

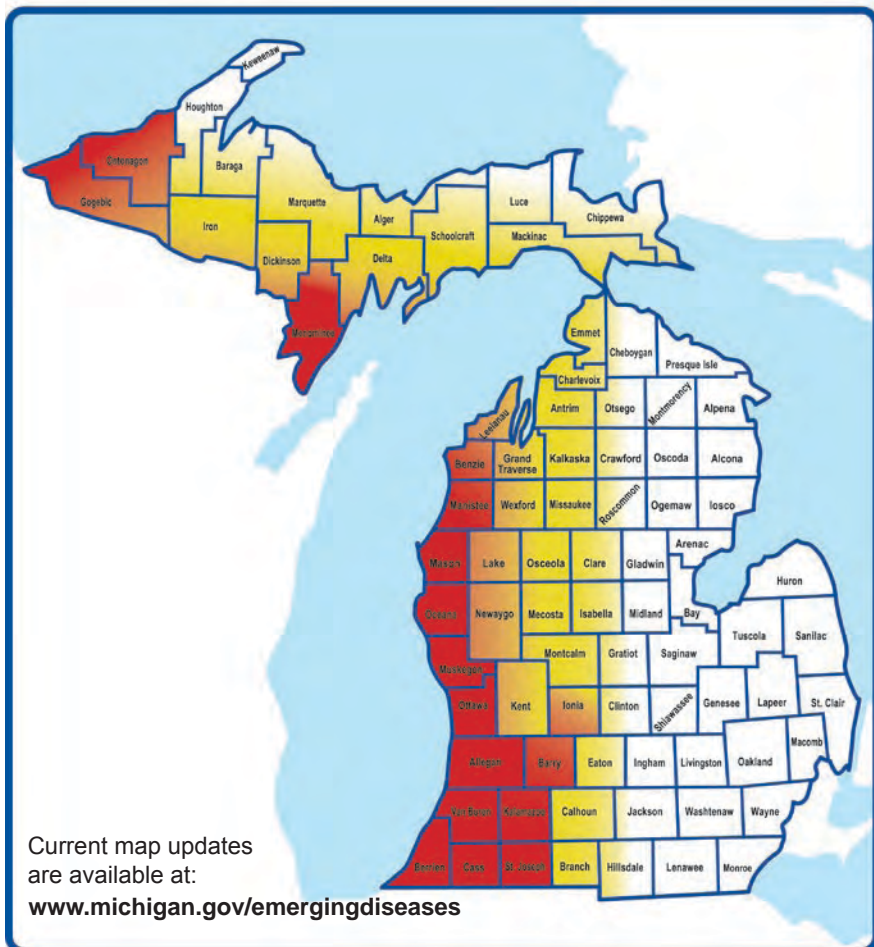
Ticks and Your Health



**Preventing tick-borne illness
in Michigan**

Michigan Department of Community Health
Michigan Department of Agriculture and Rural Development
Michigan Department of Natural Resources
Michigan State University

Michigan Lyme Disease Risk



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

- Red color indicates “endemic” counties where infected tick populations have been confirmed, and/or two or more confirmed human cases have been identified with local exposure.
- Yellow color indicate counties bordering endemic areas which may pose risk; however do not meet endemic criteria.

Tick-borne diseases are “reportable diseases;” physicians, veterinarians and laboratories that diagnose these conditions are required to report them to local health departments and animal health regulatory officials. This information is used to educate both the public and healthcare community about the risk of tick-borne disease in Michigan.

General Information

Ticks are significant vectors of pathogens that cause human disease. Tick-borne diseases do occur in Michigan, and can be serious or fatal if not properly diagnosed and treated.

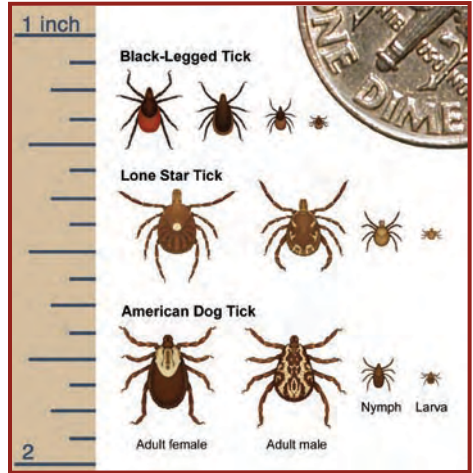
Ticks are closely related to insects and spiders, and there are over 20 known species in Michigan. Most often, they live out their lives feeding on wildlife, but several species are known to bite people and domestic animals, and may harbor dangerous pathogens (bacteria, protozoa, viruses). Ticks are most often associated with natural areas such as grassy shorelines, wooded areas, or fields near wooded areas. Ticks are rarely encountered indoors unless brought inside on the clothing of people or on the body of a pet. Ticks have three life stages – larval, nymphal and adult. (See size comparison photo).

Ticks feed painlessly by attaching themselves to the skin with their piercing mouthparts. They can attach anywhere on the body, but are commonly found in the hairline, ears, waistline, armpit,

and groin. They will normally stay attached and continue to feed for several days becoming greatly engorged, which can aid in their discovery. Ticks can transmit diseases in areas of the state where wildlife populations are infected with certain bacteria. It is important to take precautions when recreating or working in wooded environments where ticks could be encountered.

In Michigan, the most common ticks encountered by people are the American Dog tick (*Dermacentor variabilis*) and the Black-Legged tick (*Ixodes scapularis*). American Dog ticks are most abundant in spring and early summer. Black-Legged ticks are most abundant from spring through the summer, and into the warm months of the fall. However, ticks have been found on Michigan residents or their pets in all months of the year. A detailed description of the five most common ticks in Michigan can be found on the following pages.

It is important to inform a physician if you are ill and have had recent exposure to ticks. This information can be crucial for accurately diagnosing diseases.



The Ticks

The five most common ticks found on people and companion animals in Michigan are:

- *Dermacentor variabilis* (American Dog tick)
- *Ixodes scapularis* (Black-Legged tick, formerly known as the Deer tick)
- *Amblyomma americanum* (Lone Star tick, also known as the Turkey tick)
- *Ixodes cookei* (Woodchuck tick)
- *Rhipicephalus sanguineus* (Brown Dog tick)

* Order based on the number of submissions by the public

American Dog tick

Sometimes incorrectly referred to as the Wood tick, the American Dog tick is found throughout the Lower and Upper Peninsulas of Michigan. The American Dog tick is by far the most common tick found in the state. It is active from early May-November and it will readily bite humans and their companion animals.

Adult ticks can be distinguished by their ornate appearance and size. This species is a vector of:

- Rocky Mountain spotted fever
- Tularemia



Black-Legged tick

Since 2001, the Black-Legged tick (formerly known as the Deer tick) has expanded its geographic range to include much of western lower Michigan in addition to its range in the western Upper Peninsula. It is normally associated with wooded and grassy areas, overlying sandy soils, and an abundance of small mammals and deer. It may be hard to distinguish from other species, and is one of the smaller ticks in Michigan. It is the vector of several diseases including:



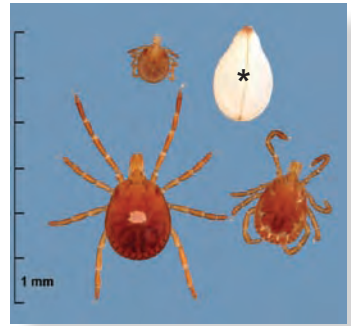
- Lyme disease
- Anaplasmosis
- Babesiosis

* Sesame seed

Lone Star tick

Known by its distinctive “Lone Star” marking, this tick is becoming more prevalent in Michigan. This tick is common in wooded areas with populations of white-tailed deer. It will readily bite people and their companion animals, and is the vector of:

- Ehrlichiosis
- Rocky Mountain spotted fever
- Tularemia



Woodchuck tick

The woodchuck tick is normally associated with woodchuck and skunk dens, but may also be found in wooded areas where other mammal species are abundant. They readily feed on pets, and will also bite people. The woodchuck tick is the vector of:

- Powassan encephalitis, a potentially serious viral illness



Brown dog tick

Also known as the Kennel tick, this species is unique in its ability to survive and breed in indoor environments. It may be hard to distinguish from other ticks because of its “plain” brown appearance. Hygienic practices in shelters/kennels can prevent infestations. It is a vector of:

- Rocky Mountain spotted fever
- Canine Babesiosis
- Canine Ehrlichiosis



* Sesame seed

Other tick species

There are many other tick species in Michigan. Most are seen less frequently on people and companion animals, and are not associated with human illness. Notably the Rabbit tick (*Ixodes dentatus*) is very difficult to distinguish from the Black-Legged tick; the Winter tick (*Dermacentor albipictus*), which spends its life almost entirely on white-tailed deer, may be difficult to distinguish from the American Dog tick. Ticks are best identified by an experienced professional. See the section on “Tick Identification and Testing” for information on how to submit ticks for identification.

Lyme Disease

Lyme disease is an illness caused by the spirochete bacterium *Borrelia burgdorferi*. In the Midwestern and Eastern U.S., this disease is transmitted to people and animals by the bite of an infected *Ixodes scapularis* tick. Prompt removal of ticks is an important step in preventing tick-borne disease. Studies of Lyme disease have shown that a tick infected with *Borrelia burgdorferi* must be attached to its host for 24-48 hours for the bacteria to be transmitted. Prompt removal is the best method to decrease the chance of infection. The



disease typically progresses through flu-like symptoms, often with an unusual bull's eye rash and then may advance to painful swelling of the large joints. Some people, when left untreated, may develop complications involving the heart, nervous system, and/or joints.

In Michigan, numerous studies to characterize Lyme disease have been conducted since the discovery of Black-Legged ticks and associated human disease in the western Upper Peninsula

in the 1980's. Physicians, veterinarians, local health departments, universities, and the Michigan departments of Community Health (MDCH), Natural Resources and Environment (DNR), and Agriculture (MDARD) have coordinated surveillance for tick populations, disease in wildlife, and human cases. The map of Lyme disease risk in Michigan (on the inside front cover) summarizes these efforts, and shows the currently known range of infected ticks in the state as well as counties where people have contracted the disease locally.

The most important factors in preventing Lyme disease are:

1. Knowing where ticks can be encountered
2. Preventing tick bites
3. Removing ticks promptly if they do bite
4. Seeking prompt medical care if illness occurs after exposure to ticks

The symptoms of Lyme disease may include:

Early Lyme disease (3-30 days after exposure)

- Chills and fever
- Headaches
- Muscle and joint pain
- A characteristic skin rash, called erythema migrans (EM) present in 70-80% of cases

Late Lyme disease (weeks or months after exposure)

- Joint swelling, usually in one or more large joints, especially the knees
- Nervous system abnormalities can include nerve paralysis (facial muscles), and meningitis
- Rarely, irregularities of the heart rhythm may occur

The MDCH laboratory offers the nationally-standardized two-stage serological (blood test) for Lyme disease. Culture of tissues, including EM lesions, is also available. Consult with your physician if you think you may have been exposed to Lyme disease.

Other Tick-Borne Illnesses

Ticks may transmit numerous other diseases to people and pets and although they are less common than Lyme disease, it is no less important to protect yourself when in tick habitats. Many of the diseases can be quite serious and progress to hospitalization if not treated early. The table on the next page gives information about Lyme disease and other tick-borne diseases in Michigan.

Treatment

Lyme disease, tularemia, Rocky Mountain spotted fever (RMSF), anaplasmosis, and ehrlichiosis are all treatable with antibiotics. Patients and domestic animals treated in the early stages with short courses of antibiotics usually recover rapidly and completely. Several commonly-used antibiotics, such as the tetracyclines, are particularly effective in the treatment of these diseases.

Babesiosis is treatable with a combination of drugs, normally an antibiotic and a quinine drug (similar to anti-malaria drugs). There is no specific treatment for infections with Powassan virus, although early detection and supportive care often leads to full recovery.

It is important to monitor your general health after a tick bite; any change in your health, particularly fever, rash, or muscle/joint ache may be an early indication of tick-borne disease. Contact your provider and indicate that you have had recent exposure to a tick bite.



Diseases Potentially Carried by Ticks in Michigan

Disease (Agent)	Arthropod Vector	Wildlife Reservoir	Incubation Time	Signs & Symptoms	Rash Appearance	Comments
Lyme Disease (<i>Borrelia burgdorferi</i>)	<i>Ixodes scapularis</i> (Black-Legged tick)	Mice, chipmunks, squirrels and other small animals	7-14 days	<p>Early disease (acute):</p> <ul style="list-style-type: none"> • Chills and fever • Headaches • Muscle and joint pain • Characteristic Erythema Migrans rash <p>Late disease (weeks to years post-exposure) :</p> <ul style="list-style-type: none"> • Arthritis, in large joints, especially the knees. • Nervous system abnormalities including nerve paralysis (facial muscles), meningitis. • Rarely, irregularities of the heart rhythm may occur. 	<p>Erythema Migrans (EM):</p> <p>Beginning as a red macule or papule that appears at the site of the tick bite within 3 days to 1 month after the bite of an infected tick. The red area expands to form a "bull's-eye" pattern \geq 5 cm across. The EM is usually not painful or itchy.</p>	<p>Pets are also susceptible to Lyme Disease.</p> <p>Disease transmission does not typically occur unless tick attachment is for longer than 24-48 hours.</p> <p>Treatable with antibiotics.</p>
Rocky Mountain Spotted Fever (<i>Rickettsia rickettsii</i>)	<i>Dermacentor variabilis</i> (American Dog tick) most common in MI	White-tailed deer, fox, wolves, badgers, opossums, rabbits, raccoons, skunks, squirrels, mice, chipmunks, feral dogs	3-14 days	<p>Begins 3-12 days after tick exposure.</p> <ul style="list-style-type: none"> • Malaise • Severe headache • Chills and myalgia • Diarrhea, vomiting, nausea • Light sensitivity in adults 	<p>Maculopapular rash</p> <p>contains both flat discolored areas of the skin and small raised bumps that cover a large, red area. Occurs ~2- 4 d after fever onset. Rash might evolve to petechiae (pinpoint-sized red dots under the surface of the skin).</p>	<p>Maculopapular rash often begins at the extremities, including palms and soles between days 3-5, then makes its way centrally towards the body's trunk.</p> <p>Tick attachment for 4-6 hours is required for the rickettsia to activate.</p> <p>Treatable with antibiotics.</p>
Human Granulocytic Anaplasmosis (HGA) (<i>Anaplasma phagocytophilum</i>)	<i>Ixodes scapularis</i> (Black-Legged tick)	White-tailed deer, elk, meadow voles, white-footed mice, coyotes	5-21 days	<ul style="list-style-type: none"> • Fever and shaking chills • Headache • Malaise and muscle aches 	<p>Rare</p>	<p>Affects white blood cells.</p> <p>Treatable with antibiotics.</p>

Human Monocytic Ehrlichiosis (HME) (<i>Ehrlichia chaffeensis</i>)	<i>Amblyomma americanum</i> (Lone Star tick)	White-tailed deer and small rodents	5-14 days	<ul style="list-style-type: none"> • Fever • Headache • Malaise and muscle aches • Other signs may include nausea, vomiting, diarrhea, cough, joint pain, confusion, and occasionally rash. 	Rash in <30% of adults and ~ 60% of children	Treatable with antibiotics.
Babesia (<i>Babesia microti</i>)	<i>Ixodes scapularis</i> (Black-Legged tick)	Small rodents and other unknown hosts	1-8 weeks	<ul style="list-style-type: none"> • Fever • Chills and sweats • Headache • Body ache • Loss of appetite • Nausea • Fatigue 		Possible intermittent fever. Treatable with combination of antibiotics and other drugs.
Tularemia (<i>Francisella tularensis</i>)	<i>Dermaecentor variabilis</i> (American Dog tick) <i>Amblyomma americanum</i> (Lone Star tick) Deer Flies	Rabbits, hares, voles, muskrats, beavers	On average 3-5 days, but can vary from 1-21 days	<ul style="list-style-type: none"> • Ulcerative lesion at site of bite or wound • Lymph node swelling • Pneumonia • Fever, chills • Headache • Muscle pain and joint stiffness 	Ulcerative skin lesion	Multiple modes of transmission possible including through skin or mucous membrane contact with contaminated water, blood or tissue from an infected carcass of a game animal. Treatable with antibiotics.
Powassan Encephalitis (<i>Flavivirus</i>)	<i>Ixodes cookei</i> (Woodchuck tick)	Woodchuck, coyotes, striped skunks, foxes and raccoons	1-5 weeks	<ul style="list-style-type: none"> • Days 1-3: fever, malaise, sore throat, lethargy, drowsiness, myalgia, nausea, vomiting, headache, dizziness • Confusion, stupor or coma • Altered vision • Seizures in children 		No specific anti-viral therapy is available, treatment is supportive.
Disease (Agent)	Arthropod Vector	Wildlife Reservoir	Incubation Time	Signs & Symptoms	Rash Appearance	Comments

Prevention

Avoid areas with a lot of ticks

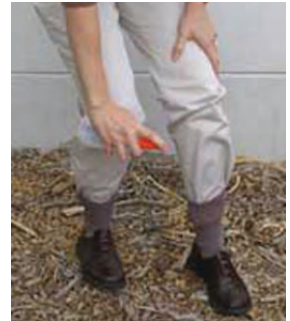
- Ticks generally prefer shady, moist areas in wooded and grassy locations. See the map inserts in this brochure for information on the range of ticks found in Michigan.
- When recreating or working in tick areas, try to stay on well groomed trails and avoid contact with overgrown grass, brush and leaf litter.

Keep ticks off your skin

- Wear light-colored clothing with a tight weave so ticks can be spotted easily.
- Wear closed-toe shoes, long pants, and a long sleeved shirt. Tuck pant legs into socks or boots and shirt into pants.
- Check clothes and any exposed skin frequently for ticks.
- Avoid sitting directly on the ground, fallen logs, or stone walls.

Use of insect repellents

- Insect repellents have been shown to be effective for repelling ticks and can be applied to clothing and skin –
 - Environmental Protection Agency (EPA) approved repellents registered for ticks include products containing:
 - DEET
 - Picaridin
 - Oil of Lemon Eucalyptus
 - Store away from children, and follow label guidelines for proper application.
 - Do NOT apply repellents directly to children. Apply to your own hands and then put it on the child, avoiding the hands, eyes, nose and mouth.
- Permethrin is another type of repellent. Permethrin kills ticks on contact! Some permethrin products are labeled for application to clothing. Such products once applied will stay effective as a repellent to ticks following several washings. Permethrin should NOT be applied directly to skin.
- Whenever using an insect repellent, always read and follow the label use directions for proper application and safety concerns.



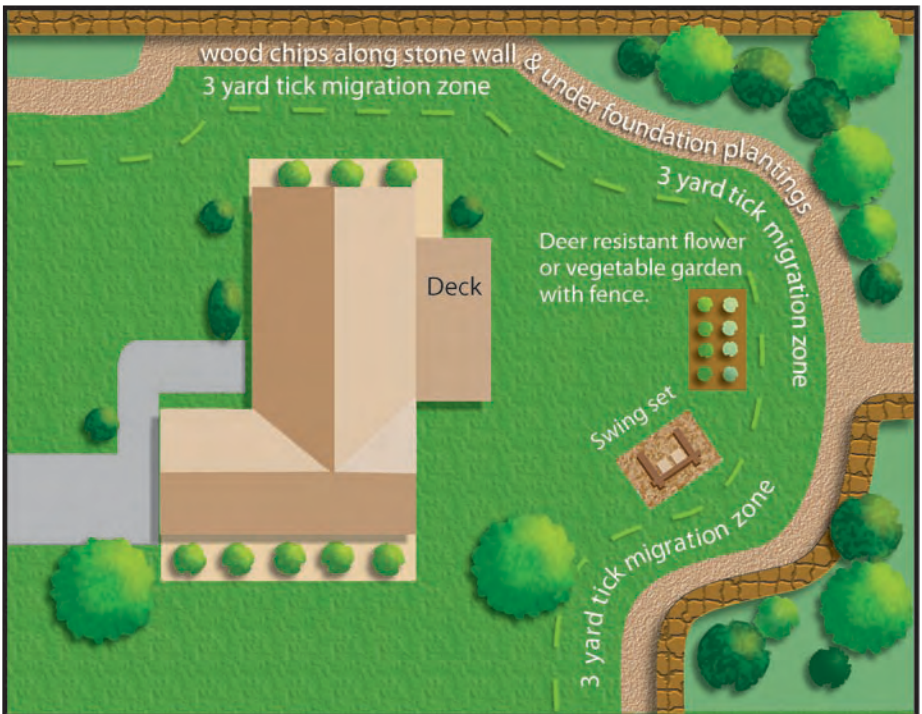
Check your skin and clothes for ticks every day

- Remove ticks from your clothes before going indoors. To kill ticks that you may have missed, wash your clothes with hot water and dry them using high heat for at least one hour.
- Perform daily tick checks after being outdoors, even in your own yard. Inspect all parts of your body carefully, including your armpits, scalp, and groin.

Ways to keep your home “Tick Free”

If your home is bordered by grassy or wooded areas with abundant wildlife, including deer and small mammals, there are several ways you can create a “Tick Safe Zone” around your residence. Wildlife and ticks need moist, shaded places to live and hide while they’re not searching for food. Keeping these areas separated from your lawn or recreation areas and reducing clutter around your home can help reduce the number of ticks dramatically. While it’s not always possible to keep all ticks away, the following recommendations will help reduce tick populations around the home:

Landscaping Considerations for Tick Prevention



- Keep grass mowed
- Remove leaf litter, brush and weeds at the edge of the lawn
- Maintain wood piles and bird feeders away from the home if possible
- Clean up and seal small openings around the home and garages or sheds, this will reduce rodent activity
- Keeping dogs and cats out of wooded and grassy areas will reduce ticks brought into the home by pets
- Move swing sets and sand boxes away from the woodland edge and place them on a wood chip or mulch foundation
- Trim shrubbery and tree branches around the yard to let in more sunlight
- A well sunlit three-foot wide barrier of wood chips, mulch, or gravel between lawns and wooded or shrubby/grassy areas will help to keep ticks from surviving or reaching the yard
- Pesticides can be applied as targeted treatments to reduce tick populations or create a barrier for the yard. Do not use pesticides near streams or any body of water, **always follow the label directions**

Tick Removal

Ticks can attach to any part of the human body, but prefer body creases and areas with hair such as the groin, armpit, ankle and scalp.

To remove attached ticks, use the following procedure:

1. Using fine-tipped tweezers or a tick removal tool, grasp the tick as close to the skin as possible then slowly, but firmly, pull it straight out. Do not twist or jerk the tick, apply petroleum jelly, a hot match, or other irritants. This can lead to a skin infection because the tick's mouth parts may remain embedded, or you may be burned. Use your fingernails and tissue paper if tweezers are not available.
2. Immediately wash the bite area and your hands with soap and water then apply an antiseptic to the bite wound.



Tick Identification and Testing

Expert tick identification is available at a number of state agencies. Place the tick in a small vial containing a damp piece of tissue or piece of grass and submit it to the appropriate agency, following the guidelines for tick identification and testing found at www.michigan.gov/lymedisease. This service is free to the public for ticks removed from residents in Michigan.

Tick Prevention in Pets

Animals may become sick with the same tick-borne diseases that affect people. Tick prevention for your pets is very similar to prevention for people and the best way to prevent ticks from attaching to your pets is the combined use of topical pest repellents as well as frequent body checks.



Visual and hands-on inspections are especially important to make sure a tick is not hidden in the fur.

- Make sure to run your hands over the animal's body with sufficient pressure to feel any bumps.
- Be sure to check around the animal's ears, chest, underbelly, legs, feet (including between the toes) and tail.
- Try to avoid wooded or grassy areas when walking your pet.
- A vaccination for Lyme disease should be considered for dogs that live in endemic areas.

There are a number of topical and systemic pesticides that can be used in pets to prevent tick and flea infestations. Discuss with your veterinarian the best options for tick prevention for your pet.

If a tick is found on your animal, use the same method outlined above for tick removal from people.

Symptoms of Lyme Disease in Pets:

While a typical skin rash may not appear on your pet, they may experience a variety of symptoms. For dogs, symptoms may include; lethargy, arthritis, fever, fatigue and kidney damage. Cats are thought to be highly resistant to lyme disease although there is some debate on this issue.

Diagnosis and Treatment of Lyme Disease in Pets:

If your pet displays signs of illness following an exposure to ticks, be sure to alert your veterinarian. They can check your pet's blood for antibodies to the various organisms carried by ticks. The presence of specific antibodies can indicate recent exposure to the organism. As in humans, antibiotics are effective in treating most infections.

Tick-Borne Disease in Wildlife

Many species of wildlife, including small mammals and white-tailed deer in Michigan can harbor ticks and serve as a reservoir for tick-borne illness. Wildlife are the natural hosts for ticks and do not normally show signs of illness due to tick-borne pathogens. Be aware of ticks on wildlife, as they may find their way onto people or pets. Importantly, hunters and outdoor enthusiasts are not at risk of contracting a tick-borne disease from direct handling of game species (ie. field-dressing a harvested animal). **There is, however, one exception:** Hunters and trappers handling rabbits, hares, beavers, and muskrat may be at risk of contracting tularemia from the blood or tissues of infected animals if exposed through cuts and abrasions in the skin or through mucous membranes such as the eyes or nose.

It is always important when skinning/cleaning carcasses to wear gloves, and practice good hand hygiene after handling carcasses. The reason for this is that there are bacteria present on the carcass or in the bodily fluids of wild animals that may cause infection.



Additional Information

For information regarding specific questions about the effects of these tick borne illnesses on human health, wildlife, or domestic animals, visit the Centers for Disease Control and Prevention website at www.cdc.gov or consult one of the agencies listed below:

Michigan Department of Community Health

Communicable Disease Division

517-335-8165

201 Townsend St., 5th Floor

Lansing, MI 48913

www.michigan.gov/mdch

www.michigan.gov/lymedisease

Michigan Department of Agriculture and Rural Development

Animal Industry Division or

Pesticide & Plant Pest Management Division

517-373-1077 or 517-241-1169

525 West Allegan Street, 5th Floor

Lansing, MI 48933

www.michigan.gov/mda

Michigan Department of Natural Resources

Wildlife Disease Laboratory

517-336-5030

4125 Beaumont Rd., Rm 250

Lansing, MI 48910

www.michigan.gov/dnr

Michigan State University

Department of Entomology

517-355-4663

243 Natural Science Building

East Lansing, MI 48824

www.msue.msu.edu

MDCH is an Equal Opportunity Employer, Services, and Programs Provider

This publication was supported by Cooperative Agreement Number 3U5OC1523806 from the Centers for Disease Control and Prevention (CDC), and was not paid for with state funds.



Images courtesy of:
Kent Loeffler
Dept. of Plant Pathology & Plant-Microbe Biology
Cornell University

K. Stafford
Connecticut Agricultural Experiment Station
Centers for Disease Control and Prevention
MDCH Communicable Disease Division

Michigan Department
of Community Health



www.michigan.gov/emergingdiseases