Ticks and Tick-borne Disease

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Outline

- Ticks and tick biology
- Changes in tick distribution
- Lyme Disease
- Other tick-borne disease
- Disease prevention

Tick biology and natural history

- 15-17 species in Upper Midwest
- Most common species include:

Dermacentor variabilis
“wood tick”
American dog tick

Ixodes scapularis
“deer tick”
Black-legged tick

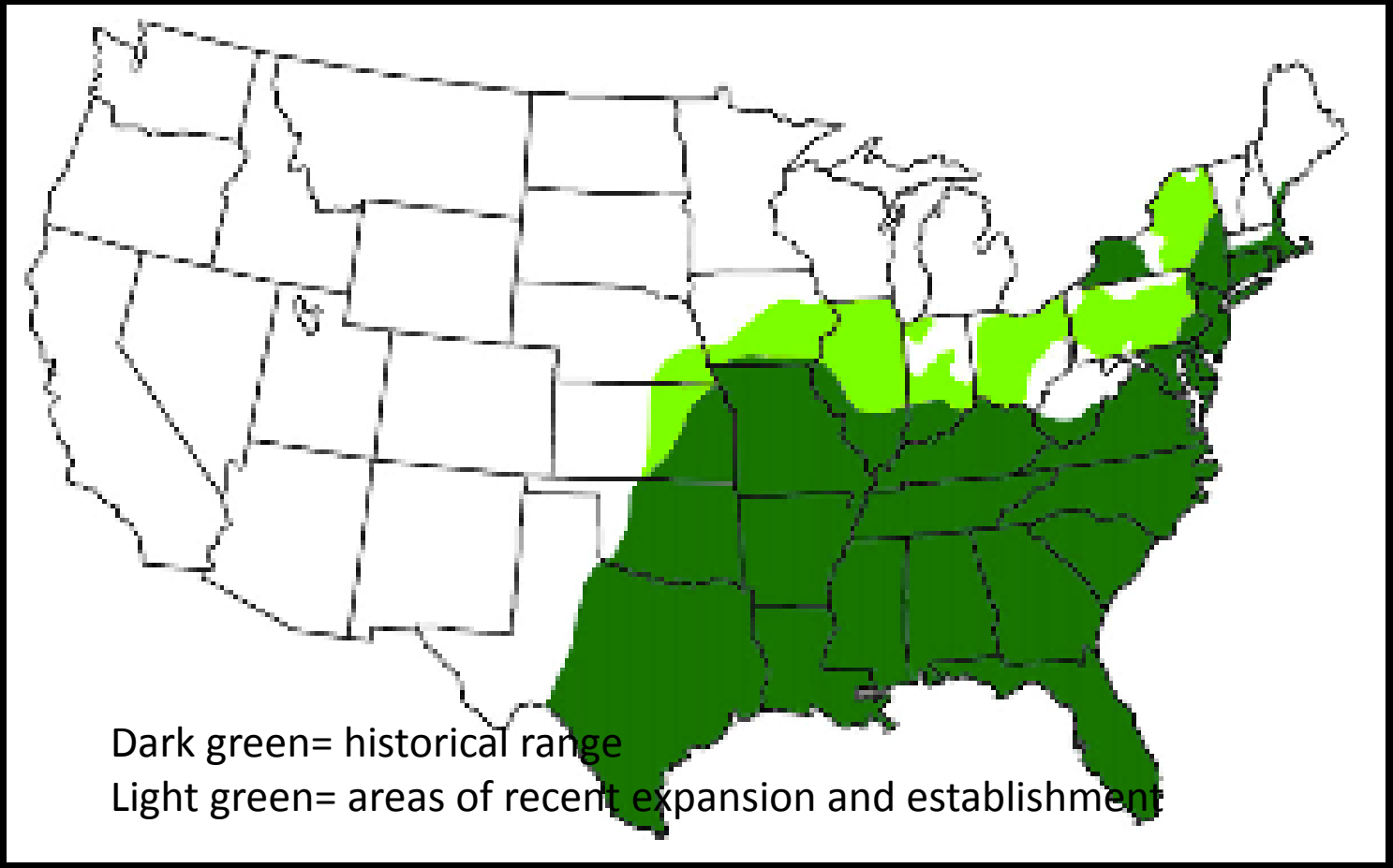
New Tick?

Lonestar Tick

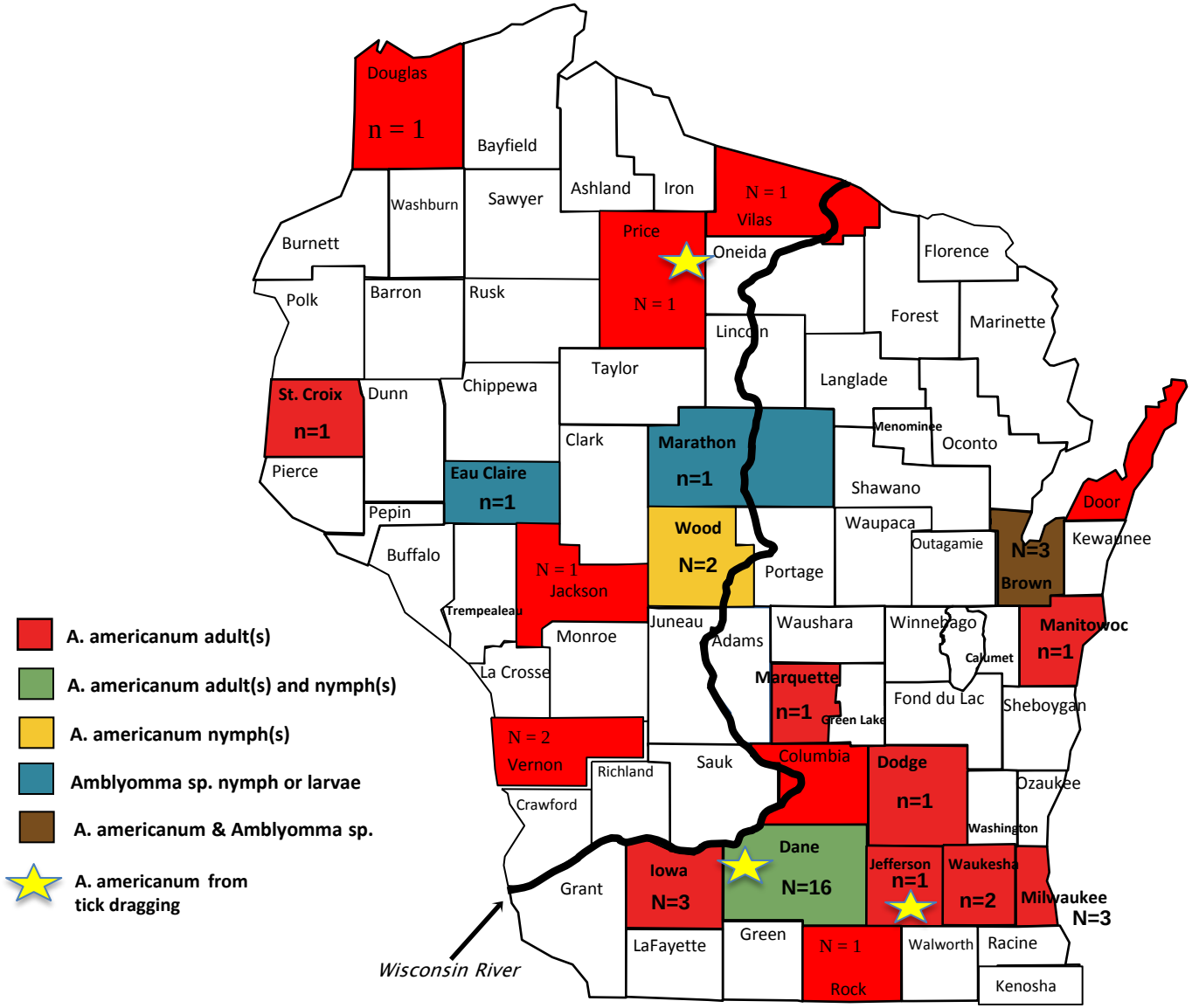
Wisconsin foresters: Please send these with collection location and date to:

Susan Paskewitz
Dept of Entomology
237 Russell Labs
1630 Linden Drive
Madison, Wi 53706

Approximate distribution of *Amblyomma americanum* (Lonestar tick)



Amblyomma americanum records in Wisconsin 2006-2015



Lone star ticks and meat allergies

1 inch

2

Blacklegged Tick *(Ixodes scapularis)*

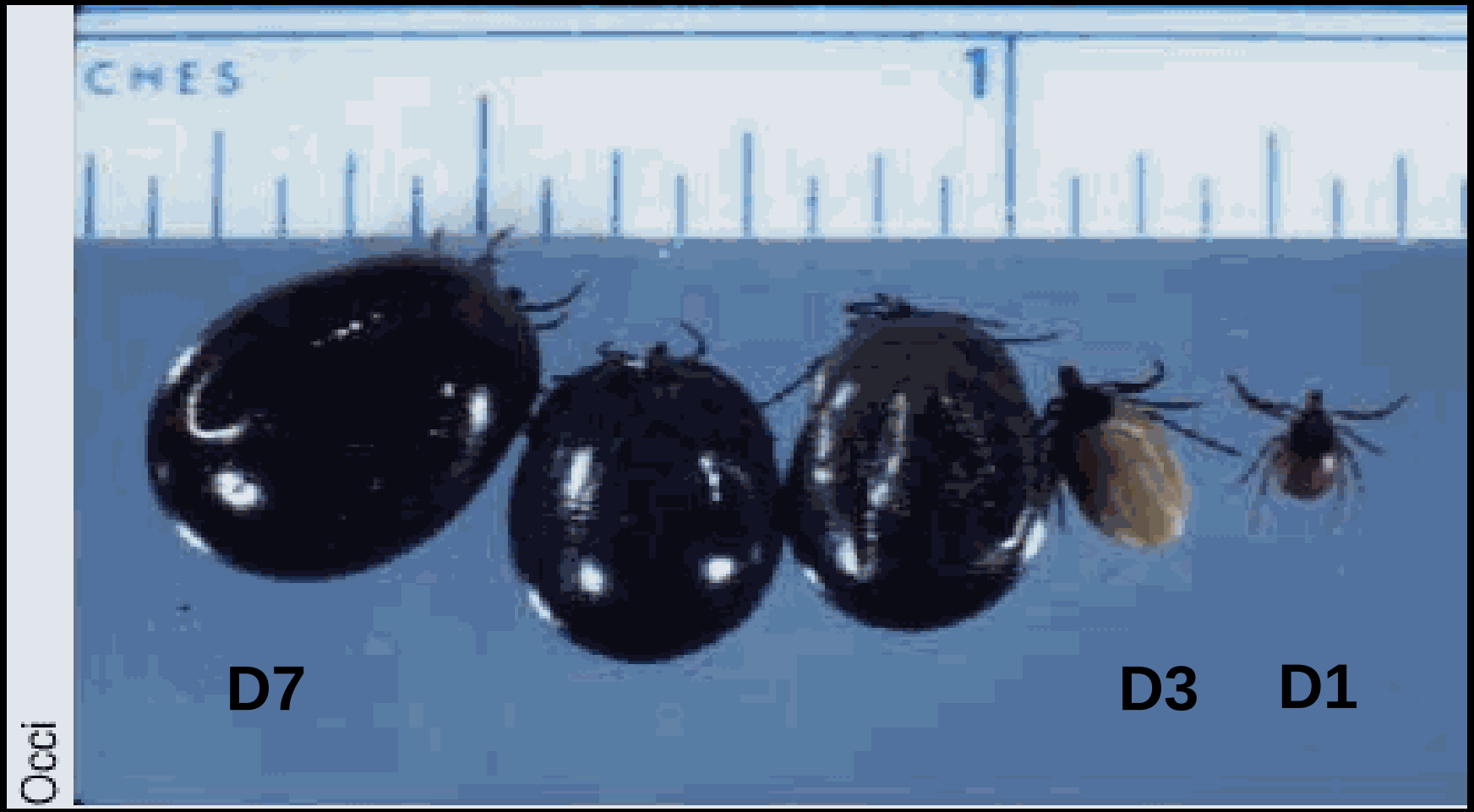
adult female | adult male | nymph | larva

Lone Star Tick *(Amblyomma americanum)*

Dog Tick *(Dermacentor variabilis)*

Life Cycle

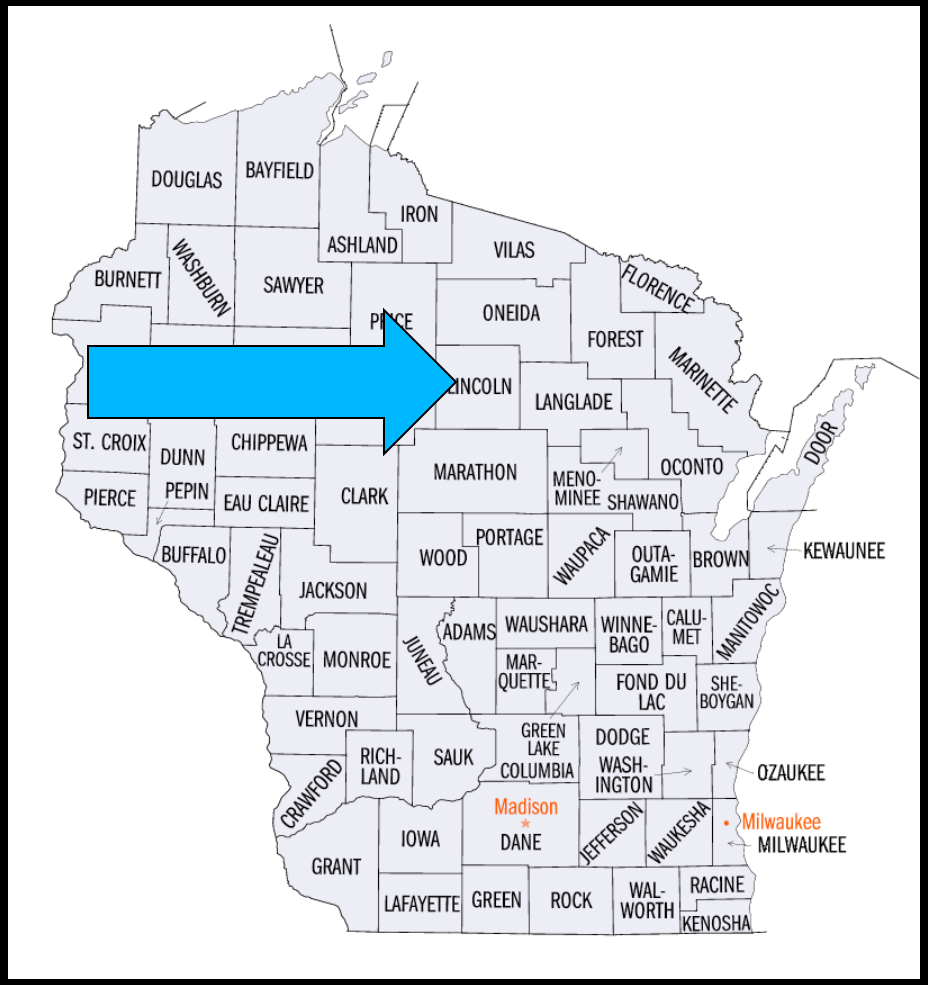
Blood feeding adult females



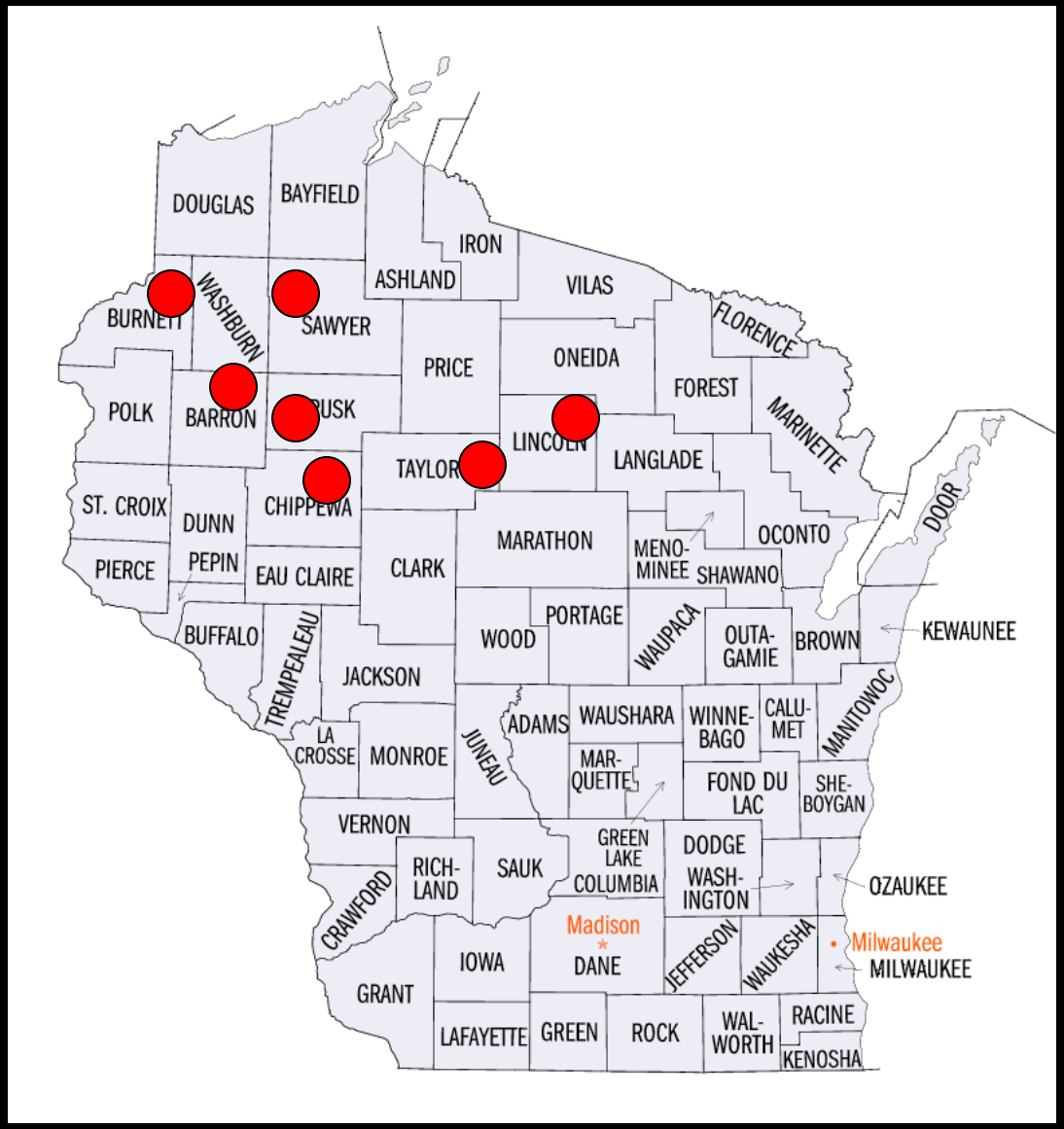
Blood = eggs

Wildlife can feed larvae and nymphs of deer ticks

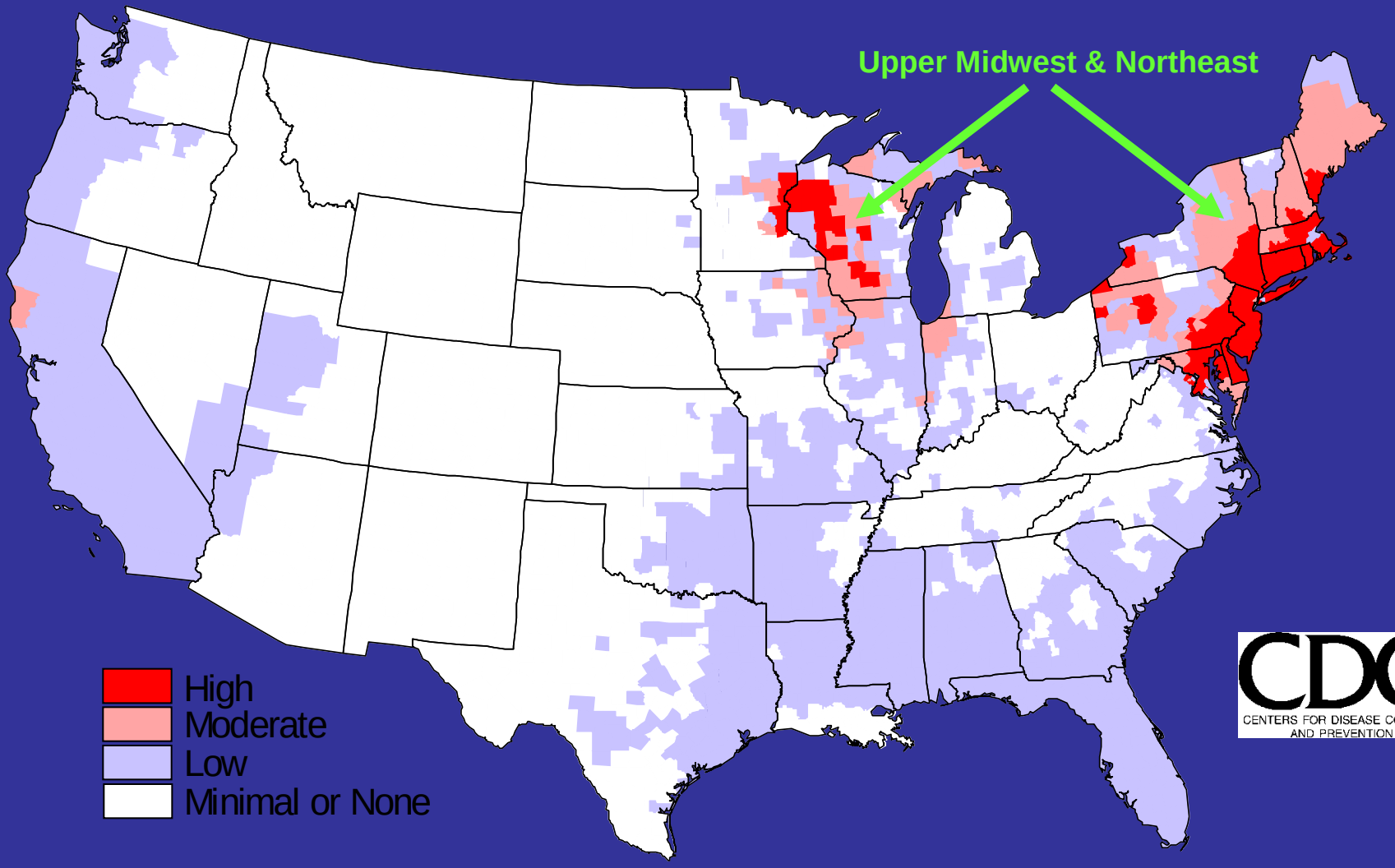
First record of deer tick in 1965: Forestry workers in Lincoln County



1965-1970


DOUGLAS
BAYFIELD
IRON
ASHLAND
VILAS
FLORENCE
BURNETT
WASHBURN
SAWYER
PRICE
ONEIDA
FOREST
MARINETTE
POLK
BARRON
RUSK
LINCOLN
LANGLADE
DOOR
TAYLOR
ST. CROIX
DUNN
CHIPPEWA
MARATHON
MENO-
MINEE
OCONTO
SHAWANO
PIERCE
PEPIN
EAU CLAIRE
CLARK
BUFFALO
TREMPEALEAU
WOOD
PORTAGE
WAUPACA
OUTA-
GAMIE
BROWN
KEWAUNEE
JACKSON
ADAMS
WAUSHARA
WINNE-
BAGO
CALU-
MET
MANITOWOC
LA
CROSSE
MONROE
JUNEAU
MAR-
QUETTE
FOND DU
LAC
SHE-
BOYGAN
VERNON
GREEN
LAKE
DODGE
RICH-
LAND
SAUK
COLUMBIA
WASH-
INGTON
OZAUKEE
CRAWFORD
Madison
IOWA
DANE
JEFFERSON
WAUKESHA
Milwaukee
MILWAUKEE
GRANT
LAFAYETTE
GREEN
ROCK
WAL-
WORTH
RACINE
KENOSHA

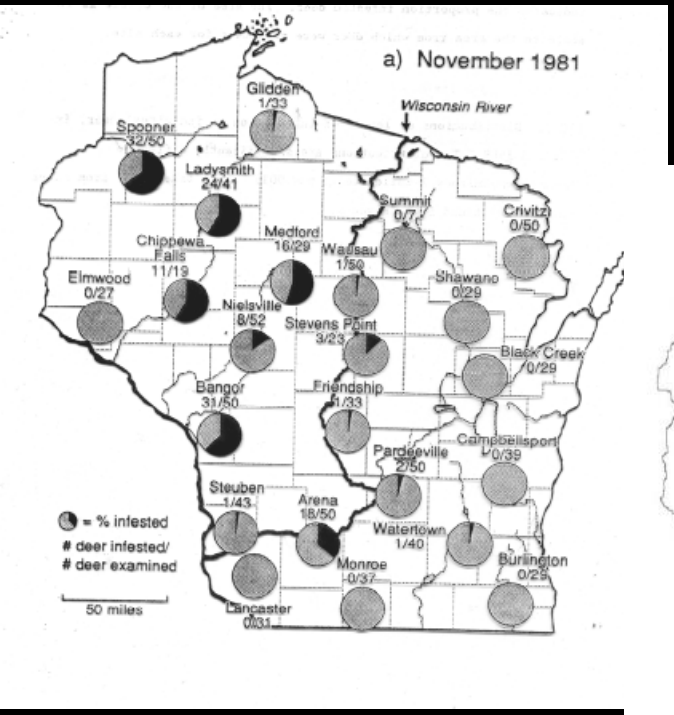
Lyme Disease High Risk Areas



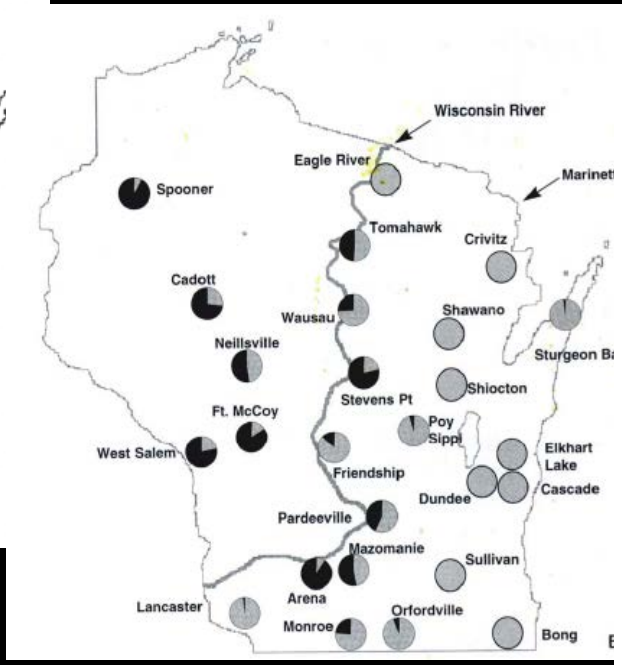
Changing distribution of deer ticks

Hunter killed deer- Tick Surveys

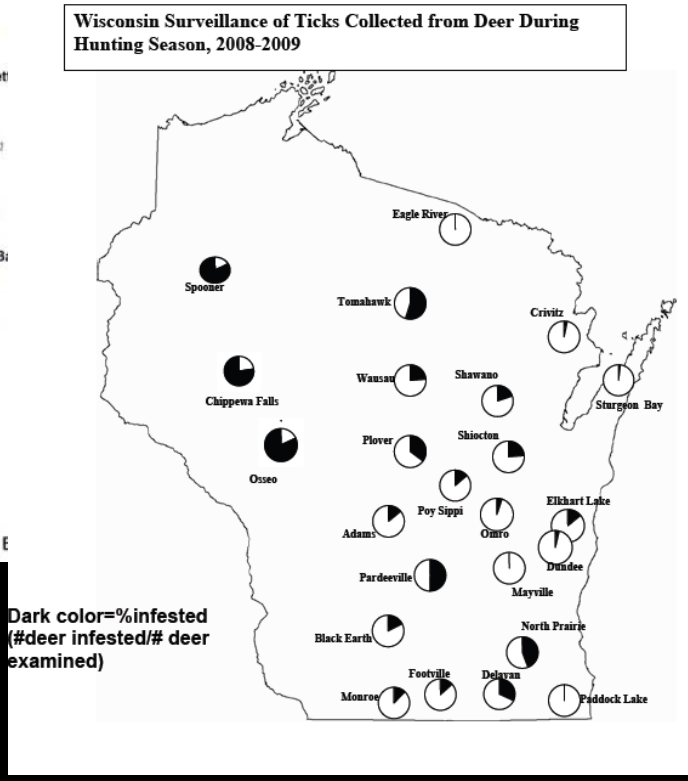
1981



1994

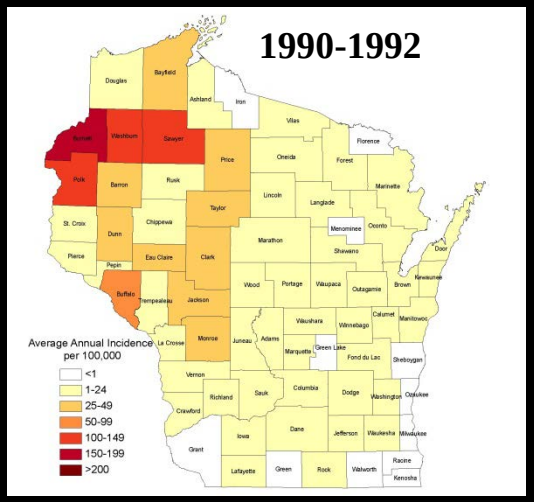


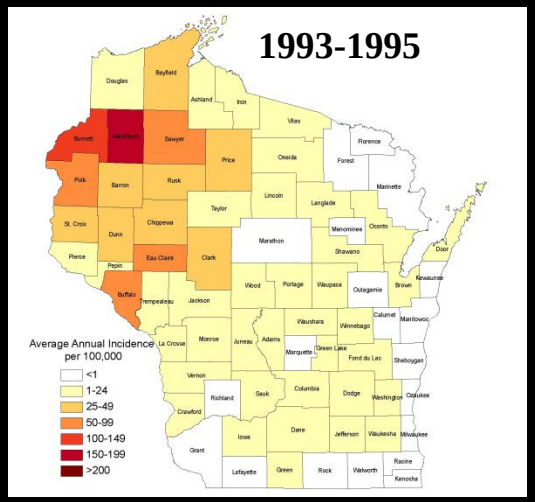
2008-2009

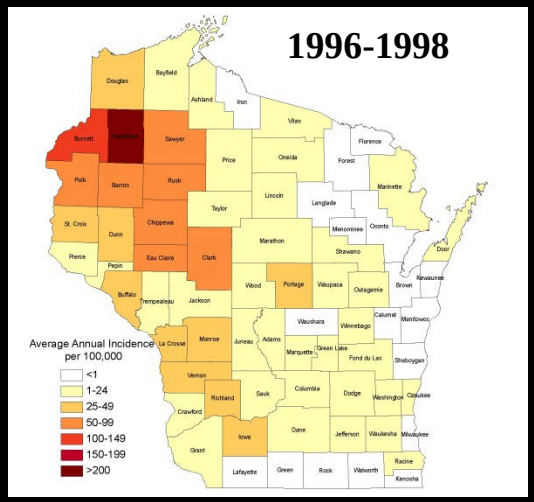


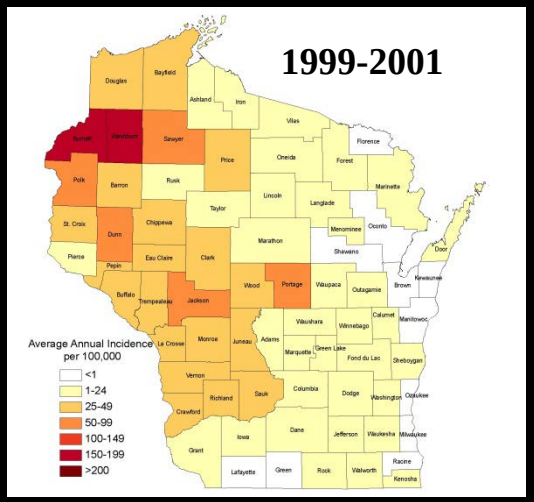
Dark color of the pie= % deer infested with *Ixodes* ticks.

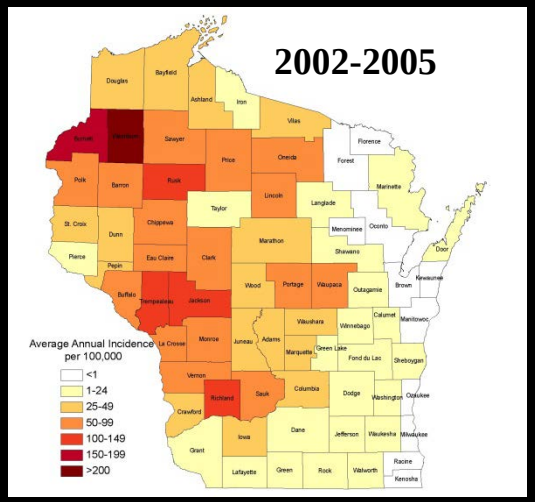
Lyme disease average annual incidence Wisconsin, 1990-2010, by county

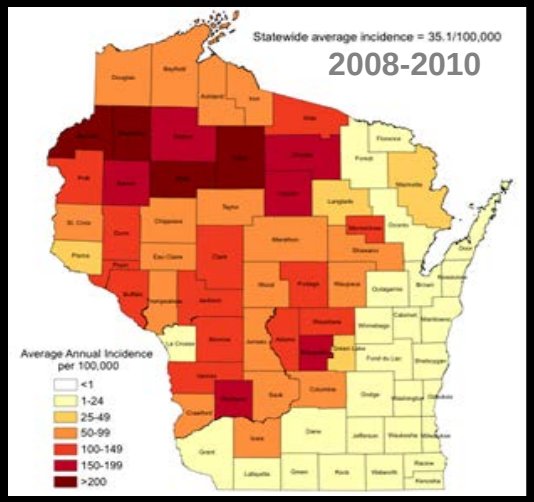




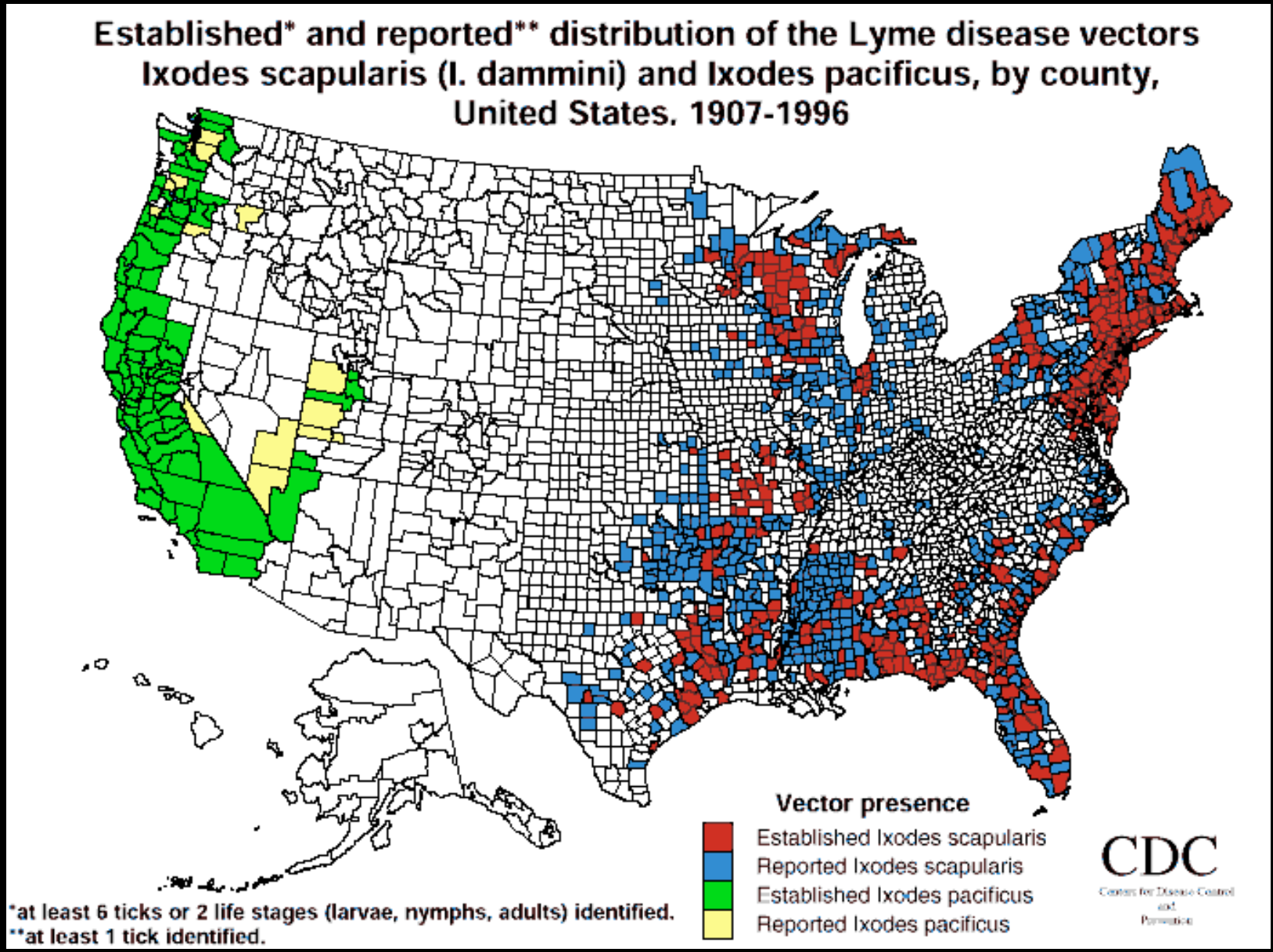








Updated map of deer tick range in progress



Diseases Transmitted by the Deer Tick in the Midwest

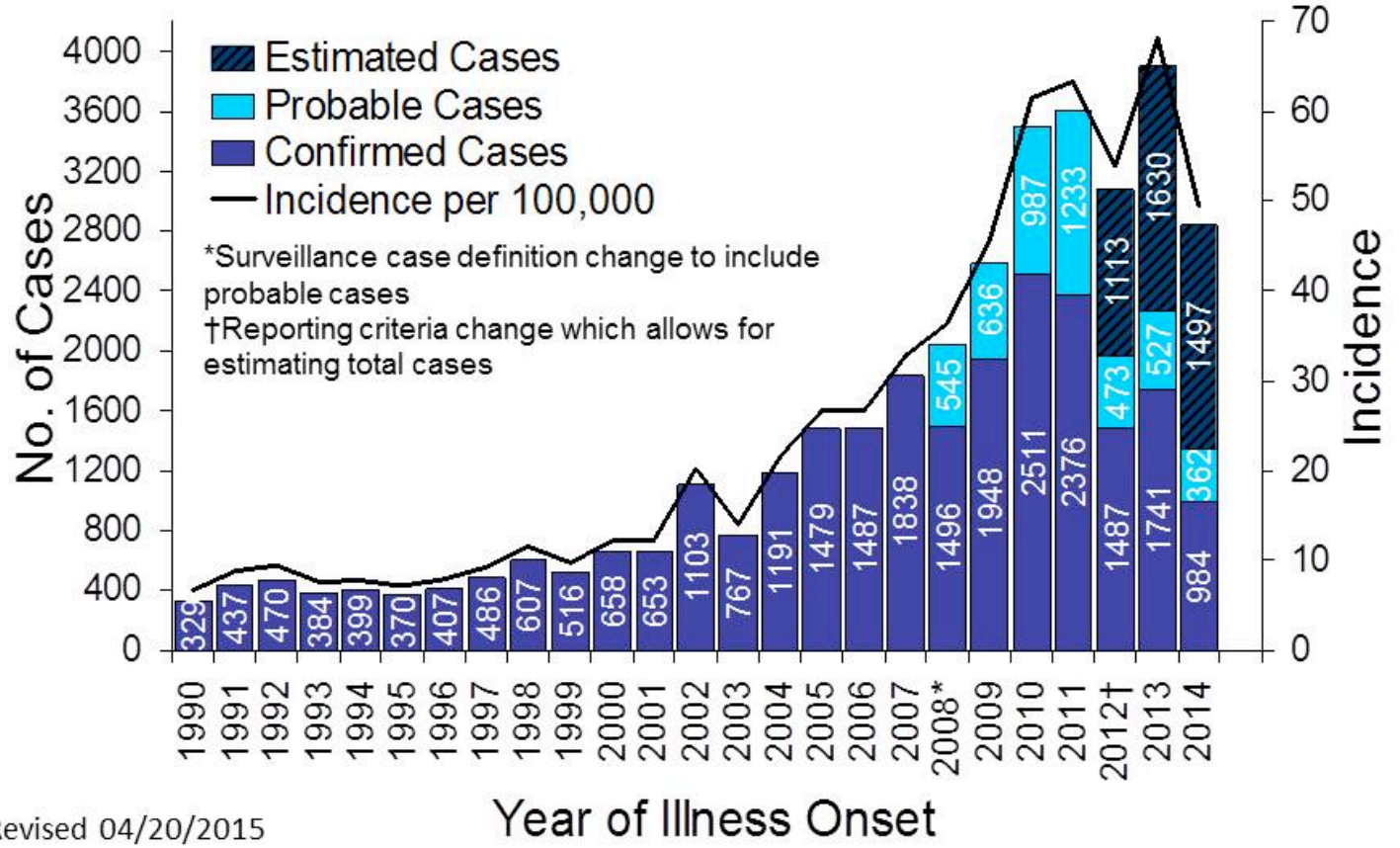
- Lyme disease - bacteria *Borrelia burgdorferi*
- Anaplasmosis - caused by the bacteria *Anaplasma phagocytophilum*
- Ehrlichiosis – bacteria *Ehrlichia muris*
- Powassan virus - tickborne virus in the arbovirus group
- Babesiosis - *Babesia microti* parasite

Lyme Disease

- Typical symptoms include…
  - Fever
  - Headache
  - Fatigue
  - Characteristic skin rash, erythema migrans, seen in approximately 80% of cases
- If left untreated, infection can spread to joints, the heart, and the nervous system

CDC

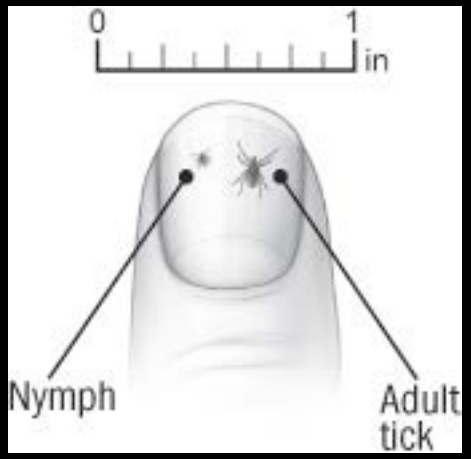
Reported Lyme Disease Cases
Wisconsin, 1990 - 2014
(n=35,127)

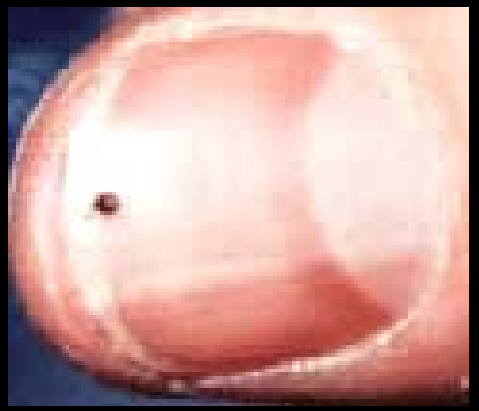


Revised 04/20/2015

* Previous to 2008 only confirmed cases were reported. Beginning 2008, the total number of cases includes confirmed and probable cases.

Both tick density and infection rates in ticks have increased over 20 yr



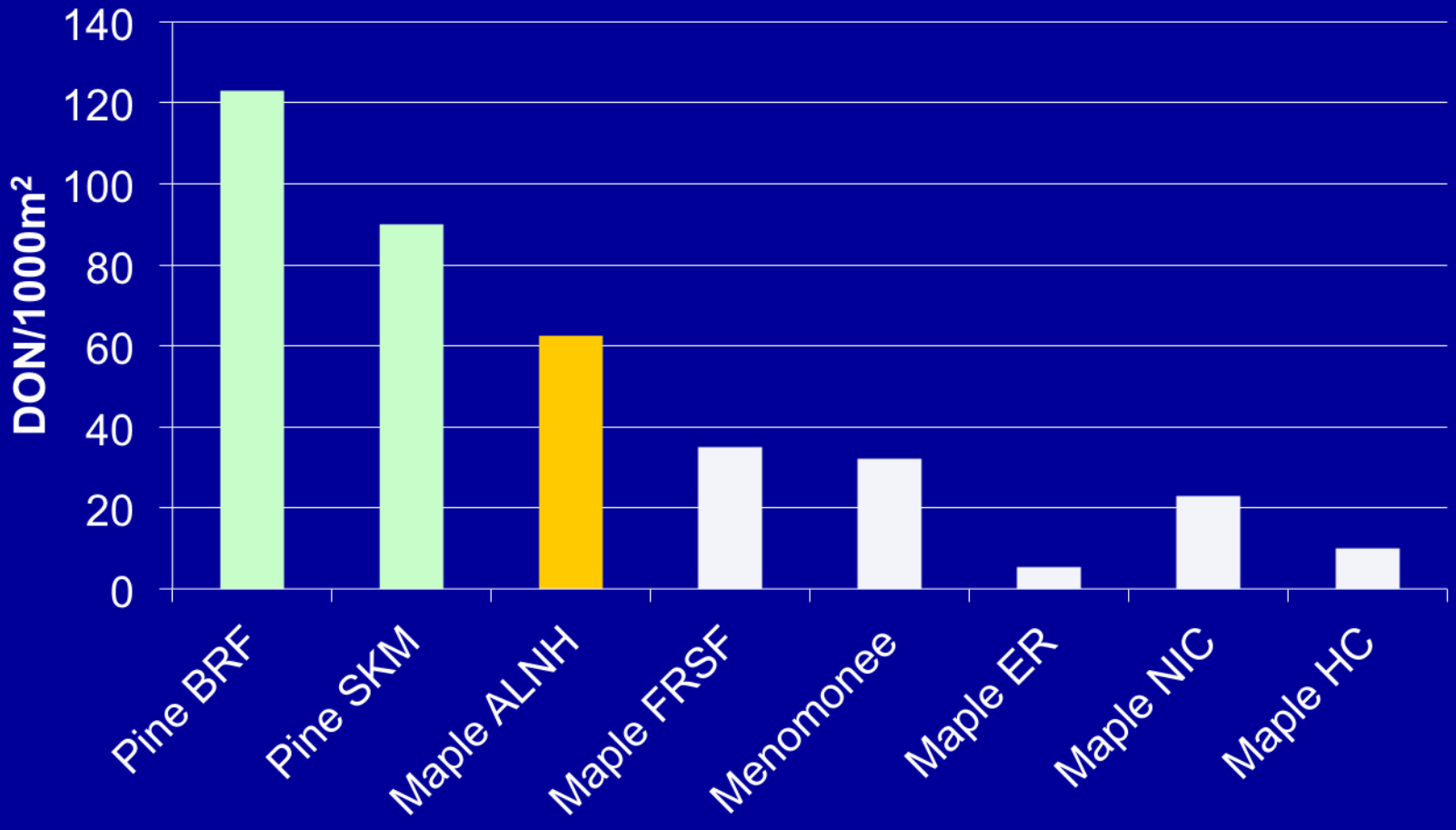


Nymphs do most of the transmission: note small size

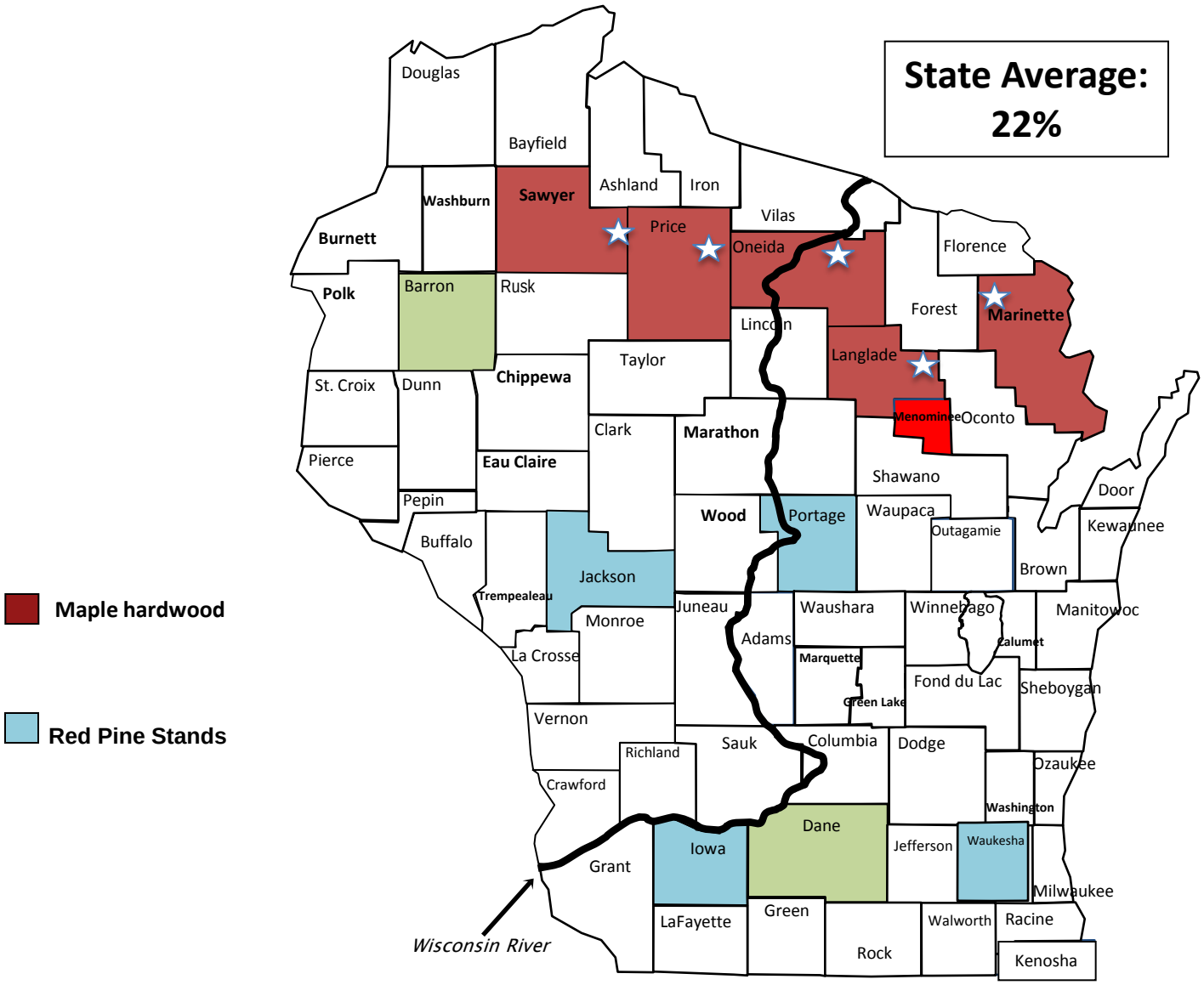
Peak is in June but nymphs continue to be active until fall

Using tick drags to measure density

Density of nymphs across forest sites, 2013 (high year)



Borrelia burgdorferi infection rates in questing nymphs



GUIDELINES FOR TREATMENT

TREAT TICK BITE IF:
>20% OF NYMPHS ARE INFECTED IN AREA

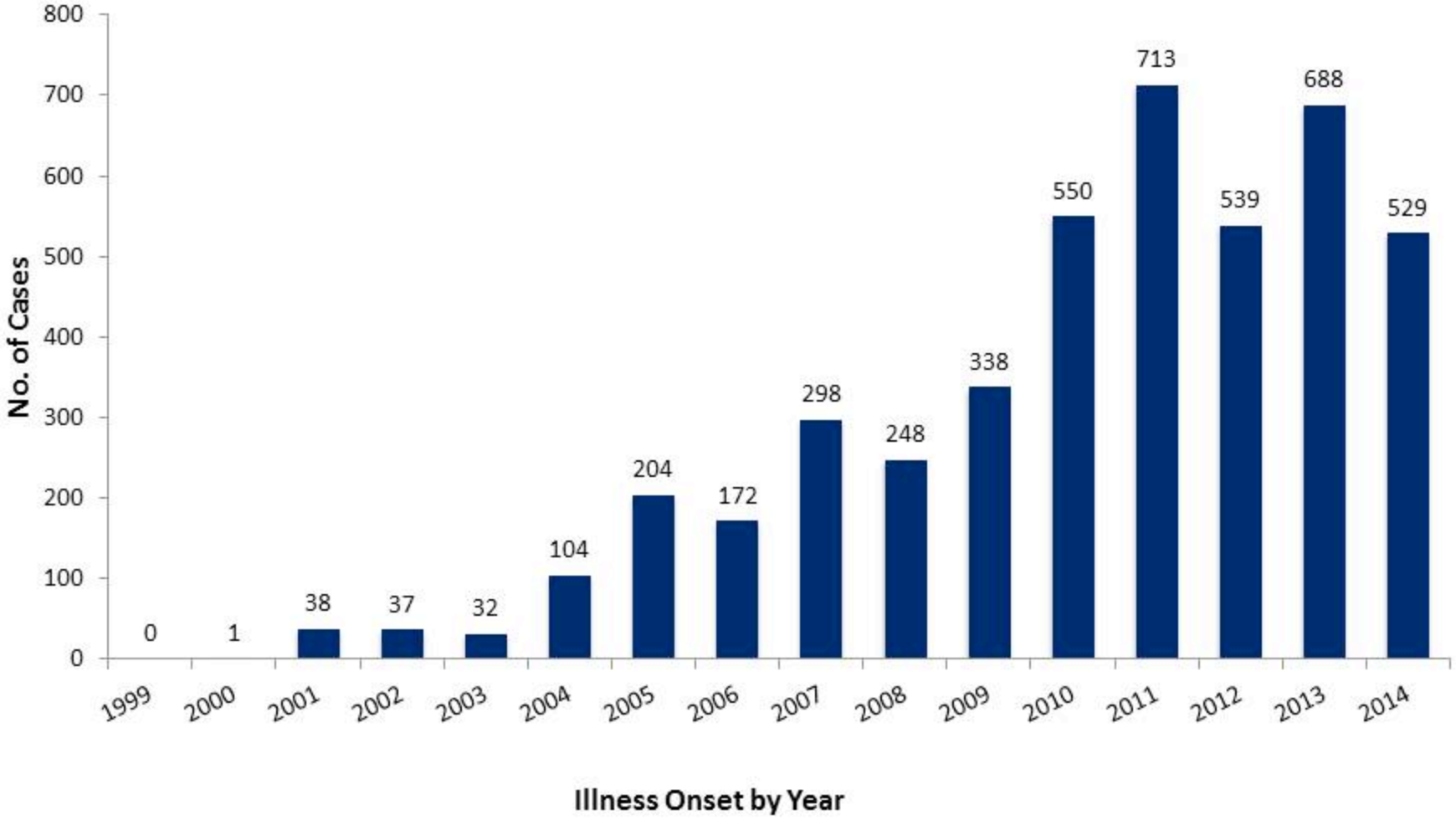
+ identification as Ixodes scapularis
+Attached for >36 hr
+Drug can be started within 72 hr of removal

Surveillance in WI, 2002-2011

Tickborne Infections	Total Cases 2014**	2003-2013
• Lyme disease	2843	14,876
• Anaplasmosis/Ehrlichiosis	529	1,968
• Powassan	4	17
• Babesiosis	29	125

**2014 numbers included confirmed, probable and extrapolated cases.

Reported Cases of Anaplasmosis/Ehrlichiosis, Wisconsin, 1999 - 2014 (n=4,491)

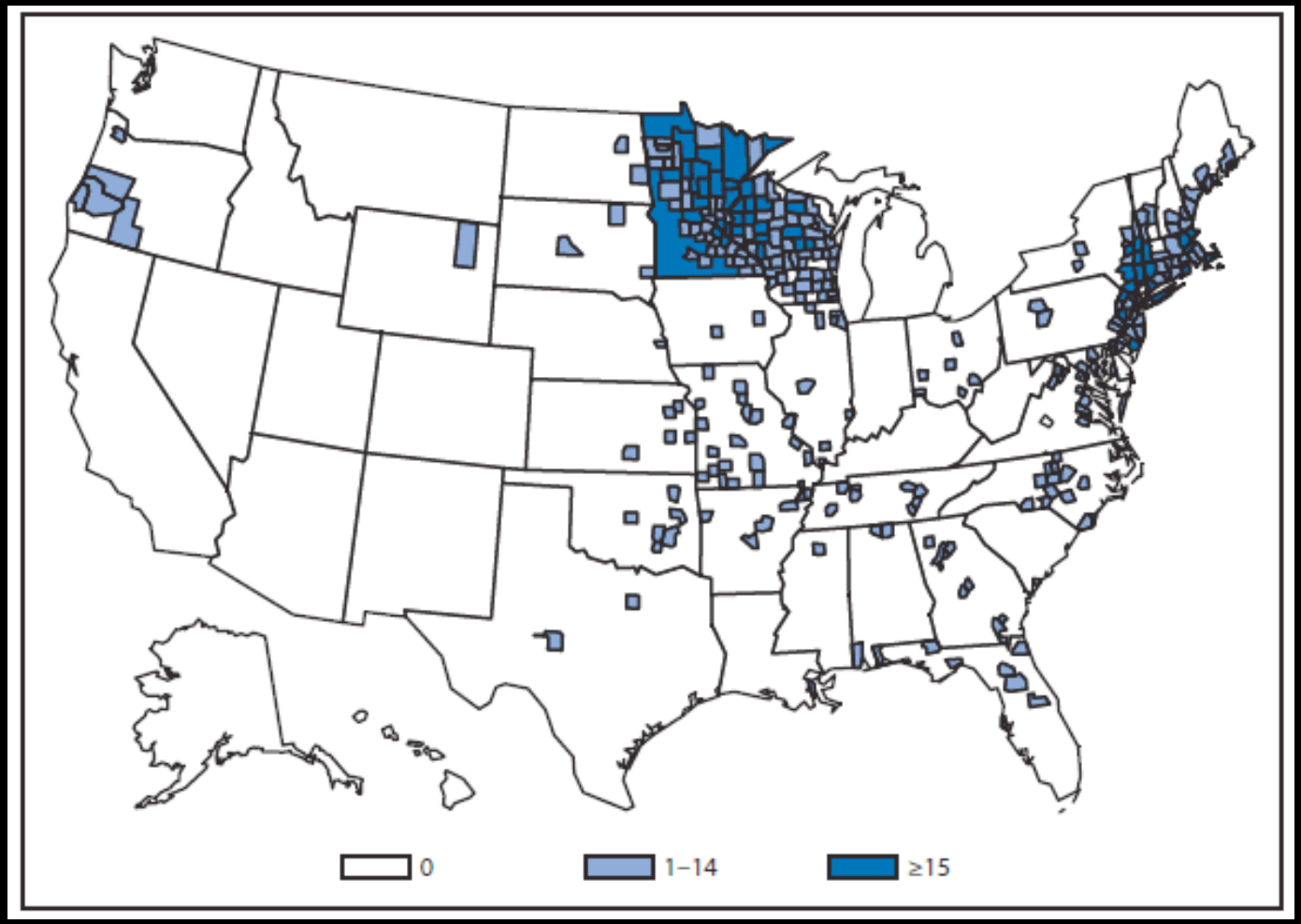


*Total number of cases include confirmed and probable
Revised 4/3/2015

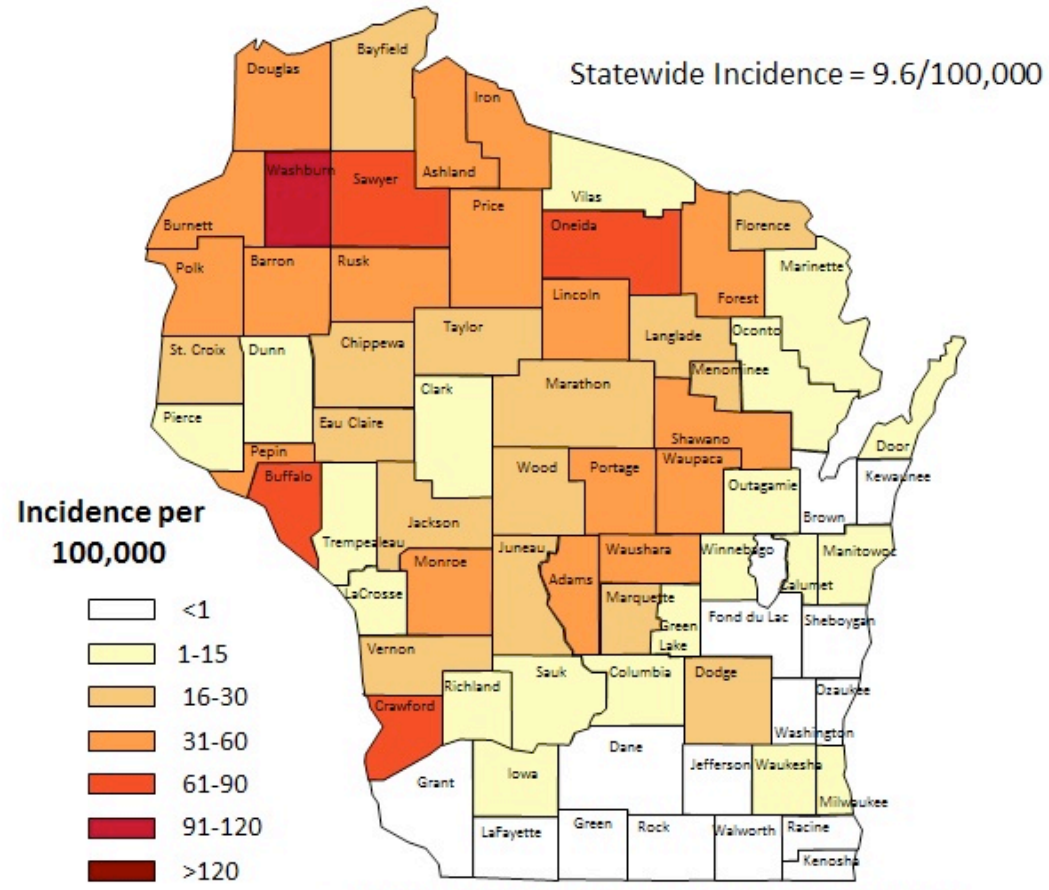
Anaplasmosis & Ehrlichiosis

- Acute tickborne diseases of humans and animals caused by two separate groups of bacteria:
  - *Anaplasma* (*A. phagocytophilum*) and *Ehrlichia (E. chaffeensis, E. ewingii, and E. muris*-like)
- Clinical manifestation: fever, headache, fatigue, muscle aches, and shaking chills
- Less common symptoms: nausea, vomiting, diarrhea, cough, joint pain, confusion, and occasional rash (but not a bullseye rash)
- Symptoms usually appear 5-10 days after a tick bite

Geography of Human anaplasmosis cases: 50% in Midwest



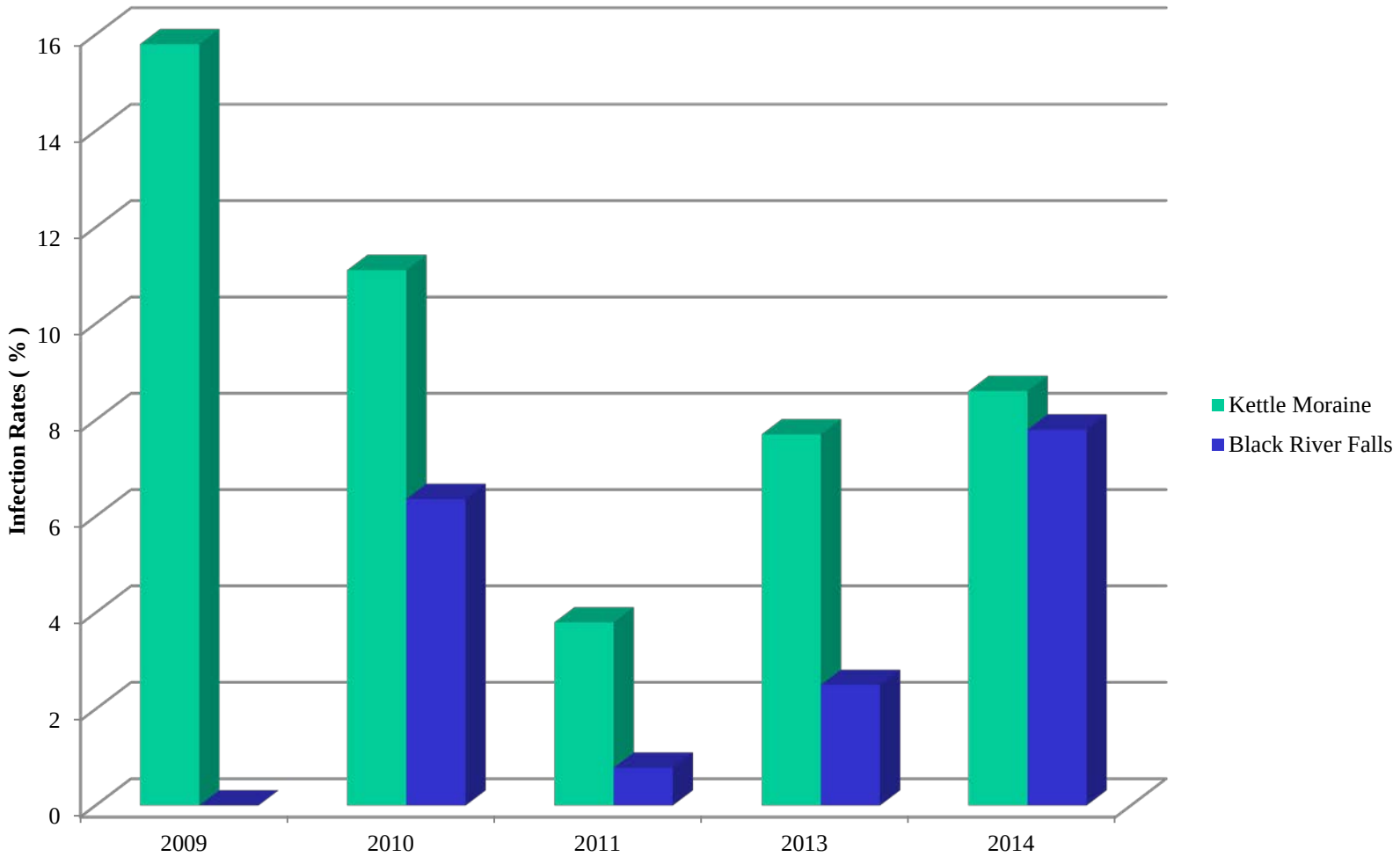
Ehrlichia/Anaplasma Annual Incidence
Wisconsin, 2014



This map is based on the county of residence of confirmed and probable cases. Some infections may have been acquired during travel to other areas.

Revised 4/9/2015

Anaplasma phagocytophilum Infection Rates



Treatment for Tickborne Diseases

- For most tickborne diseases (Lyme, ehrlichiosis/anaplasmosis)- antibiotics can be very effective, usually prescribed for 10-14 days.

- There is no specific treatment for Powassan virus infections, supportive care is all that is available.

- No vaccines available at this time.

Don’t get “Tick-ed”

- Wear protective clothing, long pants and sleeves.
- Tuck shirts into pants and pants into socks or boots to prevent ticks from crawling under clothing and attaching to skin. Rubber boots.
- Use repellents per label instructions (20% DEET).
- Permethrin spray for clothing.
- Check for ticks after being outdoors.
- Take showers to wash off crawling ticks.

Personal Protection

- Shoes
  - Boots
  - or tape pants to shoes

Personal Protection

- Permethrin treatment of clothing
- Lasts through 6 washes
- Bad for cats
- Never on skin &
  Allow clothes to dry

Personal Protection

- Inspect clothing and exposed skin often

- Full body check at the end of the day
- Shower, sponge or loofah is helpful
- Clothes in plastic bag; or hot dryer

Acknowledgments

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Zip Johnson, Wisconsin Division of Health
UW Forestry and Wildlife Ecology: Eric Kruger, Autumn Sabo, Phil Townsend
UW Entomology: Ken Raffa, Dave Coyle
Mayo: Bobbi Pritt, Lynne Sloan