Michigan Zoonotic & Vector-Borne Disease
Surveillance Summary, 2012

Disease Reports

I. Overview
II. Arboviruses
III. Rabies
IV. Lyme Disease

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PREPARED BY THE MICHIGAN DEPARTMENT OF COMMUNITY HEALTH
DIVISION OF COMMUNICABLE DISEASE
ZOONOTIC DISEASE AND SPECIAL PROJECTS SECTION

201 Townsend St., 5th Floor | Lansing, MI 48913
(517) 335-8165

Michigan Department of Community Health
MDCH

MDCH Zoonotic Disease and Special Projects Section
Mary Grace Stobierski, DVM, MPH, DACVPM – Manager, State Public Health Veterinarian
Kim Signs, DVM – Zoonotic Disease Epidemiologist
Erik Foster, MS – Medical Entomologist
Rebecca Reik, MPH –Epidemiologist

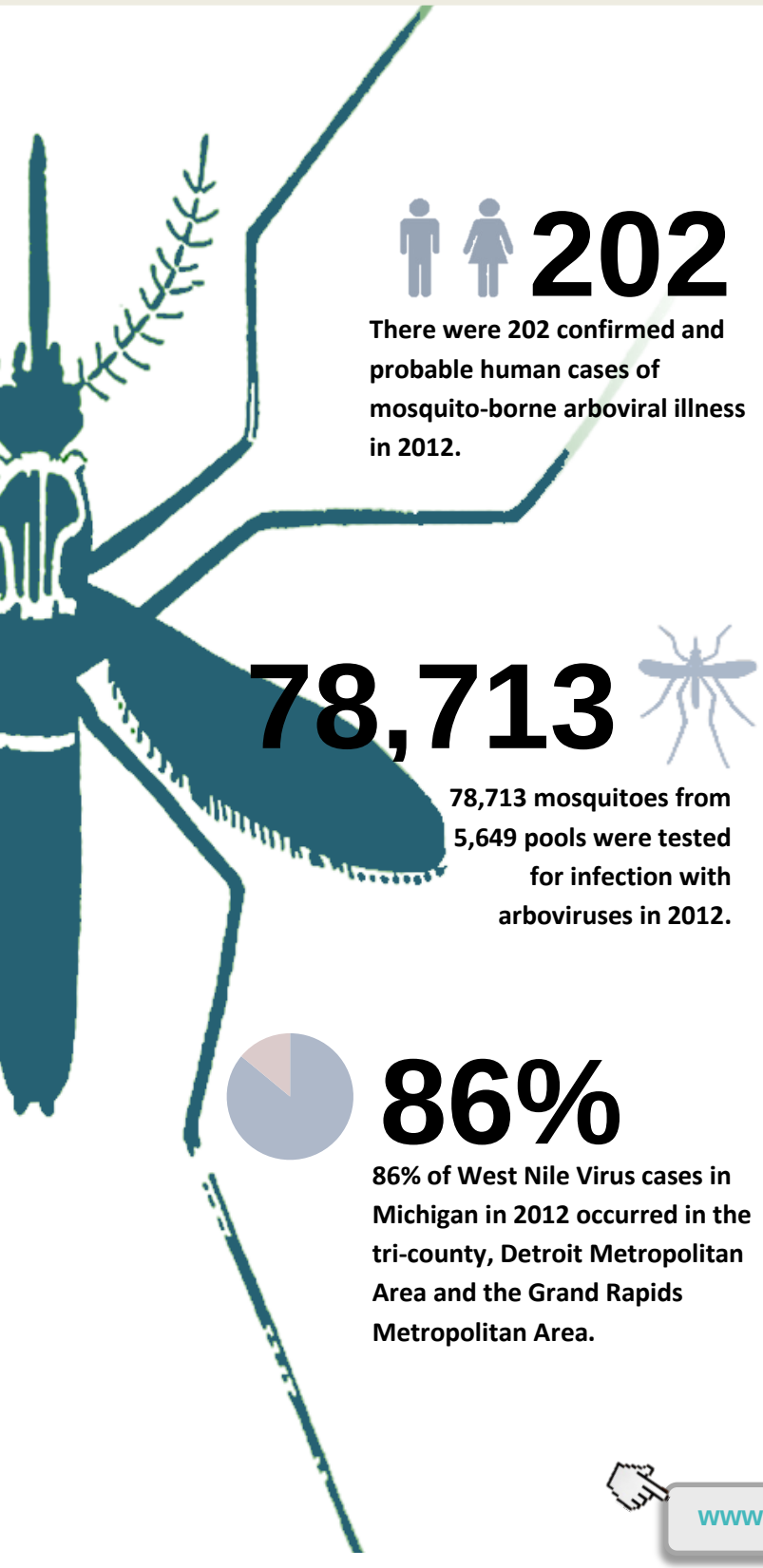
Reportable Zoonotic Diseases in Michigan

The list of reportable diseases in Michigan includes many diseases that are transmitted by animals and arthropods to people (see table below). The Michigan Department of Community Health, Zoonotic Disease and Special Projects Section is responsible for statewide human case surveillance and cooperates in multi-agency ecologic and animal case surveillance. The following report will focus on several of the diseases listed in this table including: Arboviruses, Lyme disease, and Rabies.

Zoonotic Diseases in Michigan – 5 Year Table

Disease	2008	2009	2010	2011	2012	Total
Bird-Associated						
Psittacosis	0	0	1	0	0	1
Livestock-Associated						
Anthrax	0	0	0	0	0	0
Q Fever, acute	2	1	3	8	3	17
Q Fever, chronic	0	0	2	1	0	3
Mosquito Borne						
Dengue Fever	11	6	9	7	9	42
Encephalitis, California (La Crosse)	0	0	2	1	0	3
Encephalitis, Eastern Equine	0	0	3	0	0	3
Encephalitis, St. Louis	1	0	2	0	0	3
Encephalitis, Western Equine	0	0	0	0	0	0
Malaria	17	32	34	35	26	144
West Nile Virus	17	1	29	34	202	283
Yellow Fever	0	0	0	0	0	0
Multi-Mode Zoonoses						
Brucellosis	1	10	4	2	1	18
Leptospirosis	1	0	0	1	0	2
Plague	0	0	0	0	0	0
Rickettsial Disease - Typhus	0	0	1	0	0	1
Tularemia	0	0	0	0	0	0
Public Health Pest						
Head Lice (Aggregate School Reporting)	440	2103	4063	5551	6855	19012
Rabies and Animal Bites						
Animal Bite	562	2125	2388	3056	2798	10929
Rabies, Animal	79	68	73	65	61	346
Rabies, Human	0	1	0	0	0	1
Rodent Borne						
Hantavirus	0	0	0	0	0	0
Hantavirus, Other	0	0	0	0	0	0
Hantavirus, Pulmonary	0	0	0	0	0	0
Tick Borne						
Ehrlichiosis, *Anaplasma phagocytophilum*	0	0	5	4	6	15
Ehrlichiosis, *Ehrlichia chaffeensis*	3	6	2	4	3	18
Ehrlichiosis, *Ehrlichia ewingii*	0	0	0	0	0	0
Ehrlichiosis, human other/undetermined	0	0	0	0	0	0
Encephalitis, Powassan	0	0	0	0	0	0
Lyme Disease	92	103	95	106	98	494
Rickettsial Disease – Spotted Fever	3	5	2	4	3	17
Total	**1229**	**4461**	**6716**	**8876**	**10065**	**31352**

Michigan Zoonotic & Vector-Borne Disease
Surveillance Summary



202

There were 202 confirmed and probable human cases of mosquito-borne arboviral illness in 2012.

78,713

78,713 mosquitoes from 5,649 pools were tested for infection with arboviruses in 2012.

86%

86% of West Nile Virus cases in Michigan in 2012 occurred in the tri-county, Detroit Metropolitan Area and the Grand Rapids Metropolitan Area.

Arboviruses

June 2013

Many states experienced a resurgence of arbovirus activity in 2012 with 5,674 human West Nile Virus (WNV) cases and 286 deaths reported in the U.S., the second highest number since 2003. Michigan was no exception with 202 cases and 17 deaths, the most human cases of WNV reported in the state since 2002.

Wildlife disease surveillance conducted by the Michigan Department of Natural Resources detected WNV in a sick-acting wild turkey collected in Washtenaw County in mid-June. This was the first ecologic evidence of WNV activity in Michigan in 2012. Saginaw County reported the first WNV positive mosquitos shortly thereafter. For comparison, in 2011, the first WNV activity was reported in August when a crow tested positive for the virus.

Like much of the U.S., Michigan experienced an extremely hot and dry spring and summer in 2012. Previous experience with WNV has shown that hot and dry conditions favor the WNV transmission cycle in the Midwest, providing ideal conditions for larval mosquito development in the stagnant water of retention ponds and urban and suburban catch basins. In addition, only a few communities or counties in the state conduct comprehensive mosquito surveillance and control.

In Michigan, prevention of illness from mosquito-borne diseases is very dependent on personal protection. The Michigan Department of Community Health and its partners strive to provide the public with timely information about WNV activity though regular updates to the Emerging Diseases website and other efforts, including press releases and media events.

www.michigan.gov/emergingdiseases

Prepared by the Michigan Department of Community Health
Division of Communicable Disease
Zoonotic Disease and Special Projects Section

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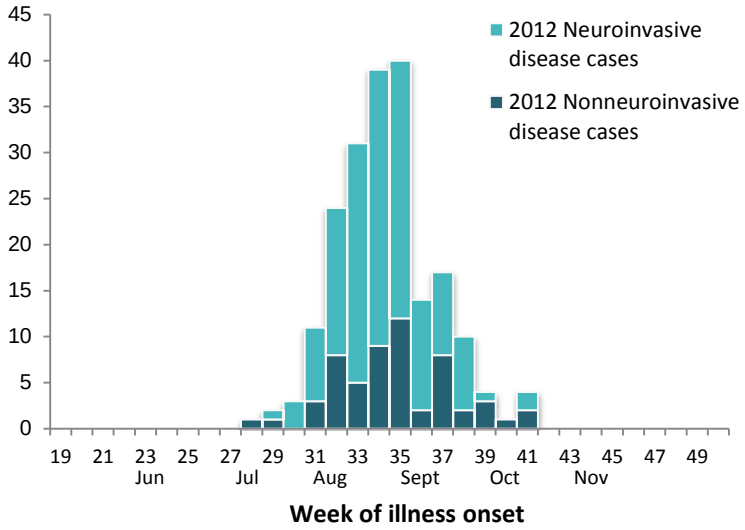
2012 Arboviral Disease Data

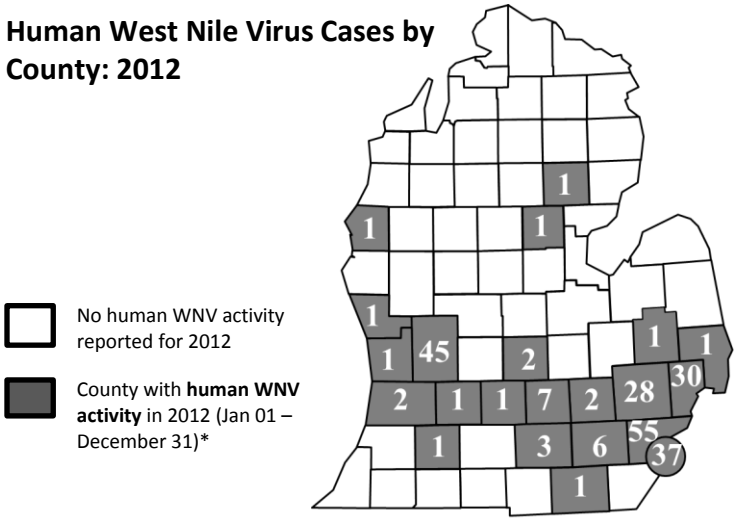
2012 WNV Disease Case Onset by Week



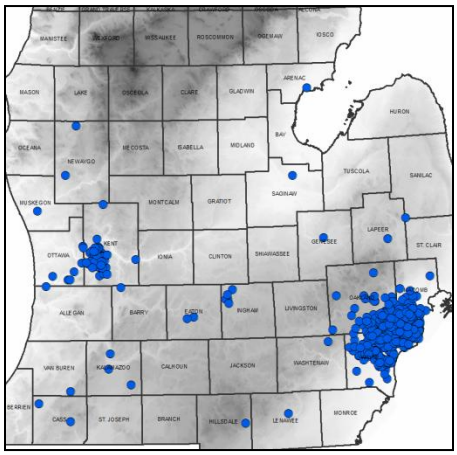
- In 2012, 202 human cases of WNV disease were reported, including 17 deaths.
- WNV was the only arbovirus detected in humans in 2012.
- The age range for Michigan WNV cases was 2–91 years with a median age of 57 years.
- 144 WNV cases (71%) were neuroinvasive (caused meningitis, encephalitis or paralysis).
- The case fatality rate for patients with neuroinvasive disease was 12%.
- Blood donor screening detected 38 donors with evidence of WNV in their blood at the time of donation. Of these, 11 became symptomatic.

- WNV cases were reported from 20 Michigan counties/jurisdictions.
- WNV case illness onset dates ranged from July 6 to October 6.
- Presumptive viremic blood donors were reported from 11 counties; donation dates ranged from July 27 through October 16.
- Deaths were reported from 5 counties and the City of Detroit.
- The ages of those who died following WNV illness ranged from 48-87 years, with a median age of 73.

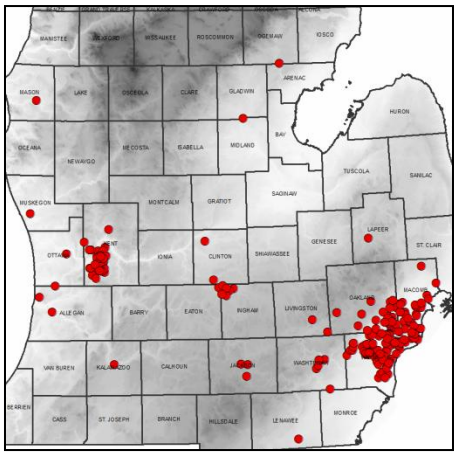
Human West Nile Virus Cases by County: 2012



2002 WNV Outbreak
(each dot represents a human case)



2012 WNV Outbreak
(each dot represents a human case)



Outbreak Geographic Comparison:

- The distribution of WNV cases in 2012 mirrored that seen during the outbreak of 2002.
- The majority of illnesses in both of these outbreaks occurred in people who lived in or around the metropolitan areas of Detroit and Grand Rapids.
- These communities can expect to experience WNV activity when conditions are favorable.

Yearly Climate Variations Influence West Nile Virus

Several factors influence West Nile virus outbreaks. One of the most significant factors is the climate in which mosquitoes develop. The winter of 2011-2012 was the fourth warmest winter since the winter of 1894/1895 in Michigan (2002 was the warmest winter on record). This and record-breaking March temperatures allowed for higher winter survival, and earlier emergence of adult *Culex pipiens* mosquitoes in Michigan in 2012. These early mosquito populations were observed in samples collected from Michigan's mosquito control districts and are highlighted against Michigan's 2012 human epidemic curve in the figure below. Mosquito surveillance data is a sound predictor of WNV human risk, and can aid communities in targeting mosquito control and public education efforts.

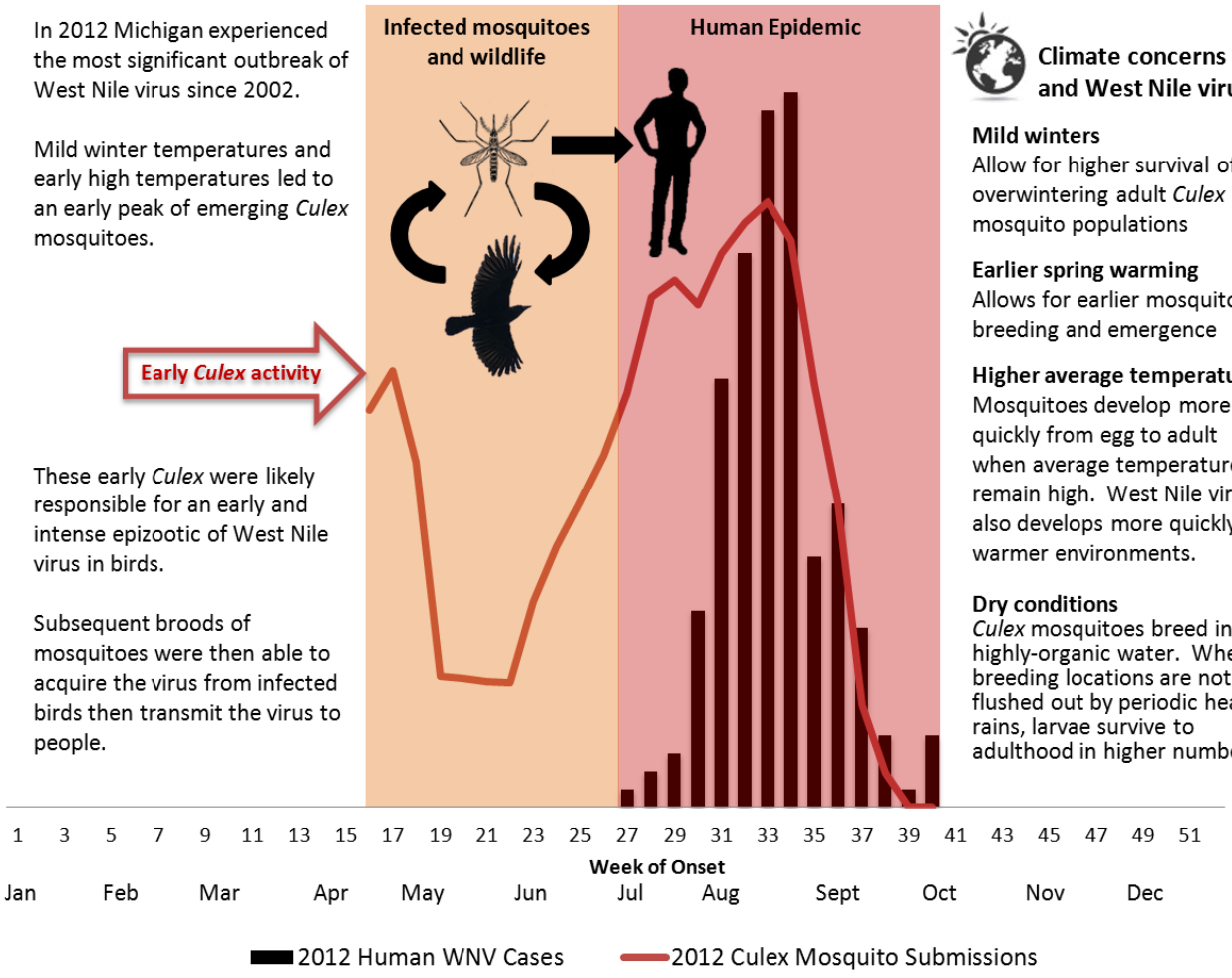
In 2012 Michigan experienced the most significant outbreak of West Nile virus since 2002.

Mild winter temperatures and early high temperatures led to an early peak of emerging *Culex* mosquitoes.

Early *Culex* activity

These early *Culex* were likely responsible for an early and intense epizootic of West Nile virus in birds.

Subsequent broods of mosquitoes were then able to acquire the virus from infected birds then transmit the virus to people.



Climate concerns and West Nile virus

Mild winters
Allow for higher survival of overwintering adult *Culex* mosquito populations

Earlier spring warming
Allows for earlier mosquito breeding and emergence

Higher average temperatures
Mosquitoes develop more quickly from egg to adult when average temperatures remain high. West Nile virus also develops more quickly in warmer environments.

Dry conditions
Culex mosquitoes breed in highly-organic water. When breeding locations are not flushed out by periodic heavy rains, larvae survive to adulthood in higher numbers.

GUIDES AND PRINTED RESOURCES

Posters, pamphlets, and guides are available to download, print and order at http://www.michigan.gov/westnile - library. Printed "Fight the Bite" pamphlets will be made available to local health departments at no charge. Please call MDCH Division of Communicable Disease to order these materials at 517-335-8165.

What Can Be Done?

Public Health Agencies can

- Monitor Michigan's mosquito populations
- Maintain a surveillance system for arboviral diseases
- Make Michigan data publicly available
- Promote arbovirus disease prevention guidance

Health Providers can

- Review public health data regarding the risk of arboviruses in Michigan
- Diagnose and treat infections using best practices
- Report cases promptly to your local health department
- Remind patients about the risk of arbovirus infection in your area and ways to prevent infections

Everyone can

- **Inform** yourself about where risk for contracting arboviruses is greatest (lack of reported activity ≠ lack of risk however)
- **Inform** yourself about when the risk for contracting arboviruses is greatest:
  - Summer
  - At dusk and dawn, mosquitoes are most active
  - Adults > 50 years of age are more susceptible to serious illness from WNV
  - Children < 15 years of age are more susceptible to serious illness from EEE and La Crosse encephalitis virus.
- **Eliminate** standing water where mosquitos can lay eggs
- **Report** dead birds to your local authorities
- **Protect.** Take precautions to prevent mosquito bites when engaging in outdoor activities

MDCH West Nile Virus Website:
http://www.michigan.gov/emergingdiseases

Centers for Disease Control and Prevention West Nile Virus Website:
http://www.cdc.gov/ncidod/dvbid/westnile/index.htm

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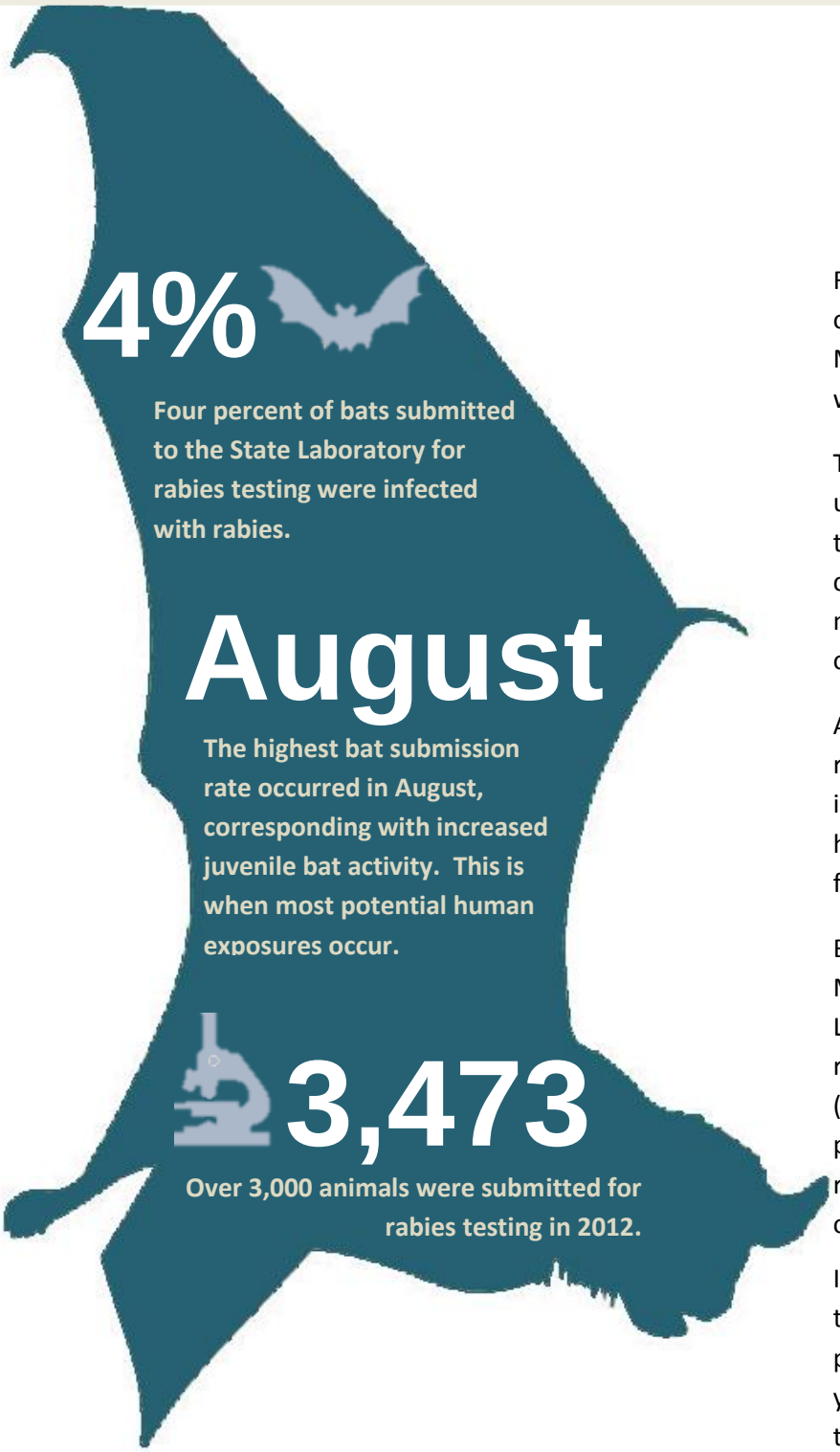

Rabies

June 2013

Rabies is a preventable viral disease of mammals most often transmitted through the bite of a rabid animal. In Michigan, the majority of reported cases each year occur in wild animals like bats, skunks, and foxes.

The rabies virus infects the central nervous system, ultimately causing disease in the brain and death. Exposure to the virus occurs when saliva from an infected animal contaminates broken skin or mucus membranes. Rabies is not transmitted though exposure to blood, urine, or feces of an infected animal.

Another possible exposure occurs when bats are found in rooms with sleeping individuals. In these cases, it is important not to let the bat go before consulting the local health department to determine if the bat should be tested for rabies.

Between January 1, 2012 and December 31, 2012, the Michigan Department of Community Health's Bureau of Laboratories (MDCH BOL) received 3,473 specimens for rabies testing, of which 3,342 could be tested. Of these, 58 (1.7%) were positive for rabies. Surveillance testing performed by the USDA/WS detected three additional rabies positive animals: two skunks and one bat, for a total of 61 rabies positive animals in the state.

In comparison, in 2011, 3,325 animals were submitted for testing, of which 3,171 could be tested and 65 (2.0%) were positive. Demand for rabies testing has increased in recent years, primarily due to an increase in bats submitted for testing.

www.michigan.gov/emergingdiseases

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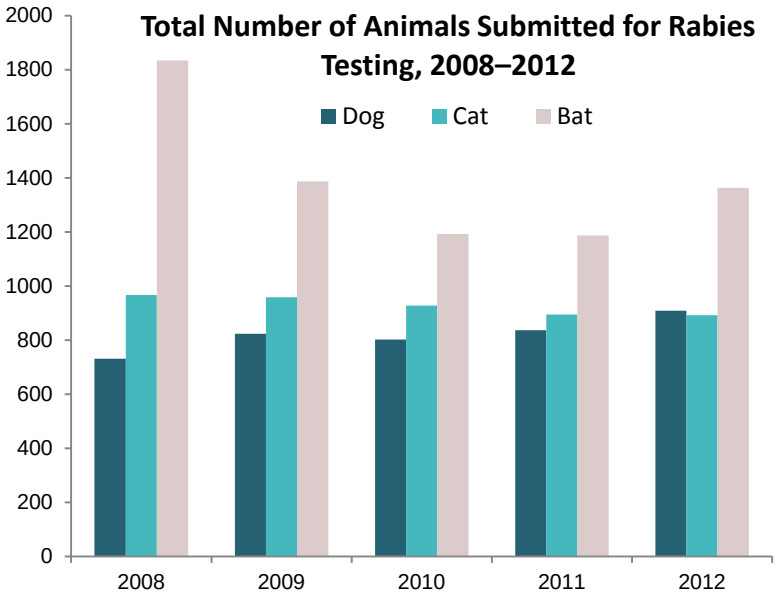
2012 Rabies Data



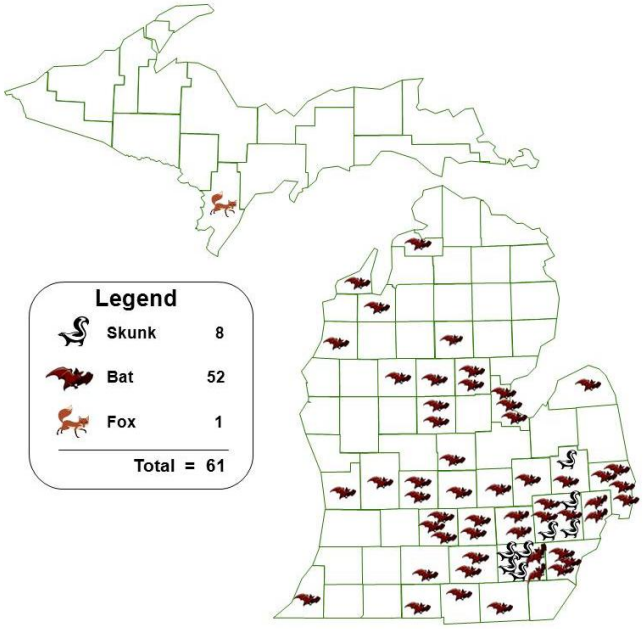
- 3,342 animals were tested for rabies by the MDCH Bureau of Laboratories.
- Bats were the most frequently submitted animal for testing (1,363) followed by 908 dogs, and 892 cats.
- Surveillance testing performed by the USDA/WS detected three additional rabies positive animals: two skunks and one bat.
- Michigan reported a total of 61 rabies-positive animals in 2012.
- Positive animals included 52 bats, 8 skunks, and 1 fox.

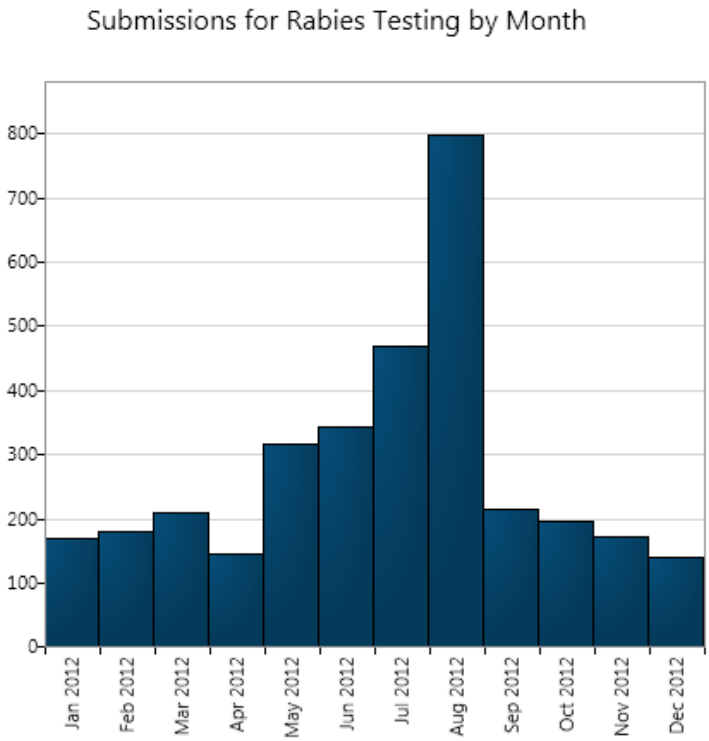
The map at right shows the location and species of rabies-positive animals in 2012.

Bats were the most frequently submitted species and 4% were rabies positive.

Relatively few skunks (35) were tested for rabies at MDCH BOL in 2012, but 17% were rabies positive.

2012
Rabies Positive Animals in Michigan





A fox from Menominee County tested positive for rabies in 2012, detected through surveillance for rabies in wildlife being conducted by the United States Department of Agriculture's Wildlife Services Division (USDA/WS).

Through this program, sick acting as well as nuisance and some road-kill animals that have not exposed any people or unvaccinated pets can be tested for rabies.

Using a field test developed by the Centers for Disease Control and Prevention for use in raccoon-strain rabies control programs, USDA/WS biologists enhance Michigan's public health diagnostic capacity by providing an additional source of rabies surveillance information.

Special Projects

RABIES POST-EXPOSURE PROPHYLAXIS

Vaccine and Immune Globulin Availability (update as of 6/6/2013)

Rabies Vaccine

- No supply restrictions.
- Rabies vaccine produced by Novartis (RabAvert) is available for pre-exposure (PreEP) and postexposure prophylaxis (PEP) from wholesale distributors.
- Rabies vaccine produced by Sanofi Pasteur (IMOVAX) is currently available for PreEP and PEP.

Human Rabies Immune Globulin

- Human rabies immune globulin produced by Grifols (HyperRAB) is available with no restrictions.
- Human rabies immune globulin produced by Sanofi Pasteur (Imogam) is currently restricted and available on an as needed basis; request forms and instructions can be found here.

No special ordering instructions are in effect. A list of distributors is provided below for reference (Please note that this list may not be complete).

McKessen (415) 983-8300

Cardinal (614) 757-5000

Amerisource Bergen (610) 727-7000

Medico Mart (800) 242-6248

Recommended Preventive Measures Unaffected by Supply Restrictions:

- Pets and livestock should be vaccinated against rabies, as recommended by the Rabies Compendium.
- When possible, after an exposure, the animal involved should be safely captured and held for observation (if a dog, cat, or ferret) or tested for rabies.

GUIDES AND PRINTED RESOURCES

MDCH developed a poster that reminds people not to touch bats and to try to safely capture any bat found in the home until determining if rabies testing is advised. Frequently, bats found in the home are immediately released upon discovery. In many of these cases, without a specimen to test for rabies, household members have to undergo costly rabies post-exposure prophylaxis treatment. The poster is available to Michigan local health departments, and can be customized with local contact information. It may be found at www.michigan.gov/emergingdiseases.

The St. Clair County Health Department has compiled a list of patient assistance resources for those underinsured or uninsured individuals seeking rabies pre- or post-exposure prophylaxis. The list is available at www.michigan.gov/cdinfo - under “Communicable Diseases A-Z – Rabies”. Additional Patient Assistance Program information can be located at www.Rxhope.com.

What Can Be Done?

Public Health Agencies can

- Maintain a rabies surveillance system
- Provide rabies testing services to the public
- Provide consultation to health care providers and the public
- Make Michigan data publicly available
- Maintain relationships with animal control and animal health organizations
- Promote rabies prevention

Health Care Providers can

- Review epidemiology of rabies in Michigan
- Treat potential exposures using best practices
- Report animal bites to your local health department

Everyone can

- **Vaccinate** your pets against rabies and keep them up to date
- **Avoid** contact with wild or unfamiliar animals
- **Know** what to do if you find a bat in your home
- **Keep** a list of important phone numbers that includes animal control and your local health department
- **Seek** prompt medical care if you are bitten by an animal

Veterinarians can

- Vaccinate pets and livestock against rabies
- Educate your clients and the public about rabies prevention
- Ensure your rabies titers remain at protective levels

Learn More

MDCH Rabies Website:
http://www.michigan.gov/emergingdiseases

Centers for Disease Control and Prevention Rabies Website:
http://www.cdc.gov/rabies

National Association of State Public Health Veterinarians Rabies Compendium:
http://www.nasphv.org/Documents/RabiesCompendium.pdf

Maryland's Rabies Post-exposure Prophylaxis Basics Training for Healthcare Providers (CE available):
http://ideha.dhmh.maryland.gov/training/SitePages/rabies.aspx

New York's bat capture instructional video:
http://www.health.ny.gov/diseases/communicable/zoonoses/rabies/docs/catch_the_bat_high.wmv

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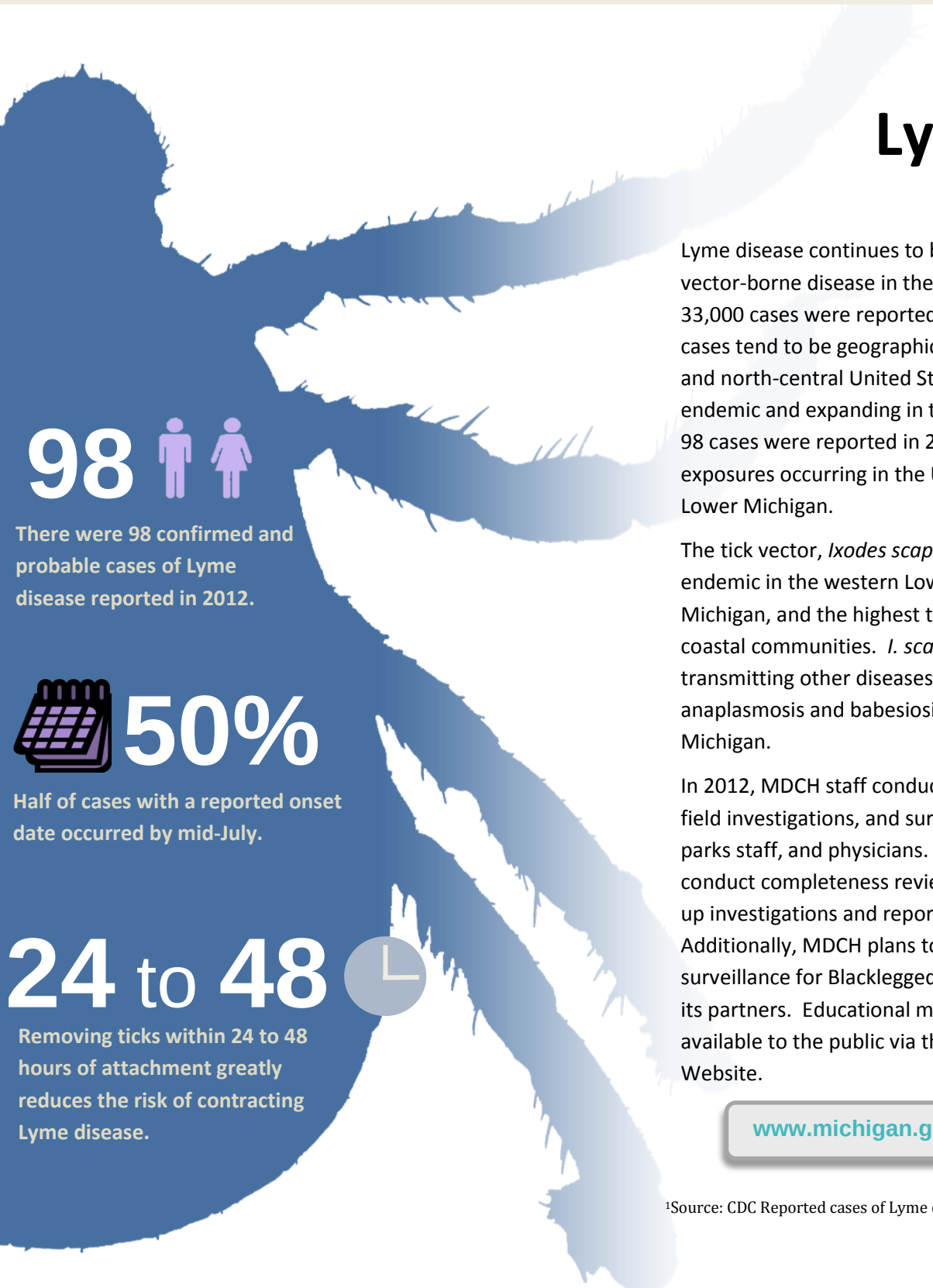

98

There were 98 confirmed and probable cases of Lyme disease reported in 2012.

50%

Half of cases with a reported onset date occurred by mid-July.

24 to 48

Removing ticks within 24 to 48 hours of attachment greatly reduces the risk of contracting Lyme disease.

Lyme Disease

June 2013

Lyme disease continues to be the most commonly reported vector-borne disease in the United States; approximately 33,000 cases were reported nationally in 2011[1]. In the U.S. cases tend to be geographically focused in the northeastern and north-central United States, but Lyme disease is also endemic and expanding in the Upper-Midwest. In Michigan, 98 cases were reported in 2012 with most Michigan exposures occurring in the Upper Peninsula and western Lower Michigan.

The tick vector, *Ixodes scapularis* (Blacklegged tick), is now endemic in the western Lower Peninsula along Lake Michigan, and the highest tick populations occur among coastal communities. *I. scapularis* is also responsible for transmitting other diseases to humans including anaplasmosis and babesiosis, though both are rare in Michigan.

In 2012, MDCH staff conducted human case surveillance, tick field investigations, and surveys of the public, recreational parks staff, and physicians. In 2013 staff will continue to conduct completeness reviews of Lyme disease case follow-up investigations and report annual findings to the public. Additionally, MDCH plans to continue field ecologic surveillance for Blacklegged ticks in the state with the help of its partners. Educational materials will continue to be made available to the public via the MDCH "Emerging Diseases" Website.

www.michigan.gov/emergingdiseases

[1]Source: CDC Reported cases of Lyme disease by state or locality, 2002-2011.

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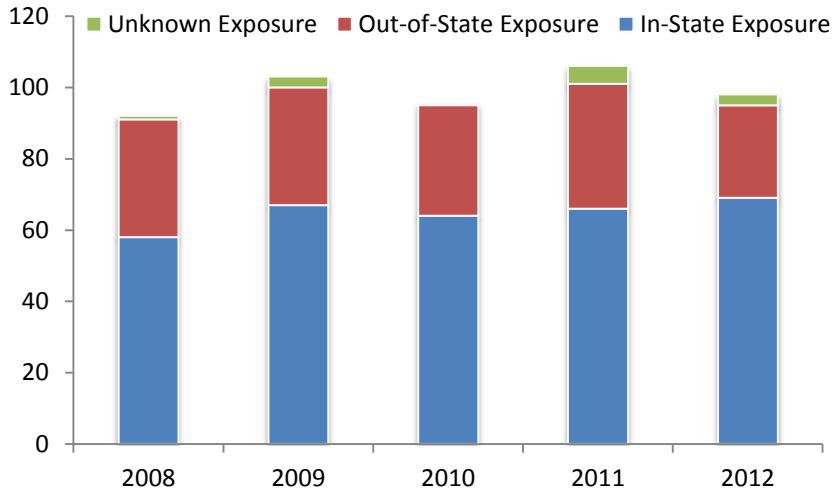
MDCH

2012 Lyme Disease Data

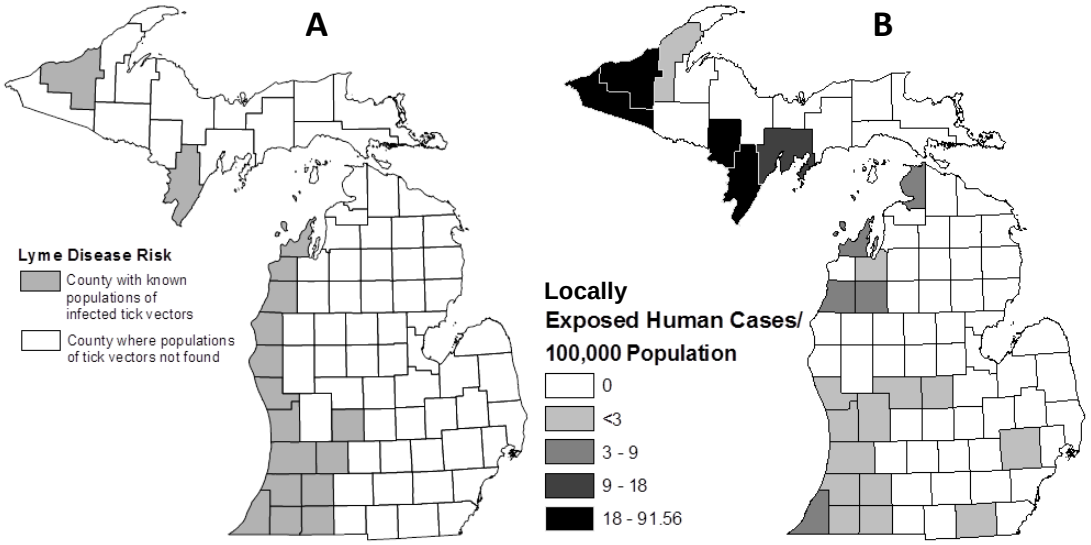
Michigan Lyme Disease Cases by Year, 2008--2012



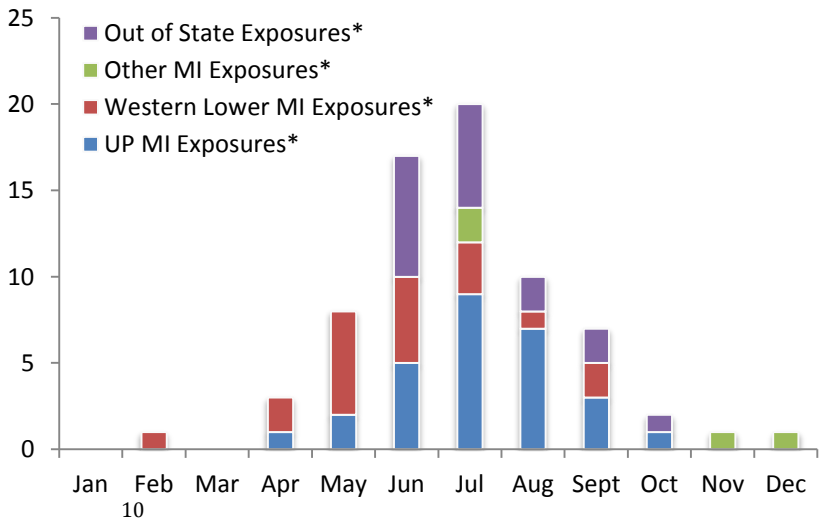
- A total of 98 probable and confirmed cases were reported to MDCH in 2012, a slight decrease from 2011.
- Sixty-nine patients reported potential exposure in Michigan.
- The incidence rate in Michigan for 2012 was 0.97 cases per 100,000 persons.
- Incidence rates for 2012 differ between the Upper Peninsula (14.5 cases per 100,000 persons) and the western Lower Peninsula (1.1 cases per 100,000 persons).

The maps at right highlight Michigan counties by Lyme disease human case incidence and potential risk based on known populations of vectors.

A) Counties with blacklegged tick populations identified by field researchers.
B) Incidence of locally exposed Lyme disease cases (ie. cases exposed in county that is shaded).



2012 Lyme Disease Case Onset by Month



Human case onset dates coincide with tick activity:

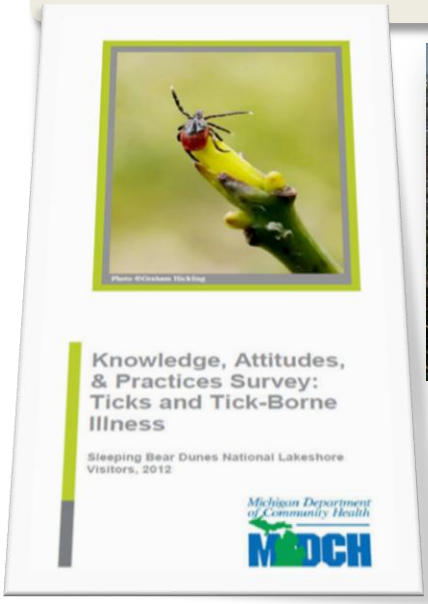
Adult ticks often have the highest infection rate and are active in the early-spring and the fall, generally at temperatures above 45°F. Because of their large size they are more easily detected.

Nymphal ticks are responsible for a majority of human Lyme disease due to their small size (difficult to notice and remove promptly) and are active during the warmer months (May-August) when people are recreating and working outdoors.

Special Projects

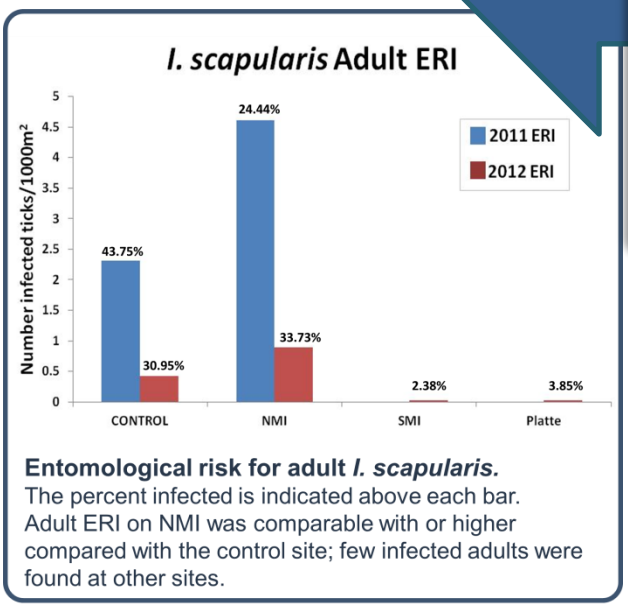
Surveys and Public Education

Michigan State University and MDCH partnered during 2012 to complete several projects aimed at assessing public and employee knowledge about Lyme disease prevention at Sleeping Bear Dunes National Lakeshore. Sleeping Bear Dunes hosts over one million visitors each year. Employees and volunteers were given a pre-test, received tick training, and post-test. Significant progress was made in improving employee and volunteer confidence in educating visitors to the park about tick safety, and trail-head markings in tick habitats and prevention information in park brochures were also improved.



Field Surveys and Risk Determinations

Field sampling was conducted during 2012 to determine the entomological risk index (ERI) at sites within Sleeping Bear Dunes National Park, as compared to a control site in southwestern Lower Michigan. The ERI is the number of infected ticks encountered over 1000m^2. During the time of year when adult ticks are active (spring & fall) the risk index is highest on N. Manitou Island (NMI) and at the control site. However, during the peak visitation period when nymphal stage ticks are active, the ERI was lower at all sites within the park than the control site.



Entomological risk for adult *I. scapularis*.
The percent infected is indicated above each bar. Adult ERI on NMI was comparable with or higher compared with the control site; few infected adults were found at other sites.

What Can Be Done?

Public Health Agencies can

- Monitor Michigan's tick populations
- Maintain Lyme disease surveillance system
- Offer tick identification and testing services to the public
- Make Michigan data publicly available
- Promote tick-borne disease prevention guidance

Health Providers can

- Review public health data regarding the risk of Lyme disease in Michigan
- Diagnose and treat infections using best practices
- Report cases promptly to your local health department
- Remind patients about the risk of Lyme disease in your area, and ways to prevent infections

Everyone can

- **Inform** yourself about where ticks can be encountered in Michigan
- **Prevent** tick bites by taking precautions and using EPA approved repellents on skin and clothing
- **Check** yourself and others for ticks regularly after spending time outdoors
- **Remove** ticks promptly and safely if you have been bitten
- **Submit** ticks you find on yourself or your pets for identification
- **Recognize** the symptoms of Lyme disease
- **Seek** prompt medical care if illness occurs after exposure to ticks

New Tick Submission Kit

As part of an effort to streamline public tick submission and testing, we have developed a kit for submitting ticks to the State of Michigan. The kit consists of a screw cap plastic vial, a self-addressed, padded return envelope, a submission form, instructions for submission, and the Ticks and Your Health brochure.

The kit will be made available to local health departments, healthcare facilities, and veterinary clinics, and can be ordered via the Communicable Disease Division's publication order form at: www.michigan.gov/cdinfo

Learn More

MDCH Lyme disease Website:
http://www.michigan.gov/lymedisease

Centers for Disease Control and Prevention Lyme disease Website:
http://www.cdc.gov/lyme

Tickborne Diseases of the United States: A reference manual for health care providers:
http://www.cdc.gov/lyme/resources/TickborneDiseases.pdf

MDCH "Ticks and Your Health" Brochure:
http://michigan.gov/documents/emergingdiseases/resize_307382_7.pdf