

Deer Tick Surveillance: Adults & Nymphs: Beginning 2008

OVERVIEW

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Bureau of Communicable Disease Control
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Health Data NY

General Description:

Tick-borne diseases, such as Lyme disease, anaplasmosis and babesiosis, are a significant issue in New York (NY), impacting well over 10,000 individuals yearly. The New York State Department of Health (NYSDOH) has a responsibility to perform surveillance to monitor and track different kinds of tick-borne diseases. While most surveillance is done via reportable cases of human illness, tick-borne diseases can also be monitored by collecting ticks from the environment (called active surveillance) and testing them for bacteria, viruses, and parasites known to cause illness. Active surveillance allows local county health departments in NY, excluding New York City (NYC) to have a better understanding of the tick populations present in the state, the species composition of the tick population, and the rate at which ticks are infected with different bacteria, parasites, or viruses (called pathogens). The Department started testing ticks in 2002 in limited areas; testing statewide began in 2008.

The data provided are the results of deer tick surveillance, also known as blacklegged ticks or by their scientific name *Ixodes scapularis*. The datasets are split by life stages (adult and nymph). Deer ticks in the adult life stage are most commonly seen in fall and early winter. Deer ticks in the nymph life stage are most commonly seen in late spring and early summer. The biology is different between the life stages, therefore, the infection rates among the two life stages are also different, and it is important to look at the data separately.

The first two datasets cover testing of individual deer ticks for bacteria and parasites that cause Lyme disease, anaplasmosis, babesiosis, and a relapsing fever illness recently associated with a bacteria called *Borrelia miyamotoi*.

- Deer Tick Surveillance: Adults (Oct to Dec) excluding Powassan virus: Beginning 2008
- Deer Tick Surveillance: Nymphs (May to Sept) excluding Powassan virus: Beginning 2008

The next two datasets cover testing for only for the Powassan virus (also known as Deer Tick virus). We do not include these data in the above datasets because ticks are not tested individually for Powassan/Deer tick virus, they are tested in groups, called “pools” of 5-10 ticks.

- Deer Tick Surveillance: Adults (Oct to Dec) Powassan virus only: Beginning 2009
- Deer Tick Surveillance: Nymphs (May to Sept) Powassan virus only: Beginning 2009

Data from each publicly accessible site have been combined to be presented at the county level in these datasets. These data can be used by local county health departments, public land managers, medical and veterinary providers, and the public to encourage preventive measures to minimize exposure to ticks, thereby reducing the incidence of new cases of tick-borne disease in the state (excluding NYC).

Data Methodology:

As part of annual active surveillance efforts, staff visit approximately 100 publicly accessible sites across the state (excluding NYC) each year to monitor for certain tick-borne pathogens.

The sites where ticks are sampled are selected for several reasons. Primarily, the sites are chosen because they are marketed as places where the public can spend recreational time hiking, hunting, or camping. They may be parks or preserves that are publicly owned. Some were chosen because multiple sites could be sampled in a day. Typically, a single site is not sampled comprehensively—for example, a large park will not be sampled multiple times to completely cover the entire area of the park. Some privately-owned sites are visited as part of special investigations; however, they are not included in these datasets.

Ticks are collected by using techniques called “dragging” and “flagging.” These techniques involve capturing ticks by having them make contact with a piece of fabric that is held by a collector and brushed against the ground and vegetation during a walking survey. The goal is to collect at least 50 ticks at each collection site; for some sites that can take minutes, at other sites that can take hours or multiple visits, and at some locations it may not be feasible. Standardized methods are used to ensure that accurate measurements and comparisons can be made of tick population density.

Ticks are returned to the NYSDOH laboratory, total sample DNA is extracted, and they are tested individually via real-time multiplex polymerase chain reaction (qPCR) for the presence of the following tick-borne pathogens.

- ***Borrelia burgdorferi* (B. burgdorferi)** – bacterial causative agent of Lyme disease
- ***Anaplasma phagocytophilum* (A. phagocytophilum)** – bacterial causative agent of anaplasmosis [also known as human granulocytic anaplasmosis (HGA)]
- ***Babesia microti* (B. microti)** – parasitic causative agent of babesiosis
- ***Borrelia miyamotoi* (B. miyamotoi)** – bacterial causative agent of a relapsing fever-like illness
- **Powassan/Deer Tick virus(POW/DTV)**– viral causative agent of Powassan encephalitis and meningitis

Deer ticks are not tested individually for POW/DTV, but in pools of 5-10 ticks. The POW/DTV data are in separate datasets from the other bacteria and parasite tests listed above.

How to Understand the Data:

These data depict number of publicly accessible sites visited (excluding NYC), number of ticks collected, number of deer ticks tested, the deer tick population density for that life stage, and

the proportion (percent positive) of ticks infected with the specified bacteria, parasite or viruses by county and year from 2008-2016.

It is natural to immediately look at the percentage of ticks positive for a specific bacteria, parasite, or virus, but that is only part of the risk equation for tick-borne diseases. Likelihood of encountering a tick also plays an important role, and we measure that through tick population density (lower is generally better). The likelihood of encountering a tick varies with time and location, within both the state and the county.

The duration of time required for a deer tick to feed and transmit bacteria, parasites, or viruses is: 36 to 48 hours for *B. burgdorferi*, 12 to 24 hours for *A. phagocytophilum*, 24 to 36 hours for *B. microti*, and possibly as little as 15 minutes for the two lineages of Powassan virus. The feeding time required for *B. miyamotoi* transmission is currently unknown.

Adult deer ticks primarily feed on deer or larger mammals, and will feed on humans. In general adult deer ticks are twice as likely to be infected with bacteria, parasites, or viruses than during the nymph stage. However, due to their larger size, adult deer ticks that have attached themselves to animals or humans are usually detected and removed before they can transmit bacteria, parasites, or viruses. Adult deer ticks are typically active from mid-October until temperatures are consistently below freezing. They are also present in late winter and early spring, from March through June.

The nymph stage of the deer tick, though it has a lower infection rate than adults from the same geographic area, will feed on humans and is small in size and more difficult to detect than adults. This life stage is most likely to transmit tick-borne pathogens to people. Nymph deer ticks are active from mid-May through September.

Limitations of Data Use:

These data must not be over-interpreted. It is important to note that tick infection does not directly relate to the risk or prevalence of disease in humans. These results only provide information about tick infection at a precise location at one point in time. The data here summarizes multiple locations in a county, by year. Both tick population density and the proportion of ticks infected with the specified bacteria, parasite, or virus can vary greatly within a very small area, and vary widely within a county. Therefore, these data should not be used to broadly predict disease risk for a larger or smaller area, such as for the county or the town. They should be used simply to educate that there is a risk of coming in contact with ticks and tick-borne pathogens.

Resources:

NYSDOH performs tick surveillance to help provide information to local health departments and other agencies (e.g. parks departments, schools) so they can get prevention messages to the public. Prevention messages educate the public about the potential risk of encountering ticks and how to reduce the risk of exposure to ticks. Visit the Department's website for important prevention messages: <https://www.health.ny.gov/diseases/communicable/lyme/>.

In addition, the data serve to help communicate to healthcare providers in the community and remind them of the continued presence of Lyme disease as well as newly emerging tick-borne diseases [anaplasmosis (HGA), babesiosis, *Borrelia miyamotoi* infection, and Powassan encephalitis/meningitis]. For more information specific to your county, contact your local health department. To find contact information for your local health department, visit <http://www.nyscho.org/i4a/pages/index.cfm?pageid=3713>.