

Report to Maine Legislature

Lyme and other Tickborne Illnesses

February 1, 2017

Prepared by:

Sara Robinson, MPH, Epidemiologist, Division of Disease Control
Catherine Peranzi, Public Health Corps, Division of Disease Control

Submitted by

Maine Department of Health and Human Services, Maine Center for
Disease Control and Prevention (Maine CDC), Division of Disease Control,
Infectious Disease Program

Report to Maine Legislature – Lyme Disease

During the first special session of the 123rd Legislature in 2008, hearings and discussion over proposed legislation regarding the reporting of Lyme disease led to Chapter 561 of the Session Laws. This law, An Act to Implement the Recommendations of the Joint Standing Committee on Insurance and Financial Services Regarding Reporting on Lyme Disease and Other Tickborne Illnesses, directed Maine Center for Disease Control and Prevention to submit an annual report to the joint standing committee of the Legislature having jurisdiction over health and human services matters and the joint standing committee of the Legislature having jurisdiction over health insurance matters. This report was to include recommendations for legislation to address public health programs for the prevention and treatment of Lyme disease and other tickborne illnesses in the state, as well as to address a review and evaluation of Lyme disease and other tickborne illnesses in Maine.

A bill in the second session of the 124th Legislature in 2010 amended these laws to include information on diagnosis of Lyme disease.

Title 22, Chapter 266-B, Subsection 1645 in Maine statutes, directs Maine CDC to report on:

- I. [The incidence of Lyme disease and other tickborne illness in Maine](#)
- II. [The Diagnosis and Treatment Guidelines for Lyme disease recommended by Maine Center for Disease Control and Prevention and the United States Department of Health and Human Services, Centers for Disease Control and Prevention](#)
- III. [A summary or bibliography of peer-reviewed medical literature and studies related to the diagnosis, medical management, and treatment of Lyme disease and other tickborne illnesses, including, but not limited to, the recognition of chronic Lyme disease and the use of long-term antibiotic treatment](#)
- IV. [The education, training, and guidance provided by Maine Center for Disease Control and Prevention to health care professionals on the current methods of diagnosing and treating Lyme disease and other tickborne illnesses](#)
- V. [The education and public awareness activities conducted by Maine Center for Disease Control and Prevention for the prevention of Lyme disease and other tickborne illnesses; and](#)
- VI. [A summary of the laws of other states enacted during the last year related to the diagnosis, treatment, and insurance coverage for Lyme disease and other tickborne illnesses based on resources made available by the federal Centers for Disease Control and Prevention or other organizations.](#)

This is the ninth annual report to the Legislature and includes an update on activities conducted during 2016.

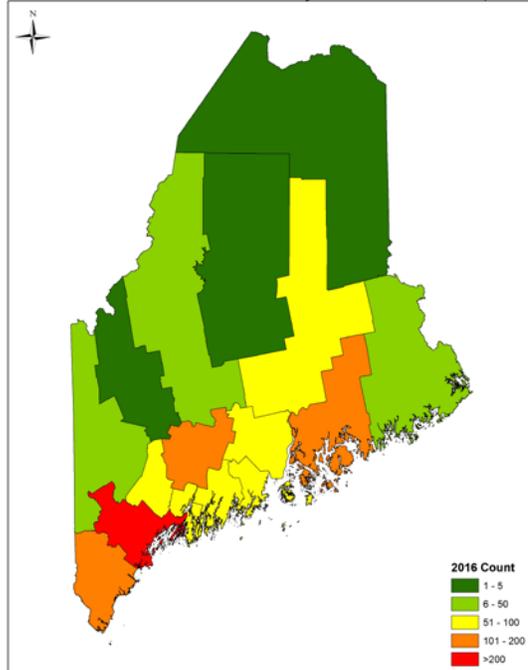
Executive Summary

Lyme disease is a notifiable condition in the State of Maine. The goal of Lyme disease surveillance is to help define demographic, geographic, and seasonal distribution; monitor disease trends; identify risk factors for transmission; and promote prevention and education efforts among the public and medical communities. Reported cases are classified as confirmed, probable, and suspect based on clinical symptoms and laboratory testing interpreted using criteria established by federal CDC. The surveillance case definition is not intended to be used in clinical diagnosis. Lyme disease surveillance is passive, dependent upon reporting, and therefore likely to be an under-representation of the true burden of Lyme disease in Maine. Federal CDC released a statement in 2013 that the true burden of Lyme disease may be up to ten times the number of reported cases.

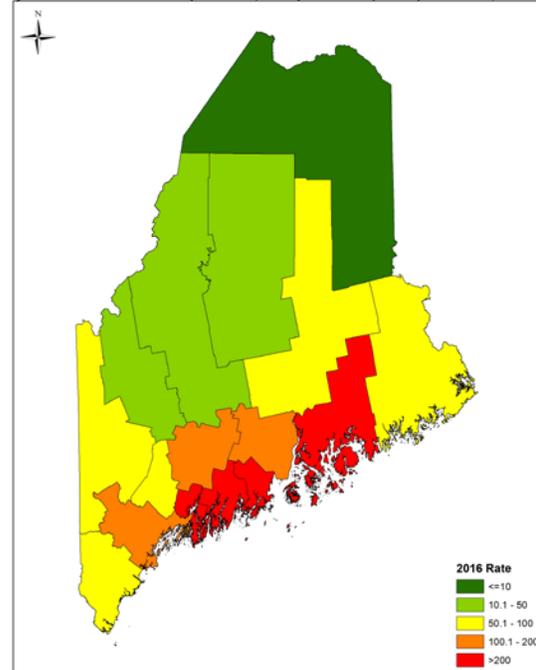
Maine Lyme Disease Summary, 2016 (Preliminary data as of January 18, 2017)

- 1,439 confirmed and probable cases
- Most common symptoms of reported cases* of Lyme disease in Maine included:
 - Erythema Migrans (characteristic expanding rash): 716 cases (50%)
 - Arthritis (joint swelling): 436 cases (30%)
 - Neurological (Bells Palsy or other cranial neuritis): 159 cases (11%)
- * Cases could report more than one symptom
- Hospitalization occurred in 64 cases (4%).
- Among case patients with a reported date of symptom onset, 70% began experiencing symptoms during June, July, or August. Date of symptom onset is missing for 23% of cases.

Confirmed and Probable Cases of Lyme Disease - Maine, 2016*



Lyme Disease Cases per 100,000 persons (Rate) - Maine, 2016*



* 2016 data are preliminary as of 01/18/2017

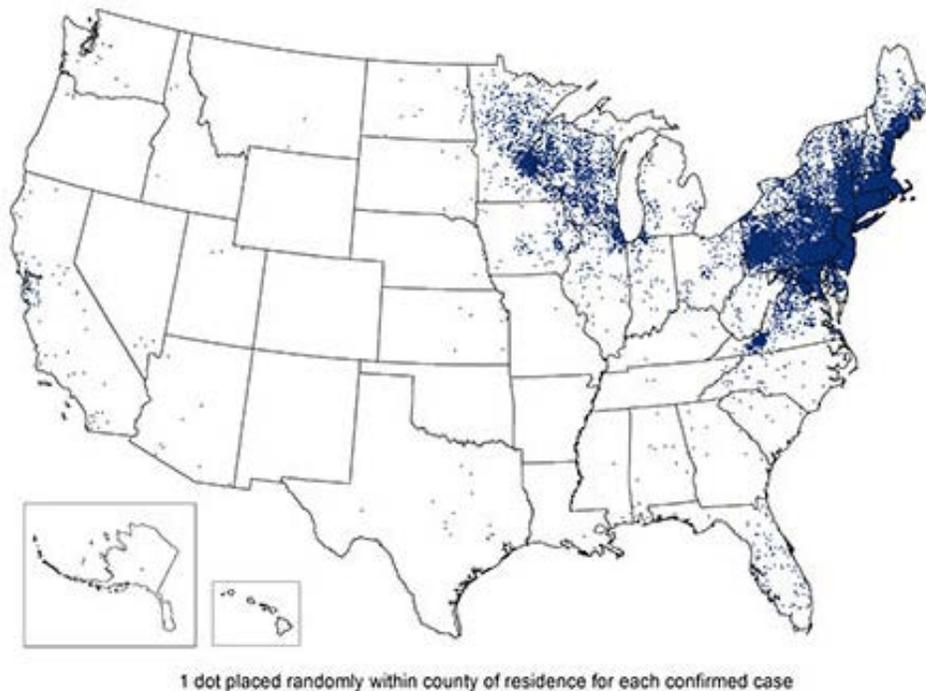
I. The Incidence of Lyme disease and other tickborne illness in Maine

A. Lyme disease

Lyme disease is caused by the bacteria *Borrelia burgdorferi* which is transmitted to a person through the bite of an infected deer tick (*Ixodes scapularis*). Symptoms of Lyme disease include the formation of a characteristic expanding rash (erythema migrans) at the site of a tick bite 3-30 days after exposure. Fever, headache, joint and muscle pains, and fatigue are also common during the first several weeks. Later features of Lyme disease can include arthritis in one or more joints (often the knee), Bell's palsy and other cranial nerve palsies, meningitis, and carditis (AV block). Lyme disease is rarely fatal. The great majority of Lyme disease cases can be treated very effectively with oral antibiotics for ten days to a few weeks. IV antibiotics for up to 28 days may be needed for some cases of Lyme disease which affect the nervous system, joints, or heart.

In the United States, the highest rates of Lyme disease occur across the eastern seaboard (Maryland to Maine) and in the upper Midwest (northern Wisconsin and southern Minnesota), with the onset of most cases occurring during the summer months. In endemic areas, deer ticks are most abundant in wooded, grassy, and brushy areas ("tick habitat"), especially where deer populations are large.

Reported Cases of Lyme Disease -- United States, 2015



Source: federal CDC (https://www.cdc.gov/lyme/resources/reportedcasesoflymedisease_2015.pdf)

The first documented case of Maine-acquired Lyme disease was diagnosed in 1986. The current 2016 numbers are an increase from previous years and will continue to rise as more reports are returned to Maine CDC. In the 1990's the great majority of Lyme disease cases occurred among residents of south coastal Maine, principally in York County. Disease incidence remains high in the southern and the Mid-Coast areas but is starting to increase in the northern and western counties as

well, making the problem statewide. Androscoggin, Cumberland, Hancock, Kennebec, Lincoln, Oxford, Penobscot, Piscataquis, Sagadahoc, and Waldo counties rates increased from 2015 to 2016. Six counties have rates of Lyme disease higher than the State rate (Hancock, Kennebec, Knox, Lincoln, Sagadahoc, and Waldo).

In 2016 (preliminary data as of January 18, 2017) providers reported 1,439 confirmed and probable cases of Lyme disease among Maine residents, which is a rate of 108.2 cases of Lyme disease per 100,000 persons in Maine. Thirty-three percent (33%) of reported cases were from the southern counties (Cumberland and York), and 24% of reported cases were from the Midcoast counties (Knox, Lincoln, Sagadahoc, and Waldo).

Forty-one percent (41%) of cases were female and fifty-nine percent (59%) of cases were male. The median age of cases in 2016 was 51 years of age (average age of 45 years). The age at diagnosis ranged from 1-95 years. Seventy percent (70%) of the cases with a known onset date had onset during June, July, or August (date of onset is missing for 23% of cases). Providers reported 64 persons (4% of all cases) were hospitalized with Lyme disease. For further Lyme disease statistics in Maine please see [Appendix 1](#).

B. Other Tickborne Diseases in Maine

Anaplasmosis:

Anaplasmosis is a disease caused by the bacteria *Anaplasma phagocytophilum* which infects white blood cells (neutrophils). Anaplasma was previously known as human granulocytic ehrlichiosis (HGE) or human granulocytic anaplasmosis (HGA) but was renamed in 2003 to differentiate between two different organisms that cause similar diseases (Anaplasmosis and Ehrlichiosis). Signs and symptoms of anaplasmosis include: fever, headache, malaise, and body aches. Encephalitis/meningitis may occur but is rare. Anaplasmosis is transmitted to a person through the bite of an infected deer tick (*Ixodes scapularis*). Preliminary data as of January 18, 2017 showed 373 cases of anaplasmosis reported in 2016, a 100% increase from the 186 cases in 2015. Cases occurred in Androscoggin, Cumberland, Franklin, Hancock, Kennebec, Knox, Lincoln, Oxford, Penobscot, Sagadahoc, Somerset, Waldo, and York counties. For further anaplasmosis disease statistics in Maine please see [Appendix 2](#).

Babesiosis:

Babesiosis is a rare and potentially severe tickborne disease transmitted through the bite of an infected deer tick (*Ixodes scapularis*). Signs of babesiosis usually range from no symptoms at all (asymptomatic) to serious disease. Common symptoms include extreme fatigue, aches, fever, chills, sweating, dark urine, and possibly anemia. People who are infected generally make a full recovery as long as they have a healthy spleen and do not have other diseases that prevent them from fighting off infections. Preliminary data as of January 18, 2017 showed 83 cases of babesiosis reported in 2016, which is an increase from the 55 cases in 2015. Cases occurred in Androscoggin, Cumberland, Hancock, Kennebec, Knox, Lincoln, Oxford, Penobscot, Sagadahoc, Somerset, Waldo, and York counties. For further babesiosis disease statistics in Maine please see [Appendix 2](#).

***Borrelia miyamotoi*:**

Borrelia miyamotoi is a species of spiral-shaped bacteria that is closely related to the bacteria that cause tick-borne relapsing fever (TBRF). It is more distantly related to the bacteria that cause Lyme disease. First identified in 1995 in ticks from Japan, *B. miyamotoi* has now been detected in two

species of North American ticks, the black-legged or “deer” tick (*Ixodes scapularis*) and the western black-legged tick (*Ixodes pacificus*). Individuals with this infection are likely to have fever, chills, and headache. Other common symptoms include joint pain and fatigue. Unlike Lyme disease, rash is uncommon. There is no standardized case definition for *B. miyamotoi* at this time. Preliminary data as of January 18, 2017 showed two cases with *Borrelia miyamotoi* infections in Maine.

Ehrlichiosis:

Ehrlichiosis is a disease caused by the bacteria *Ehrlichia chaffeensis* which infects white blood cells (monocytes). Ehrlichia was previously known as human monocytic ehrlichiosis (HME). Signs and symptoms of ehrlichiosis include: fever, headache, nausea, and body aches. Encephalitis/ meningitis may occur. Ehrlichiosis is transmitted to a person through the bite of an infected lone star tick (*Amblyomma americanum*). Ehrlichiosis is uncommon in Maine as the tick is not commonly found here. However, this may be a disease to watch for as the tick appears to be moving north. Preliminary data as of January 18, 2017 showed six cases of *Ehrlichia chaffeensis* reported in 2016 from Cumberland, Kennebec, Penobscot, Sagadahoc, and Washington counties. Maine had four probable cases of Ehrlichia/Anaplasma Undetermined in 2016, which occurs when serologies are done, but titers are the same for both Ehrlichia and Anaplasma so we cannot tell which organism was present. For further ehrlichiosis disease statistics in Maine please see [Appendix 2](#).

Powassan:

Powassan is a virus transmitted to humans through the bite of an infected woodchuck tick (*Ixodes cookei*) or deer tick (*Ixodes scapularis*). It is the only tickborne arbovirus occurring in the United States and Canada. Approximately 60 cases of Powassan were reported in the United States in the last decade, and cases appear to be increasing. Signs and symptoms of Powassan include fever, headache, vomiting, weakness, confusion, seizures, and memory loss. Long-term neurologic problems may occur. There was one reported case of Powassan in Maine in 2016.

Spotted Fever Rickettsiosis:

Spotted Fever Rickettsioses (SFR) are a group of bacterial illnesses, the most common of which is Rocky Mountain Spotted Fever (RMSF). Signs and symptoms of RMSF include fever, chills, headache, gastrointestinal symptoms, and a maculopapular rash often on the palms and the soles. RMSF is transmitted to a person through the bite of an infected dog tick (*Dermacentor variabilis*). RMSF is not known to be endemic in Maine, but could become an emerging disease. Preliminary data as of January 11, 2017 showed three probable case of SFR reported in 2016. These cases were reported in Androscoggin, Cumberland, and York counties. For further SFR disease statistics in Maine please see [Appendix 2](#).

Other Emerging Tickborne Diseases:

Federal CDC and other researchers are continually on the watch for new or emerging tickborne disease. Pathogens identified in the last few years include Heartland virus, and Bourbon virus. Maine has no documented cases of any of these diseases, but there is serological evidence (from either humans or wild animals) of Heartland virus in Maine, so these are diseases to watch.

II. The Diagnosis and Treatment Guidelines for Lyme disease recommended by Maine Center for Disease Control and Prevention and the United States Department of Health and Human Services, Centers for Disease Control and Prevention

Maine Center for Disease Control and Prevention continues to adhere to the strongest science-based source of information for the diagnosis and treatment of any infectious disease of public health significance. Nationally, the Infectious Disease Society of America (IDSA) is the leader in setting the standard for clinical practice guidelines on Lyme disease and other tickborne illnesses:

https://www.idsociety.org/uploadedfiles/idsa/guidelines-patient_care/pdf_library/lyme%20disease.pdf .

Lyme disease is diagnosed clinically with the aid of laboratory testing. An erythema migrans in an endemic area is sufficiently distinctive to allow clinical diagnosis in the absence of laboratory confirmation. Patients should be treated on the basis of clinical findings. A two tier testing algorithm is recommended for laboratory testing and is included in [Appendix 3](#). First-tier testing is most often an enzyme-linked immunosorbent assay (ELISA) test which, if positive or equivocal, should be followed by an IgM and IgG Immunoblot. IgM is only considered reliable if tested within the first 30 days after symptom onset. Acute and convalescent testing is useful to determine final diagnosis. Untreated patients who remain seronegative despite having symptoms for 6-8 weeks are unlikely to have Lyme disease, and other potential diagnoses should be actively pursued. A diagnosis of Lyme disease made by a clinician may or may not meet the federal surveillance case definition, and therefore may not always be counted as a case. Maine CDC refers physicians with questions about diagnosis to the IDSA guidelines https://www.idsociety.org/uploadedfiles/idsa/guidelines-patient_care/pdf_library/lyme%20disease.pdf

During 2009 and 2010, IDSA convened a special review of the clinical practice guidelines on Lyme disease to determine whether the 2006 guidelines should be revised and updated. A central question explored at the Review Panel hearing held during July 2009 was whether Lyme disease can persist as a chronic infection that can be successfully treated with an extended course of antibiotics.

The special panel reviewed the medical and scientific literature as well as material submitted by the 18 individuals who testified at the hearing and about 150 other comments submitted by the public. The panel also heard from several representatives of the International Lyme and Associated Diseases Society (ILADS), who argued for more extensive treatment for what ILADS identifies as chronic Lyme disease. The panel met 16 times and the review took more than a year to complete. On April 22, 2010 the special Review Panel “unanimously agreed that no changes need be made to the 2006 Lyme disease treatment guidelines developed by the Infectious Diseases Society of America (IDSA)” (https://www.idsociety.org/uploadedfiles/idsa/guidelines-patient_care/pdf_library/lyme%20disease.pdf).

“The Review Panel concurred that all of the recommendations from the 2006 guidelines are medically and scientifically justified in light of the evidence and information provided, including the recommendations that are most contentious: that there is no convincing evidence for the existence of chronic Lyme infection; and that long-term antibiotic treatment of “chronic Lyme disease” is unproven and unwarranted. This recommendation is also supported by federal CDC. Inappropriate use of antibiotics (especially given intravenously) has been shown to lead to deadly blood infections, serious drug reactions and *C. difficile* diarrhea, as well as the creation of antibiotic-resistant bacteria or ‘superbugs.’” (https://www.idsociety.org/uploadedfiles/idsa/guidelines-patient_care/pdf_library/lyme%20disease.pdf).

III. A Summary or bibliography of peer reviewed medical literature and studies related to the diagnosis, medical management and the treatment of Lyme disease and other tickborne illnesses, including, but not limited to, the recognition of chronic Lyme disease and the use of long term antibiotic treatment.

The Infectious Disease Society of America (IDSA) continues to provide leadership in setting the standard for clinical practice guidelines on Lyme disease.

https://www.idsociety.org/uploadedfiles/idsa/guidelines-patient_care/pdf_library/lyme%20disease.pdf.

A bibliography of peer reviewed journal articles published in 2016, as related to these clinical guidelines and other topics of interest, is included in [Appendix 4](#). Maine CDC reviews these journal articles to maintain an understanding of the current research and literature available on Lyme disease clinical management and treatment.

IV. The education, training, and guidance provided by Maine Center for Disease Control and Prevention to health care professionals on the current methods of diagnosing and treating Lyme disease and other tickborne illnesses

Maine CDC continues to emphasize prevention and control of Lyme disease. Surveillance for tickborne diseases, including Lyme disease, is performed by the Division of Disease Control, Infectious Disease Program, as Lyme disease is a notifiable disease entity by both medical practitioners and clinical laboratories. Reporting clinicians must submit subsequent clinical and laboratory information following the initial report. Maine CDC also monitors tickborne diseases through syndromic surveillance. By querying of participating hospital emergency department (ED) patient visit data, patients that complain of a tick bite are identified. An increase in ED visits for tick bites is usually a precursor for the typical seasonal increase in Lyme disease incidence. Maine CDC partners with the University of Maine Cooperative Extension Office to monitor the identification of deer ticks in Maine through a passive submission system.

A spatial analysis of 2016 Lyme disease surveillance data was performed at the county level, showing the continual disease progression ([Appendix 5](#)). Outreach and education to clinicians and other healthcare providers to increase provider response to required supplemental clinical and laboratory information is ongoing.

Maine CDC epidemiologists provide consultation to the medical community on tickborne diseases, offering educational and preventive information as needed. Maine CDC epidemiologists present educational outreach activities and seminars on tickborne disease prevention targeting the medical community at statewide meetings of school nurses and others. Ongoing educational initiatives are featured on the Maine CDC web site: <http://www.maine.gov/lyme>

During 2016, a **clinical management guide**, “Physician’s Reference Manual: Tickborne Diseases in Maine” was mailed to hospital emergency rooms, infectious disease providers, and pediatric practices. This guide includes information on ticks found in Maine and signs/symptoms, laboratory services, diagnosis, and treatment of six tickborne diseases, including Lyme disease.

- 294 copies of this guide were distributed in 2016

Maine CDC continues to contribute to **national surveillance and prevention activities**. During 2016, Maine CDC epidemiologists represented the State at both local and national meetings including:

- The Lyme and Other Tickborne Diseases Meeting for High Incidence States in Manchester, New Hampshire in March 2016
- Council of State and Territorial Epidemiologist (CSTE) annual conference held in Anchorage, Alaska in June 2016
- Northeast Epidemiology annual conference held in Saratoga, New York in October 2016

V. The education and public awareness activities conducted by Maine Center for Disease Control and Prevention for the prevention of Lyme disease and other tickborne illnesses

Maine CDC promotes ongoing **educational outreach activities** targeting the public and Maine municipalities. During 2016, Maine CDC epidemiologists provided consultation to the public on tickborne diseases, offering educational and preventive information as needed. Maine CDC epidemiologists present educational outreach activities and seminars on tickborne disease prevention to the general public including:

- 40 presentations or displays held for: students in 3rd-7th grade, district game wardens, Boy Scouts of America, Central Maine Power staff, forestry department summer workers, child care providers, summer camps, health care providers, state staff, seniors, and the general public.
- Numerous media interviews given by Maine CDC employees (vectorborne epidemiologist, state health officer, and state epidemiologist).

Maine CDC's Vectorborne Epidemiologist chairs the State **Vectorborne Disease Work Group**; a group comprised of both State agencies and private entities, which meets on a bimonthly basis to proactively address surveillance, prevention and control strategies. Members of this group include: Maine Department of Health and Human Services, Maine Department of Agriculture, Conservation, and Forestry, Maine Department of Inland Fisheries and Wildlife, Maine Department of Education, Maine Department of Environmental Protection, Maine Forest Service, University of Maine Cooperative Extension Services, and the United States Department of Agriculture. A full list of members can be found in [Appendix 6. Educational efforts](#) by the Vectorborne Work Group included:

- Presentations given on ticks and Lyme disease
- Presence at vendor shows, television and radio interviews
- Distribution of educational materials including Lyme brochures, tick spoons, fact sheets, etc.

In 2014, Maine CDC began a pilot project with **students in 3rd to 5th grade to teach them about tick biology and ecology**, as well as present information on tickborne diseases and prevention. In 2016 Maine CDC expanded the program to eight elementary schools and two summer camps in Maine. The program consists of a pre-test to gauge knowledge prior to the intervention; a twenty minute PowerPoint presentation on tick biology and ecology, as well as disease information; four ten-minute interactive activities; a take-home packet with games, activities, and information for parents; and a post-test to determine changes in knowledge and practices. This was undertaken with the Maine Public Health Corps (PHC) students who designed the curriculum and assisted with the activities. An epidemiologist or PHC member presented the disease and biology/ecology information. Participants evaluated the program highly in all four schools, and Maine CDC is currently working to expand this project statewide. This endeavor is being undertaken in close partnership with the Maine Department

of Education. An example of one of the take-home activities can be found in [Appendix 7](#). The school curriculum materials are all accessible online at: <http://www.maine.gov/dhhs/mecdc/infectious-disease/epi/school-curriculum/index.shtml>

- The curriculum resources website was visited 1,844 times in 2016
- The curriculum webinar videos were viewed 40 times in 2016

Educational materials for the 3rd-5th graders are available online, including our educator's guide, group activities, and activity book for both ticks and mosquitoes. PHC continues to review and update the education materials. Educational materials are available online at: <http://www.maine.gov/dhhs/mecdc/infectious-disease/epi/school-curriculum/index.shtml>.

- The web resource for educators was visited 1,844 times in 2016

In 2016, Maine CDC and PHC expanded an intervention to **educate adults ages 45 years and older about ticks and tick prevention practices**. In 2016 Maine CDC implemented the program in 18 libraries across Maine and expanded the efforts to include adults ages 45 years and older. This was an expansion from the pilot intervention launched in 2015, which included four libraries and adults ages 65 years and older. The program consisted of a questionnaire administered prior to participation to gauge prior knowledge and tick prevention behaviors and to gather contact information, a packet of information in the form of fact sheets on tickborne diseases in Maine (Lyme disease, *Anaplasma*, and *Babesia*), repellent and other tick prevention methods, tick identification, a tick spoon for tick removal; and a calendar to track prevention behaviors used to measure a change in behavior from before the pilot program to throughout the program. PHC students used weekly surveys to measure participant's prevention behaviors each week. Maine CDC is working to expand the program and revamp the current materials to gain more improvement in participants' prevention behaviors. See [Appendix 8](#) for a sample of an advertisement flyer used by libraries.

Maine CDC and PHC continued developing a series of **instructional short videos** to educate the Maine community in tick prevention and tickborne diseases. These videos include:

- Choosing and Applying Personal Repellents – viewed 61 times in 2016
- Tickborne Diseases Webinar 2016 – viewed 206 times in 2016
- Tick Identification – viewed 3,306 times in 2016
- Tickborne Diseases in Maine: Anaplasmosis – viewed 384 times as in 2016
- How to Choose a Residential Pesticide Applicator – viewed 49 times in 2016
- Tickborne Diseases in Maine : Babesiosis – viewed 90 times in 2016
- Reducing Tick Habitat Around Your Home- viewed 112 times in 2016
- Tickborne Diseases in Maine: Lyme Disease-viewed 151 times in 2016
- Don't Let the Ticks Bite! – viewed 25 times in 2016

Maine CDC's Lyme disease website is continually updated to provide information to the public and to health professionals about Lyme disease in Maine. A new web address was created to simplify messaging: www.maine.gov/lyme. In 2016:

- The Lyme disease homepage was visited 10,253 times
- The tick identification page was visited 7,484 times
- The FAQ section was visited 26,834 times

Ongoing educational initiatives featured on the Maine CDC website include:

- Lyme disease fact sheets
- Tick Identification
- Prevention of Tickborne Diseases
- Lyme Disease Surveillance Reports from 2008-2015
- Lyme disease awareness and prevention movie

Links are also provided for the educational materials for educators and the 3rd-5th grade curriculum, and for other tickborne diseases including: anaplasmosis, babesiosis, ehrlichiosis, Powassan, and RMSF.

During 2016, **Lyme disease educational materials** were distributed to partners and members of the public. Approximate numbers of materials distributed include:

- ~11,743 Wallet-sized laminated tick identification cards
- ~7,451 Tick remover spoons
- ~3,415 Lyme disease brochures
- ~2,902 Tick ID posters

Members of the Vectorborne Disease Working Group assist Maine CDC in distributing educational materials as widely as possible throughout the State.

Maine CDC releases **Health Alerts, press releases**, and other information on disease concerns of public health significance, including tickborne diseases. Maine CDC also responds to numerous press inquiries and releases press statements as appropriate (www.mainepublichealth.gov). Official releases in 2016 included:

- 2016 Lyme and other tickborne disease information (Health Alert) – May 3rd
- Winners of Lyme Disease Awareness Contest (Press Release) – released August 5th
- Tickborne diseases update (Health Alert) – released August 16th
- Mainers urged to take precautions as tickborne illnesses surge (Health Alert) – released August 18th

Pursuant to Legislation enacted in the second regular session of the 126th Legislature, May 2016 was declared to be **Lyme Disease Awareness Month** (PL 494). Educational activities took place the entire month including:

- Press release/Health Alert
- Governor's Proclamation of Lyme Disease Awareness Month ([Appendix 9](#))
- Information distributed through social media (Facebook, Twitter, Blog)
- Information distributed through multiple newsletters throughout the state
- Lyme Disease Public Awareness Events held in Augusta, Freeport, Falmouth, Wells, Portland, and Acadia
- Presentations throughout the state
- Maine CDC presence at multiple health fairs and conferences

Another major Lyme Disease Awareness month activity was a **statewide poster contest** for students in grades K-8. Students were asked to create a poster with the theme "**Tick Watch**" demonstrating at least one of the four Lyme disease prevention methods (wear protective clothing, use repellent, use caution in tick infested areas, and perform daily tick checks). The three winning posters are available

for viewing at the Lyme disease website www.maine.gov/lyme. Maine CDC used one of the winning posters for our 2016 statewide educational campaign ([Appendix 10](#)). Maine CDC distributed this poster to schools, state parks, the board of tourism, and historical sites.

In 2011 Maine CDC launched Lyme disease data on the **Maine Tracking Network Portal**. The data portal allows users to customize their data inquiries and includes data from 2001-2015. Maine CDC added town level data from 2008-2015 to the portal in 2016. Maine CDC also added deer tick submission data and information from the Behavioral Risk Factor Surveillance System. The Lyme portion of the portal was accessed 2,636 times during 2016. The Maine Tracking Network Lyme Data are available on Maine CDC's website at www.maine.gov/idepi. Please see [Appendix 11](#) for a sample table and map. Data can be broken down by:

- Public Health District
- County
- Town
- Gender
- Age group

Maine CDC's main **prevention message** is encouraging Maine residents and visitors to use personal protective measures to prevent tick exposures. Personal protective measures include avoiding tick habitat, use of EPA approved repellents, wearing long sleeves and pants, and daily tick checks and tick removal after being in tick habitats (ticks must be attached >24 hours to transmit Lyme disease). Persons who have been in tick habitats should consult a medical provider if they have unexplained rashes, fever, or other unusual illnesses during the first several months after exposure. Possible community approaches to prevent Lyme disease include landscape management and control of deer herd populations.

VI. A summary of laws of other states enacted during the past year related to the diagnosis, treatment, and insurance coverage for Lyme disease and other tickborne illnesses based on resources made available by federal Centers for Disease Control and Prevention or Other Organizations

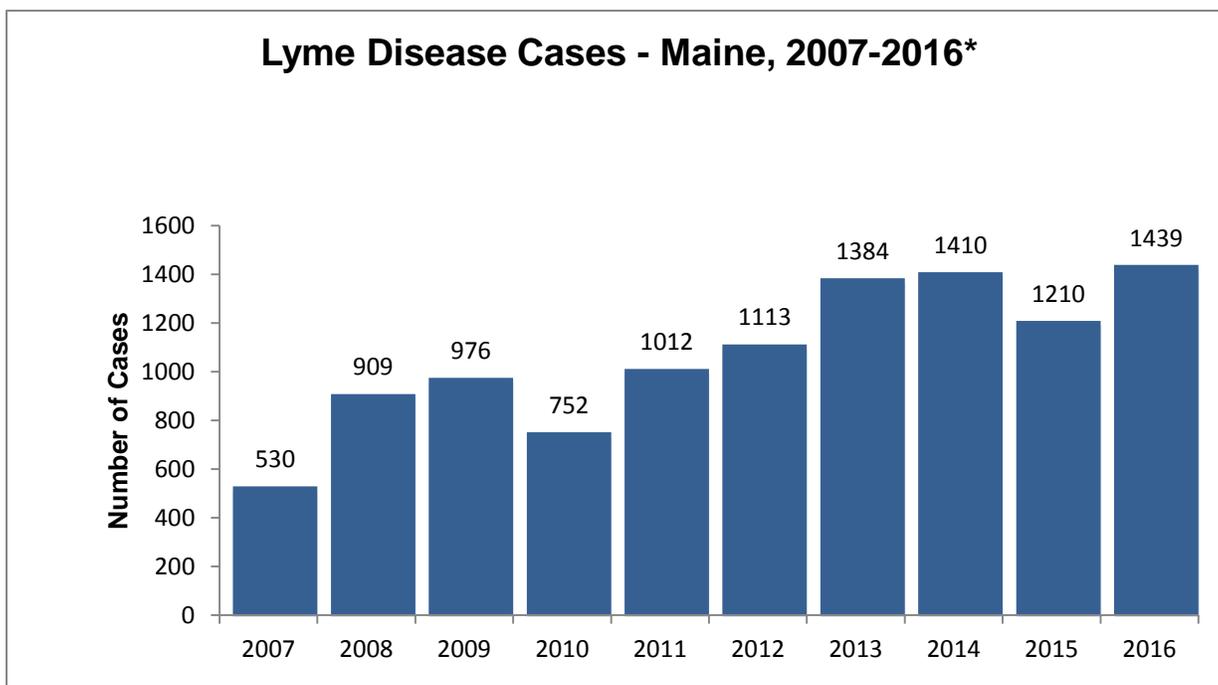
Maine CDC performed a search of state and federal legislation. A state by state listing of legislation relating to Lyme disease can be found in [Appendix 12](#).

Appendix 1 Maine Lyme disease statistics

Number and Rate per 100,000 persons of Lyme Disease Cases by County of Residence – Maine, 2012-2016*

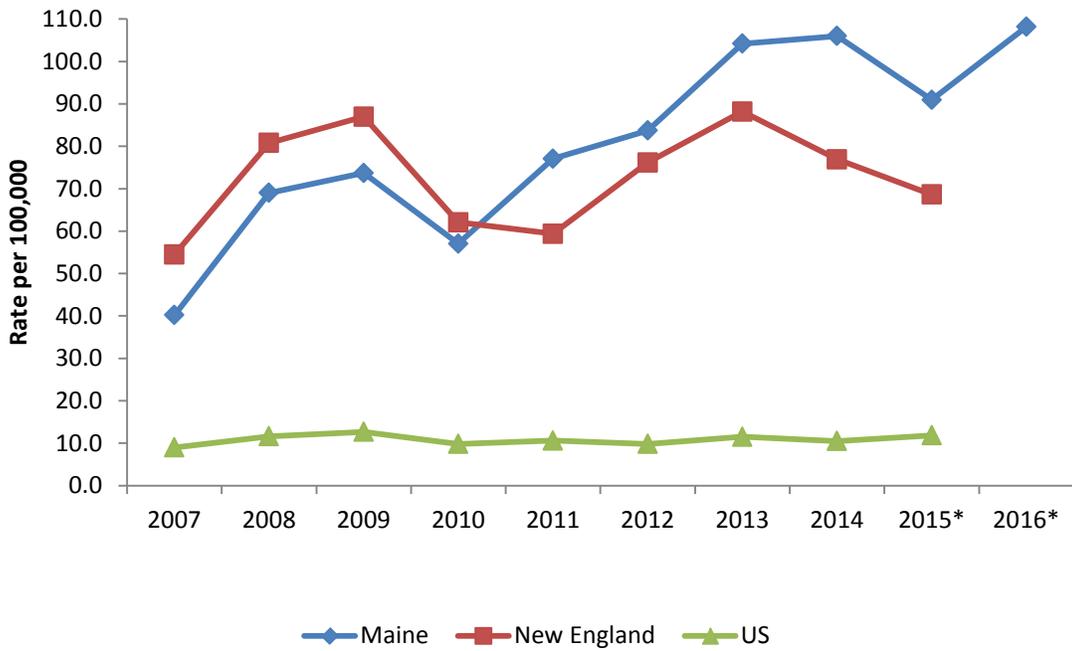
County	2012 Count	2012 Rate	2013 Count	2013 Rate	2014 Count	2014 Rate	2015 Count	2015 Rate	2016* Count	2016* Rate
Androscoggin	80	74.3	72	66.9	95	88.4	51	47.6	84	78.3
Aroostook	1	1.4	3	4.3	5	7.2	2	2.9	1	1.5
Cumberland	267	94	351	123	339	117.8	258	89.0	302	104.1
Franklin	6	19.6	11	36.1	10	33	10	33.3	3	10
Hancock	59	108.1	100	182.3	121	221.2	121	221.4	147	268.9
Kennebec	128	105	183	151	139	114.8	154	128.4	199	165.9
Knox	109	274.8	95	240.2	106	267.2	119	298.6	98	245.9
Lincoln	65	190.2	71	208.3	83	242.9	74	217.8	96	282.6
Oxford	25	43.5	50	87	43	75.1	26	45.5	43	75.2
Penobscot	21	13.7	38	24.8	50	32.6	51	33.4	86	56.3
Piscataquis	2	11.6	0	0	2	11.7	1	5.9	2	11.8
Sagadahoc	59	167.7	55	157.1	65	185.5	48	136.6	86	244.7
Somerset	11	21.2	32	61.9	17	33.2	28	54.8	21	41.1
Waldo	55	141.7	89	228.6	49	125.5	63	160.9	71	181.3
Washington	7	21.6	13	40.4	14	44	20	63.2	20	63.2
York	218	109.5	221	110.8	272	135.5	184	91.5	180	89.5
State	1113	83.7	1384	104.2	1410	106	1210	91.0	1439	108.2

All data includes both confirmed and probable cases



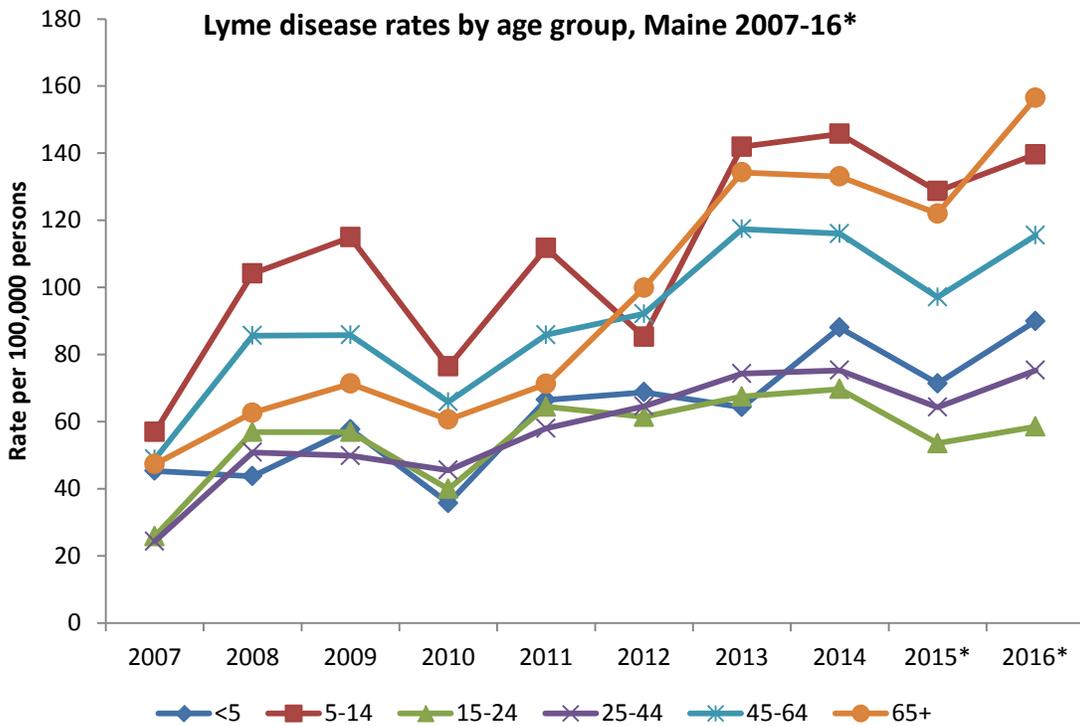
* 2016 data are preliminary as of 01/18/2017

Lyme Disease Incidence - Maine and US, 2007-2016*



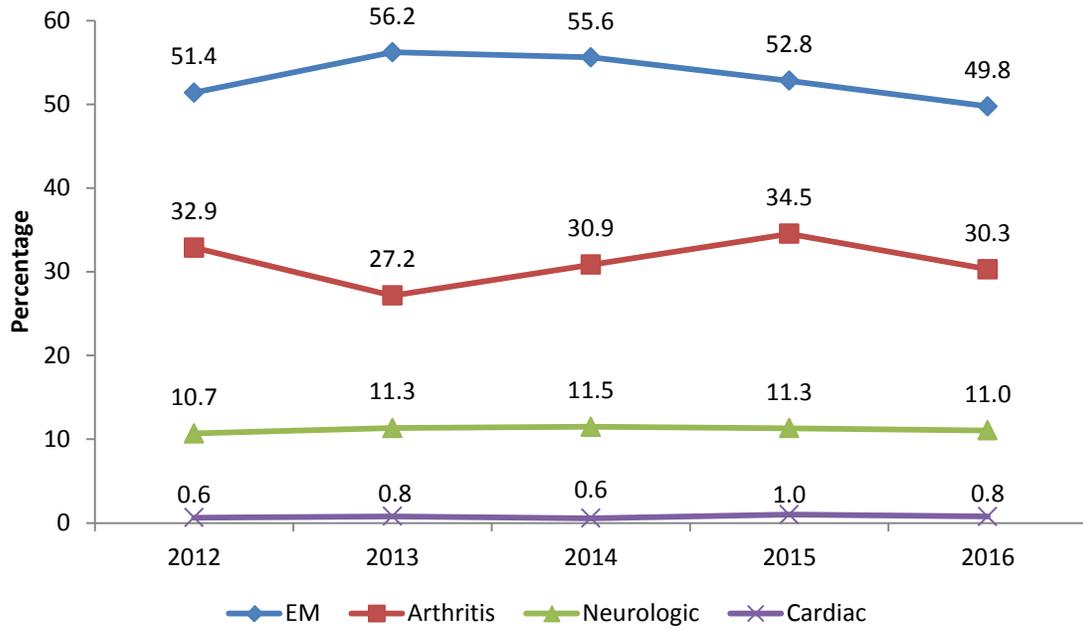
*2016 data are preliminary as of 01/18/2017

Lyme disease rates by age group, Maine 2007-16*



* 2015 data are preliminary as of 01/18/2017

**Percentage of Symptoms Reported Among Lyme Disease Cases -
Maine, 2012-2016***



* 2016 data are preliminary as of 01/18/2017

Appendix 2
Maine tickborne disease statistics (excluding Lyme disease)

Number of Selected Tickborne Disease Cases by County of Residence – Maine, 2016*

County	Anaplasmosis	Babesiosis	Ehrlichiosis	Ehrlichiosis/ Anaplasmosis Undetermined	Spotted Fever Rickettsiosis
Androscoggin	14	6	0	1	1
Aroostook	0	0	0	0	0
Cumberland	59	17	2	1	1
Franklin	1	0	0	0	0
Hancock	13	1	0	0	0
Kennebec	29	5	1	2	0
Knox	77	13	0	0	0
Lincoln	63	7	0	0	0
Oxford	5	2	0	0	0
Penobscot	2	3	1	0	1
Piscataquis	0	0	0	0	0
Sagadahoc	27	5	1	0	0
Somerset	2	2	0	0	0
Waldo	10	2	0	0	0
Washington	0	0	1	0	0
York	71	20	0	0	1
Total	373	83	6	4	3

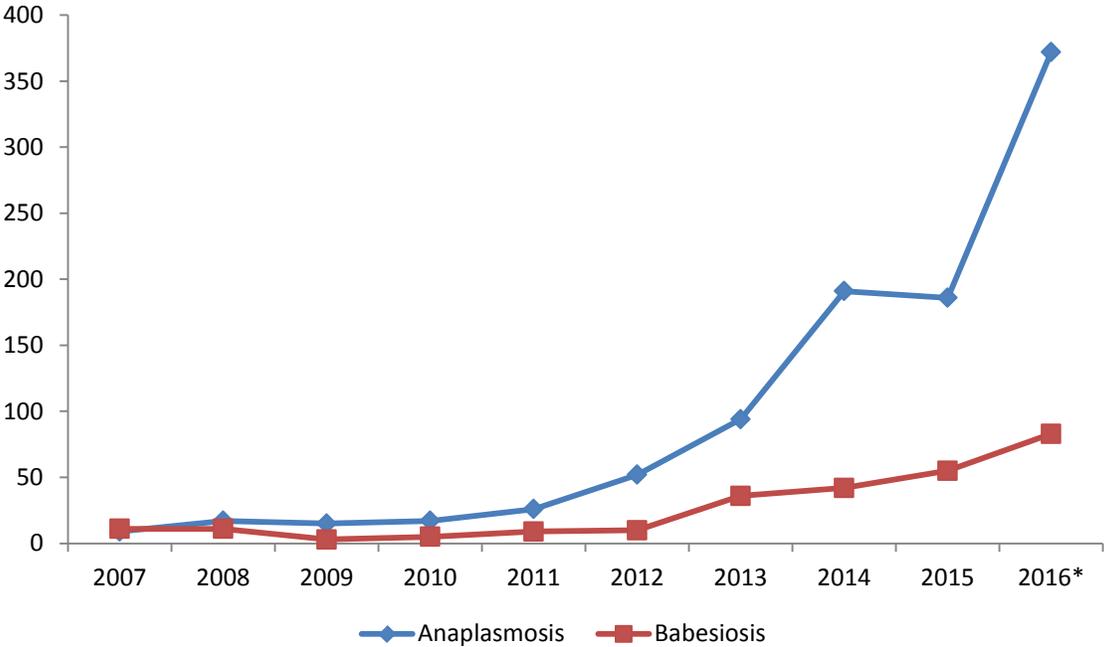
* 2015 data are preliminary as of 01/18/2017

Number of Selected Tickborne Disease Cases– Maine, 2006 - 2016*

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016*
Anaplasmosis	9	17	15	17	26	52	94	191	186	373
Babesiosis	11	11	3	5	9	10	36	42	55	83
Ehrlichia chaffeensis	3	1	1	4	1	3	3	8	5	6
Ehr/Ana undetermined	0	0	0	0	0	0	2	6	1	4
RMSF	NR	1	5	2	1	3	2	3	1	3
Powassan	0	0	0	0	0	0	1	0	0	1

* 2016 data are preliminary as of 01/18/2017

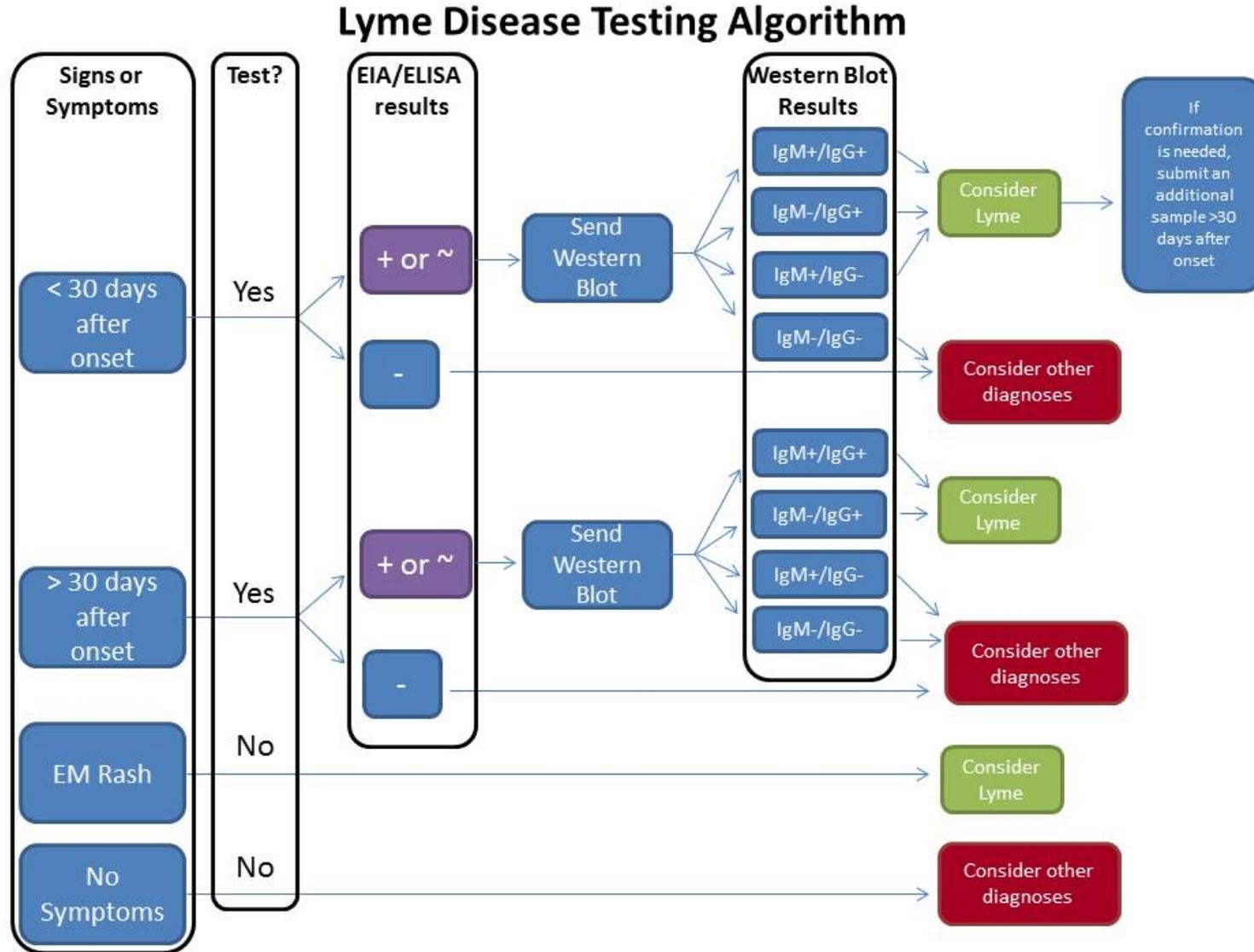
Anaplasmosis and Babesiosis, Maine 2007-2016*



* 2016 data are preliminary as of 01/18/2016

Appendix 3

Two-tiered Antibody testing for Lyme disease



Appendix 4

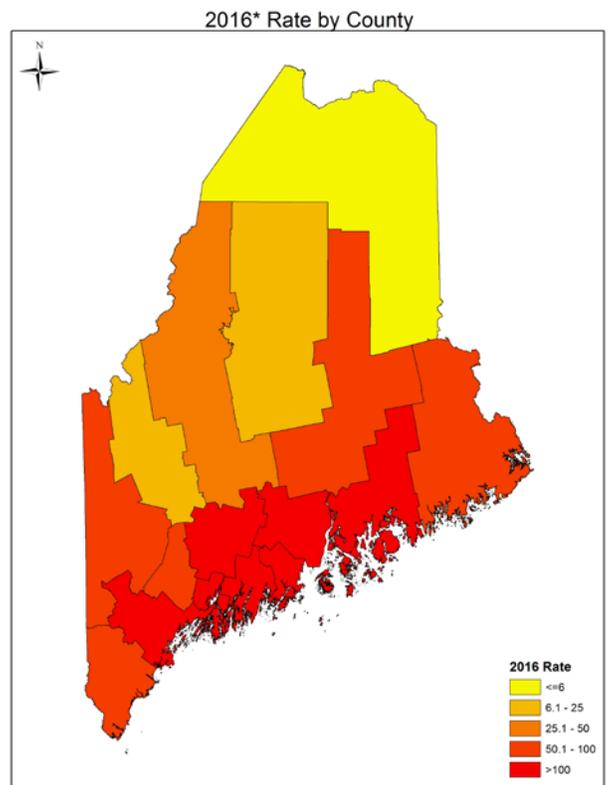
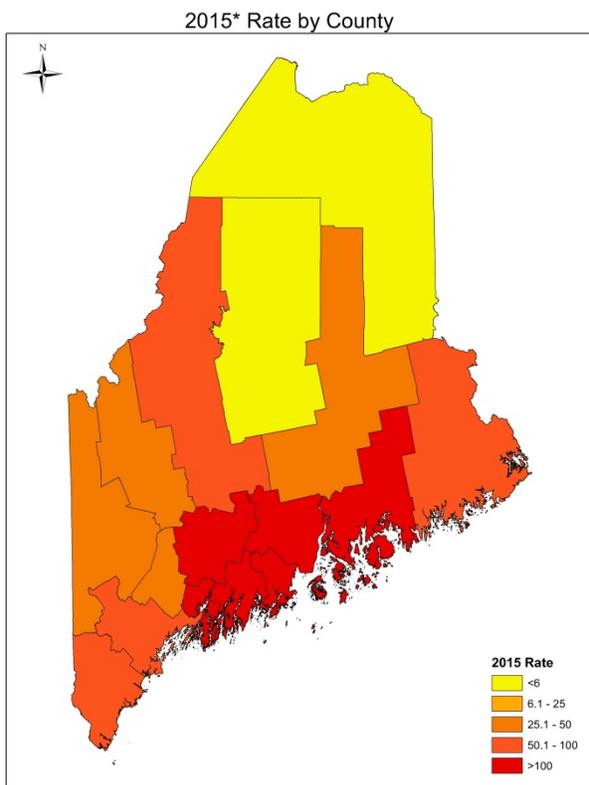
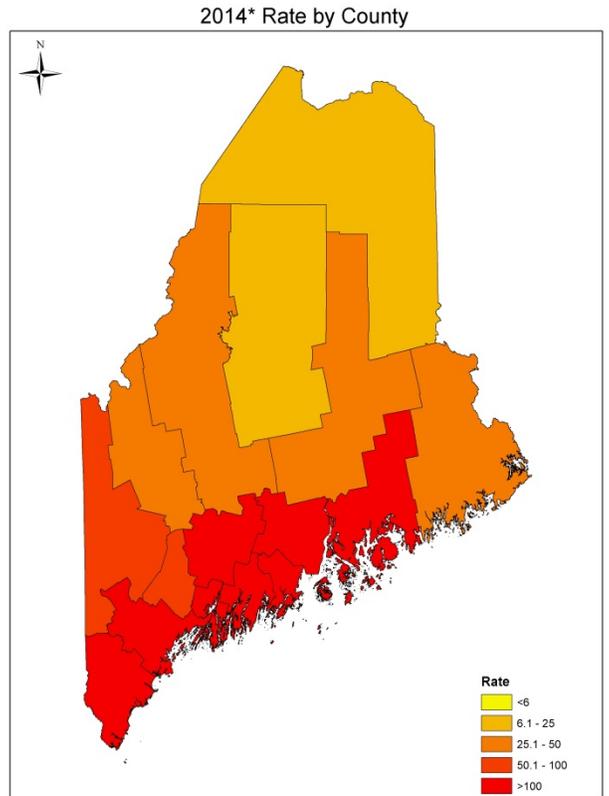
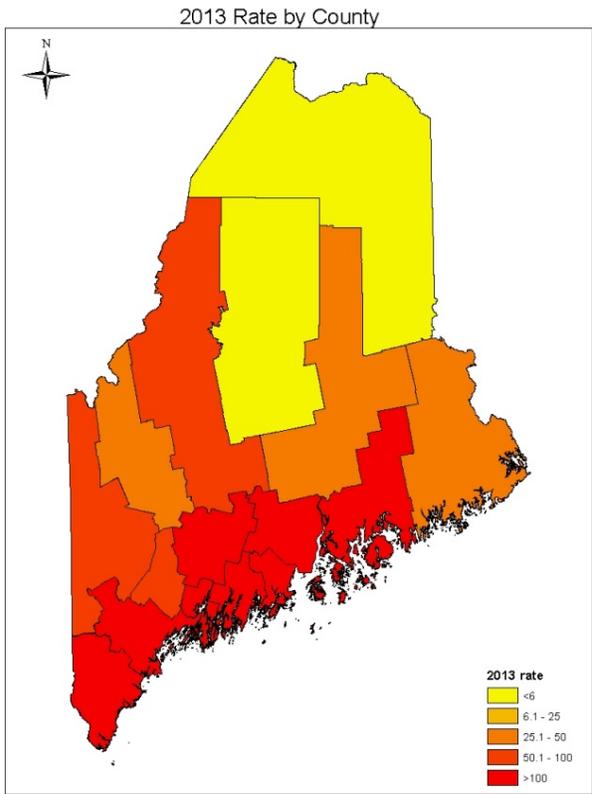
Peer-reviewed medical literature related to medical management and treatment of Lyme disease – bibliography: 2016

- Abusaada, K., Ajmal, S., & Hughes, L. (2016). Successful treatment of human monocytic Ehrlichiosis with Rifampin. *Cureus*, 8(1), e444. doi: 10.7759/cureus.444.
- Berende, A., ter Hofstede, H.J., Vos, F.J., van Middendorp, H., Vogelaar, M.L., Tromp, M., van den Hoogen, F.H., Donders, A.R., Evers, A.W., & Kullberg, B.J. (2016). Randomized trial of longer-term therapy for symptoms attributed to Lyme disease. *New England Journal of Medicine*, 374(13), 1209-20. doi: 10.1056/NEJMoa1505425.
- Biggs, H.M., Behravesh, C.B., Bradley, K.K., Dahlgren, F.S., Drexler, N.A., Dumler, J.S.,...Traeger, M.S. (2016). Diagnosis and management of tickborne Rickettsial disease: Rocky Mountain Spotted Fever and other spotted fever group Rickettsioses, Ehrlichioses, and Anaplasmosis-United States. *MMWR Recommendations and Reports*, 65(2), 1-44. doi: 10.15585/mmwr.rr6502a1.
- Connally, N.P., Hinckley, A.F., Feldman, K.A., Kemperman, M., Neitzel, D., Wee, S.B.,...Meek, J.I. (2016). Testing practices and volume of non-Lyme tickborne diseases in the United States. *Ticks and Tickborne Diseases*, 7(1), 193-198. doi: 10.1016/j.ttbdis.2015.10.005.
- Golovchenko, M., Vancová, M., Clark, K., Oliver, J.H., Grubhoffer, L., & Rudenko, N. (2016). A divergent spirochete strain isolated from a resident of the southeastern United States was identified by multilocus sequence typing as *Borrelia bissettii*. *Parasites & Vectors*, 9, 68. doi: 10.1186/s13071-016-1353-4.
- Mechai, S., Margos, G., Feil, E.J., Barairo, N., Lindsay, L.R., Michel, P., & Ogden, N.H. (2016). Evidence for host-genotype associations of *Borrelia burgdorferi sensu stricto*. *PLoS One*, 11(2), e0149345. doi: 10.1371/journal.pone.0149345.
- Nelder, M.P., Russell, C.B., Sheehan, N.J., Sander, B., Moore, S. Li, Y.,...Sider, D. (2016). Human pathogens associated with the blacklegged tick *Ixodes scapularis*: a systematic review. *Parasites & Vectors*, 9, 265. doi: 10.1186/s13071-016-1529-y.
- Oosting, M., Buffen, K., van der Meer, J.W., Netea, M.G., & Joosten, L.A. (2016). Innate immunity networks during infection with *Borrelia burgdorferi*. *Critical Reviews in Microbiology*, 42(2), 233-244. doi: 10.3109/1040841X.2014.929563.
- Piantadosi, A., Rubin, D.B., McQuillen, D.P., Hus, L., Lederer, P.A., Ashbaugh, C.D.,...Lyons, J.L. (2016). Emerging cases of Powassan Virus Encephalitis in New England: Clinical presentation, imaging, and review of the literature. *Clinical Infectious Diseases*, 62(6), 707-713. doi: 10.1093/cid/civ1005.
- Pothineni, V.R., Wagh, D., Babar, M.M., Inayathullah, M., Solow-Cordero, D., Kim, K.M.,...Rajadas, J. (2016). Identification of new drug candidates against *Borrelia burgdorferi* using high-throughput screening. *Journal of Drug Design, Development and Therapy*, 10, 1307-1322. doi: 10.2147/DDDT.S101486.

- Sanchez, E., Vannier, E., Wormser, G.P., & Hu, L.T. (2016). Diagnosis, treatment, and prevention of Lyme disease, human granulocytic Anaplasmosis, and Babesiosis: A review. *JAMA*, 315(16), 1767-77. doi: 10.1001/jama.2016.2884.
- Sathiamoorthi, S. & Smith, W.M. (2016). The eye and tickborne disease in the United States. *Current Opinion in Ophthalmology*, 27(6), 530-537. doi: 10.1097/ICU.0000000000000308.
- Schwameis, M., Kündig, T., Huber, G., von Bidder, L., Meinel, L., Weisser, R.,...Jilma, B. (2016). Topical azithromycin for the prevention of Lyme borreliosis: a randomized, placebo-controlled, phase 3 efficacy trial. *The Lancet Infectious Diseases*, pii:S1473-3099(16)30529-1. doi: 10.1016/S1473-3099(16)30529-1.[Epub ahead of print].
- Shroff, G. (2016). Transplantation of human embryonic stem cells in patients with Multiple Sclerosis and Lyme disease. *American Journal of Case Reports*, 17, 944-949. PMID: 27956736.
- Singh, S., Parker, D., Mark-Carew, M., White, R., & Fisher, M. (2016). Lyme disease in West Virginia: An assessment of distribution and clinicians' knowledge and surveillance. *West Virginia Medical Journal*, 112(4): 48-54. PMID: 27491103.
- Šmit, R., and Postma, M.J. (2016). Vaccines for tickborne diseases and cost-effectiveness of vaccination: A public health challenge to reduce the diseases' burden. *Expert Review of Vaccines*, 15(1), 5-7. doi: 10.1586/14760584.2016.1111142.
- Tseng, Y.J., DeMaria, A. Jr., Goldmann, D.A., & Mandi, K.D. (2016). Claims-based diagnostic patterns of patients evaluated for Lyme disease and given extended antibiotic therapy. *Vectorborne and Zoonotic Diseases*. doi: 10.1089/vbz.2016.1991.[Epub ahead of print].

Appendix 5

Lyme Disease Cases per 100,000 people (Rate) – Maine, 2013-2016*



* Preliminary data as of 1/18/2016

Appendix 6

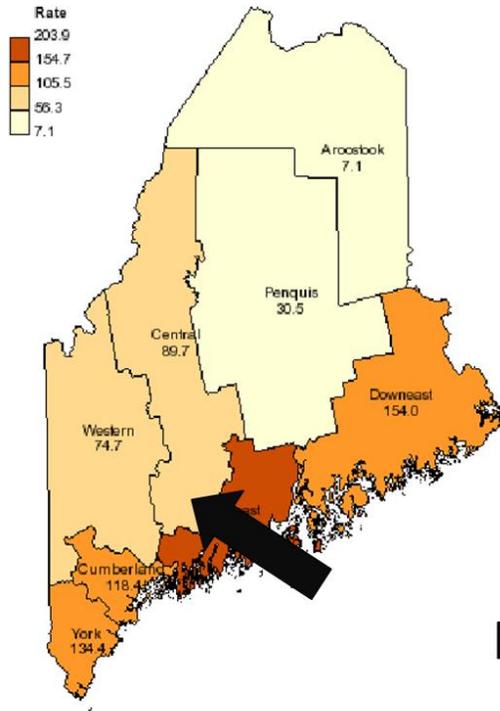
2016 Maine Vectorborne Disease Work Group

Chair: Sara Robinson, Maine Center for Disease Control and Prevention (Maine CDC)

Adams, Justin	Municipal Pest Management
Beausang, Beth	Chellie Pingree's Staff
Bonthius, Jessica	Maine CDC
Camuso, Judy	Maine Department of Inland Fisheries and Wildlife
Chamberlain, Anne	Maine Board of Pesticide Control
Davis, Shari	Maine CDC
Dill, Griffin	Maine Cooperative Extension
Dill, Jim	Maine Cooperative Extension
Donahue, Charlene	Maine Forest Service
Dyer, Robin	US Department of Agriculture
Elias, Susan	Maine Medical Center Research Institute, UMaine Orono
Fish, Gary	Maine Board of Pesticides Control
Groden, Ellie	University of Maine Orono
Hicks, Lebelle	Maine Board of Pesticides Control
Hinkel, Bill	Maine Department of Environmental Protection
Jackson Jones, Paula	Midcoast Lyme Disease Support Group
Jennings, Henry	Maine Board of Pesticides Control
Kantar, Lee	Maine Department of Inland Fisheries and Wildlife
Kavanah, Brian W	Maine Department of Environmental Protection
Keenan, Patrick	Biodiversity Research Institute
Kirby, Clay	University of Maine Cooperative Extension
Lacombe, Eleanor	Maine Medical Center Research Institute
Lichtenwalner, Anne	University of Maine, Animal Health Laboratory
Lubelczyk, Charles	Maine Medical Center Research Institute
Morris, Jesse W	US Department of Agriculture
Morrison, Mike	Municipal Pest Management
Murray, Kathy	Maine Board of Pesticides Control
Patterson, Megan L	Maine Board of Pesticides Control
Rand, Peter	Maine Medical Center Research Institute
Ravana, Kyle	Maine Department of Inland Fisheries and Wildlife
Robinson, Sara	Maine CDC
Smith, Rob	Maine Medical Center Research Institute
Storch, Dick	University of Maine Cooperative Extension
Struble, Dave	Maine Forest Service
Szantyr, Beatrice	Physician, Lincoln Maine
Walsh, Michele	Maine Department of Agriculture, Conservation, and Forestry
Webber, Lori	Maine CDC
Welch, Margaret	Maine Medical Center Research Institute
Wood, Greg	Maine Department of Environmental Protection

Appendix 8 2016 Sample Advertisement Flyer Used in Augusta Area Libraries

Rate of Lyme Disease
by Public Health District, Maine 2014



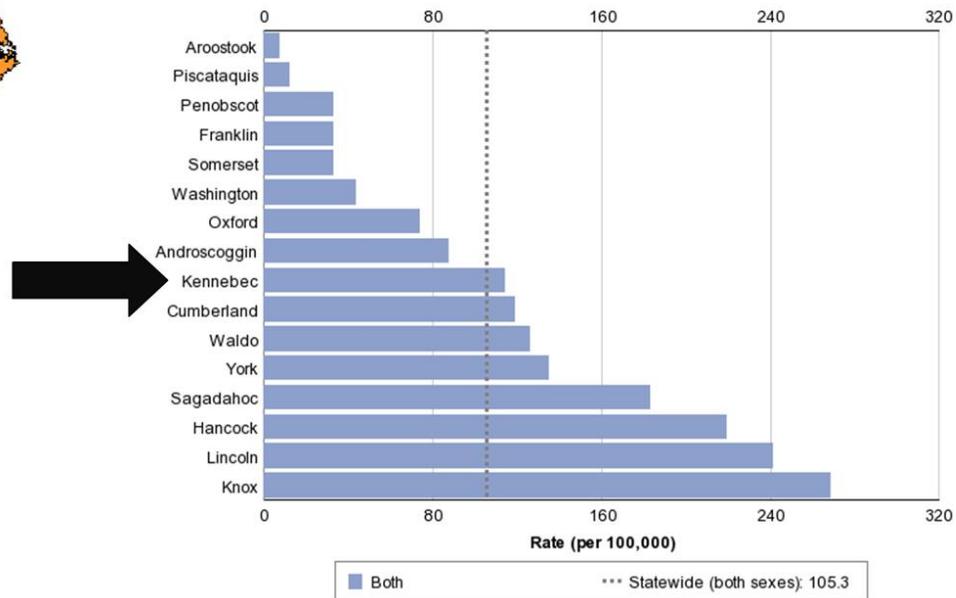
Images Source: Maine Tracking Network



Augusta

Maine State Library is located in Kennebec County, within Maine's Central District. In 2014, Kennebec County reported high rates of Lyme disease, above the statewide average. It is important to learn preventive behaviors, since rates of Lyme disease continue to be high in Kennebec and across Maine.

Rate of Lyme Disease
by County, Maine 2014



Appendix 9

2016 Governor's Proclamation

State of Maine



WHEREAS, the Maine Center for Disease Control and Prevention reports that in 2015, 1,200 cases of Lyme disease have been reported; and

WHEREAS, the actual incidence of Lyme disease is likely far more than reported; and

WHEREAS, Lyme disease disproportionately affects children between five and fifteen years and mature adults over sixty-five years; and

WHEREAS, public awareness and education are necessary to educate and promote awareness of Lyme disease and other tick-borne illnesses; and

WHEREAS, the 124th Maine Legislature enacted Public Law Chapter 494, L.D. 1709, Item 1, *An Act to Enhance Public Awareness of Lyme Disease*.

NOW, THEREFORE, I, PAUL R. LEPAGE, Governor of the State of Maine, do hereby proclaim the month of May as

LYME DISEASE AWARENESS MONTH

throughout the State of Maine, and urge the public to become aware of the steps that can be taken to reduce the risk of tick-borne illnesses.

In testimony whereof, I have caused the Great Seal of the State to be hereunto affixed GIVEN under my hand at Augusta this twenty-second day of April Two Thousand Sixteen

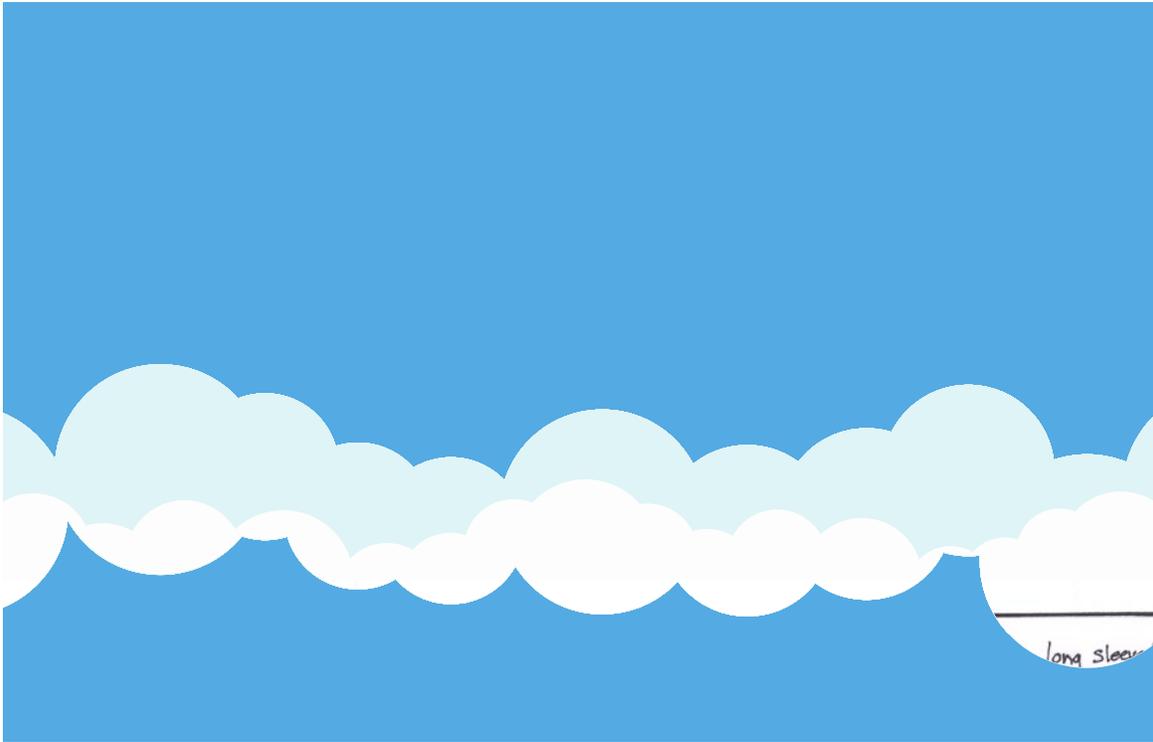

Paul R. LePage
Governor




Matthew Dunlap
Secretary of State
TRUE ATTESTED COPY

Appendix 10

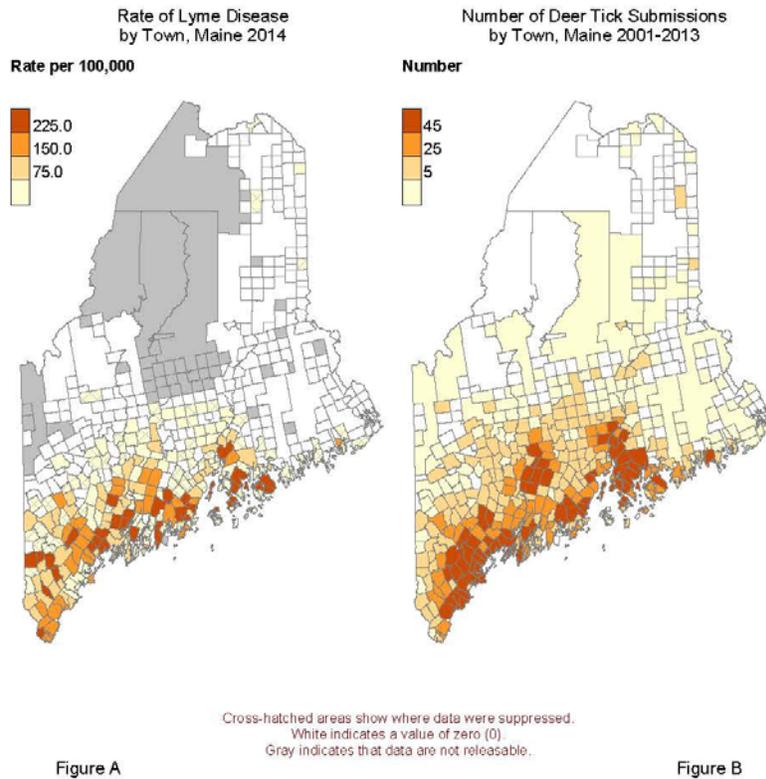
Maine CDC Lyme Disease Awareness Month Poster 2016



2016 "Tick Watch" Poster Contest Winner
For more information visit www.maine.gov/lyme

Appendix 11

Maine Tracking Network: Lyme Disease Data Portal



About these figures

Figure A shows the incidence rate (per 100,000 people) of confirmed and probable cases of Lyme disease in the population. Beginning in 2008, the case definition was expanded to include the classification of probable cases. These data are obtained through notifiable conditions surveillance managed by the Maine CDC Infectious Disease Epidemiology Program, based upon reports from healthcare providers, laboratories, and other healthcare partners.

Figure B shows the number of deer ticks (*Ixodes scapularis*) submitted to the Maine Medical Center Research Institute (MMCRI). From 1988-2013, MMCRI's Vector-borne Disease Laboratory (in cooperation with the State of Maine) offered free tick identification to Maine residents and physicians. Data represent only ticks that were attached to human hosts.

Different map colors are not based on statistical tests of difference.

In order to protect privacy as per Maine CDC Privacy Policy, data may have been suppressed. Locations where data must be suppressed are represented by cross-hatching. Locations where data are not releasable (NR) are shaded gray.

Sources of these data

Figure A: The data were collected and analyzed by the Maine CDC Infectious Disease Epidemiology Program. Population data from the U.S. Census Bureau were used to calculate state, public health district, and county rates of Lyme disease. Population data from the Maine Office of Data, Research, and Vital Statistics (ODRVS) were used to calculate town-level rates of Lyme disease. The data display was prepared by the Maine Environmental Public Health Tracking Program. Data updated: 04/2016. Display updated: 04/2016.

Figure B: MMCRI provided the data for this display. The data were analyzed by the Maine Environmental Public Health Tracking Program. Data updated: 04/2016. Display updated: 04/2016.

Appendix 12

2016 Tickborne Disease Legislation

Alabama

Title: Tick Borne Illness, commission, membership and duties, colleges and universities, allocation of research monies, Alabama Study Commission on Tick Borne Illness (HB 253)

Status: Passed

Connecticut

Title: An Act Designating Various Months, Weeks And Days of Commemoration (SB 438)

Status: Failed

Title: An Act Concerning The Authority And Responsibilities Of Advanced Practice Registered Nurses (SB 67)

Status: Passed

Delaware

Title: An Act To Amend Title 16 Of The Delaware Code Relating To The Creation Of An Oversight Board To Educate Health Care Professionals About Lyme Disease (HB 291)

Status: Passed

Title: Recognizing May 2016 As “Lyme Disease Awareness Month” In The State Of Delaware (HCR 79)

Status: Passed

Title: An Act To Amend Title 16 Of The Delaware Code Relating To Tick Control (HB 290)

Status: Passed

Illinois

Title: Lyme Disease Awareness Month (HR 1287)

Status: Failed

Maine

Title: An Act to Establish a Fund for the Operations and Outreach Activities of the University of Maine Cooperative Extension Animal and Plant Disease and Insect Control Laboratory (HB 1099)

Status: Failed

Maryland

Title: Lyme Disease – Laboratory Test – Required Notice (SB 926; HB 399)

Status: Passed

Massachusetts

Title: Relative to expanded access to therapies for the treatment of Lyme Disease (HB 4560)
Status: Passed

Title: Financing of health care coverage and analysis (SB 2381; B 2231; SB 635)
Status: Failed

Title: A report of the Senate Committee on Global Warming and Climate Change entitled: NO TIME TO WASTE: Our climate clock is ticking and our natural resources, public health and future of our economy are at stake (SB 13)
Status: Failed

Title: Environment (HB 4650; HB 629; HB 647; HB 651; HB 666; HB 673; HB 682; HB 683; HB 687; HB 722; HB 730; HB 774)
Status: Failed

Michigan

Title: A resolution to declare May 2016 as Lyme Disease Awareness Month in the state of Michigan (HR 282)
Status: Passed

Title: A resolution to declare October 9, 2016 as PANS and PANDAS Awareness Day in the state of Michigan (HR 347)
Status: Passed

New Hampshire

Title: Relative to testing for Lyme disease (HB 1537)
Status: Passed

New Jersey

Title: Requires health insurance to cover Lyme disease (SB 901; AB 966)
Status: Failed

Title: Codifies Lyme disease reporting requirements (SB 1348)
Status: Failed

Title: Implements person-first language and changes pejorative terminology referring to persons with certain disabilities or substance use disorders (SB 2721; AB 926)
Status: Failed

New York

Title: Requires health insurers to provide coverage for long term medical care for Lyme disease and other tick borne related pathogens (SB 653; SB 46; AB 1277)

Status: Failed

Title: Relates to including a lyme disease and tickborne infection awareness and prevention program within health care and wellness education and outreach programs (SB 5803; AB 8106)

Status: Passed

Title: Requires the New York state health care quality and cost containment commission to issue a report considering the impact on health insurance costs and quality of legislation requiring coverage of long term and chronic Lyme disease and other tickborne diseases (SB 7777; AB 10677)

Status: Failed

Title: Relates to instructional tools and materials for school districts and libraries to assist in the education and awareness program to protect children from lyme disease and tickborne infections (SB 5804; AB 8105)

Status: Passed

Title: Relates to the control and reporting of communicable diseases (AB 6873)

Status: Failed

Title: Establishes a tick control district in the town of East Hampton, county of Suffolk (SB 4439; AB 6316)

Status: Failed

Pennsylvania

Title: Designating the month of May 2016 as “Lyme Disease Awareness Month” in Pennsylvania (SR 338; HR 866)

Status: Passed

Title: Providing for patient access to diagnostics and treatments for Lyme disease and related tickborne illnesses; and requiring health care policies to provide certain coverage (SB 1299; HB 2242)

Status: Failed

Rhode Island

Title: Senate Resolution Proclaiming the Month of May, 2016, To Be “Lyme and Other Tick Borne Diseases Month” In the State of Rhode Island (SR 3068)

Status: Passed

Virginia

Title: Lyme disease; treatment of a patient (SB 671; HB 1284)

Status: Failed

Title: Lyme disease; prevention pilot program (HB 354)

Status: Failed

Title: Lyme disease; testing disclosure (HB 962)

Status: Failed

Washington

Title: Concerning the treatment of Lyme disease (HB 1347)

Status: Failed

Wisconsin

Title: Rules regarding the diagnosis and treatment of Lyme disease and requiring the exercise of rule-making authority (HB 768)

Status: Failed