Massachusetts Department of Public Health

Mosquito and Tick-borne Disease in MA

2024 Season Reminders and Updates for Local Health

June 11, 2024

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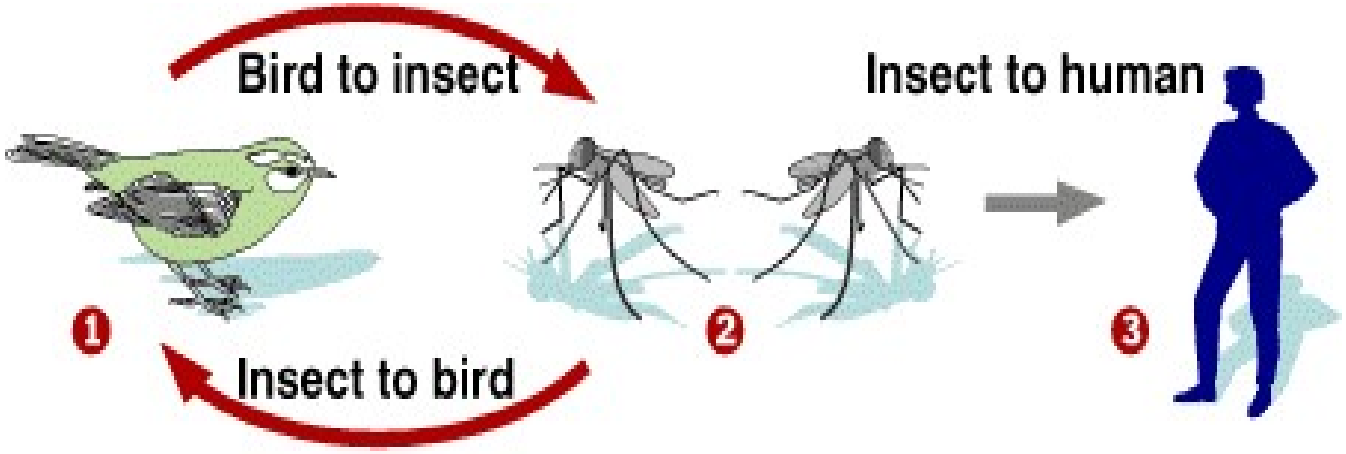
Agenda

- **Arbovirus Overview**
  - Diseases & Surveillance:
    - Eastern Equine Encephalitis (EEE), West Nile Virus (WNV) (MDPH Follow-up)
    - Dengue (Local Health Follow-up Needed)
  - Prevention Tools & Messaging
  - Public Communication Tools & Guidance
  - Mosquito Control: Annual Timeline
  - LBOH Arbovirus Coordinator – Be Sure To Update Contact Information
  - LBOH Reminders

- **Tickborne Disease Overview**
  - Available Case Investigation Trainings & Tip Sheets
  - Case Investigation Reminders
  - Key Diseases & Surveillance
  - MA Clearinghouse Educational Resources Available

Arbovirus Transmission



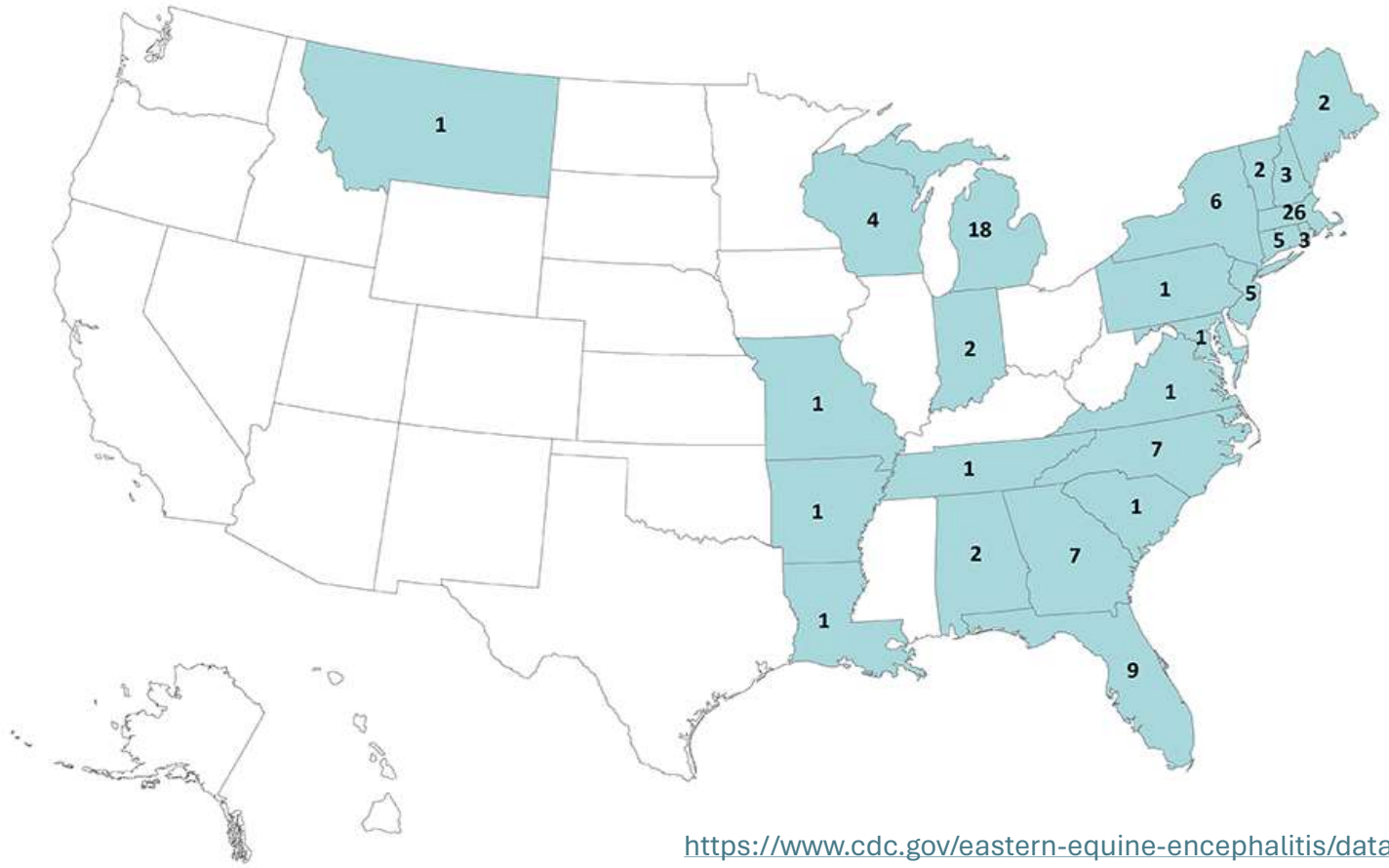
Amplification Cycle:
Escalating interactions between infected birds and bird-biting mosquitoes

Spill-over:
Incidental Transmission by mammal-biting mosquitoes

June July August September October

Opportunity for adult mosquito control interventions; includes ground-based and aerial

Eastern Equine Encephalitis Virus Neuroinvasive Disease Cases 2012-2023



https://www.cdc.gov/eastern-equine-encephalitis/data-maps/current-year-data.html

EEE Vectors and Habitat

Culiseta melanura

White Cedar and Red Maple

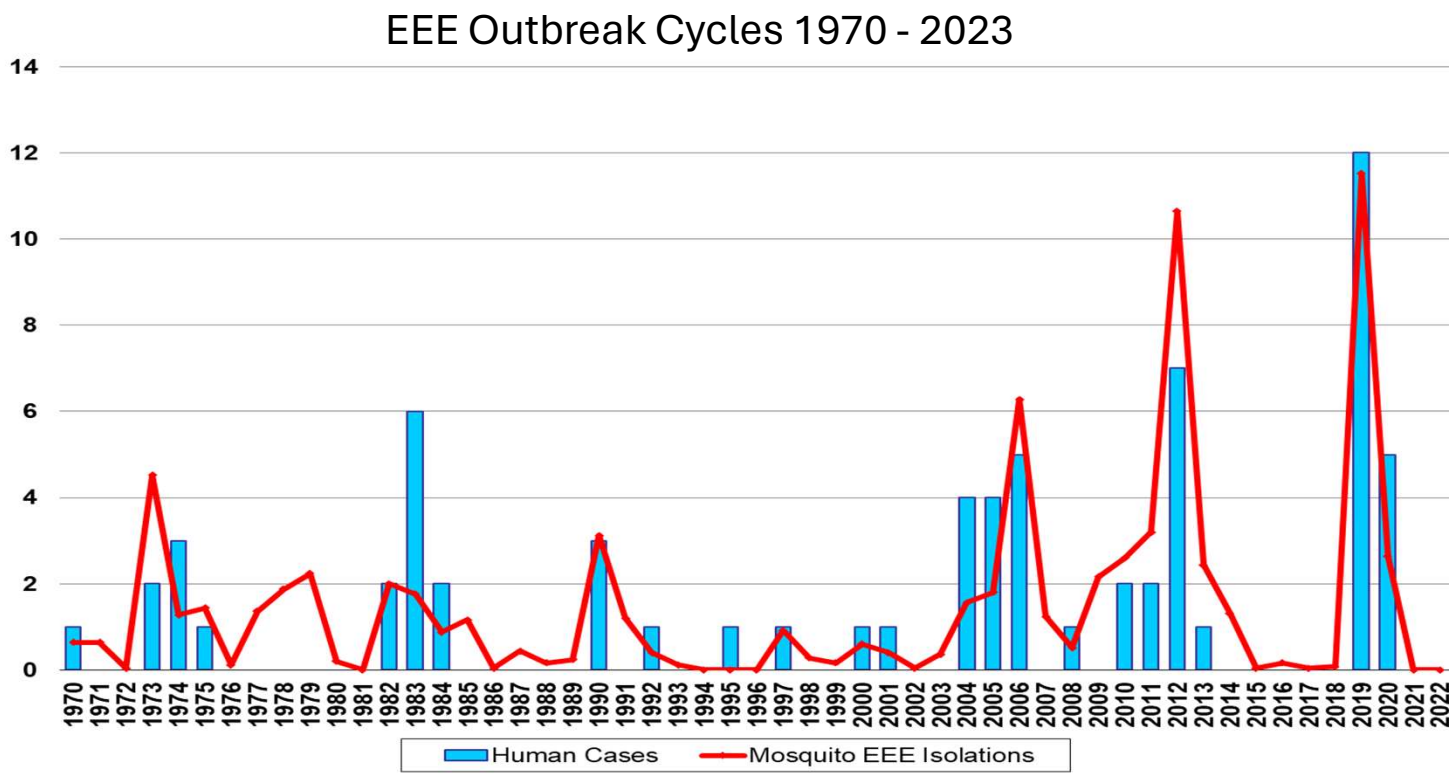
EEE Vectors and Habitat

Coquillettidia perturbans

Cattail Marsh

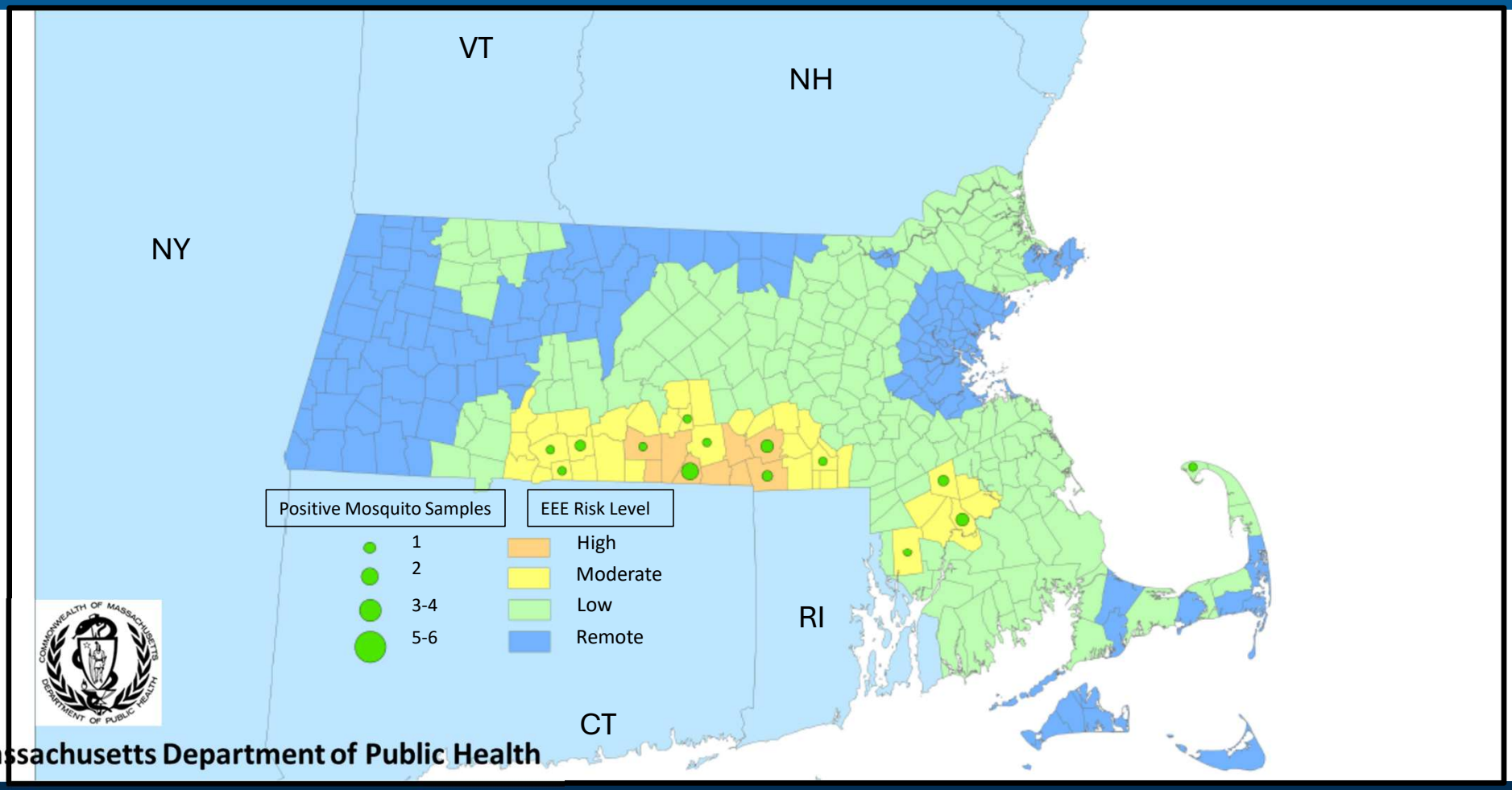
EEE Outbreak Cycles 1970 - 2023

- Typically occur in 2-3 year cycles
  - 2019-2020 was the most recent outbreak cycle
- Purpose of mosquito control: reduce populations of bird-biting and mammal-biting mosquito species in order to reduce the risk of arbovirus
- EEE Sampling over Time

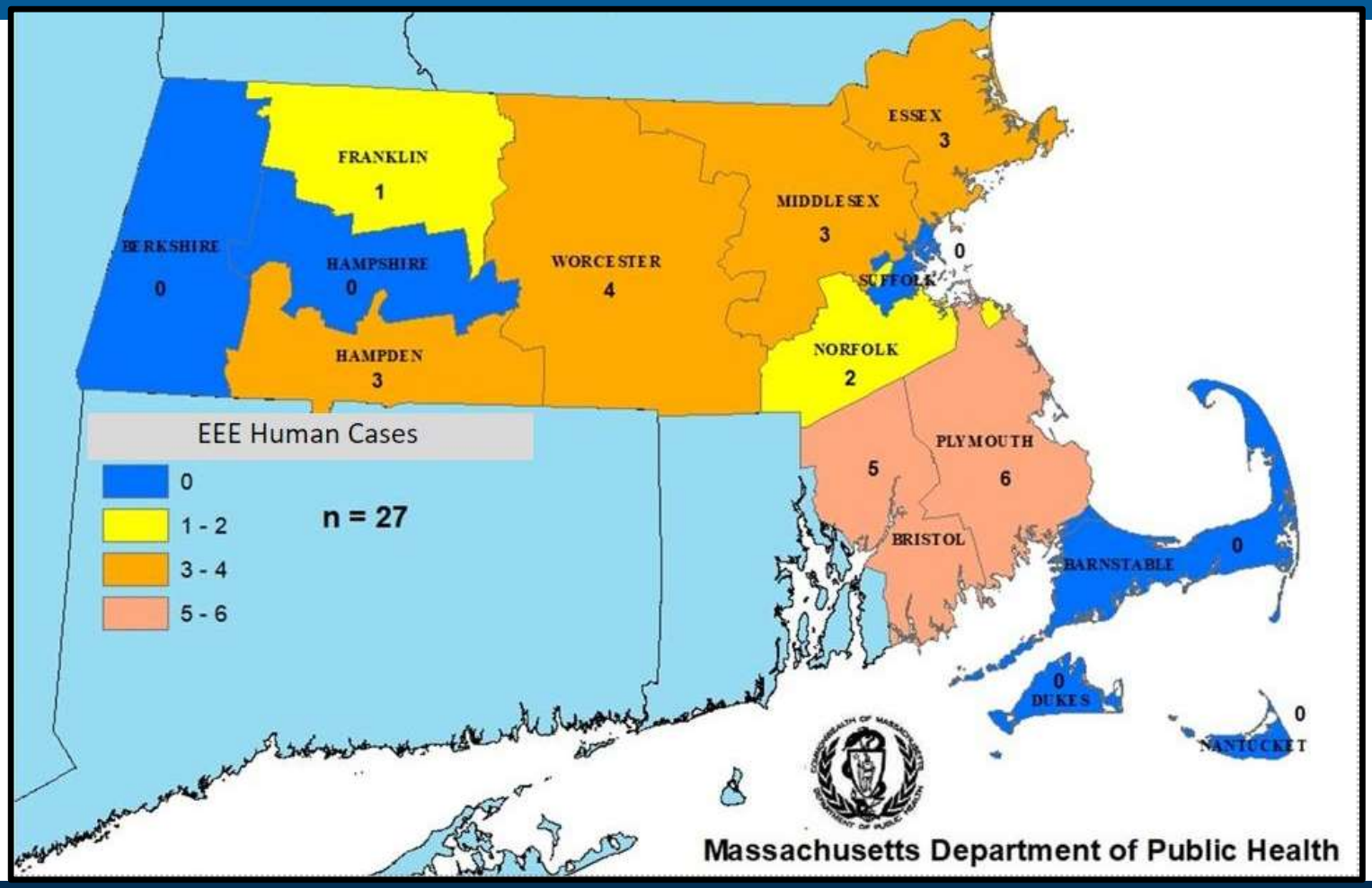


*Data as of 6/2/2024

EEE Activity in Massachusetts 2023



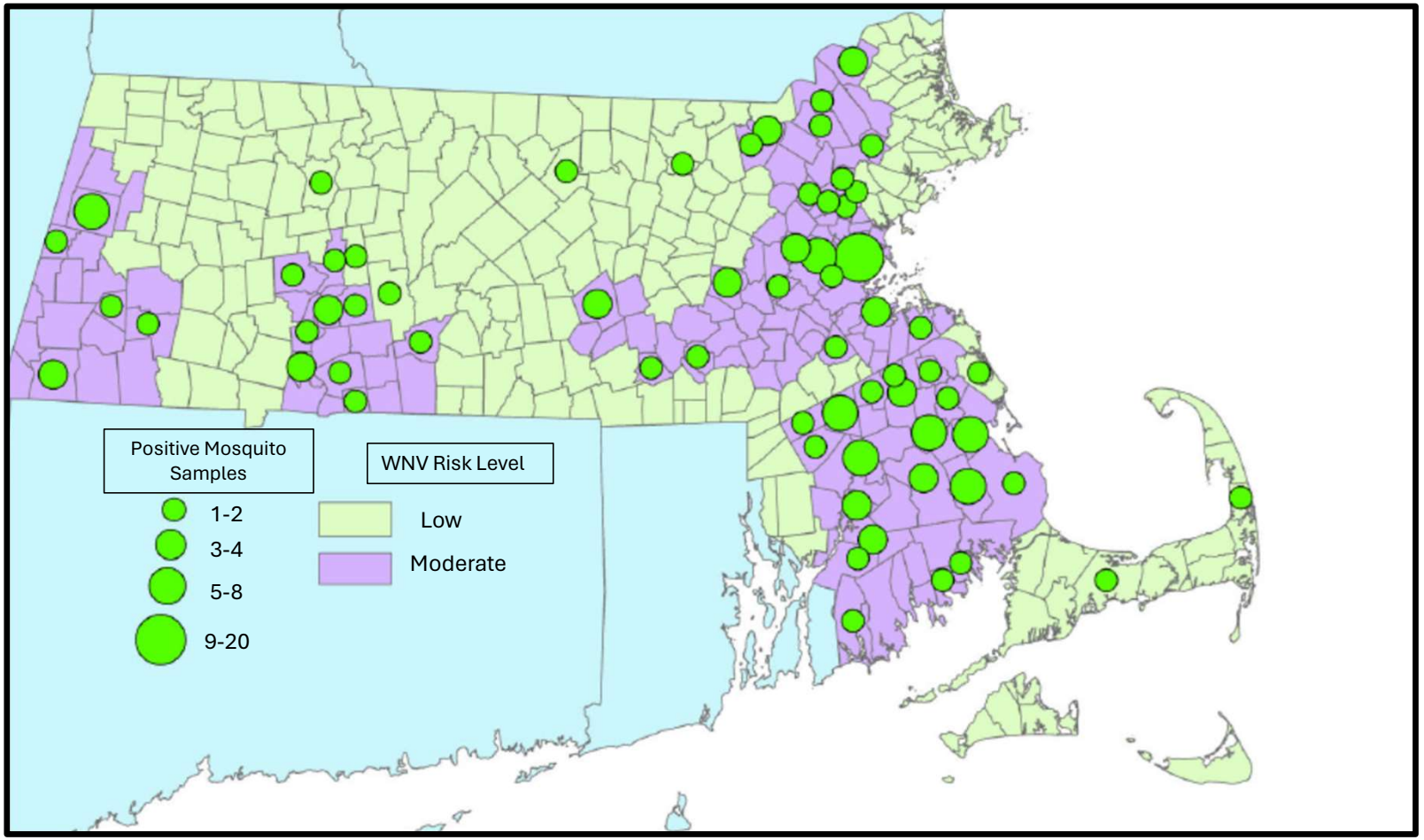
EEE Human Cases in MA 2010-2024



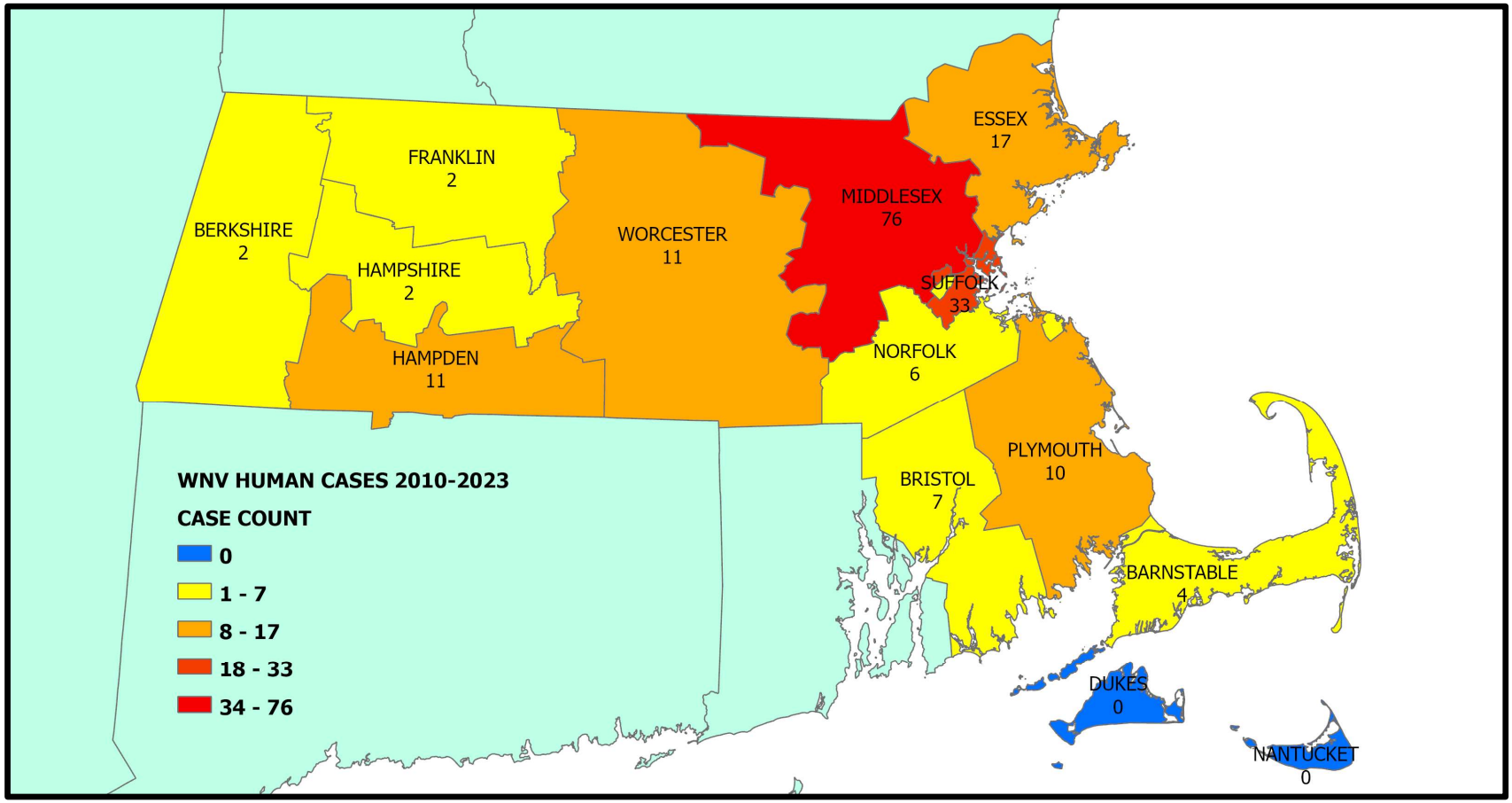
Culex pipiens
Primary WNV vector

Massachusetts Department of Public Health

WNV Activity in Massachusetts 2023



WNV Human Cases 2010-2023



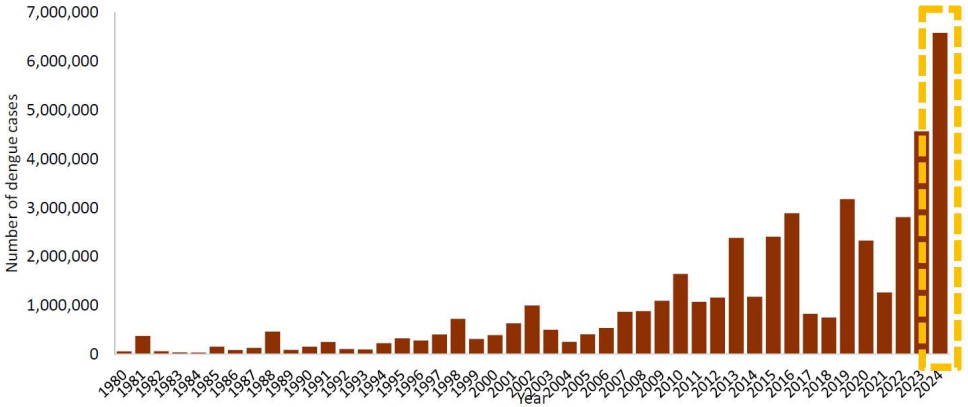
Dengue

- Viral disease
  - Four different but closely-related dengue virus types
- Symptoms
  - Main symptom fever
  - Accompanied by aches and pains (head, body, joint, muscle, eye), nausea, vomiting, or rash
  - Typically lasts 2-7 days
- Incubation period
  - Typically 5-7 days, range 3-10 days
- Transmission
  - Bite of infected *Aedes* mosquito

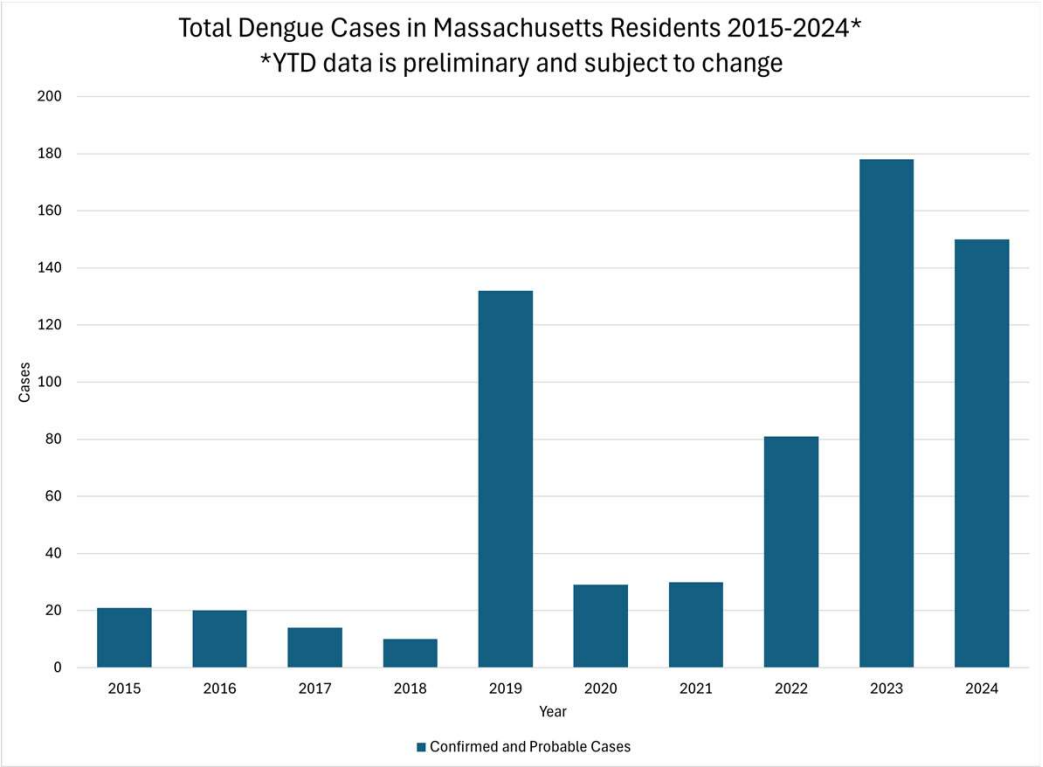
Global and Local Dengue Trends

Dengue cases in the Americas, 1980–2024*

More than 6.5 million cases reported as of May 1 in 2024



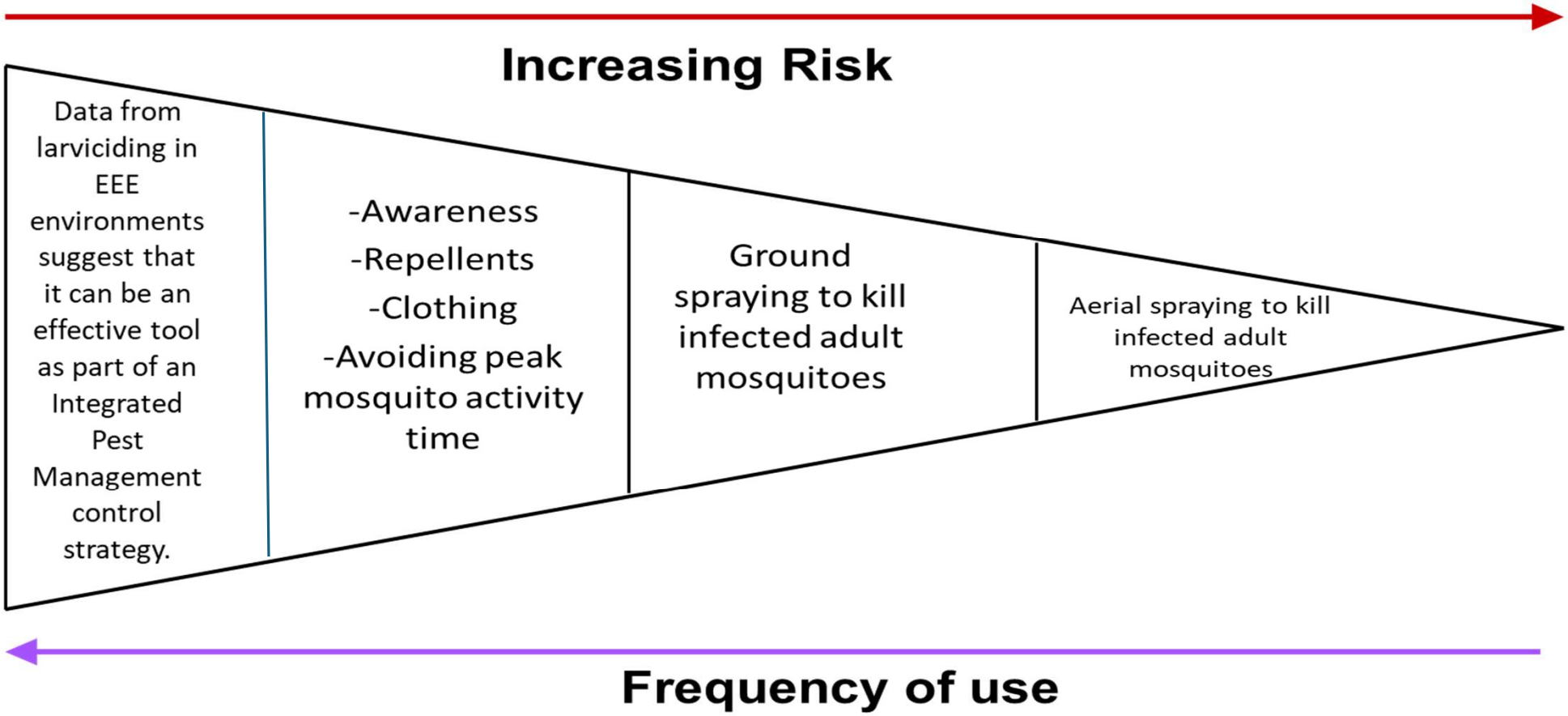
*Data from PAHO PLISA Health Information Platform for the Americas



Dengue (Local Follow-up Needed)

- Dengue risk has been increasing globally and in the Americas region
- MDPH has seen an increase in cases amongst travelers in MA and the US
- Local Health
  - Follow-up investigation to obtain clinical and risk info (travel history)

Prevention Tools

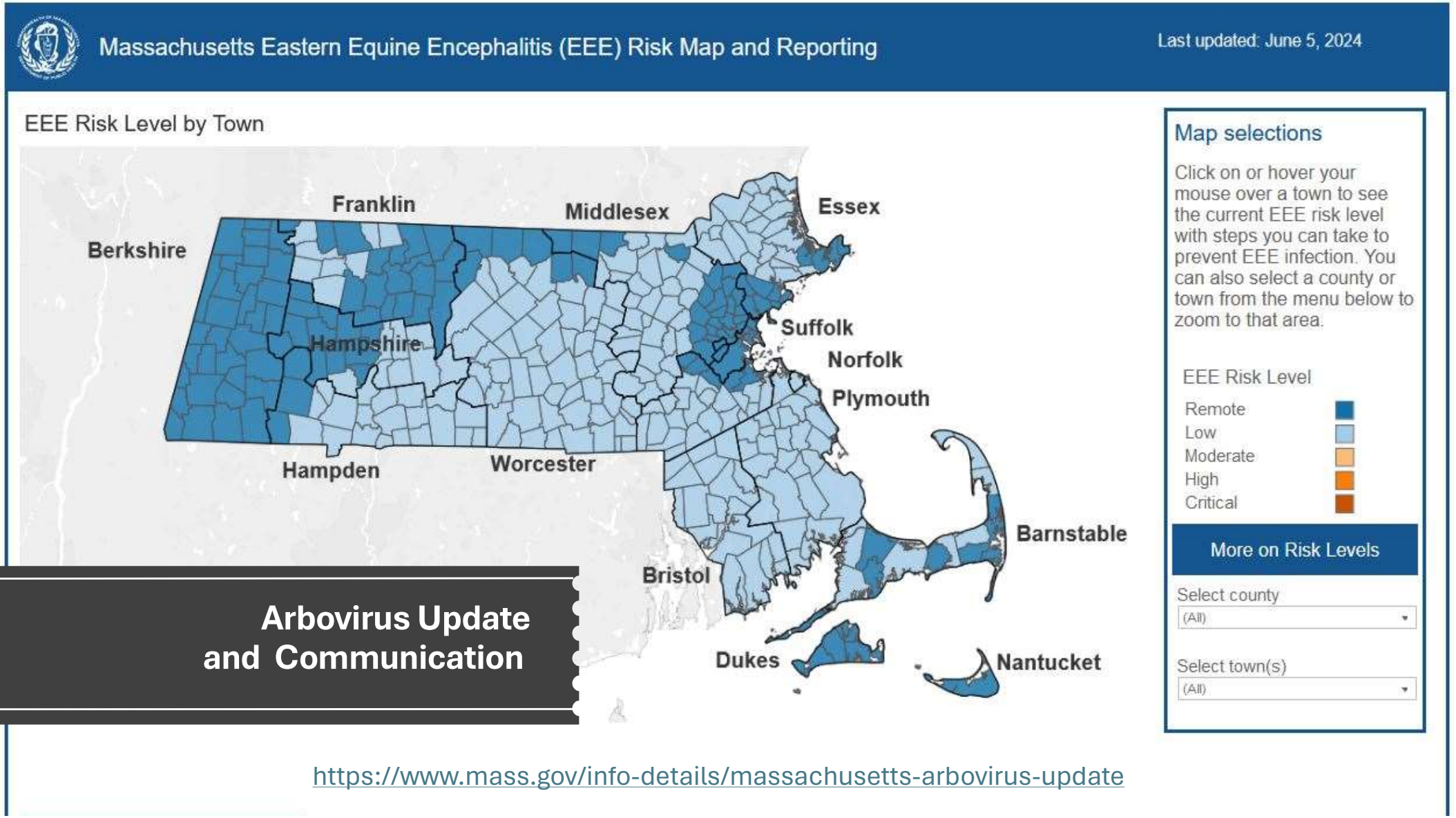


Public Communications

- Messaging focuses on ticks in June and transitions to mosquitos in late June/July
- Press releases to the public and to those within high or critical risk communities
- Information on cases we release: gender, age range, county of exposure, communities moving to high or critical risk based on exposure information
- Information we do NOT release: city/town/or county of residence, hospital facility of treatment, patient condition

Mosquito Control: Annual Timeline

- **<u>Leading up to and throughout the season</u>: Planning & Surveillance**
  - In collaboration with DPH the SRB/MDAR arbovirus response plan is updated and informed based on the previous season
  - Surveillance is conducted by the MCDs who collect mosquitoes and submit samples to DPH for virus testing, results help inform a response strategy
- **<u>Early March – End of May</u>: Larviciding applications**
  - Larvicide is targeted to areas of standing water and targets mosquito species that would reduce the risk of EEE cycle amplification
  - Applications depends on foliage, weather and water temperature
  - Depending on the mosquito species, this will continue throughout the season
- **<u>Early June – Early September</u>: Adulticiding applications**
  - Mosquito population type, mosquito testing for virus, and determination of risk levels drives decisions for appropriate mosquito control interventions
  - Includes targeting of EEE hotspots with backpack spraying and truck mounted Ultra-Low-Volume (ULV) spraying
  - May include aerial application



Arbovirus Update and Communication

https://www.mass.gov/info-details/massachusetts-arbovirus-update

LBOH Arbovirus Coordinator

- Each town has a designated arbovirus coordinator – this is the person the Zoonotic Epidemiologist calls to notify you of any positive WNV/EEE mosquitoes, animals, or humans in your town
  - The coordinator collects this information and decides on a plan of action to notify the residents
  - DPH can also provide sample press releases!
- Not sure who the arbovirus coordinator is for your town? Check MAVEN!
  - The information in the LBOH communication event is based off who the assigned coordinator was the previous year. If this is outdated, please review and update where appropriate!
- Please Update Contact Info for 2024!!

Local Health's Role in Arbovirus Prevention and Communication

- MDPH conducts human arbovirus case investigations and will notify communities of preliminary and confirmed cases
- LBOHs are responsible for dengue and chikungunya investigations.

- Please promote personal protective activities including use of EPA approved repellents

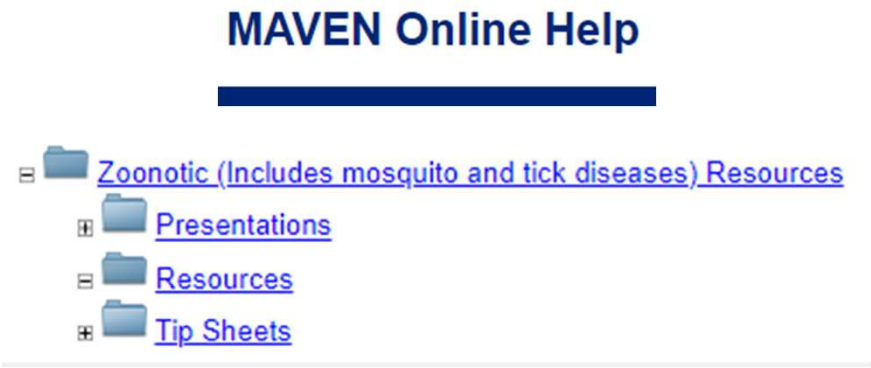
- Mosquito testing begins on 6/17/24, results will be posted here https://www.mass.gov/info-details/massachusetts-arbovirus-update

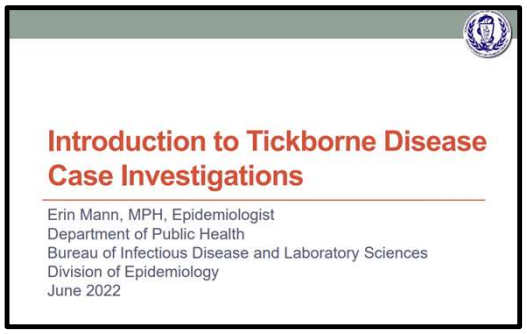
- Please review the updated 2024 Arbovirus Surveillance and Response Plan

Tickborne Disease Updates: 2024

Tickborne Disease Case Investigations Trainings Available

- Within MAVEN Help, under the Zoonotic folder: June 2022 presentation provides in depth training on how to conduct tickborne disease case investigations!
- Additional tips and reminders were provided in June 2023 training.

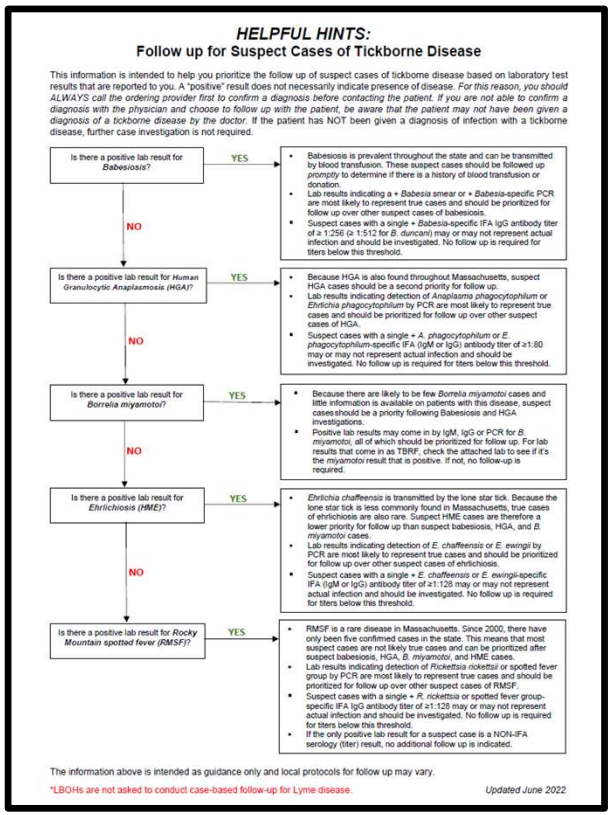




Slides (PDF),
Webinar Recording

Tickborne Disease LBOH Follow-up

- Investigation critical in order to classify cases and identify trends
- Focus on clinical and risk Question Packages
  - Wizard for HGA and Babesiosis
- Tickborne Disease Tip Sheet available to help prioritize



HELPFUL HINTS:
Follow up for Suspect Cases of Tickborne Disease

This information is intended to help you prioritize the follow up of suspect cases of tickborne disease based on laboratory test results that are reported to you. A "positive" result does not necessarily indicate presence of disease. *For this reason, you should ALWAYS call the ordering provider first to confirm a diagnosis before contacting the patient. If you are not able to confirm a diagnosis with the physician and choose to follow up with the patient, be aware that the patient may not have been given a diagnosis of a tickborne disease by the doctor.* If the patient has NOT been given a diagnosis of infection with a tickborne disease, further case investigation is not required.

Is there a positive lab result for *Babesiosis*? YES
- Babesiosis is prevalent throughout the state and can be transmitted by blood transfusion. These suspect cases should be followed up *promptly* to determine if there is a history of blood transfusion or donation.
- Lab results indicating a + *Babesia* smear or + *Babesia*-specific PCR are most likely to represent true cases and should be prioritized for follow up over other suspect cases of babesiosis.
- Suspect cases with a single + *Babesia*-specific IFA IgG antibody titer of ≥ 1:256 (≥ 1:512 for *B. duncani*) may or may not represent actual infection and should be investigated. No follow up is required for titers below this threshold.

NO

Is there a positive lab result for *Human Granulocytic Anaplasmosis (HGA)*? YES
- Because HGA is also found throughout Massachusetts, suspect HGA cases should be a second priority for follow up.
- Lab results indicating detection of *Anaplasma phagocytophilum* or *Ehrlichia phagocytophilum* by PCR are most likely to represent true cases and should be prioritized for follow up over other suspect cases of HGA.
- Suspect cases with a single + *A. phagocytophilum* or *E. phagocytophilum*-specific IFA (IgM or IgG) antibody titer of ≥1:80 may or may not represent actual infection and should be investigated. No follow up is required for titers below this threshold.

NO

Is there a positive lab result for *Borrelia miyamotoi*? YES
- Because there are likely to be few *Borrelia miyamotoi* cases and little information is available on patients with this disease, suspect cases should be a priority following Babesiosis and HGA investigations.
- Positive lab results may come in by IgM, IgG or PCR for *B. miyamotoi*, all of which should be prioritized for follow up. For lab results that come in as TBRF, check the attached lab to see if it's the *miyamotoi* result that is positive. If not, no follow-up is required.

NO

Is there a positive lab result for *Ehrlichiosis (HME)*? YES
- *Ehrlichia chaffeensis* is transmitted by the lone star tick. Because the lone star tick is less commonly found in Massachusetts, true cases of ehrlichiosis are also rare. Suspect HME cases are therefore a lower priority for follow up than suspect babesiosis, HGA, and *B. miyamotoi* cases.
- Lab results indicating detection of *E. chaffeensis* or *E. ewingii* by PCR are most likely to represent true cases and should be prioritized for follow up over other suspect cases of ehrlichiosis.
- Suspect cases with a single + *E. chaffeensis* or *E. ewingii*-specific IFA (IgM or IgG) antibody titer of ≥1:128 may or may not represent actual infection and should be investigated. No follow up is required for titers below this threshold.

NO

Is there a positive lab result for *Rocky Mountain spotted fever (RMSF)*? YES
- RMSF is a rare disease in Massachusetts. Since 2000, there have only been five confirmed cases in the state. This means that most suspect cases are not likely true cases and can be prioritized after suspect babesiosis, HGA, *B. miyamotoi*, and HME cases.
- Lab results indicating detection of *Rickettsia rickettsii* or spotted fever group by PCR are most likely to represent true cases and should be prioritized for follow up over other suspect cases of RMSF.
- Suspect cases with a single + *R. rickettsia* or spotted fever group-specific IFA IgG antibody titer of ≥1:128 may or may not represent actual infection and should be investigated. No follow up is required for titers below this threshold.
- If the only positive lab result for a suspect case is a NON-IFA serology (titer) result, no additional follow up is indicated.

The information above is intended as guidance only and local protocols for follow up may vary.

*LBOHs are not asked to conduct case-based follow-up for Lyme disease.

Updated June 2022

Summary of Tickborne Disease Case Investigation for Local Health

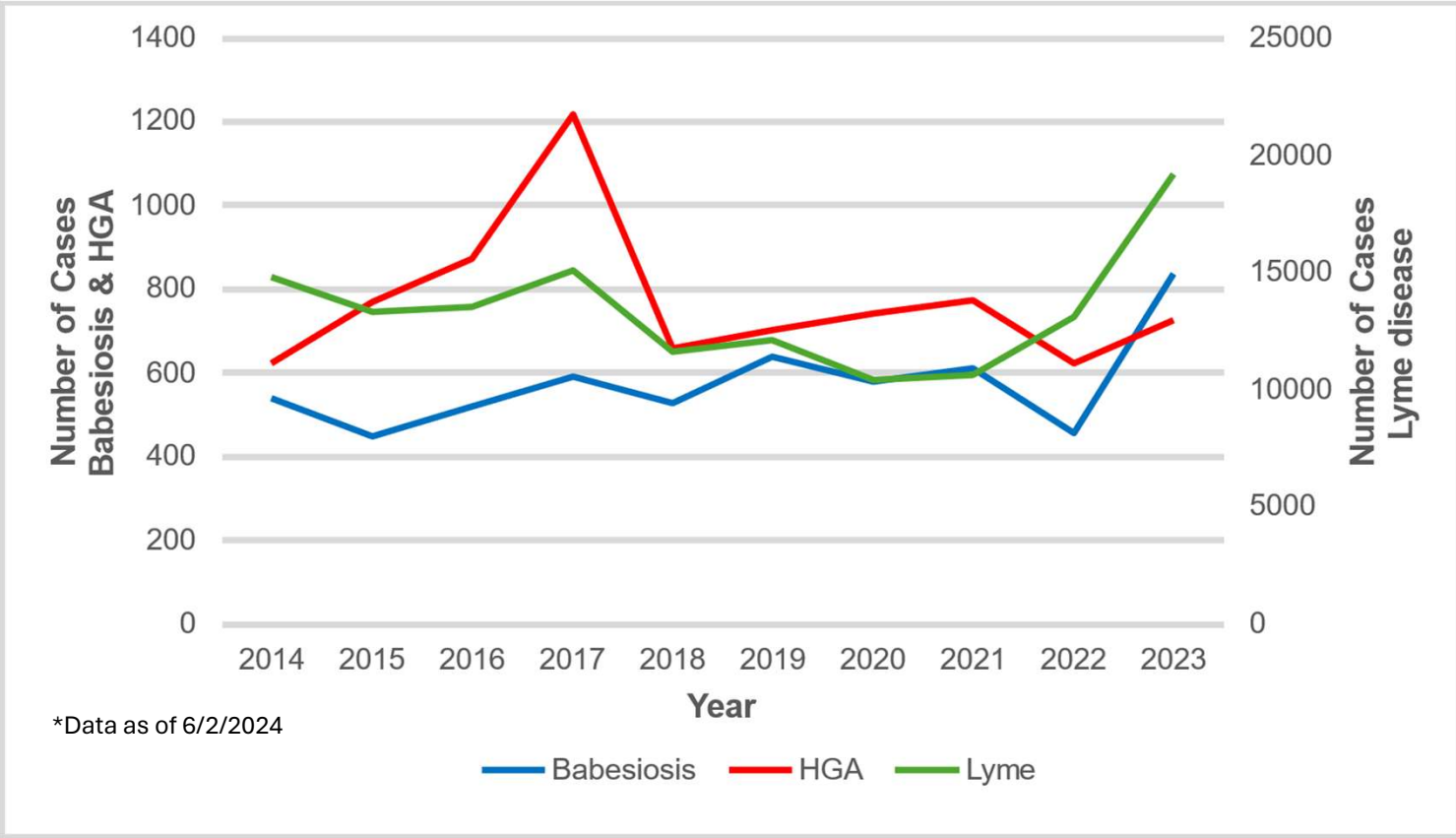
- Receive tickborne disease (TBD) event in your workflow. (See Tip Sheet!)
- Check the lab tab and call the provider/IP to collect the clinical and risk information.
- Complete the variables in MAVEN (using the wizard where it's available).
  - Lab result is not reliable on its own, need compatible symptoms.
  - If you leave a field blank, we will assume it wasn't asked.
  - Example: if you ask about symptoms in general and the provider says "headache, fever" – ask specifically about each symptom, or select "no" if the doctor clearly states: "they only had headache."
- Call the case if you have time to provide resources and education
- Guide people to seek tickborne panel testing, not just Lyme (includes HGA, Babesia, TBRF/Borrelia *miyamotoi*), as there is potential for co-infection.

Tick-borne Disease in Massachusetts (2023)

- Lyme Disease: ***Borrelia burgdorferi***
  - 9,723 confirmed and probable cases
- Babesiosis: ***Babesia microti***
  - 839 confirmed and probable cases
- Anaplasmosis: ***Anaplasma phagocytophilum***
  - 727 confirmed and probable cases
- Powassan virus
  - 11 confirmed and probable cases
- *Borrelia miyamotoi*
  - 47 confirmed and probable cases
- Rocky Mountain Spotted Fever - Rare in MA
- Tularemia: ***Francisella tularensis***
  - Cape Cod and the Islands, uncommon
- Ehrlichiosis (HME)
  - Transmitted by the lone star tick- uncommon in Massachusetts

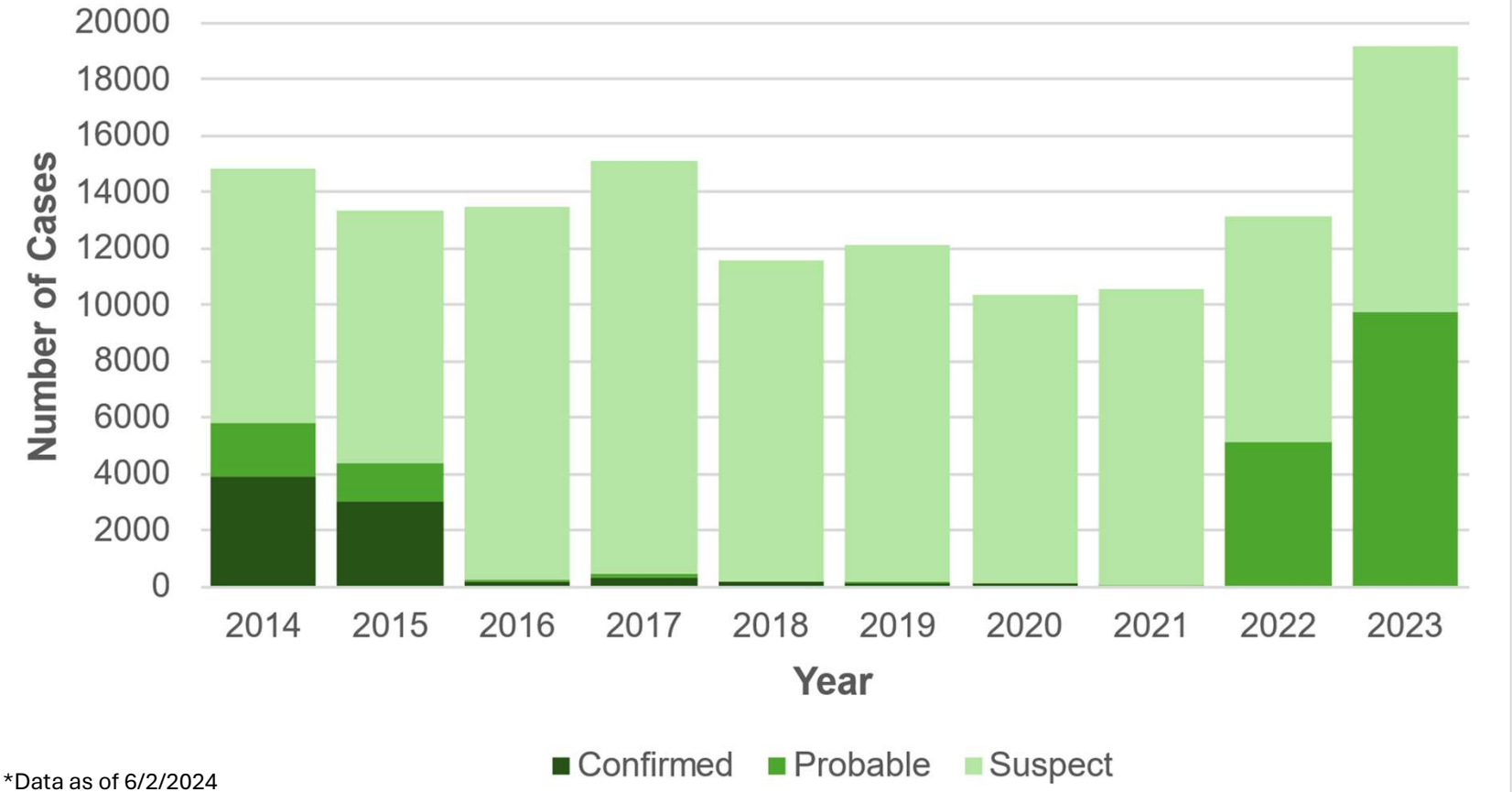
- Mass.gov Monthly Tick-borne Disease Reports are available.
- Monthly tick reports show seasonal trends in reported tick bites and tick-borne disease diagnoses in Massachusetts residents.
  - **Local health follow-up and data completion contributes to this data.**

Tick-borne Disease Case Volume in Massachusetts (2023)



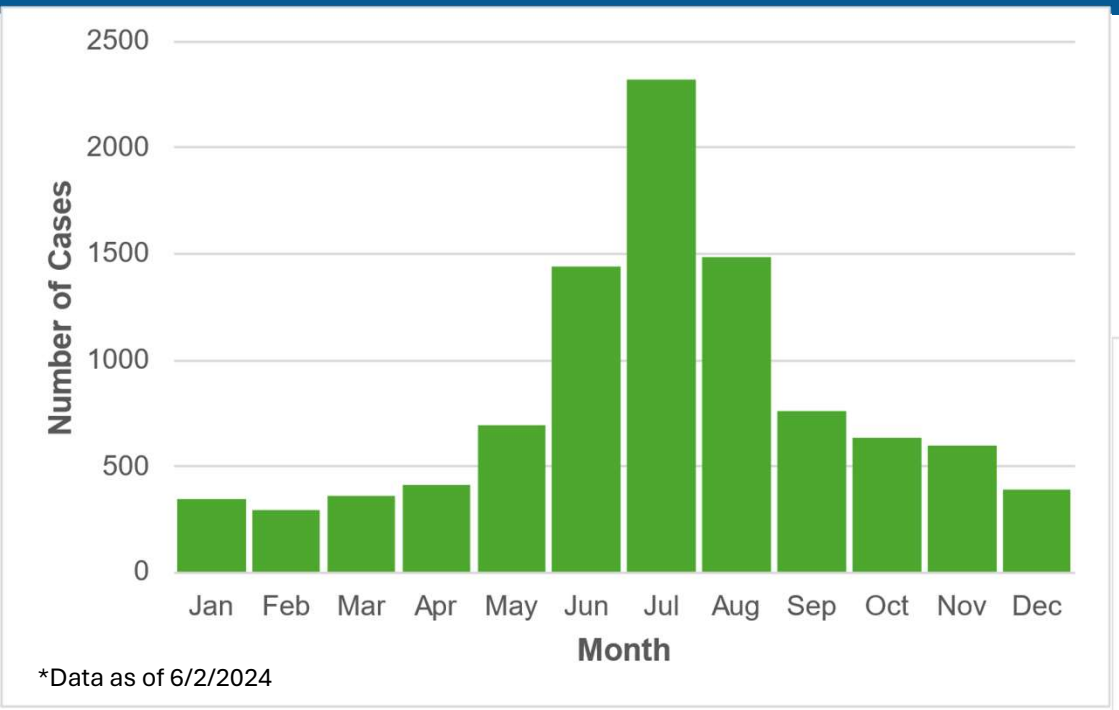
*Data as of 6/2/2024

Lyme Disease in MA (10 year trend)



*Data as of 6/2/2024

Lyme Disease by Month of Onset and Age Distibution (2023)



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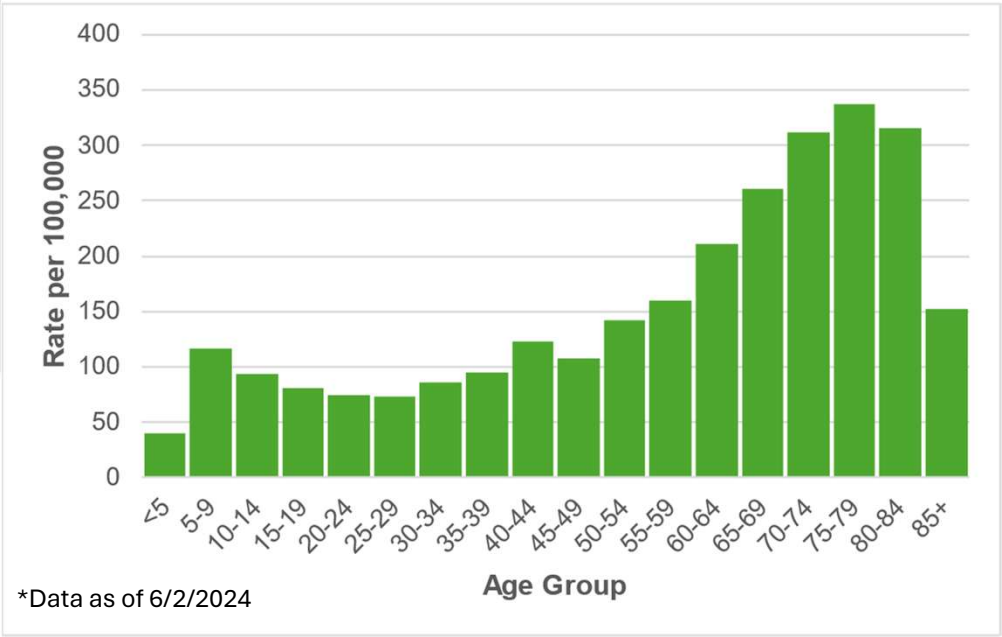
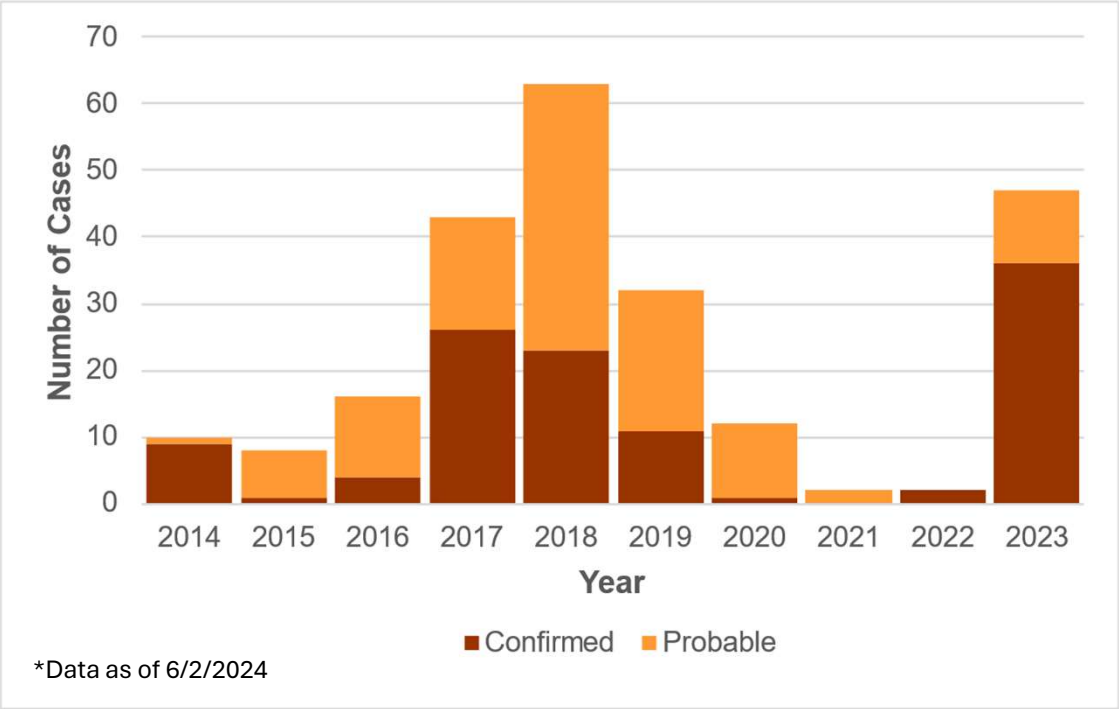


*Data as of 6/2/2024

Borrelia *Miyamotoi*

- Vector:
  - *Ixodes scapularis*
- Reservoir species:
  - Small rodents/white-footed mice

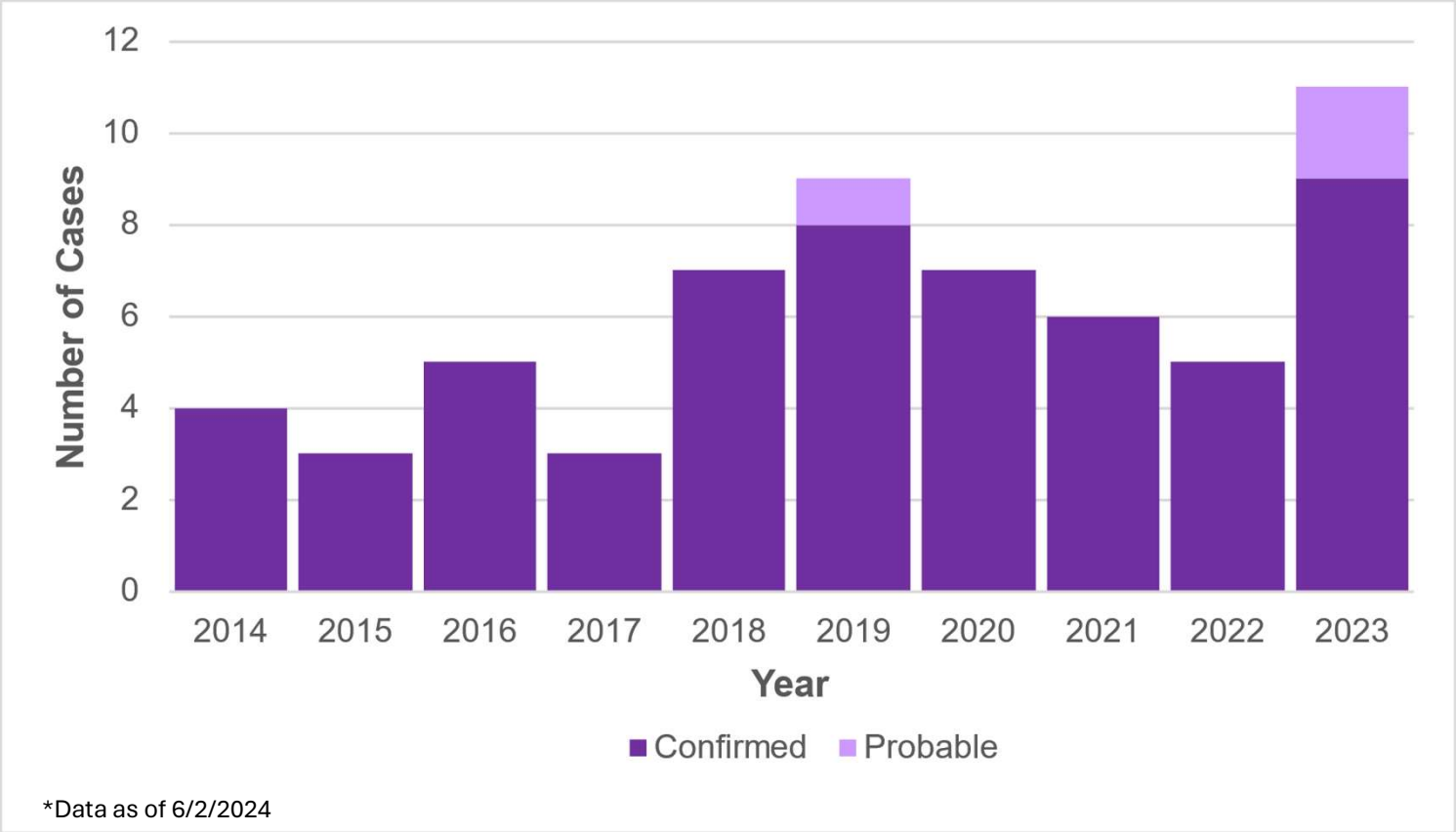


*Data as of 6/2/2024

Powassan Virus (POW)

- Spread by the deer tick and woodchuck tick
  - The virus is maintained in small to medium sized rodents
- Symptoms develop between one week to one month following the bite of an infected tick
  - Most exposed individuals will be asymptomatic or have mild symptoms
- Symptoms include:
  - Fever, headache, confusion, muscle weakness, nausea, vomiting, speech difficulties, loss of coordination, seizures, encephalitis
- Treatment:
  - No vaccine
  - Supportive care only
  - Approximately 10% of POW virus encephalitis cases are fatal

Powassan in MA (10 year trends)



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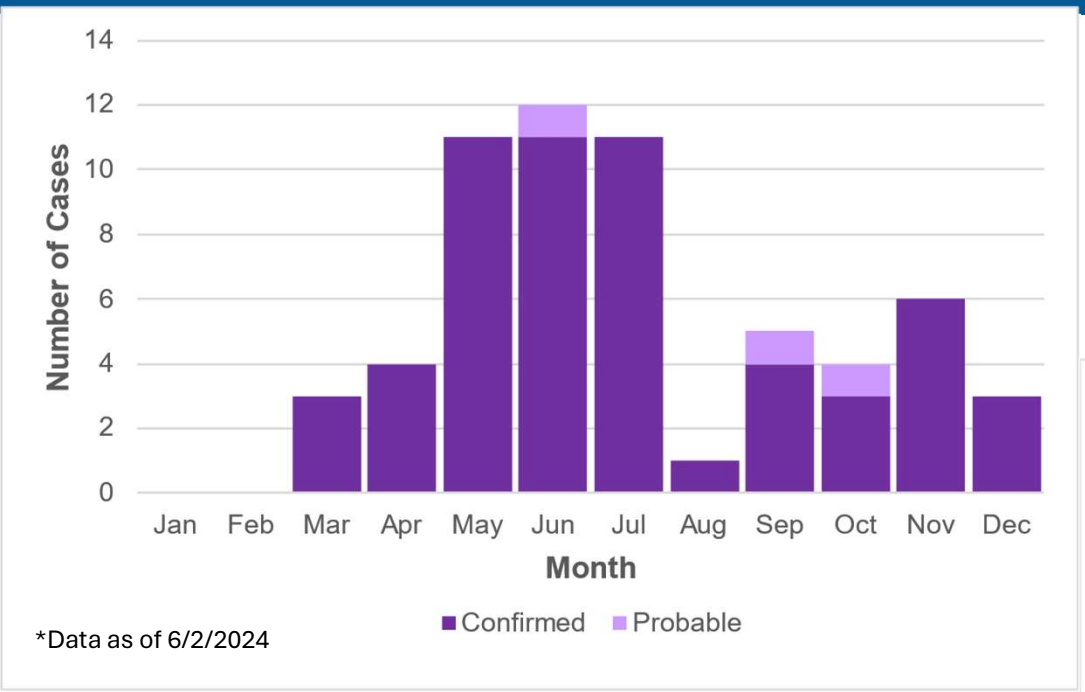
Powassan by Month of Onset and Age Distibution (2023)



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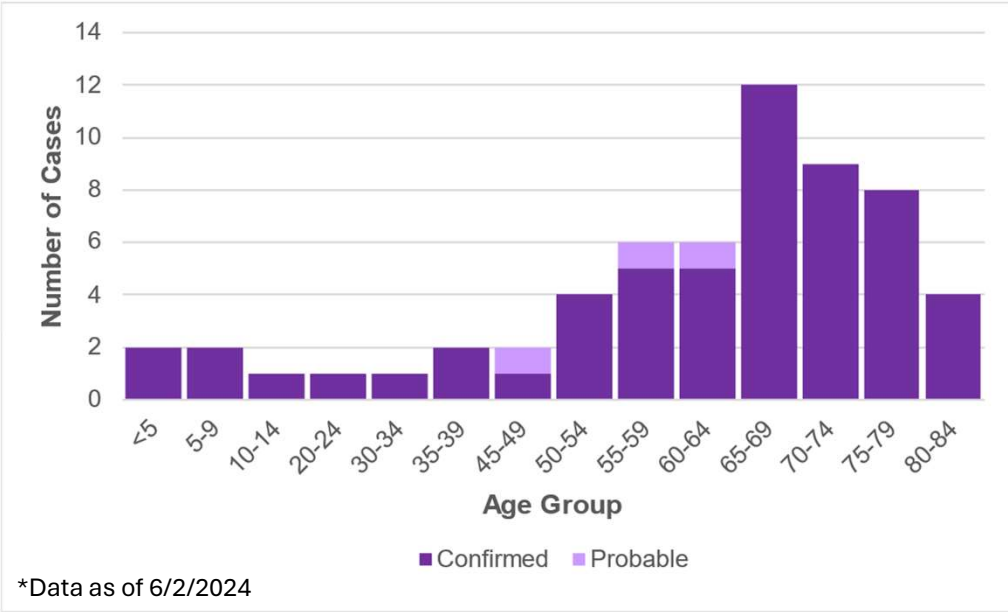


*Data as of 6/2/2024

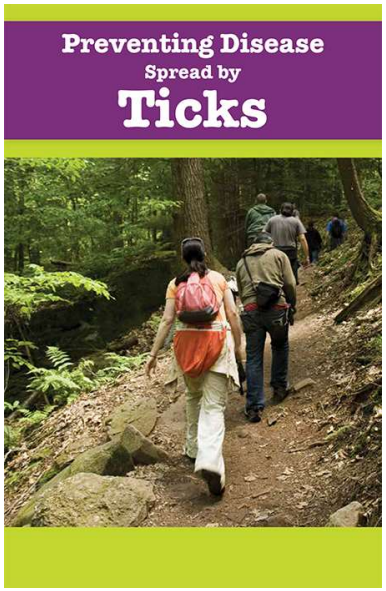
Alpha-Gal Syndrome (AGS)

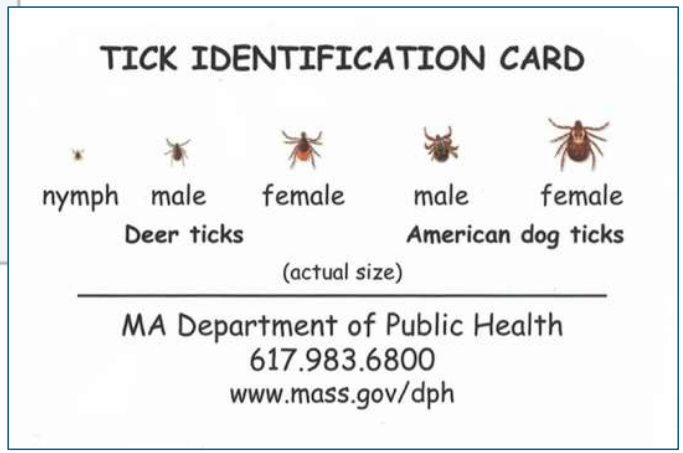
- Reaction to the bite from a lone star tick
- Alpha-gal (galactose-α-1,3-galactose) is a sugar molecule found in most mammals.
- Alpha-gal is not found in fish, reptiles, birds, or people.
- Alpha-gal can be found in meat (for example, pork, beef, rabbit, lamb, venison) and products made from mammals (including gelatin, cow's milk, and milk products).
- Symptoms usually appear 2–6 hours after eating meat or dairy products, or after exposure to products containing alpha-gal (for example, gelatin-coated medications). People may not have an allergic reaction after every alpha-gal exposure.

  - Hives/rash, indigestion, diarrhea, difficulty breathing, nausea, vomiting, swelling of the tongue, dizziness, severe stomach pain

Clearinghouse – Educational Resources

- https://massclearinghouse.ehs.state.ma.us/





Local Health's Role in Tickborne Disease Prevention

- LBOH investigates tickborne disease cases
- Timely case investigation is critical for MDPH to classify and count cases in MA
- Communication to the public heightening public awareness of tick-borne disease is key to decreasing exposure and infections.
- Promote personal protective activities including use of EPA approved repellents

QA