Maine Center for Disease Control and Prevention
An Office of the Department of Health and Human Services
Paul R. LePage, Governor
Mary C. Mayhew, Commissioner

Report to Maine Legislature

Lyme Disease

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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 Tick Borne 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 tick borne illnesses in the state, as well as to address a review and evaluation of Lyme disease and other tick borne 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 tick-borne 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 tick borne 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 tick borne 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 tick borne 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 tick borne illnesses based on resources made available by the federal Centers for Disease Control and Prevention or other organizations.

This is the sixth annual report to the Legislature and includes an update on activities conducted during 2013.

Executive Summary

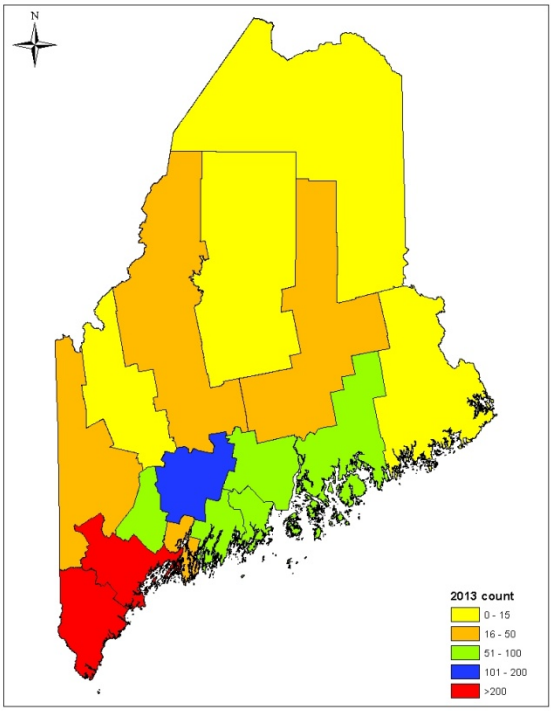
Lyme disease is a notifiable condition in the state of Maine. The goal of Lyme disease surveillance is to help define demographic, geographic, and seasonal distribution; monitor disease trends; identify risk factors for transmission; and promote prevention and education efforts among the public and medical 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 is likely to be an under-representation of the true burden of Lyme disease in Maine. Federal CDC released a new statement in 2013 that the true burden of Lyme disease may be up to 10 times the number of reported cases.

Maine Lyme Disease Summary, 2013 (Preliminary data as of January 22, 2014)

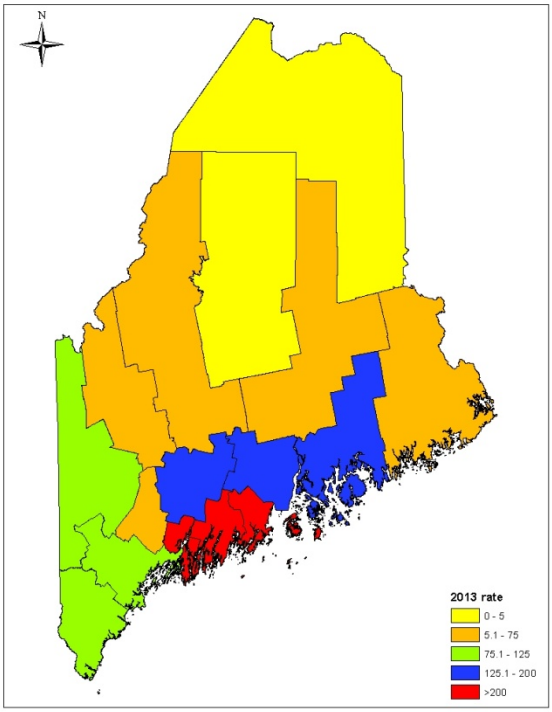
- 1349 confirmed and probable cases
- Symptoms of reported cases* of Lyme disease in Maine included:
  - Erythema Migrans (characteristic expanding rash): 764 cases (57%)
  - Arthritis (joint swelling): 368 cases (27%)
  - Neurological (Bells Palsy or other cranial neuritis): 153 cases (11%)

  * Cases could report more than one symptom
- Hospitalization occurred in 51 cases (4%).
- Among case patients with a reported date of symptom onset, 56% began experiencing symptoms during June, July, or August. Date of symptom onset is missing for 24% of cases.
- Middle aged adults (45-64) represent the highest number of cases.

Confirmed and Probable Cases of Lyme DIsease - Maine, 2013*



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



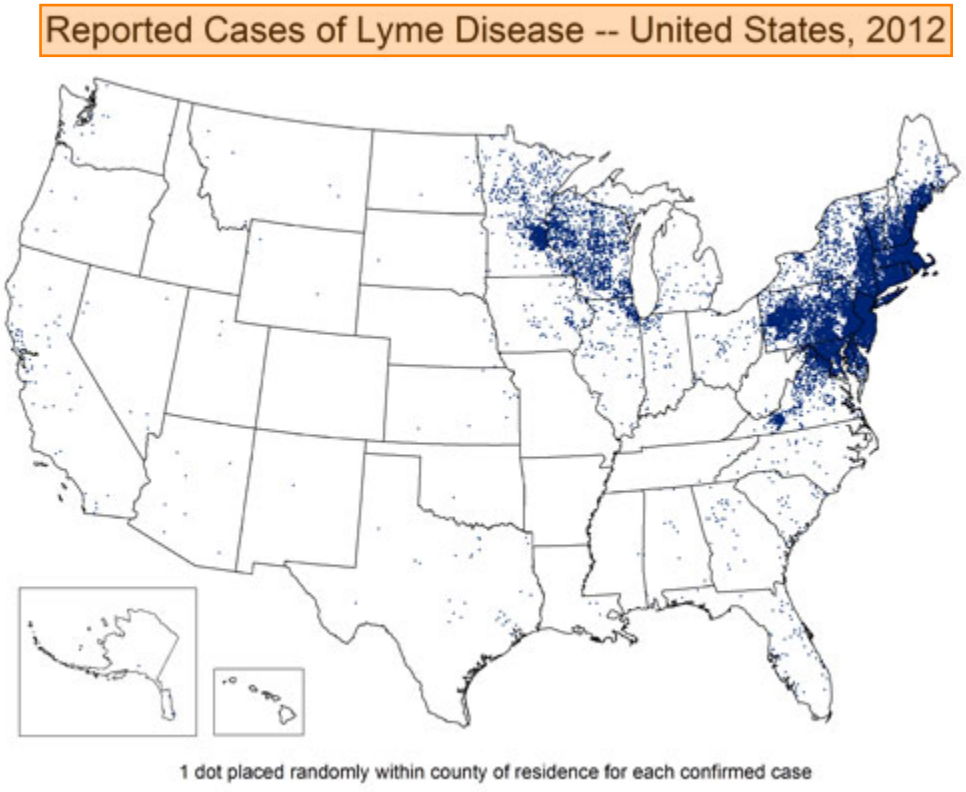
* 2013 data are preliminary as of 01/22/2014

I. The Incidence of Lyme disease and other tick-borne 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 10 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.



Source: federal CDC (http://www.cdc.gov/lyme/resources/ReportedCasesofLymeDisease_2012.pdf)

The first documented case of Maine-acquired Lyme disease was diagnosed in 1986. Since 2003, when 175 cases were confirmed, the numbers of reported cases have increased each year through 2013 with the exception of 2010. In 2010 there was a slight decrease in cases both in Maine, New England, and the United States, the reasons for which are unknown, but could be attributed to multiple factors including fewer ticks due to weather conditions, and prevention education. 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 Midcoast areas but is starting to increase in the northern and western counties as well, making the problem statewide. Aroostook, Cumberland, Franklin, Hancock, Kennebec, Lincoln, Oxford, Penobscot, Somerset, Waldo, and Washington counties rates increased from 2012 to 2013.

In 2013 (preliminary data as of January 22, 2014) 1,349 confirmed and probable cases of Lyme disease were reported among Maine residents, which is a rate of 101.6 cases of Lyme disease per 100,000 persons in Maine. Forty-two (42%) percent of reported cases were from Cumberland and York County.

Forty-three (43%) percent of cases were female and fifty-seven (57%) percent of cases were male. The median age of cases in 2013 was 50 years of age (average age of 44), which continues the gradual ascent of the median age throughout the past 5 years. The age at diagnosis ranges from1-89 years. 56 (56%) percent of the cases had onset during June, July, or August (date of onset is missing for 24% of cases). Fifty-one persons (4% of all cases) were reported to have been hospitalized with Lyme disease. For further Lyme disease statistics in Maine please see Appendix 1.

B. Other Tick Borne 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 22, 2014 showed 94 cases (72 confirmed and 22 probable) of anaplasmosis reported in 2013. This is almost double the number of confirmed and probable cases that occurred in 2012, the second consecutive year the number has jumped dramatically. Cases occurred in Androscoggin, Aroostook, Cumberland, Franklin, Kennebec, Knox, Lincoln, Oxford, Sagadahoc, Waldo, and York counties.

Babesiosis:

Babesiosis is a rare and potentially severe tick-borne disease. 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 22, 2014 showed 36 cases (30 confirmed and 6 probable) of babesiosis reported in 2013 which is more than triple the cases in 2012. Cases occurred in Cumberland, Kennebec, Knox, Lincoln, Penobscot, and York counties. Babesiosis is also an emerging disease 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 as the tick appears to be moving north. Preliminary data as of January 22, 2014 showed 3 cases (all probable) of *Ehrlichia chaffensis* reported in 2013 from Cumberland, Knox, and Sagadahoc counties. Maine had 1 confirmed case of *Ehrlichia ewingii* (a different species in the same family) in Lincoln county. Maine had 2 probable cases of Ehrlichia/Anaplasma Undetermined, which occurs when serologies are done, but are the same for both Ehrlichia and Anaplasma so we cannot tell which organism was present.

Powassan:

Powassan is a virus transmitted to humans through the bite of an infected tick. It is the only tick-borne arbovirus occurring the United States and Canada. Approximately 50 cases of Powassan were reported in the United States in the last decade. Signs and symptoms of Powassan include fever, headache, vomiting, weakness, confusion, seizures, and memory loss. Long-term neurologic problems may occur. Preliminary data as of January 22, 2014 showed 1 confirmed case of Powassan reported in 2013. The case was reported from Knox county and was the first case identified in Maine in nearly a decade.

Spotted Fever Rickettsiosis:

Spotted Fever Rickettsioses 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 22, 2014 showed 2 probable cases of RMSF reported in 2013. Cases were reported from Aroostook and York counties.

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 tick borne illnesses: http://www.idsociety.org/Index.aspx.

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. First-tier testing is most often an Enzyme-Linked Immunosorbant 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 http://www.idsociety.org/Index.aspx.

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)" (http://www.idsociety.org/Index.aspx).

"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.'" (http://www.idsociety.org/Index.aspx).

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 tick borne 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. http://www.idsociety.org/Index.aspx. A bibliography of peer reviewed journal articles published in 2013 as related to these clinical guidelines and other topics of interest is included in Appendix 2. 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 tick borne illnesses

Maine CDC continues to emphasize prevention and control of Lyme disease. Surveillance for tick borne diseases, including Lyme disease, is performed by the Division of Infectious Disease, 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 tick-borne 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 continues to partner with Maine Medical Center Research Institute to monitor the identification of deer ticks in Maine through a passive submission system. A map of deer ticks by town of submitter is included in Appendix 3.

During 2013, a spatial analysis of Lyme disease surveillance data was performed at the county level, showing the disease progressing north through the state (Appendix 4). Outreach and education to clinicians and other healthcare providers to increase provider response to required supplemental clinical and laboratory information is ongoing.

During 2013, Maine CDC held 8 Lyme Disease Forums for the general public, one in each public health district. The intent of these forums was to provide an overview of ticks and Lyme disease, discuss prevention methods, and then open the forum up to questions from the audience. Each forum had a presentation given by an epidemiologist, and then the panel was introduced. Each district was slightly different, but Maine CDC attempted to have an epidemiologist, biologist, physician, veterinarian, and pesticide expert at each panel. Participants completed a paper-based questionnaire about their knowledge of ticks and Lyme disease at the end of the forum, and then were invited to complete a second electronic survey after all the forums were complete. A copy of the electronic survey is included in (Appendix 5).

Maine CDC epidemiologists provide consultation to the medical community on tick borne diseases, offering educational and preventive information as needed. Maine CDC epidemiologists present educational outreach activities and seminars on tick-borne 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/dhhs/mecdc/infectious-disease/epi/vector-borne/lyme/index.shtml.

During 2013, a **clinical management guide**, "Physician's Reference Manual: Tick-borne Diseases in Maine, December 2012" was mailed to all emergency rooms, urgent care facilities, infectious disease providers, and pediatricians. This guide includes information on ticks found in Maine and signs/symptoms, laboratory services, diagnosis, and treatment of six tick-borne diseases, including Lyme disease. The cover of this guide is viewable in Appendix 6.

- ~500 copies of this guide were distributed to health care facilities in 2013.

Maine CDC continues to contribute to **national surveillance and prevention activities**. During 2013, Maine CDC epidemiologists represented the State at both local and national meetings including:

- Council of State and Territorial Epidemiologist (CSTE) annual conference held in Pasadena, California in June 2013
- Northeast Epidemiology annual conference held in Burlington, Vermont in October 2013

Maine CDC epidemiologists also presented a poster (Appendix 7) entitled "Impact of Lyme disease prevention forums – Maine, 2013" at the Maine Infectious Disease annual conference held in Augusta, Maine in November 2013.

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

Maine CDC promotes ongoing **educational outreach activities** targeting the public and Maine municipalities. Maine CDC epidemiologists provided consultation to the public on tick borne 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:

- 37 presentations or displays held for: providers, hospitals, universities, state employees, health officers, schools, health fairs, private companies, sportsman shows and other events throughout the year.
- Numerous media interviews given by the Director of Maine CDC and the State Epidemiologist.
- Numerous talks and grand rounds given by the Director of Maine CDC and the State Epidemiologist.

Maine CDC's State Epidemiologist chairs the State **Vector-borne 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 Human Services, Maine Department of Conservation, Maine Department of Agriculture, Conservation, and Forestry, Maine Department of Inland Fisheries and Wildlife, Maine Department of Education and Cultural Services, Maine Veterinary Association, Maine Municipal Association, University of Maine Cooperative Extension Services, United States Department of Agriculture, and Maine Department of Public Safety. A full list of members can be found in Appendix 8. **Educational efforts** by the Vector-borne 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.

The Vectorborne Work Group educational sub-committee maintains **educational materials for fifth graders** on Lyme disease prevention. Developed materials are available on the website for use by all schools. A "Ticks: Know Your Enemy" PowerPoint presentation recorded and narrated by Doug Rafferty is also available online.

- The educational portion of the Lyme disease website was visited 546 times in 2013.

The education subcommittee continues to review and update the materials. This endeavor is being undertaken in close partnership with the Maine Department of Education. The educational materials are available online at: http://www.maine.gov/dhhs/mecdc/infectious-disease/epi/vector-borne/lyme/lyme-resource-educators.shtml.

Maine CDC's Lyme disease website is continually updated to provide information to the public and to health professionals about Lyme disease in Maine.

- In 2013, the Lyme disease homepage was visited over 10,300 times.
- The tick identification page was visited over 7,750 times
- The FAQ section was visited over 36,900 times

Ongoing educational initiatives featured on the Maine CDC web site (http://www.maine.gov/dhhs/mecdc/infectious-disease/epi/vector-borne/lyme/index.shtml) include:

- Lyme disease fact sheet and Q&As
- Tick Identification
- Distribution of Deer Ticks in Maine
- Prevention of Tick-borne Diseases

- Lyme Disease Surveillance Reports from 2006-2012
- Lyme disease awareness and prevention movie
- Tick Identification game

Links are also provided for the educational materials for educators and the 5th grade curriculum, and for other tick-borne diseases including: powassan, babesiosis, anaplasmosis, and ehrlichiosis.

During 2013, **Lyme disease educational materials** were distributed to partners and members of the public. Approximate numbers of materials distributed include:

- ~10,000 wallet-sized laminated tick identification cards
- ~3,000 Lyme disease brochures
- ~3,000 Lyme disease fact sheets
- ~5,000 Tick remover spoons
- ~2,000 Tick removal kits

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

In partnership with Maine Medical Center Research Institute, Maine CDC provides Lyme disease education and prevention materials to members of the public that submit ticks to the Research Institute for identification.

Maine CDC releases **Health Alerts, press releases,** and other information on disease concerns of public health significance, including tick-borne diseases. Maine CDC also responds to numerous press inquiries and releases press statements as appropriate (www.mainepublichealth.gov). Official releases in 2013 included:

- 2013 Lyme disease information - released May 1st, 2013.
- May is Lyme Disease awareness month - released May 16th, 2013
- Public Health update: Lyme disease - released June 27th, 2013
- Public Health update: Tick-borne disease - released July 25th, 2013
- Emerging Tick-borne Disease: Babesiosis - released August 15th, 2013
- Public Health update: Tick-borne diseases - released October 31,2013
- Update on Tick-borne Diseases in Maine - released December 18th, 2013

Pursuant to Legislation enacted in the second regular session of the 125th Legislature, May 2013 was declared to be **Lyme Disease Awareness Month** (PL 494). Educational activities took place the entire month including:

- Press release/ HAN
- Governor's Reproclamation of Lyme Disease Awareness Month (Appendix 9)
- Information distributed through social media (Facebook, Twitter, Blog)
- Information distributed through newsletters including:
    - American Nursing Association- Maine
    - Biodiversity Research Institute
    - Maine Air National Guard
    - Maine Army National Guard
    - Maine Department of Environmental Protection
    - Maine Guides Association
    - Maine Medical Association

- Maine Osteopathic Association
- Maine Summer Camps
- Maine Veterinary Medical Association
- Medical Professionals Health Program at Maine Medical Association
- Munjoy Hill Observer
- School Nurses Association
- University of Maine Cooperative Extension
- Wellness Works ME

- Lyme Disease Public Awareness Events held in Augusta, Freeport, and Scarborough
- 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 "**Target Lyme**" 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). Three winning posters were chosen and are available for viewing at the Lyme disease website http://www.maine.gov/dhhs/mecdc/infectious-disease/epi/vector-borne/lyme/. One of the winning posters was chosen and turned into a Maine CDC poster (Appendix 10). This poster was distributed to schools, state parks, board of tourism, and historical sites.

In 2012 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 2001-2012. Data are broken down by public health district, county, gender, and age group where possible. Data can be viewed as tables, charts, trend charts, or maps. The portal was launched in December 2012, and was accessed 2,076 times during 2013. The Maine Tracking Network Lyme Data are available on Maine CDC's website at www.maine.gov/idepi.

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 tick-borne illnesses based on resources made available by federal Centers for Disease Control and Prevention or Other Organizations

Maine passed a law in 2013 entitled "An Act to Inform Persons of the Options for the Treatment of Lyme Disease" which acknowledges the difficulty in diagnosing and treating Lyme disease, and provides information on the risks of long term antibiotic therapy. Maine CDC updated our website to conform to the new requirements outlined in this law.

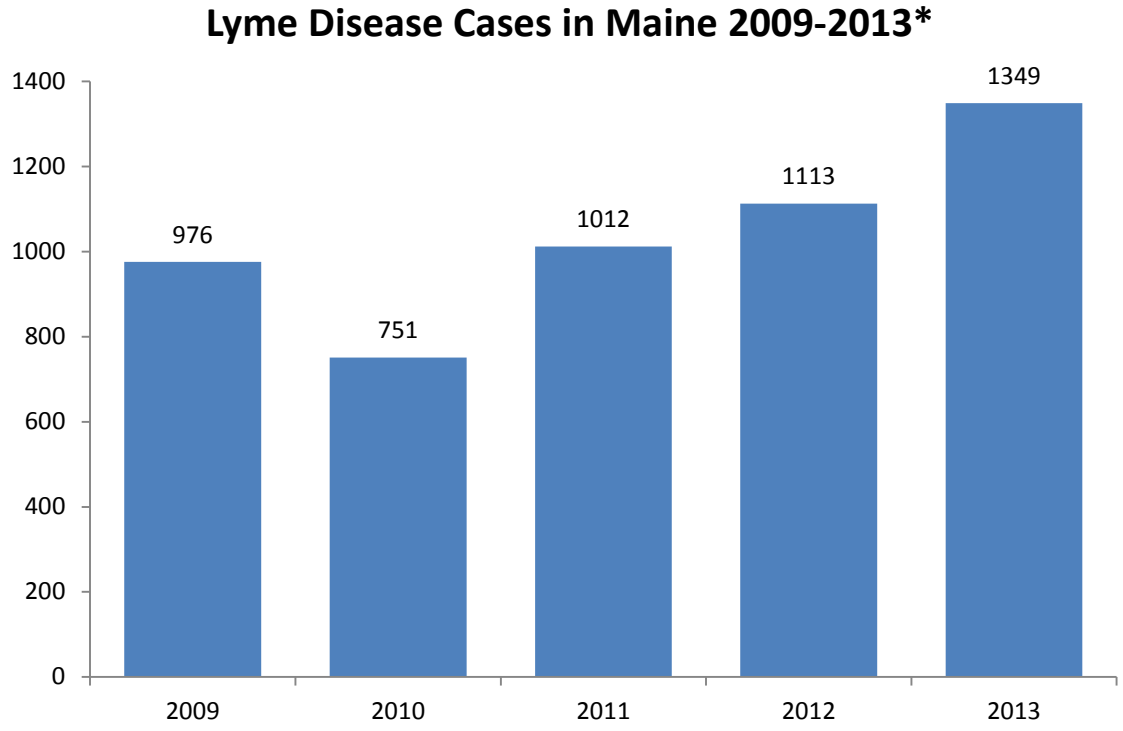
Maine CDC performed a search of state and federal legislation and a state by state listing of legislation relating to Lyme disease can be found in Appendix 11.

Appendix 1
Maine Lyme disease statistics

Number and Rate per 100,000 persons of Lyme Disease Cases by County of Residence – Maine, 2009-2013*

	2009		2010		2011		2012		2013	
County	Count	Rate	Count	Rate	Count	Rate	Count	Rate	Count	Rate
Androscoggin	56	52.4	38	35.7	58	54.6	80	74.3	67	62.3
Aroostook	7	9.8	4	5.6	3	4.2	1	1.4	3	4.2
Cumberland	279	100.0	182	65.1	276	99.8	267	94.0	353	124.3
Franklin	15	50.2	19	64.1	6	20.2	6	19.6	10	32.6
Hancock	34	64.0	28	52.6	43	80.7	59	108.1	96	176.0
Kennebec	99	81.8	88	73.6	132	109.1	128	105.0	186	152.6
Knox	70	169.6	65	160.3	103	254.0	109	274.8	93	234.4
Lincoln	45	130.0	38	110.5	53	154.2	65	190.2	69	201.9
Oxford	15	26.4	15	26.8	28	50.1	25	43.5	50	87.0
Penobscot	8	5.4	12	7.4	11	7.4	21	13.7	41	26.7
Piscataquis	2	11.8	1	5.9	6	35.6	2	11.6	0	0
Sagadahoc	51	140.4	45	124.9	47	130.4	59	167.7	48	136.4
Somerset	6	11.7	7	13.8	9	17.7	11	21.2	30	57.8
Waldo	19	49.6	25	67.8	25	65.2	55	141.7	76	195.8
Washington	4	12.3	8	25.1	13	40.7	7	21.6	12	37.0
York	266	130.9	176	28.8	199	98.7	218	109.5	215	108.0
Maine	**976**	**73.7**	**751**	**57.0**	**1012**	**77.1**	**1113**	**83.7**	**1349**	**101.6**

All data includes both confirmed and probable cases



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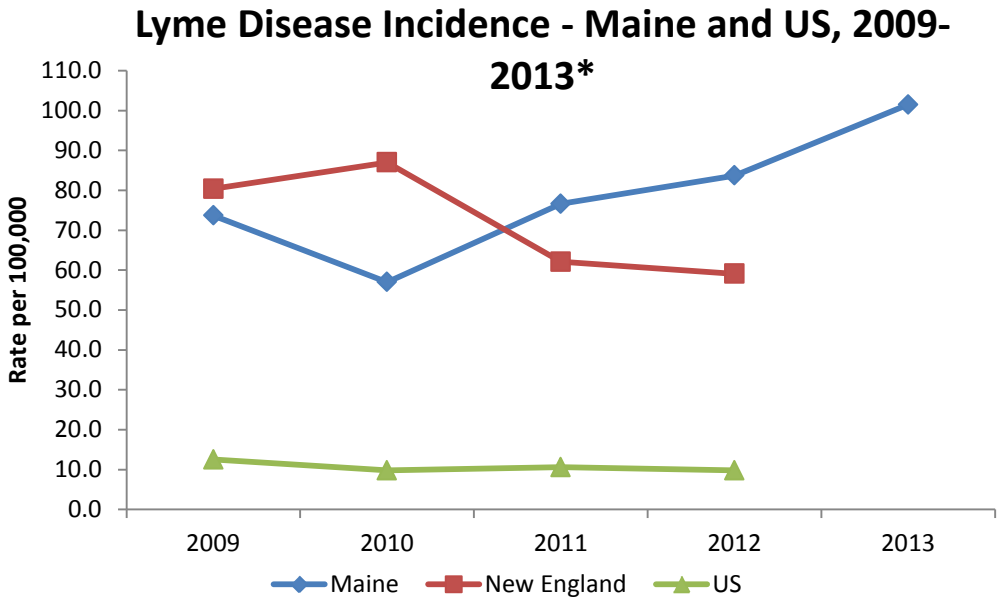
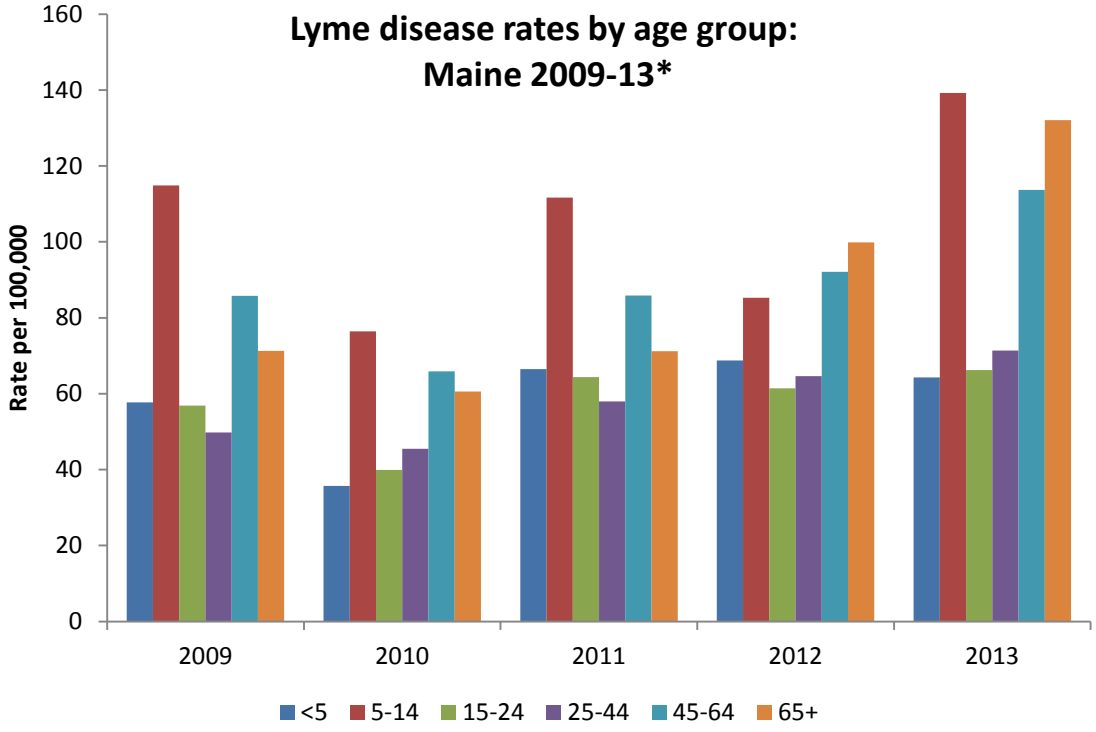
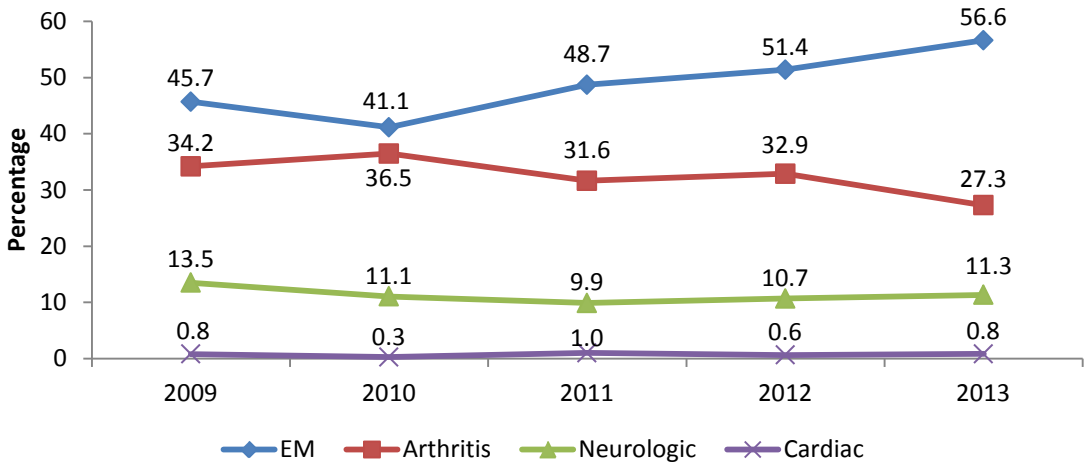




* 2013 data are preliminary as of 01/22/2014

Percentage of Symptoms Reported Among Lyme Disease Cases - Maine, 2009-2013*



* 2013 data are preliminary as of 01/22/2014

Appendix 2
Peer-reviewed medical literature related to medical management and treatment of Lyme disease- bibliography

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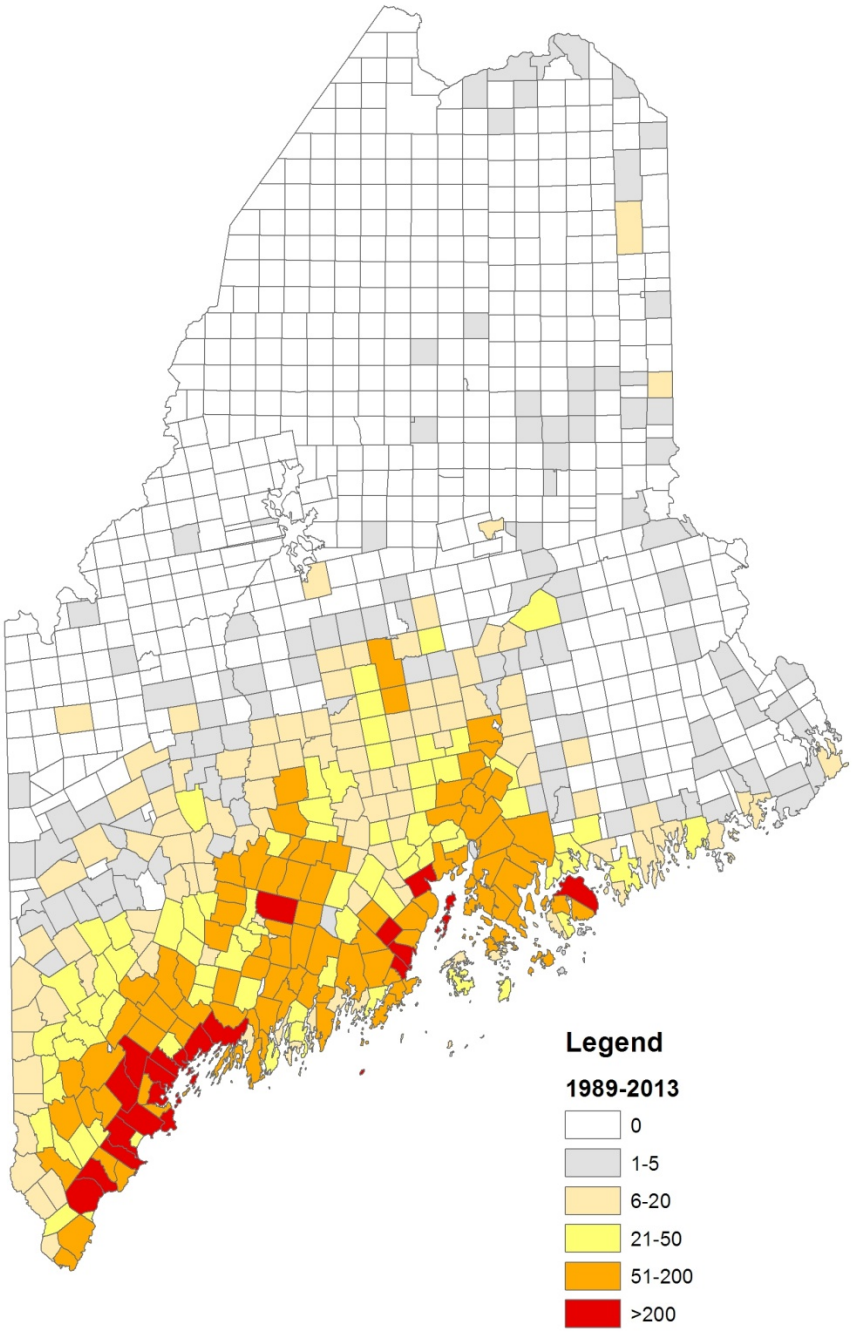
Appendix 3

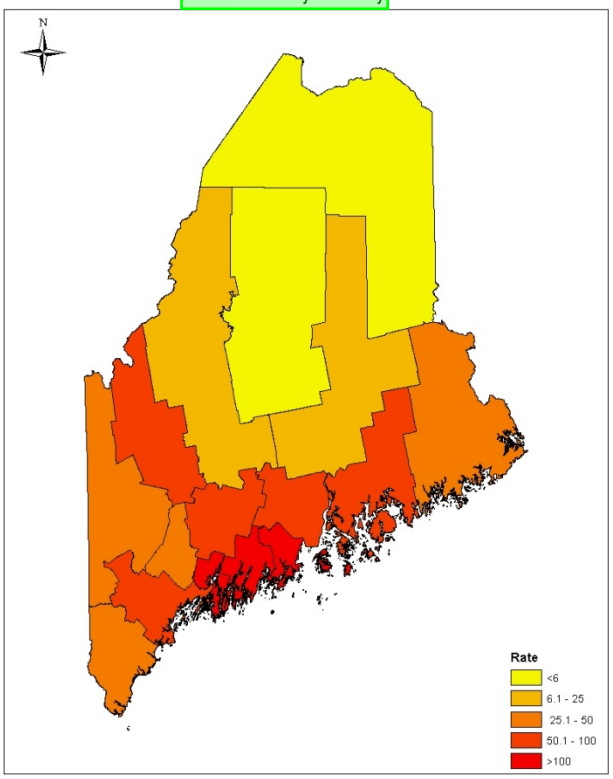
Submissions of *Ixodes scapularis* to MMCRI, 1989-2013



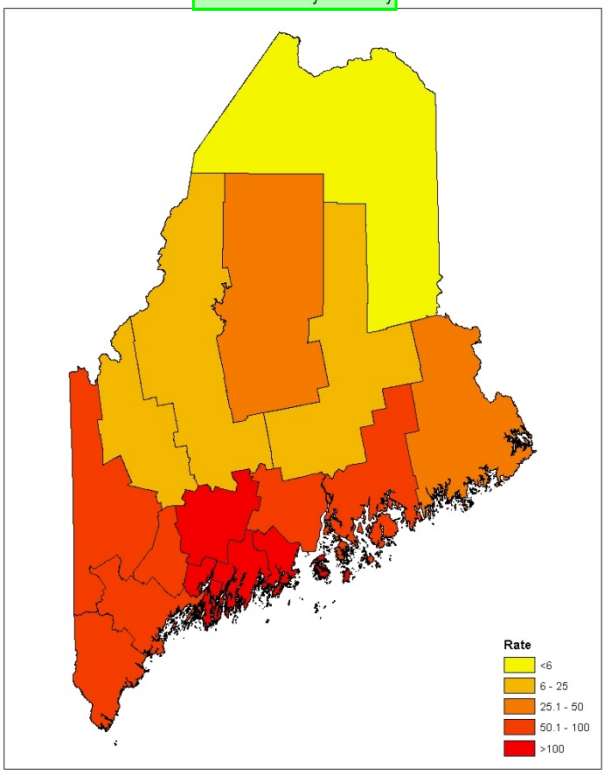
Appendix 4

Lyme Disease Cases per 100,000 people (Rate) – Maine, 2010-2013

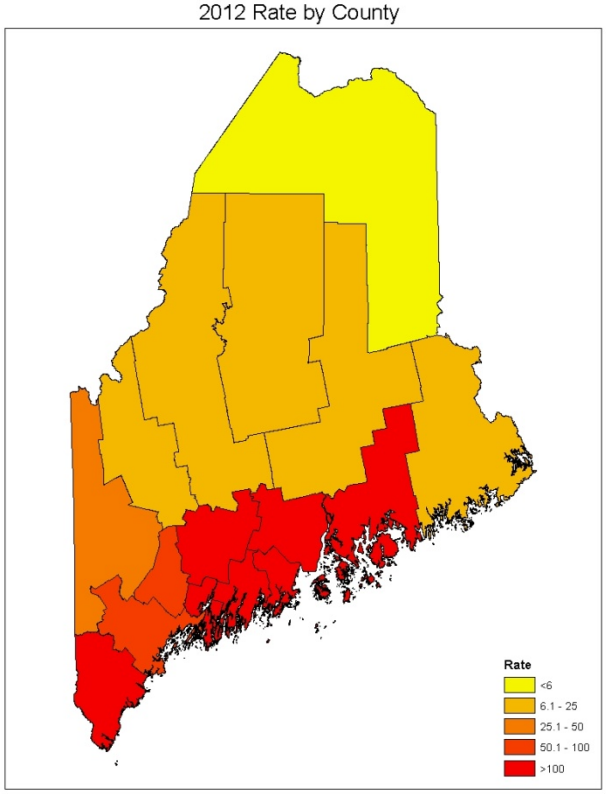
2010 Rate by County



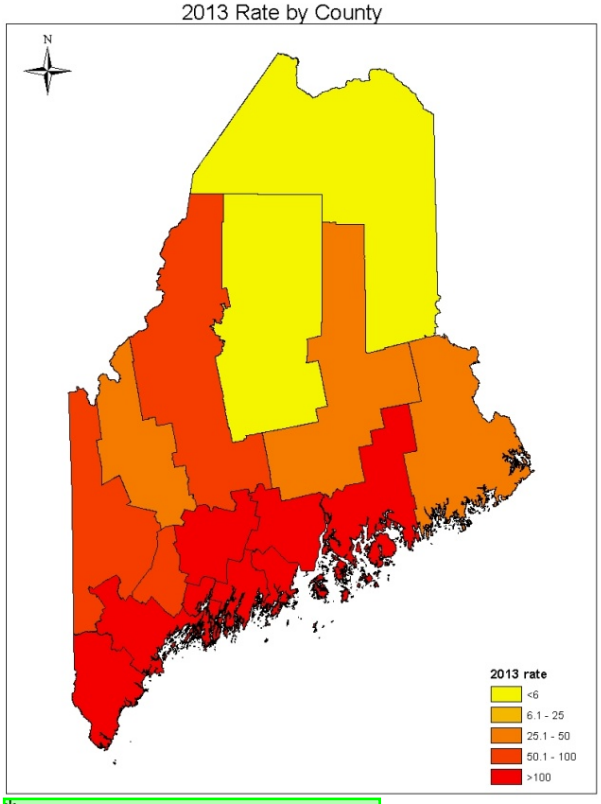
2011 Rate by County



2012 Rate by County



2013 Rate by County



* Preliminary data as of 1/22/2014

Appendix 5
Lyme Forum Survey

Maine Center for Disease Control and Prevention
An Office of the Department of Health and Human Services
Paul R. LePage, Governor Mary C. Mayhew, Commissioner

1. Please rank your current level of tick or Lyme Disease knowledge
   - ☐ Low ☐ Medium ☐ High ☐ Expert

2. Please rank the following topics as to which you are most interested in
   - _____ Diagnosis/Treatment
   - _____ General information
   - _____ Lyme and animals,
   - _____ Pesticides
   - _____ Prevention
   - _____ Tick biology/ecology,
   - _____ Other (please explain)

3. Name the tick
   - ☐ Dog tick or wood tick (*Dermacenter variabilis*)
   - ☐ Deer tick or black-legged tick (*Ixodes scapularis)*

4. Name the tick
   - ☐ Dog tick or wood tick (*Dermacenter*
   - ☐ Deer tick or black-legged tick (*Ixodes*

variabilis)
scapularis)

5. Which of these ticks may carry Lyme disease?
   - ☐ Dog tick or wood tick (*Dermacenter variabilis*)
   - ☐ Deer tick or black-legged tick (*Ixodes scapularis*

6. What are the four main ways to prevent Lyme disease (Choose four)
   - ☐ Cover your cough
   - ☐ Get vaccinated
   - ☐ Perform daily tick checks
   - ☐ Drain artificial sources of standing water
   - ☐ Use caution in tick infested areas
   - ☐ Use repellent
   - ☐ Wear protective clothing
   - ☐ Install and repair screens

7. How long do ticks need to be attached to a person to transmit Lyme disease
   - ☐ 30 minutes
   - ☐ 12 hours
   - ☐ at least 24 hours

- ☐ at least 48 hours
- ☐ 5 days

8. How long should you monitor for signs and symptoms after a tick bite?
   - ☐ 1 year
   - ☐ 90 days
   - ☐ 30 days
   - ☐ 7 days
   - ☐ 3 days

9. How do ticks move?
   ☐ Jump ☐ Fly ☐ Walk ☐ Jive

10. What are the best method to remove a tick (select all that apply)
    ☐ Fire ☐ Tick spoon ☐ Tweezers ☐ Vaseline ☐ Your hands/fingers

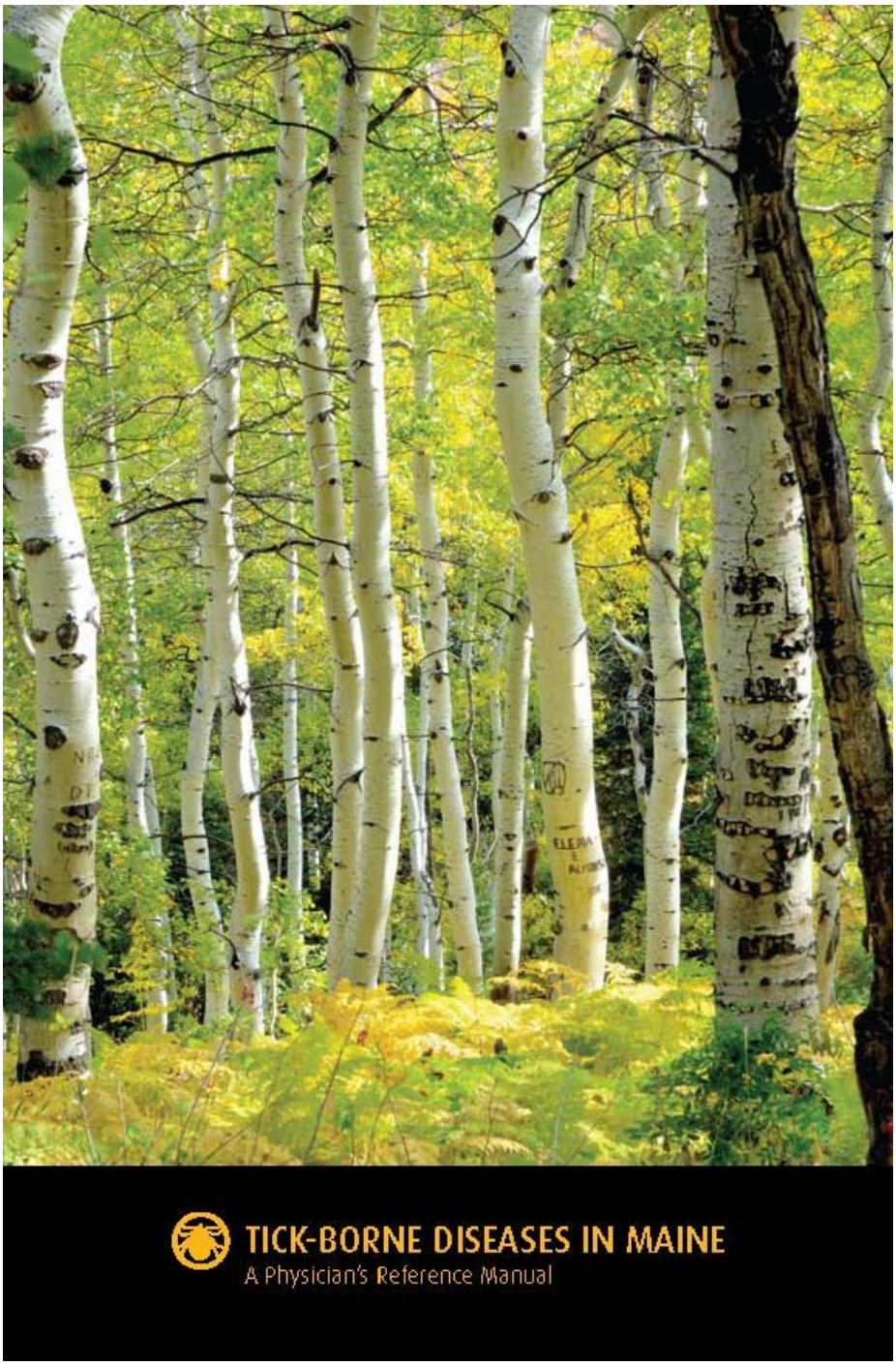
11. Have you done a tick check since attending the Lyme disease forum?
    ☐ Yes ☐ No

12. How likely are you to recommend a Lyme forum to a friend
    ☐ Very unlikely ☐ Unlikely ☐ Likely ☐ Very Likely

13. Please tell us other comments or suggestions on Lyme disease prevention.

Appendix 6

Physician's Reference Guide



Appendix 7

Human Lyme Disease Surveillance System Evaluation Poster

Maine Center for Disease Control and Prevention
An Office of the Department of Health and Human Services
Paul R. LePage, Governor Mary C. Mayhew, Commissioner

Impact of Lyme disease prevention forums - Maine, 2013

Sarah Levine[1,2], Sara Robinson[1], Anne Redmond Sites[1], Johanna Mackenzie[1,3], Megan Saunders[1,4]
[1] Maine Center for Disease Control and Prevention; [2] Walden University; [3] Simon Fraser University; [4]University of Maryland, College Park

BACKGROUND

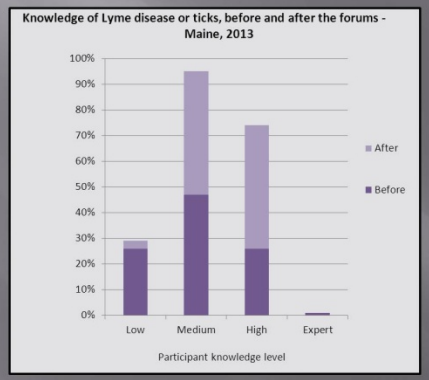
- Maine's case rate for Lyme disease was 83.7 cases per 100,000 persons in 2012, which was an all-time high.
- Lyme disease is the most common vector-borne disease reported in the US and the 3rd most commonly reported infectious disease in Maine.
- In order to prevent the transmission of Lyme disease, quick identification of a tick and prompt removal are critical. [1]
- The rate of transmission increases exponentially the longer the tick is attached from 24 to 72 hours. [1]
- The use of protective behaviors to prevent Lyme disease has been shown to be significantly correlated to knowledge of the disease. [2]
- In order to educate Mainers to protect themselves from ticks and Lyme disease, public forums were planned by Maine CDC and partners.

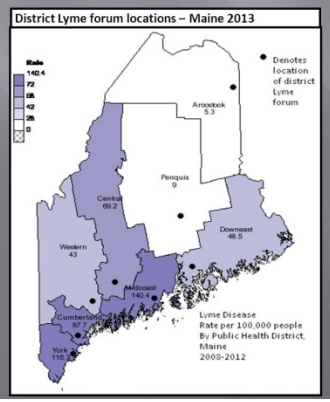
METHODS

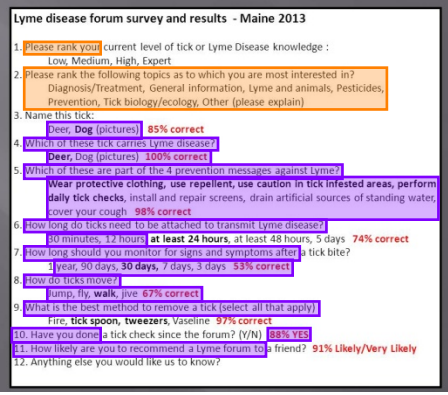
- Eight Lyme disease forums were held in public health districts from May 1 – August 31, 2013.
- An epidemiologist provided Lyme disease prevention messages and an expert panel of health care providers, biologists, veterinarians, and epidemiologists answered questions.
- Participants completed a paper-based questionnaire about their knowledge of ticks and Lyme disease at the end of the forum.
- Participants who provided an email address were asked to complete an electronic-based survey via SurveyMonkey after all forums were completed.

RESULTS

- Of the 168 participants who signed in at the forums, 85 (50%) completed the paper-based questionnaire. Of those 85 participants, 62 (73%) reported a medium to high level of knowledge about ticks or Lyme disease prior to the forums.
- Of the 168 participants who signed in at the forums, 110 (68%) provided an email address and were asked to complete an electronic-based survey. Of those 110 participants, 34 (31%) completed the survey and 33 (97%) of those participants reported a medium to high level of knowledge about ticks or Lyme disease after the forums.

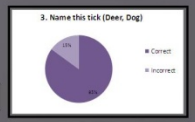


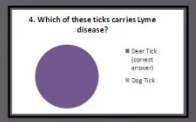




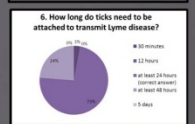
RESULTS

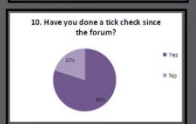

Ixodes scapularis (Deer tick)






Dermacenter variabilis (Dog tick)





CONCLUSIONS

- Participants in the Lyme disease forums reported an increase in knowledge of ticks and Lyme disease.
- In addition, the majority of participants reported completing tick checks as part of a Lyme disease prevention plan.
- Although participant responses to the paper-based questionnaire and electronic-based survey were not linked, it appears this health education and outreach effort was successful in promoting Lyme disease awareness and prevention.
- Additional evaluation of community education efforts is needed to see if these health behaviors are sustained over time.

LIMITATIONS

- Participant responses to the paper-based questionnaire and the electronic-based survey are not linked.
- Surveys are a self-reported and voluntary measures and therefore may be vulnerable to biases.

BIBLIOGRAPHY

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Appendix 8

2013 Maine Vector-borne Work Group

Chair: Stephen Sears, Maine Center for Disease Control and Prevention (Maine CDC)

Adams, Justin	Municipal Pest Management
Aherne, Jim	Maine Organic Farmers and Gardeners Association
Campbell, Polly	Nurse, Augusta, Maine
Camuso, Judy	Maine Department of Inland Fisheries and Wildlife
Dill, Jim	Maine Cooperative Extension
Donahue, Charlene	Maine Forest Service
Dube, Nancy	Maine Department of Education
Elias, Susan	Maine Medical Center Research Institute
Fish, Gary	Maine Board of Pesticides Control
Forbes, John	United States Department of Agriculture Wildlife Services
Foss, Kimberly	Municipal Pest Management
Hicks, Lebelle	Maine Board of Pesticides Control
Jennings, Henry	Maine Board of Pesticides Control
Juris, Sherrie	Atlantic Pest Solutions
Kantar, Lee	Maine Department of Inland Fisheries and Wildlife
Keenan, Patrick	Biodiversity Research Institute
Kirby, Clay	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
McCutchan, Thomas	Maine Insectary Services
McEvoy, Elizabeth O.	Maine Department of Agriculture, Conservation, and Forestry
Morrison, Mike	Municipal Pest Management
Murray, Kathy	Maine Department of Agriculture, Conservation, and Forestry
Pote, Ken	Maine CDC
Rand, Peter	Maine Medical Center Research Institute
Ravana, Kyle	Maine Department of Inland Fisheries and Wildlife
Ridky, Chip	United States Department of Agriculture
Robinson, Sara	Maine CDC
Saunders, Megan	Maine CDC
St. Amand, Ted	Atlantic Pest Solutions
Sites, Anne	Maine CDC
Smith, Rob	Maine Medical Center Research Institute
Storch, Dick	University of Maine, Environmental Services
Stratton, Robert D.	Maine Department of Inland Fisheries and Wildlife
Struble, Dave	Maine Forest Service
Sullivan, Kelsey	Maine Department of Inland Fisheries and Wildlife
Szantyr, Beatrice	Physician, Lincoln, Maine
Tsomides, Leon	Maine Department of Environmental Protection
Walsh, Michele	Maine Department of Agriculture, Conservation, and Forestry
Webber, Lori	Maine CDC

Appendix 9

Governor's Proclamation

State of Maine

Proclamation

WHEREAS, the Maine Center for Disease Control and Prevention reports that in 2012, more than 1,100 cases of Lyme Disease have been reported; and

WHEREAS, the actual incidence of Lyme Disease is far more than reported; 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.

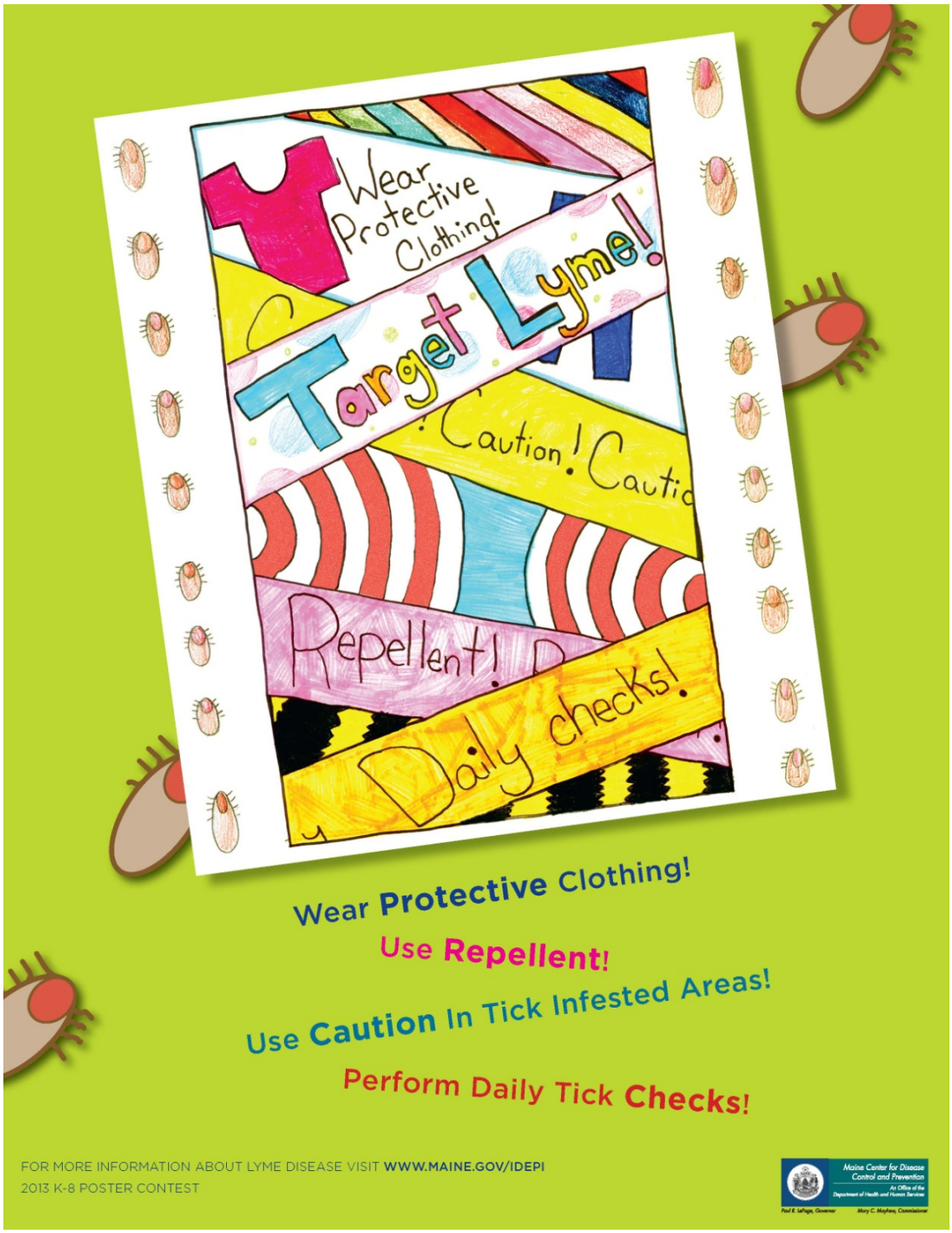
In testimony whereof, I have caused the Great Seal of the State to be hereunto affixed GIVEN under my hand at Augusta this Thirtieth day of April Two-Thousand Thirteen

Paul R. LePage
Governor

Matthew Dunlap
Secretary of State
TRUE ATTESTED COPY

Appendix 10

Maine CDC Lyme Disease Awareness Month Poster 2013



Appendix 11

Recent Lyme Legislation

Connecticut

Title: To establish an advisory council on Lyme disease and other tick-borne diseases. (SB00368)
Status: Did not pass

Maine

Title: An act to inform persons of the options for the treatment of Lyme disease. (H.P. 416- L.D. 597)
Status: Passed

Massachusetts

Title: An act relative to Lyme disease treatment coverage (H989)
Status: Did not pass

Montana

Title: An act establishing that physicians may not be disciplined for treating Lyme disease with long-term antibiotics; and providing an immediate effective date. (SB296)
Status: Passed

New York

Title: Requires health insurers to provide coverage for long term medical care for Lyme disease and other tick-borne pathogens, and establish educational measures including a tick borne illness research, detection and education fund. (S541, S3478)
Status: Passed

Pennsylvania

Title: Create a Task Force. (SB177)
Status: Passed

Virginia

Title: Lyme Disease; written information to patient when ordering laboratory test for presence of disease. (HB1933, SB971)
Status: Passed

Vermont

Title: An act relating to Lyme disease and other tick-borne illnesses. (H123, S0112)
Status: Passed

Federal

Title: The Lyme and Tick-Borne Disease Prevention, Education, and Research act of 2013. (S719)
Status: Did not pass

Title: To provide for the establishment of the Tick-Borne Diseases Advisory Committee. (H.R. 610)
Status: Did not pass