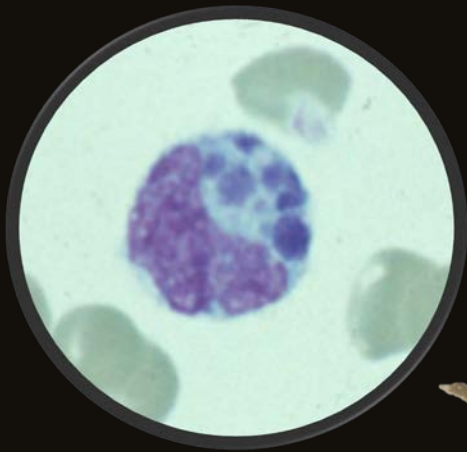


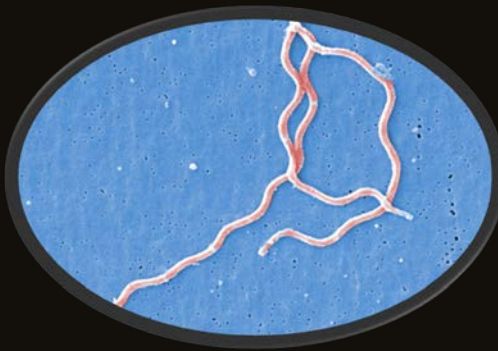
Ticks!



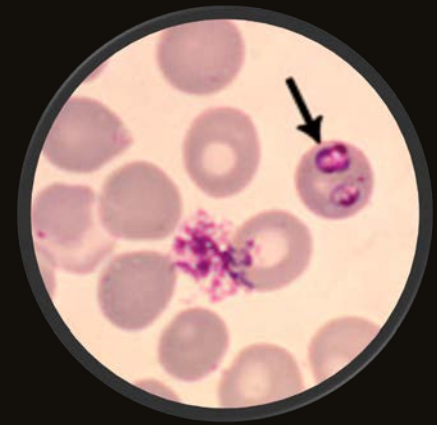
Susan Paskewitz, Department of Entomology
College of Agriculture and Life Sciences
UW Madison



Anaplasmosis



Lyme Disease

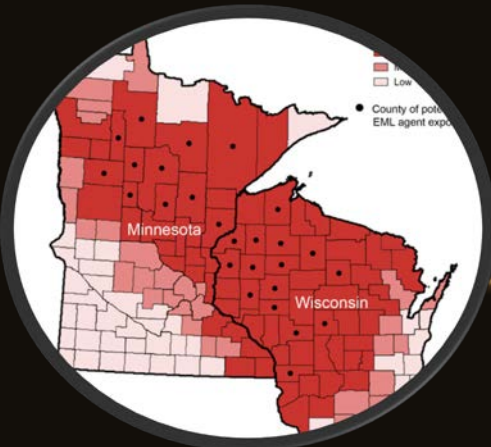


Babesiosis



Ehrlichiosis

Powassan virus



Tick-borne
Relapsing fever



Outline

- Tick Biology
- Prevention and Control
- Surveillance Methods



**Midwest Center
of Excellence**
VECTOR-BORNE DISEASE

Tick biology and natural history

- 15 species in Wisconsin
- Common species include:



Dermacentor variabilis
“wood tick”
American dog tick



Ixodes scapularis
“deer tick”
Black-legged tick



Deer or blacklegged ticks
Ixodes scapularis

Wood tick
Dermacentor variabilis

1 inch

Blacklegged Tick (*Ixodes scapularis*)



Lone Star Tick (*Amblyomma americanum*)



Dog Tick (*Dermacentor variabilis*)



2

Go to <http://labs.russell.wisc.edu/wisconsin-ticks/>
Or Google “Wisconsin Ticks”



WISCONSIN TICKS AND TICK-BORNE DISEASES

Department of Entomology, University of Wisconsin-Madison

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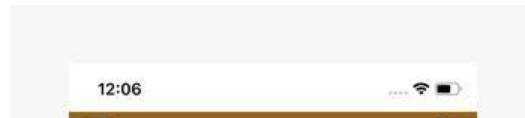
[TICK-BORNE
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Page over to check out the Tick App, our new tool for studying tick exposure and providing mobile information about ticks and tick-borne disease. More than 600 Wisconsinites participated in 2018. The TickApp will launch on May 15 with new features for 2019.



Deer Tick Life Cycle



Nymph



Larva



Female



Male

Blood feeding adult females



[CLICK HERE TO WATCH THEM GROW](#)



**Female Adult-stage *Ixodes scapularis*
Growth Comparison**

<https://tickencounter.org/>



#deeplook #ticks #tickbite

How Ticks Dig In With a Mouth Full of Hooks | Deep Look

https://www.youtube.com/watch?v=_IoOJu2_FKE

Blood = eggs
Female then dies





Adult tick hosts



White tailed deer are
Important for adult
blood meals



Blood feeding nymphs (and larvae)

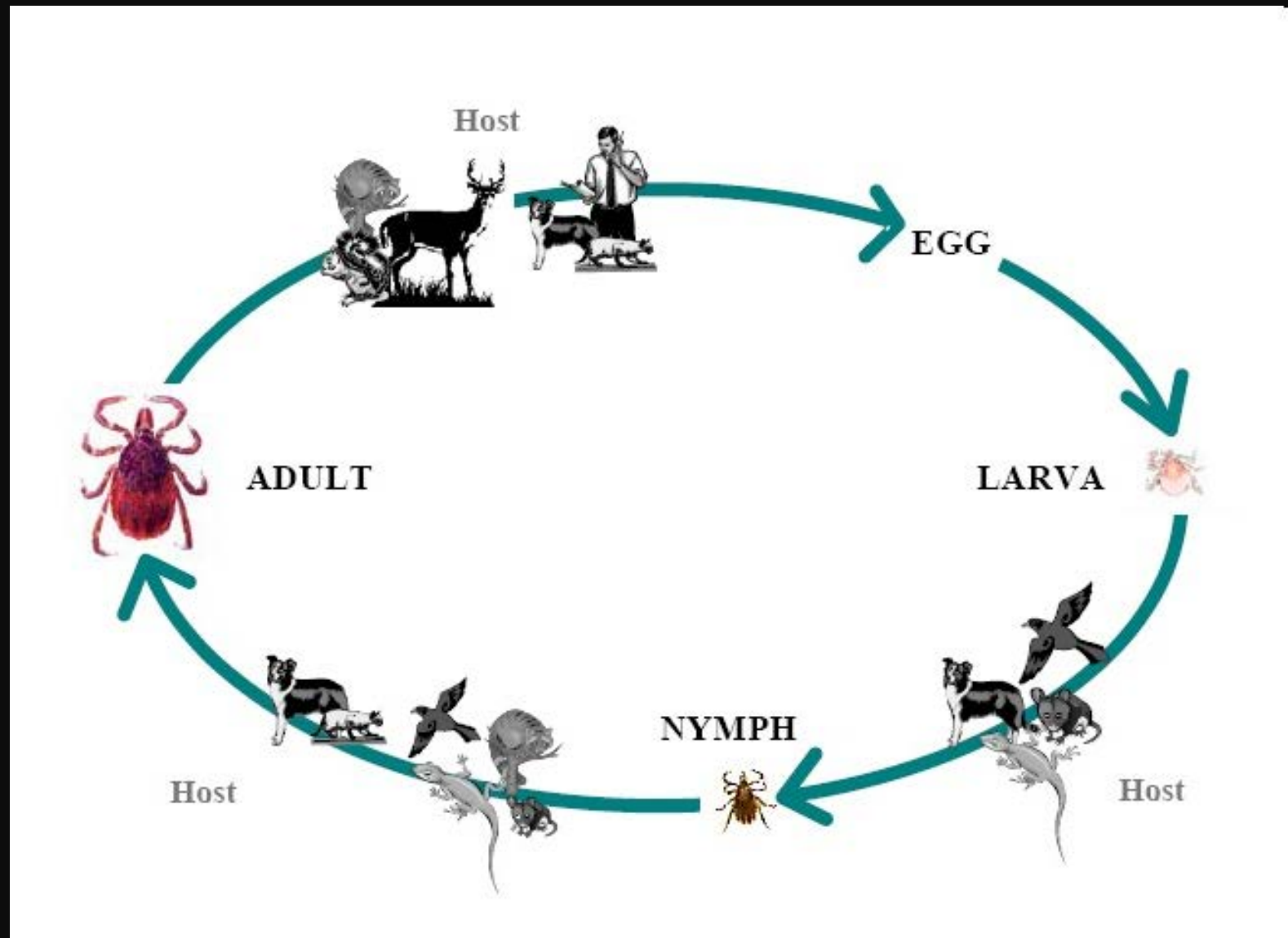
On host for 2-4 days



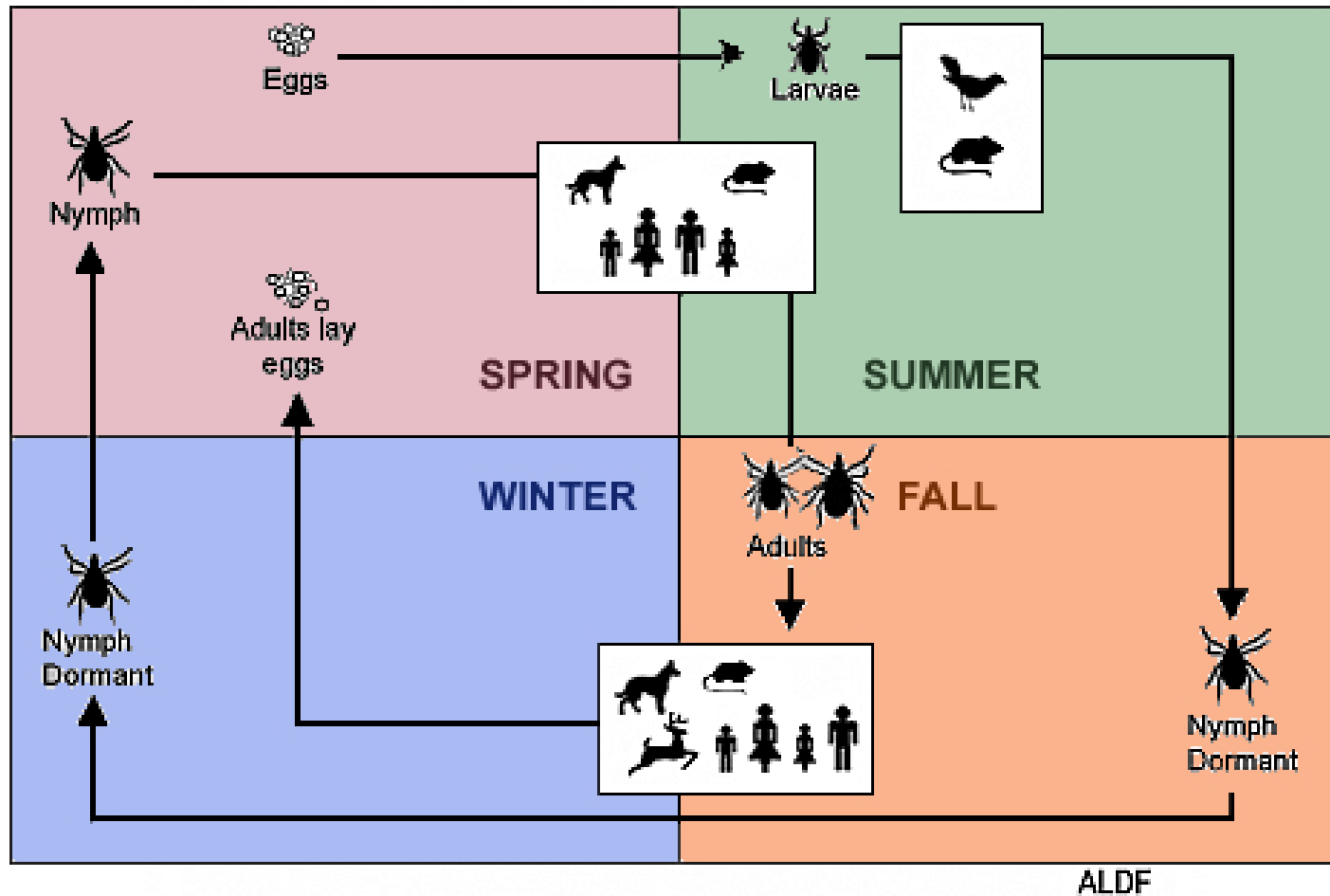
Many animals can feed
larvae and nymphs
of deer ticks



Three host tick: acquisition of pathogens



2-Year Life Cycle of the Deer Tick



Feed, fall off host into leaf litter; slowly digest blood, molt or lay eggs; find another host

Habitats for deer ticks



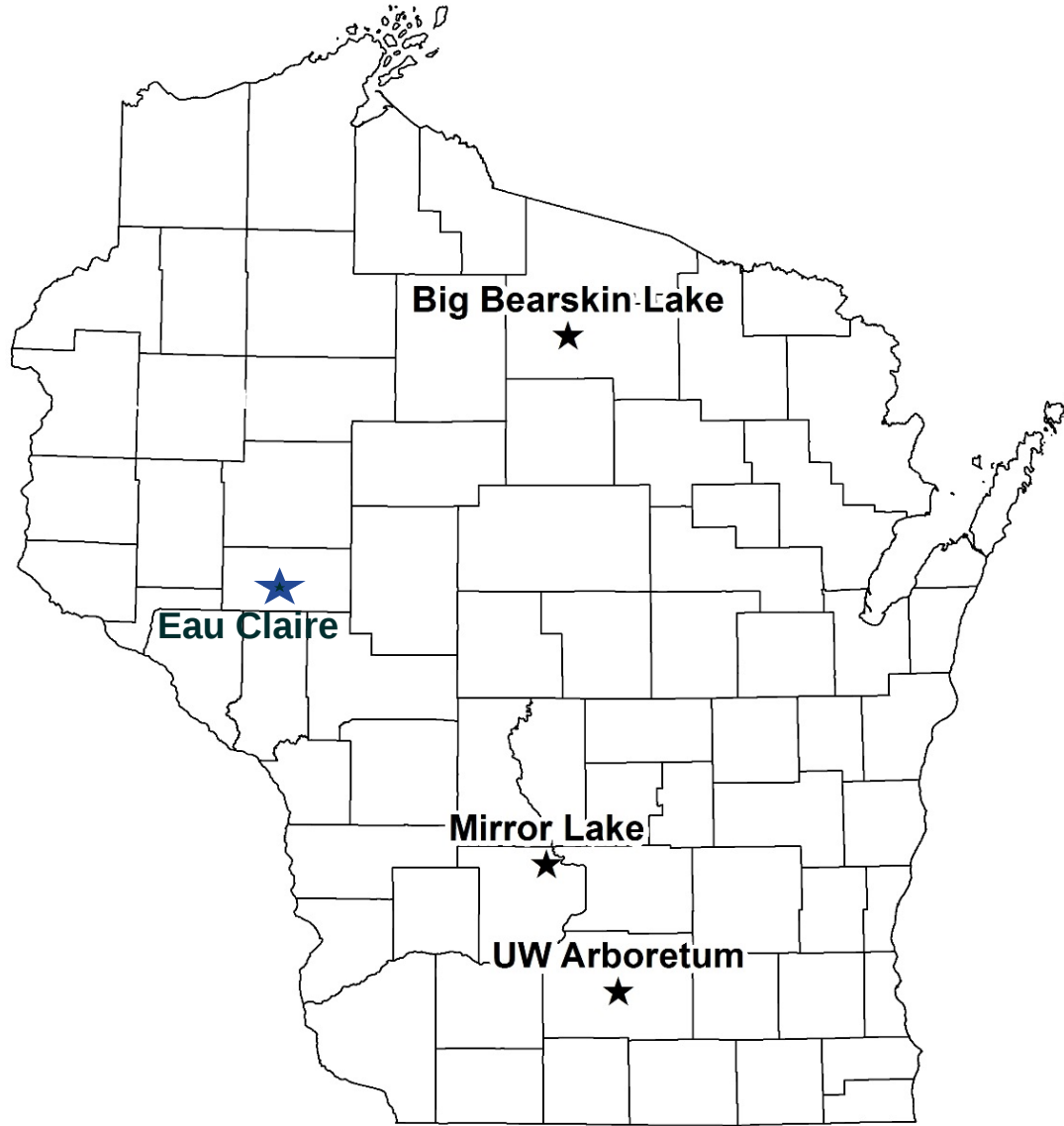
Coniferous and deciduous forests



Edge environments



Unusual places where we find a few deer ticks

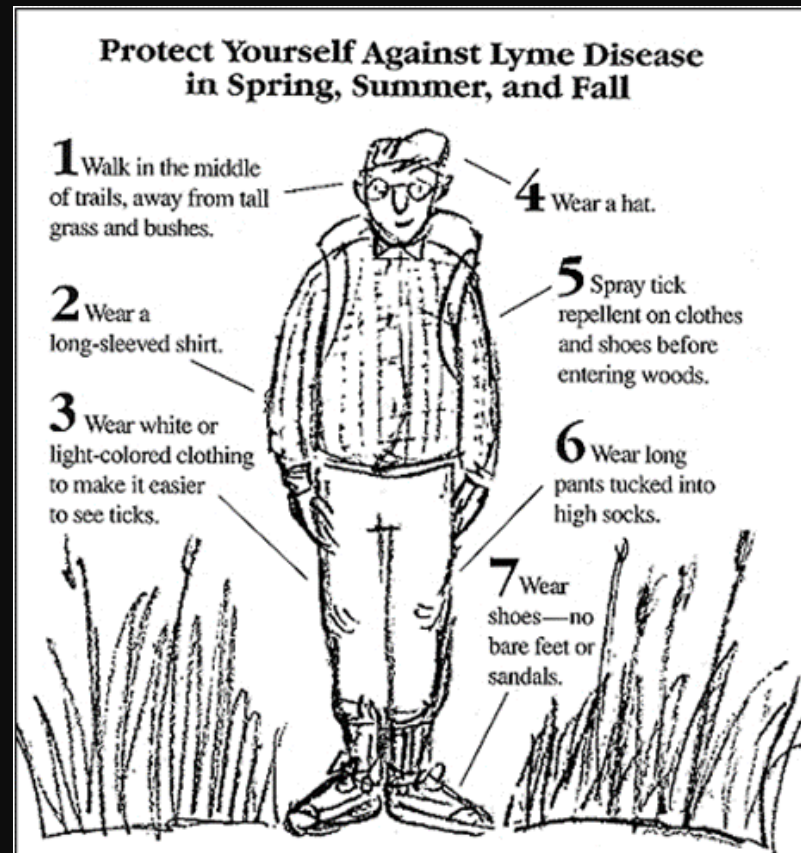




TICKRISKY

TICKSAFE

Prevention and Control



Personal Protection

- Light colored clothing, long pants, long sleeves, closed shoes/socks
- Tick repellents
- DEET, Picaridin (20% or higher)
- 0.5% Permethrin to treat clothing
- Frequent tick checks of clothing and skin
- Full-body tick check and shower at end of day

Finding nymphs is hard



Field crew



Personal Protection

- For field crew, white coveralls, or long sleeved shirts and long pants. Closed toe shoes or boots. Socks to draw up over pants. Duct tape?
- Store field clothes in plastic bag or wash and dry using high heat





Dupont Tyvek Coveralls / Suits



DUPONT TYVEK
Dupont Tyvek 400 Coveralls TY120
★★★★★



DUPONT TYVEK
Dupont Tyvek 400 Coveralls TY122
\$7.17 - \$9.33
[As Low As \\$5.10](#)



DUPONT TYVEK
Dupont Tyvek 400 Coveralls TY125
\$6.39 - \$8.31
[As Low As \\$4.64](#)

Removing a tick



A. Arugay 2002
L. A. County West Vector
Control District

Tick Identification Services



WISCONSIN TICKS AND TICK-BORNE DISEASES

Department of Entomology, University of Wisconsin-Madison

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TICK IDENTIFICATION

TICK IDENTIFICATION SERVICE

Identifying the stage and species of a tick is crucial to deciding whether to seek medical attention or not, because tick-borne diseases are only carried by certain ticks in specific regions.

If you'd like to submit a photo or mail a specimen, use the following link:

[Click here to submit a tick photo or](http://labs.russell.wisc.edu/wisconsin-ticks/tick-identification-for-public-health-and-medical-professionals/)

WANT TO TRY TO IDENTIFY THE TICK YOURSELF?

In the Midwest, the most common ticks on people and pets are the deer tick (also called the blacklegged tick), the wood tick (also called the American dog tick) and the lone star tick. Here we provide some images to help you decide which one you have. Most people notice and find adult ticks but be alert for tiny ticks as well. These might be nymphal deer ticks or larval/nymphal lone star ticks.



© Heriberto Venzugo M. & Darby S. Murphy

<http://labs.russell.wisc.edu/wisconsin-ticks/tick-identification-for-public-health-and-medical-professionals/>

Identification services

PJ Liesch

@WiBugGuy

<http://labs.russell.wisc.edu/insectlab/>



UW Madison Department of Entomology
Insect Diagnostic Lab



Insect Diagnostic Lab

Department of Entomology

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RECENT BLOG POSTS

Identifying Insects by Smell,
Part 2: Odorous House Ants
April 24, 2019

Spring's Coming...and so are
the Insects
March 13, 2019

2018's Top Trends from the Di-
agnostic Lab (Part 2)



ANTS, INDOOR/KITCHEN INSECTS, OUTDOOR INSECT
INVADERS

IDENTIFYING INSECTS BY SMELL, PART
2: ODOROUS HOUSE ANTS



BETTER, BORERS, IN THE NEWS, INVASIVE SPECIES, OUTDOOR
INSECT INVADERS, PHENOLOGY, TICKS

SPRING'S COMING...AND SO ARE THE
INSECTS



ANTS, BUGS, CATERPILLARS, FLIES, INDOOR FLIES, INDOOR
GNATS, INVASIVE SPECIES, MOTHS, OUTDOOR INSECT
INVADERS

2018'S TOP TRENDS FROM THE
DIAGNOSTIC LAB (PART 1)

Identification services

 University of Rhode Island
TickEncounter Resource Center



HOME ABOUT TICKSMART™ F.A.Q. TICK IDENTIFICATION TICK TESTING PREVENTION TICKSPOTTERS BLOG PARTNER RESOURCES

[TickSpotters](#)  [Submit Form](#) | [Photo Tips](#) | [Veterinary Clinic Program](#)

 **Spot a tick - submit a pic!**

Review our 3 step guide with tips to **improve your photo submission**: [Photo Tips](#)

Tick Identification Quick Reference
(click for full interactive tool)

LARVA, NYMPH, MALE, FEMALE

Blacklegged or Deer tick



American Dog tick



TickSpotters is a crowdsourced tick survey tool that sources information on tick encounters from around North America, and provides users with tailored risk assessment reports.

By submitting a tick photo and completing the submission form, you are actually taking part in a research study. The purpose of the study is to track tick distributions, seasonal trends, and encounter factors for humans and pets. Please [read the following](#) before agreeing to be in the study.

By unclicking "I AGREE", you are opting to exclude your submission from our study.

☒ I Agree

[Select a File](#)

Please upload your tick photo here. (Please check - file size must be less than 25MB)

* required fields

First Name

Last Name

- https://tickencounter.org/tickspotters/submit_form

Tick testing

- Surveillance versus the general public
- For surveillance goals, CDC may test under certain conditions
- For general public, several providers will test ticks for a fee
- CDC does not recommend tick testing for the general public

Lyme disease control toolbox



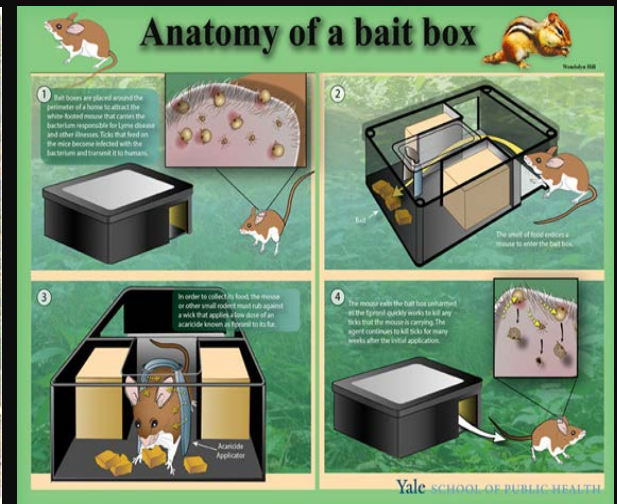
Personal Protection Measures	Treatment/Vaccination in Humans	Landscape/Vegetation Management	Killing of Host-Seeking Ticks	Rodent-Targeted Approaches	Deer-Targeted Approaches
Avoidance of tick habitat	Antibiotic prophylaxis after tick bite	Xeroscaping / Hardscaping	Synthetic chemical acaricide	Topical acaricide bait box	Topical acaricide feeding station
Physically protective clothing	Human vaccine	Keep grass short, remove weeds	Natural product-based acaricide	Oral vaccine	Deer reduction
Regular tick checks & Prompt removal		Remove leaf litter and brush	Fungal acaricide	Oral antibiotic bait	Deer fencing
Synthetic chemical repellent		Remove rodent harborage		Oral tick growth regulator	Oral tick growth regulator
Natural product-based repellent		Avoid plants that attract deer			Anti-tick vaccine for deer
Permethrin-treated clothing		Move play structures to low risk areas			
Natural product-based acaricidal soap/lotion					

Note: Yellow text denotes intervention that is not currently available but under development

<https://www.bayarealyme.org/blog/cdc-talk/>

Evidence-based tick control

- Landscape management
- Barrier sprays between woods/grassy yards
- Target mice



The Tick App: 2019



What is it about? Lyme disease! And other things related to ticks: how to identify them, how to report them and, most importantly for the research team, it asks about your whereabouts and tick encounters.

This is research? Yes, and it also reminds you to check for ticks and take precautions to not get bitten!

What do I need to do? How can I participate?

1. Download the app (>18y old)
2. Complete the consent form and enrollment questions
3. Start filling in daily tick diaries

More information: www.thetickapp.org or tickapp@wisc.edu

 **Midwest Center of Excellence**
VECTOR-BORNE DISEASE

What is in it for me?

1. You have a free reminder to check for ticks
2. You can report a tick at any time
3. Your shared information helps to identify risk factors for ticks encounters and this will be used to develop better prevention strategies.

- **Information for you:**
 - Tick 101
 - Coming this year:
 - Tick Activity
 - Tick identification
- **Information provided by you:**
 - Daily log: What (outdoor) activities do you do?
 - Report-a-Tick: What tick species do you find? Where did you get it? What were you doing?

Survey of knowledge and behaviors related to ticks and tick control



HELP US PREVENT
TICK BITES!

Midwest Center of Excellence for Vector-Borne Disease
University of Wisconsin-Madison
1656 Linden Drive
Madison, WI 53706

Take a 5-minute survey
& get a \$10 gift card!*



Dear Resident,

The Wisconsin Department of Health Services, Midwest Center of Excellence for Vector-Borne Disease, and the CDC invite you to take a survey about ticks and the diseases they spread. We want to know what issues matter to you most.

Please have the adult in your house who had the most recent birthday take this survey.

This voluntary survey will take 5-10 minutes. Your responses are confidential. We will mail you a \$10 gift card* after you complete the survey.

PLEASE NOTE:

1. This survey expires in 4 weeks.
2. After you take the survey, keep your access code until you have received your gift card.
3. Questions or trouble? Call 608-890-0723 or email mcevbd@wisc.edu.

Thank you!



Midwest Center
of Excellence
VECTOR-BORNE DISEASE

Sponsored by



WISCONSIN DEPARTMENT
of HEALTH SERVICES

To Take This Survey



Ask the adult in your house who had the most recent birthday to take this survey

Go to
www.cdc.gov/ticknet/midwest
OR
call 608-890-0723



Find your access code above your address on the back of this postcard & take the survey

Get a \$10 gift card
in the mail*

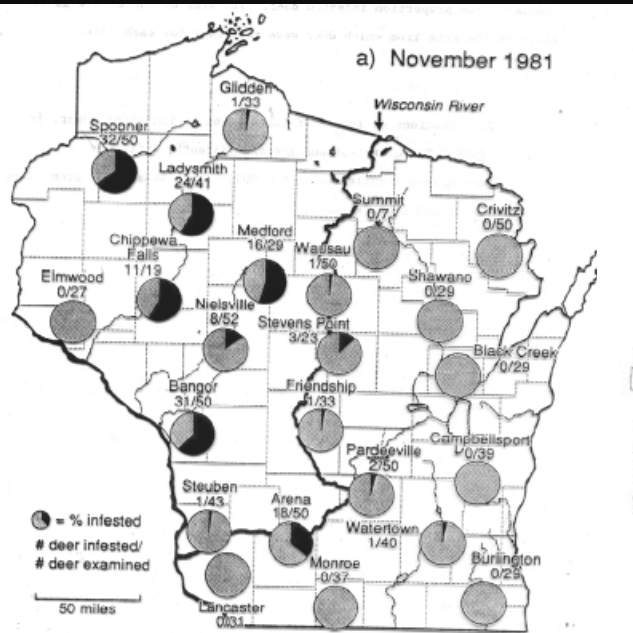


*The first 1,000 people who take the survey will get a gift card

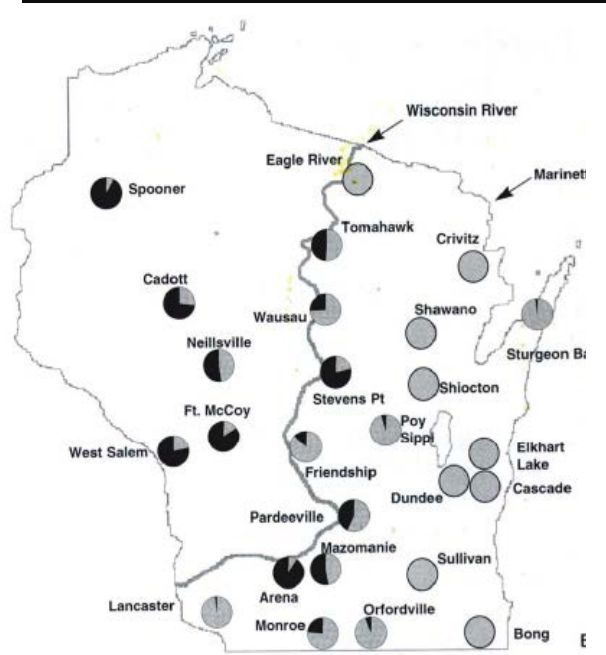
Surveillance for I. scapularis deer ticks in Wisconsin

Hunter killed deer- Tick Surveys

1981



1994



2008-2009

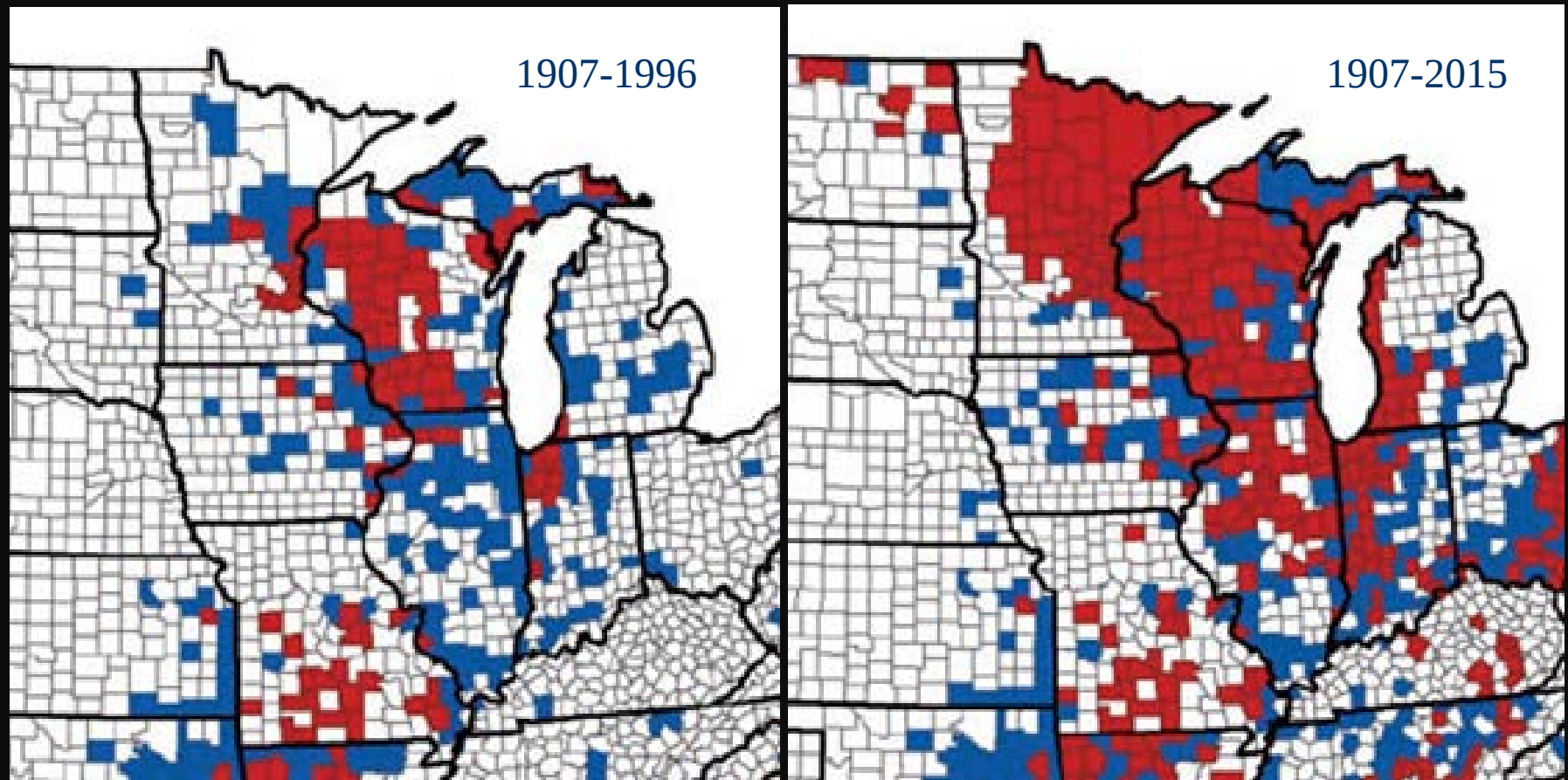
Wisconsin Surveillance of Ticks Collected from Deer During Hunting Season, 2008-2009



Dark color=%infested
 (#deer infested/# deer
 examined)

Dark color of the pie= % deer infested with *Ixodes* ticks.

Deer ticks in the Upper Midwest Established (red), Detected (blue) or no information (white)

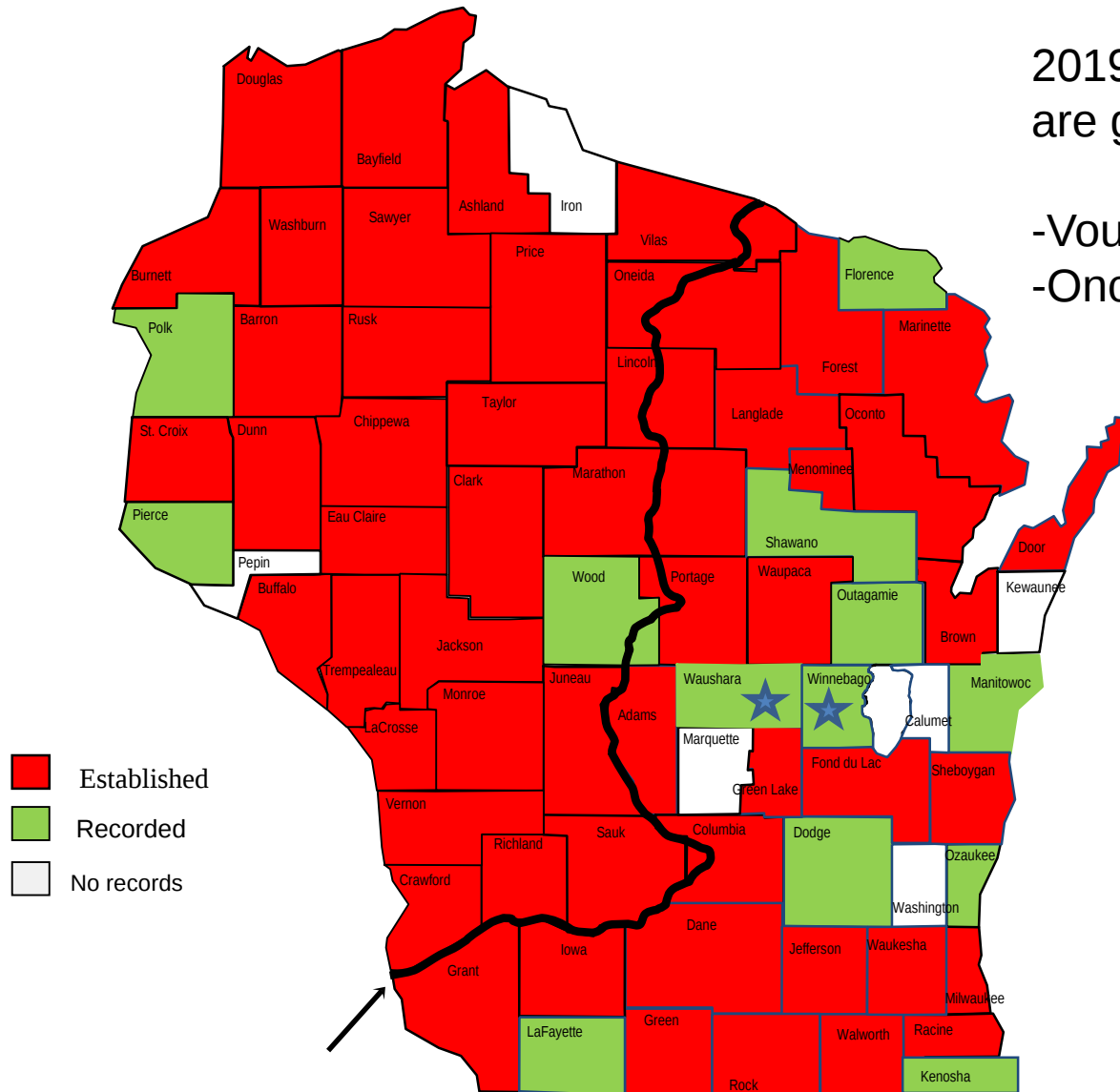


Eisen et al. J Med Entomol. 2016 Mar; 53(2): 349–386.

Surveillance for deer ticks

1. Classify county status for *Ixodes scapularis*
 - Established: more than 6 *I. scapularis* of a single life stage or more than 1 life stage collected per county within a 12 month period
 - Reported: less than 6 *I. scapularis* of a single life stage collected per county within a 12 month period
 - No records

County Status for Deer tick (blacklegged tick) Distribution in Wisconsin



2019 priority counties
are green and white

-Voucher specimens
-Once red, stays red

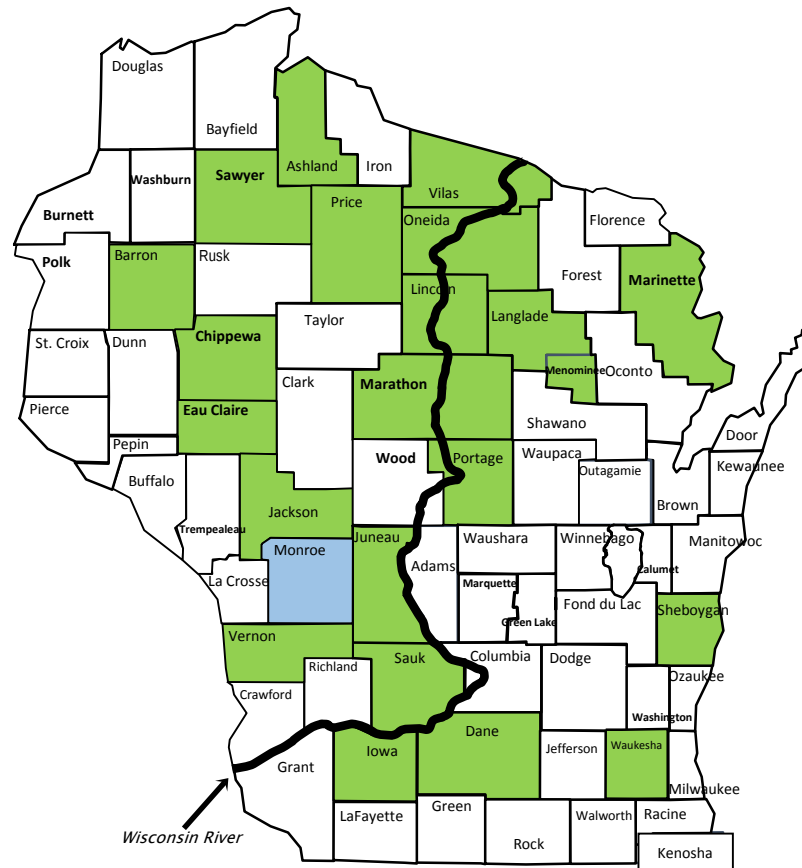
Summary of methods that can be used for establishing county status

Collection Method	Objective: Classify county status
Dragging/Flagging	Acceptable
Walking	Acceptable
CO2 traps	Acceptable
Ticks collected from deer	Acceptable
Ticks collected from small- or medium-sized mammals, birds, lizards	Acceptable
Ticks from people/pets	Acceptable, if travel history is accounted for

Surveillance for deer ticks

1. Classify county status for *Ixodes scapularis*
2. Classify county status for presence of specific pathogens in ticks

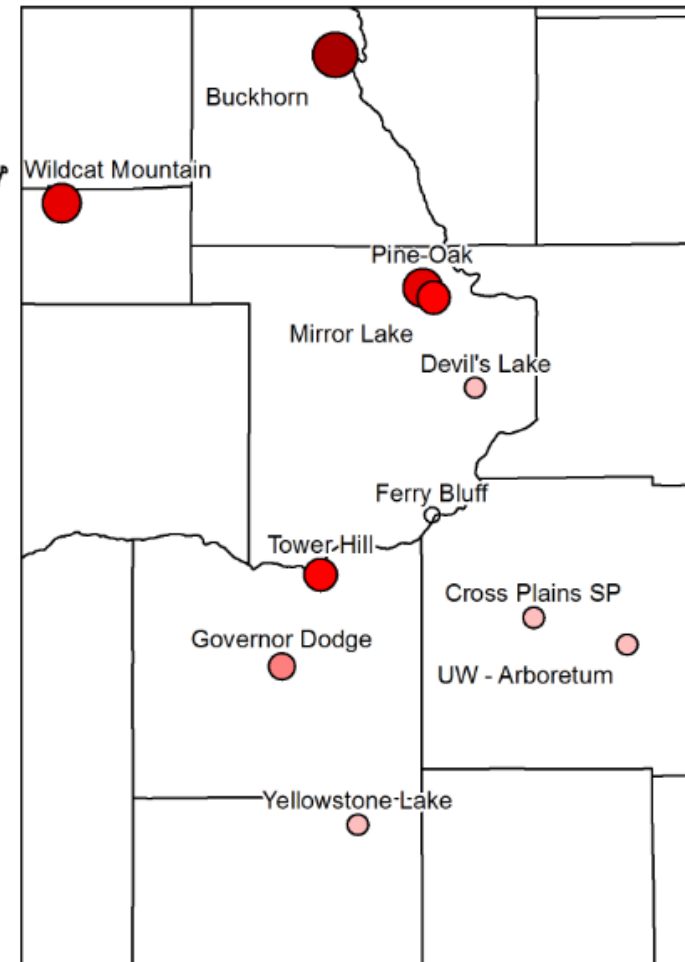
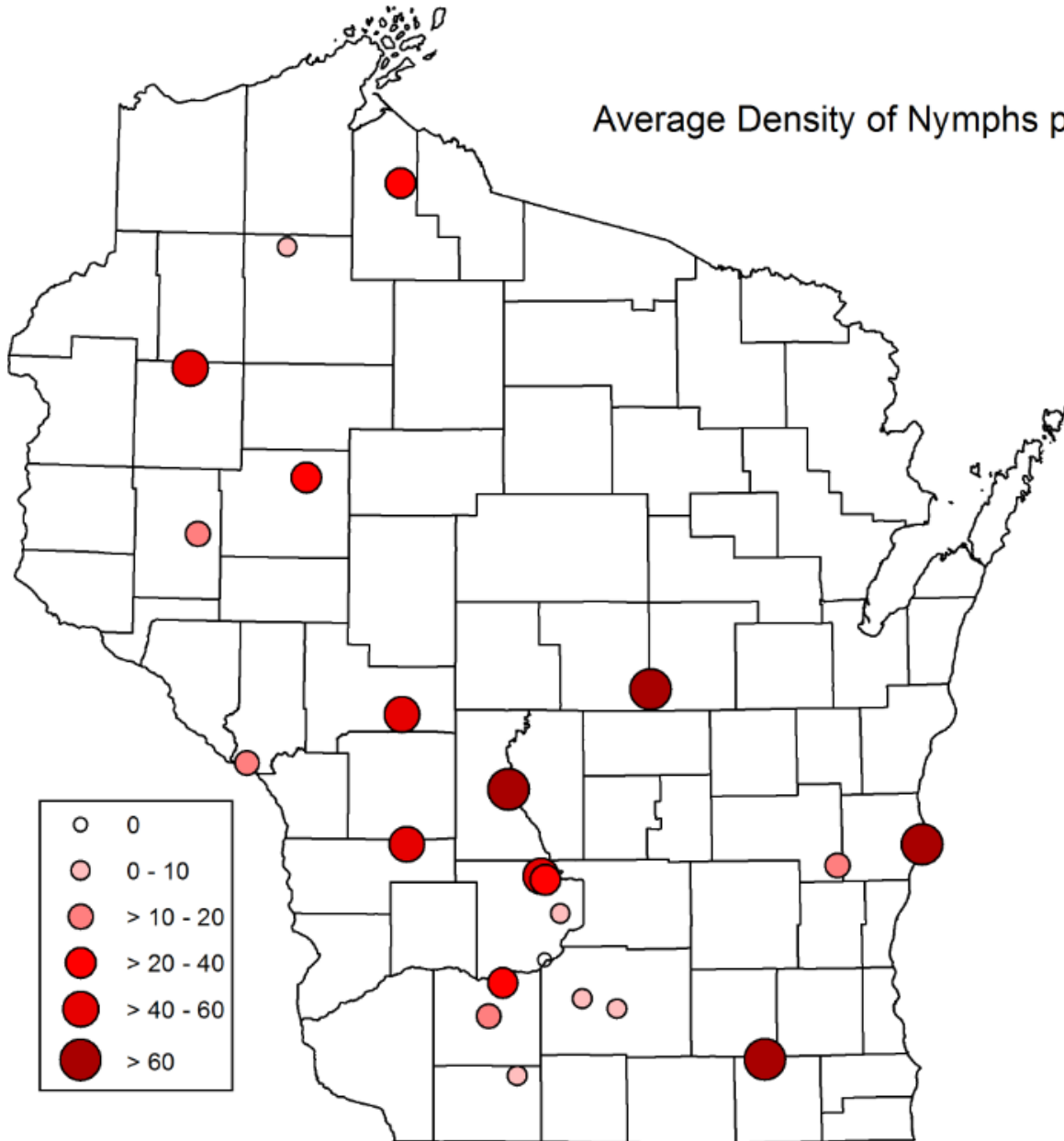
Borrelia burgdorferi presence in questing nymphs



Surveillance for deer ticks

1. Classify county status for *Ixodes scapularis*
2. Classify county status for presence of specific pathogens in ticks
3. Generate estimates for prevalence of pathogens in nymphs or adults and density of host-seeking infected nymphs or adults: RISK ESTIMATES
4. Document host-seeking phenology of all life stages

Average Density of Nymphs per 1000m² from 2015-2017



2018 Nymphal Infection rates for *Borrelia burgdorferi*

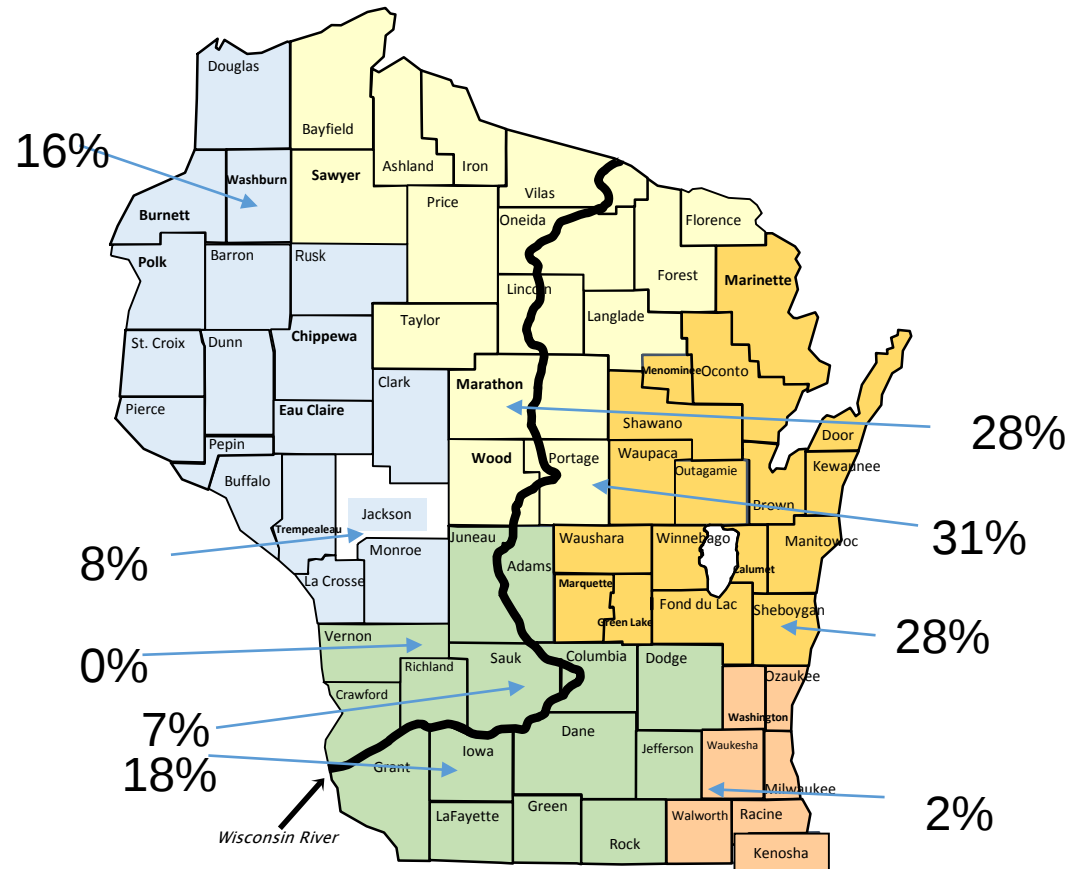
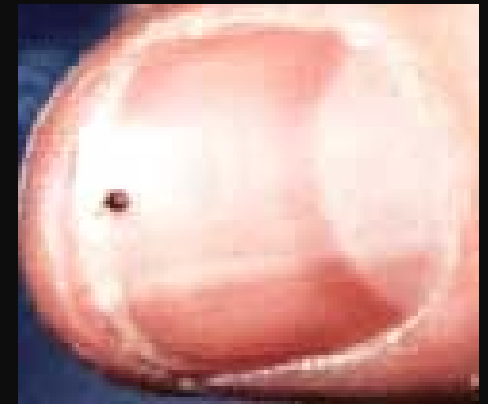
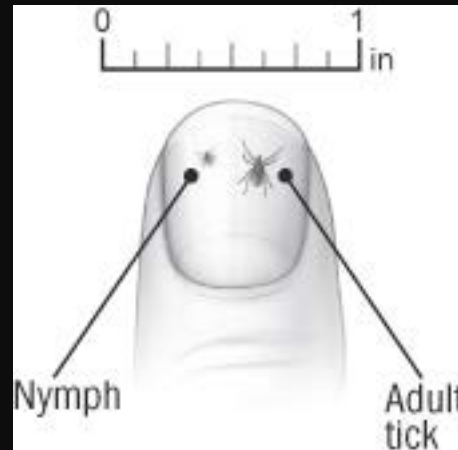


Table 2. Summary of tick collection methods that are acceptable or unacceptable for each surveillance objective.

Collection Method	Objective: Classify county status	Objective: Presence/Prevalence of pathogens in ticks	Objective: DON/DIN or DOF/DIF	Objective: Phenology
Dragging/Flagging	Acceptable	Acceptable	Acceptable	Acceptable
Walking	Acceptable	Acceptable	Not Acceptable	Acceptable
CO2 traps	Acceptable	Acceptable for presence, but not prevalence	Not Acceptable	Not Acceptable
Ticks collected from deer	Acceptable	Acceptable for presence, but not prevalence	Not Acceptable	Not Acceptable
Ticks collected from small- or medium-sized mammals, birds, lizards	Acceptable	Acceptable for presence, but not prevalence	Not Acceptable	Acceptable
Ticks from people/pets	Acceptable, if travel history is accounted for	Acceptable for presence, but not prevalence	Not Acceptable	Not Acceptable



Collecting Nymphs by Dragging



Nymphs do most of the Lyme Disease transmission
Peak is in June but nymphs continue to be active until fall

Questing



Surveillance for deer ticks

- Report # of questing nymphs per 100m² (=DON; density of nymphs)
- Requires at least 750 m² dragged per site; inspect drags every 10-20 m; sample at peak nymphal activity period
Estimate based on 2-3 visits to site during seasonal peak
- Peak for nymphs is June through 1st 1-2 weeks in July.
- Requires at least 1 site sampled per county but multiple sites representing the range of suitable habitat is better
- Only distance-based Density of Nymphs (DON) is accepted by CDC for comparing across sites

Sampling tips

- Don't sample when it's raining
- Don't sample when it's cold or windy
- Don't sample when vegetation is wet and saturates the drag
- Noon seems to be a lull in activity
- Sometimes early evening is good

Ticks for testing

- Usually not from animals
- 25-50 nymphs
- 70-95% Ethanol
- RNALater (Powassan virus)
- Frozen at -80 without preservatives

??