Indiana Department of Health

IDOH ENTOMOLOGY UPDATE

LEE GREEN
SENIOR MEDICAL ENTOMOLOGIST

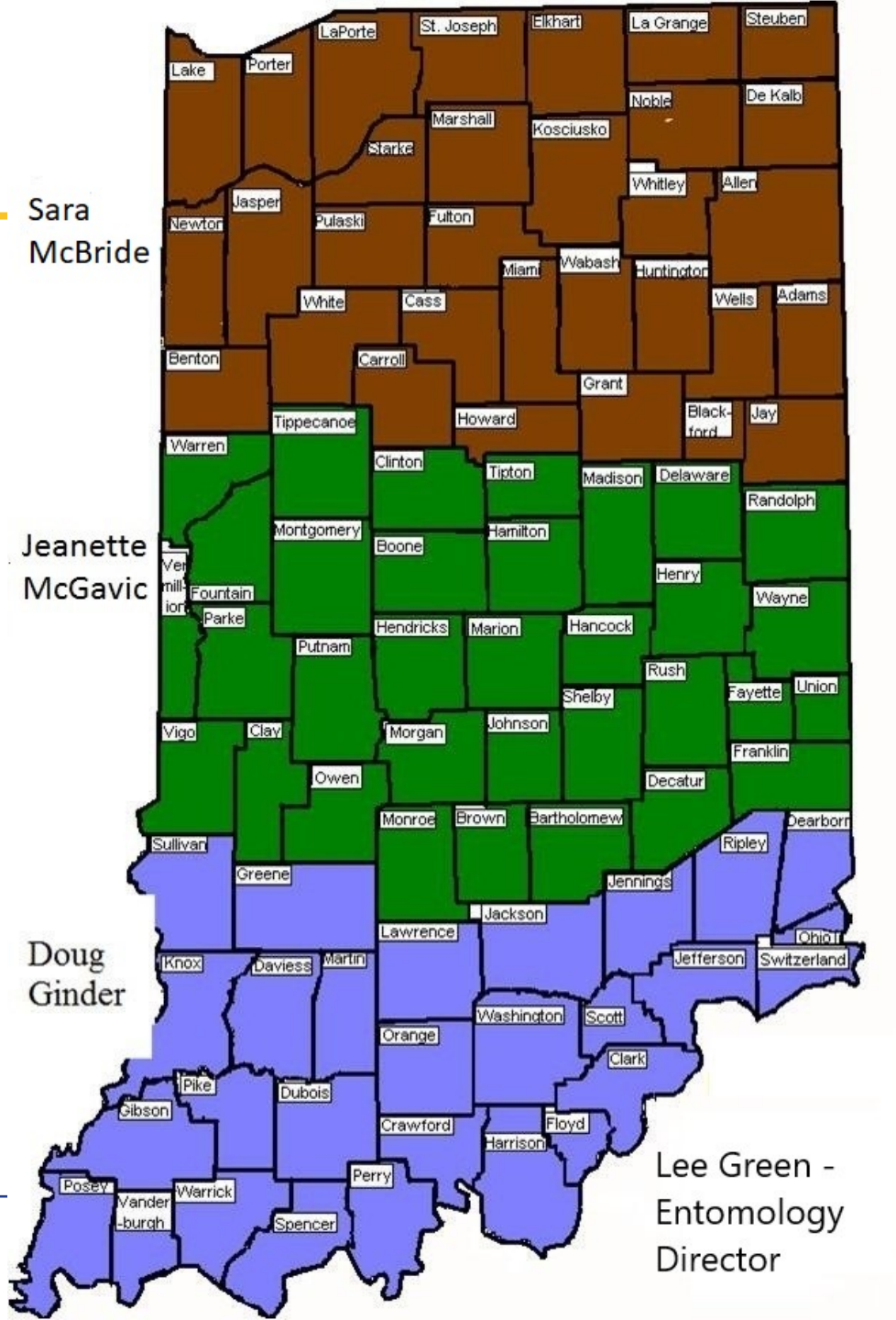
11/17/2023

Who We Are

- Medical Entomologists (4)
  - Director – Lee Green
  - Northern IN – Sara McBride
  - Central IN – Jeanette McGavic
  - Southern IN – Doug Ginder

- Vector-borne Epi (1)
  - Kira Richardson

  - NEW LAB LOCATION in 2023



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What We Do

Mosquito-borne Diseases

- West Nile Virus
- St. Louis Encephalitis
- Eastern Equine Encephalitis
- LaCrosse Encephalitis

  - Dengue Fever
  - Chikungunya
  - Malaria
  - Zika

Tick-borne Diseases

- Lyme Disease
- Spotted Fever Group Rickettsioses
- Ehrlichiosis
- Anaplasmosis
- Tularemia
- Babesiosis
- Non-Lyme Borrelioses

What We Do

Mosquito-borne Diseases

- West Nile Virus
- ~~St. Louis Encephalitis~~
- Eastern Equine Encephalitis
- LaCrosse Encephalitis ????

  - Dengue Fever
  - Chikungunya
  - Malaria
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Tick-borne Diseases

- Lyme Disease
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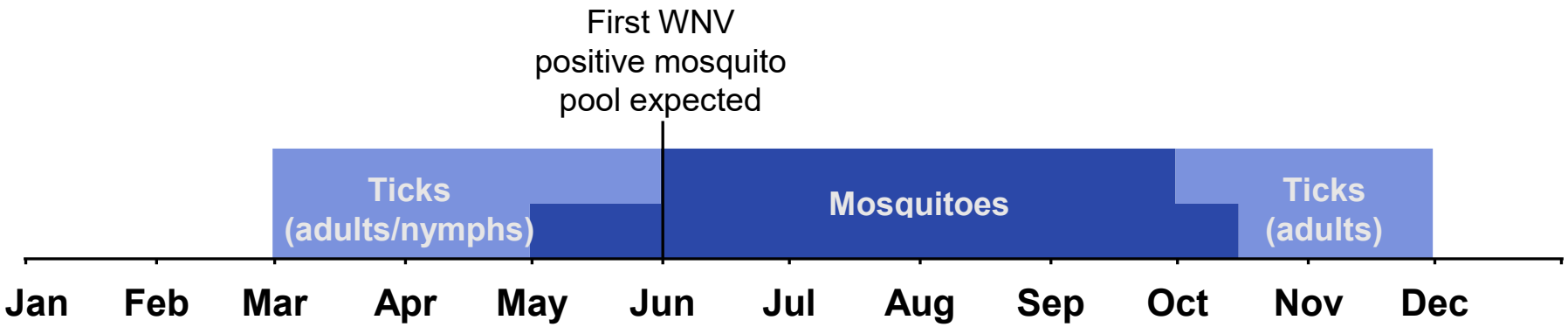
Entomology Projects



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Mosquito Surveillance

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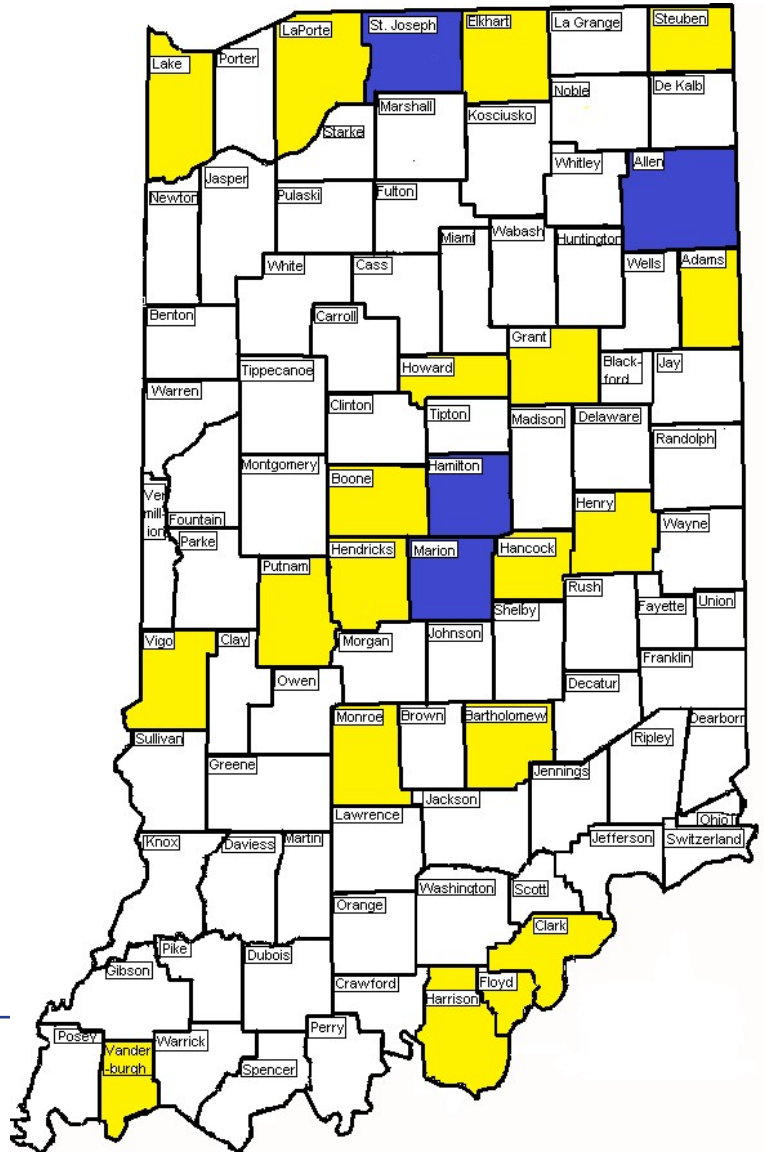
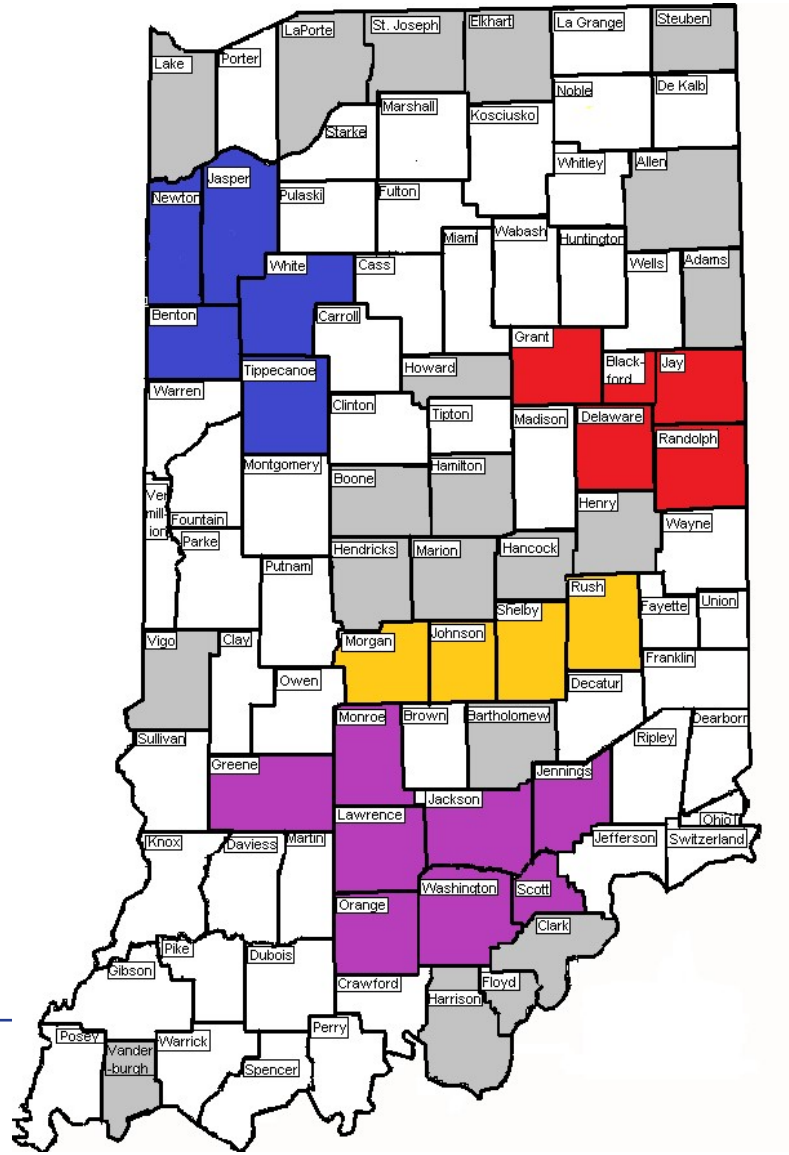
Surveillance Network

2024 Entomology Interns

LHD Traps and Tests

LHD Traps





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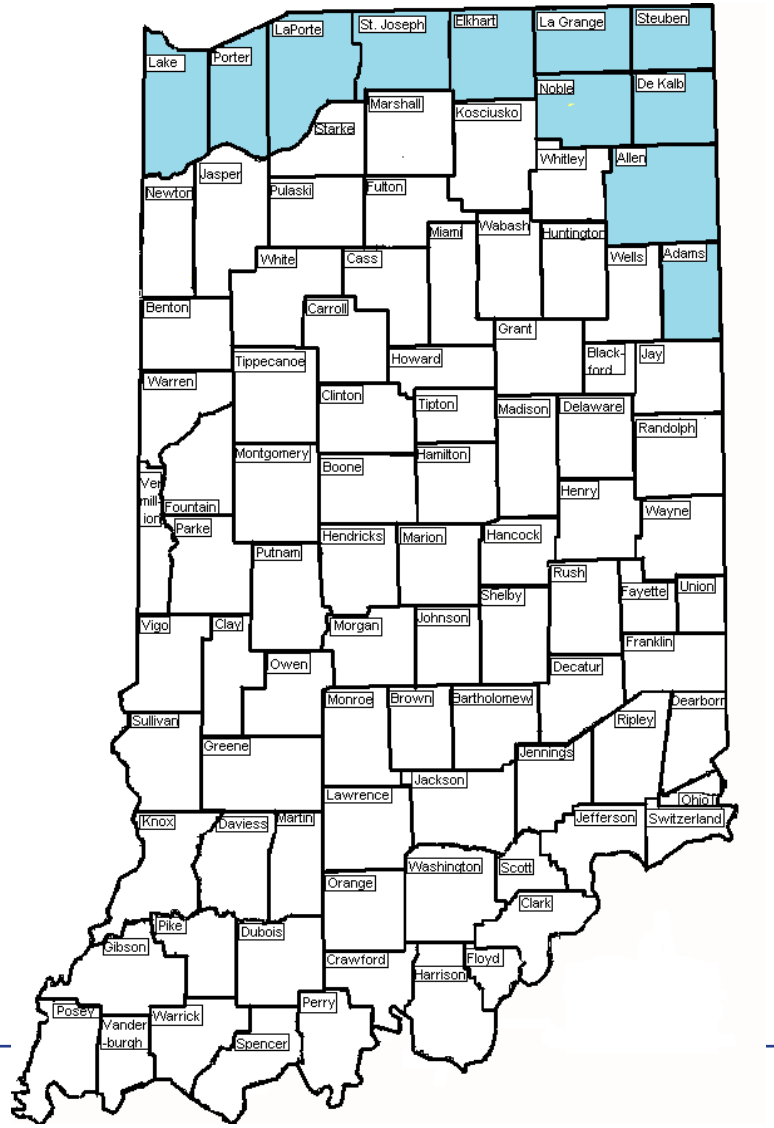
Eastern Equine Encephalomyelitis Mosquito Surveil



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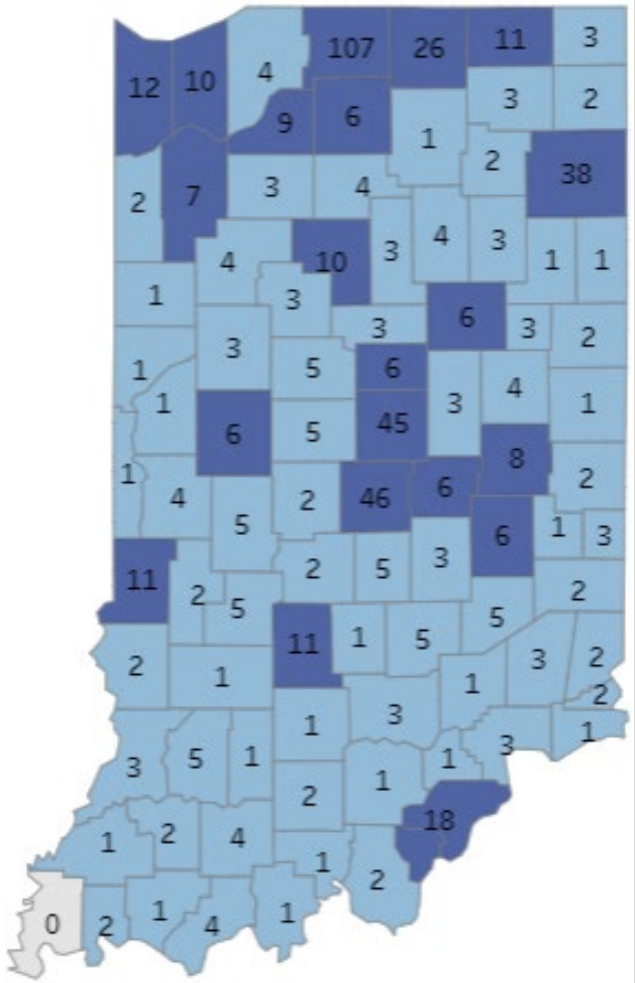
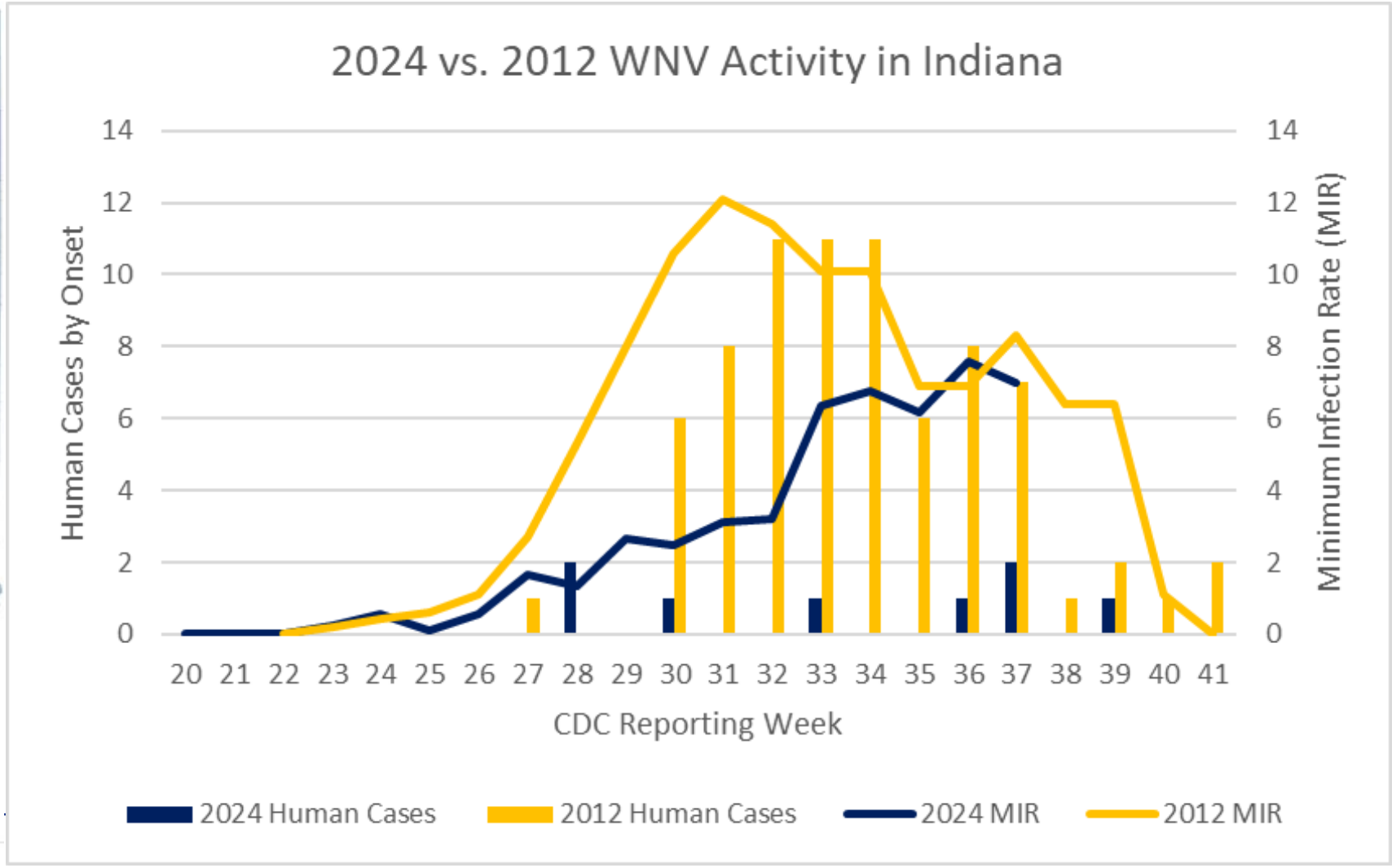
2024 WNV Positive Mosquito Pools



West Nile Virus Positive Pools

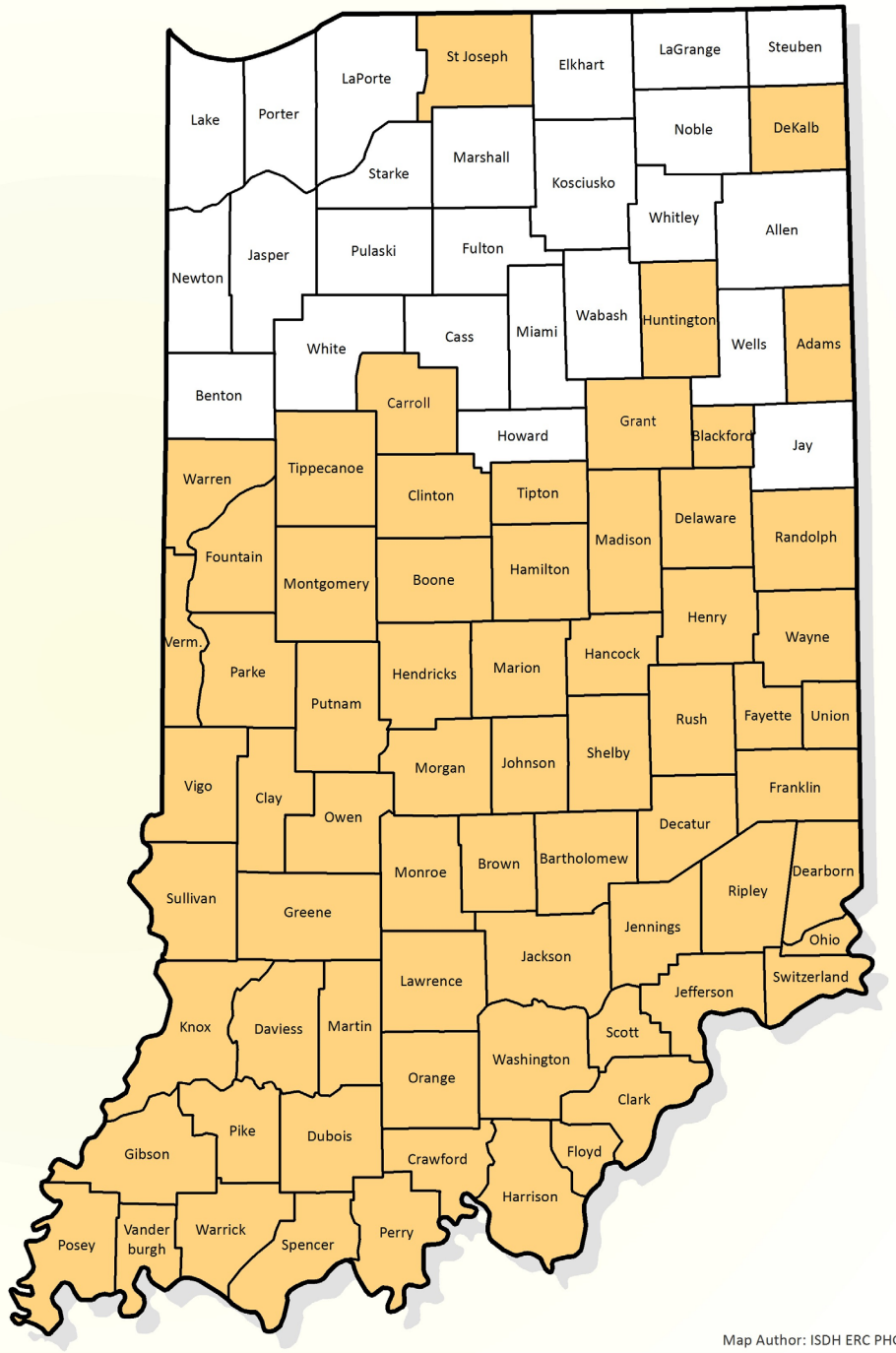
0 1-5 6+



M.I.R. = # + Pools/ # Mosquitoes Tested X 1,000

Aedes albopictus
Adult Occurrence
In Indiana: 2001- 2023

At least 1 trapped in county



Map Author: ISDH ERC PHG - Nov, 2018

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Ticks of Medical Importance in Indiana - 2017

IDOH

American Dog Tick
Dermacentor variabilis

Brown Dog Tick
Rhipicephalus sanguineus

Blacklegged Tick
Ixodes scapularis

IDOH

Lone Star Tick
Amblyomma americanum

IDOH

Ticks of Medical Importance in Indiana - 2023

IDOH

American Dog Tick
Dermacentor variabilis

IDOH

Gulf Coast Tick
Amblyomma maculatum

CDC

Brown Dog Tick
Rhipicephalus sanguineus

Blacklegged Tick
Ixodes scapularis

IDOH

Asian Longhorned Tick
Haemaphysalis longicornis

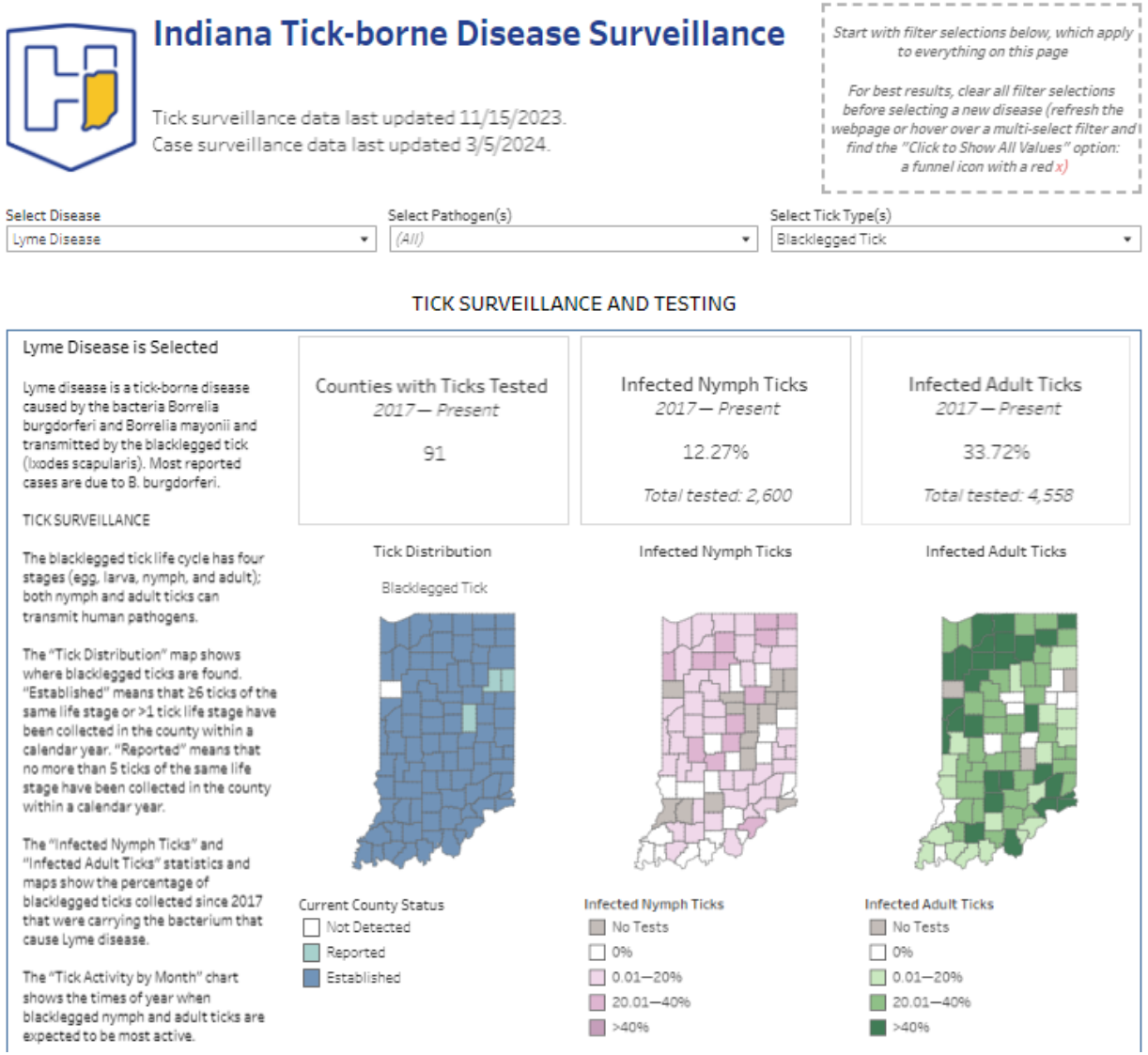
CDC

Lone Star Tick
Amblyomma americanum

IDOH

NEW TICK DASHBOARD!

https://www.in.gov/health/idepd/zoonotic-and-vectorborne-epidemiology-entomology/vector-borne-diseases/tick-borne-diseases/



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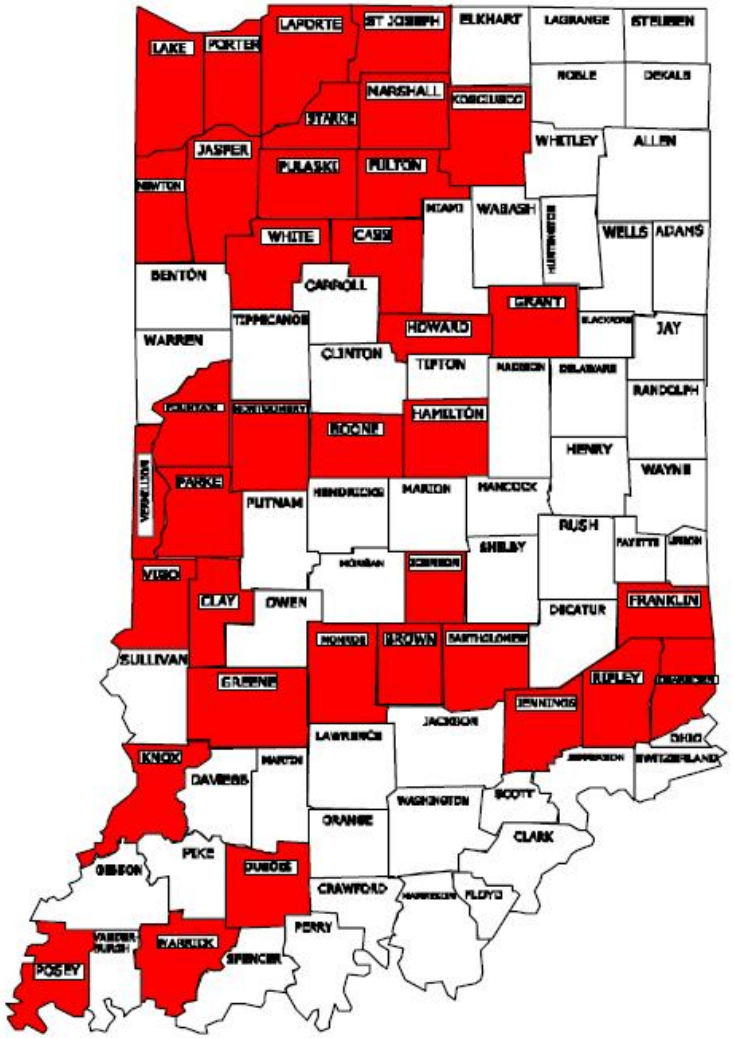
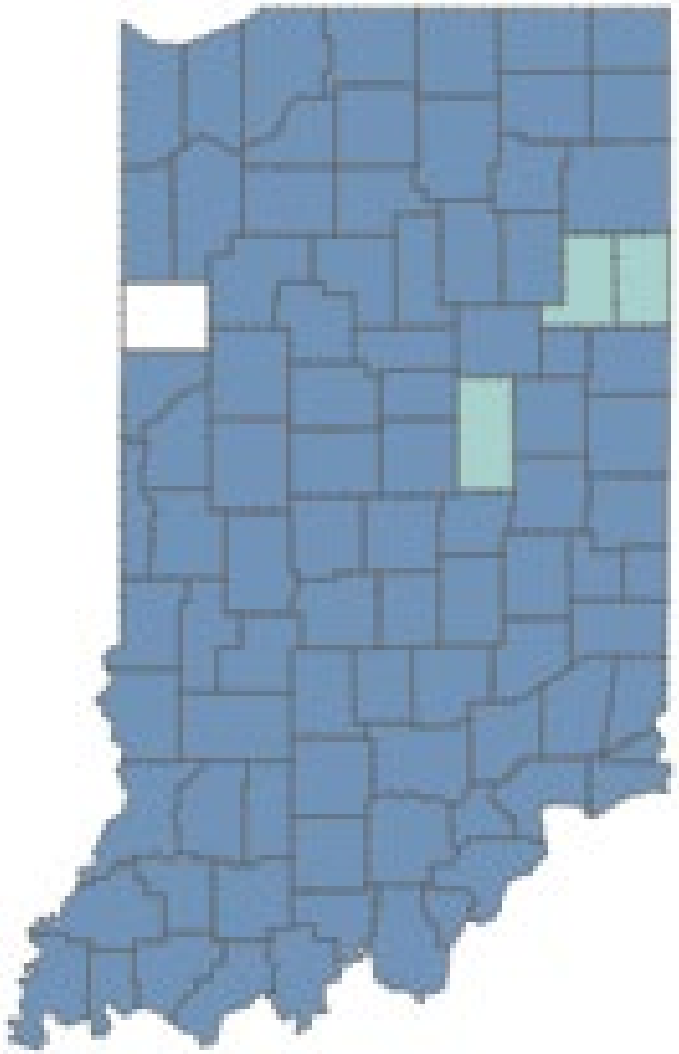
Tick Surveillance - *Ixodes scapularis*

2001



2023



Biology of *Ixodes scapularis*

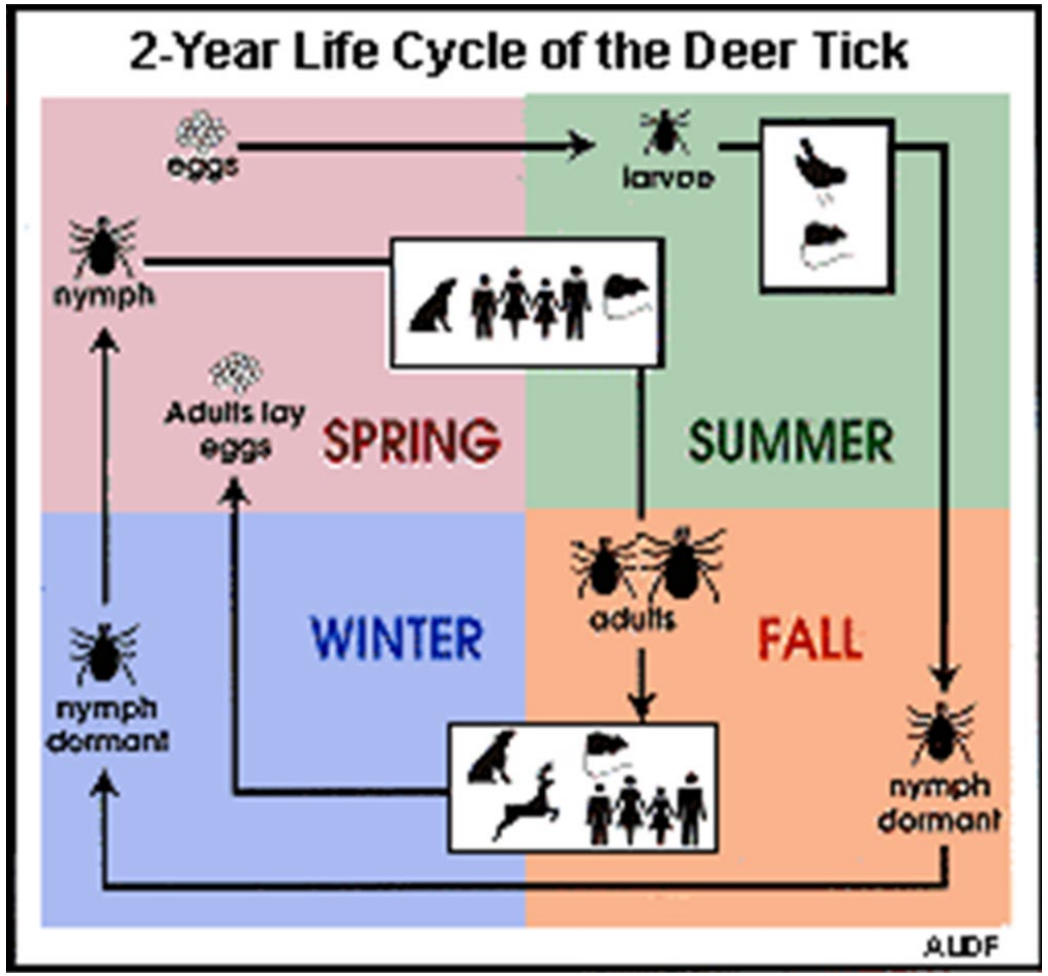
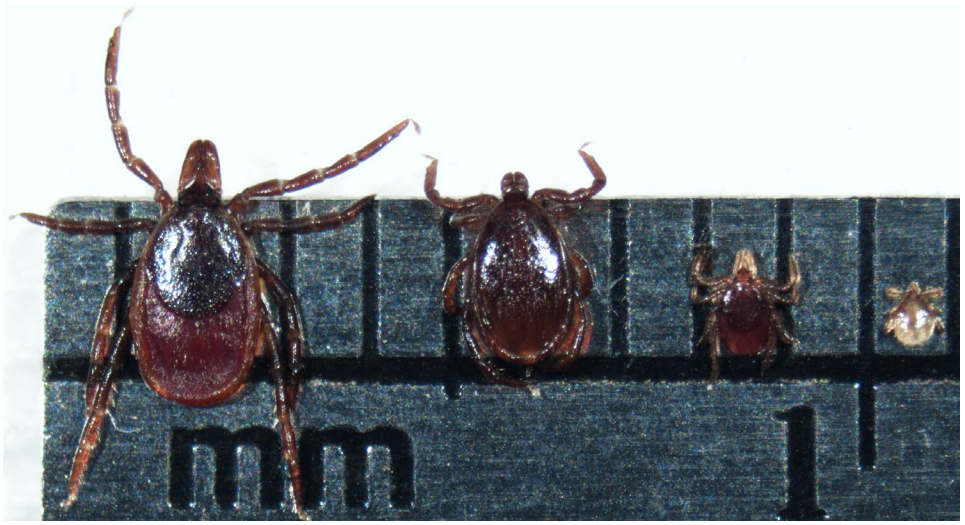
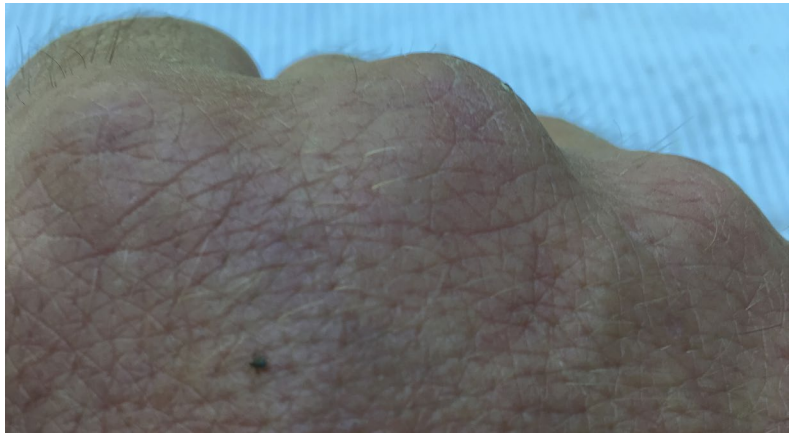
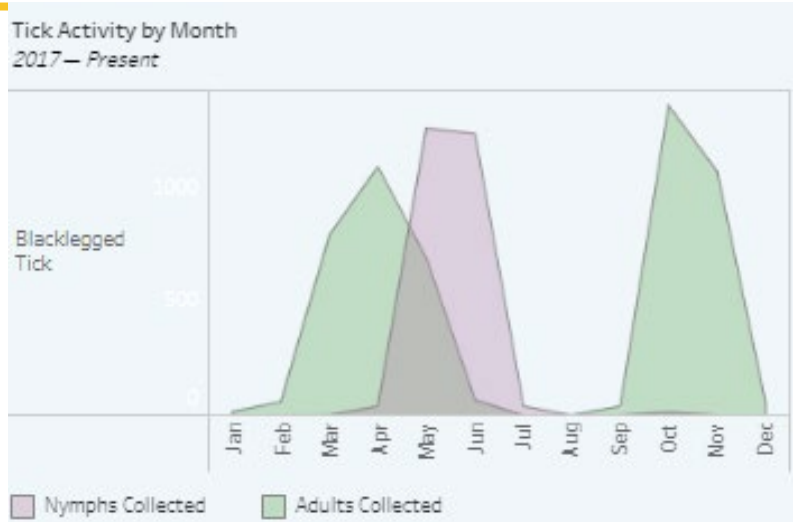


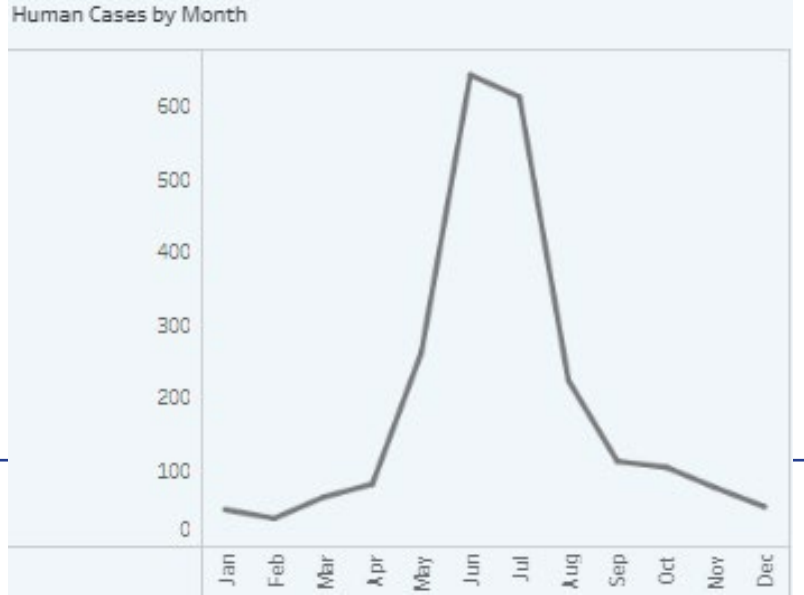
Photo: L. Green IDOH

Blacklegged Tick Phenology and Lyme Disease









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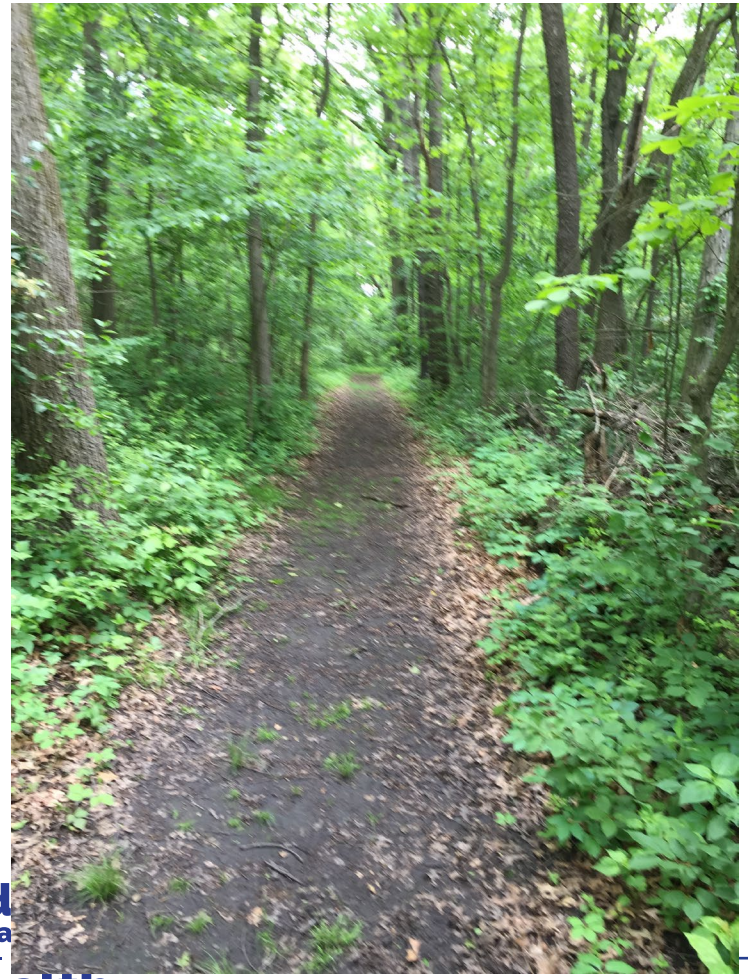
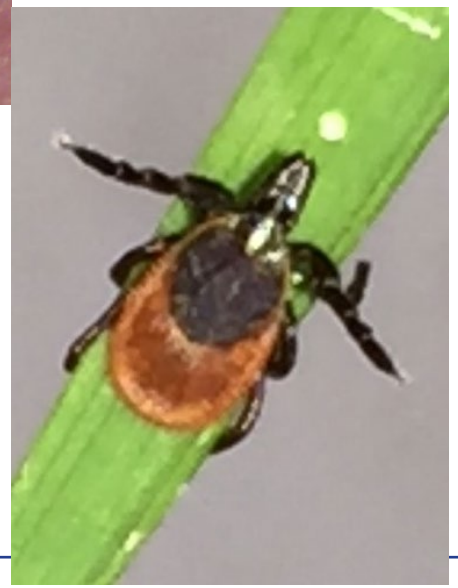
Biology of *Ixodes scapularis*

Habitat



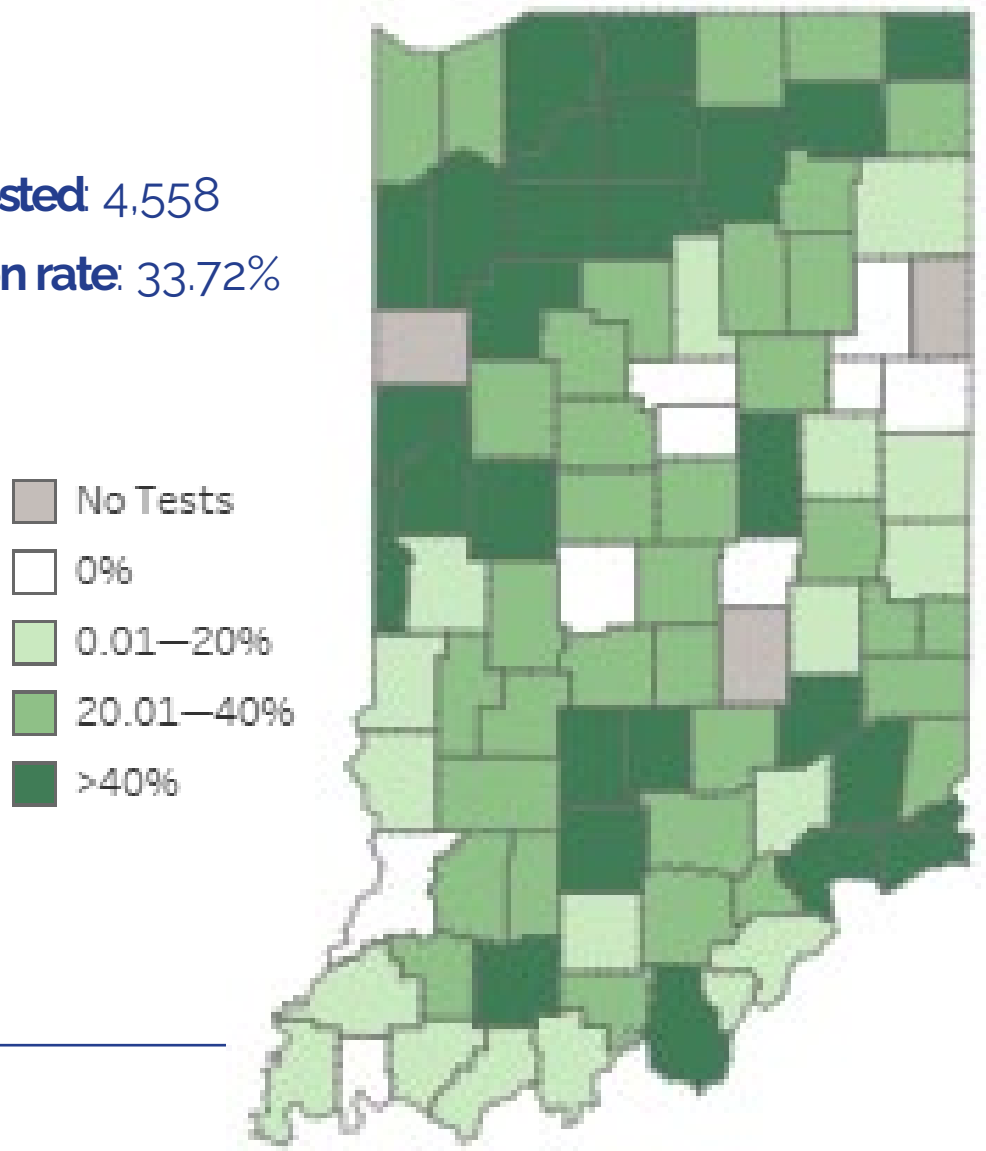
Photos: L. Green ISDH

Percentage of adult *Ixodes scapularis* ticks infected with *Borrelia burgdorferi*, 2017-2023



Total Tested: 4,558

Infection rate: 33.72%



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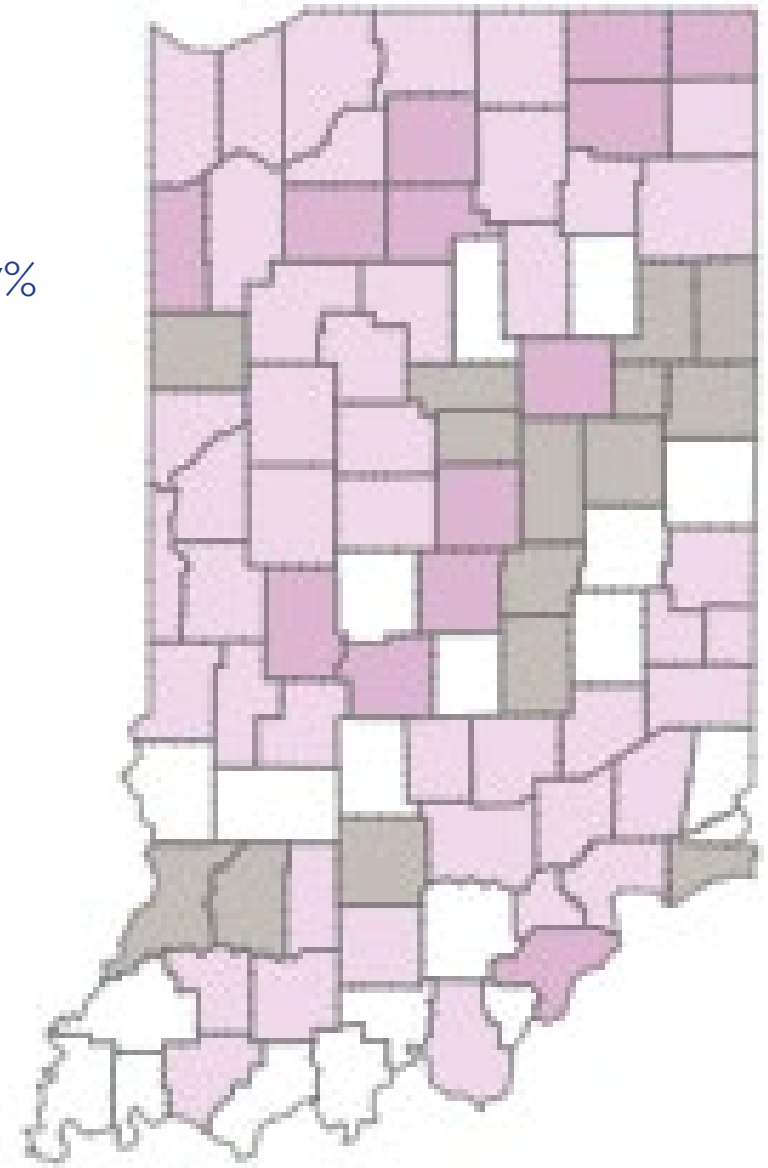
Percentage of nymph *Ixodes scapularis* ticks infected with *Borrelia burgdorferi*, 2017-2023

Total Tested: 2,600

Infection rate: 12.27%



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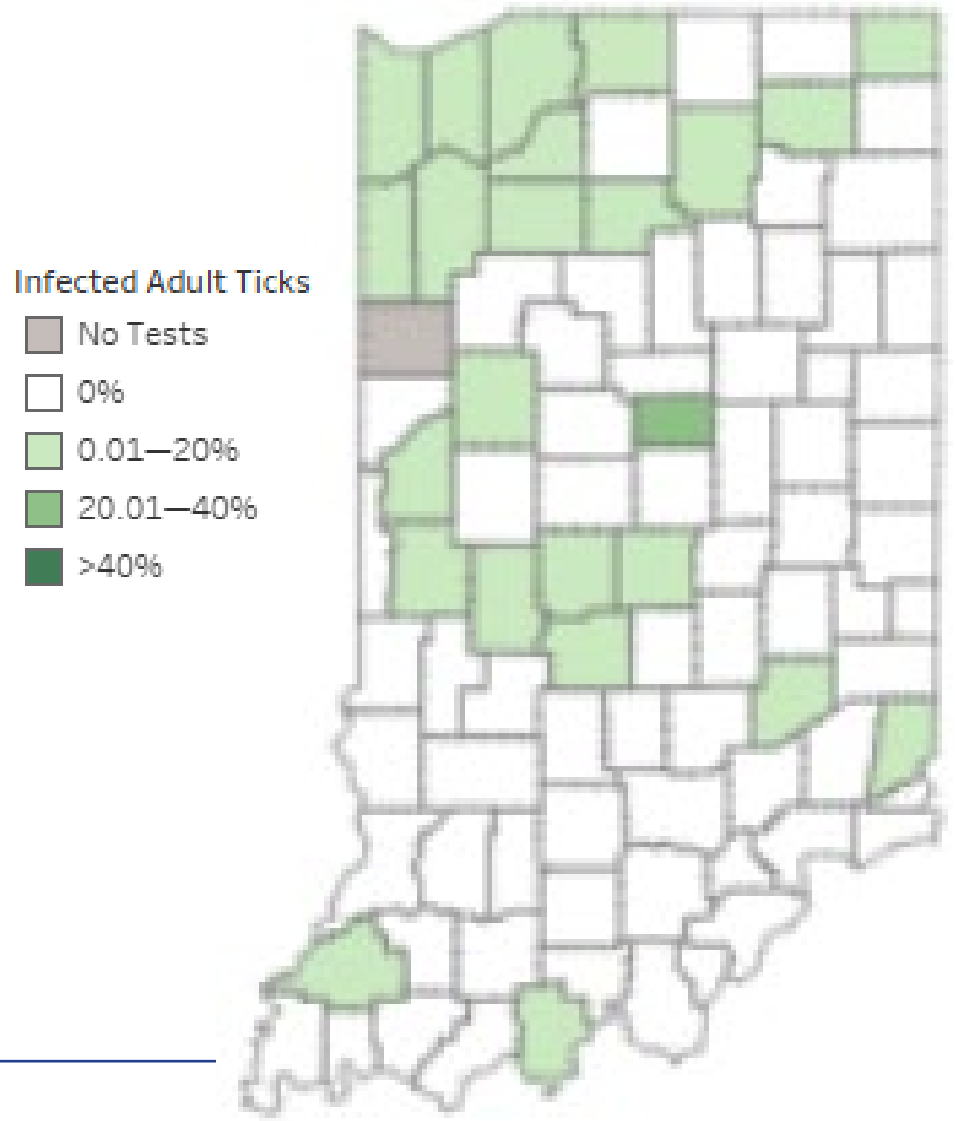
Other *Ixodes scapularis* pathogens

Anaplasma phagocytophilium

- Human cases included with Ehrlichiosis before 2019, now anaplasmosis
- 5 cases in 2019 and 2021
- 3 cases in 2022
- 2 cases in 2023

- Adult Tick Detections
  - 100/5508 ticks – 1.8%
  - 4% in adults in NW IN



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Other *Ixodes scapularis* pathogens

Babesia microti

- Parasite that causes babesiosis
- Most cases NE & Upper MW

- Tick Detections
  - Only 2 Sites
    - 15%

(200+ collected 5 miles away, no detections)

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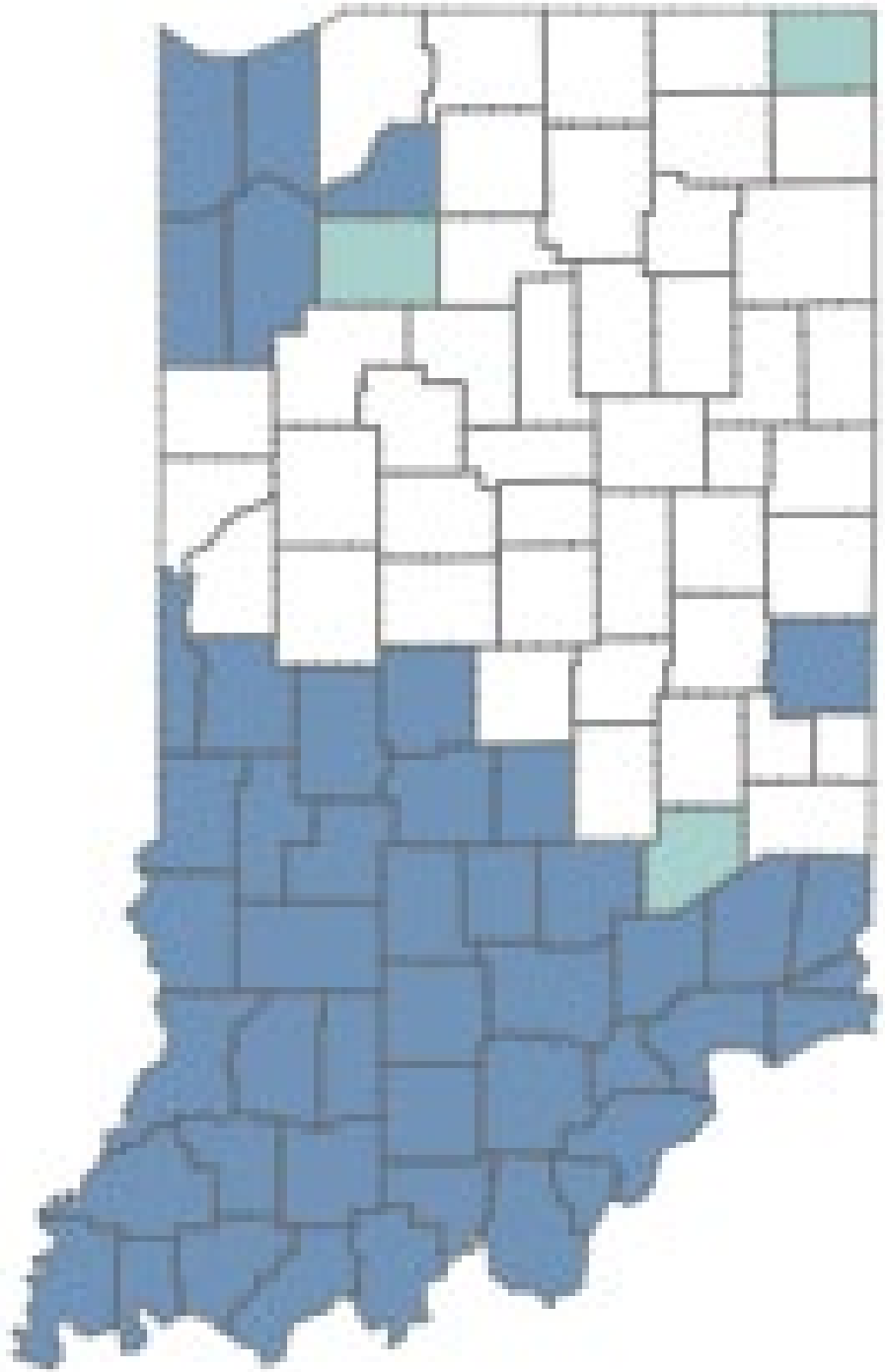
Lone Star Tick Distribution



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Amblyomma americanum Habitat

2 Oklahoma Agricultural Experiment Station

Tick stage sampled	Grasses >2 ft	Grasses 2-4 ft	Grasses <4 ft	Brush or low trees 20 ft	Medium trees 20-40 ft	Climax forest 40 ft +
	Number samples taken					
	63	272	73	39	323	96
	Average number of ticks/sample					
Adults	.8	1.3	1.8	6.2	2.2	.9
Nymphs	4.8	4.4	9.7	146.0	10.9	7.2

Figure 2. Average number of adult and nymphal ticks collected per sample from within or under different vegetative types according to overstory height in Cookson Hills State Game Refuge during June and July, 1969.

Hair, Jakie A., and Dariel Elza Howell. "Oklahoma Agricultural Experiment Station, Bulletin no. 679, July 1970: Lone star ticks; Their biology and control in Ozark recreation areas." (1970).

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Ehrlichiosis in Indiana

- Two different bacteria transmitted by the Lone Star Tick
  - *Ehrlichia chaffeensis*
  - *Ehrlichia ewingii*

Infected Nymph Ticks
2017 — Present

1.15%

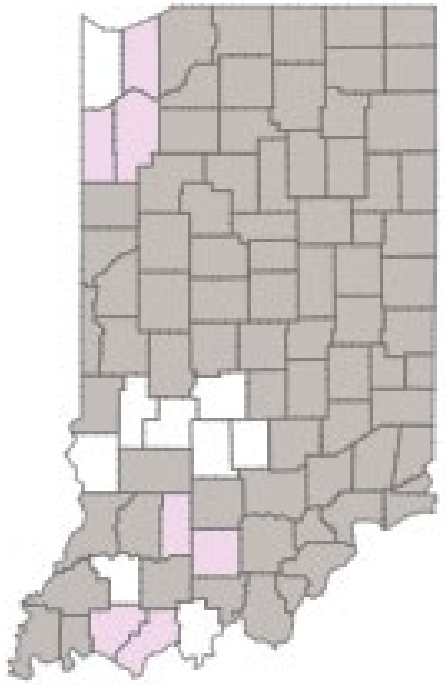
Total tested: 1,046

Infected Adult Ticks
2017 — Present

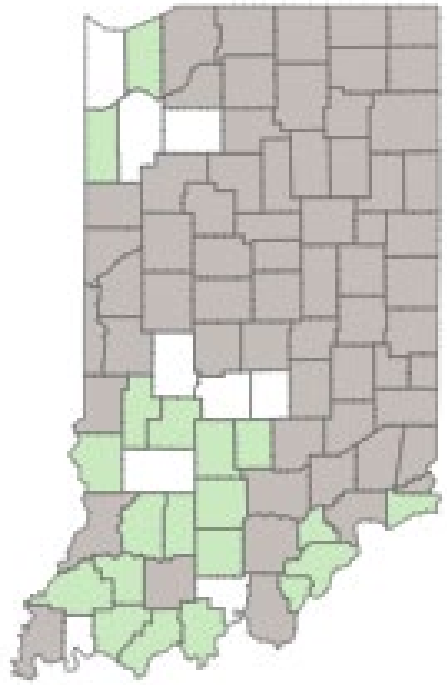
4.44%

Total tested: 2,546

Infected Nymph Ticks



Infected Adult Ticks



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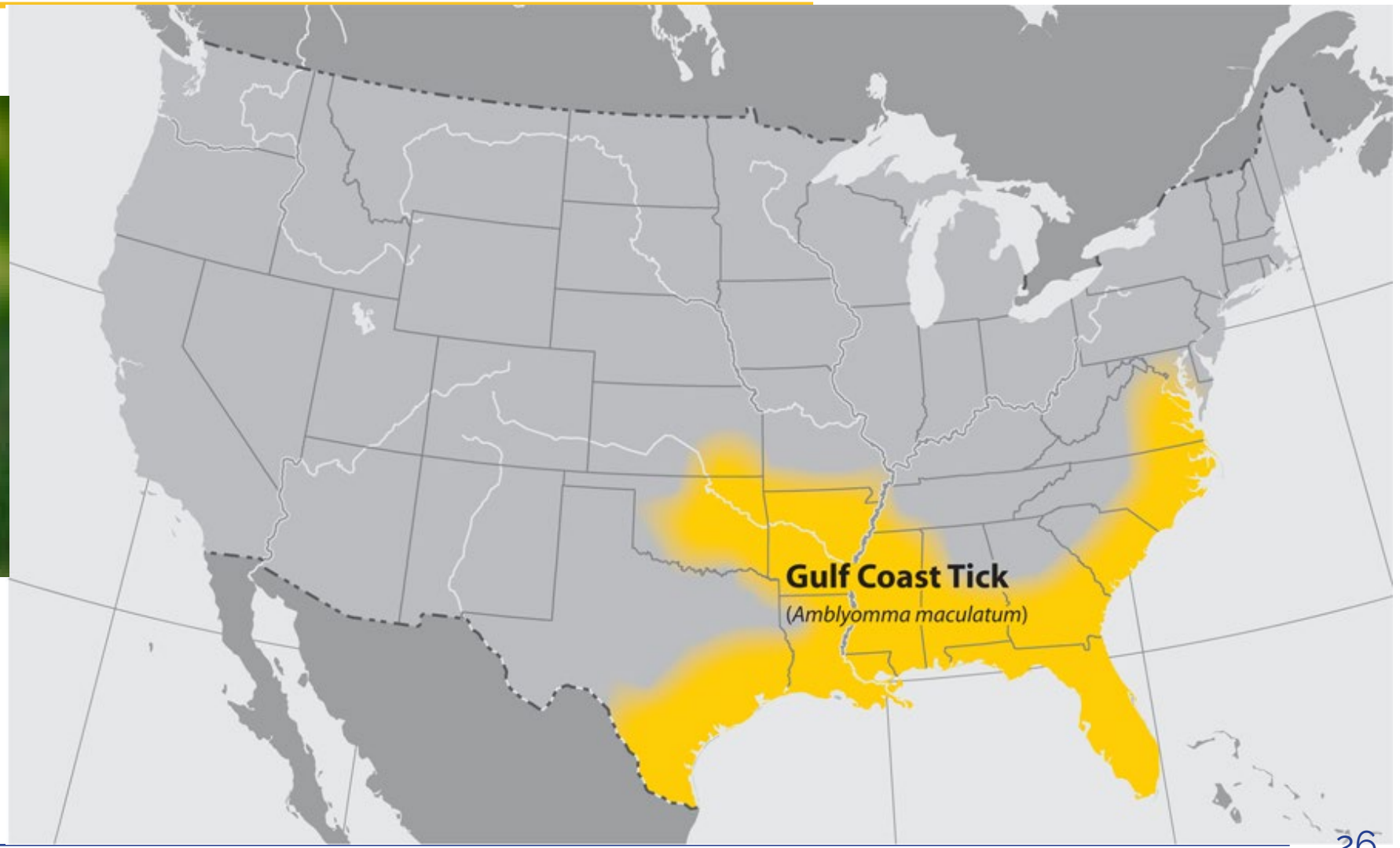
Alpha-gal syndrome

- Alpha-gal (galactose-α-1,3-galactose) is a sugar molecule found in most mammals (except in people, apes, and monkeys).
- Alpha-gal is not normally found in fish, reptiles, or birds.
- An alpha-gal allergy is an allergy to the alpha-gal sugar molecule. Allergic reactions typically occur after people eat meat from mammals that have alpha-gal or are exposed to products made from mammals.
- Most cases of alpha-gal allergy have been reported in the southeastern and midwestern United States.
- Both children and adults can develop alpha-gal allergy; however, most cases of alpha-gal allergy appear to be in people >50 years of age.

Amblyomma maculatum – Gulf Coast Tick

CDC



CDC

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Photo: U of FL Ento

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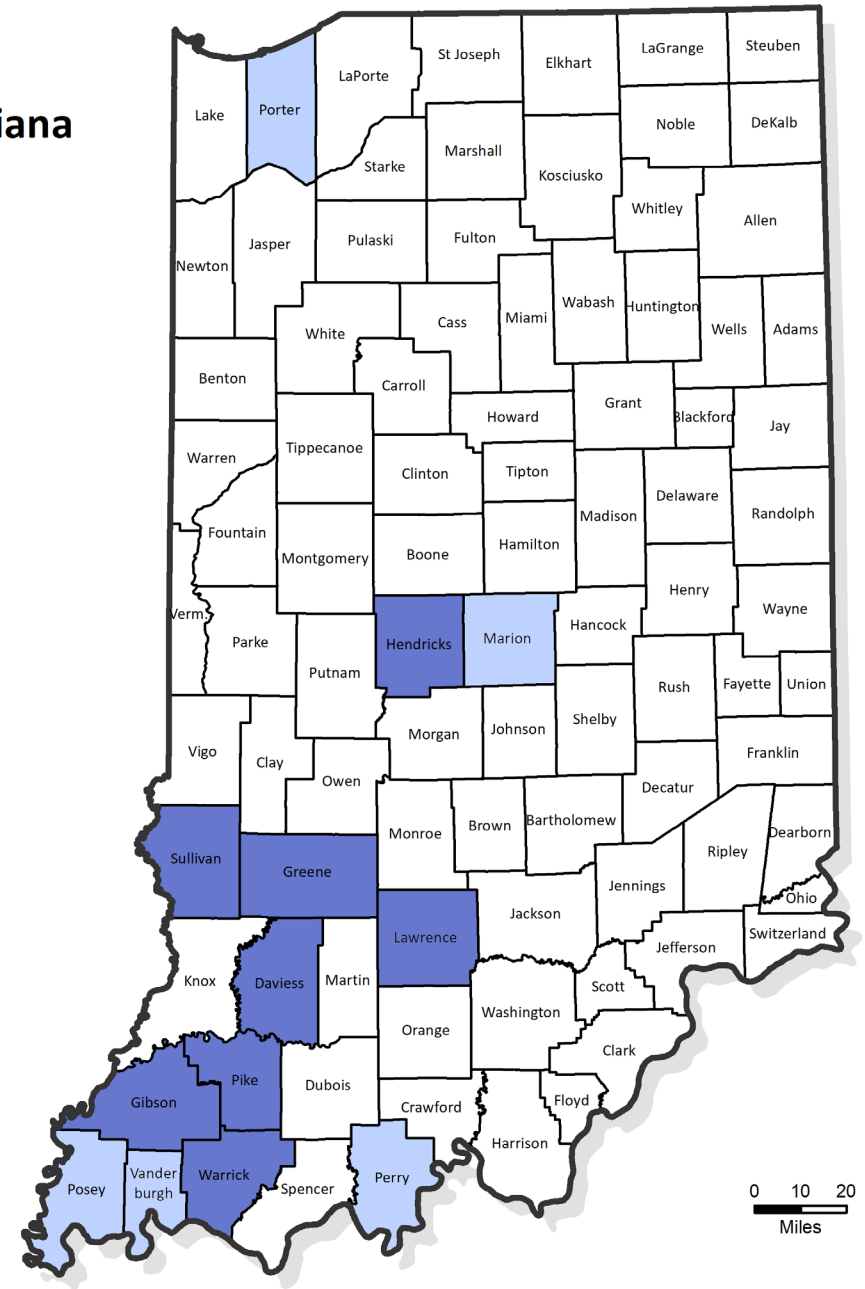
Status of *Amblyomma maculatum* in Indiana

Status

- Established
- Reported
- Not Reported

Established: 6 or more *A. maculatum* of a single life stage or more than 1 life stage collected per county within a 12 - month period

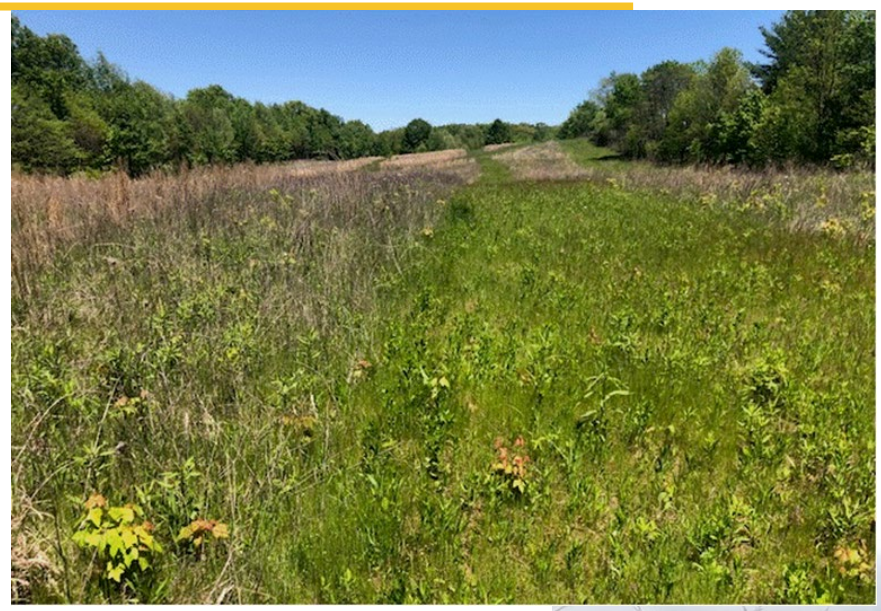
Reported: Less than 6 *A. maculatum* of a single life stage collected per county within a 12 - month period



Data Source: IDOH, Keith Clay (Indiana University)
Map Author: IDOH ODA PHG, 9/2021

Amblyomma maculatum Habitat

- Grass/shrub land
- Populations decrease if canopy is allowed to close in (Nadolny and Gaff 2018)
- Xerophilic
- Better adapted to burned habitat than LST (Gleim et al. 2013)
- Immature stages hard to find/ freshly mowed grass fields (Nadolny and Gaff 2018)



IDOH

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Amblyomma maculatum Host Preference

- Immature- rodent and birds (important in long distance dispersal)

- Adults- Medium-large mammals
  - Including whited-tailed deer, coyotes, dogs, cattle, horses, sheep, swine (Teel et al. 2010)

CDC

Rickettsia parkeri

- *Rickettsia parkeri* rickettsiosis
- Part of SFGR (spotted fevers)
- Eschar

- **Detection in Indiana**
  - 77/500 (15.4%)

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Haemaphysalis longicornis – Asian Longhorned Tick

L. Beati, Georgia Southern

USDA

Asian Longhorned Ticks

April, 2023

IN is 19th State with confirmed ALHTs.

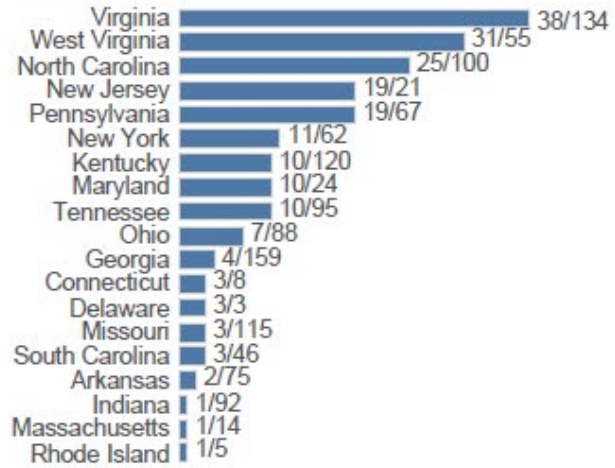
4/13/2023
-Environmental collection in Switzerland Co, IN

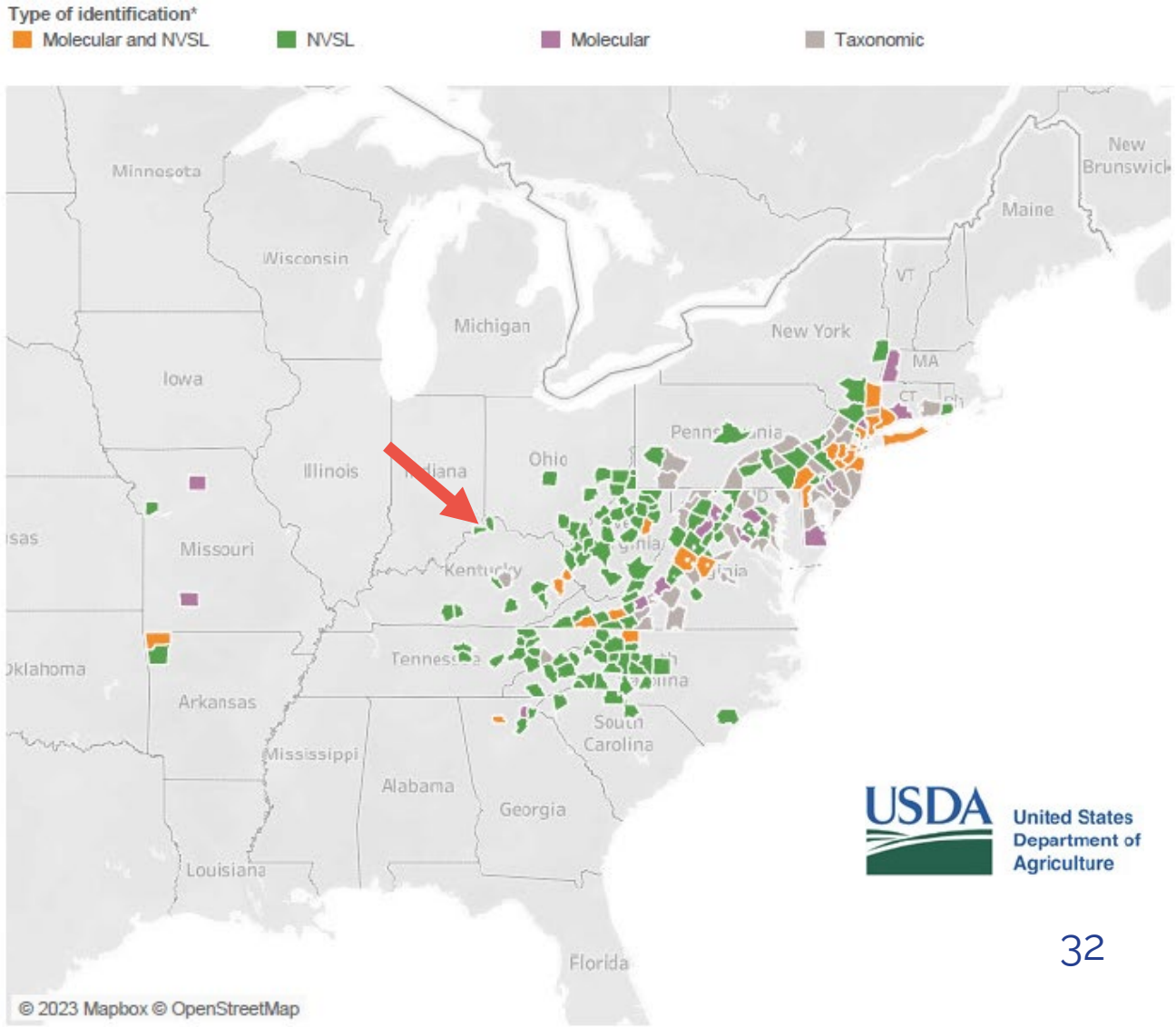
-Single nymph

Haemaphysalis longicornis (Asian longhorned tick), an exotic East Asian tick, has never previously established a population in the United States. It is a known serious pest of livestock in the Australasian and Western Pacific Regions where it occurs. It is an aggressive biter and frequently builds intense infestations on domestic hosts causing great stress, reduced growth and production, and severe blood loss.

The tick can reproduce parthenogenetically (without a male); as such, a single fed female tick can create a population. It is also a known/suspected vector of several viral, bacterial, and protozoan agents of livestock and human diseases. This three-host tick can spread pathogens among a diverse host range, on which it feeds side-by-side with other tick species. The detections detailed here are the first reports of this tick out of quarantine in the United States.

States with confirmed local Asian longhorned tick populations with number of counties in each state. (# of confirmed counties / total # of counties)





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USDA United States Department of Agriculture

Asian Longhorned Tick Host Preference

Ranked Host/ Source

Tick Source	July 2024	July 2024 rank	August 2024	August 2024 rank
Environment	1323^**	1	1331^	1
White-tailed Deer	172^**	2	172	2
Human	101^**	3	105^	3
Dog	86	4	86	4
Raccoon	60	5	60	5
Cow	50	6	51^	6
Virginia opossum	32	7	32	7
Elk	16	8	16	8
Striped skunk	14	9	14	9
Gray squirrel	10	10	10	10
Groundhog	10	11	10	11
Grey catbird	9	12/13/14	9	12/13/14
Cat	9	12/13/14	9	12/13/14
Red-tailed Hawk	9	12/13/14	9	12/13/14
Red Fox	8	15	8	15
Horse	7^	16	7	16
Eastern cottontail rabbit	6	17	6	17
Coyote	5	18	5	18
Gray Fox	4	19/20	4	19/20
Chicken	4	19/20	4	19/20

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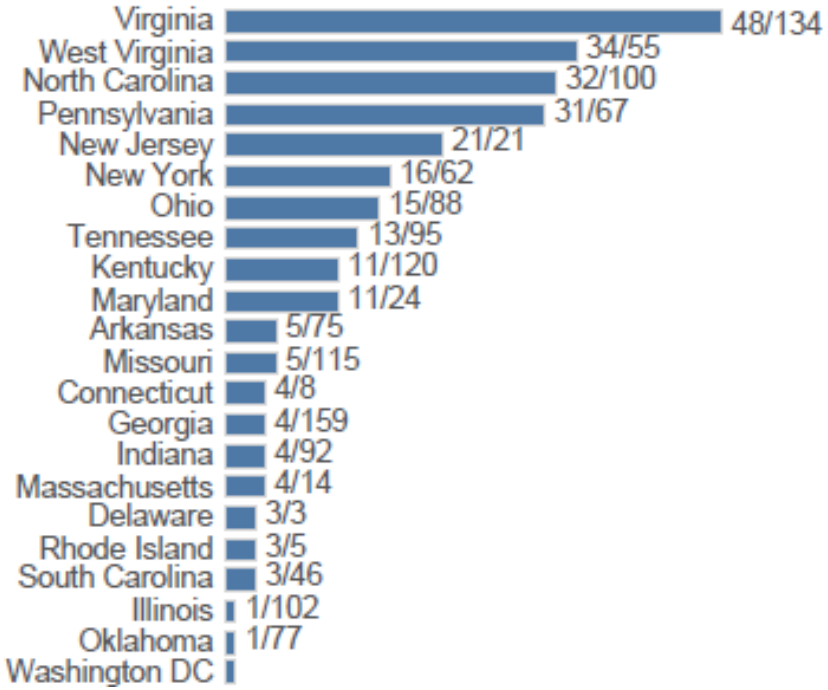
Went up in rank

^= Increased

** Arbonet entries

ALT Distribution

States with confirmed local Asian longhorned tick populations with number of counties in each state. (# of confirmed counties / total # of counties)



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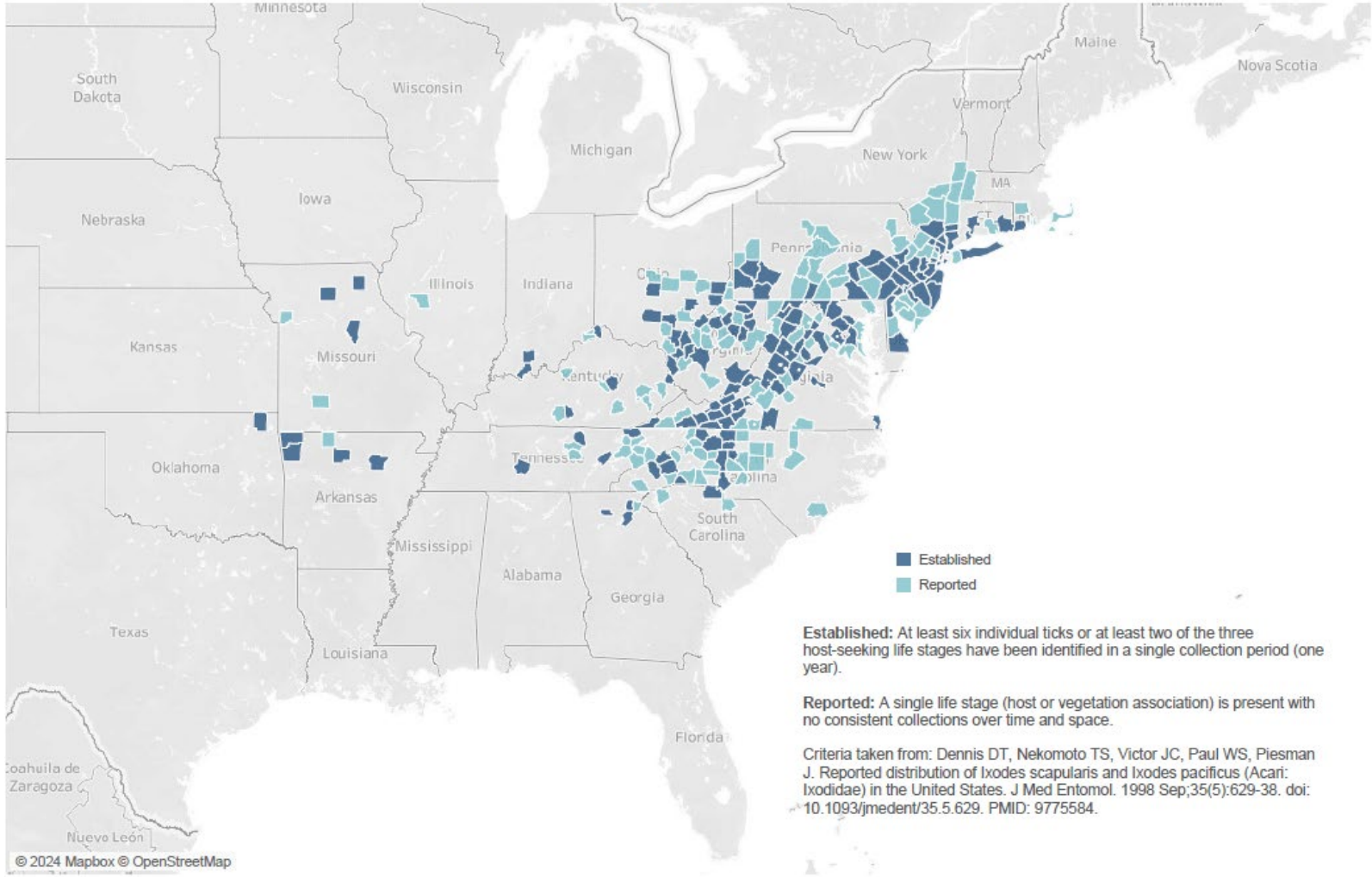
Counties with established Asian longhorned tick populations



Established: At least six individual ticks or at least two of the three host-seeking life stages have been identified in a single collection period (one year).

Reported: A single life stage (host or vegetation association) is present with no consistent collections over time and space.

Criteria taken from: Dennis DT, Nekomoto TS, Victor JC, Paul WS, Piesman J. Reported distribution of Ixodes scapularis and Ixodes pacificus (Acari: Ixodidae) in the United States. J Med Entomol. 1998 Sep;35(5):629-38. doi: 10.1093/jmedent/35.5.629. PMID: 9775584.

USDA United States Department of Agriculture

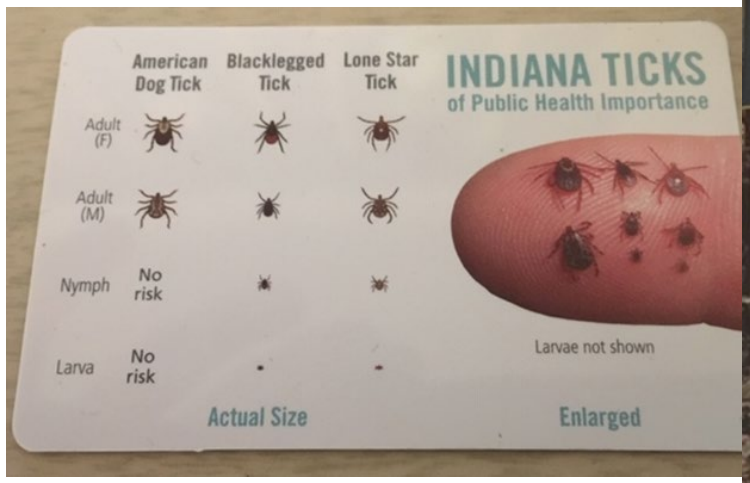
Questions?

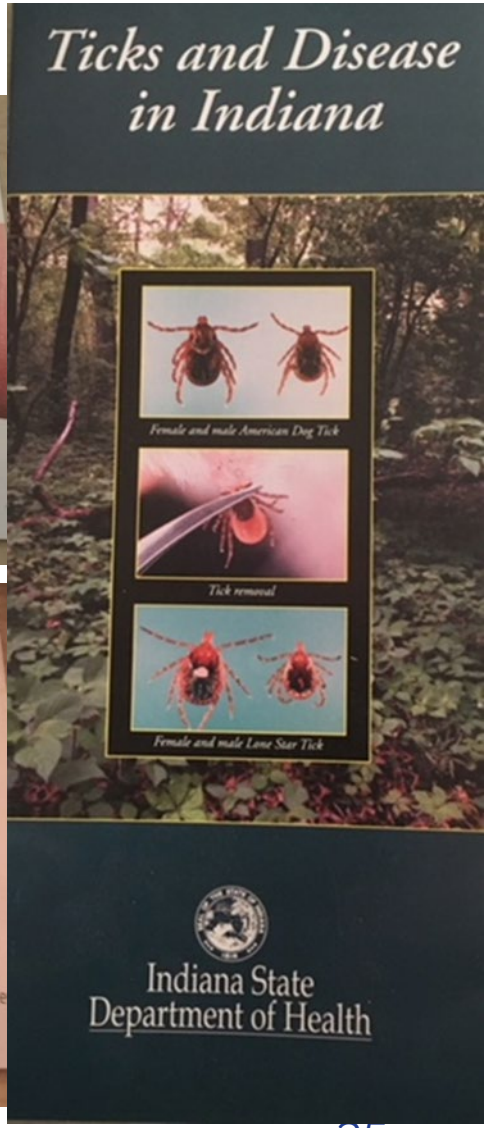
- Lee Green – legreen@health.in.gov
- Director (317) 517-5843

- Sara McBride – smcbride@health.in.gov
- Central Indiana – (574) 347-5102

- Jeanette McGavic – jmcgavic@health.in.gov
- Central Indiana (317) 995-3121

- Doug Ginder – dginder@health.in.gov
- Southern Indiana (317) 501-6349





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