Vector-Borne Disease

A C3 CLIMATE READINESS TRAINING MODULE

Cambridge
Public Health
Department

MAPC
METROPOLITAN AREA PLANNING COUNCIL

ICEBREAKER

- Name
- Affiliation/time with C3
- Where do you like to spend time outside in Cambridge during the summer?

Agenda

- Vector-Borne Disease 101
- Mosquitos
- Break!
- Tick-Borne Disease Prevention and Control

In groups of 2 to 3, discuss:

- **Where** have you experienced mosquitos or ticks in Cambridge?
- What are **strategies** you use to fend off mosquitos or ticks?
- Are there any **recent news** stories or events on this topic?

PAIR & SHARE

What's a Vector?

A **vector** is any blood-feeding organism that carries serious diseases and transmits them to another organism.

Vectors carry diseases to and between humans and other animals

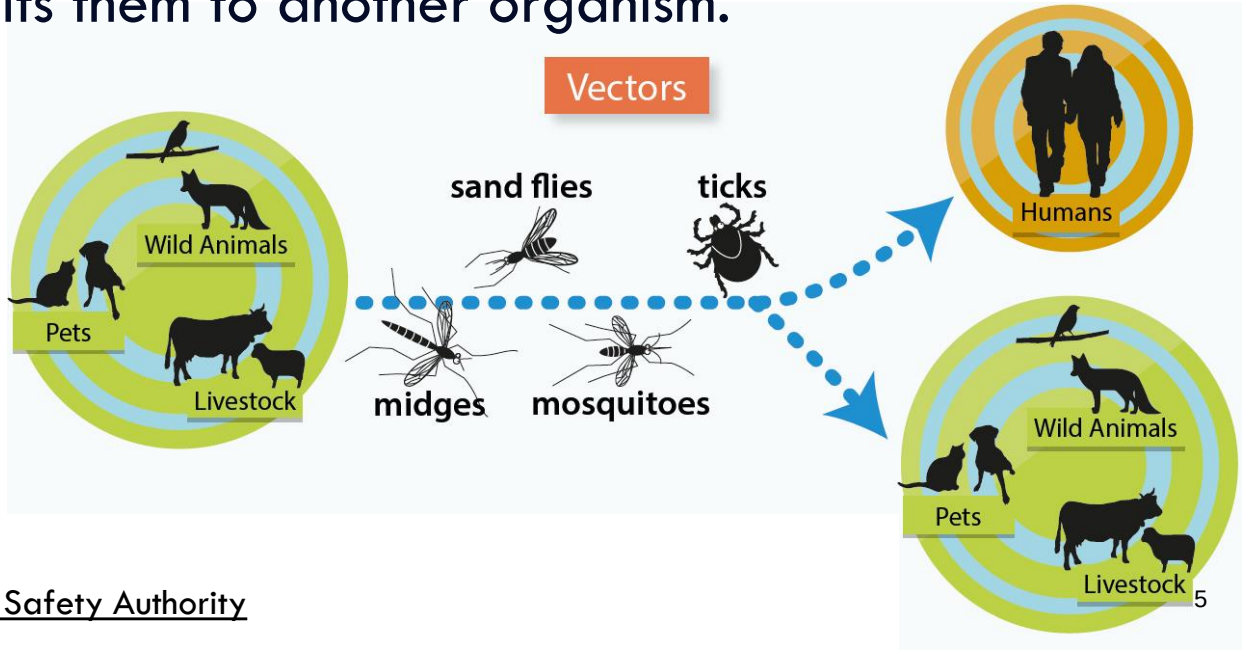


Diagram Source: European Food Safety Authority

WANTED

DEAD OR ALIVE

Mosquitos

Flea

Tick

Vectors carry human illnesses

The human and other animal illnesses carried by vectors are called **Vector Borne Diseases (VBD).** Vector borne diseases include:

- **Viral diseases** like Dengue fever, West Nile Virus, EEE, and Zika
- **Parasitic** (or, protozoal) **diseases** like Malaria, schistosomiasis, and Chagas

Climate is expanding VBD risk

There are 3 main ways:

1. Warmer weather creates longer breeding seasons and an increased range for species
2. Wetter weather means more standing water from flooding and storms
3. Global travel, loss of native habitats, and changing local climates make VBD risk more global and less predictable

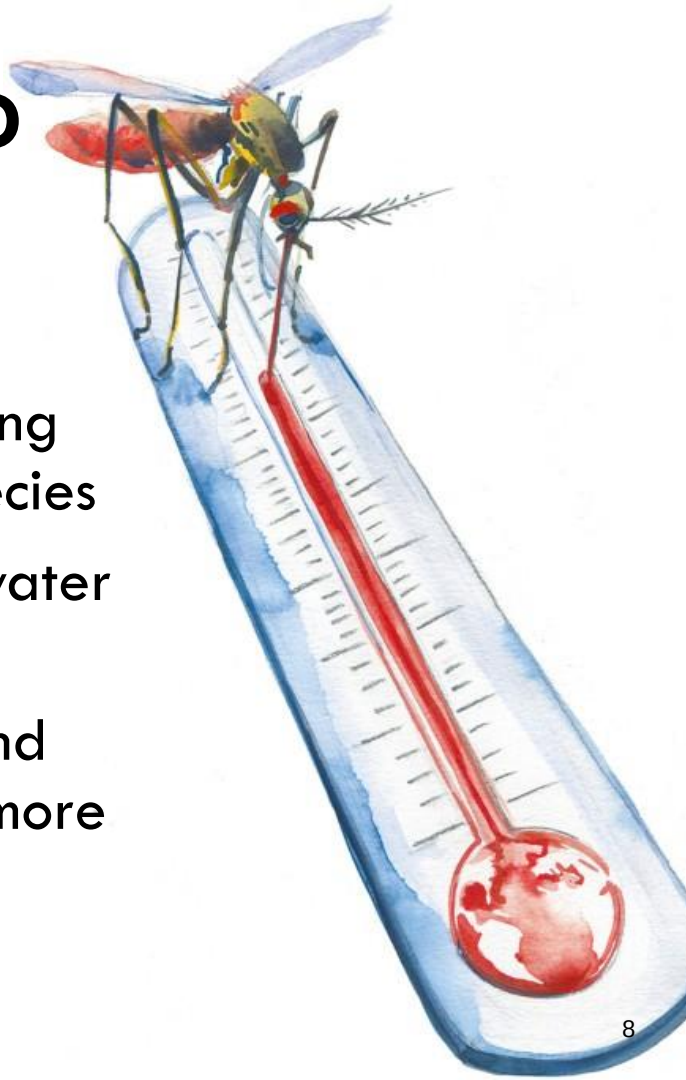
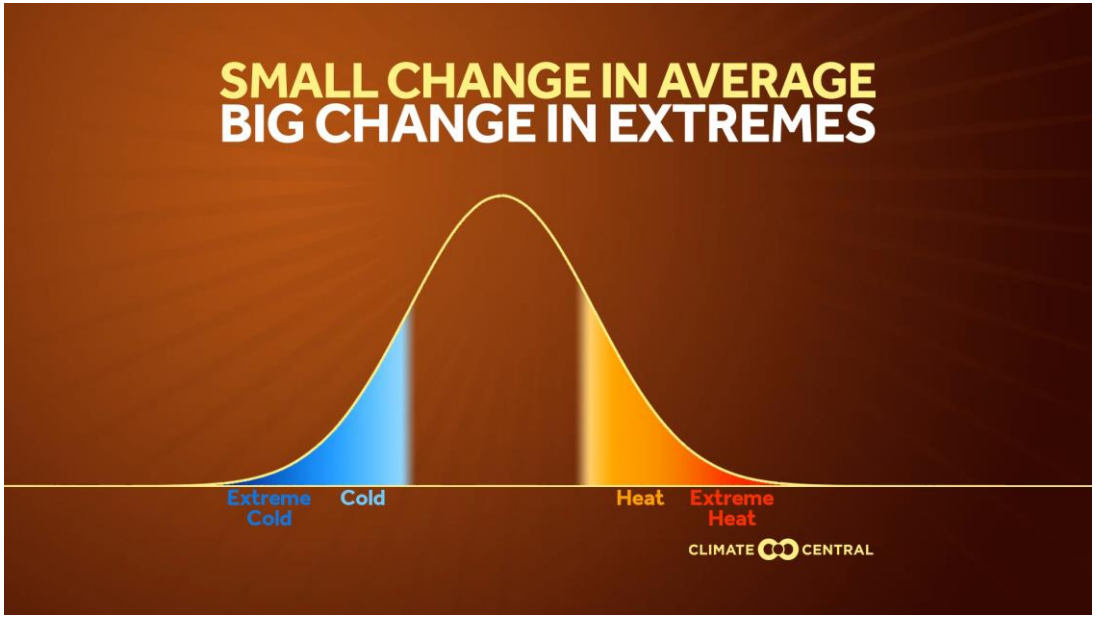


Image Source: Chris Sharp via Nature

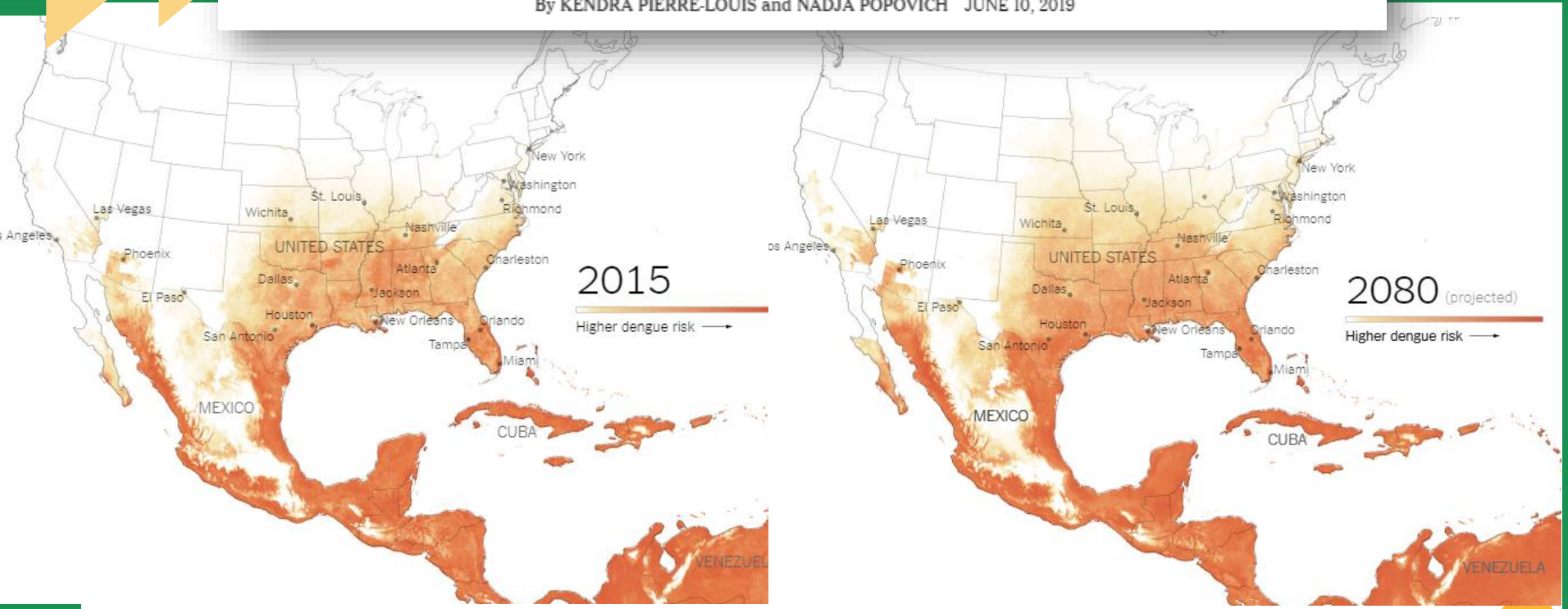
Refresher: The effects of Climate Change

A warming Earth disturbs the long-standing climate patterns, resulting in **WARMER**, **WETTER**, and **WEIRDER** weather

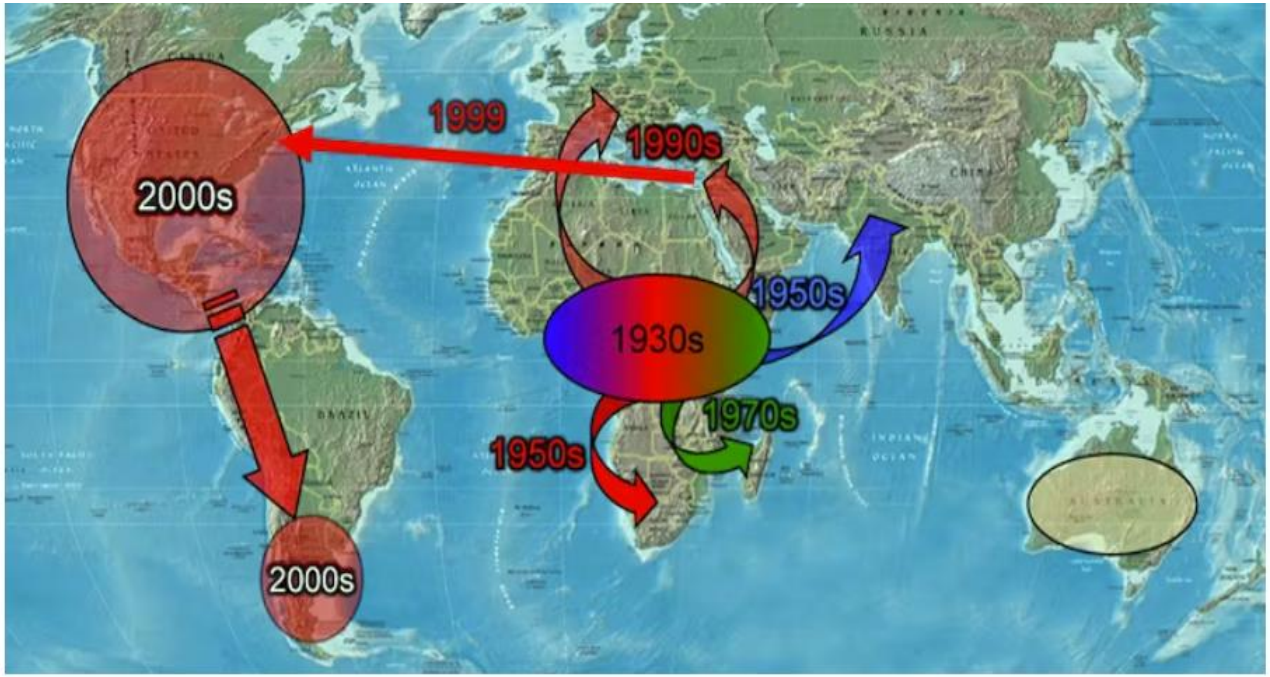


How Dengue, a Deadly Mosquito-Borne Disease, Could Spread in a Warming World

By KENDRA PIERRE-LOUIS and NADJA POPOVICH JUNE 10, 2019



VBD risk is less predictable and more global



The spread of West Nile virus. AJ Cann

West Nile virus moved via mosquitoes from Central Africa to Israel and Romania, then NYC.

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Why are we more worried about mosquitos?

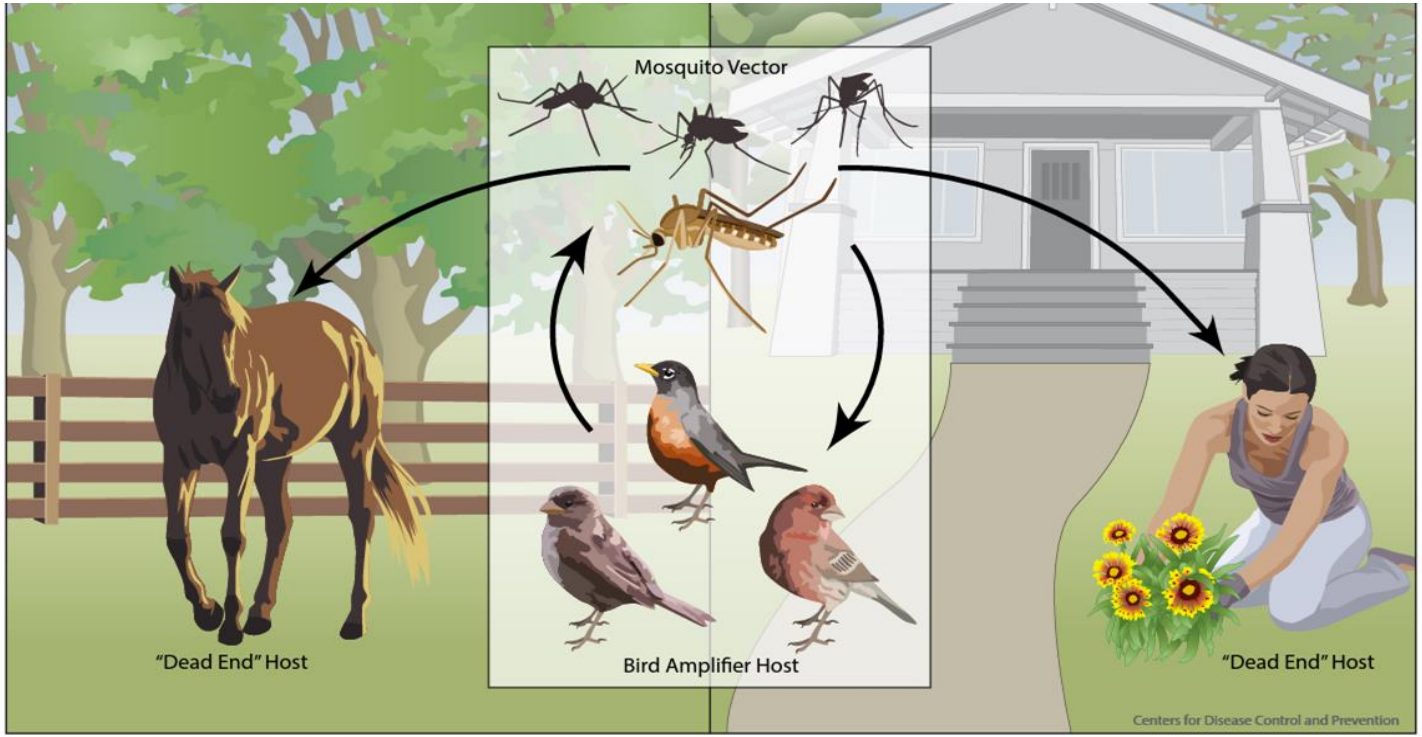
Long human history with fleas, mosquitoes and ticks, but mosquitoes have been the biggest VBD threat for the last 600 years.

Dozens of insect species carry diseases that can infect people, but only a few actually transmit to people directly.

Even among mosquitos, only a few species are human vectors. Some species transmit pathogens to other animals.

- For example, sparrows and crows carried west nile virus to our region where local mosquito populations transmit the virus to people.

Mosquito-borne Diseases in New England: West Nile Virus

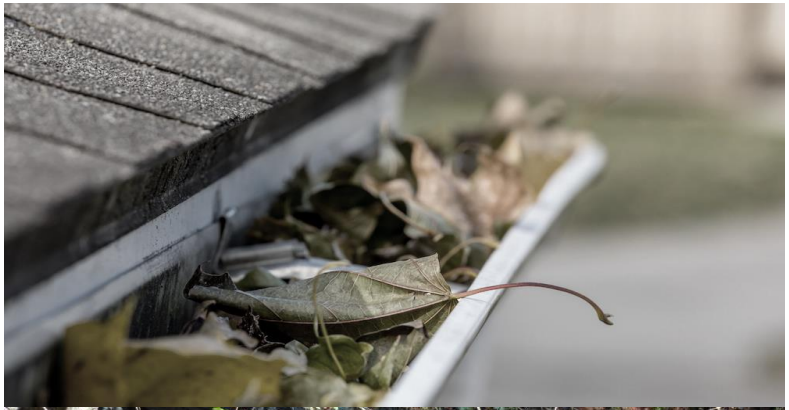


What is West Nile Virus?

West Nile Virus (WNV) is a viral infection and the leading cause of mosquito-borne illness in the US

WNV causes fevers and can cause neurological impairment

The mosquitos who transmit breed in a **container, urban/suburban habitat**



Mosquito-borne Diseases in New England: Eastern Equine Encephalitis (EEE)

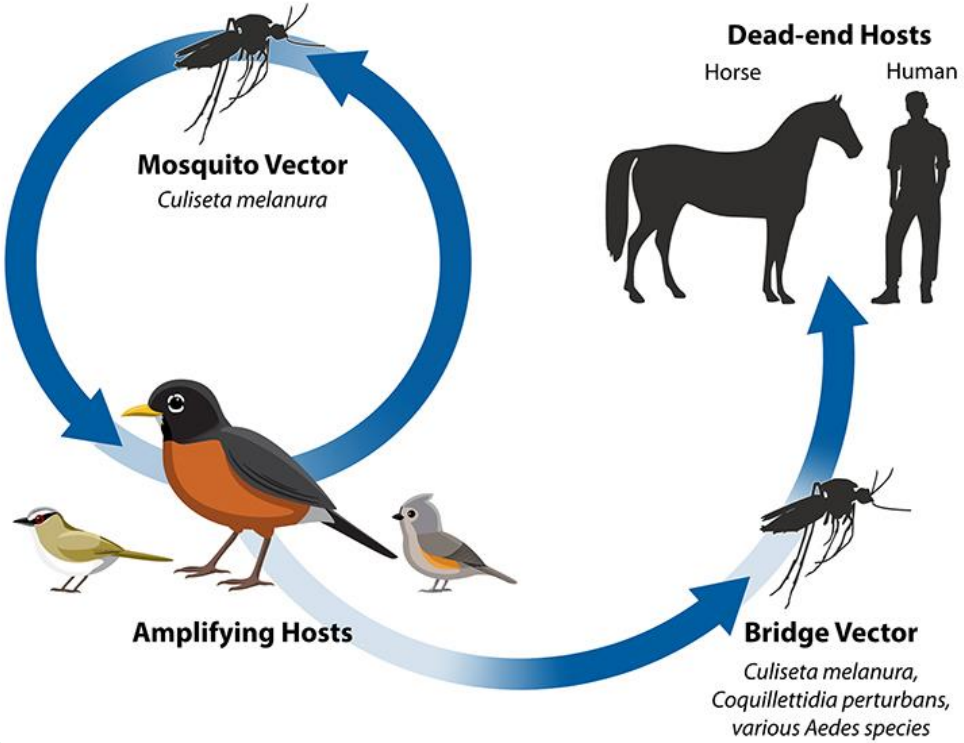
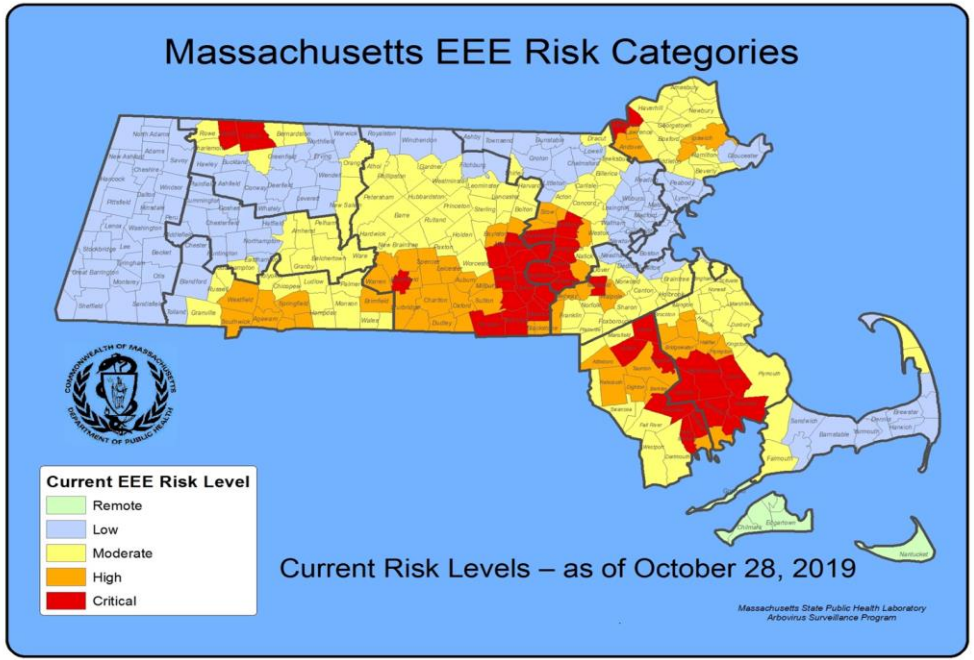


Image Source: CDC

Mosquito-borne Diseases in New England: Eastern Equine Encephalitis (EEE)

Although rare, EEE is a very serious disease. 1 in 3 people with EEE die and survivors often have neurological damage

The mosquitos who transmit it to birds breed in **wetlands**



Welcome the Tiger Mosquito (*Aedes albopictus*) to New England!

Puddle Patrol: mosquito habitat control

In previous summers, Cambridge established crews to survey storm drains for misquito larva

Storm were then treated to prevent larvae from becoming adults

The City also educates the public on the risks of standing water

What activities make you at higher risk to be exposed to WNV? And, EEE?

What groups might we want to focus on for outreach on mosquito-borne illnesses?

Mosquito risk messaging when talking with residents

- **WNV risk is low so far in 2023**. Will increase through October, but likely to remain low this year
- ***Culex pipens*: Urban, container-breeding (can breed in small pool, very gentle, night-time active)**
  - Not an aggressive biter, most likely at night while sitting still or gaps in screens
  - Wear long sleeves/pants sitting outside in August-September. use repellent, fix screens, eliminate habitat in yard and gutter, notify City if you observe standing water (not in street)
- **Container vs Wetlands-breeding mosquitoes**
  - Why wetlands are not a major WNV risk, but your gutters and backyard might be

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- **EEE is not a risk in Metro Boston**. Overall MA risk is low this year, Last surge in 2012.
- **EEE generally isolated to marshy areas in SE Mass, Central MA and NW of Boston**
  - No known infections acquired in Metro Boston in recent decades. **Habitat could shift**
  - When risk is high there are major public info campaigns, event cancellations

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- **Cambridge residents should protect themselves following public health guidance: long-sleeves, repellent, habitat control, screen repairs (especially late Aug-Oct)**
- **Sitting quietly outside at night in Aug-Oct is risky behavior if not protected. Very gentle biters**
- ***Aedes albopictus*** (now local species) carries **Dengue, Zika, Chikungunya. No local infections seen**

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Vox

Tick-Borne Disease

PREVENTION AND CONTROL

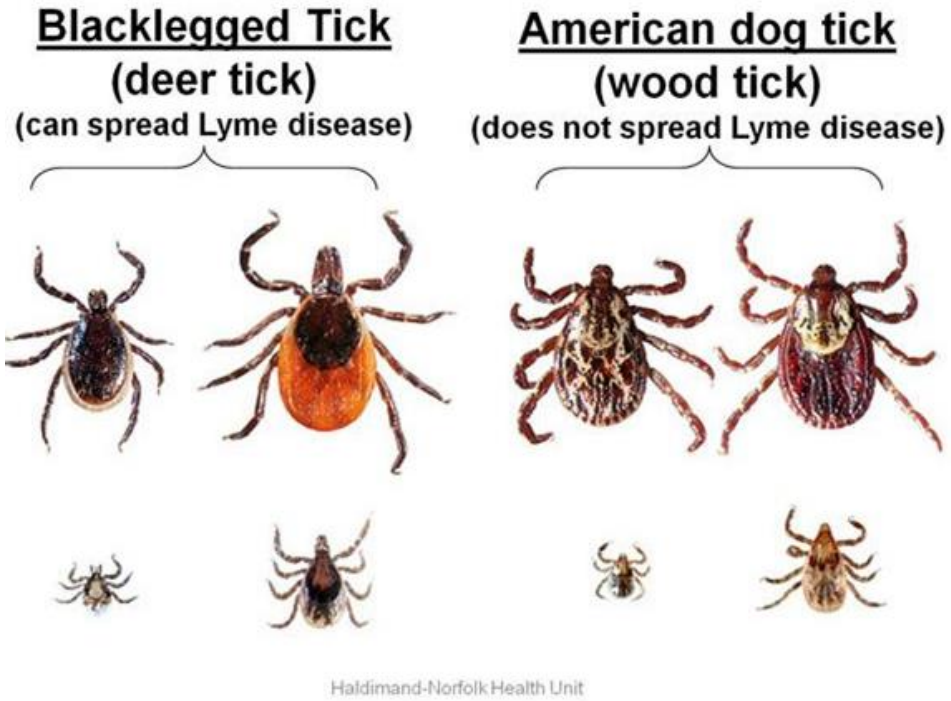
What are Ticks? Deer vs. Dog

Deer Ticks

- Sesame seed size
- Orange/rusty colored abdomen
- **Carries Lyme Disease**

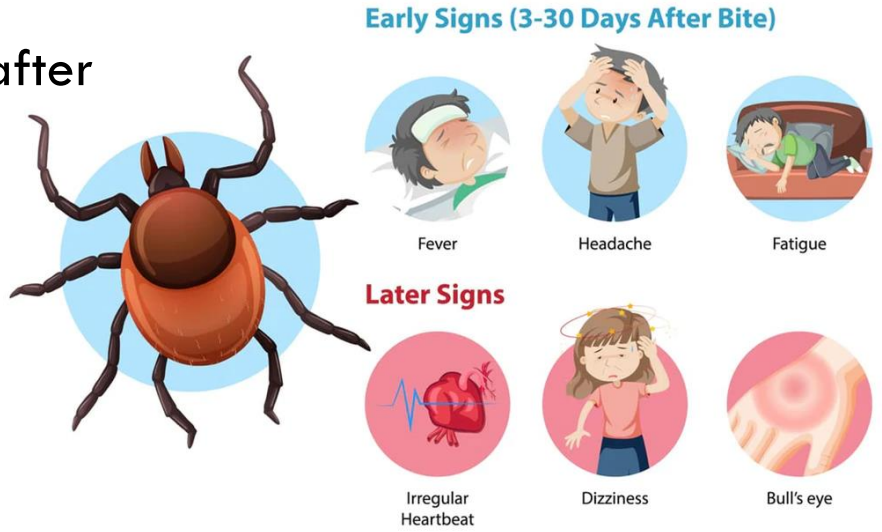
Dog Ticks

- Apple seed size
- All brown
- **Carries Rocky Mountain Spotted Fever**

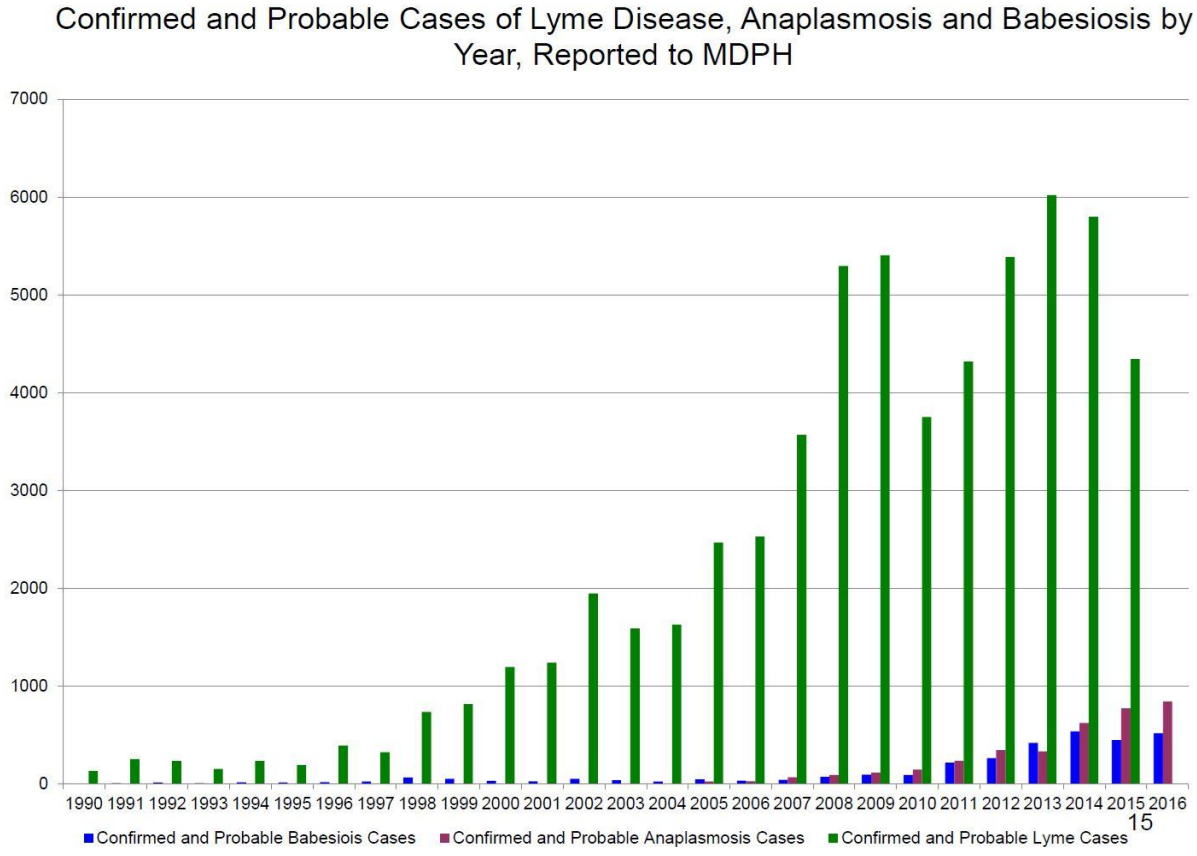


Lyme Disease & Symptoms

- Bacterial infection
- Fever, headache, fatigue, “Bullseye Rash”
- Can lead to chronic symptoms, autoimmune response (link unclear)
- Low risk if treated within 72 hours after tick removal



Lyme Disease is Getting More Prevalent



Lyme Disease is Getting More Prevalent

There are 2 main reasons why:

- Deforestation and/or Intermediate reforestation
- Spread of Deer

Where do Ticks Live?

Deer Ticks

- **Shady, moist areas at ground level**
- Cling to tall grass, shrubs, “brushy” areas/wooded grasslands
- Where deer go, ticks follow- even in cities

Dog Ticks

- Similar to deer ticks, common on overgrown trails or scrubland
- Found in less tree-covered areas

Where do Ticks Live?

Low Risk

High Risk

Let’s play a game!

Is it lower risk, or higher risk?

HOW TO FIGHT BACK!

Personal Protection: Reduce your tick exposure

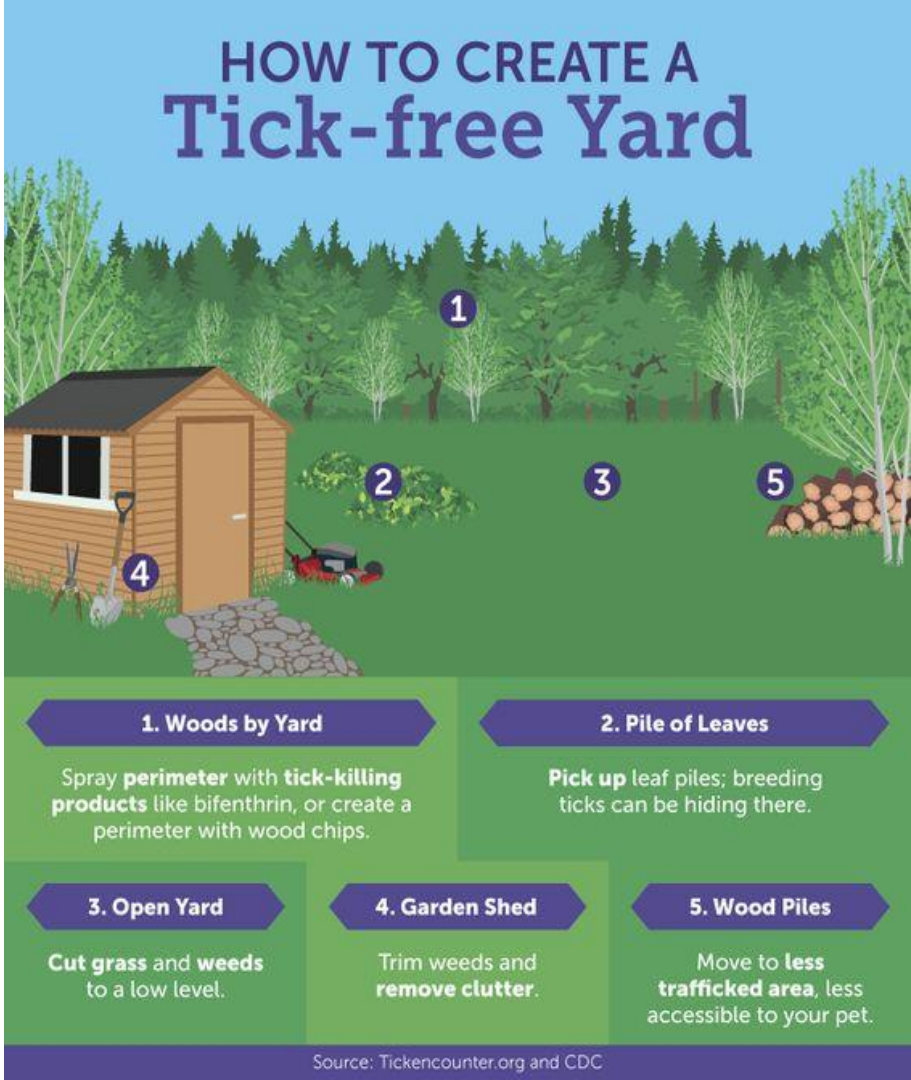
Cover skin, apply insect repellent, **avoid high-risk areas**

- Wear long pants and long sleeves when spending time outdoors (tuck pant legs into boots or socks to minimize skin exposure).
- Apply insect repellent with DEET to skin before spending time outdoors (note: DEET is not recommended for children under two months of age; children older than two months of age should use repellent with a DEET concentration of 30% or less; repellents with a DEET concentration over 50% have not been shown to provide much additional protection against ticks).
- Apply permethrin (found in hardware and outdoor equipment stores) to clothing to repel ticks.
- Wear light-colored clothing (allows ticks to be more easily noticed on clothing before they become attached to skin) .
- Stay in the middle of trails and avoid areas of dense brush when hiking.
- Perform tick checks after spending time outdoors, even after gardening or cutting the lawn. Be sure to check yourself, children, and pets for ticks.
- Take a shower within 2 hours of returning indoors to wash off any unattached ticks and toss your clothes into a dryer on high heat for 10 minutes to kill any ticks.
- Remove any attached tick promptly and properly.

HOW TO FIGHT BACK!

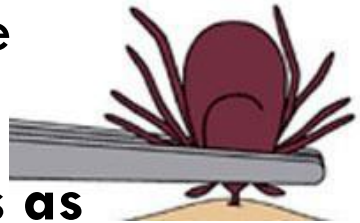
Limit tick habitat:

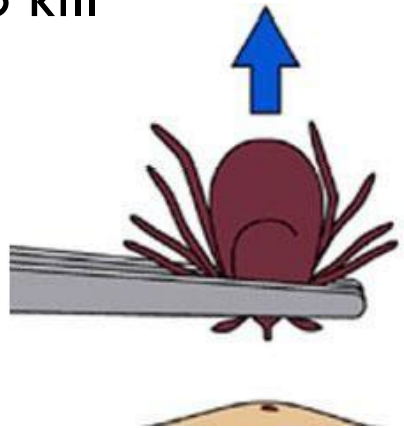
Lawn pesticide treatments



What do I do after being in a high-exposure habitat?

1. Once home, take a shower. Any ticks that are unlatched will wash off
2. Put clothes in dryer on high heat for 10 minutes to kill hidden ticks
3. Check your body- start around feet and ankles, travel up. Use mirror or phone
4. If you find a tick, use tweezers **as close to the skin** as possible

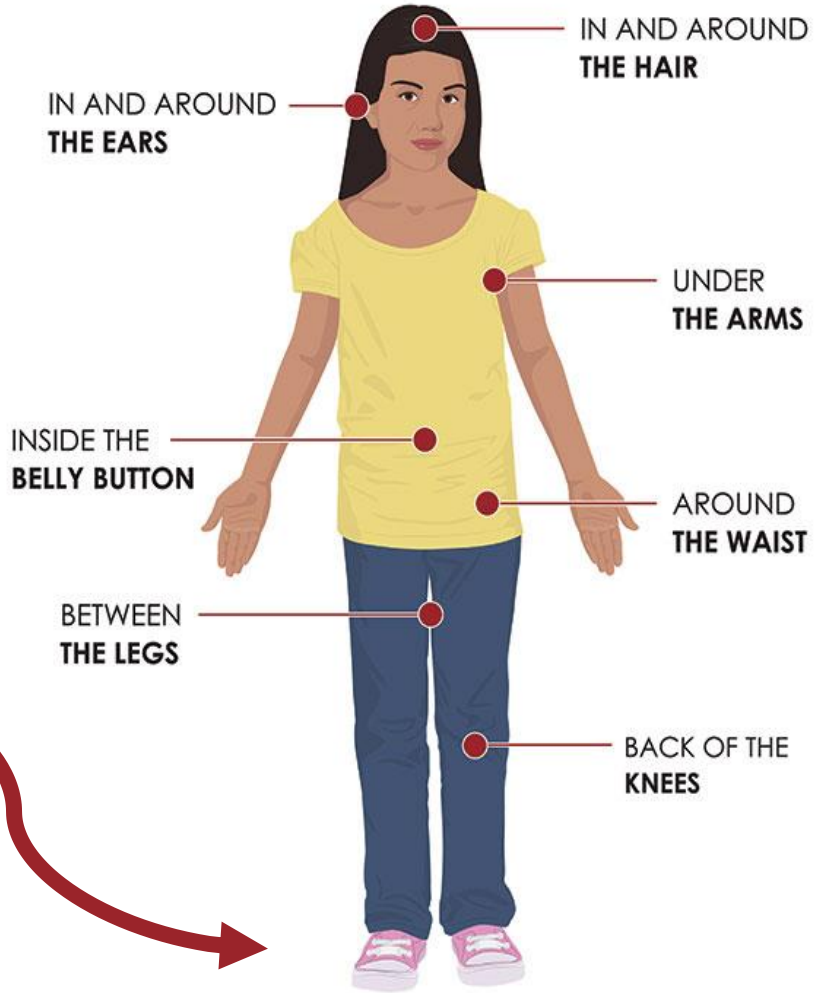




How to do a tick check

Check your body- start around feet and ankles, travel up. Use mirror or phone

Common areas for ticks



Thank you

Please take a minute to tell us how today went & fill out an evaluation form!