Where the Field Meets the Forest: Tick Safety On & Off the Farm

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Online Webinar
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Entomology Research Laboratory

Erik_Karits, Pixabay

FotoRieth, Pixabay

Entomology Research Laboratory

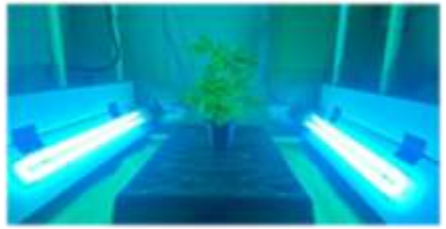
Specialize in Integrated Pest Management (IPM)

Conservation biological control (habitats to attract & sustain beneficial insects in agroecosystems)

Hemlock woolly adelgid & other invasive pests.

Ticks

Maple Production Pests (pear thrips, maple leaf cutter)



UV-C irradiation

Saffron

Greenhouse ornamentals & high tunnel vegetables

Primary emphasis on biological control (parasites, predators and pathogens)

Tick on Farms Survey Says

28% answered correctly that both adult & nymph blacklegged ticks transmit Lyme disease; 19% were unsure.

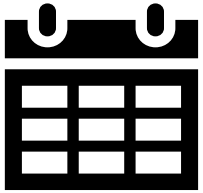
48% identified a black legged tick correctly; 15% were unsure.

70% strongly agree/somewhat agree that ticks and tick-borne diseases are increasing on their farm/property; 69% strongly agree/somewhat agree that ticks are an occupational hazard.

When asked about how ticks and tick-borne diseases (TBD) have impacted them or their agricultural operations, the top responses were:

- spent money on personal protection against ticks, treating animals for suspected TBD & on themselves and/or their family to treat for a TBD.
- avoid working on their farm in areas where they know ticks are most active.
- avoid recreating on their property in their spare time because of ticks.

When asked which seasons blacklegged ticks were the most active in the Northeast, although ticks can be active year-round with temps above freezing and no snow, peak activity is spring and fall and, only 25% selected that option.



Ticks are Parasitic Mites (Arachnids)

Hard Ticks: Have a hard shield/scutum

Soft Ticks: Are leathery, no shield/scutum

~. 900 species worldwide..

~ 90 species in the USA.

~ 15 species in VT, [7 able to transmit diseases to humans]

Ticks are responsible for transmitting almost 95% of vector-borne diseases in the US.

Ntl. Park Service via picryl

Hilton Pond Center

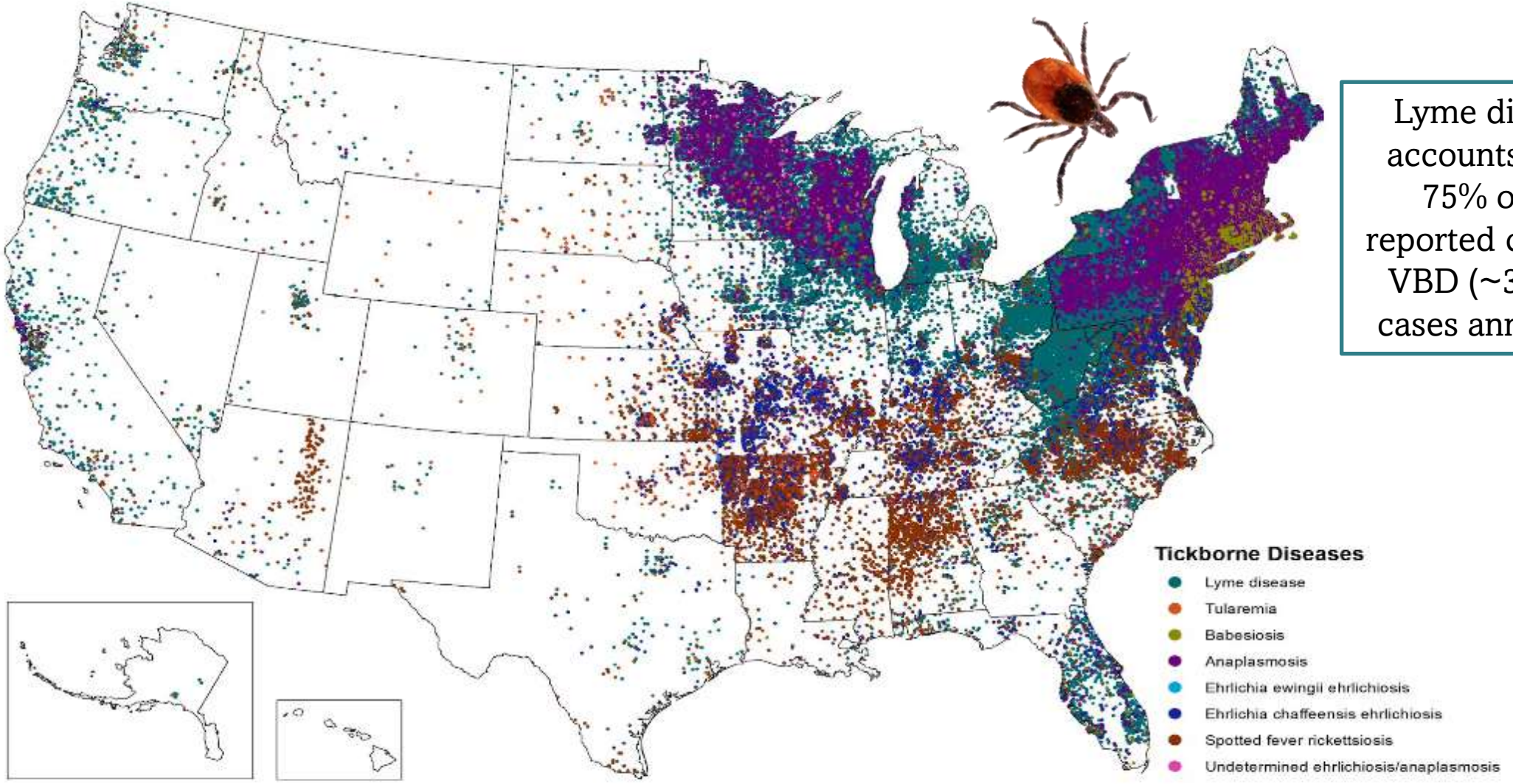
Wikimedia Commons

Filipe Dantas-Torres

~10% of ticks affect the health of domestic animals & humans, most only associated with wildlife.

Wikimedia Commons

Reported Cases of TBD (USA) 2019 - 2022



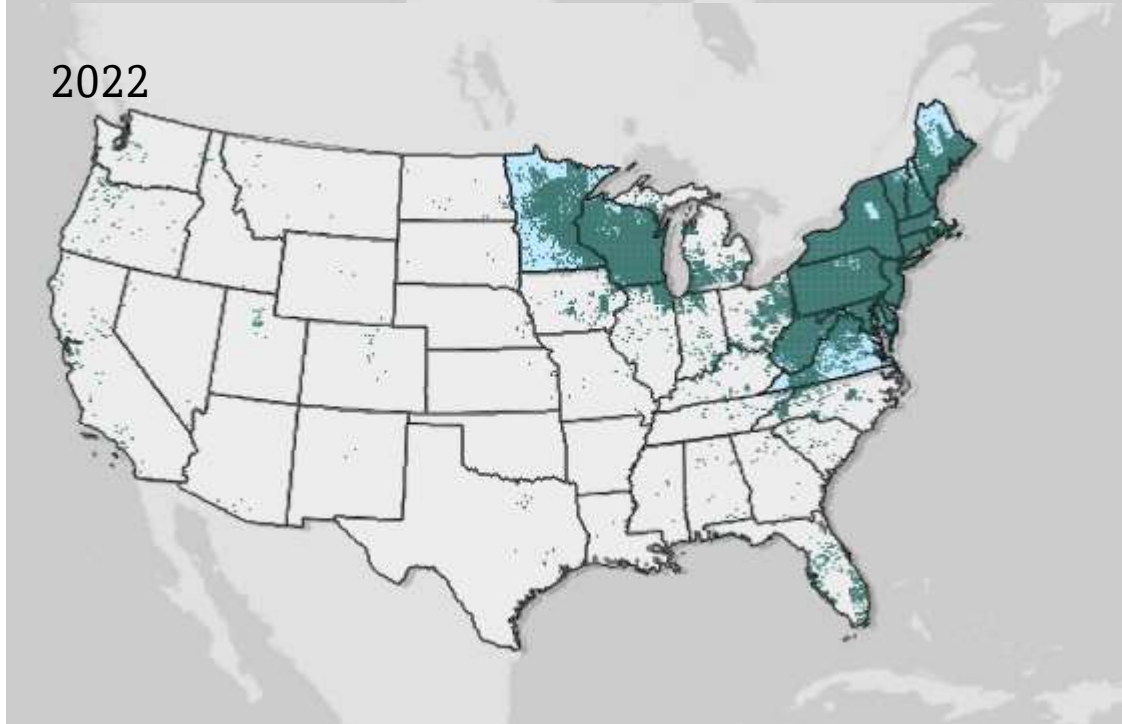
Lyme disease accounts for ~ 75% of all reported cases of VBD (~30,000 cases annually).

Note: Powassan data not represented on the map. Babesiosis data incomplete for years shown.

CDC

Lyme Disease on the Rise

Annual incidence of LD (the number of new cases per 100,000 people)



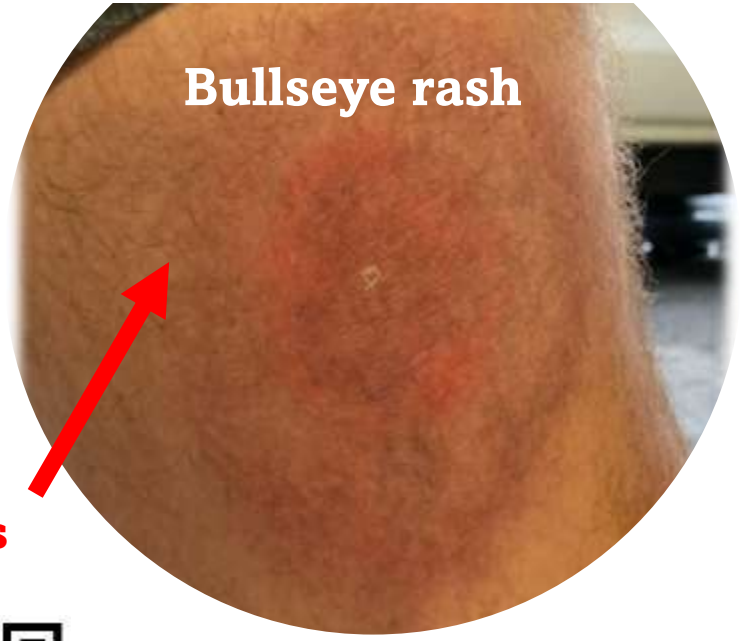
[Lyme Disease Surveillance and Data (CDC)]
[Climate Change Indicators: Lyme Disease (EPA)]

Common Tick-Borne Illnesses

Main tick-borne diseases (TBD) in Vermont:

- Lyme disease (bacteria - *Borrelia burgdorferi*) **#1**
- Anaplasmosis (bacteria - *Anaplasma phagocytophilum*) **#2**
- Babesiosis (protozoan parasite - *Babesia microti*) **#3**
- Hard Tick Relapsing Fever (bacteria - *Borrelia miyamotoi*)
- Powassan/Deer Tick Virus

99% from blacklegged tick bites



Only in ~ 70% of cases

Other threats:

- Tularemia (bacteria - *Francisella tularensis*)
- Ehrlichiosis (bacteria - *Ehrlichia chaffensis/E. ewingii*)
- Rocky Mountain Spotted Fever (bacteria - *Rickettsia rickettsii*)
- Alpha-gal syndrome 'red meat allergy' (sugar molecule)

VAAFM PHARM Tick Surveillance Program Reports

General symptoms:

- Flu-like - Fever, headache, joint pain & swelling, muscle aches, fatigue, loss of appetite.
- May take up to 30 days to appear (or not at all).
- Lyme disease 'erythema migrans'/bulls-eye rash **(not always!)**

53% ticks carry disease-causing pathogens

TBD are preventable and *most* are treatable if detected early.

CDC Tick Surveillance

Timeline of Tick-Borne Diseases in Humans

(vectored by blacklegged ticks)

Babesia microti (Babesiosis) in MA

Powassan Virus in NJ

Lyme Disease (*Borrelia bugdorferi*) in CT

Anaplasmosis (*Anaplasma phagocytophilum*) in WI

[Kay Hagan Tick Act]

Borrelia miyamotoi disease (several cases in the Northeast)

1960 | 1970 | 1980 | 1990 | 2000 | 2010 | 2020

Powassan Virus

Lyme Disease

Anaplasmosis

B. miyamotoi disease

Babesiosis

Now 100s of cases a year

CDC | VDOH

The Rising-Tide of Tick-Borne Diseases

- Climate change impacts on ticks, hosts & pathogens.
- Land use changes (reforestation, fragmentation, urbanization into forested areas)
- Thriving host (deer & rodent populations).
- Lack of research & control measures.
- Increased surveillance efforts led to discoveries of new TBD-causing pathogens & improved distribution maps.
- Greater public awareness of TBD leads to increased medical attention.

Climate Change Effects

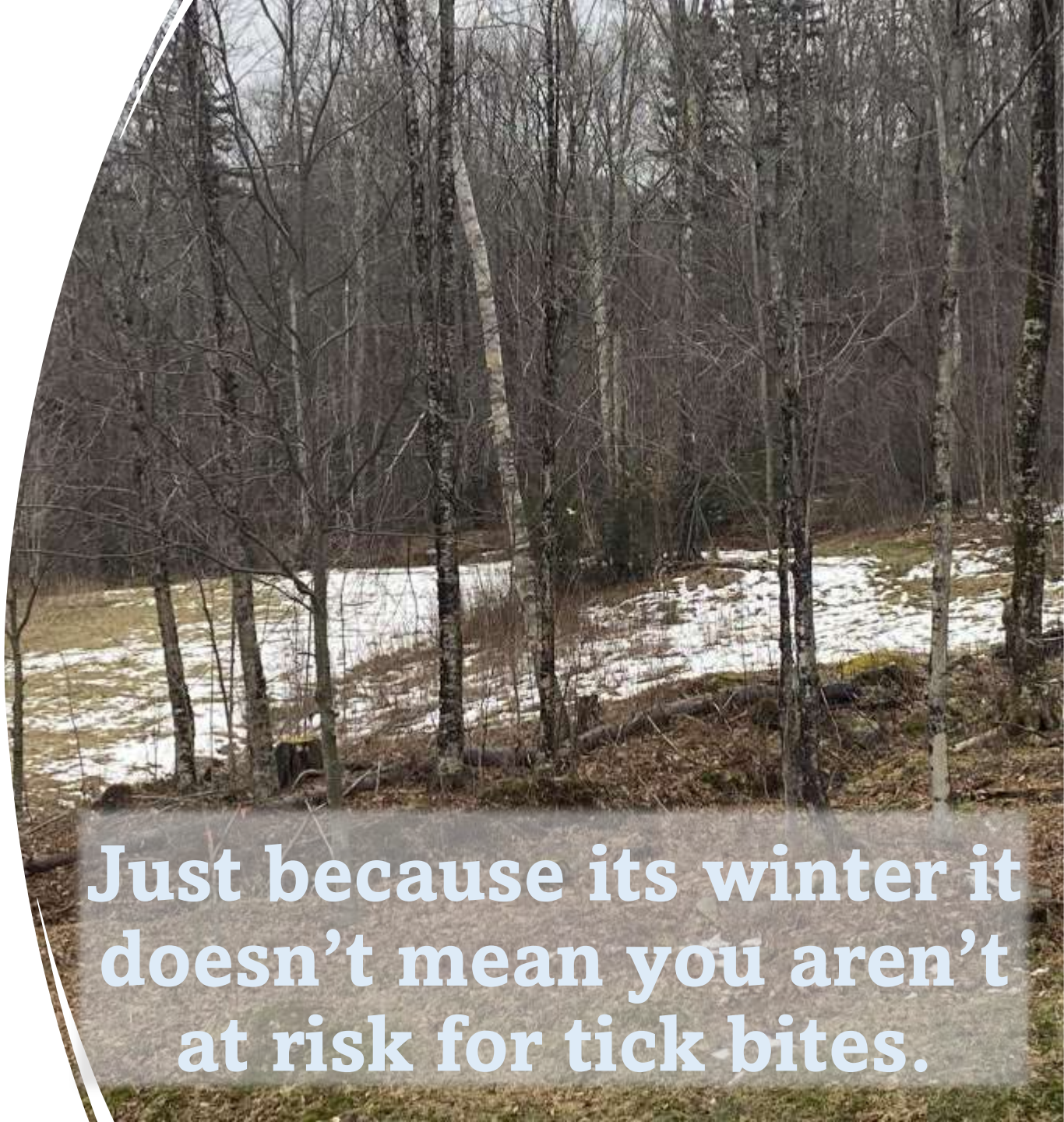
Higher temperatures & increased precipitation provide suitable conditions that promote tick survival (ticks thrive in humid environments).

Allows for range expansion into new areas & higher elevations that were previously inhospitable.

Increases tick reproduction & accelerates life cycles.

Prolongs tick activity periods (i.e., snow free times of the year) which increases risk for bites, acquiring disease-causing pathogens & their transmission.

Ticks active year-round if temperatures are above freeing & snow is sparse.



Get To Know Your Ticks

Blacklegged
(*Ixodes scapularis*: Eastern
Ixodes pacificus: Western)

American Dog/Wood
(*Dernacentor variabilis*)

Most common in VT

Asian Longhorned
(*Haemaphysalis longicornis*)

Lone Star
(*Amblyomma americanum*)

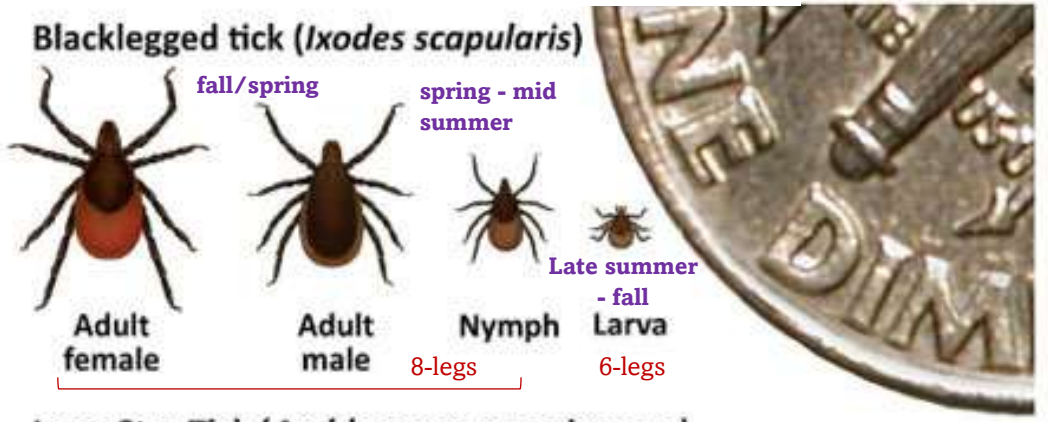
Engorged (blood-filled) adult deer tick.

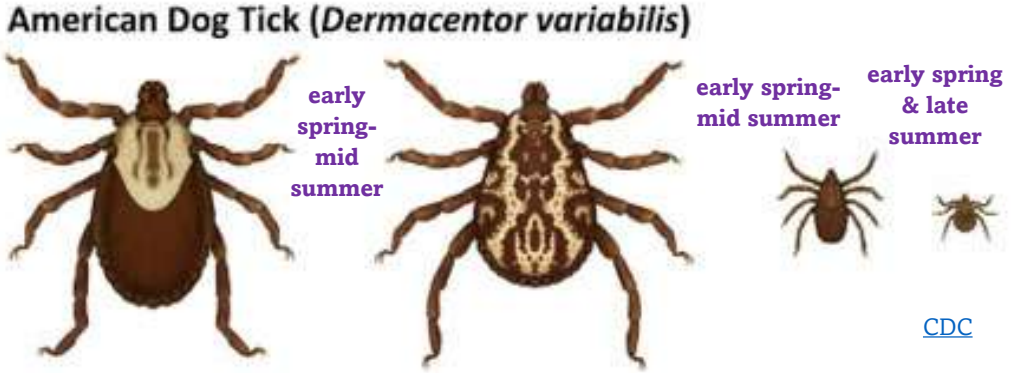
… and others

Not established in VT (yet..)

(These are all adult females)

Tick Life Stages





Check out [Tick Encounter](#) for Detailed Tick Descriptions.

Blacklegged (Deer) Tick
(*Ixodes scapularis*)

- **Habitat:** Within forests & forest edges, particularly where brushy/shrubby.
- Adults **quest (seek hosts)** at knee-high on the tips of vegetation/nymphs/larvae closer to the ground esp. on leaf litter/debris.

Erik Karits, pexels.com

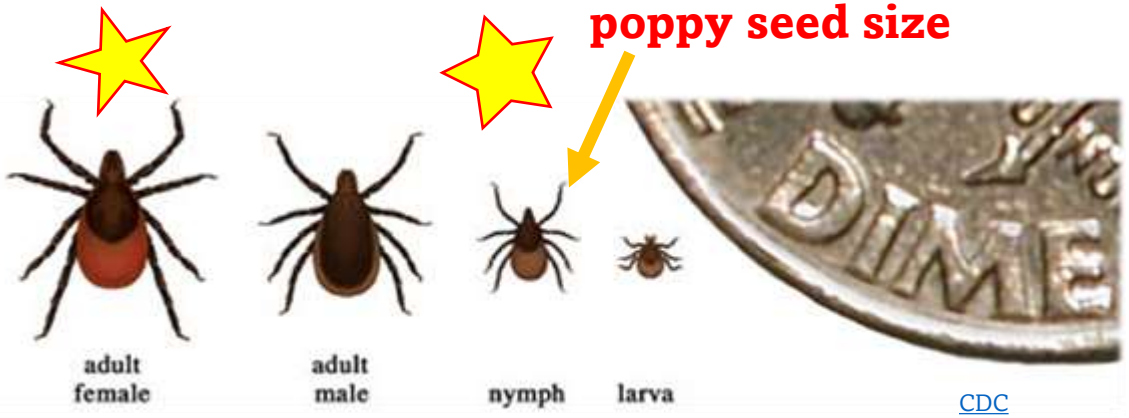
Questing adult

Orange-red body surrounding the black scutum/shield.

Scott Bauer, USDA ARS, Bugwood.org

Jim Occi, BugPics, Bugwood.org

poppy seed size



CDC

Blacklegged Tick Life Cycle
3-Host | 2-Years

STARTS HERE

Larval Activity (August-Sept)

Most Common Reservoir Host (infection source)

Spring Year 1
Blood fed female lays eggs

Summer Year 1
Larvae emerge (6 legs)

Summer Year 1
Larvae feed on host 1

Fall Year 1
Larvae molt to nymphs (8 legs)

50-90% of white-footed mice are infected with Lyme- disease-causing bacteria in the Northeast

Winter Year 1
Nymphs are inactive

Spring/Summer Year 2
Nymphs feed on host 2

Nymph Activity (May-July)

Summer/Fall Year 2
Nymphs molt to adults

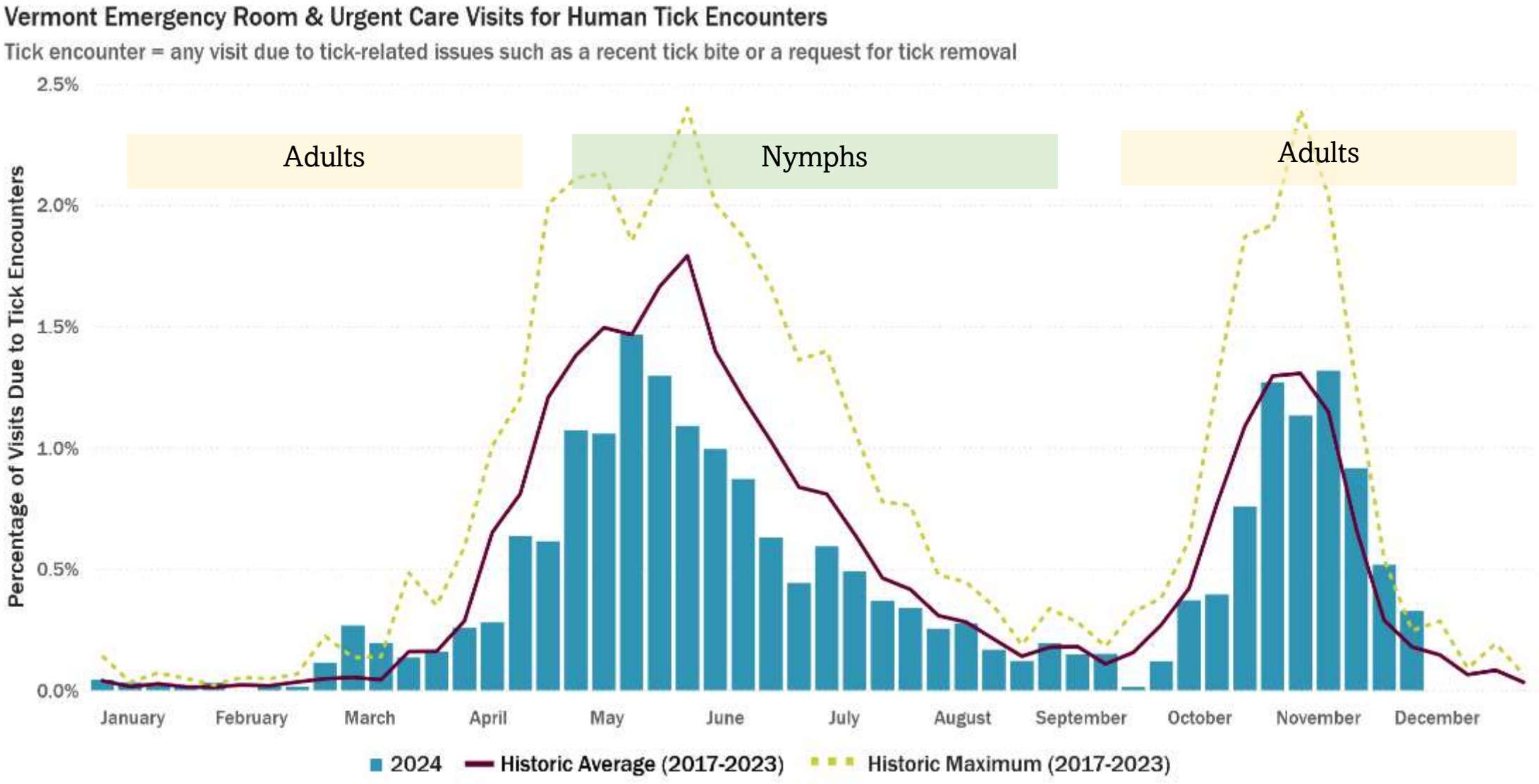
Adult Activity (October – May)

Late Summer/Fall Year 2
Adults feed on host 3

Most Common Reproductive Host

Winter Year 2
Adults overwinter

[MSU Extension: What you need to know about ticks](). (modified from)



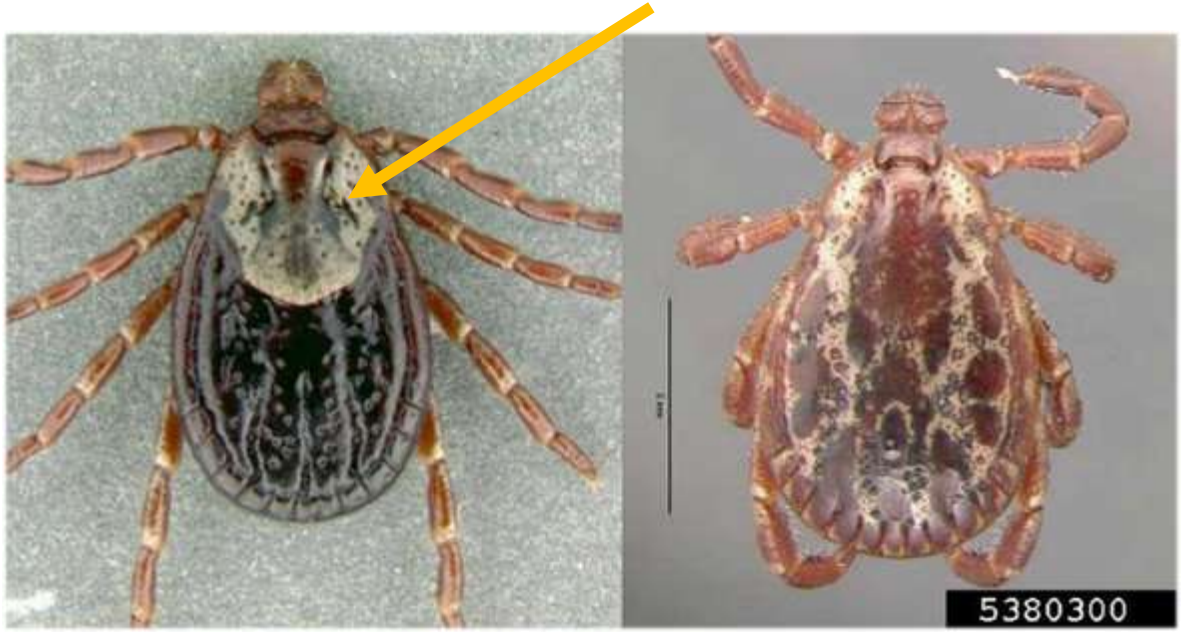
[VT Dept. of Health]

Medical treatment coincides with peak nymph & adult activity.

American Dog Tick
(*Dermacentor variablilis*)

- **Hosts:** Small rodents & medium-sized mammals, domestic cats, dogs, livestock & humans.
- Adults commonly attack humans & pets
  Nymphs & larvae to a lesser extent because they prefer smaller mammals (rodents).
- **Habitat:** Forest edges, areas with little or no tree cover (i.e., grassy fields, scrubland) & along trails.
- **Activity:** Spring-Summer.
- **Diseases/Disorders: (Rare in VT)**
  - Rocky Mountain Spotted Fever (bacteria)
  - Tularemia (bacteria)

Brown-red bodies and ornate scutum/shield



Gary Alpert, Harvard University, Bugwood.org

Adult female

Adult male

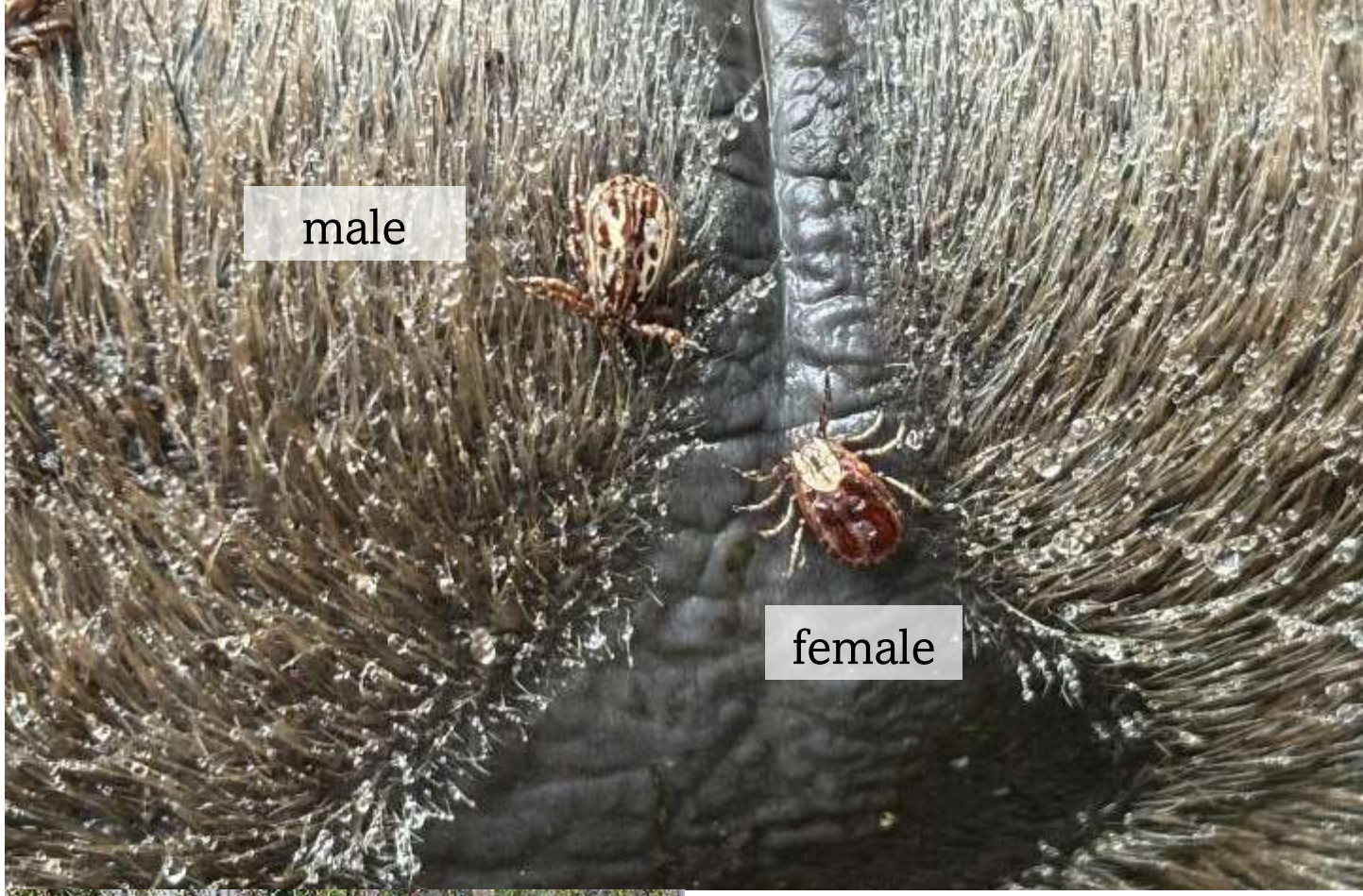
Nymph

Larva

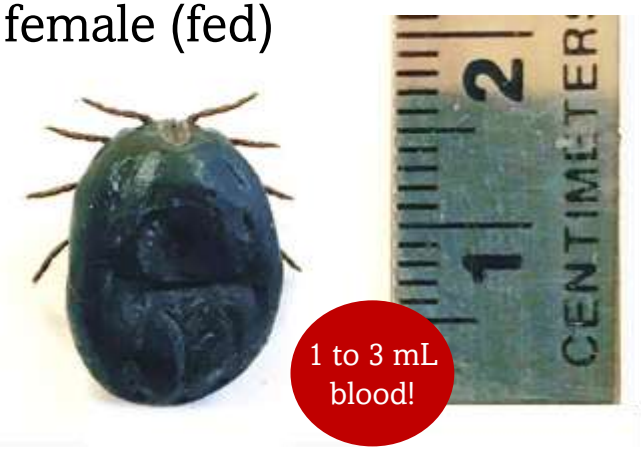
CDC

Winter Tick
(*Dermacentor albipictus*)
aka Moose Tick

- Infests large ungulates (moose, elk, deer, caribou, cattle, horses etc.)
- Moose calf mortality (>50% annually) over past 20 years. In VT, 91% calf mortality, 25% adults, due to weight loss (atrophy of fat), hair loss & reduced cow productivity.
- Average >47,000, density 2.9 ticks/cm^2 on moose.
- Climate change increases tick survival & recruitment during snow-free times of their off-host period (spring – fall)



female (fed)




Total ticks on self = ~ 15,000
Total ticks on sampling flag = ~ 20,000

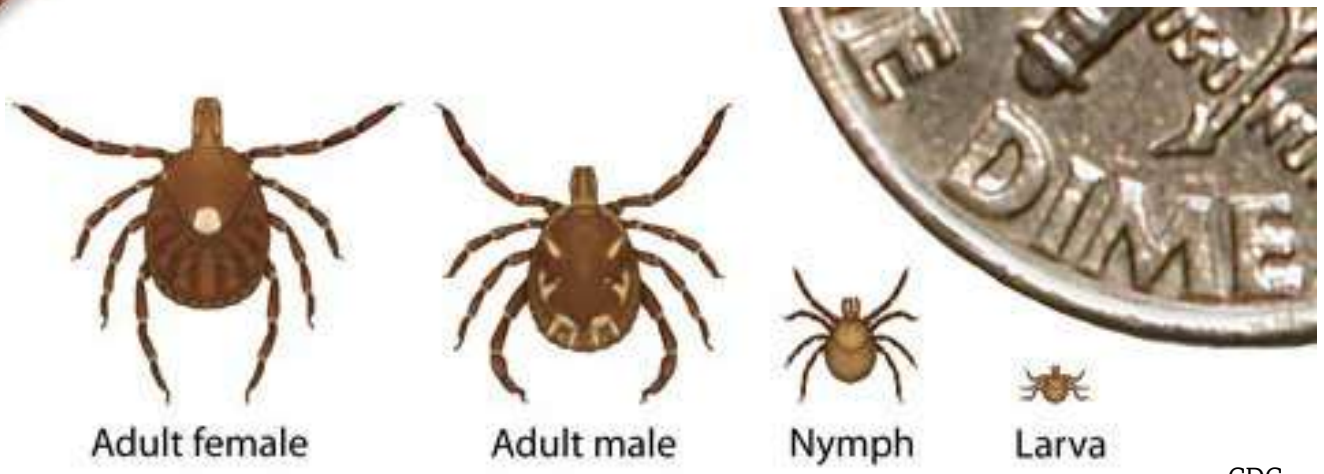
Lone Star Tick

(*Amblyomma americanum*)

Adult females Brown-red body with a single white dot on scutum/shield

- **Hosts:** Squirrels, raccoons, deer, cattle, some bird species, cats, dogs, humans.
- **Habitat:** Found in woodlands with dense undergrowth & near animal resting areas.
- **Activity:** Spring-Fall & they hunt down their hosts instead of waiting for hosts to pass by.
- Aggressive biters.

- **Diseases/Disorders:**
  - Ehrlichiosis (bacteria)
  - Rocky Mountain Spotted Fever (bacteria)
  - Tularemia (bacteria)
  - Southern Tick–Associated Rash Illness 'STARI' (unidentified agent) [southern states]
  - Alpha-gal syndrome 'red meat allergy' (sugar molecule)



CDC

- Not established in VT (yet).

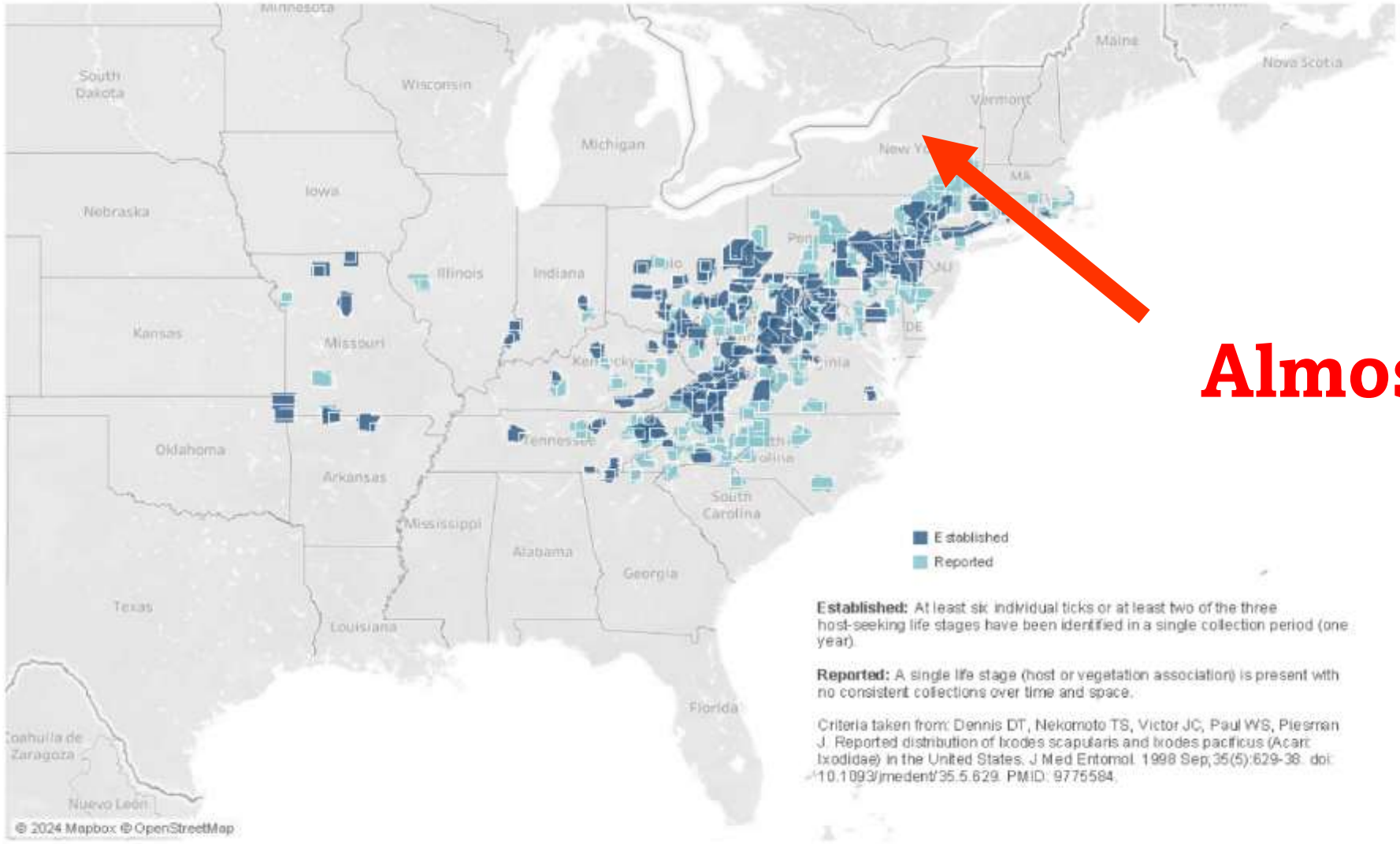
Asian Longhorned Tick (*Haemaphysalis longicornis*)

- **INVASIVE SPECIES ALERT!** Identified in 2017 on sheep in NJ (native to Asia). Not established in VT (yet).
- **Hosts:** Wide range of domestic animals & wildlife (sometimes humans)
- **Habitat:** Pastures & meadows
- Parthenogenic/aesexual (can produce thousands of offspring without a male) – rapidly spreading across the US (NOT in VT, yet).
- Very large infestations occur. Tend to quest for hosts in groups on tops of vegetation (Larvae can be picked by the hundreds).
- **Diseases/Disorders:** Several in its native range in humans, potential uncertain here in US, possibly Ehrlichiosis, - Causes Bovine theileriosis [*Theileria orientalis* Ikeda]

USDA APHIS: Asian Longhorned Tick

Counties with established Asian longhorned tick populations

Asian Longhorned Ticks (USDA APHIS)



Almost Here!

USDA United States Department of Agriculture

Different Ticks Pose Different Risks

					
Blacklegged (*Ixodes* sp.) 	Lyme, Anaplasmosis, Babesiosis, Powassan, Ehrlichiosis, Relapsing Fever	Lyme, Anaplasmosis	—	Lyme, Anaplasmosis	Lyme, Anaplasmosis
American Dog/Wood (*Dermacentor* sp.) 	Rocky Mtn. Spotted Fever, Tularemia	—	Anaplasmosis	Rocky Mtn. Spotted Fever, Babesiosis	Cytauxzoonosis (bobcat fever), Tularemia
Lone Star (*Amblyomma* sp.) 	Southern tick-associated rash illness (STARI), Ehrlichiosis, Alpha-gal, Tularemia	—	—	Ehrlichiosis, Rocky Mtn. Spotted Fever	Cytauxzoonosis (bobcat fever), Tularemia
Asian Longhorned (*Haemaphysalis* sp.) 	Ehrlichiosis?	—	Bovine theileriosis [*Theileria orientalis* Ikeda]	—	—

Companion Animal Parasite Council
Merck Veterinary Manual

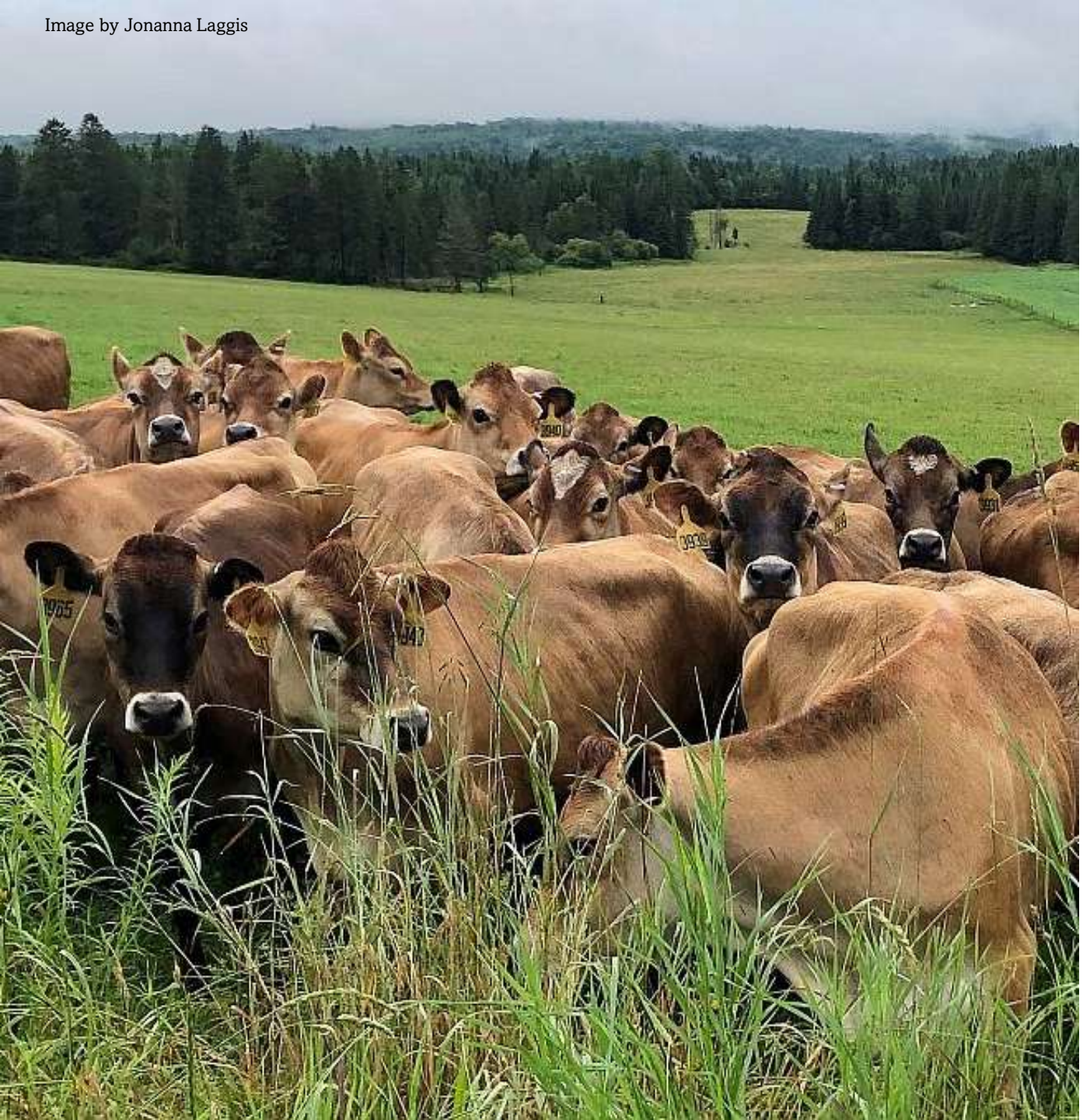


Image by Jonanna Laggis

Cattle

Bovine Anaplasmosis [*Anaplasma marginale*]

- Bacterial parasite from *Dermacentor* sp. ticks.
- Causes acute anemia; infected animals become carriers.
- Difficult to diagnose (lethargy most common initial sign, fever, jaundice, weakness, weight loss, decreased milk production, constipation, abortion).
- Treated with antibiotics.

Bovine Theileriosis [*Theileria orientalis* Ikeda]

- Blood-borne protozoan parasite (protozoan).
- Transmitted by invasive Asian longhorned tick.
- Infected cattle remain carriers, causes severe anemia leading to death.
- No approved treatment in US.

Bovine Anaplasmosis (USDA)
Bovine Theileriosis (USDA)

Horses

Lyme Disease & Equine Granulocytic Anaplasmosis

- Caused by *Borrelia burgdorferi & Anaplasma phagocytophilum*
- Transmitted by blacklegged ticks
- Signs include lameness, fever, joint pain, stiffness, weight loss,behavioral changes. neurological issues.
- Treated with antibiotics

Equine Piroplasmosis

- Foreign disease
- Caused by *Theileria equi or Babesia caballi.*
- Blood-borne protozoan parasite (protozoan) .
- Mortality rates can reach 50%.

What To Do About The Ticks?

Franz26, Pixabay

Openclipart-Vectors, Pixabay

Dandelion_tea, Pixabay

Tick Management Is Complicated

- Ticks are long-lived spending ~ 90% of their time off-host, free-living in the environment.
- Tick-host-habitat-ecology complexities causes patchy tick distribution challenging targeted landscape treatments.
- Takes years of research to demonstrate acceptable tick & disease reductions from targeted landscape treatments (i.e., reduced encounters & disease).


Pixabay


Pixabay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Integrated Tick Management

Tick Checks-Monitoring

- Check for ticks daily after working in the field, forest or with animals. Check animals too.
- Use a mirror to check hard-to-see places.
- Remove ticks immediately.
- Contribute to passive tick id surveillance programs (citizen science).
- Consider sending ticks in for pathogen screening.

Personal Protection

- Wear protective clothing (light-colored long pants, long-sleeve shirt, permethrin-treated) and tuck pants into socks.
- Use EPA-approved tick repellents (i.e., Deet, Picardin). Read the label!
- Use lint roller on clothes in field after working in or near tick-infested areas.
- Shower daily in peak tick periods
- Put clothes in dryer (10 min) on high heat.
- Develop a Tick Protection Plan.
- Avoid tick habitat during peak tick activity.
- Educate others (family members, employees).

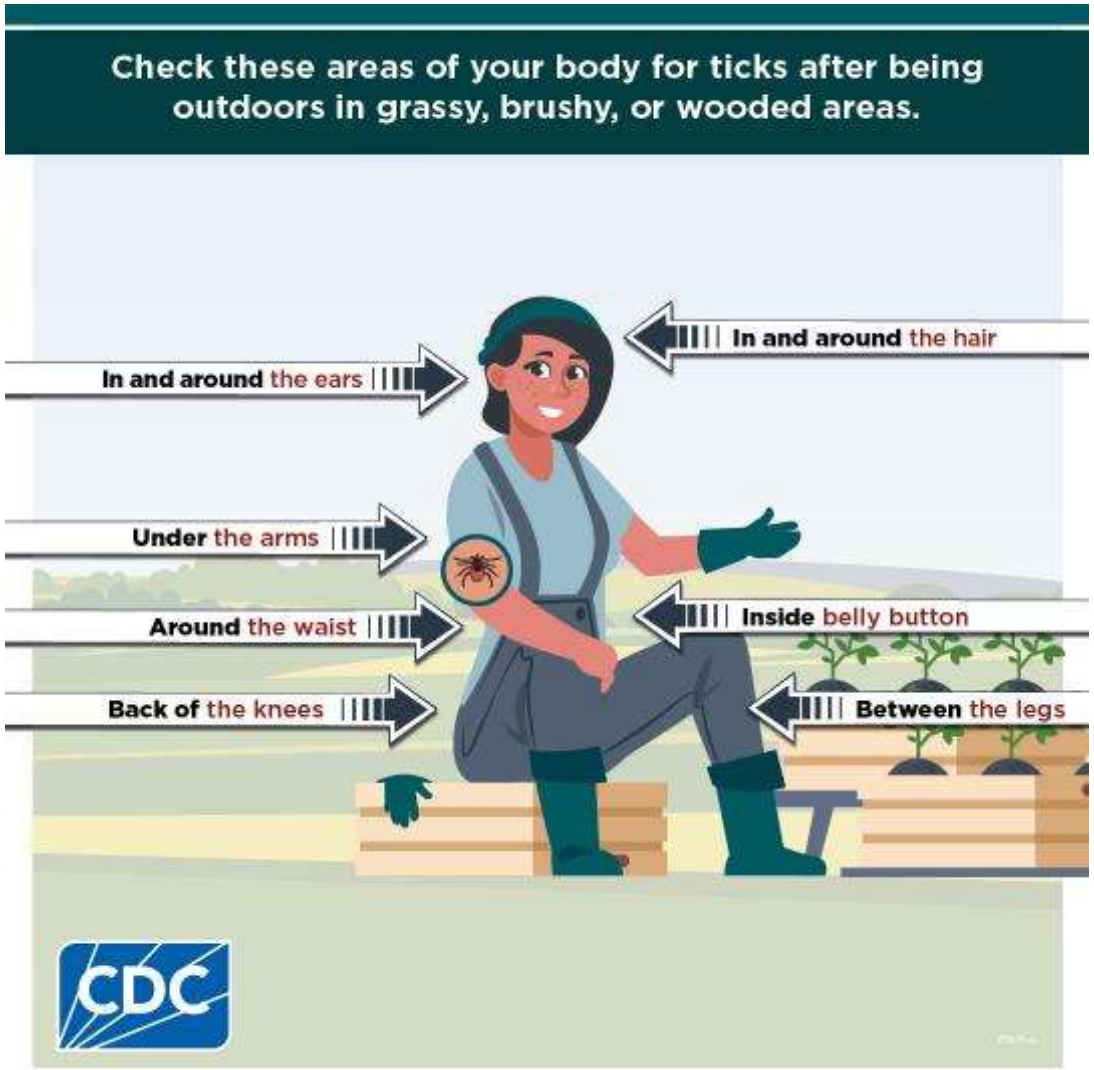
Host Management

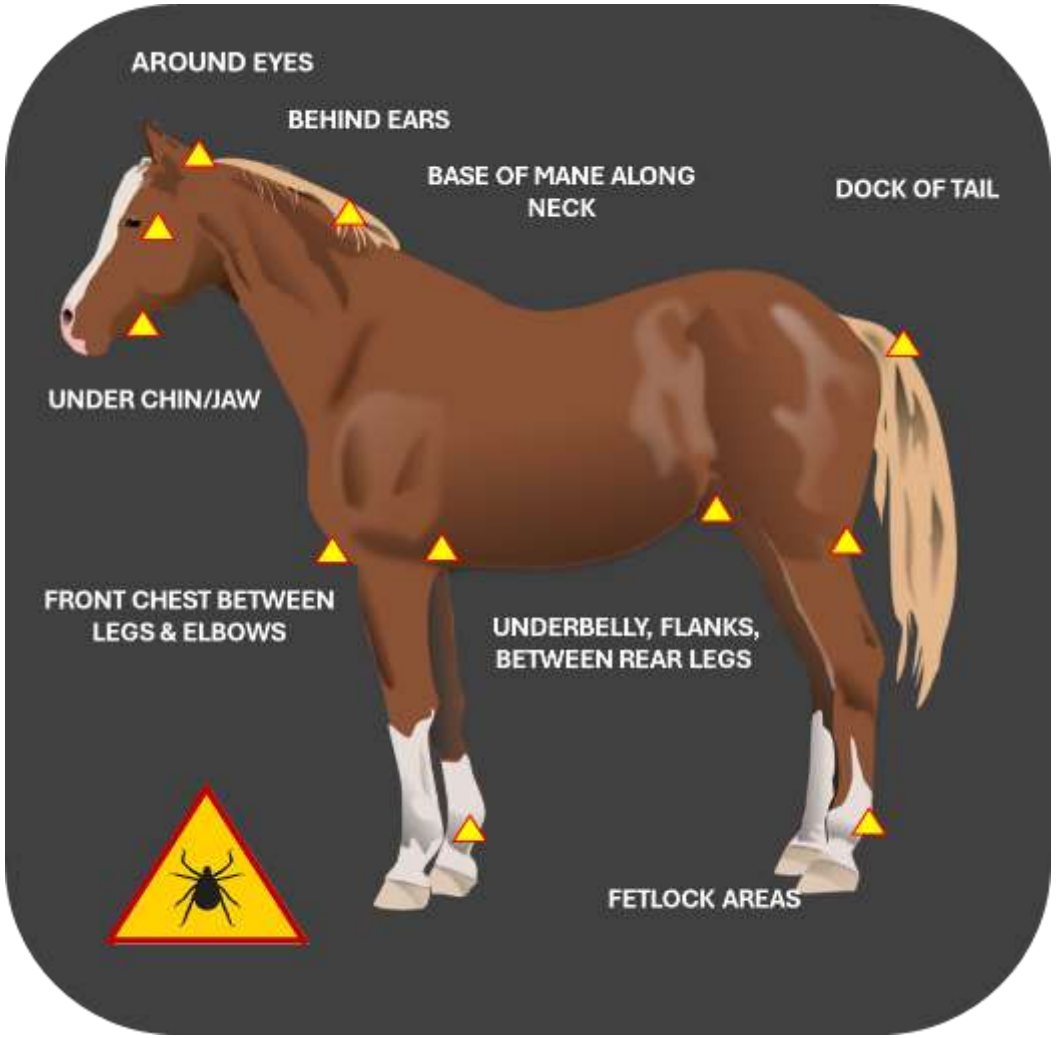
- Treat livestock & companion animals to prevent ticks (i.e., vaccines, pills/chews, repellent sprays/wipe, ear tags, collars, pour on/spot, dusts, backrubbers) – Read labels to ensure can be used on ticks on target animal. - Consult veterinarian.
- Treat hosts (i.e., tick tubes/tick box for mice, 4 poster device for deer).
- Deter hosts & hiding places. (i.e., deer fencing for exclusion, keep compost & brush piles away from production areas, cleanup waste grain & store in rodent proof containers, hunt/trap to reduce population).

Environmental Treatments

- Mow lawn & pastures (reduces humidity tick like)
- Provide buffer strips (3ft) between forest-lawn; (10-20 ft) between forest-fence & maintain it (trim tree branches, shrubs & mow).
- Pesticide sprays along fence-forest edges (last resort if all else fails).

Check for Ticks Every Day

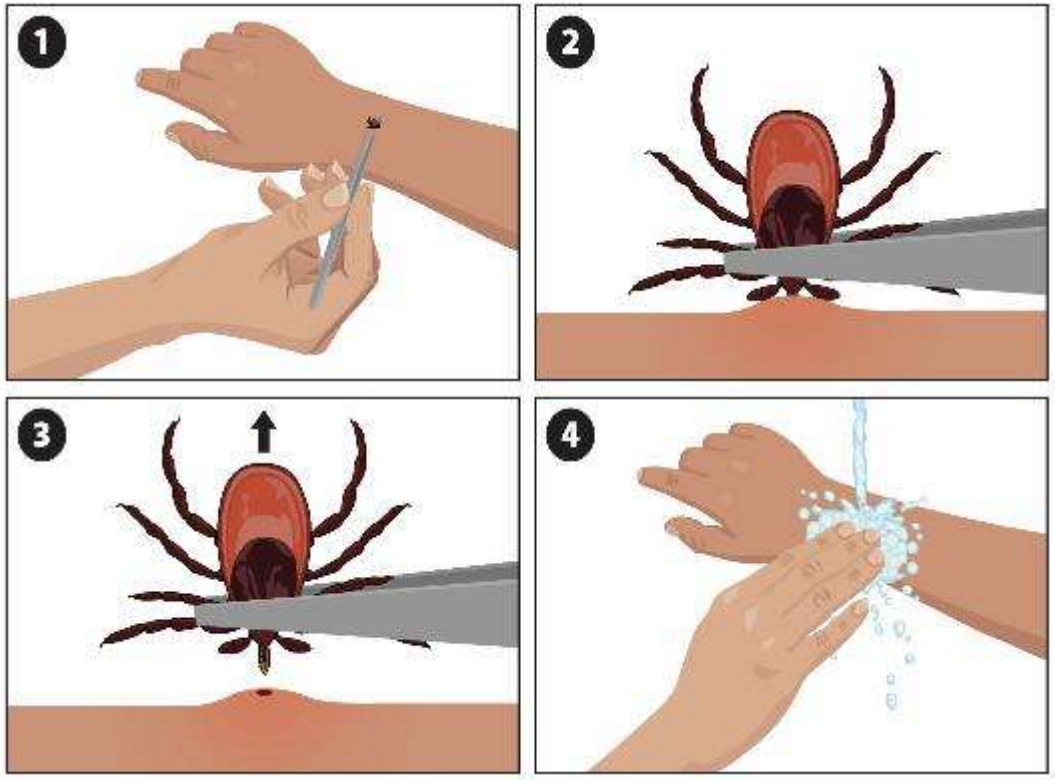




I Found a Tick on Me! Now What?

Remove the Tick:

- Use fine tip tweezers.
- Grab tick by the head, close to skin
- Pull upward with steady, even pressure – do not twist, do not crush between fingers.
- Clean area with soap & water or alcohol.
- Watch for flu-like symptoms or consult physician.



What to Do with the Tick (options)

- Get an ID (picture or save in alcohol) & send to
- Dispose of tick (flush it down toilet, place between tape)
- Send it for Pathogen Testing (also includes ID) testing (note: positive results don't necessarily mean you have been infected). Not offered in VT.

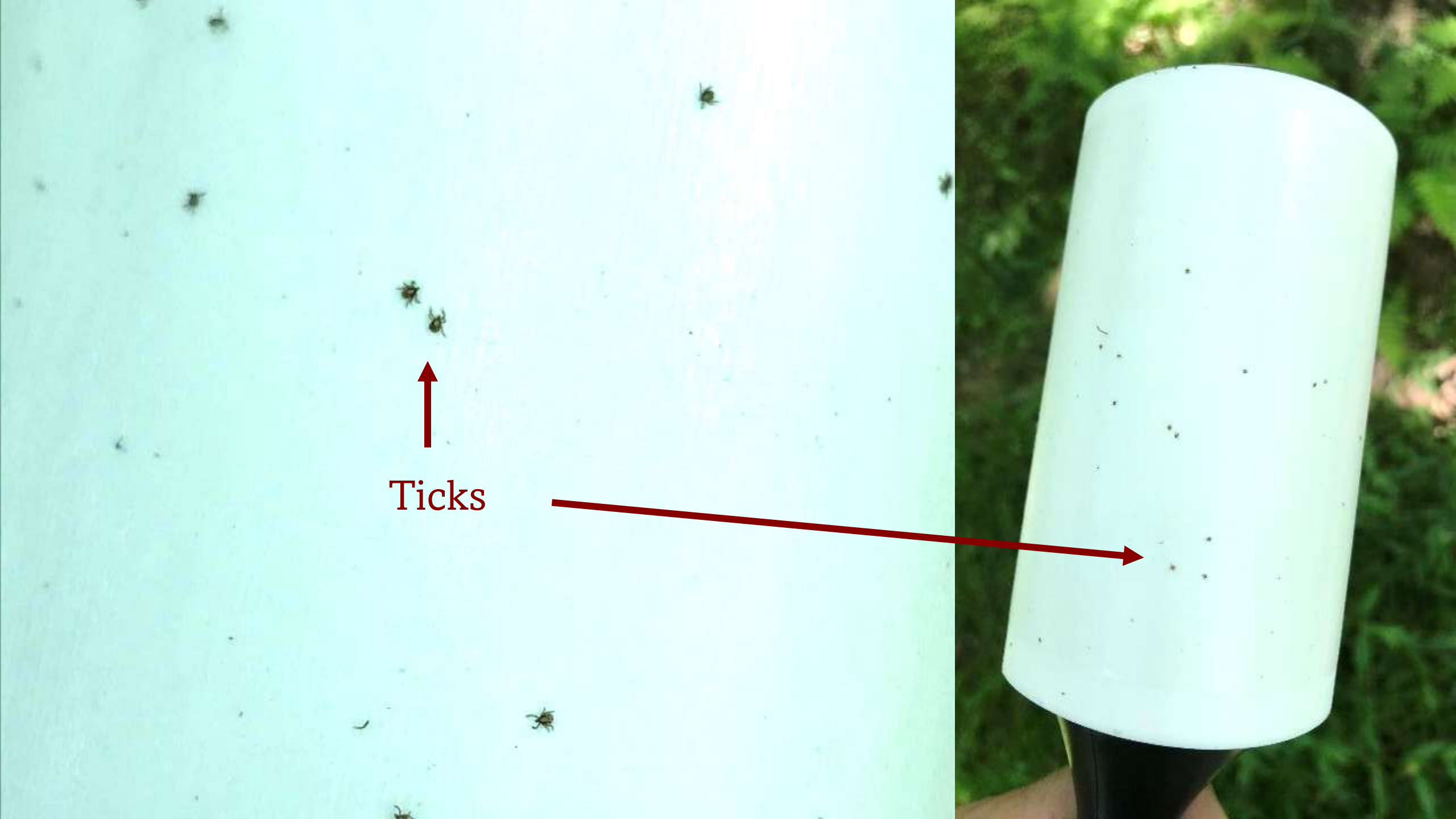
CDC: Tick Removal

Personal Protection: The 1st Line of Defense Against Tick Bites

- Wear protective clothing (light-colored long pants, long-sleeve shirt, permethrin-treated) and tuck pants into socks.
- Use EPA-approved tick repellents (i.e., Deet, Picardin). **Read the label!**
- Use lint roller on clothes in field after working in or near tick-infested areas.
- Shower daily in peak tick periods
- Put clothes in dryer (10 min) on high heat.
- Develop a Tick Protection Plan.
- Avoid tick habitat during peak tick activity.
- Educate others (family members, employees).

Reference to specific commercial products does not constitute its endorsement.

VT Dept. Health Tick Prevention


Ticks

Especially check where pets sleep...

Pixabay

Ticks ARE an Occupational Hazard

Tick bites occurring in the work environment are work-related injuries: must be recorded in accordance with OSHA recordkeeping requirements,

General recommendations:

- Train workers about the hazards of ticks and tickborne diseases in the region (provided in in their preferred language)
- Supply tick removal/prevention supplies (i.e., insect repellent, tweezers/tick removal kit, mirror, first aid kit).

OSHA Tickborne Diseases

Resources in Other Languages

- [CDC Resources in Languages Other than English]: Enter “lyme” into search box
- [Health Information in Many Languages] (VT Dept. of Health): Enter “tick” into search box
- Ticks: What you need to know: [Vermont Language Justice Project YouTube Channel] (Videos)
- NIOSH Fast Facts: [Protecting Yourself from Ticks and Mosquitoes] (Spanish)

Create Unfriendly Habitats For Tick Hosts

- Remove old furniture, mattresses, & other hiding places.
- Stack wood in a well-maintained/open & dry areas away from dwellings & consider sealed stone walls.
- Keep trash, bird feeders & compost away from structures.
- Store animal feed in rodent proof containers.
- Select deer resistant plant varieties in gardens.
- Remove invasive species in woodlots (i.e, honeysuckle, barberry, multifloral rose)
- Consider adequately fencing backyard or crop production areas.


Pixabay

Reduce Habitats That Favor Tick Survival

- Maintain yards & pastures to increase sun exposure to reduce humidity
- Mow lawn & pastures frequently.
- Provide buffer strips (3ft) between forest-lawn; (10-20 ft) between forest-fence & maintain it (trim tree branches, shrubs & mow).
- Establish wood chip/gravel barrier between lawns & wooded areas, around patios & play equipment.
- Keep playground equipment, pergolas, gazebos & patios away from yard edges.
- Remove leaf litter.
- Applying pesticides

Photo credit: Best in Backyards

Photo credit: Houzz

Goodworks

Pesticides (Acaricides) to Repel or Kill Ticks

Biopesticides: Derived primarily from plants, microbes (fungi & bacteria), some minerals. [i.e., Mycoacaricides (fungus-based); Pyrethrins]

EPA Approved Synthetic Chemicals:
bifenthrin, permethrin, cyfluthrin, deltamethrin; fipronil, ivermectin, DEET, picaridin, etc.)

Natural product-based chemicals & products exempt from EPA registration:
Essential oils - Rosemary, Peppermint Oil, Cedarwood oil, Garlic Oil, etc. (variable efficacy)

Call a pest control operator or consult veterinarian

Check Out Our Resources Pages For More Information!

[VT-TIC](#) (UVM Tick Info Center)

Thank YOU!

Questions?

Please provide feedback at this LINK by scanning code below:

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NORTHEAST EXTENSION RISK MANAGEMENT EDUCATION

University of Vermont

College of Agriculture and Life Sciences
Department of Agriculture, Landscape, and Environment

USDA National Institute of Food and Agriculture
U.S. DEPARTMENT OF AGRICULTURE

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