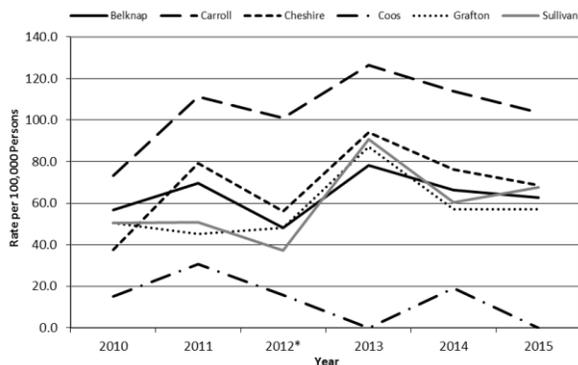
**Figure 2.** Average annual incidence of reported cases of Lyme disease by age group and sex, New Hampshire, 2010-2015.<sup>1</sup>



**Figure 3.** New Hampshire counties with established (endemic) high-incidence rates of Lyme disease, 2010-2015.<sup>1</sup>



**Figure 4.** New Hampshire counties with increasing (emerging) incidence rates of Lyme disease, 2010-2015.<sup>1</sup>



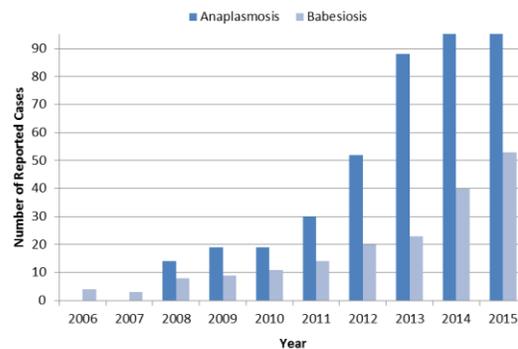
### Anaplasmosis

Anaplasmosis is caused by the bacterium *Anaplasma phagocytophilum*. Some people who are infected have no or mild symptoms. Symptoms typically occur within 5-21 days following the bite of an infected tick and often resemble the flu, with fever, chills, headache, fatigue, muscle aches, nausea, and/or vomiting. Some individuals may also have a rash. Some people, particularly elderly persons or those with weakened immune systems, may have a more severe illness. People can be successfully treated with antibiotics, so it is important for individuals to contact their health care provider if they develop a fever or flu-like symptoms.

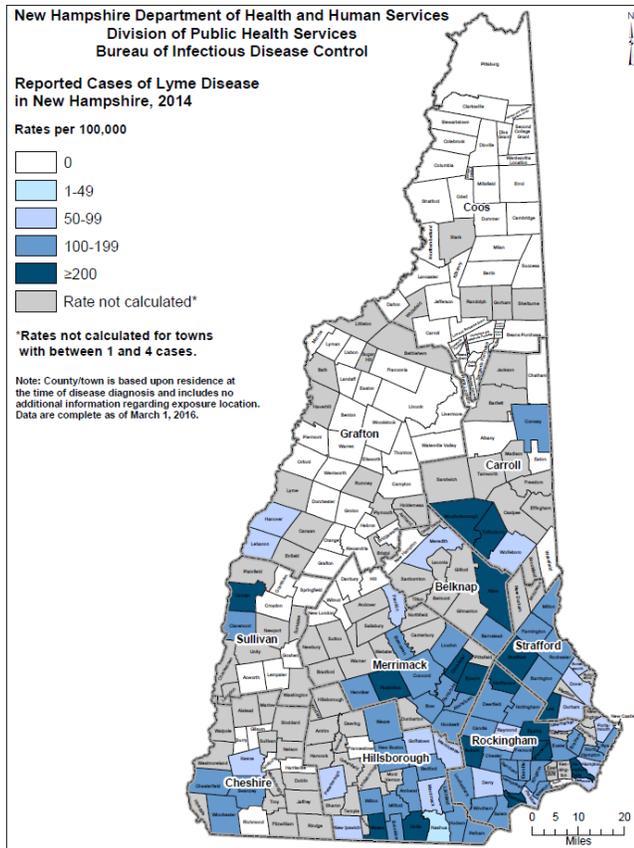
### Babesiosis

Babesiosis in the United States is most commonly caused by *Babesia microti*, a parasite that infects red blood cells, although there are other species that are capable of producing human illness. Symptoms of babesiosis vary and typically occur within one to six weeks following the bite of an infected tick. Some people infected with *Babesia* never feel ill, while others may have flu-like symptoms such as fatigue, fever, sweats, and muscle aches. Symptoms of nausea, vomiting, headache, and bloody urine can also occur. Severe and fatal cases most often occur in patients who are older or have a weakened immune system, such as those without a spleen. People can be successfully treated with anti-parasitic medications, so it is important for individuals to contact their health care provider if they feel ill or develop flu-like symptoms.

**Figure 5.** Reported anaplasmosis and babesiosis cases by year, New Hampshire, 2006-2015.

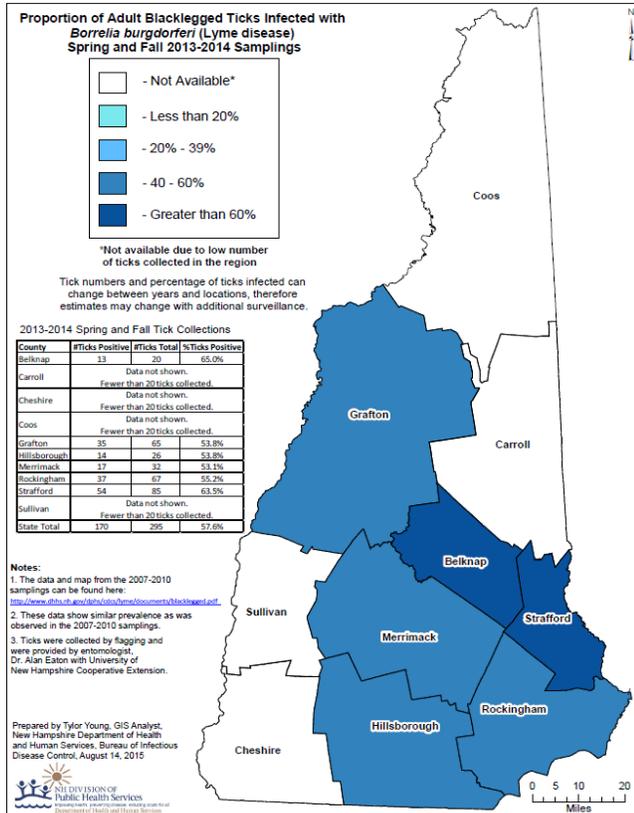


Reports of anaplasmosis- and babesiosis-related illnesses have been increasing in NH over the last five years (Figure 5). This may be due to many factors including expansion of the pathogens, reservoirs and vectors as well as an increased awareness of these infections.



**Map 1.** Reported cases of Lyme disease in New Hampshire, 2014.

The Bureau of Infectious Disease Control publishes maps to provide the public with information on where Lyme disease is most commonly seen and what the burden of disease is. Over the last several years, a westward and northward expansion of Lyme disease has been observed in NH. This is a possible reflection of expansion of the geographic range of the blacklegged tick, changes in habitat suitability of the tick's primary hosts (deer and white-footed mice) and changes in housing developments and recreational behaviors that increase the likelihood of NH residents coming into contact with tick habitat. Maps from previous years are available at: <http://www.dhhs.nh.gov/dphs/cdcs/lyme/publications.htm>



**Map 2.** Proportion of adult blacklegged ticks infected with *Borrelia burgdorferi* (Lyme disease), Fall 2013-2014 samplings.

Ticks were collected and tested from 2013-2014 to understand how common it is for adult blacklegged ticks in NH to be infected with *Borrelia burgdorferi*, the bacterium that causes Lyme disease. The map demonstrates that infection with this bacterium among ticks is very common, with about 60% of ticks across the state being infected. Additional surveillance of ticks in future years may be performed if funding allows.

## **Powassan Virus Disease**

Powassan virus disease is a rare but potentially serious illness caused by the Powassan virus, which is part of the same family of viruses as West Nile virus, and is transmitted by the blacklegged tick or the less common woodchuck tick. Symptoms generally begin one to four weeks after the bite of an infected tick and might include fever, headache, muscle weakness, stiff neck, fatigue, paralysis and confusion. Powassan virus can cause brain inflammation (encephalitis) and inflammation of the membranes surrounding the brain and spinal cord (meningitis). Although Powassan virus disease is very rare, it has been found in several northern states including New Hampshire, Maine and New York. The exact length of time required for a tick to transmit Powassan virus is unknown, therefore it is important to do frequent tick checks and remove any attached ticks promptly.

## **Additional Resources**

The resources listed below may provide additional information about ticks and how to protect yourself against tick-borne diseases.

1. [CDC Tickborne Diseases Webpage](http://www.cdc.gov/ticks/)  
(<http://www.cdc.gov/ticks/>)
2. [EPA Repellent Selection Tool Website](https://www.epa.gov/insect-repellents/find-insect-repellent-right-you)  
(<https://www.epa.gov/insect-repellents/find-insect-repellent-right-you>)
3. [State of New Hampshire Tickborne Disease Prevention Plan](http://www.dhhs.nh.gov/dphs/cdcs/lyme/documents/tbdpreventionplan.pdf)  
(<http://www.dhhs.nh.gov/dphs/cdcs/lyme/documents/tbdpreventionplan.pdf>)
4. [DPHS Tickborne Disease page](#)

(<http://www.dhhs.nh.gov/dphs/cdcs/lyme/index.htm>)

5. [Tick Management Handbook-Connecticut Agricultural Experiment Station](http://www.ct.gov/caes/lib/caes/documents/special_features/TickHandbook.pdf)  
([http://www.ct.gov/caes/lib/caes/documents/special\\_features/TickHandbook.pdf](http://www.ct.gov/caes/lib/caes/documents/special_features/TickHandbook.pdf))
6. [Insect Repellents: Dr. Alan Eaton, UNH Cooperative Extension](http://extension.unh.edu/resources/files/Resource000963_Rep1073.pdf)  
([http://extension.unh.edu/resources/files/Resource000963\\_Rep1073.pdf](http://extension.unh.edu/resources/files/Resource000963_Rep1073.pdf))
7. [Biology and Management of Ticks in New Hampshire: Dr. Alan Eaton, UNH Cooperative Extension](http://extension.unh.edu/resources/files/Resource000528_Rep1451.pdf)  
([http://extension.unh.edu/resources/files/Resource000528\\_Rep1451.pdf](http://extension.unh.edu/resources/files/Resource000528_Rep1451.pdf))
8. [Tickborne Diseases of the United States: A Reference Manual for Health Care Providers-CDC](http://www.cdc.gov/lyme/resources/TickborneDiseases.pdf)  
(<http://www.cdc.gov/lyme/resources/TickborneDiseases.pdf>)

## **Contact Information**

Carolyn Fredette, MPH  
Vectorborne Disease Surveillance Coordinator  
Telephone: 603-271-0273  
Email: [carolyn.fredette@dhhs.nh.gov](mailto:carolyn.fredette@dhhs.nh.gov)

Abigail Mathewson, DVM, MPH  
Surveillance Epidemiology Program Manager  
Telephone: 603-271-0274  
Email: [abigail.mathewson@dhhs.nh.gov](mailto:abigail.mathewson@dhhs.nh.gov)

NH Department of Health and Human Services  
Division of Public Health Services  
29 Hazen Drive  
Concord, NH 03301  
Phone: 603-271-4496  
Toll-free (in NH): 800-852-3345 x4496  
Fax: 603-271-0545  
<http://www.dhhs.nh.gov/>