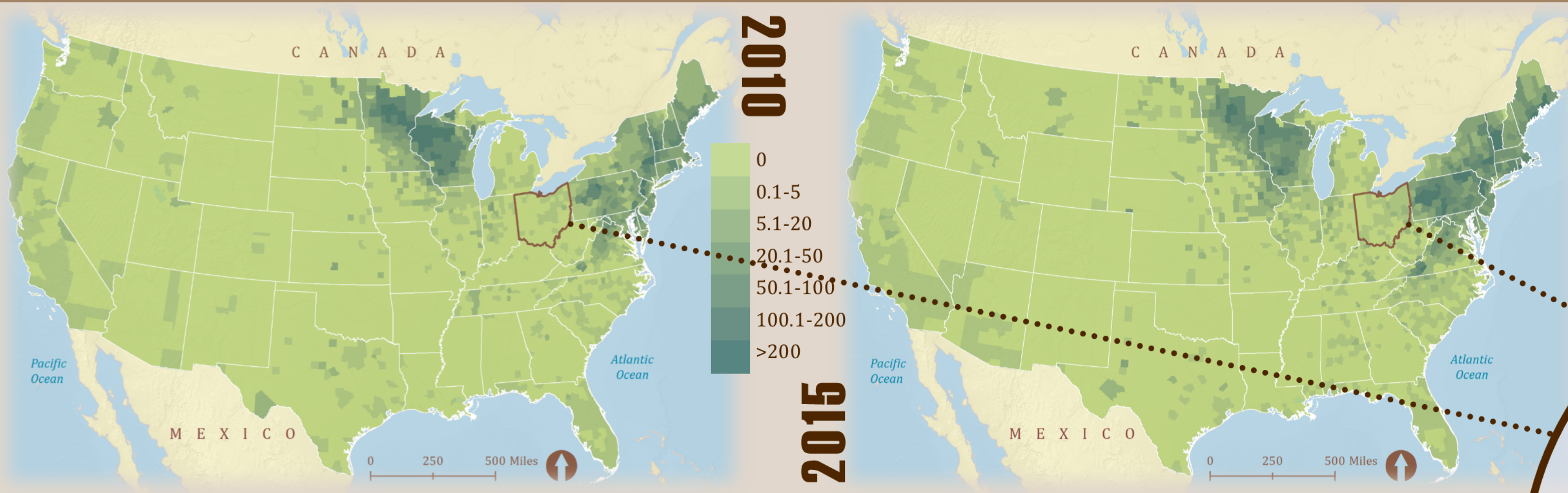


Looking Out For Lyme:

Identifying Areas of Disease Risk in Ohio

Lyme Disease in the United States

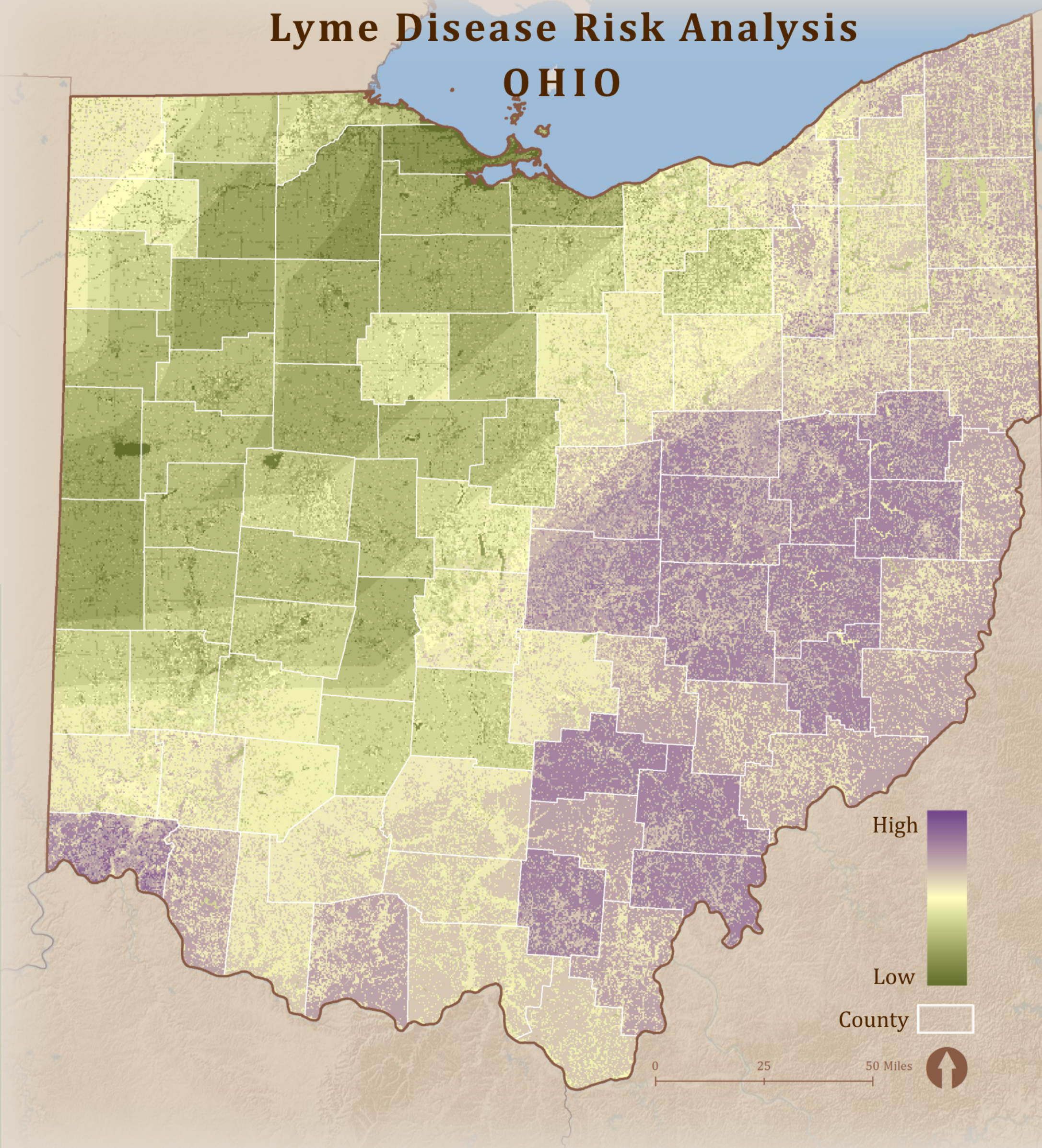


Lyme disease is a zoonotic tick-borne disease, commonly characterized by a bullseye-shaped skin rash. This disease was first described in the 1970s in the United States, and in the early 80s it was linked to *Ixodes scapularis*, the blacklegged tick or deer tick. The tick acts as a vector for the causative agent; a bacterium called *Borrelia burgdorferi* that is transmitted when an infected tick bites a suitable host. The CDC estimates that more than 300,000 new human cases occur each year, concentrated in the Northeast and Upper Midwest states. Currently, a vaccine against Lyme disease exists for dogs but there is no vaccine for humans.

In order to understand the persistence and growing number of cases of Lyme disease each year, the life cycle of blacklegged ticks must be understood. Adult blacklegged ticks lay eggs in the spring that hatch in the summer. These larval ticks must find a meal- typically birds or small mammals such as white-footed mice (*Peromyscus leucopus*). White-footed mice are considered the principal reservoir for Lyme disease, meaning they can be natural carriers of the disease-causing bacteria. Ticks become infected when they feed on an infected individual. In the spring, the now nymphal ticks search for a second blood meal. Finally in the fall, the nymphs become adults that seek larger hosts, such as white-tailed deer (*Odocoileus virginianus*). Occasionally, humans become the unlucky host for nymph or adult ticks. Because of their small size, nymphal ticks often go unnoticed when attached to a human.

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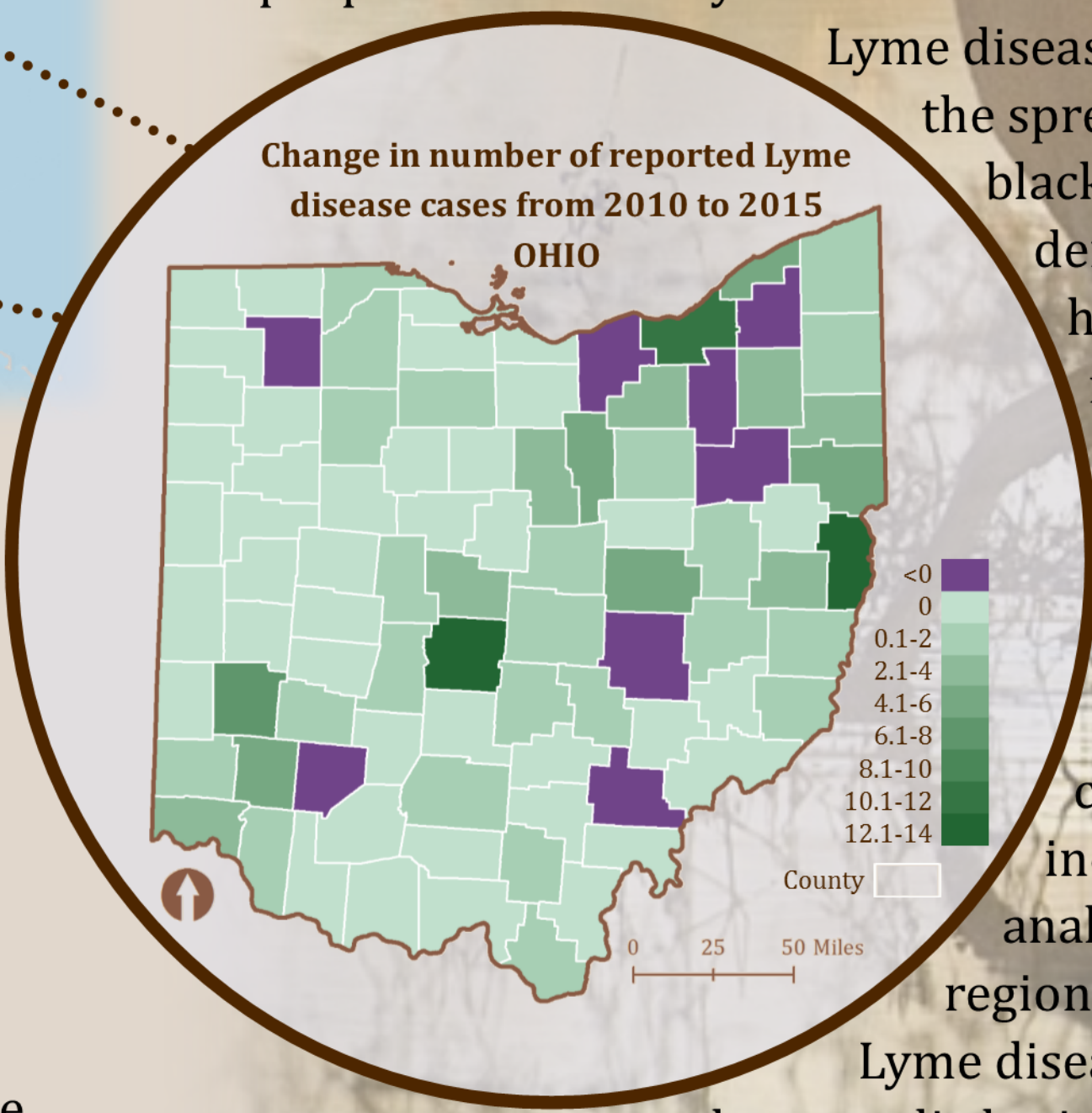
THANK YOU to Carolyn Talmadge for her wealth of knowledge and continued support throughout this project. Many thanks also to Clint McCoy from the Ohio Division of Wildlife for deer harvest data.



Lyme Disease in Ohio

Ohio has seen very few cases of reported Lyme disease compared to neighboring Pennsylvania, though the number grows each year. In 2010, 44 cases were reported compared to 2015's 154 reported cases. Those numbers will likely continue to grow, and about half of the counties in Ohio have already seen an increase in the reported number of Lyme disease cases from 2010-2015.

The purpose of this analysis was to determine areas in Ohio that are most at risk for Lyme disease. There are many factors that contribute to the spread of Lyme disease, including increased blacklegged tick habitat, white-tailed deer density, white-footed mouse density, and human population density. Climate change may be a factor driving the increase in suitable habitat for blacklegged ticks as temperatures rise and therefore allow the ticks to spread northward and remain active for a longer period of time. Unfortunately, due to data limitations, climate changes were unable to be incorporated into this analysis. The final risk analysis shows that the Appalachian Plateau region of eastern Ohio is at the greatest risk for Lyme disease, while the northwestern part of the state has very little risk.



What does this mean for you?

Lyme disease is one of many tick-borne diseases. Take necessary precautions when outdoors to avoid tick bites. Use insect repellent and thoroughly check for the presence of ticks on your clothing and body. For pets, be sure to regularly use tick prevention. Consider vaccinating your dog for Lyme disease, especially if you live in

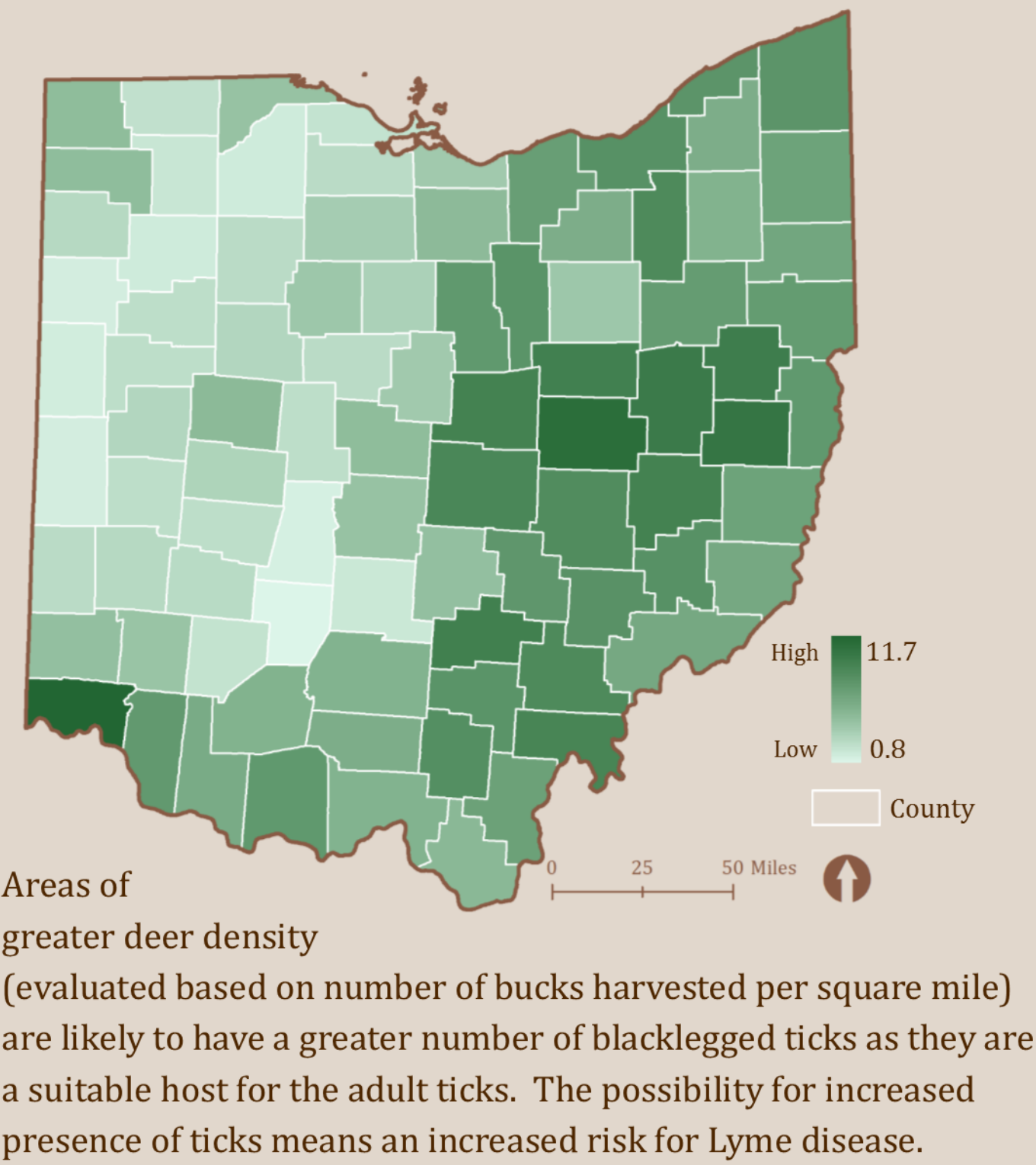


Methods

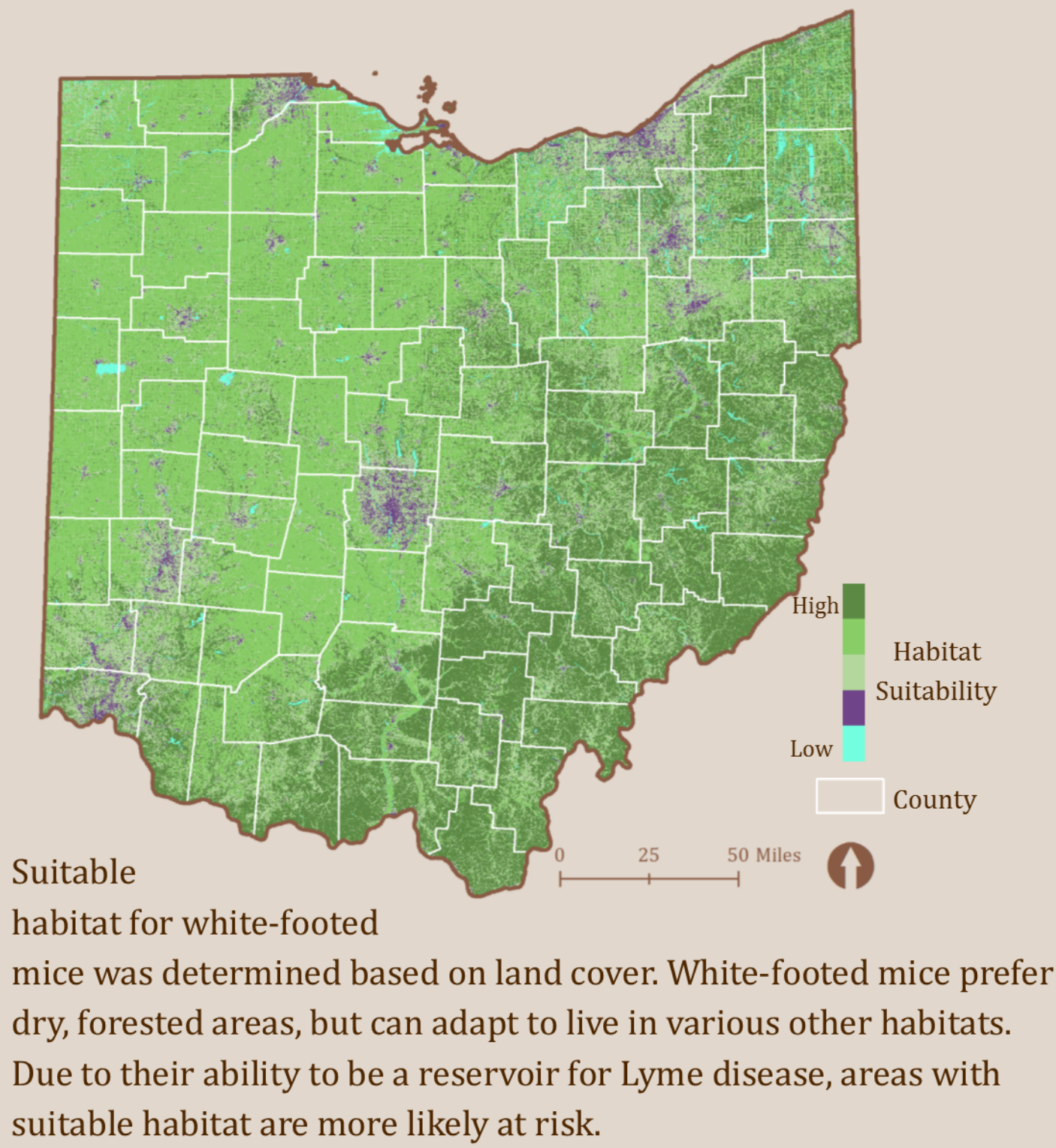
A **risk analysis** was performed by converting each factor layer into a raster and ranking the values from 1-5 (5 being the highest risk). Raster calculator was used to develop a final risk map incorporating each of the four factors.

ANALYSIS FACTORS	RISK SCORE 1 (Lowest Risk)	RISK SCORE 2	RISK SCORE 3	RISK SCORE 4	RISK SCORE 5 (Highest Risk)	WEIGHT
White-tailed deer density Harvested bucks per square mile by county	0-2	2-4	4-6	6-8	8-12	30%
Blacklegged tick range Distance from range (miles)	>50	25-50	10-25	5-10	Within-5	20%
White-footed mouse habitat Based on land cover	Water, Perennial Ice/Snow, Wetlands	Developed (Medium and High Intensity), Barren Land	Developed (Open Space and Low Intensity), Pasture, Scrub	Grassland, Herbaceous, Crops	Forest	30%
Human population density People per square mile by block group	0-1,000	1,001 - 3,000	3,001 - 10,000	10,001 - 20,000	20,001 - 40,000	20%

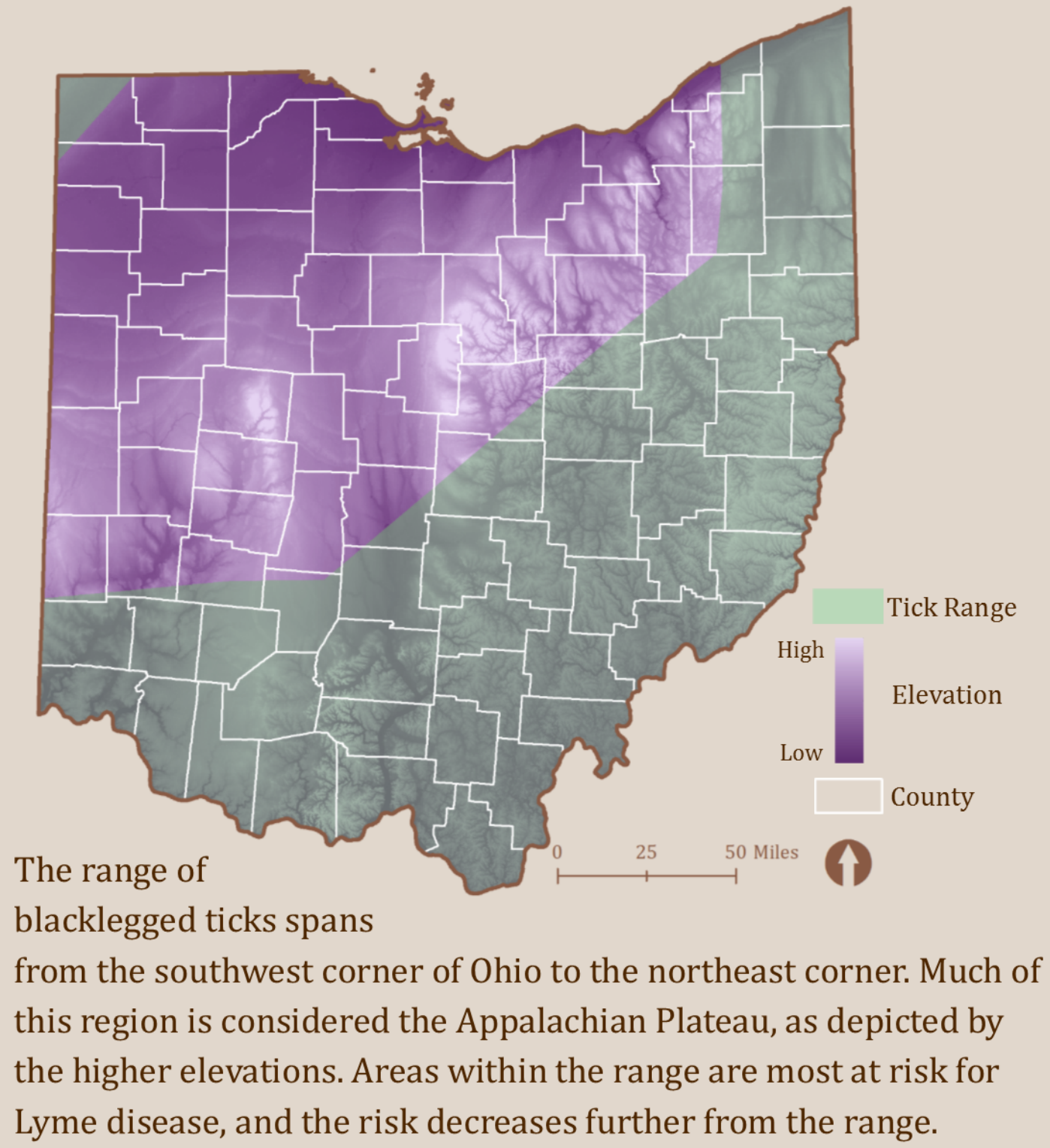
White-tailed Deer Density



White-footed Mouse Habitat



Blacklegged Tick Range



Human Population Density

