

# THE ECOLOGY OF LYME DISEASE



Since 1990, researchers at the Cary Institute have been investigating the ecology of tick-borne disease.

Lyme disease is the most commonly reported vector-borne illness in the United States. In the Northeast, the blacklegged ticks that spread Lyme disease are increasing their range, putting more people in harm's way.

For more than two decades, the Cary Institute's Dr. Richard Ostfeld has been investigating how wildlife, land use, acorns, and climate change set the stage for tick-borne disease transmission. **Among the lessons learned:**



Blacklegged ticks can be infected with several pathogens, not just the bacterium that causes Lyme disease.

**1. Tiny blacklegged ticks called nymphs pose the greatest threat to people.**

Nymphal ticks, which are as small as poppy seeds, can transmit infections acquired during their larval blood meals. Nymphs are abundant from May through July.

**2. Climate change is increasing tick-borne disease risk.**

Blacklegged ticks are expanding their range northward and nymphal ticks are emerging earlier in the spring. Cary Institute science suggests that to adequately protect public health, we should move Lyme Disease Awareness month to April.

**3. A single tick bite can pack a double (or triple) pathogen punch.**

Blacklegged ticks can carry and transmit multiple disease-causing pathogens. In the Hudson Valley, one tick bite can infect people with Lyme disease, babesiosis, and anaplasmosis.

**4. Tick-borne illness risk increases when white-footed mice are abundant.**

When ticks feed on white-footed mice, they are much more likely to survive and become infected with the pathogens that cause Lyme disease, anaplasmosis, and babesiosis.

**5. Biodiversity is good for our health.**

When a variety of birds and mammals are present, blacklegged ticks can feed on non-mouse hosts that are less efficient at transferring the Lyme disease bacterium. This reduces the number of infected ticks. Also, some animals are very efficient at killing ticks. Opossums are fastidious groomers and can kill thousands of ticks each week during tick season.



When white-footed mice dominate the landscape, the risk of tick-borne illness rises.

# Tick Life Stages



*Ticks take one blood meal at each developmental life stage—larva, nymph, and adult.*



*Opossums can kill thousands of ticks each week while grooming.*

## **6. Predators are a weapon against Lyme disease.**

Again, another biodiversity benefit. Landscapes that support predators have reduced Lyme disease risk. This is because predators, such as foxes, bobcats, and barred owls control the abundance of white-footed mice.

## **7. Intact forests harbor fewer infected ticks.**

Numerous studies have found that small forest fragments have a higher percentage of infected ticks compared to intact forests. This is because forest patches have lower animal diversity, fewer predators, and an abundance of white-footed mice.

## **8. Acorn crops can help forecast Lyme disease risk.**

Notice an abundant supply of acorns on the forest floor? This is a good indicator that white-footed mouse populations will be high the following summer. When mouse populations spike, the risk of Lyme disease increases the following spring.

With Bard scientist Felicia Keesing, Ostfeld is currently co-leading The Tick Project. The five-year study is testing environmental interventions with the potential to reduce tick-borne disease in neighborhoods. Twenty Dutchess County communities are participating. If successful, it will revolutionize Lyme disease prevention.

Learn more at: [www.tickproject.org](http://www.tickproject.org)

In the meantime, enjoy the outdoors. But be tick aware. The Centers for Disease Control recommends avoiding brushy areas, judicious use of repellents, performing tick checks, showering after spending time in tick habitat, and putting exposed clothing in the dryer on high heat to kill potential tag-along ticks.

For science-based advice on prevention and tick removal, visit this Lyme Disease FAQ developed in partnership between Cary Institute scientist Dr. Richard Ostfeld and the Dutchess County Department of Behavioral & Community Health:

[www.dutchessny.gov/CountyGov/Departments/DBCH/26753.htm](http://www.dutchessny.gov/CountyGov/Departments/DBCH/26753.htm)



*Foxes and other predators can help control populations of white-footed mice.*

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