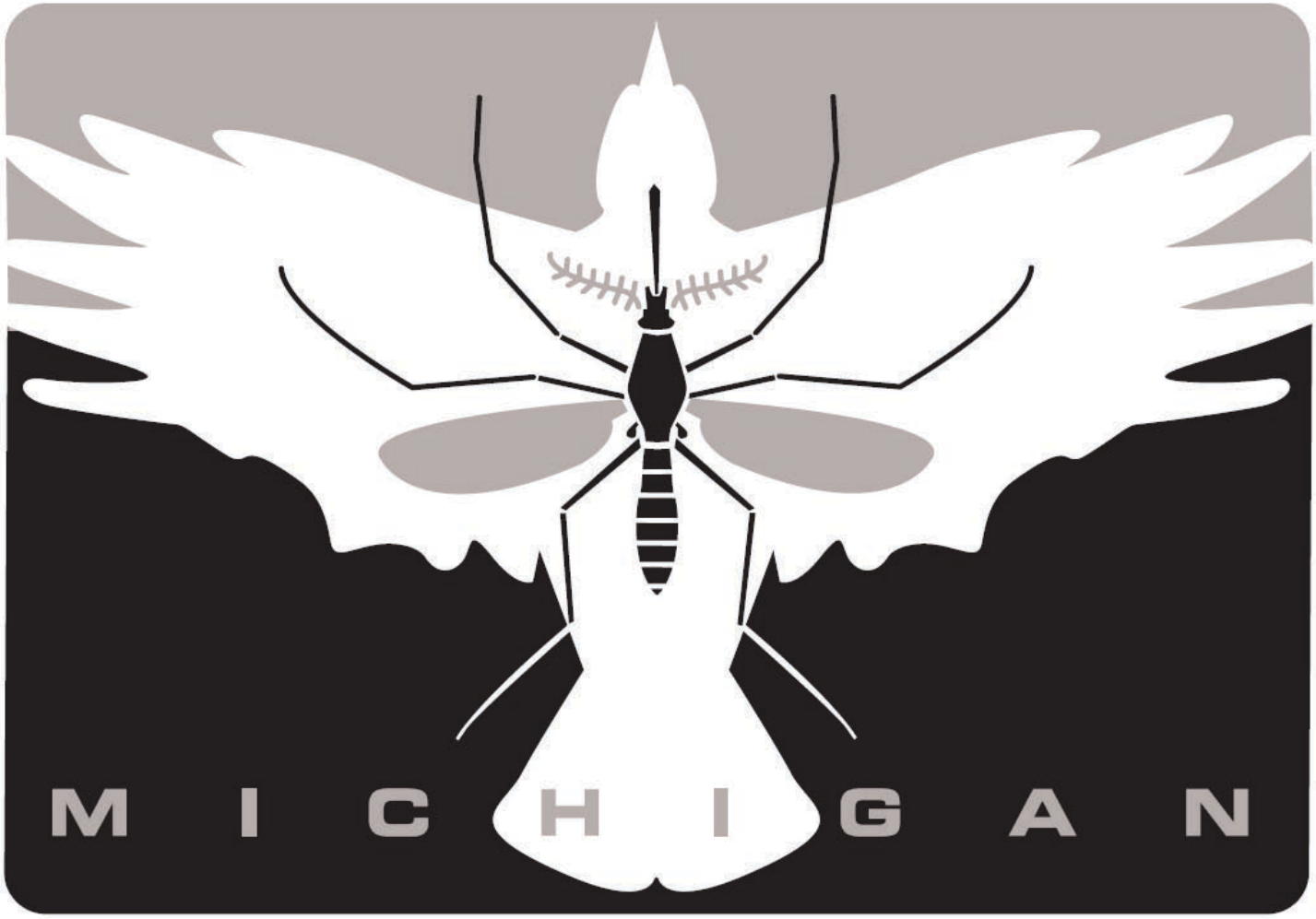

- 2010 -
ZOONOTIC & VECTOR BORNE DISEASE SURVEILLANCE REPORT

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

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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 state-wide 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: West Nile virus, Eastern Equine Encephalitis, Lyme Disease, and Rabies.

Zoonotic Disease in Michigan - 5 Year Table

Disease	2006	2007	2008	2009	2010	Total
Bird Associated Disease						
Psittacosis	0	2	0	0	1	3
Livestock Associated Disease						
Anthrax	0	0	0	0	0	0
Q Fever Acute	3	2	2	1	3	11
Q Fever Chronic	0	0	0	0	2	2
Mosquito Borne Disease						
Dengue Fever	9	13	11	6	9	48
Encephalitis, California	1	1	0	0	2	4
Encephalitis, Eastern Equine	0	0	0	0	3	3
Encephalitis, St. Louis	0	0	1	0	2	3
Encephalitis, Western Equine	0	0	0	0	0	0
Malaria	22	23	17	32	34	128
West Nile Virus	55	17	17	1	29	119
Yellow Fever	0	0	0	0	0	0
Multi-Mode Zoonoses						
Brucellosis (Food Borne & Animal Contact)	3	5	1	10	4	23
Leptospirosis (Water Borne, Animal Contact, Rodents)	1	3	1	0	0	5
Plague (Flea Borne & Animal Contact)	0	0	0	0	0	0
Rickettsial Disease - Typhus (Fleas, Lice, Ticks)	0	0	0	0	1	1
Tularemia (Tick Borne & Animal Contact)	0	0	0	0	0	0
Public Health Pest						
Head Lice (Aggregate School Reporting)	1	0	440	2103	4063	6607
Rabies and Animal Bites						
Animal Bite	33	55	562	2125	2388	5163
Rabies Animal	49	210	79	68	73	468
Rabies Human	0	0	0	1	0	1
Rodent Borne Disease						
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 Disease						
Ehrlichiosis, *Anaplasma phagocytophilum*	1	0	0	0	5	6
Ehrlichiosis, *Ehrlichia chaffeensis*	2	0	3	6	2	13
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	56	68	92	103	93	412
Rickettsial Disease - Spotted Fever	7	3	3	5	2	20
Totals	243	402	1229	4461	6716	13040

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ZOONOTIC DISEASE & SPECIAL PROJECTS

MICHIGAN PUBLIC HEALTH

Michigan Department of Community Health

2010 Arbovirus Surveillance Summary

The summer of 2010 was an unusually active arbovirus season in Michigan, marking the first year since 2002 when four different mosquito-borne viruses caused human illness. These included 29 West Nile virus (WNV) cases, three Eastern Equine Encephalitis (EEE) cases, two St. Louis Encephalitis (SLE) cases, and two LaCrosse virus (LAC) cases, see **Figure 1**. In addition, horses in southwest Michigan were affected with a significant EEE outbreak with over 130 fatal cases. In contrast, only one case of WNV was identified in a Michigan horse in 2010.

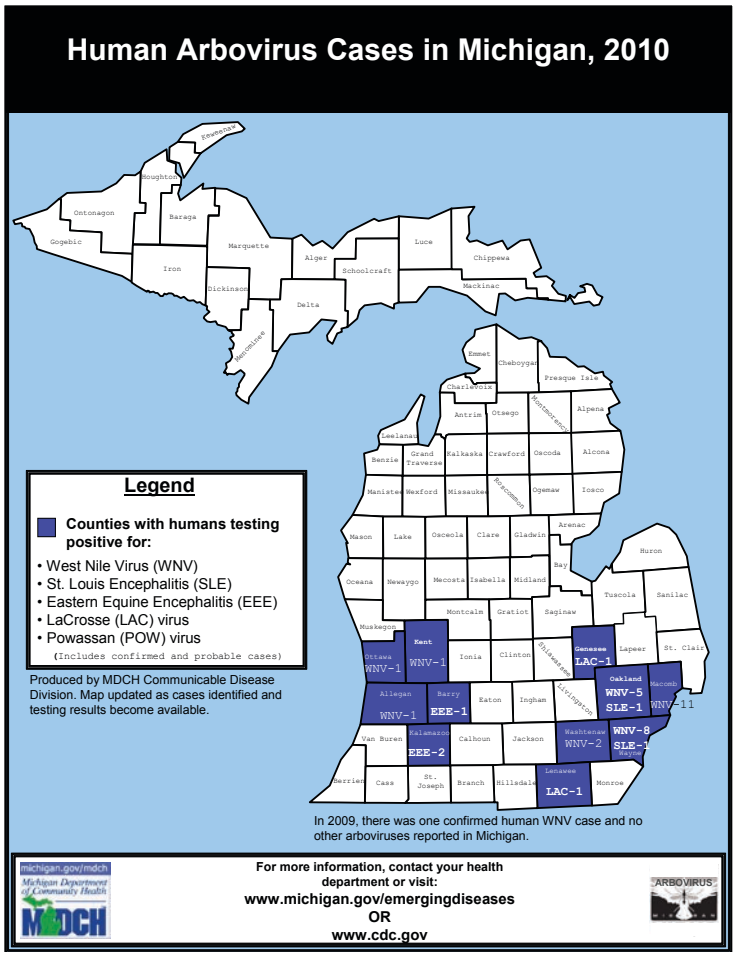


Figure 1. Human arbovirus cases in Michigan, 2010.

High summer temperatures and low rainfall provide conditions that favor *Culex* mosquitoes, factors that were present last summer in Michigan and may account for the increase in WNV human cases over the previous mild summer when only one human case was reported. In addition, an early and warm spring in 2010 may have provided favorable conditions for EEE, which is associated with *Culiseta melanura* mosquitoes, denizens of freshwater swamps and bogs. The following is a summary of arbovirus surveillance for 2010:

West Nile Virus

Human cases of WNV increased from one reported case in 2009 to 29 in 2010, including three deaths. States reporting the most WNV cases in 2010 included Arizona (163), New York (127), and California (104).

The age range for Michigan cases was 17-95 years with a median of 57 years. **Table 1** shows the age distribution of cases. Over half of the WNV cases in Michigan were 60 years and older. Of these cases, 17 were males (59%) and 12 were females (41%). Four of the cases were classified as West Nile fever (14%), and 25 were classified as neuroinvasive (86%). Two cases (7%) were identified through blood donor screening.

Table 1. Case Count by Age Range		
Age in Years	Case Count	Percentage
0-19	1	3%
20-39	5	17%
40-59	6	21%
60-79	15	52%
80 +	2	7%
Total	29	100%

Table 1. WNV case count by age range in Michigan, 2010.

Three deaths (10%) occurred in patients identified with WNV infections in 2010, but the role of WNV in their deaths is not known.

West Nile Virus (Continued)

Illness onsets occurred between August 4, 2010 and October 6, 2010 as shown in **Figure 2**. The counties reporting human cases included Macomb (11 including 3 deaths), Wayne (8), Oakland (5), Washtenaw (2), Allegan (1), Kent (1), and Ottawa (1), see **Figure 1**.

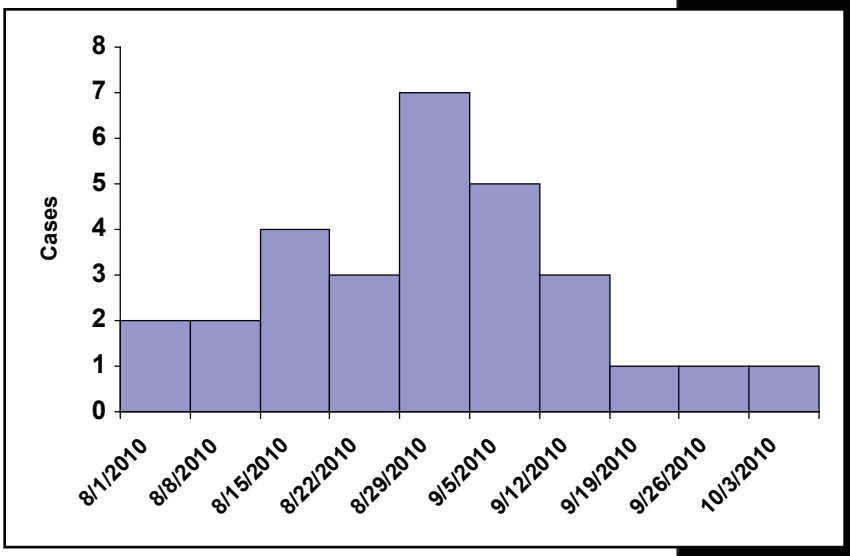


Figure 2. West Nile virus epi-curve, Michigan, 2010.

Eastern Equine Encephalitis

In 2010, southwest Michigan experienced the largest EEE outbreak in the state since 1980-81 with three confirmed human cases, and over 130 reported deaths in horses, 56 of which were confirmed to be caused by EEE. In addition, two white-tailed deer with neurologic signs tested positive for EEE. The geographic distribution of cases can be seen in Figure 3. Illness onsets for human, equine and wildlife cases occurred from July 12 through October 16. Figure 4 illustrates the 2010 EEE epidemic curve for all species impacted. Nationally, EEE activity was detected in 17 states in 2010. Michigan was second only to Florida in both confirmed human cases (FL-4, MI-3) and equine cases (FL-93, MI-56).

While EEE occurs sporadically in Michigan, ecologic conditions in parts of the state (southwest and south central Lower Peninsula) favor occasional large outbreaks. Historically, clusters of equine and human cases have occured in cycles lasting 1-2 years, with a hiatus of 10-20 years between outbreaks as illustrated in Figure 5. The geographic extent of recent and historic outbreaks is usually southwestern to south central, lower Michigan. In the years between outbreaks, isolated cases may occur.

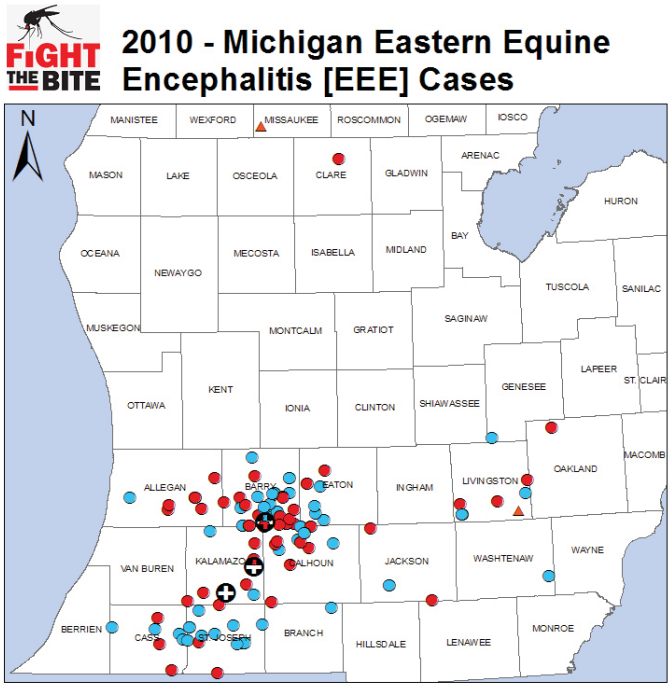
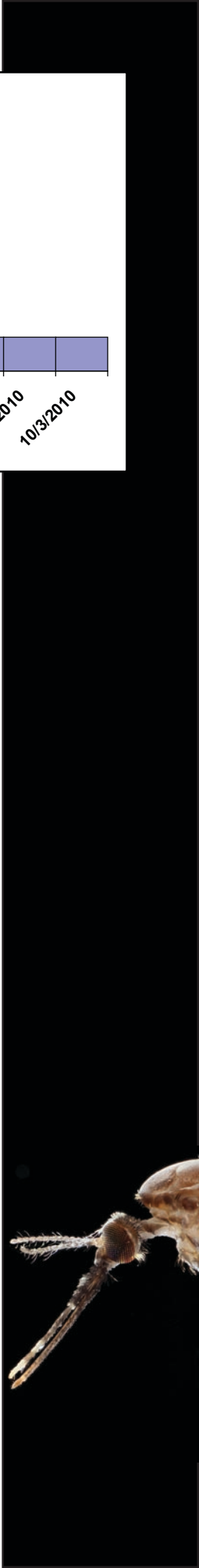


Figure 3. Geographic distribution of the 2011 EEE outbreak. The distribution was similar to previous outbreaks, and is associated with areas that have bogs and hardwood swamps.

The primary vector for EEE is the *Culiseta melanura* mosquito which primarily bites birds, flourishes in freshwater swamps and bogs, and has a very short flight range of 1 km. These mosquitoes are responsible for maintaining the natural enzootic cycle of the virus and outbreaks are associated with conditions that favor their life cycle (early, warm spring and summer, abundant rainfall or high groundwater levels and snow cover in fall and winter may enhance survival of *Cs. melanura* larval populations). However, other mosquito species such as *Coquillettidia*, *Aedes* and *Culex* can breed in or near these environments and may also bite EEE infected birds. These mosquitoes will also bite mammals and are responsible for outbreaks of EEE that affect horses and people.

The natural history of EEE is not well understood. Reservoirs for the virus include passerine birds, but may also include reptiles and other species. How the virus reappears



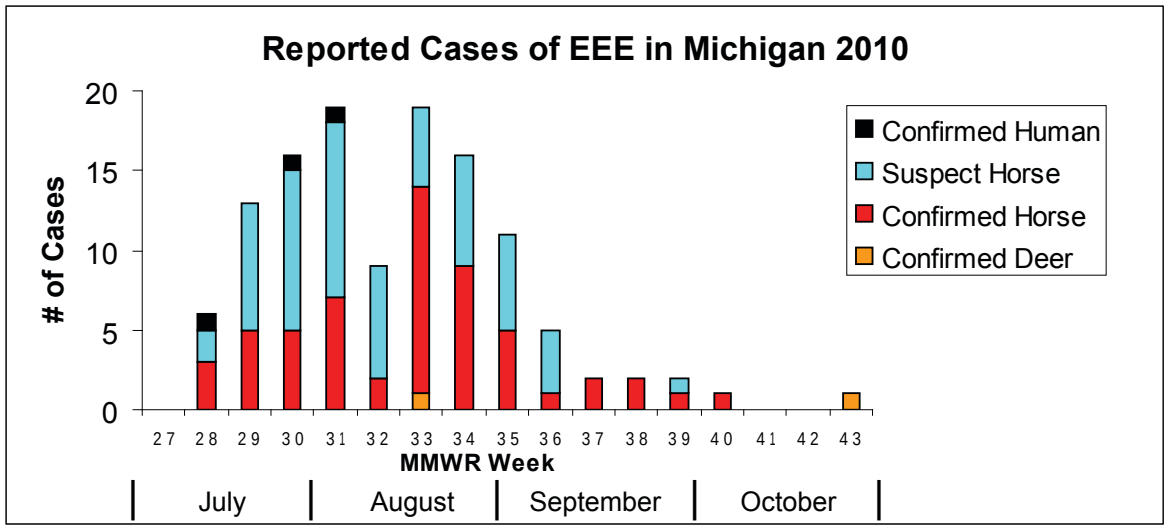


Figure 4 2011 EEE outbreak epi-curve for human and animal species.

from season to season in an ecosystem is not known, but theories include reservoir species and a cryptic cycle that typically excludes human and horse infection unless virus loads in reservoir species become high, reintroduction of the virus through bird migration, over-wintering in larval mosquitoes, or some other mechanism.

Identification of EEE in mosquitoes requires targeted surveillance in suitable habitats. In Michigan, there is no ongoing mosquito surveillance in EEE endemic counties, therefore identification of a EEE-infected horse or person is usually the first indication that EEE is present in a location. EEE is a reportable condition in both people and animals, and when either the Michigan Department of Agriculture of the Michigan Department of Community Health are notified of a suspect case of EEE, this information is typically shared with the public via a press release and posting on the state's Emerging Diseases web site. Identification of EEE in either horses or humans means that the risk of EEE infection is high for others who may be bitten by mosquitoes in the same area. The public should be advised to take precautions to avoid being bitten by mosquitoes (stay indoors from dusk to dawn, use mosquito repellents when you must be outdoors, remove standing water which can support breeding mosquitoes, and make sure door and window screens are in good repair). Spraying for adult mosquitoes in a targeted area can also decrease the risk of human infection during an outbreak.

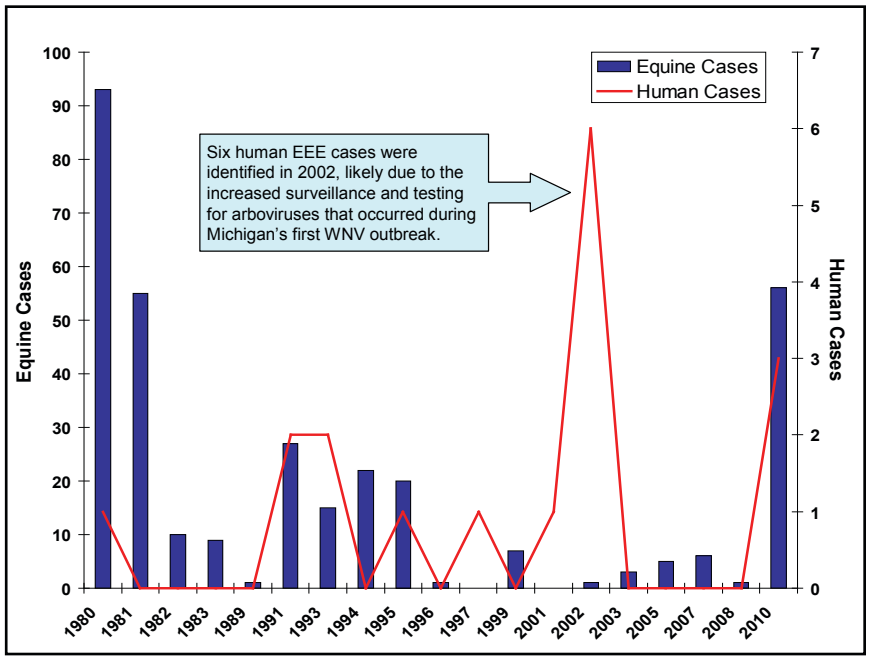


Figure 5. Historic EEE equine outbreaks and human cases in Michigan.

Laboratory Testing for Human Arboviral Infection

The Michigan Department of Community Health's Bureau of Laboratories (MDCH BOL) performs state

of the art arboviral testing, available to Michigan's health care providers at no cost, providing timely and reliable results. Detection of IgM antibodies against an arbovirus in the CSF of a patient who has a clinically compatible illness indicates a recent infection with that virus. The MDCH BOL can detect IgM antibodies against WNV, SLE, EEE, and CGV using several enzyme-linked immunoassay (EIA) methodologies, some of which are not available at commercial laboratories. The more commercially available immunofluorescent antibody test (IFA) for arboviruses has the disadvantage of being less sensitive in detecting IgM antibodies, particularly early in the course of infection and as a result, can yield false negative results, particularly if not performed on both acute and convalescent specimens.

EIA IgM testing for WNV is performed at most commercial laboratories, and EIA IgM tests for SLE, EEE or CGV are not currently widely available. However, WNV and SLE are both flaviviruses and the antibodies that are produced in response to an infection with one of these viruses cross react with one another in the laboratory. Therefore, a WNV IgM EIA test alone cannot differentiate between an infection with WNV and SLE, which both occur in Michigan. MDCH BOL is able to differentiate between these two viruses using the methodologies at their disposal. When necessary, MDCH BOL can also conduct confirmatory testing for arbovirus infection using the Plaque Reduction Neutralization Test (PRNT), a methodology only performed at state and federal reference laboratories.

Laboratory testing of human specimens (CSF preferred, serum by prior arrangement) at the MDCH BOL is available May 1, 2011 through November 1, 2011. Instructions for submitting a specimen for arbovirus testing to the MDCH BOL can be found at www.michigan.gov/mdchlab.

2011 Surveillance Plans

Ecologic (mosquito, animal) and human testing for arboviruses is available from April 15-Nov. 1 for Michigan Local Health Departments, Mosquito Control Districts and human and animal health care providers. Mosquito testing is performed at Michigan State University's (MSU), Microbiology and Molecular Genetics Department by Dr. Mike Kaufman (517) 353-3379, animal testing is performed at MSU's Diagnostic Center for Population and Animal Health (DCPAH), (517) 353-1684 and human testing is performed by MDCH BOL (517) 335-8067.

Surveillance in 2011 will include the use of resting boxes. Resting boxes are placed in wooded areas adjacent to bogs and swamps to collect the vectors of EEE. Photo: Rutgers University

Michigan State University and MDCH will be conducting enhanced mosquito surveillance for EEE in the late spring and summer of 2011. This will include targeted trapping and viral testing of vector species in southwestern lower Michigan. Results of this surveillance will be made available through the Emerging Diseases web site.

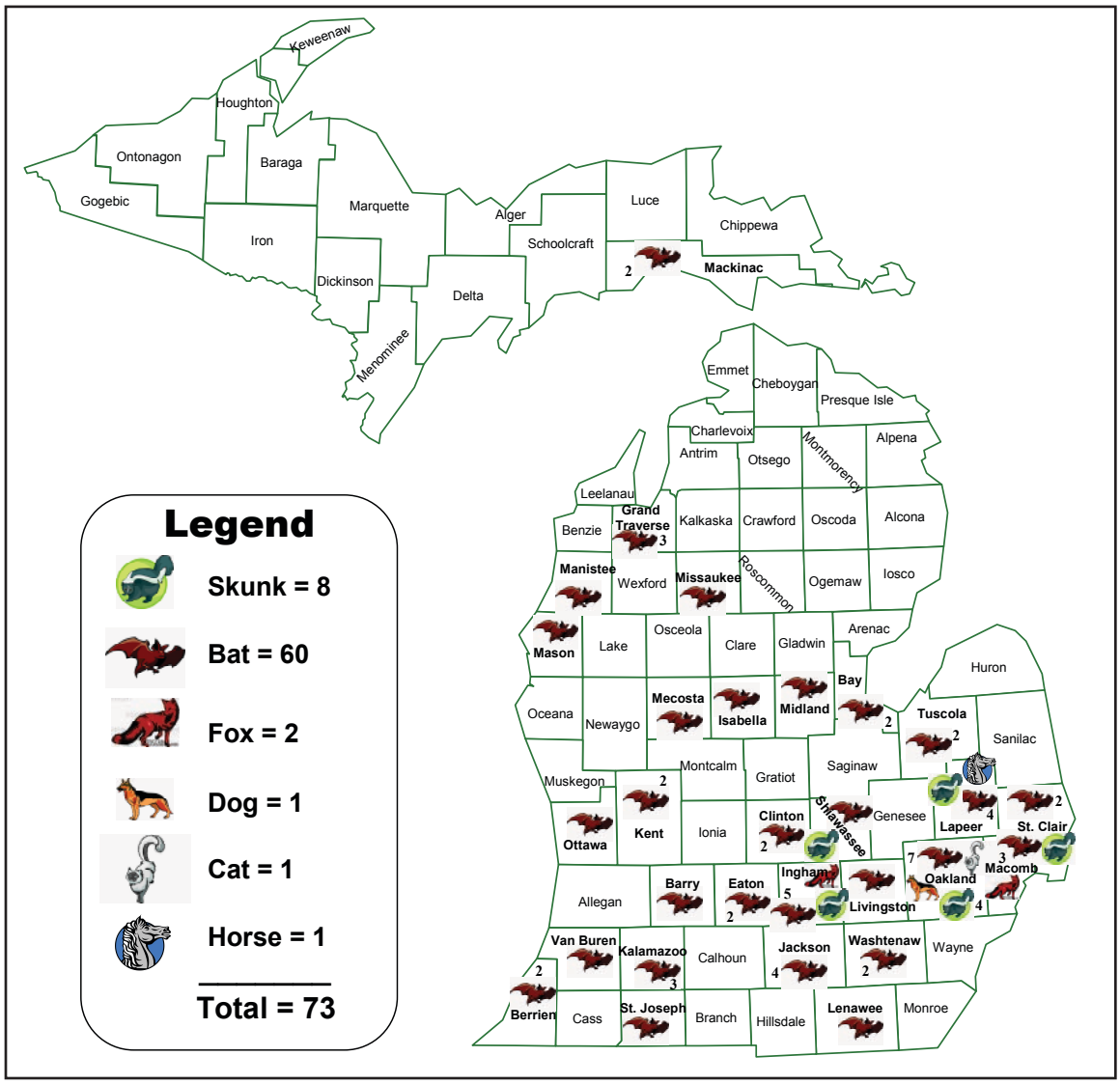
The Emerging Diseases web site (www.michigan.gov/emergingdiseases) will also continue to be the primary resource for obtaining up to date surveillance data for all arboviruses throughout the 2011 transmission season, with updates performed at least weekly. There will be an MDCH press release for the first arbovirus human case, animal case, and the first positive bird or mosquito pool in the state. The Local Health Departments are encouraged to make local media and residents aware of their risk from arboviral diseases in their community and provide specific actions individuals and communities can take to reduce the risk. The public is more likely to act when they know a threat is nearby.

2010 Rabies Surveillance Summary

The Michigan Department of Community Health's Bureau of Laboratories (MDCH BOL) tested 3,300 animals for rabies in 2010, nearly identical to the 3,373 that were tested in 2009. Of these, 72 (2.2%) were positive for rabies including 60 bats, eight skunk, one fox, one horse, one dog and one cat. This compares to 2009 when 65 (1.9%) animals tested positive at BOL, including 52 bats, 10 skunk, two fox and one cat (an additional bat, fox and skunk tested positive at labs other than BOL in 2009). In 2010, all of the positive animals other than bats were infected with the north central skunk virus variant (NCSVV) of rabies. An additional NCSVV positive fox was identified as part of ongoing surveillance for raccoon virus variant (RVV) rabies in Michigan being conducted by the United States Department of Agriculture's Wildlife Services (USDA/WS) and the Centers for Disease Control and Prevention (CDC). Figure 1 shows the distribution of rabies positive animals throughout the state for 2010.

Bats, cats and dogs are the species most often tested for rabies in Michigan. In 2010, BOL received 1294 bats, followed by 937 cats and 813 dogs. Bats are the primary rabies vector in Michigan and on average, 4-6% of the bats tested at BOL are found to be rabid. Both 2009 and 2010 were typical years, with 4.1% and 5% of bats testing positive respectively. In contrast, 0.1% of the dogs and cats tested in 2010 were positive. While relatively few skunks (29) were tested for rabies at BOL in 2010, eight (27.6%) were positive. This is similar to 2009 when 10 of 43 (23%) skunks tested were positive. Fox are another wildlife species that frequently tests positive for rabies in Michigan, and in 2010, two of 15 (13%) fox tested at BOL were positive. In 2009, three of 14 (21%) fox tested were positive.

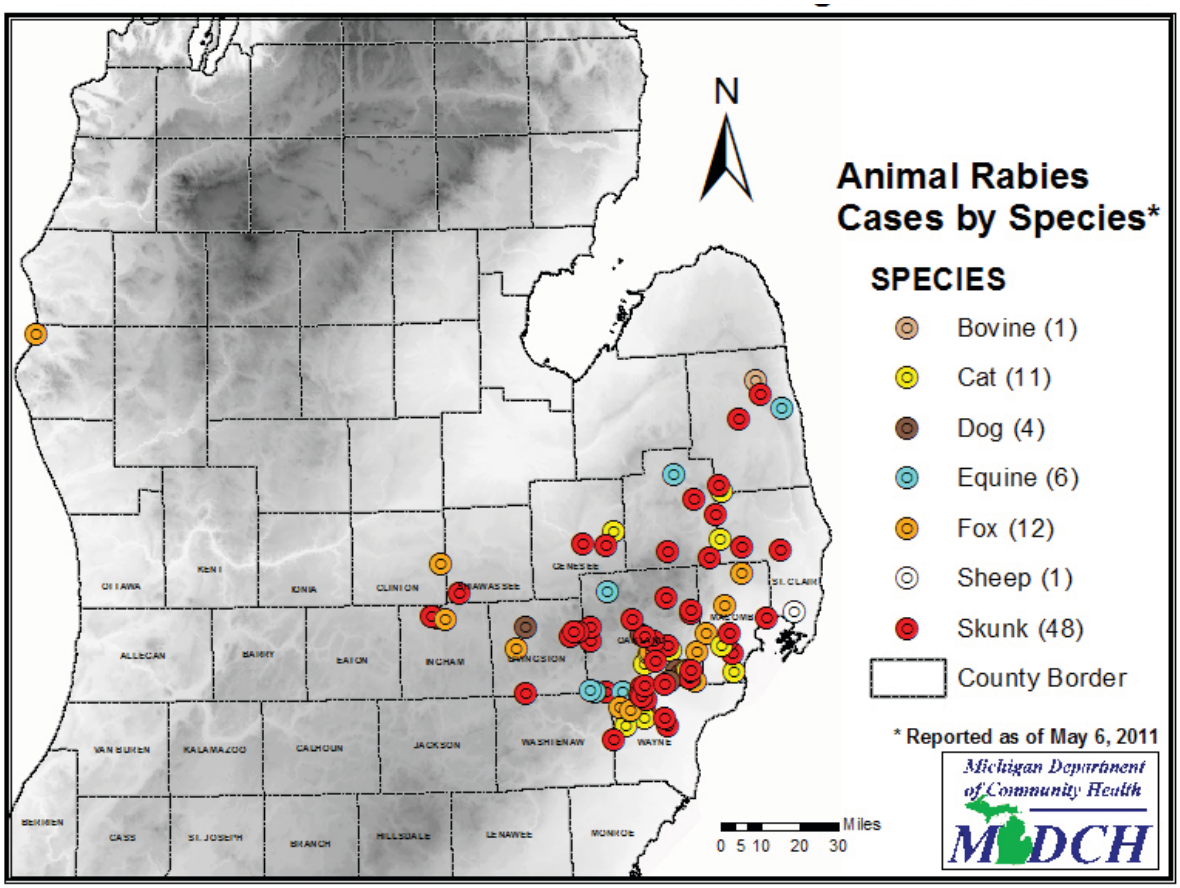
Figure 1. Rabies positive animals in Michigan, 2010.



MDCH, USDA/WS and the CDC continue to document cases of NCSVV rabies in terrestrial (non-bat) animals in southeastern Michigan. In 2009, for the first time in many decades, both a fox and a skunk infected with this rabies virus variant were documented in Clinton and Ingham counties, adjacent to but still outside the documented range for this strain in the state. In 2010, additional outlying terrestrial wildlife rabies cases were detected, including a fox and skunk in Ingham County and a skunk in Shiawassee County. These findings likely represent a subtle expansion of this rabies variant's range in Michigan. Cases of rabies in domestic animals and terrestrial wildlife are much more likely to occur in counties where NCSVV is present, as illustrated in Figure 2. As a result, these counties can expect to experience occasional cases of rabies in species other than bats. Residents should be reminded to vaccinate their pets and livestock against rabies and avoid contact with wildlife.

State and federal partners continue to cooperate to conduct enhanced surveillance to detect the presence of RVV in Michigan. The MDCH BOL tested 189 raccoons for rabies and none were positive. The USDA/WS tested an additional 55 raccoons for rabies using the direct rapid immunohistochemical test (dRIT), a field test that has been developed by CDC for use in surveillance for RVV, and none were positive. Michigan remains free of RVV, but Ohio health authorities continue to work with federal partners to combat this emerging infection on their northeastern border by conducting enhanced surveillance and twice yearly oral rabies vaccination campaigns. These ongoing efforts have been effective in preventing further westward spread of RVV.

Figure 2. Rabies in terrestrial species, Michigan 2003 - Present.



GUIDELINES FOR THE REPORTING OF RABIES CASES USING THE MICHIGAN DISEASE SURVEILLANCE SYSTEM (MDSS)

As Michigan Local Health Department's (LHD) use of the Michigan Disease Surveillance System (MDSS) expands, there is sometimes a need to clarify use of the various forms available on the system. Rabies is one disease for which several events are reportable, including animal bites, cases of animal rabies, and cases of human rabies. There are three different forms in MDSS which can potentially be used by LHD's to report these events. The following are some general guidelines to promote consistency among health agencies in the transmission of this data.

Animal Bites

The Public Health Code requires that any animal bite be reported to the public health agency where the bitten person resides, as well as where the bite occurred, within 24 hours of the bite incident. [R325.180 (Rule 10) (6)] The purpose for this reporting is to allow for rapid assessment of the risk for rabies exposure, and if necessary, arrange for the capture and confinement of a live dog, cat, or ferret for a 10-day observation period, or the laboratory examination of an animal head. There is no requirement for LHD's to, in turn, report these incidents to the Michigan Department of Community Health (MDCH). However, MDSS can be used by local health departments to track the follow-up of these cases. There is now a specific "Animal Bite" form in MDSS for this use. After basic demographics are entered, pertinent information about the bite event can be entered to suit the needs LHD's with regard to this data. The standardized form was developed for MDSS because LHD's requested it, but MDCH does not compile or summarize the data statewide.

Animal Rabies

Cases of animal rabies include any animals that test positive for rabies in the state. In most instances, these are wildlife species, but on occasion they include domestic species. MDSS contains a specific form for reporting animal rabies; "Rabies Case Investigation Report". Rabies testing is conducted by the MDCH Bureau of Laboratories and laboratory reporting will result in a case of "**Rabies Animal**" being automatically generated into MDSS. A "RABIES ANIMAL" FORM MUST BE COMPLETED IN MDSS FOR ALL RABIES POSITIVE ANIMALS. Do not change the "**Rabies Animal**" form to an "**Animal Bite**" form as this will prevent the case of animal rabies from being reported to CDC electronically via MDSS. If a LHD wishes to also complete an "Animal Bite" form related to the rabies positive animal, they must create a new case.

In most instances, there will be a name associated with the animal, which is usually an exposed person, or the owner of an exposed animal, and this will be in the "**Patient Name**" field. The following are suggestions on how to populate the fields for laboratory confirmed cases of animal rabies:

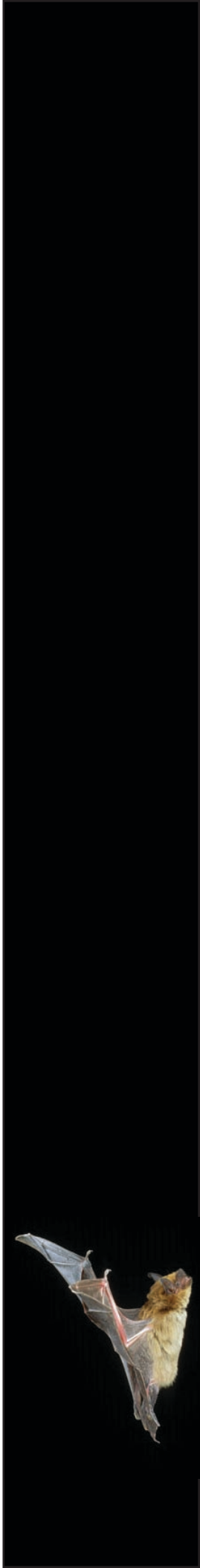
Investigation Information:
Onset Date: date of collection for testing
Diagnosis date: date of laboratory report
Patient status date: blank
Part of an outbreak: Unknown (to allow population of "Outbreak Name" field)
Outbreak Name: Enter species of animals testing positive, for example, "bat" (This will help us to be able to easily view this data from a main page in MDSS)
Patient Information:
Name, first and last: Information on exposed person/pet owner
Street address: Address where positive animal was collected from, or exposed person/pet residence
Demographics: Leave blank
Referral Information: No change
Epidemiologic Information: Enter any pertinent data including county where exposure to the rabid animal occurred (if different from the exposed person's address), as well as names, contact information, and exposure details for exposed persons and/or animals.
Other Information: Fill out as usual, except read "Relationship to Patient" as "Relationship to Rabid

Animal", which could include "owner" in the case of a domestic animal, or "home owner" or "pet owner" in most cases of wild animal exposure. Use "Comments or Additional Information" as needed to supply other pertinent information not covered by the form.

Human Rabies

Cases of human rabies are extremely rare, but **suspect** cases would include any patient with encephalitis of unknown cause for which rabies is a rule-out. While there is no specific form in MDSS for reporting these suspect cases, there are two forms that can be utilized for this purpose. The first is the "Basic Case Investigation Report". The box marked "Rabies, human" should **only** be checked when reporting suspect cases of **human** rabies. **Exposure to a potentially rabid animal should not be entered as a case of Human Rabies**. Instead, these can be entered as an "Animal Bite", or the information can be entered under "Rabies Animal" if the exposing animal tested positive for rabies. Another avenue to report suspect cases of human rabies would be via the "Encephalitis, Primary" form. This form allows for more detailed data entry with regard to clinical information, and might be the best choice for suspect cases, since alternate diagnoses are usually found.

For questions about this document, please call 517-335-8165.
For up-to-date information about Rabies in Michigan, please visit the
Michigan Emerging Diseases web site at:
www.michigan.gov/emergingdiseases
or
www.michigan.gov/rabies



Michigan Department of Community Health

MDCH

Request to Update Rabies Contact Persons

Ideally, we request each county within a health jurisdiction designate a person(s)

COUNTY INFORMATION (type information into cells or print legibly)
District:
County:

PRIMARY CONTACT (type information into cells or print legibly)		
Name:		
Address:		
City:		Zip:
Work Phone:	Cell Phone:	Fax:
Email:		

SECONDARY CONTACT (type information into cells or print legibly)		
Name:		
Address:		
City:		Zip:
Work Phone:	Cell Phone:	Fax:
Email:		

For multi-county jurisdictions, please coordinate the response from your jurisdiction.
Questions may be directed to MDCH at 517-335-8165

PLEASE RETURN VIA FAX TO: 517-335-8263 by June 16, 2011
Thank you!

2010 Lyme Disease Surveillance Summary

Lyme disease (LD) continues to be the most highly reported vector-borne disease nationwide and in the state of Michigan. Illness is caused by a bacteria (*Borrelia burgdorferi*) that infects a variety of small mammals in the Upper Midwest and Northeastern United States, and is then transmitted to people through the bite of an infected Blacklegged tick (*Ixodes scapularis*). In Michigan, LD in ticks and people has historically been isolated to the eastern Upper Peninsula, but is now appearing in the western counties of Lower Michigan.

In the early stages, most infected people will experience a "flu-like" illness that includes fever and body aches. Up to 70% of infected persons will also present with a "Bull's-eye" rash, erythema migrans, around the site of the tick bite 3-30 days after exposure. The rash expands over time, with no pain or itching, and will resolve without treatment.

Early symptoms may include:

- Headache
- Nausea
- Fever
- Spreading Rash
- Aching Joints and Muscles
- Fatigue

If not treated, some people may develop complications involving the heart and/or nervous system. Specific disorders may include: various degrees of heart block, nervous system abnormalities such as meningitis, encephalitis and facial paralysis (Bell's palsy), and other conditions involving peripheral nerves, painful joints, tendons, or muscles may also be noted during this stage of the disease.

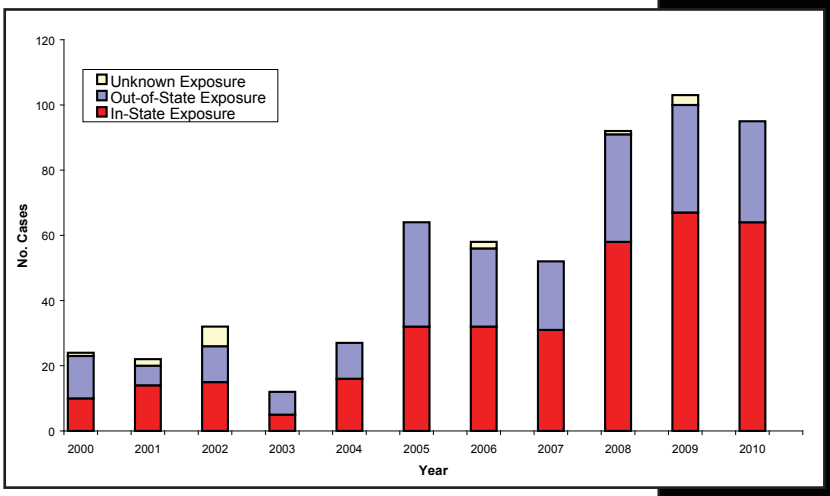


Figure 1. Confirmed and probable Lyme disease cases reported to the Michigan Department of Community Health, 2000-2010. Bars are separated into cases that were exposed in the state of Michigan (red), out-of-state (blue), or unknown (tan).

Case Summary

A total of 95 confirmed and probable LD cases were reported to MDCH in 2010. Of these, 64 cases are considered to have been exposed in the state of Michigan (Figure 1). Over the past ten years reported LD cases have consistent demographic characteristics in MI which include:

- Slightly more males than females reported with LD. Ten year mean of 57% male, 2010 cases 60% male.
- Broadly distributed age distribution. 2010 case age range 2 - 76 years, median 38 years.
- Of the cases with reported race/ethnicity, less than 1% report other than Caucasian/non-Hispanic
- Michigan exposures are generally reported from the Upper Peninsula and western Michigan counties. These regions of the state are reporting increasing numbers of cases/year over time (Figure 2)
- Onset dates generally correspond to peak tick-activity periods, onset dates from Upper Peninsula counties may peak later than those in western, lower Michigan (Figure 3).

Geographic Distribution

Field studies since 2001 have demonstrated that the Blacklegged tick is now endemic in the western Lower Peninsula. The highest populations, and greatest risk of Lyme disease, occur among the coastal communities. Many of these communities have optimum habitat for the tick, which includes sandy soils, mixed oak forest cover, an abundance of leaf litter, and plenty of small mammal and deer hosts. The western

Upper Peninsula is also an area of high risk for contact with the Blacklegged tick. Please see the map on page 13 for the most current risk map. This risk map is based on confirmed, locally acquired human cases of Lyme disease and the field confirmation of vector populations through citizen tick submission and active field surveillance efforts.

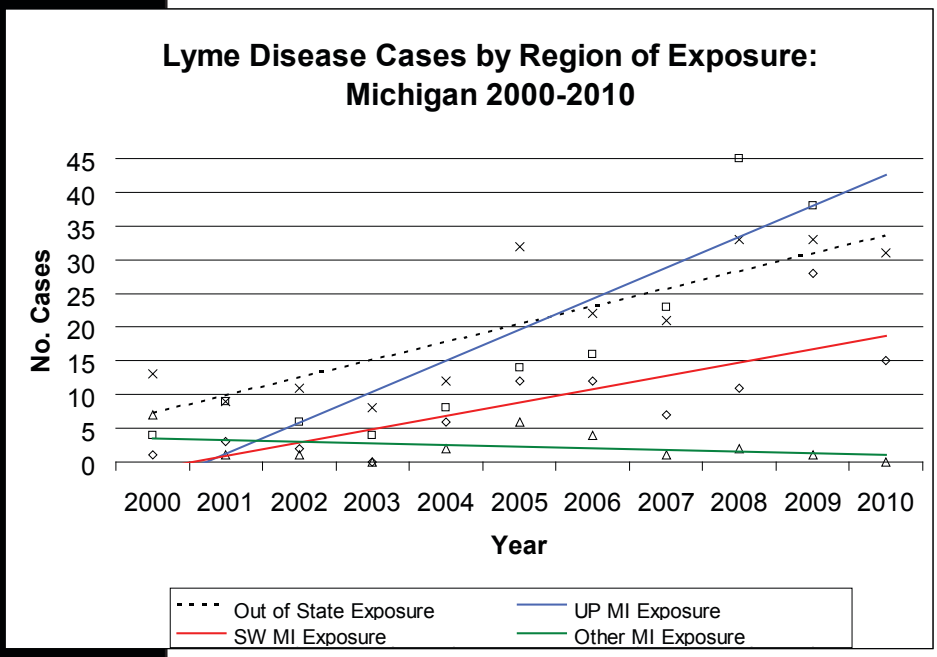


Figure 2. Case reporting has steadily increased from 2000-2010. Exposures of Michigan citizens to Lyme disease in the Upper Peninsula, western Michigan, and from out-of-state exposures are increasing. Lyme disease distribution generally mirrors the distribution of infected tick populations. In Michigan, numerous field studies have identified vector ticks in western counties, as well as the northwestern Upper Peninsula. Currently there is no evidence of vector tick populations outside of these regions.

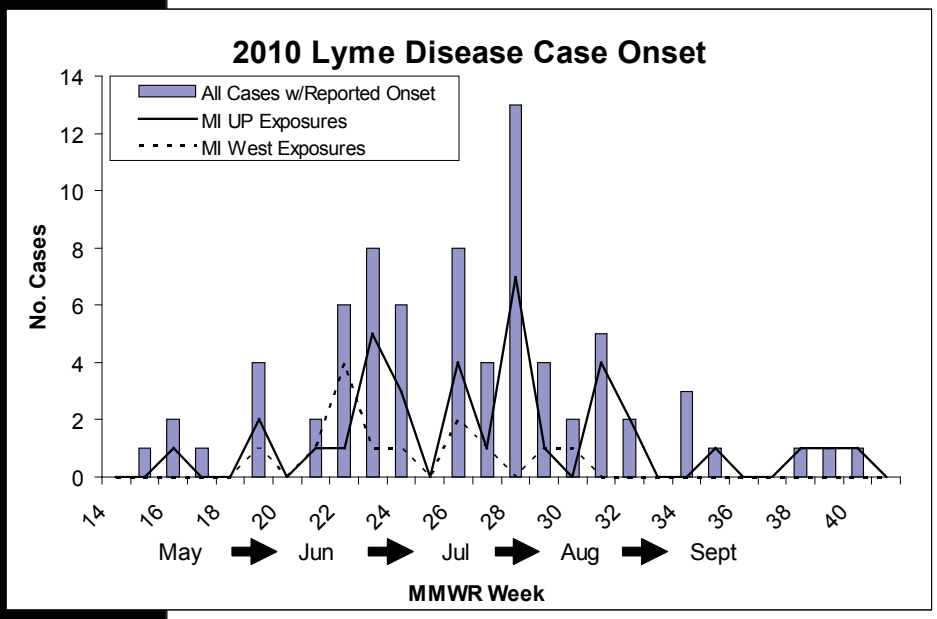


Figure 3. Human cases of Lyme disease in 2010 peaked in the middle of July, during the period when nymphal tick populations are most active. Of the 77 Lyme cases w/reported onset of symptoms by patient or physician in 2010, 51 were in-state exposures. Cases with exposure in western Michigan peaked earlier than cases with exposure in the Upper Peninsula (West - 50% cases by week 23, UP - 50% cases by week 27). Climate is most likely the reason, as nymphal tick populations peak later in northern latitudes.

Laboratory Testing for Tick-borne Disease Infection

The Michigan Department of Community Health's Bureau of Laboratories (MDCH BOL) performs the nationally standardized two-step testing protocol for Lyme disease, available to Michigan's health care providers at no cost, providing timely and reliable results. Instructions for submitting a specimen for arbovirus testing to the MDCH BOL can be found at www.michigan.gov/mdchlab.

2011 Surveillance Plans

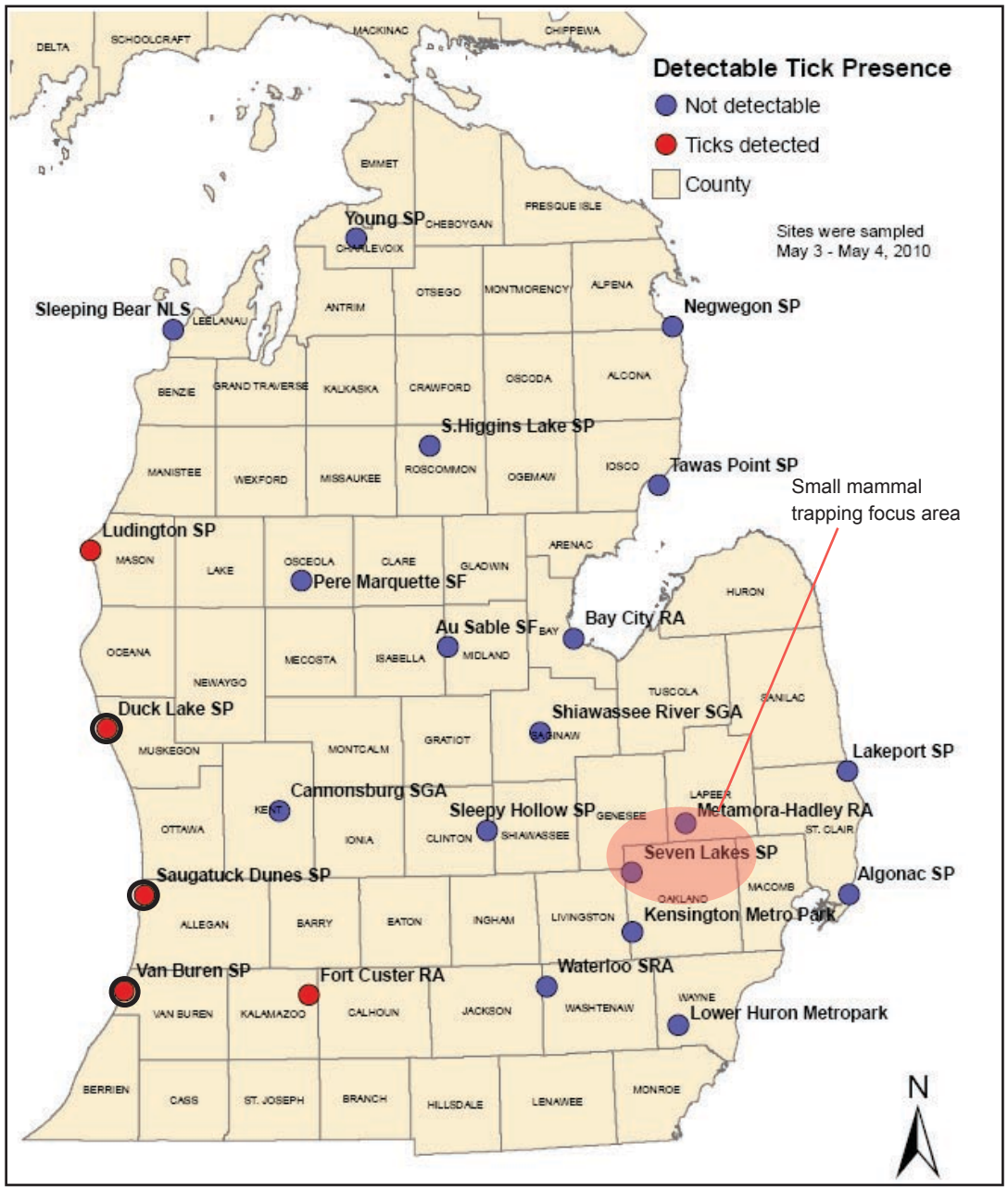
Human testing for Lyme disease is available year round for Michigan Local Health Departments and health care providers through the MDCH Bureau of Laboratories. Tick specimens may be submitted to various Michigan agencies for identification and testing year round as seen on **Page 26**. Michigan State University and MDCH will be conducting field surveillance in various areas of the state during the spring - fall of

2011. Surveys of ticks and wildlife are conducted to define the geographic range of tick vectors and the potential pathogens they carry. Sites that were surveyed in 2010 are shown in **Figure 4**. During 2010, the surveys covered Michigan's Lower Peninsula broadly with a focus on the southeastern region. Results of the surveys did not show any new populations of Lyme disease vectors in Michigan's eastern lower regions.

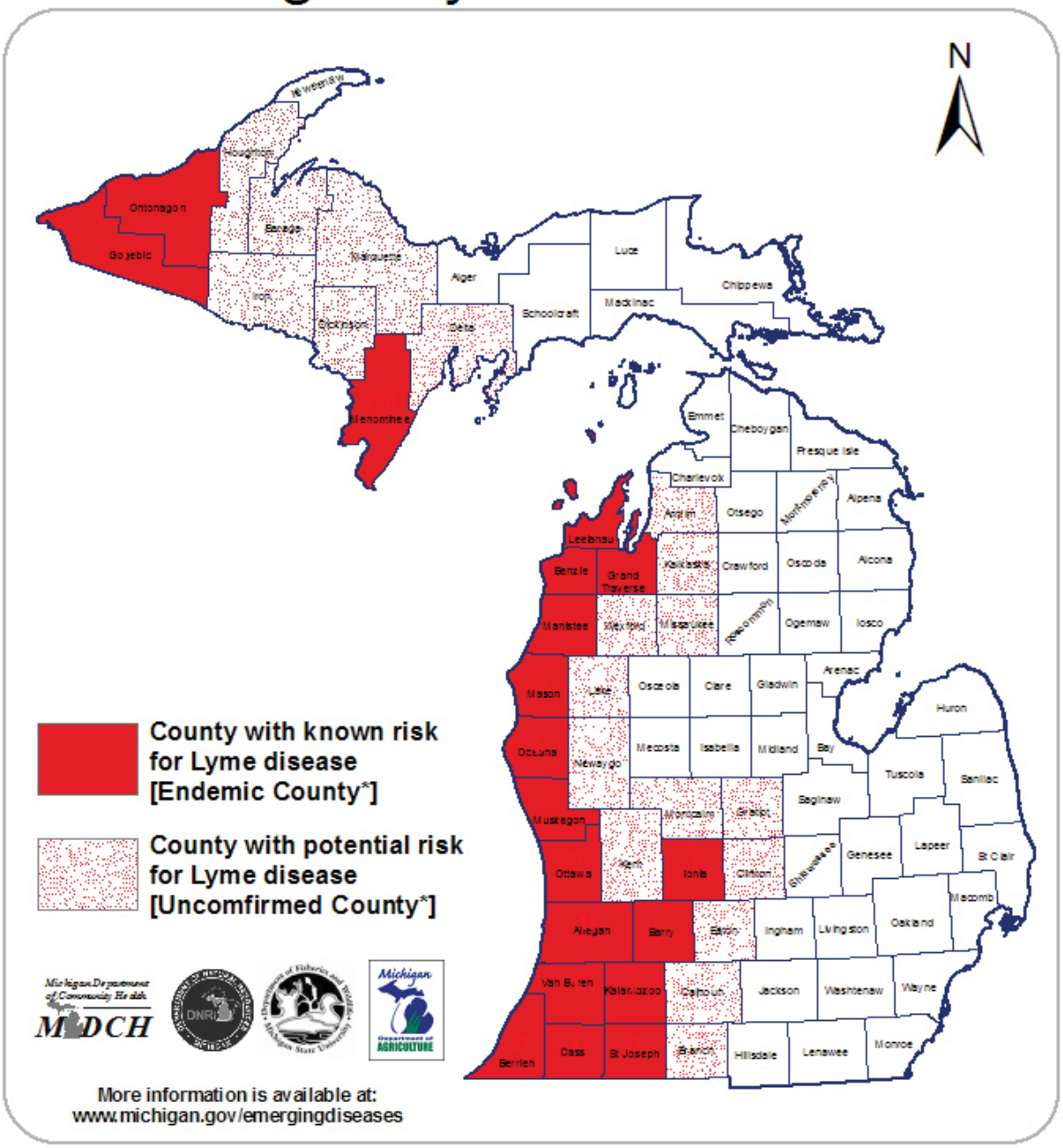
Guides and Printed Resources

Posters, pamphlets and guides are available to download and print at www.michigan.gov/lymedisease. Limited quantities of printed materials are also available. Please call the MDCH Communicable Disease Division to order these materials at 517-335-8165.

Figure 4. The MDCH/Michigan State University joint field surveillance project represents the most extensive active search to date for the presence of *I. scapularis* ticks in Michigan. Twenty-three sites were sampled for tick presence across the Lower Peninsula by drag sampling on May 3-4, 2010. Six sites were sampled using small mammal trapping, the most sensitive method for detecting immature tick stages and early infestations. Five locations where adult *I. scapularis* ticks were found are indicated in red. The three sites where these ticks were found to be infected with *B. burgdorferi* are indicated by symbols outlined in black. All other sites were negative for *I. scapularis* ticks.



Michigan Lyme Disease Risk



*** Lyme disease risk in this map is based on known, field confirmed populations of infected Black legged ticks or laboratory confirmed human cases.**

a) Counties labeled "endemic" are counties where infected tick populations have been confirmed
- and/or -
Two or more laboratory confirmed human cases have been identified with local exposure

b) Counties labeled "unconfirmed" are counties bordering endemic counties, but do not meet the above criteria for "endemic" counties

2011 GUIDELINES FOR THE REPORTING OF LYME DISEASE CASES USING THE MICHIGAN DISEASE SURVEILLANCE SYSTEM (MDSS)

INTRODUCTION

Lyme disease has been a reportable condition in Michigan since 1988. Electronic reporting via the Michigan Disease Surveillance System (MDSS) has simplified the process of communicable disease reporting for health care providers and local health departments. The following guidance is provided to aid the investigation and reporting of Lyme disease cases in MDSS. For a complete description of Lyme disease reporting criteria, the updated 2011 Surveillance Case Definition for Lyme disease can be found at: http://www.cdc.gov/osels/ph_surveillance/nndss/casedef/lyme_disease_current.htm

REQUIRED INFORMATION AND DOCUMENTATION

The following information is essential for determining case status:

- Date of illness onset
- Complete clinical presentation
- Detailed laboratory results
- Exposure to potential tick habitats (wooded, brushy, or grassy areas in a Lyme disease endemic county or state). History of a tick bite is not required, but travel information is important. Laboratory confirmation (see below) is recommended for persons with no known exposure.

IF THE ABOVE INFORMATION SUPPORTS CONSIDERATION OF LYME DISEASE, CASE CLASSIFICATION ("CASE STATUS") IS DETERMINED AS FOLLOWS:

CONFIRMED:

1. Physician verified Erythema Migrans (EM) lesion with a known exposure (as defined above)
2. Physician verified EM without a known exposure and with laboratory evidence of infection such as:
   a. A positive culture for B. burgdorferi
      OR
   b. Two-tier testing including both:
      - Screening EIA or IFA Lyme antibody test, positive or equivocal result AND
      - IgM or IgG Western Blot positive result
      OR
   c. Single-tier IgG Western Blot positive result
      OR
   d. CSF antibody positive for B. burgdorferi (EIA or IFA titer must be higher than serum titer).
3. A case with at least one late manifestation (see the Michigan Lyme disease classification flowchart below for a list of late manifestations) with laboratory evidence of infection as described above.

PROBABLE: Any other physician diagnosed case of Lyme disease that has laboratory evidence of infection as described above.

SUSPECT*:

1. EM with no known exposure and no laboratory evidence of infection.
2. A case with laboratory evidence of infection (as described above) but no clinical information.

*Note – "suspect" cases can not be closed in MDSS, if attempting to determine whether case meets "probable" case definition, please consult MDCH, or close case as "not a case"

(*Based on CDC Case Definition)

ENTERING DATA INTO THE MDSS

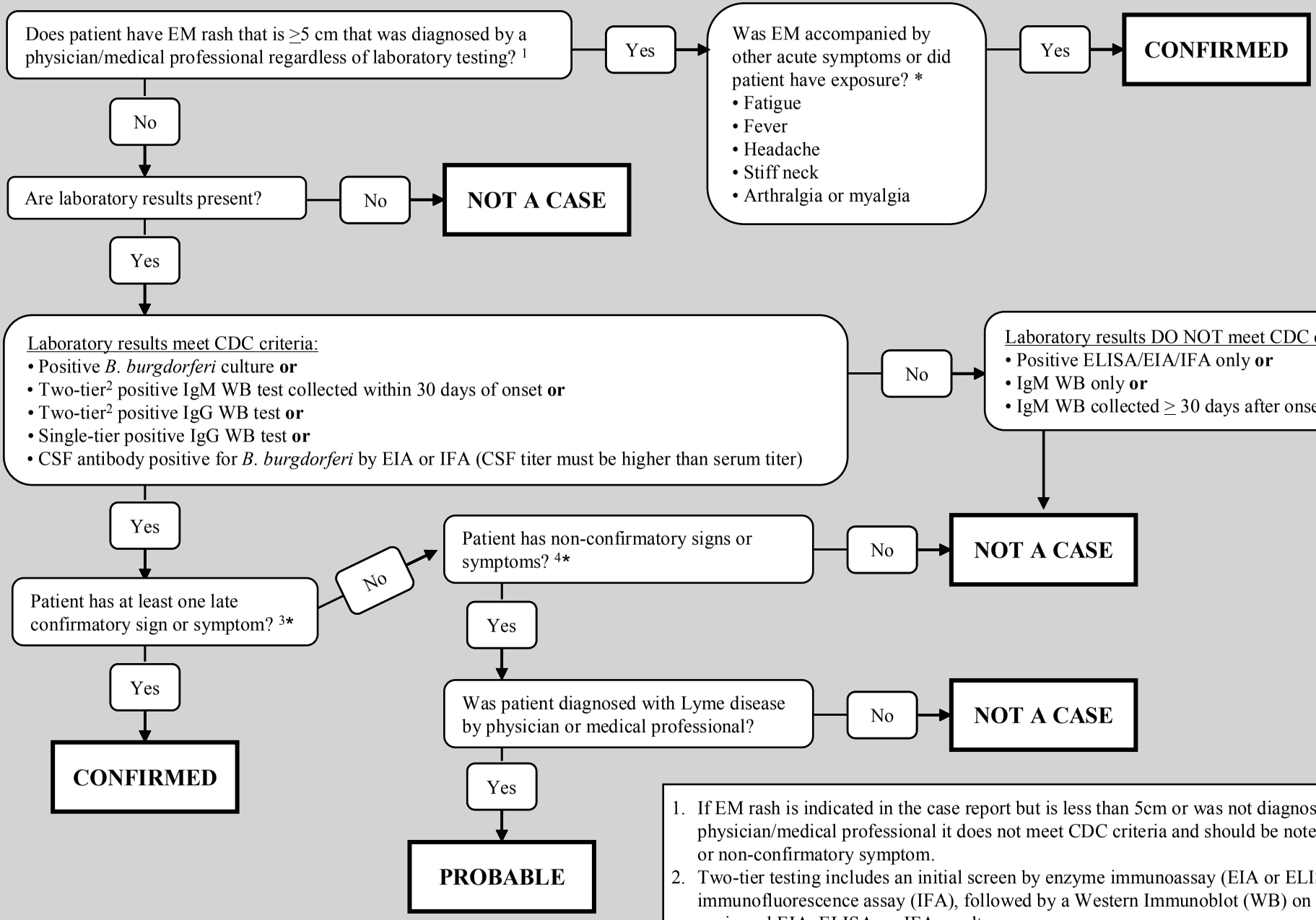
- Case determination requires that all of the above information be entered into the MDSS using the detailed Lyme Disease Case Report form in the MDSS. If the Case Report Form in the MDSS is not utilized, please fax case reports and laboratory testing results to MDCH at (517) 335-8263.
- Once the necessary information is collected, the local level MDSS user can then determine if the reported case meets the 2011 CDC Lyme Disease Surveillance Case Definition. Based on that assessment, choose the appropriate "Case Status" field: "Confirmed" "Probable", "Suspect", or "Not a Case" (as described above). State epidemiologists will review case investigations based on clinical presentation, exposure history, and laboratory testing and may change 'case status' or 'investigation status' upon that review.
- Case status may be changed by state epidemiologists, the local health department will be notified when a change is made by notes left in re-activated accounts or by phone to request information.

For questions about this document, please call 517-335-8165.
For up-to-date information about Lyme disease in Michigan, please visit the
Michigan Emerging Diseases web site at:
www.michigan.gov/emergingdiseases
or
www.michigan.gov/lymedisease

Guidance for Lyme Disease Case Report Classification

Adapted from the CSTE/CDC National Surveillance Case Definition (2011 Revision) available at www.cdc.gov

Flowchart Revised March 2011



Michigan Department of Community Health

MDCH

* Ask about exposure:defined as having been in a wooded, brushy, or grassy area, or receiving tick bite in a county in which Lyme disease is endemic anywhere in the U.S. [Michigan Map – U.S. Map]

1. If EM rash is indicated in the case report but is less than 5cm or was not diagnosed by a physician/medical professional it does not meet CDC criteria and should be noted as an "other" or non-confirmatory symptom.
2. Two-tier testing includes an initial screen by enzyme immunoassay (EIA or ELISA) or indirect immunofluorescence assay (IFA), followed by a Western Immunoblot (WB) on any positive or equivocal EIA, ELISA, or IFA results.
3. Late confirmatory signs and symptoms include arthritis (objective episodes of joint swelling), Bells palsy or other cranial neuritis, encephalomyelitis (CSF titer must be higher than serum titer), lymphocytic meningitis, radiculoneuropathy, or 2nd or 3rd degree atrioventricular block.
4. Non-confirmatory signs and symptoms include arthralgia, bundle branch block, cognitive impairment, encephalopathy, fatigue, fever/sweats/chills, headache, myalgias, myocarditis, neck pain, other rash, palpitations, paresthesisas, visual/auditory impairments.

Michigan Department of Community Health

GUIDELINES FOR COMPLETING ELECTRONICALLY REPORTED "TICK IDENTIFICATION AND TESTING" RESULTS IN MDSS

INTRODUCTION

Laboratory results from MDCH Bureau of Labs are now being automatically entered into MDSS. MDSS generates a case report based on the laboratory results. Occasionally, tick identification and testing results may appear in MDSS. While these reports are often not associated with human illness, this information may be of interest to both local and state health authorities conducting surveillance for tick-borne disease.

WHERE TO FIND RESULTS

- If a tick is determined to be a non-*Ixodes* tick species (such as a *Dermacentor variabilis* (American Dog tick) or an *Amblyomma americanum* (Lone Star tick)), the laboratory results can be found in MDSS under the disease category 'UNUSUAL OUTBREAK OR OCCURRENCE'. The laboratory will identify the species of such ticks, but no IFA testing will be performed since only *Ixodes scapularis* ticks are of concern in the transmission of Lyme disease. Therefore, no IFA results will be listed in the laboratory results section of the report.
  - To search for MDCH laboratory results within the category 'Unusual Outbreak or Occurrence,' use a NEW SEARCH in MDSS. Choose the 'Unusual Outbreak or Occurrence' category, and then use the ADVANCED tab at the bottom of the screen. Under laboratory name in the ADVANCED tab, type *MDCH* (asterisks included), and conduct the search. This will not isolate tick-testing results, but will limit the search to labs reported from MDCH within your jurisdiction, within a given time frame.
  - The local level user can then COMPLETE the 'investigation status' and determine the 'case status' to be NOT A CASE. No further investigation is necessary.

- If a tick is determined to be an *Ixodes scapularis* (Black-legged tick) it may then be tested by IFA. Ticks with a positive result will be electronically entered into MDSS under the 'LYME DISEASE' case category. However, this does not mean that a human case of Lyme disease actually occurred, so the case report can still be COMPLETED by the local level user as NOT A CASE.
  - Tick identification and testing is performed in support of the clinical evaluation performed by a physician and/or serologic testing. **In an instance of a positive tick result, patient follow-up should be conducted.**
  - Tick identification and testing is also important in identifying areas in Michigan where Black-legged ticks, the vector of Lyme disease, are common. Citizens are urged to submit ticks for identification, preferably through the local health department, if found on a person.

Additional information about submitting ticks for identification and testing can be found at www.michigan.gov/lymedisease.

Michigan Bed Bug Update

Bed bugs have quickly become a fact of life in many of Michigan's urban environments. While bed bugs do not spread disease, the bites may require medical treatment and the anxiety caused by infestations may lead citizens to misuse harmful chemicals. Bed bugs are also a heavy economic burden for property managers, facility managers, homeowners and renters. The Centers for Disease Control and Prevention (CDC) and the U.S. Environmental Protection Agency (EPA) have jointly released a statement acknowledging bed bugs as an emerging public health issue.

Bed bugs are small, brownish, flattened insects that must feed on blood during each of their six life stages (see image below). Adult bed bugs will feed repeatedly. Bed bugs will live close to their human host and may fit into any crack or crevice that a credit-card edge can fit into. The bugs may be transmitted through their attachment to, or hiding in our belongings.

Bed bug infestations in Michigan are most common in multi-unit housing, but have been reported from various types of housing and facilities. Some of these include:

- Long term care facilities
- Homeless shelters
- Social services buildings
- Medical centers
- Adult foster care facilities
- Rehabilitation centers
- Recreational camps
- Office buildings

The Michigan Department of Community Health and its partners have created a statewide working group to address gaps in educational materials, training, and guidance. The group believes that prompt action and education are the key to combatting infestations, and have been diligently conducting training events and educating the public about bed bugs, prevention, and control. The U.S. EPA recently awarded a grant to the Michigan Bed Bug Working Group to focus resources for community education in southeastern Michigan over a two year period. This work will begin soon in Metro Detroit, and products and the results of this project will be utilized throughout the state and the country.

Michigan currently has a portal for information regarding bed bugs at: www.michigan.gov/bedbugs. The **Michigan Manual for the Prevention and Control of Bed Bugs** is available at the site, as well as specific fact and guidance sheets, links to training through the National Environmental Health Association, and information about licensed pest management companies through the Department of Agriculture.

Zoonotic Diseases - Important Resources

Vector-borne Diseases

MDCH Arbovirus Test Request Form:
http://www.michigan.gov/documents/DCH-0583TEST_REQUEST_7587_7.pdf

CDC's West Nile Virus web site:
http://www.cdc.gov/ncidod/dvbid/westnile/index.htm

CDC's Eastern Equine Encephalitis web page:
http://www.cdc.gov/EasternEquineEncephalitis/

USGS ArboNet Maps:
http://www.cdc.gov/ncidod/dvbid/westnile/USGS_frame.html

"Before the Swarm; Guidelines for the Emergency Management of Mosquito-borne Disease Outbreaks":
http://www.cdc.gov/ncidod/dvbid/westnile/astho/wnv_astho.html

Rabies

CDC's Rabies Web site: http://www.cdc.gov/rabies/

Michigan Rabies Protocols for:
Human Health care Providers: http://www.michigan.gov/documents/Rabflowcht3people_7361_7.pdf
Animal Control and Veterinary Health care Providers:
http://www.michigan.gov/documents/rabies_pets_flowchart_134247_7.pdf

"Human Rabies, Michigan—2009", MMWR Vol. 60, No 14, April 15, 2011, 437-440:
http://www.cdc.gov/mmwr/PDF/wk/mm6014.pdf

"Rabies Surveillance in the United States during 2009", JAVMA, Vol 237, No. 6, September 15, 2010, 646-689: http://avmajournals.avma.org/doi/pdf/10.2460/javma.237.6.646

Rabies Test Request Form:
http://www.michigan.gov/documents/DCH-1053TEST_REQUEST_7591_7.pdf

Lyme Disease

CDC's Lyme Disease Web site: http://www.cdc.gov/ncidod/dvbid/lyme/index.htm

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

Preventing Lyme Disease in Recreational Camp Settings:
http://www.michigan.gov/documents/emergingdiseases/camp_guidelines_321958_7.pdf

Tick Identification and Testing Instructions:
http://www.michigan.gov/documents/emergingdiseases/Tick_testing_flow_chart_227376_7.pdf

Case Definitions

Nationally Notifiable Conditions:
http://www.cdc.gov/osels/ph_surveillance/nndss/casedef/case_definitions.htm

Cases Definitions; Michigan Notifiable Conditions:
www.michigan.gov/cdinfo

*** UPDATED * View/Download the Compendium of Measures to Prevent Disease Associated with Animals in Public Settings, 2011, at: http://www.cdc.gov/mmwr/pdf/rr/rr6004.pdf**

Centers for Disease Control and Prevention
MMWR
Morbidity and Mortality Weekly Report
Recommendations and Reports / Vol. 60 / No. 4
May 6, 2011

Compendium of Measures to Prevent Disease Associated with Animals in Public Settings, 2011

National Association of State Public Health Veterinarians, Inc.

Continuing Education Examination available at http://www.cdc.gov/mmwr/cme/conted.html

U.S. Department of Health and Human Services
Centers for Disease Control and Prevention

Centers for Disease Control and Prevention
MMWR
Morbidity and Mortality Weekly Report
Weekly / Vol. 60 / No. 14
April 15, 2011

Human Rabies — Michigan, 2009

On November 9, 2009, a Michigan hospital informed CDC of suspected rabies in a man aged 55 years. The patient reportedly had awakened with a bat on his arm 9 months earlier but had not sought medical evaluation. He went to a local emergency department (ED) on October 30 and soon after was hospitalized; he died 12 days later. On November 14, CDC confirmed infection with a rabies virus variant that commonly infects the silver-haired bat (*Lasionycteris noctivagans*) (Figure). This report summarizes the patient's clinical course and the associated public health investigation. The report highlights the importance of public awareness of rabies, particularly among persons who might be at risk for wildlife exposures. Persons who experience contact with a bat and cannot confidently rule out a bite or scratch should seek prompt medical attention.

Case Report

On October 30, the man went to a local ED after 10 days of pain and progressive numbness in the left hand and arm and pain in his lower neck and upper back. The patient had sought treatment for these symptoms from a chiropractor several times during the preceding 6 days. Although the back pain had improved, the numbness and tingling had worsened, and he was experiencing weakness in his left hand and arm. A neurologic examination revealed normal strength and sensation of his lower extremities. His right arm showed normal strength, but the left hand showed no grip, and the patient could only lift his left arm a few inches. The patient was afebrile, and his blood pressure was normal when he arrived at the ED. A complete blood count and routine chemistries were normal except for an elevated white blood cell count of 15,300/μL (normal: 3,600–10,000/μL) and elevated glucose of 155 mg/dL (normal: 70–99 mg/dL). A computed tomography scan of the brain without contrast revealed a cavernous sinus larger on the left than on the right and an area of slightly decreased density in the right basal ganglion and paraventricular areas.

During the ED evaluation, the patient's breathing became labored, and he had difficulty with respiratory secretions. He was placed on ventilation and transferred to a nearby tertiary-care facility. At the time of intubation, the anesthesiologist noted that the procedure was easy to perform because of lack of muscle tone in the patient's pharynx.

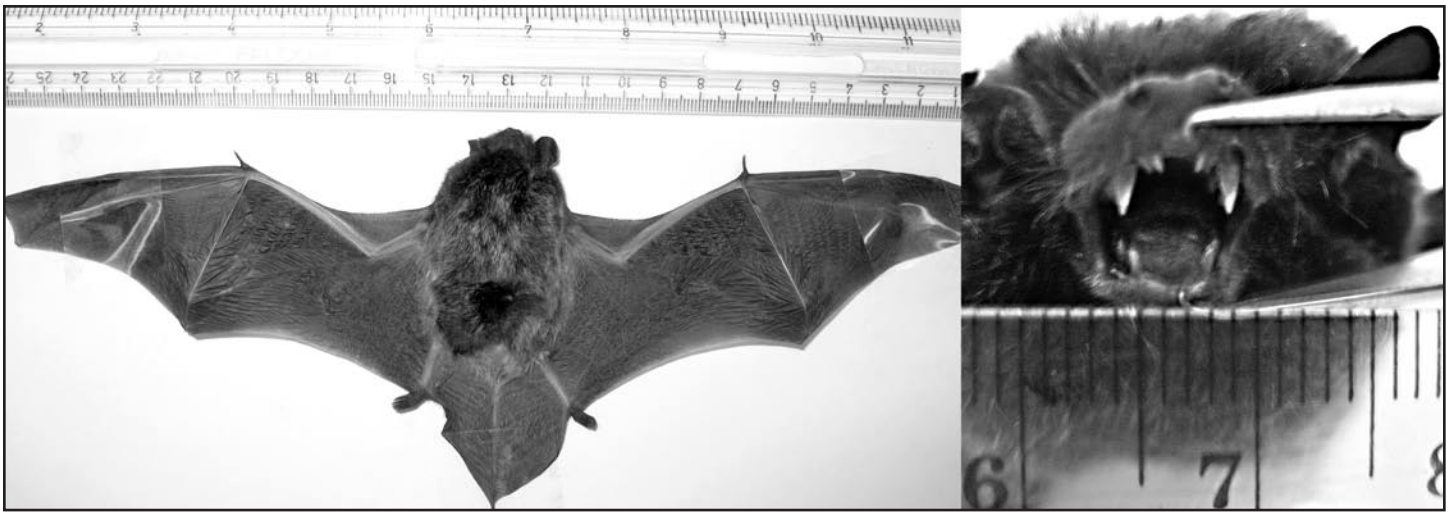
On admission to the tertiary-care facility, respiratory failure secondary to cerebral vascular accident or acute idiopathic demyelinating polyradiculoneuropathy (AIDP or Guillain-Barré syndrome) were the chief diagnoses considered. Findings from magnetic resonance imaging were unremarkable. Electromyography showed mild decreased conduction velocities and multiple absent F waves. Thereafter, AIDP was suspected, and intravenous immunoglobulin therapy was begun. The patient's sedation was lightened to conduct physical examinations.

During the first 2 days of hospitalization, the patient experienced progressive weakness, initially on the left side. He was able to respond to verbal commands and, according to the neurologist who evaluated him, his random eye movements were normal. On November 1, the patient's mental status appeared to improve, as sedation was lightened with the hope of removing him from the ventilator. However, over the next few days, his upper extremity weakness progressed to involve the right side, and lower extremity weakness was noted, demonstrating areflexia and a lack of response to plantar stimulation. Some nystagmus on far horizontal gaze to either side also was noted as a new development. On November 3, the patient became quadriplegic but could move his eyes to the right and left on request. Analysis of his cerebrospinal fluid (CSF) revealed several abnormal values: protein of 109 mg/dL (normal: 10–55 mg/dL); glucose of 92 mg/dL (normal: 45–75 mg/dL); and a white blood

INSIDE

U.S. Department of Health and Human Services
Centers for Disease Control and Prevention

FIGURE. A silver-haired bat (*Lasionycteris noctivagans*)



Photos/J. Ellison, CDC

cell count of 243 cells/μL (normal: <5 cells/μL) with a differential of 80% lymphocytes, 18% monocytes, and 2% segmented neutrophils. A Gram stain and culture were negative.

On November 4, the patient had an acute change in his neurologic status, including twitching of the left foot, more marked nystagmus, and slightly asymmetric pupils. Based on the results of the CSF analysis, the working diagnosis was changed to meningoencephalitis, and an infectious disease consultation was sought. The CSF was further analyzed for *Borrelia burgdoferi* and the following viruses: West Nile, St. Louis encephalitis, California Group, Eastern equine encephalitis, Western equine encephalitis, measles, mumps, herpes simplex virus 1 and 2, enteroviruses, varicella-zoster, cytomegalovirus, lymphocytic choriomeningitis virus, adenovirus, and influenza. All tests were negative. Antiviral treatment with acyclovir was begun. The patient's electroencephalogram showed marked deterioration from previous studies, indicating severe encephalopathy.

On November 4, the infectious disease physician asked the patient's wife about any animal exposure history. The couple

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lived in a rural area. In the past, the patient had trapped wildlife for pelts and raised orphaned animals, but he had not engaged in these activities in the past year. The wife had no knowledge of any recent animal bites the patient might have received.

On November 8, another relative recounted an incident that had occurred approximately 9 months before onset of illness. The patient had told the relative about waking one night to a bat crawling on his arm. The relative did not know whether the patient had been bitten by the bat. The bat had been killed and discarded, and the patient did not seek medical care for the incident.

The patient's condition, characterized as complete flaccid paralysis, coma, and flat electroencephalogram, remained unchanged. On November 11, the patient's family elected to withdraw life support, and the patient died shortly afterward.

Public Health Investigation

After obtaining the bat exposure history, the infectious disease physician contacted CDC on November 9 to discuss a diagnosis of rabies. The Michigan Department of Community Health Bureau of Laboratories also was contacted by the hospital regarding specimen collection. Serum, CSF, saliva, and nuchal skin biopsy specimens were collected and sent to CDC on November 10.

On November 12, CDC reported detecting no rabies virus antigens in the skin biopsy by direct fluorescent antibody test, nor amplicons in the saliva or skin biopsy specimens by reverse transcription–polymerase chain reaction. However, rabies virus antibodies were detected by indirect fluorescent antibody test and rapid fluorescent focus inhibition tests on serum and CSF. Both health-care facilities involved in the patient's care were informed of the results, as well as the local health departments covering those jurisdictions. The patient's family was informed and gave permission for a brain autopsy. On November 13, brain specimens were collected and shipped overnight to CDC. On November 14, CDC reported that rabies virus antigens were detected in the brain by direct fluorescent antibody test. Sequence analysis of the nucleoprotein gene was consistent with a rabies virus variant found in *L. noctivagans* in the United States.

A total of 14 family members and friends were interviewed by the local health department regarding exposure to the patient's saliva during the 2 weeks before his illness onset and during his hospitalization. Eleven family members received rabies postexposure prophylaxis (PEP) at the advice of the local health department because of possible exposure to saliva through shared glasses or cups; an additional person also received PEP, although it was not recommended. Of 180 health-care providers from the two health-care facilities who were assessed for potential exposure to rabies virus based on their likelihood of saliva contact, six received rabies PEP.

What is already known about this topic?

During 1980–2009, a total of 39 (91%) of the 43 reported cases of human rabies acquired in the United States via animals were associated with bat exposures.

What is added by this report?

In 2009, a Michigan resident died from rabies. The man had contact with a bat while sleeping but did not report a bite and did not seek medical care until 9 months later, after symptoms had developed.

What are the implications for public health practice?

The public should be aware of the risk for rabies associated with bats and should take appropriate actions after exposure, including contacting local authorities for guidance on how to safely capture and submit a bat for rabies diagnosis and consulting a physician or state or local health department for advice regarding rabies postexposure prophylaxis.

Reported by

K Signs, DVM, MG Stobierski, DVM, Michigan Dept of Community Health. CE Rupprecht, VMD, PhD, Div of High-Consequence Pathogens and Pathology, National Center for Emerging and Zoonotic Infectious Diseases; K Robertson, DVM, EIS Officer, CDC. *Corresponding contributor: Kis L. Robertson, CDC, 410-767-0202, krobertson@cdc.gov.*

Editorial Note

The case described in this report underscores the importance of prompt medical care after bat encounters during which undetected bites might have occurred. Such encounters include being in close proximity to a bat while asleep or being heavily intoxicated or otherwise impaired (*1*). Although the bat described in the elicited exposure history was not tested for rabies, sequence analysis of the virus associated with the patient's illness corroborates suspicion that a bat was the source of the patient's infection. Reports that medical care was not sought following the reported incident suggest that, regardless of the actual source of transmission, possible factors in the patient's illness were a lack of rabies awareness or a low perception of risk.

Rabies is a viral disease of the central nervous system that is transmitted when broken skin or a mucous membrane is contaminated with saliva from an infectious mammal. Typically, after a 1–3 month incubation period, an acute, rapidly progressive encephalomyelitis develops, and death of the patient occurs within 20 days (*2*). The disease is preventable if exposure to the virus is promptly followed by wound cleaning, administration of rabies immune globulin, and rabies vaccination (*3*). Clinical signs of rabies most often are associated with the encephalitic form of the disease and include hydrophobia, muscle spasms,

and altered mental status. The patient described in this report exhibited characteristic signs of paralytic rabies, a less common presentation that manifests as flaccid paralysis relatively early in the illness course.

During 1980–2009, a total of 39 (91%) of the 43 reported cases of human rabies acquired in the United States were associated with bat exposures* (*2*,*4*–*7*). Median age of these 39 patients was 32 years, with a range of 4 to 82 years; 28 (72%) were male. Wide differences in median age are evident when cases are compared by sex. The median age of the 11 female patients was 14 years (range: 4–42 years), and only two patients were aged ≥40 years. In contrast, the median age of the 28 male patients was 46 years (range: 10–82 years), with 16 patients aged ≥40 years (*2*,*4*–*7*). The difference in age distribution between male and female patients is statistically significant (p = 0.001, by the Wilcoxon rank sum test) and appears to derive from a preponderance of older male patients; the incidence in patients aged <40 years does not appear to differ significantly by sex (11 males and 8 females, respectively†). Explanations for this disparity are unclear, but it might be attributable, in part, to adult males spending more time engaged in outdoor activities that increase their proximity to bats and other wildlife (*8*). Studies also have shown that health-related risk perception and awareness is lower in men than in women (*9*,*10*). In countries where dogs are most often implicated in cases of human rabies, patients are disproportionately aged <15 years.

Education is an important prevention strategy against rabies and should be directed particularly toward groups most likely to have wildlife encounters. Messages should emphasize appropriate actions to take after possible animal bites, including contacting local authorities for guidance on how to safely capture and submit animals for rabies diagnosis (*1*). In the absence of a negative animal rabies diagnostic result, persons who come in contact with a bat and cannot confidently exclude a bite or scratch should be advised to seek medical attention. After the onset of symptoms, the clinical course of rabies is almost invariably fatal.

* Not including four cases that occurred in 2004 associated with transplanted tissue from an infected human donor (*4*).
† Age was not documented for one female and one male patient.

Acknowledgments

This report is based, in part, on contributions by District Health Dept No. 10, Grand Traverse County Health Dept; D Martin, MD, K Speirs, DO, D Ochs, MD, L Gottfried, MD, B Schreibe, Munson Medical Center, Traverse City, Michigan. J Ellison, R Franka, DVM, PhD, I Kuzmin, MD, PhD, L Orciari, MS, A Velasco, PhD, and P Yager, Div of High-Consequence Pathogens and Pathology, National Center for Emerging Zoonotic and Infectious Diseases, CDC.

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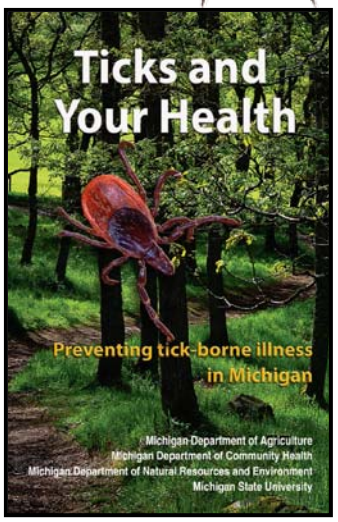
Preventing Lyme Disease in Recreational Camp Settings



The Blacklegged tick (formerly Deer tick) is now established in Michigan's western shoreline communities. These ticks are potential vectors of Lyme disease and other illnesses. The ticks are active during the summer months when tourism and camp activities in the area are highest. There are several ways to prevent ticks from becoming a problem for your campers and staff, and to prevent Lyme disease illness.

Be Aware

Knowing that ticks are present in the environment and how to avoid them is an important first step:

- ❑ Post informational placards/posters and trail-head signs alerting staff and campers.
- ❑ Train staff to identify ticks, and the proper way to remove them.
- ❑ When campers and staff arrive, incorporate tick awareness into safety and health briefs.

Go to www.michigan.gov/lymedisease for up-to-date information on tick distribution

Staff and Camper Personal Protection

Being aware that ticks may be in your environment is a great first step, but if you do happen to encounter them, it will not keep them from biting. Here are some recommendations to keep ticks off your skin:

- ❑ Require campers to have an EPA approved insect repellent. DEET (20%-30%) is the repellent recommended by the Centers for Disease Control and Prevention (CDC) to repel ticks.
- ❑ Do Not simply suggest or recommend that campers wear repellent when recreating in wooded environments (and this means even walking trails to the beach) – watch them apply the repellent to their skin.
- ❑ Wearing long pants with pant legs tucked into socks will help keep ticks from attaching to the skin. Pants can also be treated with approved repellents such as permethrin (which also kills ticks). While effective, this can be hard to follow when temperatures are high.

- ❑ Perform frequent tick checks – staff can assist campers with hard to see areas such as the scalp, ears, shoulders, and back of legs. Campers should be instructed to check the beltline, buttocks and groin area while showering.
- ❑ Have tick removal kits available for staff. If the camp has a nurse or EMT on staff, have them perform the tick removals, assess and care for the bite site.
- ❑ If a camper presents with acute illness (fever, rash, body/muscle ache), have a physician evaluate for tick-borne disease. Always report suspected cases of tick-borne disease to the local health department, even in the case of out-of-state visitors and campers.

Landscape and Facility Protections

Knowing where ticks congregate in the landscape is important to effective tick avoidance and control. There are methods to effectively combat ticks through the use of landscape modification and insecticide treatments. Below are important recommendations to consider:

- ❑ Ticks prefer moist, shaded wooded environments and well drained soils. They will normally congregate on vegetation from ground level to one meter high, along the edges of human and wildlife trails.
- ❑ Trimming vegetation and leaf litter back from the edge of trails used by campers and staff can help to prevent tick encounters.
- ❑ Maintain "high impact" zones where campers recreate most often (fields, playgrounds, etc.). Open, sunlit spaces with well trimmed grasses are least suitable for ticks. Vegetation at the edges of these areas should be kept trimmed. Lining the edges with mulch or rock borders will help prevent tick migration into these areas.

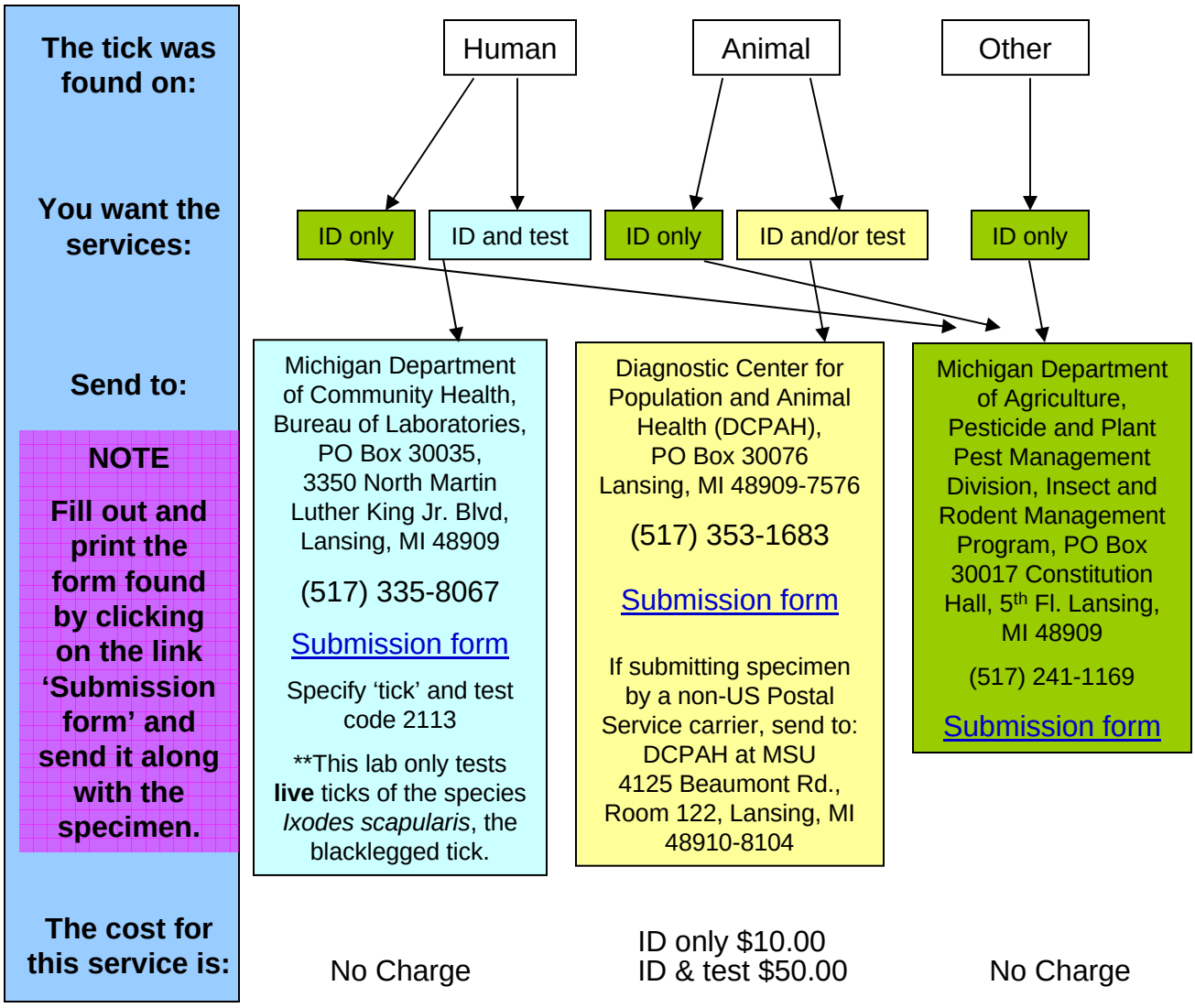
- ❑ Trim vegetation back from cabins and sleeping quarters. This will keep questing ticks and their rodent hosts farther from sleeping areas. Seal any cracks or holes that might allow rodent access.
- ❑ Insecticides labeled for use against ticks can be used along the edges of trails or recreation areas. Early season application of insecticide can have a large impact on tick populations throughout the summer. Application should be by a trained and certified pesticide applicator.

Read the "Ticks and Your Health" brochure, available at
www.michigan.gov/lymedisease
or see www.cdc.gov for more information

Michigan Department of Community Health
MDCH

Have a tick that you want identified or tested?

Ticks may carry diseases that cause illness in humans and animals in Michigan. Therefore, if you find a tick feeding on a person or a domestic animal, you may want it screened for the presence of a disease-causing organism. Not all tick species carry disease agents. The testing performed on the tick will depend on the species of tick. For more information, see our brochure on tick-borne illness in Michigan.



IMPORTANT – SHIPPING INSTRUCTIONS

If the tick is *alive*, place it in a small container with a small piece of paper towel moistened with a drop of water to send to MDCH or MDA. Place it in a small, watertight container filled with water to send it to DCPAH.

If the tick is *dead*, place it in a small, watertight container filled with water or alcohol.

Please make a note on the form where you think the tick was picked up (city, county, state).

To see a list of the five most common tick species in Michigan, click here.
(Right click on your mouse and choose "Open Weblink in Browser".)

Bed Bugs: What Camps Need to Know

Recently, Michigan and other states have seen an increased number of bed bug infestations plaguing residents. As bed bugs infest more and more homes, they are finding their way into camps. Camps should take preventive action to avoid infestation, and if they are found, stop them from spreading.

What are bed bugs?

Bed bugs are small, brownish, flattened insects that feed on the blood of people while they sleep. Although the bite does not hurt at the time, it may develop into an itchy welt similar to a mosquito bite. Bed bugs do not transmit disease, but they can cause significant itchiness, anxiety, and sleeplessness. Bed bug infestations are also very difficult and expensive to control.

Usually, bed bugs will hide during the day and only come out to feed during the night. Unlike head lice, they do not live on a person. However, they can hitchhike from one place to another in backpacks, clothing, luggage, books, and other items.

How does a camp become infested?

Bed bug infestation in camps is an increasing problem nationwide. Most commonly, a few bed bugs will “hitchhike” to the camp from an infested home by hiding in a camper’s clothing or luggage. Bed bugs that hitch a ride into the camp in one camper’s belongings could infest the camp and be taken home by other campers. This is not a minor concern; bed bugs are very difficult to get rid of and the camp’s reputation may be damaged.

An infestation usually is not discovered until weeks or months after the bed bugs were first brought into the camp, making it difficult to determine where the bed bugs came from. The most important things for camps to focus on are **planning, prevention, early detection,** and **prompt treatment**.

This fact sheet has been published by the Michigan Bed Bug Working Group (April 2011)

For more information, please visit http://www.michigan.gov/bedbugs

Michigan Department of Community Health

How do we plan for and prevent bed bugs?

Make the camp less hospitable for bed bugs

- Before camp season begins, inspect sleeping areas and make repairs. Caulk cracks and crevices, replace or encase mattresses, replace damaged furniture with metal or plastic. These repairs will make it easier to detect bed bugs, and harder for bed bugs to spread.

Prevent campers from bringing bed bugs to camp

- Consider drafting a “Packing for Prevention” guide as part of general camp enrollment materials. This guide may help to prevent campers from bringing bed bugs into the facilities. A sample packing guide is provided at the end of this fact sheet.

Be vigilant for signs of a bed bug infestation

- Train all camp staff to identify the signs of a bed bug infestation. Signs may include bites on campers, evidence of bugs in the facility, or even blood spots on sheets.
- Use bed bug passive monitors. Inexpensive sticky traps or interceptors can provide an early warning that bed bugs are present in an area.

Promptly respond to signs of an infestation

- It is easier to control a bed bug infestation when it is detected and addressed early. Plan with an experienced pest management professional, using an Integrated Pest Management (IPM) approach, to find and treat an infestation if it occurs.

Interceptor device used to detect bed bugs


Bed bugs on the seam of a sleeping bag

What are some signs of bed bugs in camps?

- **Bites –** Campers may receive many types of insect bites during their time at camp. If a camper is regularly using repellents for outdoor insects and they are still finding a significant number of new bites, the sleeping area should be inspected for bed bugs
- **Live or dead bed bugs –** Look around mattress seams and furniture crevices. If a suspected bed bug is found, it should be identified by an expert before any treatment is attempted.
- **Passive monitors** – Check passive monitors regularly for trapped bed bugs.
- **Dark or reddish marks on bedding** – small dark marks may be bed bug excrement. You may also see blood marks from crushed bed bugs.

What should we do if we find bed bugs in our facility?

- The camp director should contact their pest management company and/or local health department for assistance in identifying the specimen(s). It is important to confirm that the bugs found really are bed bugs before proceeding.
- If the specimen is confirmed as a bed bug, then the entire cabin, tent, or room should be inspected, as well as any adjoining rooms or sleeping areas.
- If a sleeping area is found to be infested, all the campers' machine-washable bedding, clothing, towels, etc. should be machine dried for 30 minutes on the hottest recommended setting, and then sealed into plastic zippered bags. Once their belongings have been treated, the affected campers should be moved to another (non-infested) sleeping area.
- There is no reason to exclude affected campers from camp activities. Bed bugs infest places, not people, and there is no scientific evidence that bed bugs spread disease.
- Before the affected campers return home, the camp director or nurse should inform the campers' parents and/or guardians of their child's exposure or potential exposure to bed bugs. Educational materials should also be provided to the families, such as those found at http://www.michigan.gov/bedbugs.
- Ongoing pest management should be overseen by the camp director in partnership with a licensed pest management professional and should conform to an Integrated Pest Management plan. Previously infested areas should not be used until they are certified as bed bug free by a pest management professional.

Additional Resources

This fact sheet provides broad guidelines for prevention and control. For more detailed information and guidance, please consult the Michigan Bed Bug Manual and other resources at:

http://www.michigan.gov/bedbugs

or

http://www.epa.gov/bedbugs

Bed bug images provided by U.S. Centers for Disease Control and Prevention

Bed bug bite image provided by University of Sydney Department of Medical Entomology

Bed bugs on sleeping bag image provided by Mark Sheperdigian, Rose Pest Solutions

Interceptor image provided by Susan McKnight, Inc.

-- Camp Name Here --

Camp & Bed Bugs: Packing for Prevention

Whether they come to camp every year or this is their first trip, attending camp is an exciting time for children. Making new friends, exploring nature, and trying new things are all part of the camp experience and create memories that will last a lifetime.

However, along with all the good parts of camp, a pesky little bug can also be part of the experience. In recent years, bed bugs have made a resurgence in North America. They are often found in hotels, multi-unit dwellings, and other structures that house people for short periods of time, such as camps. While bed bugs may be a nuisance, they do not transmit disease to people.

The good news is that there are simple steps that can be taken to help ensure that children do not bring bed bugs to camp or back home. We are taking proactive steps in our camp facilities, please help us by following the packing advice listed below:

PACKING FOR CAMP

√ **Visually inspect items for bugs.** Take sleeping bags, blankets, and luggage out of storage, place them outdoors, and inspect them carefully for any signs of bugs or eggs.

√ **Tumble bedding and luggage in clothes dryer.** Place bedding or luggage in the clothes dryer and tumble them on a high heat setting for 30 minutes. The heat from the dryer kills bed bugs and eggs. For items that cannot be placed in a dryer, vacuuming or cleaning with soap and water or alcohol based cleaning products will kill bed bugs.

√ **Use a heavy gauge garbage bag as a liner in luggage.** Place all clothing inside the liner and tightly twist and knot to seal. This will help keep bed bugs out of clothing. In addition, place bedding in a separate garbage bag. Duffle bags are recommended as luggage for campers as they can be placed in a dryer.

√ **Pack extra garbage bags.** Be sure to pack two extra garbage bags for your child. One bag will be used for all dirty clothing and the other will be used for dirty bedding.

√ **Repellents.** Children should use insect repellent during the day to protect against mosquitoes and ticks. Repellents should not be used while sleeping. To protect a child's belongings from bed bugs, products containing permethrin which are labeled for use on fabrics can be applied to backpacks, duffel bags, and the outside of sleeping bags. Always follow the label directions when applying permethrin products.

COMING HOME FROM CAMP

√ **Inspect items before you bring them indoors.** Inspect items that cannot be placed in a washer/dryer for evidence of bed bugs outdoors and clean if necessary before bringing them indoors. Place bedding and clothes stored in garbage bags directly into the washer/dryer. Dispose of the plastic bag outdoors.

√ **Clean all camp items.** For items that can be laundered, use a hot water setting and tumble dry on high heat for at least 30 minutes. For items that cannot be laundered, such as suitcases, vacuuming or cleaning with soap and water or alcohol based cleaning products are other options.

√ **Wipe off shoes.** Use rubbing alcohol or soap and water to wipe off the bottoms of shoes.

If you have any further questions, please feel free to contact us at (xxx)xxx-xxxx

Camp Logo Here

Sample letter developed in conjunction with local Michigan camps and the Michigan Bed Bug Working Group