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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 the 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 the 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 fourth annual report to the Legislature and includes an update on activities conducted during 2011.

Executive Summary

Lyme disease is a reportable 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 a passive system, dependent upon reporting, and is therefore understood to be an under-representation of the true burden of Lyme disease in Maine.

Maine Lyme Disease Summary, 2011 (Preliminary data as of January 23, 2012)

- 981 confirmed and probable cases

- Symptoms of reported cases* of Lyme disease in Maine included:
  - Erythema Migrans (characteristic expanding rash): 484 cases (49%)
  - Arthritis (joint swelling): 314 cases (32%)
  - Neurological (Bells Palsy or other cranial neuritis): 97 cases (10%)

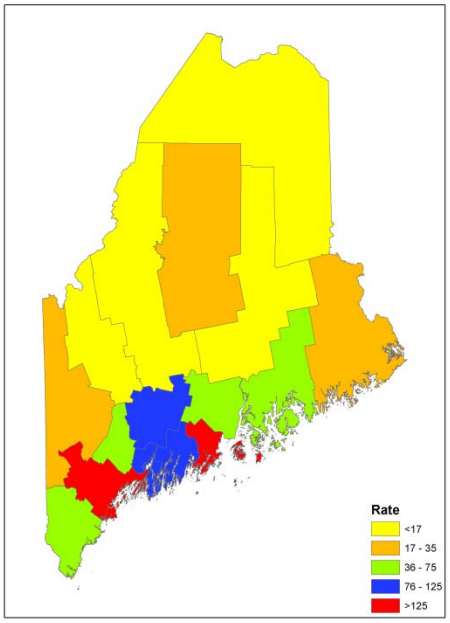
    * Cases could report more than one symptom

- Hospitalization occurred in 50 cases (5%).

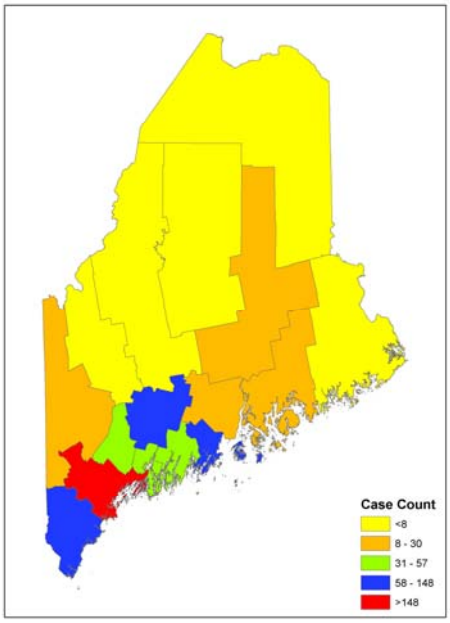
- Among case patients with a reported date of symptom onset, 54% began experiencing symptoms during June, July, or August. Date of symptom onset is missing for 20% of cases.

- Middle aged adults (45-64) represent the highest number of cases.

Lyme Disease Cases per 100,000 people (Rate) - Maine, 2011*



Confirmed and Probable Cases of Lyme Disease - Maine, 2011*



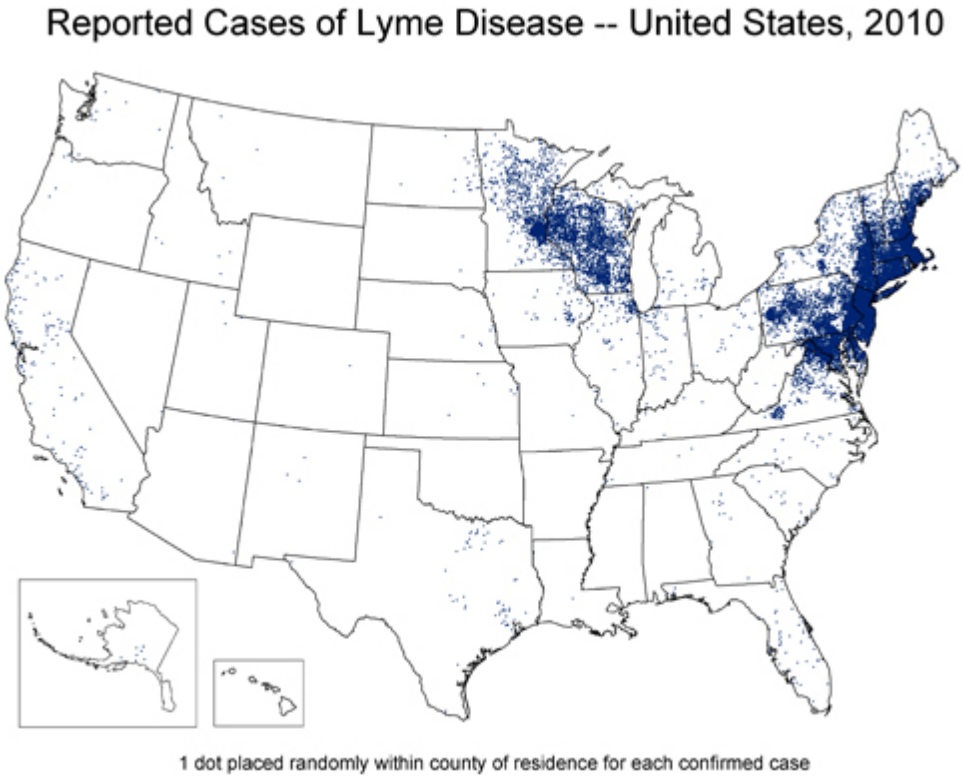
* 2011 data are preliminary as of 01/23/2012

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, if ever, 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/stats/maps/map2010.html)

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 2011 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. In recent years, however, disease incidence has increased steadily in the northern parts of the state including increases in 2011 in Androscoggin, Kennebec, Knox, and Piscataquis counties.

In 2011 (preliminary data as of January 23, 2011) 981 confirmed and probable cases of Lyme disease were reported among Maine residents, which is a rate of 74.7 cases of Lyme disease per 100,000 persons in Maine. A third of the cases were reported from Cumberland County (36%).

Fifty seven percent of cases were male and 43% were female. The median age of cases in 2011 was 45 years of age (average age of 40), which is consistent with the median age for the previous 5 years. The age at diagnosis ranges from 1-93 years. Just over half (54%) of cases had onset during June, July, or August (date of onset is missing for 20% of cases). Fifty persons (5% 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 23, 2012 showed 26 cases (16 confirmed and 10 probable) of anaplasmosis. Cases occurred in Cumberland, Hancock, Kennebec, Knox, Lincoln, Sagadahoc, and York counties. Anaplasma is considered an emerging disease in Maine as more cases are being found farther north than in previous years.

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 23, 2012 showed 9 cases (6 confirmed and 3 probable) of babesiosis. Cases occurred in Cumberland, Knox, Lincoln, and York counties. Babesia is also an emerging disease in Maine, and became a nationally notifiable disease on January 1, 2011.

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 23, 2012 showed 1 confirmed case of ehrlichiosis. The case was reported from Somerset county, and had known travel history.

Rocky Mountain Spotted Fever:
Rocky Mountain Spotted Fever (RMSF) is a disease caused by the bacteria *Rickettsia rickettsii*. 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 23, 2012 showed 1 probable case of RMSF. The case was reported from Hancock county.

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

Within Maine Center for Disease Control and Prevention, we continue 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 it is 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 clinican may or may not 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 July 30 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 2011 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. A map of deer ticks by town of submitter is included in Appendix 3.

During 2011, 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.

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 2011, a **clinical management guide**, "Physician's Reference Manual: Tick-borne Diseases in Maine, December 2009" was available to providers in Maine upon request. 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. A copy of this guide is included in Appendix 5. A large mailing of these guides is planned for 2012.

- Over 200 copies of this guide were distributed in 2011.

Maine CDC continues to contribute to **national surveillance and prevention activities**. During 2011, Maine CDC epidemiologists represented the State at both local and national meetings including:

- Council of State and Territorial Epidemiologist (CSTE) annual conference held in Pittsburgh, Pennsylvania in June 2011
- Northeast Epidemiology Conference held in Warwick, Rhode Island in November 2011

Maine CDC epidemiologists also presented on Lyme disease at the Maine Public Health Association Annual conference held in Portland, Maine in October 2011. Continued participation is planned for 2012 including attendance at the 2012 CSTE conference in Omaha, Nebraska as well as a proposed national tick borne disease conference to be held in Fort Collins, Colorado.

V. 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:

- Over 30 presentations or displays were held for: providers, hospitals, universities, state employees, health officers, schools, health fairs, sportsman shows and other events throughout the year.
- Over 10 television or newspaper interviews given by the State Epidemiologist.

A Maine CDC epidemiologist chairs the State **Vectorborne 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, 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. **Educational efforts** by the Vectorborne Work Group included:

- Over 25 presentations were given on ticks and Lyme disease.
- Presence at vendor shows, television and radio interviews.
- Distribution of educational materials including:

- ~2,000 Ticks in Maine brochures
- ~2,000 Protecting Yourself from Lyme Disease brochures
- ~8,000 tick identification cards
- ~4,000 tick removal spoons
- ~1,000 each of Maine CDC fact sheets on Anaplasmosis and Babesiosis
- ~1,000 federal CDC Lyme Disease Public Information Guides
- ~200 MMC Lyme Disease Trail Signs

The Vectorborne Work Group educational sub-committee developed **educational materials for fifth graders** on Lyme disease prevention. Developed materials were posted to the website for use by all schools. A finalized "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 459 times in 2011.
- The teacher's version of the "Ticks: Know Your Enemy" PowerPoint was visited 1,460 times in 2011.

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 2011, the Lyme disease homepage was visited over 6,200 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
- Proper Use of Insect Repellents (Q & A)
- Prevention of Tick-borne Diseases
- Lyme Disease Surveillance Reports from 2006-2010
- Lyme disease awareness and prevention movie

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 2011, **Lyme disease educational materials** were distributed to partners and members of the public. Total materials distributed include:

- 6,220 wallet-sized laminated tick identification cards
- 1,412 Lyme disease brochures
- 339 Lyme disease fact sheets
- 171 Lyme disease DVDs
- 993 Tick remover spoons
- 792 Tick removal kits
- 209 Tick-borne diseases informational cards

In 2011 Maine CDC completely redesigned our tick identification card, and developed a new companion tick identification poster. This new card and poster will be distributed widely in 2012. Copies of these materials are included in Appendix 6.

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. Copies of these materials are included in Appendix 7.

Maine CDC releases **Health Alerts** 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 2011 included:

- Information for Providers on Lyme Disease HAN issued May 2, 2011
- "May is Lyme Disease Awareness Month" Press Release issued May 2, 2011
- Tick Submissions to Help Track Lyme Disease HAN issued June 23, 2011
- "Maine CDC Announces Lyme Disease Poster Winners" Press Release issued June 29, 2011

Pursuant to Legislation enacted in the second regular session of the 124th Legislature, May 2011 was declared to be **Lyme Disease Awareness month** (PL 494). Educational activities took place the entire month including:

- Press release/ HAN
- Information distributed through social media (Facebook, Twitter, Blog)
- Information distributed through newsletters including:
    - Central Maine Power
    - Maine Youth Camping Foundation
    - Sporting Camp Association
    - Home Schoolers of Maine
    - Maine Organic Farmers and Gardeners Association
    - Maine Medical Association/Maine Osteopathic Association
    - Maine State Superintendents
    - Department of Health and Human Services
    - State Commissioners
    - State Parks Association
    - Boys Scouts/Girl Scouts
    - Maine Fair Association
    - Veterinary listserve
    - Office of the Attorney General – Portland, Augusta and Bangor offices
    - Maine Forest Service Listserv
    - Dept of Conservation employees
- Presentations throughout the state
- An information table at Maine State house
- Maine CDC presence at multiple health fairs and conferences
- Distribution of education materials including a newly created Lyme Disease Sticker (Appendix 8).

Similar activities are planned for May 2012.

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 "**No Time for 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). Over 60 posters were received and winners chosen in four age categories. All winning posters are available for viewing at the Lyme 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 9). This poster was distributed to schools, state parks, board of tourism, and historical sites. The 2012 poster contest will focus on the theme "Know Ticks, No Lyme" and new winning posters will be selected in the month of May.

Our 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 DEET-containing tick 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 habitat 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. 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

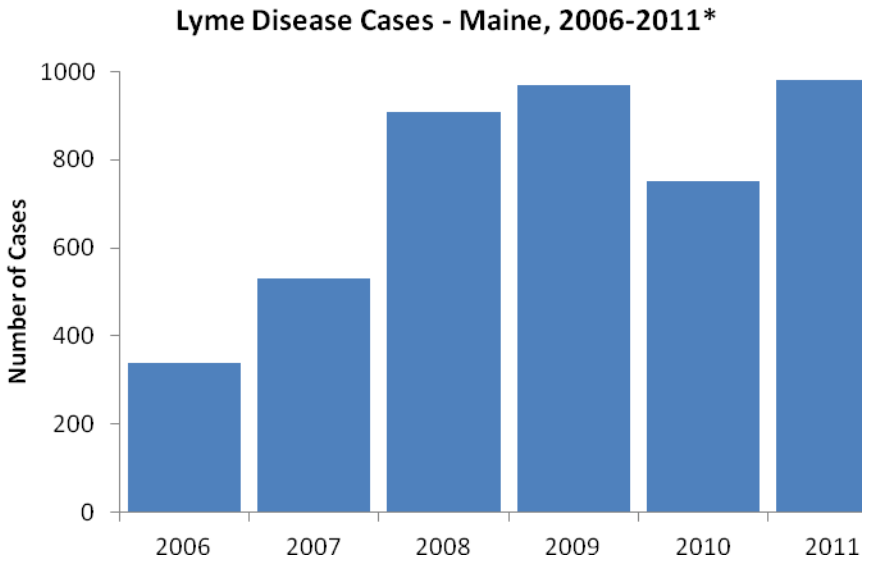
Maine CDC performed a search of state and federal legislation and a state by state listing of legislation relating to Lyme disease can be found in Appendix 10.

Appendix 1

Number and Rate per 100,000 persons of Lyme Disease Cases by County of Residence – Maine, 2006-2011*

	2006		2007		2008		2009		2010		2011	
County	Count	Rate	Count	Rate	Count	Rate	Count	Rate	Count	Rate	Count	Rate
Androscoggin	10	9.6	21	19.7	36	33.7	56	52.4	38	35.7	57	53.6
Aroostook	0	0	2	2.8	4	5.6	7	9.8	4	5.6	4	5.6
Cumberland	96	36.1	165	59.9	228	82.6	276	100.0	180	65.1	353	127.7
Franklin	5	14	1	3.3	4	13.4	15	50.2	19	64.1	5	16.9
Hancock	6	11.6	14	26.3	13	24.5	34	64.0	28	52.6	30	56.3
Kennebec	22	18.8	46	38.1	114	94.2	99	81.8	89	73.6	126	104.2
Knox	17	42.9	21	51.5	72	177	69	169.6	65	160.3	103	254.0
Lincoln	19	56.5	26	74.7	40	115.5	45	130.0	38	110.5	39	113.4
Oxford	1	1.8	6	10.6	21	37	15	26.4	15	26.8	18	32.2
Penobscot	5	3.5	7	4.7	13	8.7	8	5.4	11	7.4	20	13.4
Piscataquis	0	0	0	0	1	5.9	2	11.8	1	5.9	4	23.7
Sagadahoc	13	36.9	33	90.7	40	110.1	51	140.4	45	124.9	36	99.9
Somerset	3	5.9	3	5.8	9	17.5	6	11.7	7	13.8	6	11.8
Waldo	8	22.1	12	31.2	19	49.6	19	49.6	26	67.8	24	62.6
Washington	0	0	0	0	3	9.2	4	12.3	8	25.1	8	25.1
York	133	71.2	172	85.4	291	144.3	264	130.9	177	28.8	148	73.4
Maine	**338**	**25.6**	**529**	**40.2**	**908**	**69**	**970**	**73.7**	**751**	**57.0**	**981**	**74.7**

All data includes both confirmed and probable cases



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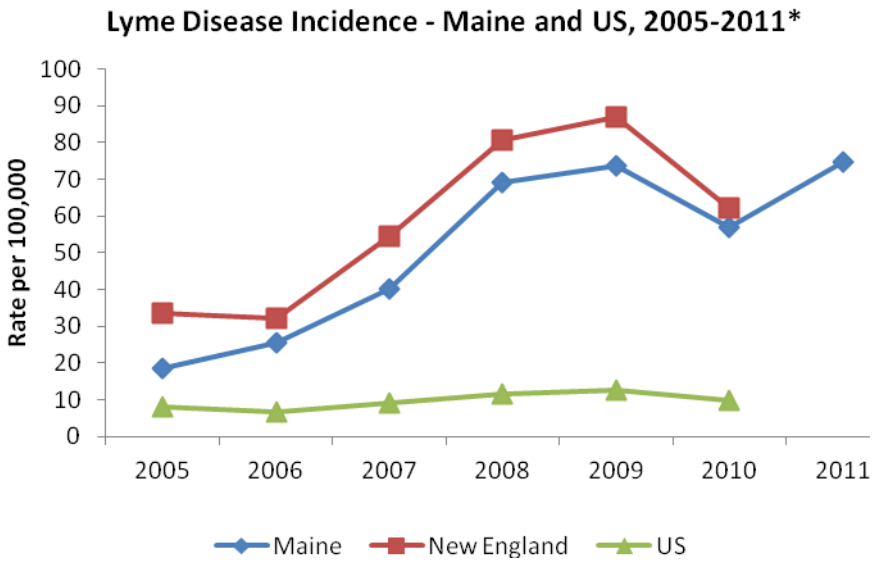

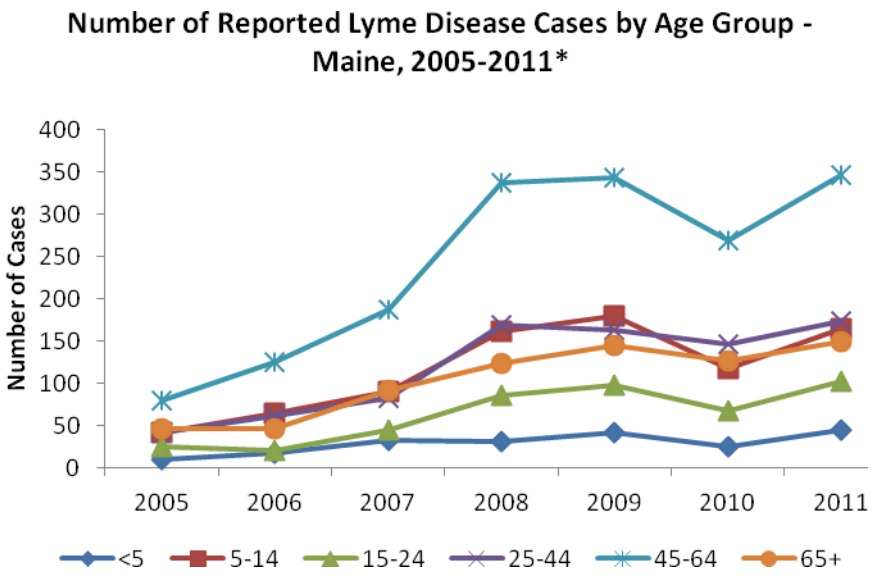

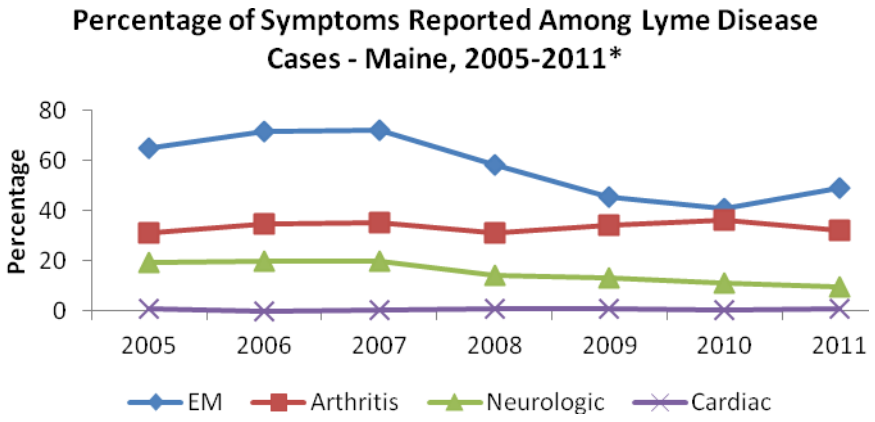

* 2011 data are preliminary as of 01/23/2012

Appendix 2

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

Lyme disease update: 30 years after the first cases, the clinical picture remains cloudy.
William S, Matthews M, Barnett T.
Adv NPs Pas. 2011 Jul;2(7):27-8, 30-2, 38.
PMID: 21834353 [PubMed – indexed for MEDLINE]

Musculoskeletal features of Lyme disease: understanding the pathogenesis of clinical findings helps make appropriate therapeutic choices.
Sigal LH.
J Clin Rheumatol. 2011 Aug;17(5):256-65.
PMID: 21778908 [PubMed – indexed for MEDLINE]

False positive Lyme serology due to syphilis: report of 6 cases and review of the literature.
Naesens R, Vermeiren S, Van Schaeren J, Jeurissen A.
Acta Clin Belg. 2011 Jan-Feb;66(1):58-9.
PMID: 21485767 [PubMed – indexed for MEDLINE]

Lyme disease: Part II. Management and prevention.
Bhate C, Schwartz RA.
J Am Acad Dermatol. 2011 Apr;64(4):639-53; quiz 654, 653.
PMID: 21414494 [PubMed – indexed for MEDLINE]

Lyme disease: Part I. Advances and perspectives.
Bhate C, Schwartz RA.
J Am Acad Dermatol. 2011 Apr;64(4):619-36; quiz 637-8.
PMID: 21414493 [PubMed – indexed for MEDLINE]

The expanding Lyme Borrelia complex—clinical significance of genomic species?
Stanek G, Reiter M.
Clin Microbiol Infect. 2011 Apr;17(4):487-93. doi: 10.1111/j.1469-0691.2011.03492.x.
PMID: 21414082 [PubMed – indexed for MEDLINE]

Lyme disease and the orthopaedic implications of lyme arthritis.
Smith BG, Cruz AI Jr, Milewski MD, Shapiro ED.
J Am Acad Orthop Surg. 2011 Feb;19(2):91-100.
PMID: 21292932 [PubMed – indexed for MEDLINE]

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PMID: 19944760 [PubMed – indexed for MEDLINE]

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Johnson L, Aylward A, Stricker RB.
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PMID: 21676482 [PubMed – indexed for MEDLINE]

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PMID: 21523405 [PubMed – indexed for MEDLINE]

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Am J Med. 2011 Apr;124(4):306-8.
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Plotkin SA.
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PMID: 20631327 [PubMed – indexed for MEDLINE]

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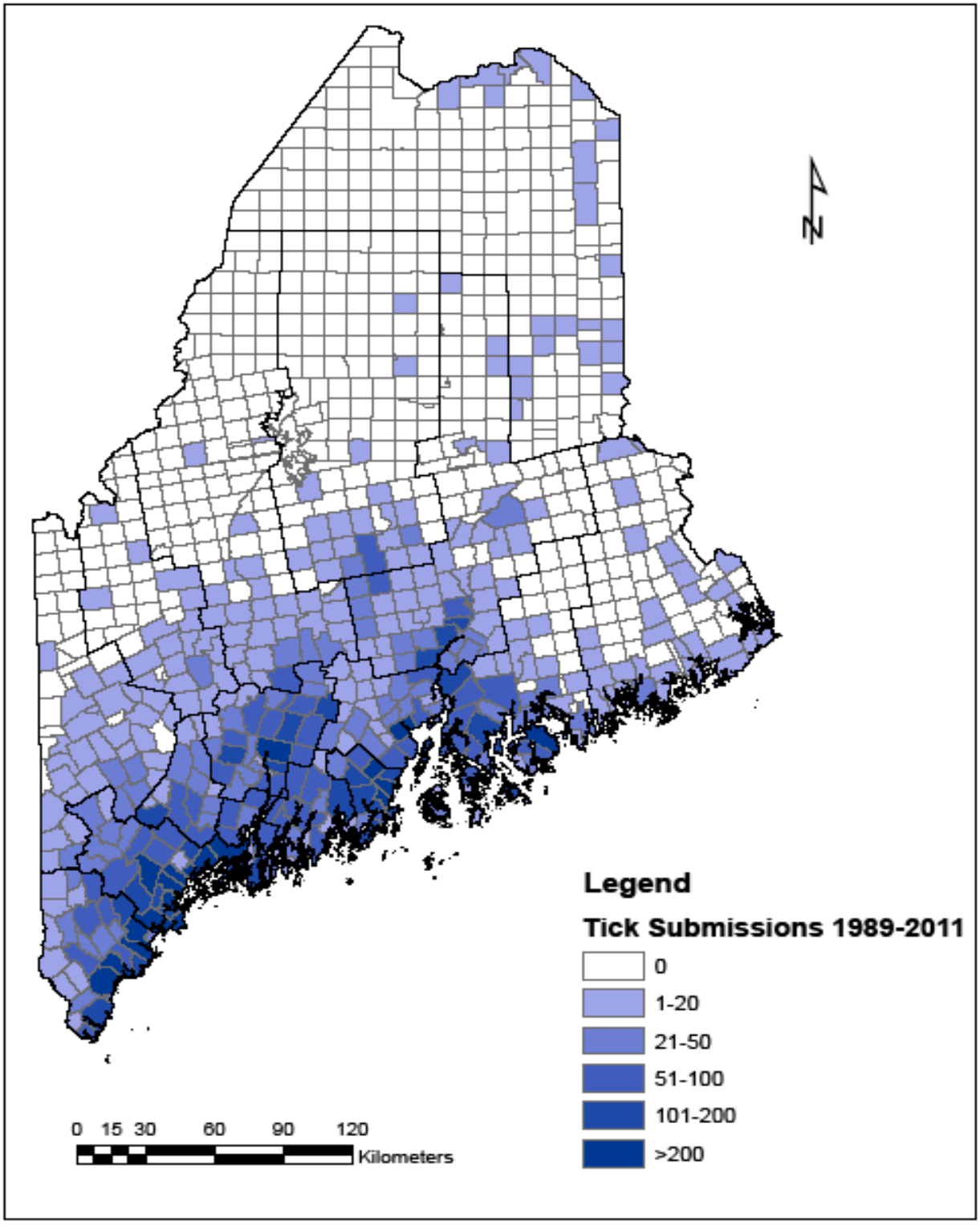
PMID: 20529367 {PubMed – indexed for MEDLINE]

Appendix 3

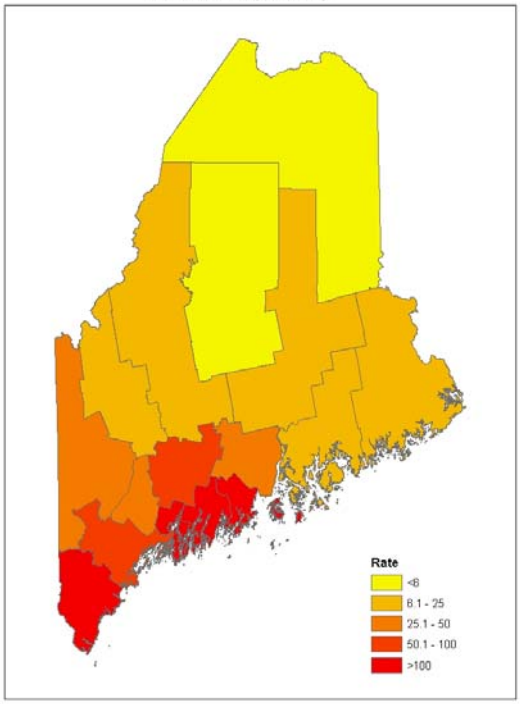
I. scapularis submissions, 1989-2011



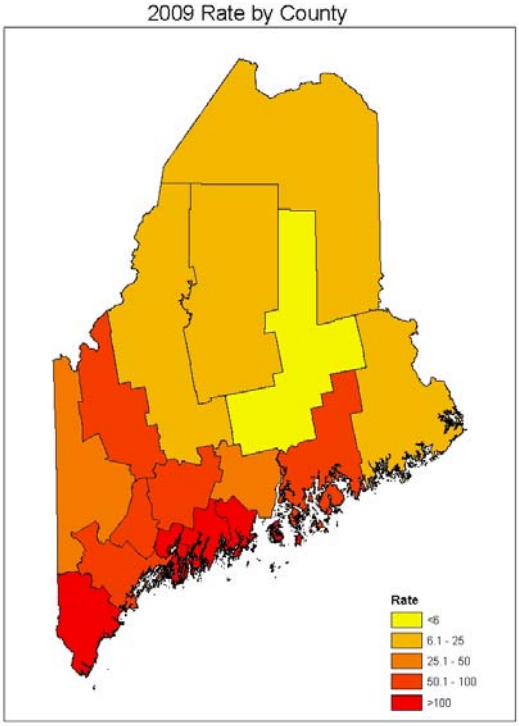
Appendix 4

Lyme Disease Cases per 100,000 people (Rate) – Maine, 2008-2011

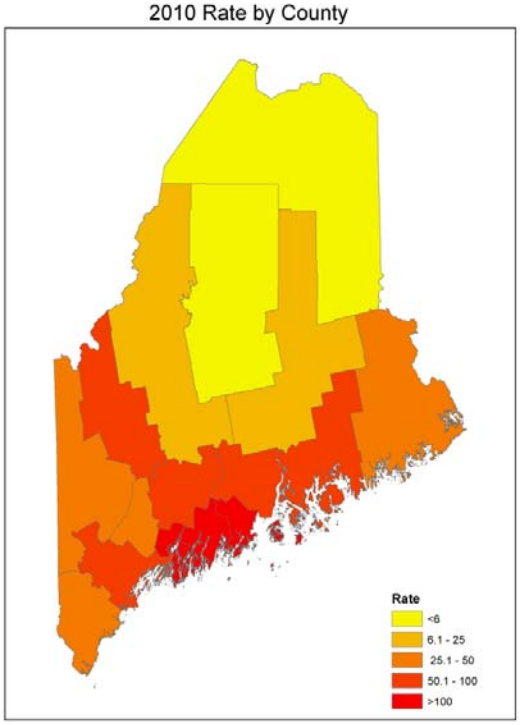
2008 Rate by County



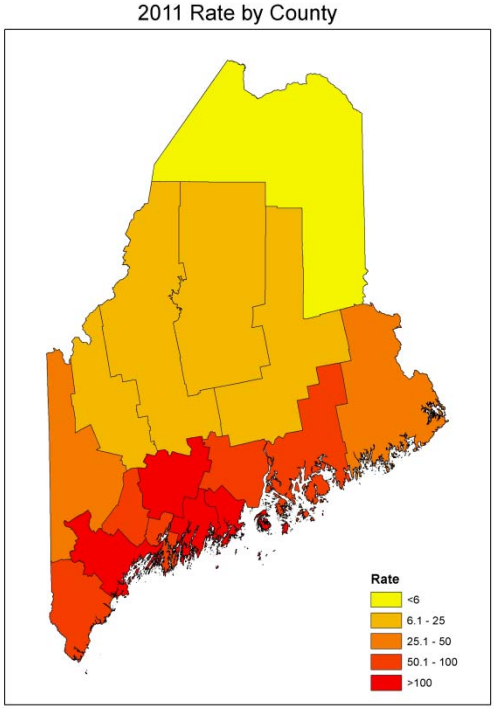
2009 Rate by County



2010 Rate by County



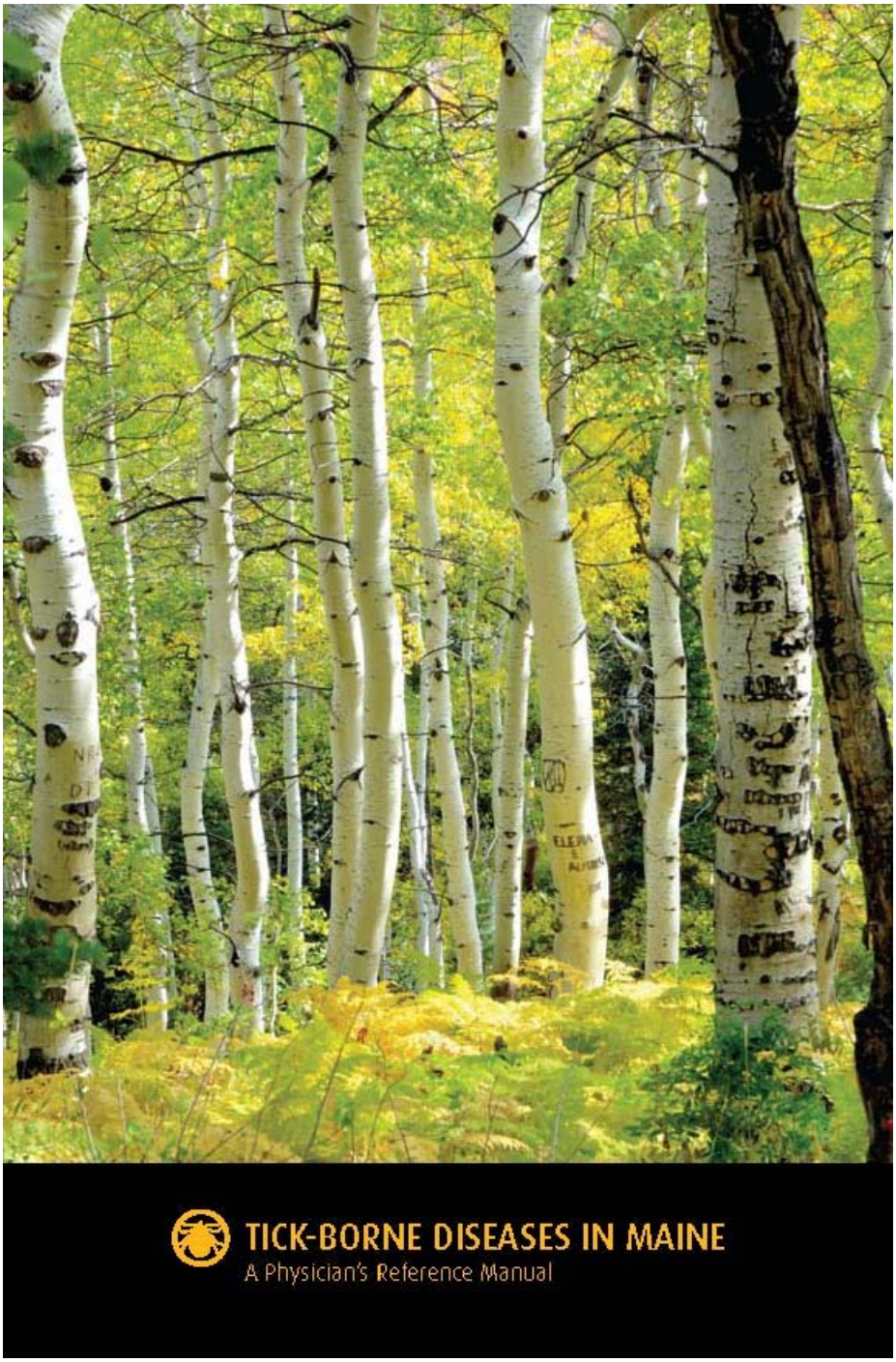
2011 Rate by County



*2011 data are preliminary as of 01/23/2012

Appendix 5

Physician Reference Guide



Appendix 6

tick ID

KNOW THEM. PREVENT THEM.

Deer Tick (Black-Legged Tick)

nymph | adult male | adult female

- Deer ticks may transmit the agents that cause Lyme disease, anaplasmosis, and babesiosis
- **What bites:** nymphs and adult females
- **When:** anytime temperatures are above freezing, greatest risk is spring through fall

Dog Tick

- Dog ticks do not transmit the agent that causes Lyme disease
- **What bites:** adult females
- **When:** April–August through fall

adult male | adult female

(examples are not actual size, dog tick nymphs are rarely found on humans or their pets)

prevent the bite

- Wear light-colored protective clothing
- Use EPA-approved insect repellent on skin or clothing
- Use caution in tick infested areas
- Perform daily tick checks
- Protect your pets, use repellents, acaricides, and a Lyme disease vaccine for dogs

tick removal

Remove ticks immediately. They usually need to attach for 24 hours to transmit Lyme disease. Consult a physician if you remove an engorged deer tick.

Using a tick spoon:

- Place the wide part of the notch on the skin near the tick (hold skin taut if necessary)
- Applying slight pressure downward on the skin, slide the remover forward so the small part of the notch is framing the tick
- Continuous sliding motion of the remover detaches the tick

Using tweezers:

- Grasp the tick close to the skin with tweezers
- Pull gently until the tick lets go

1-800-821-5821 | www.mainepublichealth.gov

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

Tick Identification Card

tick removal

Remove ticks immediately. They usually need to attach for 24 hours to transmit Lyme disease. Consult a physician if you remove an engorged deer tick.

Using a tick spoon:

- Place the wide part of the notch on the skin near the tick (hold skin taut if necessary)
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- Continuous sliding motion of the remover detaches the tick

Using tweezers:

- Grasp the tick close to the skin with tweezers
- Pull gently until the tick lets go

1-800-821-5821
www.mainepublichealth.gov

tick ID

KNOW THEM. PREVENT THEM.

Deer Tick (Black-Legged Tick)

nymph | adult male | adult female

(actual size)

nymph (1/32"-1/16") | adult (1/8") | engorged adult (up to 1/2")

Dog Tick

adult male | adult female

(examples are not actual size, dog tick nymphs are rarely found on humans or their pets)

just the facts

Deer Ticks

- Deer ticks may transmit the agents that cause Lyme disease, anaplasmosis, and babesiosis
- **What bites:** nymphs and adult females
- **When:** anytime temperatures are above freezing, greatest risk is spring through fall

Dog Ticks

- Dog ticks do not transmit the agent that causes Lyme disease
- **What bites:** adult females
- **When:** April–August

prevent the bite

- Wear light-colored protective clothing
- Use EPA-approved insect repellent on skin or clothing
- Use caution in tick infested areas
- Perform daily tick checks
- Protect your pets, use repellents, acaricides, and a Lyme disease vaccine for dogs

lyme disease

Ticks usually need to attach for 24 hours to transmit Lyme disease.

Often, people see an expanding red rash (or bull's-eye rash) more than 2 inches across at the site of the tick bite, which may occur within a few days or a few weeks.

Other symptoms include:

- fatigue
- muscle and joint pain
- headache
- fever and chills
- facial paralysis

Deer ticks may also transmit the agents that cause other diseases such as babesia and anaplasmosis.

People that remove an engorged deer tick should consult their physician as quickly as possible.

Appendix 7

Acc. # _____

Date Rec: _____

Report Sent: _____

Date Enter:

TICK SUBMISSION Form
Maine Medical Center Research Instiute
Center for Vector-borne Disease
75 John Roberts Road—Suite 9B
South Portland, ME 04106
www.mmcri.org/lyme/
ticklab@mmc.org

Feb 2010

As part of a program to monitor the distribution of the deer tick, *Ixodes scapularis*, the vector for the Lyme disease bacteria and other human pathogens, our research laboratory offers free identification of ticks. Ticks will **not be tested** to see if they contain the Lyme disease spirochete because the clinical value of this information is uncertain. Unless other arrangements have been made, ticks should be preserved in small bottles of 70% alcohol and mailed in a crush-proof container with this completed form to the above address. Please be sure to note the town where the tick was acquired and date tick found.

In the late spring and summer, many areas are infested with dog ticks, *Dermacentor variabilis*. This tick does not transmit Lyme disease. Because our laboratory can become overwhelmed by submissions of this tick, we ask that you not submit ticks on which you can distinguish the characteristic faint white markings unique to the dog tick.

To remove ticks, grasp them with fine forceps as near to the skin as possible and pull directly out firmly and steadily. The barbed mouth parts may not let go easily, so a minute or more may be required. Do not handle ticks with your bare hands.

Because we are interested in tick distribution, we may attempt to contact the person who originally collected the tick. If the tick is submitted by a clinic or other organization, please include the original collector's name and address. Please include name of guardian if under 18 years of age.

A. Individual, physician, clinic, or organization submitting tick:

Name: _____

Address: _____

_____ Zip: _____

Phone: _____

E-mail: _____

B. Person (or owner's name if pet) acquiring tick:

Name: _____

Address: _____

_____ Zip: _____

Phone: _____

E-mail: _____

Date tick found: ____ / ____ / ____ Town where acquired: _____ State: _____

Was the tick attached when found? ☐ Yes ☐ No Body part attached to: _____

Tick found on: ☐ Person (Age of person: _____) ☐ Animal ☐ Other: _____

If found on animal, what species? ☐ Dog (Breed:) ☐ Cat ☐ Other: _____

Animal's name: _____ Has animal been vaccinated for Lyme disease? ☐ Yes ☐ No

Do you use any tick control products on your animal ☐ Yes ☐ No

If yes, what product was used: ☐ Frontline ☐ Advantix ☐ Other _____

Were there any associated symptoms? _____

Patients or Physicians, please note any other pertinent information here:

Lab use only:
(do NOT write below line)

Tick Identificiation:

Ticks in Maine – 2011

(Hard ticks – Family Ixodidae)

Ixodes scapularis (previously Ixodes dammini), the "deer tick", also called the "black-legged tick", is the principal vector of the Lyme disease spirochete in the northeastern United States. At some sites in Maine, particularly in southern areas, over half of the adult ticks contain spirochetes, although infection rates vary considerably, even in adjacent areas. Infection rates of questing nymphs are typically somewhat lower. Immature stages feed on small mammals such as mice, while adult ticks prefer deer, but all stages may feed on humans and domestic animals. Less common in Maine, the agents of two other infectious diseases, human granulocytic anaplasmosis, & babesiosis, may also be found in this species of tick. Although male deer ticks can be infected, they do not engorge with blood and are therefore not thought to be vectors of Lyme disease.

Ixodes cookei, the "woodchuck tick" is widely distributed in Maine and is the second most common species of Ixodes found. It has not been associated with Lyme disease transmission. Ixodes cookei usually feeds on wild animals, such as woodchucks and raccoons, but will also feed readily on humans and domestic animals. This tick is known to be a vector of Powassan virus. Rare cases of encephalitis have occurred in Maine in people infected with Powassan virus.

Ixodes marxi, the "squirrel tick", has not been associated with Lyme disease. It is commonly found on squirrels but will occasionally bite humans.

Ixodes muris is occasionally found in Maine. Usually it is found only on voles and mice, but it may bite humans, cats, dogs, and birds. A recent report indicates that I. muris is a weak vector of Lyme disease. We have associated its bite with a reaction in dogs, cats and other domestic animals characterized by pain, swelling, fever, lethargy and loss of appetite. If this reaction is observed we are very interested in receiving the tick alive and with relevant information.

Ixodes angustus is usually found only on voles and mice and is common in many parts of Maine, but it is very rarely found on humans or domestic animals

Dermacentor variabilis, the "American dog tick", is not a vector of Lyme disease. This tick is particularly abundant in southern Maine but its range has been expanding in recent years. Immature stages feed on voles and other small rodents, but adults are often found on humans, dogs, and other domestic animals. The adults, found from May through July and rarely later in the season, are larger than Ixodes ticks and can be distinguished by characteristic white markings (see back). This tick is the vector of Rocky Mountain spotted fever in the eastern United States. Recently, some cases of RMSF were reported in Maine but these have not been confirmed as Maine-acquired cases.

Dermacentor albipictus, the "winter tick" or "moose tick", is found on moose and deer and occasionally on horses, cows, dogs and humans, particularly in central and northern Maine. Large numbers of the tiny larvae may be encountered in the fall, particularly in habitat where moose are found. This tick has not been associated with Lyme disease but has been shown to be responsible for moose mortality in northern New England in the winter.

Haemaphysalis leporispalustris, the "rabbit tick", is usually found only on rabbits and birds. Although it has rarely been reported to be infected with the Lyme disease bacteria, it has not been associated with Lyme disease in humans.

Amblyomma americanum, the "Lone Star tick", is most often found on people traveling from states to the south where it is very common, but is becoming more frequently acquired in Maine. It has been shown to carry pathogens including Ehrlichia chaffeensis and a different spirochete (Borrelia lonestari), which in humans may produce a rash and some symptoms similar to Lyme disease.

Rhipicephalus sanguineus, the "brown dog tick" or "kennel tick", is widely distributed over the world, but only rarely found in Maine. Dogs are the principal host. It has not been associated with Lyme disease transmission, but is the vector of canine ehrlichiosis (Ehrlichia canis).

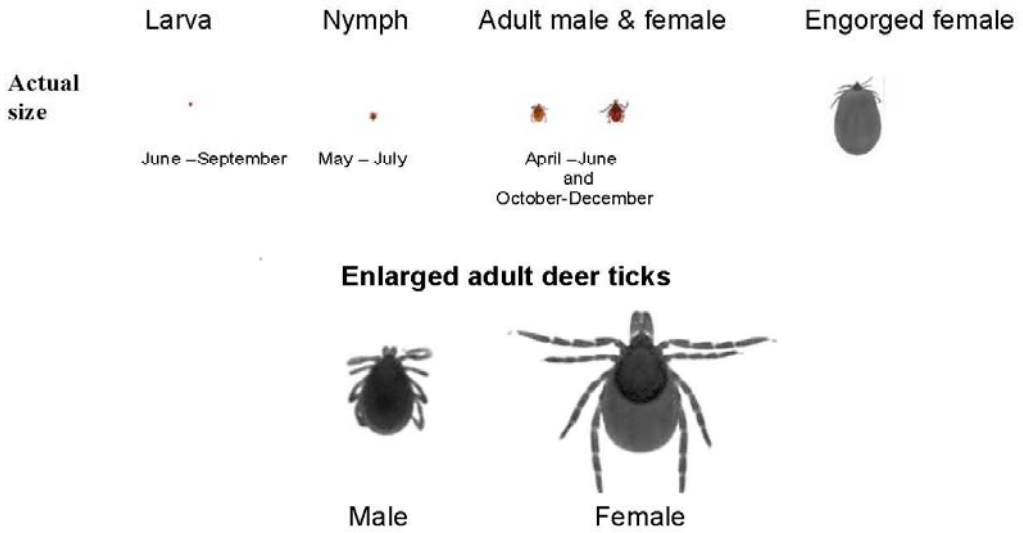
Other species of Ixodes, I. brunneus, (found on migratory birds), I. dentatus, (found on rabbits and hares), I. uriae, (found on marine birds) and I. gregsoni (found on mink, weasel and fisher) have occurred in Maine. The "bird tick" Haemaphysalis chordeilis and, Ixodes banksi (found on beaver and muskrat) have not yet been found in Maine but may occur here. There is no record of soft ticks, Family Argasidae, in Maine.

Elsewhere in the country, ticks may carry other diseases such as Rocky Mountain spotted fever, tularemia, Q –fever, and deer tick virus (DTV). As yet, these have not been reported or are rare in Maine.

Maine Medical Center Research Institute ~ Center for Vector-borne Disease 75 John Roberts Road, Suite 9B
South Portland ME 04106 `~ticklab@mmc.org

THE DEER TICK

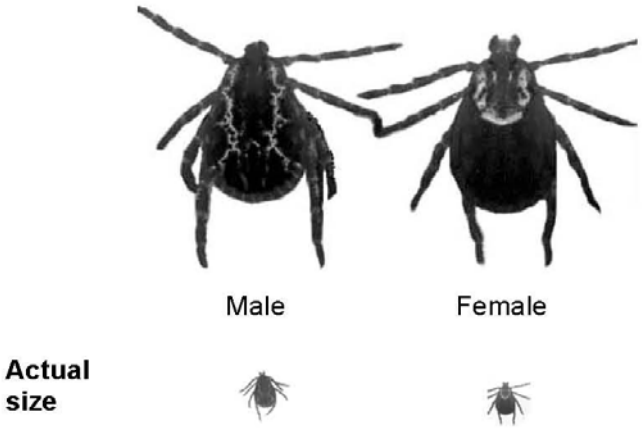
Ixodes scapularis



THE DOG TICK

Dermacentor variabilis, the American dog tick, **which does not transmit Lyme disease,** is commonly found in spring and early summer. Adult stages have **characteristic whitish markings** that can usually be seen in bright light even on engorged females.

Enlarged adult dog ticks



If bitten by a deer tick...

If you remove a deer tick that has become engorged while feeding, you should consult your physician right away, since a single dose of antibiotic given within 72 hours of the bite has been shown to prevent Lyme disease. Remember to save the tick for later identification (see following page).

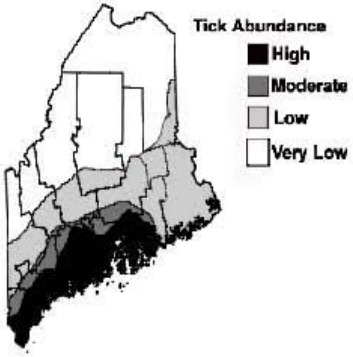
The first symptom of Lyme disease in humans is usually an expanding red rash greater than 2 inches in diameter at the site of the tick bite which may occur within a few days or several weeks later. The rash may be preceded or accompanied by flu-like symptoms such as fever, headache, chills, nausea, facial paralysis, or pain in the muscles and joints. If Lyme disease is suspected, call your doctor immediately. Early antibiotic treatment is very effective and can prevent later, more serious, complications. Not all patients develop the rash, however, and many do not recall a tick bite. The bites of ticks, mosquitoes, and black flies can produce a red, itchy, swollen area that may persist for a week or so but is usually less than 2 inches in diameter.

Lyme disease in pets. Although cats rarely show symptoms of Lyme disease, dogs may be seriously affected. The first indications include lameness, loss of appetite, fever, and lethargy. Dogs usually respond well to prompt antibiotic treatment. If deer ticks are abundant, dog owners should consult with veterinarians about canine Lyme vaccines available. Tick collars or other anti-tick treatments should also be used.

Other tick-borne pathogens. Two other deer tick-transmitted diseases, human granulocytic anaplasmosis and babesiosis, occur in Maine. These infections may start with headaches, fever and other flu-like symptoms, but without the characteristic bulls-eye rash of Lyme disease. Cats, dogs, and horses may suffer clinically from anaplasmosis. We suggest contacting your veterinarian if you find a tick on your pet. Powassan encephalitis virus has also been found in Maine and to date has resulted in four human cases. It is spread by the woodchuck tick *Ixodes cookei*.

The deer tick in Maine

This map shows a very generalized picture of the location and abundance of deer ticks in Maine through 2008. Although most often found in coastal areas, increasing numbers of ticks have been found inland. Continuing research will update this range and study the ecological variables which influence the spread.



Tick identification. If you find ticks you think may be deer ticks and would like to have them identified, send them in a small vial of alcohol in a crushproof container to the laboratory listed below. Include the name and age, if from a person, type of animal or source, the location where acquired, and the date found. ***Submitted ticks are not tested for the Lyme disease spirochete.***

Maine Medical Center Research Institute
Center for Vector-borne Disease
75 John Roberts Rd. - Suite 9B
South Portland, ME 04106
http://www.mmcri.org/lyme/
email: *ticklab@mmc.org*

Maine Medical Center
RESEARCH INSTITUTE

PROTECTING YOURSELF FROM LYME DISEASE IN MAINE

Lyme disease is an illness caused by a corkscrew-shaped bacterium (a spirochete) that is transmitted to humans and domestic animals by the bite of a tick. Frequently starting with a rash and flu-like symptoms, Lyme disease, if untreated, may progress to cause arthritis and neurological problems. Over 3000 cases of Maine-acquired Lyme disease have now been officially recognized.

The tick that transmits Lyme disease is the deer tick, *Ixodes scapularis*. This tick is well established in southern areas, particularly in coastal counties, but is increasingly found in interior Maine as well.

The risk to humans of contracting Lyme disease is greatest from the bite of the inconspicuous nymphs, which are most active in June and July. Adult ticks are found most often in the fall and in early spring as they search for larger hosts, primarily deer. The larger, reddish females can also transmit the Lyme bacteria, but the smaller, black males do not attach long enough to do so.

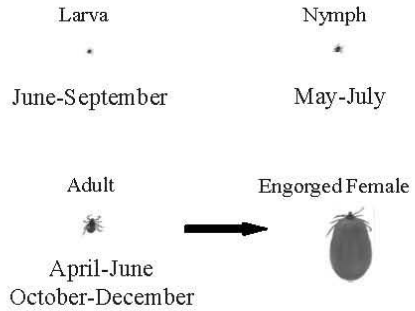
Male Female Male Female

Adult Deer Ticks (*Ixodes scapularis*) Adult Dog Ticks (*Dermacentor variabilis*)

The deer tick, which transmits Lyme disease (left), and the common dog tick (right), enlarged for comparison. The dog tick is not thought to transmit Lyme disease.

Photos by Kevin Byron.

THE ACTUAL SIZE OF DEER TICKS



Not all deer ticks contain the spirochete. Field studies in Maine have shown that although in some sites more than half the adult ticks sampled were infected, infection rates may vary considerably, even between adjacent areas at the same location.

Thirteen other species of ticks have been found in Maine, some of which look very much like deer ticks. They may bite humans and domestic animals but are not thought to transmit Lyme disease.

Ixodes cookei, the 'woodchuck tick,' which cannot be reliably distinguished from the deer tick without a microscope, is widely distributed in Maine. It usually feeds on wild animals such as woodchucks and skunks, but will also feed readily on humans and domestic animals.

Actual size

Dermacentor variabilis (shown), the American 'dog' tick, is commonly found in late spring and early summer. It is larger than the *Ixodes* ticks and can be distinguished by its characterisitic white markings. It is **not** found October-December in Maine.

Precautions to avoid tick bites:

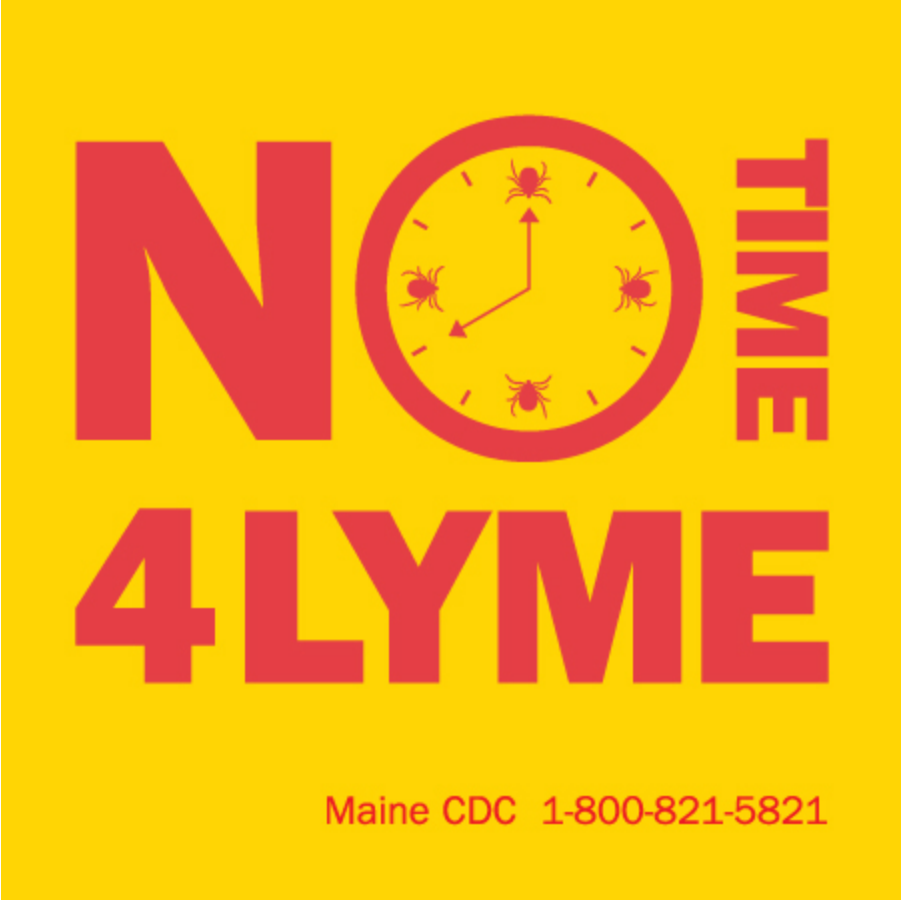
- Wear light-colored clothing and tuck your pants into your socks and your shirt into your pants when walking in the woods, brush, or tall grass. Deer ticks attach to clothing and move upwards.
- Use a repellant containing DEET according to label instructions - particularly on shoes, socks, and pant legs. (Use caution in applying high-concentration products to the skin, especially on children.)
- People may pretreat clothing with a permethrin-containing product, which both repels and kills ticks. **Caution:** This is not for use on skin; use only as directed on the label.
- To prevent engorged ticks from reproducing near your home and to protect your pets, consult your veterinarian about tick repellents and acaricides.
- **Inspect yourself, your clothing, your children, and your pets for ticks when you come in from the field and then again in a few hours.** Ticks often attach at body folds, behind the ears, and in the hair. If possible, shower and wash clothes immediately. Heat drying is effective in killing ticks.
- Mowing grass and cutting brush may reduce tick habitats in problem areas.
- When transporting pets or game, caution should be taken to avoid bringing ticks to new areas.

Prompt removal of attached ticks is extremely important. Lyme disease is rarely transmitted before the tick has been attached for 36 hours. Using tweezers, grasp the tick as close to the skin as possible and pull until the tick lets go. Do not handle ticks with bare hands. Do not squeeze the tick. Apply antiseptic to the bite. Save the tick in a small vial of 70% alcohol. Tick removal methods, such as applying vaseline, nail polish or scorching with a match, are not recommended.

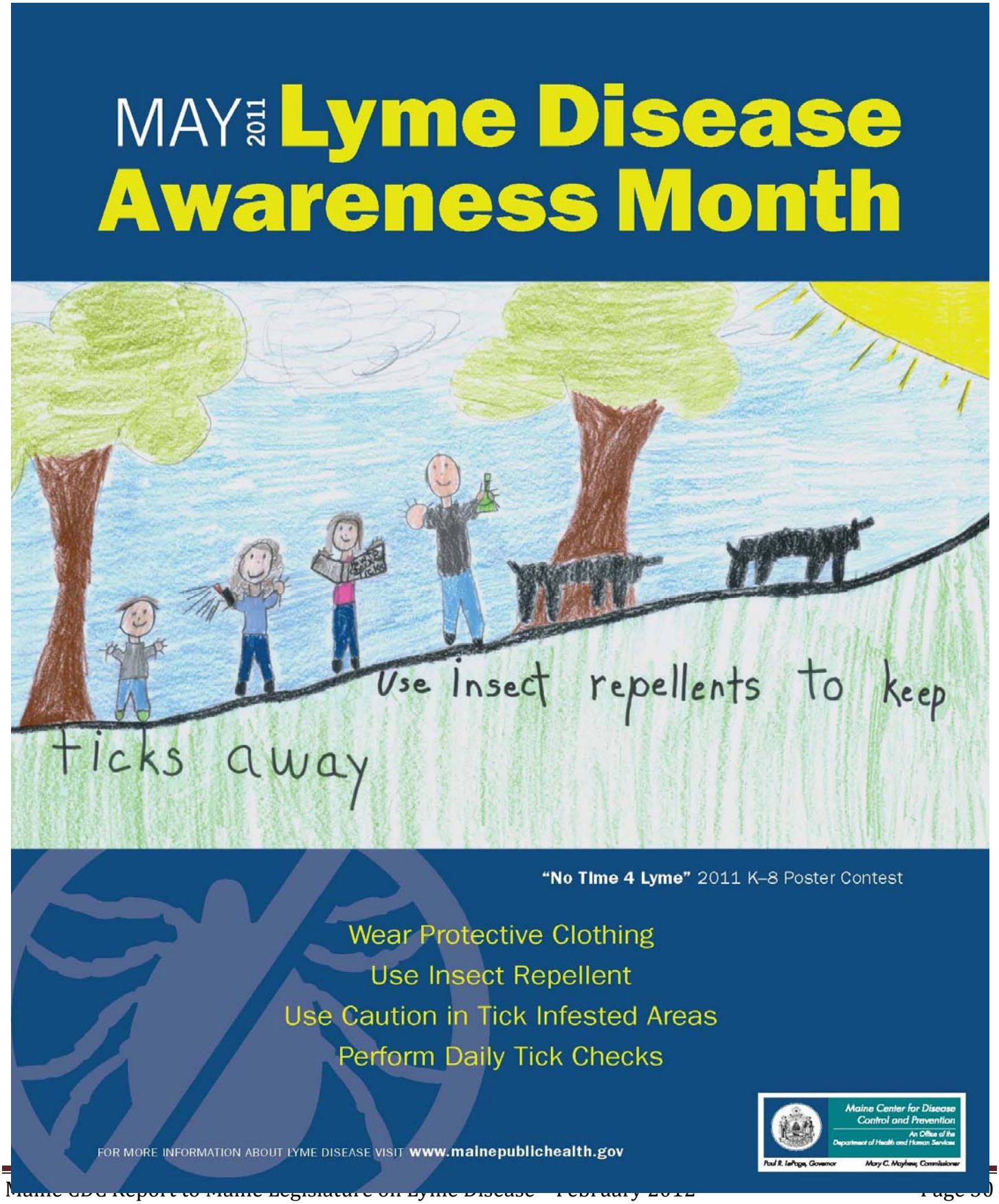
Drawing by K. Wolfe

Appendix 8

Lyme Disease Awareness Month 2011 sticker



Appendix 9


MAY 2011
Lyme Disease Awareness Month
Use insect repellents to keep ticks away
"No Time 4 Lyme" 2011 K–8 Poster Contest
Wear Protective Clothing
Use Insect Repellent
Use Caution in Tick Infested Areas
Perform Daily Tick Checks
FOR MORE INFORMATION ABOUT LYME DISEASE VISIT www.mainepublichealth.gov
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

Appendix 10

Recent Lyme Legislation

California:
Title: West Nile Virus and Mosquito and Vector Control Awareness Week (CA SCR 10)
Status: Passed

Iowa:
Title: A bill for an act to create a Lyme disease task force within the department of public health (IA HF 306)
Status: Did not pass

Title: A bill for an act creating, within the department of public health, a Lyme disease task force (IA SF 432)
Status: Did not pass

Massachusetts:
Title: An Act relative to Lyme Disease treatment coverage (MA HB 329)
Status: Did not pass

Title: An Act establishing a public health Lyme disease research institute at the University of Massachusetts Medical School at Worcester (MA HB 349)
Status: Did not pass

Title: An Act relative to the research and treatment of Lyme Disease (MA HB 3261)
Status: Did not pass

Title: An Act relative to the control of low lands and swamps to control of tick-borne illness (MA HB 3401)
Status: Did not pass

Title: An Act relative to Lyme disease and associated co-infections (MA SB 1129)
Status: Did not pass

Michigan:
Title: A resolution to declare May 2011 as Lyme Disease Awareness Month in Michigan (MI HR 88)
Status: Passed

New Hampshire:
Title: Relative to the use of long-term antibiotics for the treatment of Lyme disease (NH HB 295)
Status: Passed

New York:
Title: Legislative Resolution memorializing Governor Andrew M. Cuomo to proclaim May 2011, as Lyme Disease Awareness Month in the State of New York (NY J 1522)

Status: Passed

Pennsylvania:
Title: An Act establishing a task force on Lyme disease and related maladies; and providing for powers and duties of the task force, the Department of Health, the Department of Conservation and Natural Resources and the Pennsylvania Game Commission and for required coverage (PA HB 272)
Status: Did not pass

Title: An Act establishing a task force on Lyme disease and related maladies; and providing for powers and duties of the task force, the Department of Health, the Department of Conservation and Natural Resources and the Pennsylvania Game Commission to execute prevention and education strategies and ensure patient access to appropriate care and treatment (PA HB 210)
Status: Did not pass

Title: A Resolution designating the month of May 2011 as "Lyme Disease Awareness Month" in Pennsylvania (PA SR 96)
Status: Passed

Rhode Island:
Title: An act relating to state affairs and government - - state lottery* (RI H 5116)
Status: Did not pass

Title: An act relating to state affairs and government - - state lottery* (RI S 134)
Status: Did not pass

*This act would direct the state lottery division to conduct an instant game known as the Scratch-A-Tick Game during the fiscal year ending June 30, 2012. The lesser amount of either the net revenue from the first three (3) months of the running of said game or two hundred thousand dollars ($200,000) shall be deposited in a restricted revenue account to be used by the University of Rhode Island for Vector-Borne Disease and Tick Encounter Resource Center to help support statewide tick-bite protection and Lyme disease prevention research and outreach. This act would take effect upon passage.

United States:
Title: To provide for the establishment of the Tick-Borne Diseases Advisory Committee (US HR 2557)
Status: Did not pass

Title: Lyme and Tick-Borne Disease Prevention, Education, and Research Act of 2011 (US S 1381)
Status: Did not pass

Vermont:
Title: An act relating to Lyme disease (VT HB 90)
Status: House: Did not pass

Wisconsin:
Title: Recognizing May as Lyme Disease Awareness Month (WI AJR 35, WI SJR 25)
Status: Passed