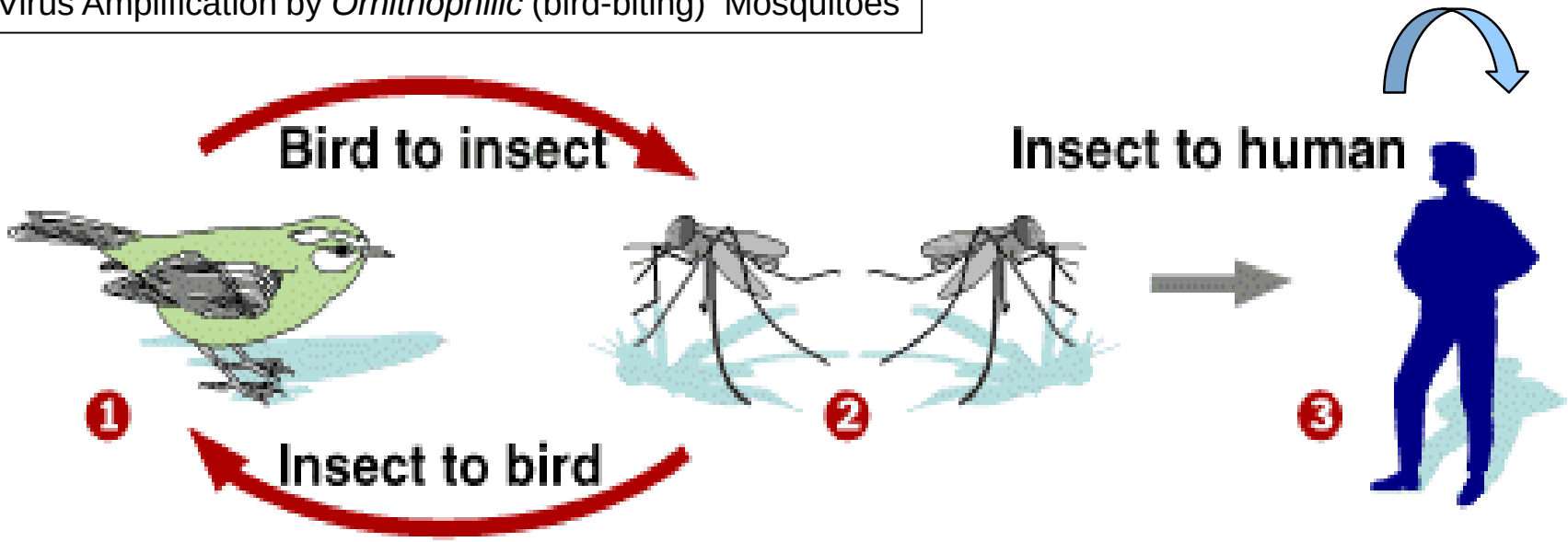
Commonwealth of Massachusetts

Department of Public Health

WNV and EEE
2020 Overview

July 22, 2020

Enzootic Cycle:
Virus Amplification by *Ornithophilic* (bird-biting) Mosquitoes



Epizootic Cycle:
Incidental Transmission by Zoophilic (mammal-biting) Mosquitoes

EEEV mosquitoes involved: *Culiseta melanura and Coquillettidia perturbans*
WNV mosquito involved: *Culex pipiens and Culex restuans*

Habitats for EEE versus WNV

- **Eastern equine encephalitis (EEE)**
  - Red maple/white cedar swamps are source habitat (for birds and mosquitoes)
  - Type of habitat most common in SE MA

- **West Nile virus**
  - Urban habitats that accumulate small collections of stagnant water are source habitat

Forecast for the Year

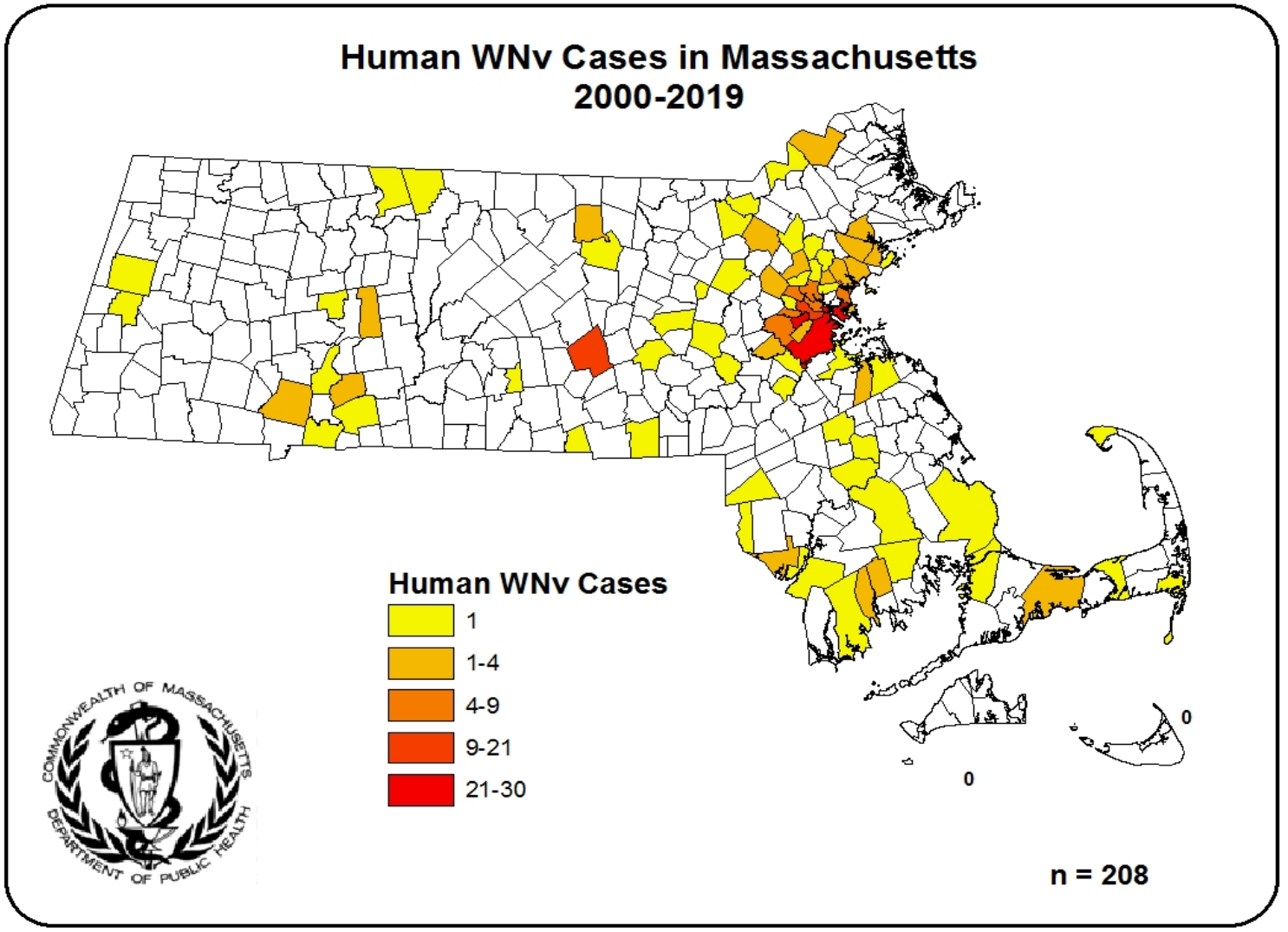
- **WNV**
  - Difficult/impossible to predict in advance
  - Dependent on temperature and rainfall patterns during the season
  - Dependent upon infection rate in birds

- **EEE**
  - Difficult to predict in advance but activity occurs in 2-3 year outbreak cycles
  - Late season 2018 activity, very active 2019 season
  - Dry fall and spring may have suppressed some mosquito populations
  - Dependent on temperature
  - Dependent upon infection rate in birds

West Nile Virus Infection Human Disease

- Incubation period 3 to 14 days
- Age-related severity
- 80% Mild and sub-clinical infection
- 20% Headache, sore throat, fatigue, muscle and joint aches, fever (moderate to high),
- <1% Aseptic meningitis, encephalitis, meningoencephalitis

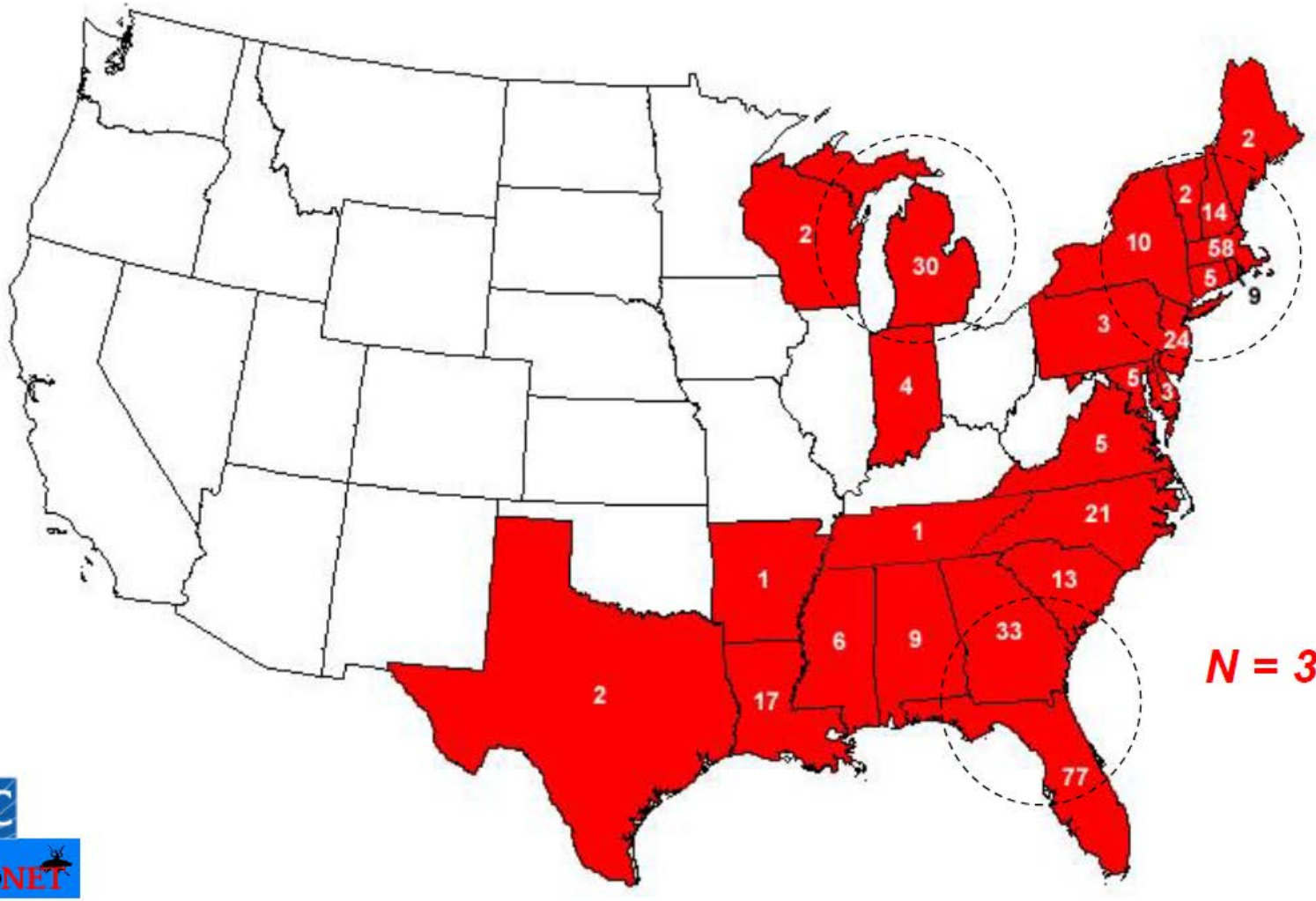
Human WNV Cases by City/Town of Residence



Eastern Equine Encephalitis Human Disease

- Rare but severe mosquito-borne infection
- Incubation period 3-10 days
- Abrupt onset: fever, chills, headache, muscle aches, nausea and vomiting, seizures, coma
- ~30-50% mortality rate
- ~80% of those who recover have permanent neurological damage
- Children: 10/38 cases (40%) mortality rate
  - Adults 28/38 cases (60%)

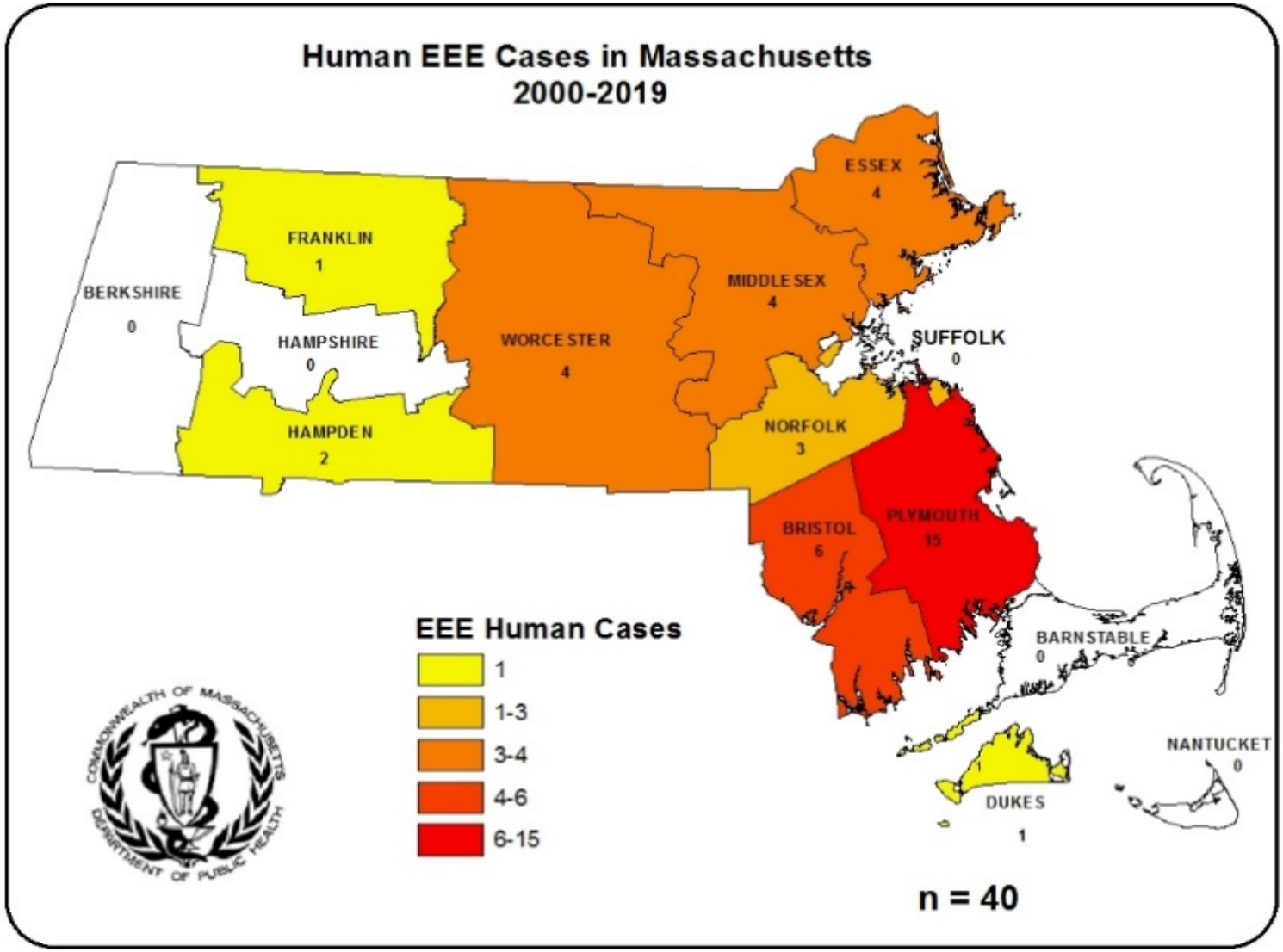
Human Cases of EEE in the United States 1964 - 2019

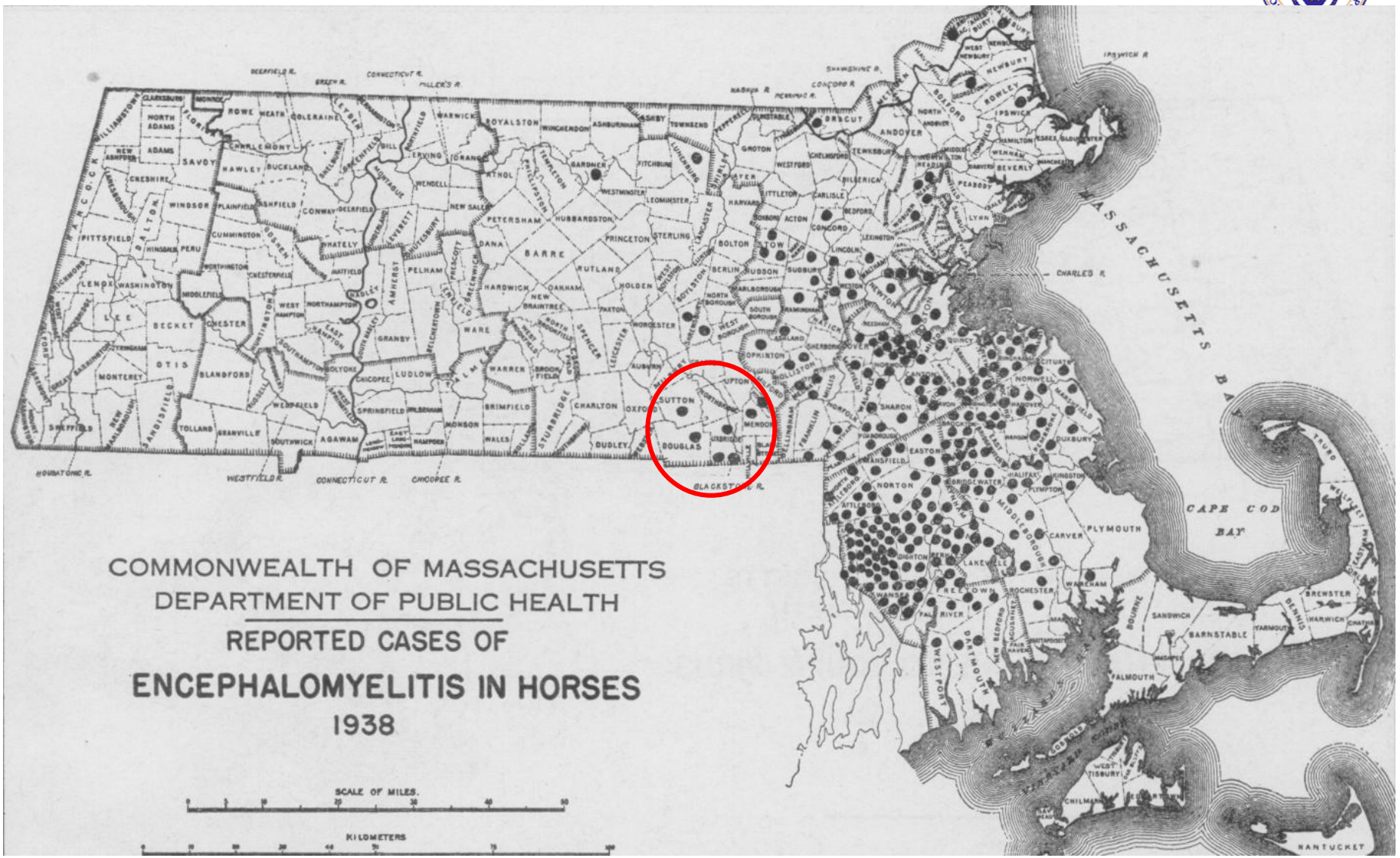


N = 347

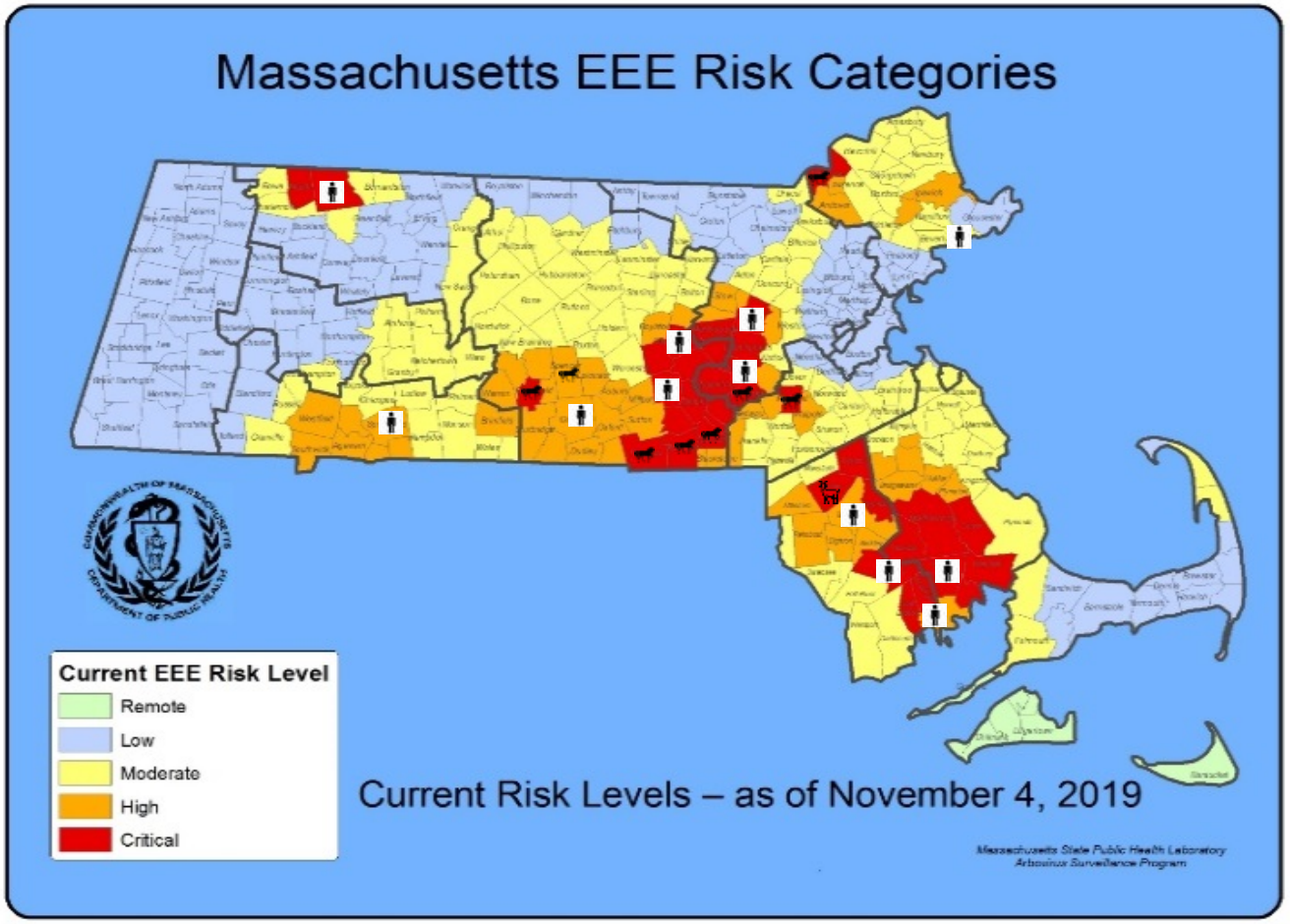
CDC ArboNET

Human EEE Cases by County of Residence




COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF PUBLIC HEALTH
REPORTED CASES OF
ENCEPHALOMYELITIS IN HORSES
1938
SCALE OF MILES.
KILOMETERS
MASSACHUSETTS BAY
CAPE COD BAY
SUTTON
DOUGLAS
BLACKSTONE R.
CONNECTICUT R.
HOUSATONIC R.
WESTFIELD R.
CHICOPEE R.
CHARLES R.
IPSWICH R.
NANTUCKET

EEE: Expanding Activity



Multi-agency Arbovirus Surveillance and Response

- **Executive Office of Health and Human Services**
  - Department of Public Health
- **Executive Office of Energy and Environmental Affairs**
  - State Reclamation and Mosquito Control Board
  - Department of Agricultural Resources
  - Department of Conservation and Recreation
  - Department of Environmental Protection
- **Local Mosquito Control Projects**
- **Local Health Departments**

MA State Plans: DPH & MDAR/SRMCB

- **Department of Public Health: 2020 Massachusetts Arbovirus Surveillance and Response Plan**
  - Critical Tool
  - Outlines public health response to mosquito animal and human surveillance data
  - WNV and EEE

- **Department of Agricultural Resources / State Reclamation and Mosquito Control Board: Massachusetts Emergency Operations Response Plan for Mosquito-Borne Illness**
  - Critical tool
  - Outlines the SRMBC and MDAR response when an emergency response is needed.

Arbovirus Surveillance and Response Plan

Massachusetts Department of Public Health

2020

Massachusetts Arbovirus Surveillance and Response Plan

Monica Bharel, MD, MPH
Commissioner
Massachusetts Department of Public Health

Kevin Cranston, MDiv
Assistant Commissioner
Director, Bureau of Infectious Disease and Laboratory Sciences

DPH Arbovirus Program Overview

Surveillance

- **Set and collect traps**
  - Collaborate with Mosquito Control Projects (MCP) on their surveillance efforts in member communities
  - DPH long-term trap sites in southeastern MA
  - Monitor areas without MCP

Laboratory Testing and Correlation with Patient Information

- **Test specimens for EEE/WNV infection**

  Mosquitoes, suspect animal & human specimens

Risk Analysis and Communication

- **Identify areas at risk for human disease**
- **Communicate findings with local health agents, MCP's and the public**
- **Provide information to guide the control actions to reduce the risk of disease**

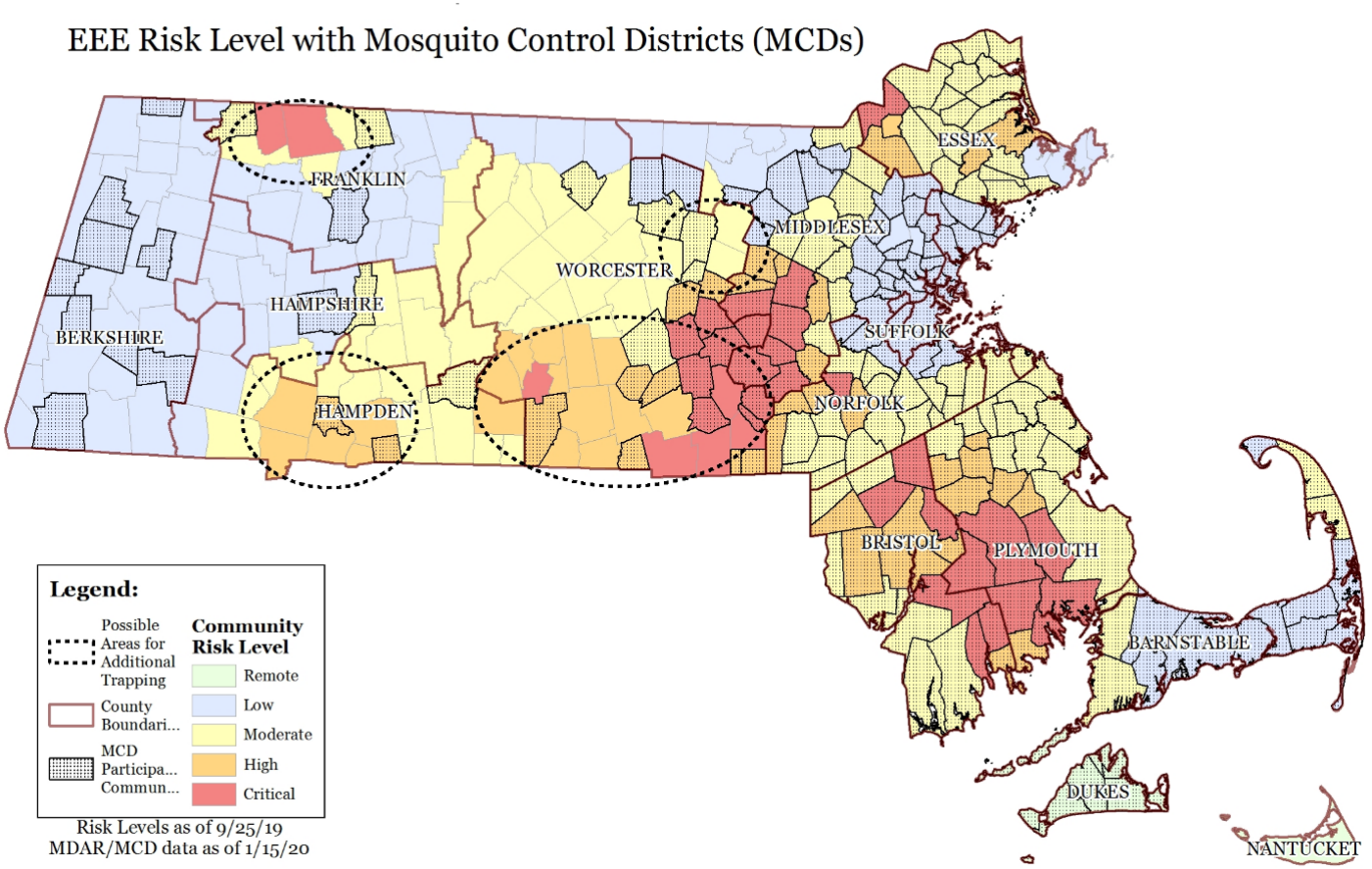
Risk Criteria and Public Health Recommendations

2	WNV - Moderate	Current Year 1. Sustained or increasing WNV activity in mosquitoes in the focal area. OR 2. One confirmed human case in the focal area (focal area based on exposure history not necessarily residence) OR 3. More than one animal case in the focal area (focal area based on exposure history not necessarily residence) Definitions: ***Sporadic*** WNV activity- when 1-2 mosquito isolates are detected during non-consecutive weeks within one focal area. ***Sustained*** WNV activity- when mosquito isolates are detected for at least 2 consecutive weeks within one focal area. (NOTE: Two consecutive weekly findings from the same trap location may not always be considered indicative of sustained activity)	Response as in category 1, plus: 1. Expand community outreach and public education programs, particularly among high-risk populations, focused on risk potential and personal protection, emphasizing source reduction. 2. Local boards of health are contacted via phone or HHAN (Health and Homeland Alert Network) upon confirmation of WNV in any specimen. Advise health care facilities of increased risk status and corresponding need to send specimens to the MA SPHL for testing. 3. Supplemental mosquito trapping and testing may be performed in areas with positive WNV findings. --- For localities participating in local Mosquito Control Districts: 4. Increase larval control and source reduction measures. 5. If not already in progress, standard, locally determined adult mosquito vector control efforts including targeted ground adulticiding operations should be considered against *Culex* mosquitoes and other potential vectors, as appropriate. The decision to use ground-based adult mosquito control will depend on critical modifying variables including the time of year, mosquito population abundance and proximity of virus activity to populations.

Surveillance / Trapping

Goals of surveillance:

1) detect the presence of virus as it emerges and
2) 2) identify how rapidly and where it is spreading



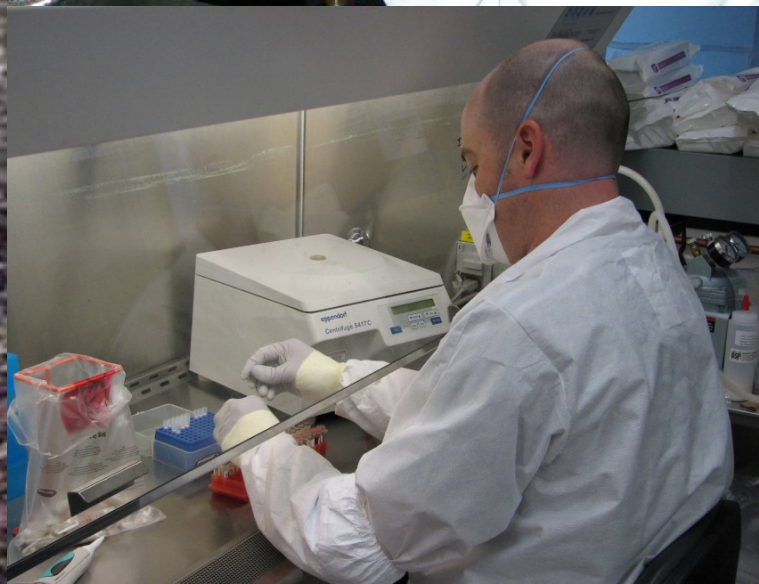
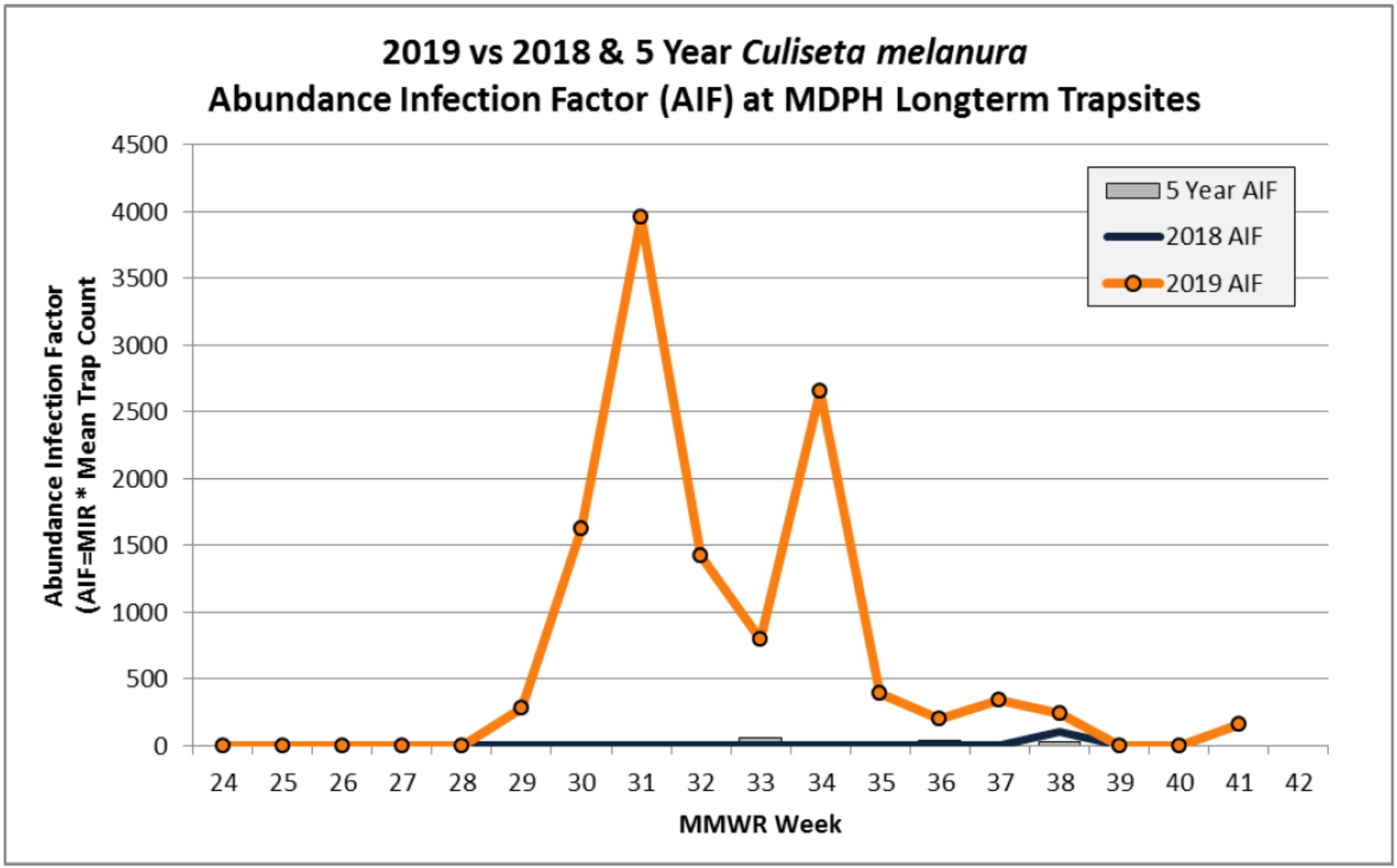
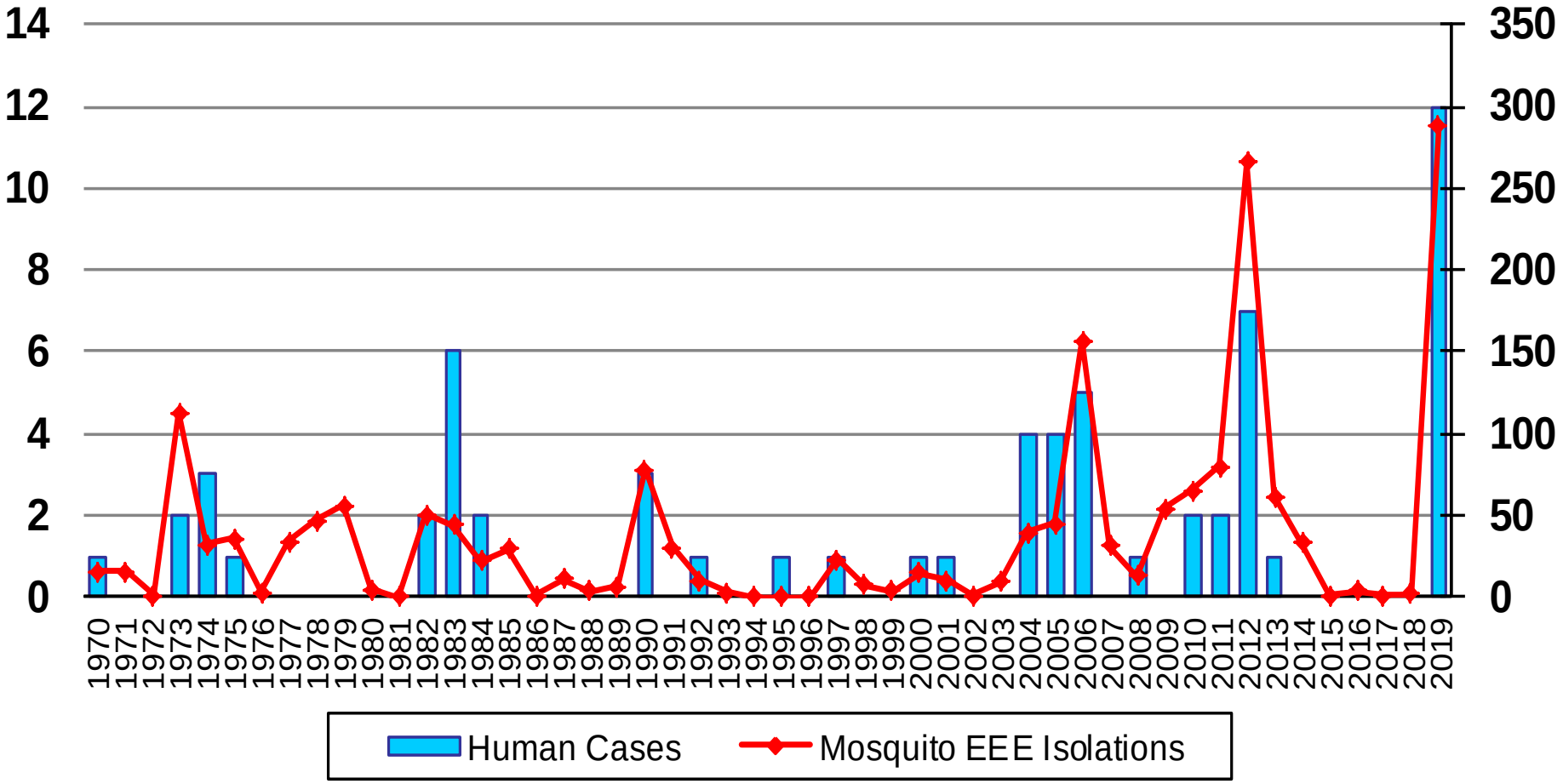


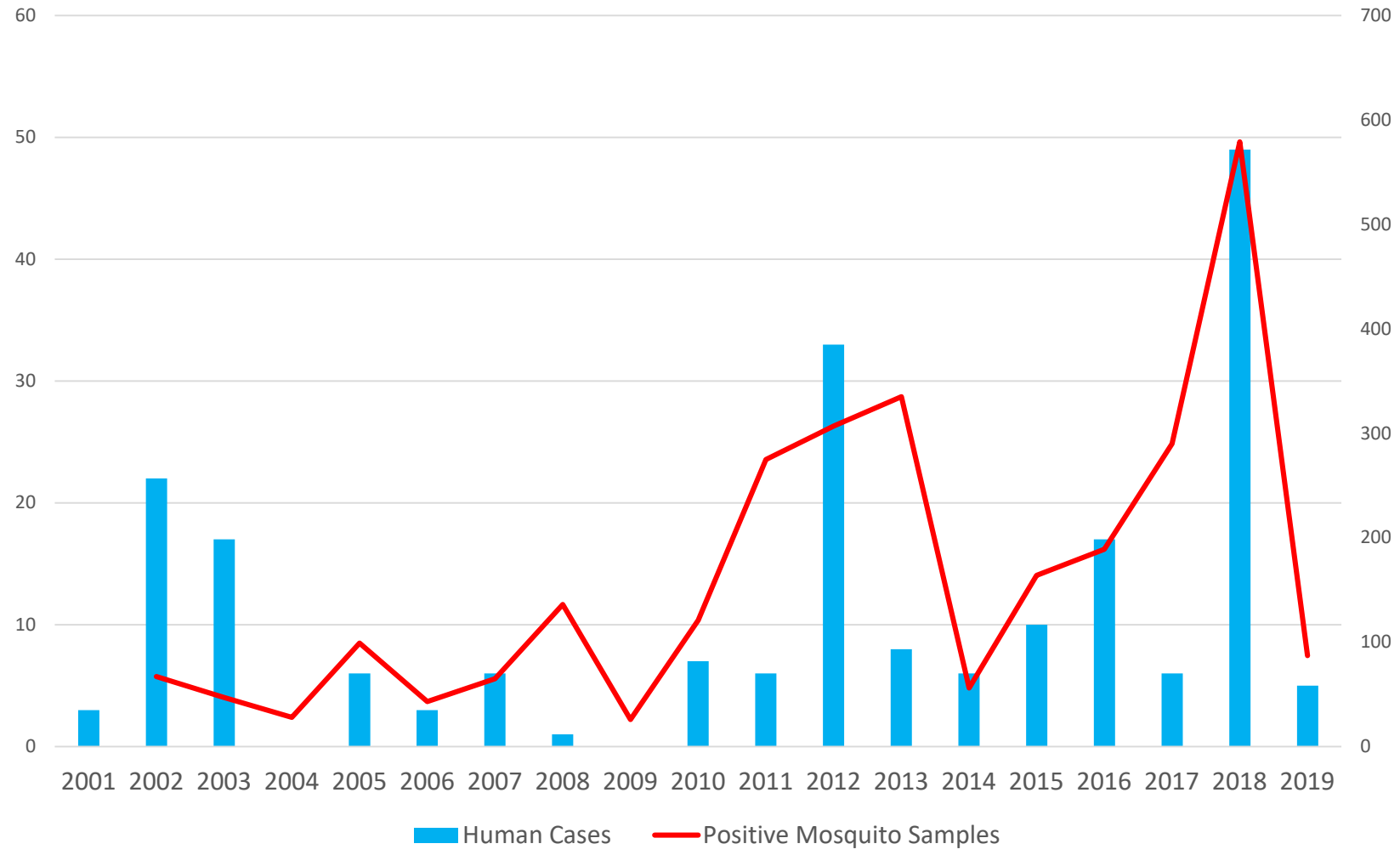
Figure 6:


2019 vs 2018 & 5 Year Culiseta melanura
Abundance Infection Factor (AIF) at MDPH Longterm Trapsites
Abundance Infection Factor
(AIF=MIR * Mean Trap Count
4500
4000
3500
3000
2500
2000
1500
1000
500
0
5 Year AIF
2018 AIF
2019 AIF
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
MMWR Week

Human and Mosquito EEE, 1970-2019



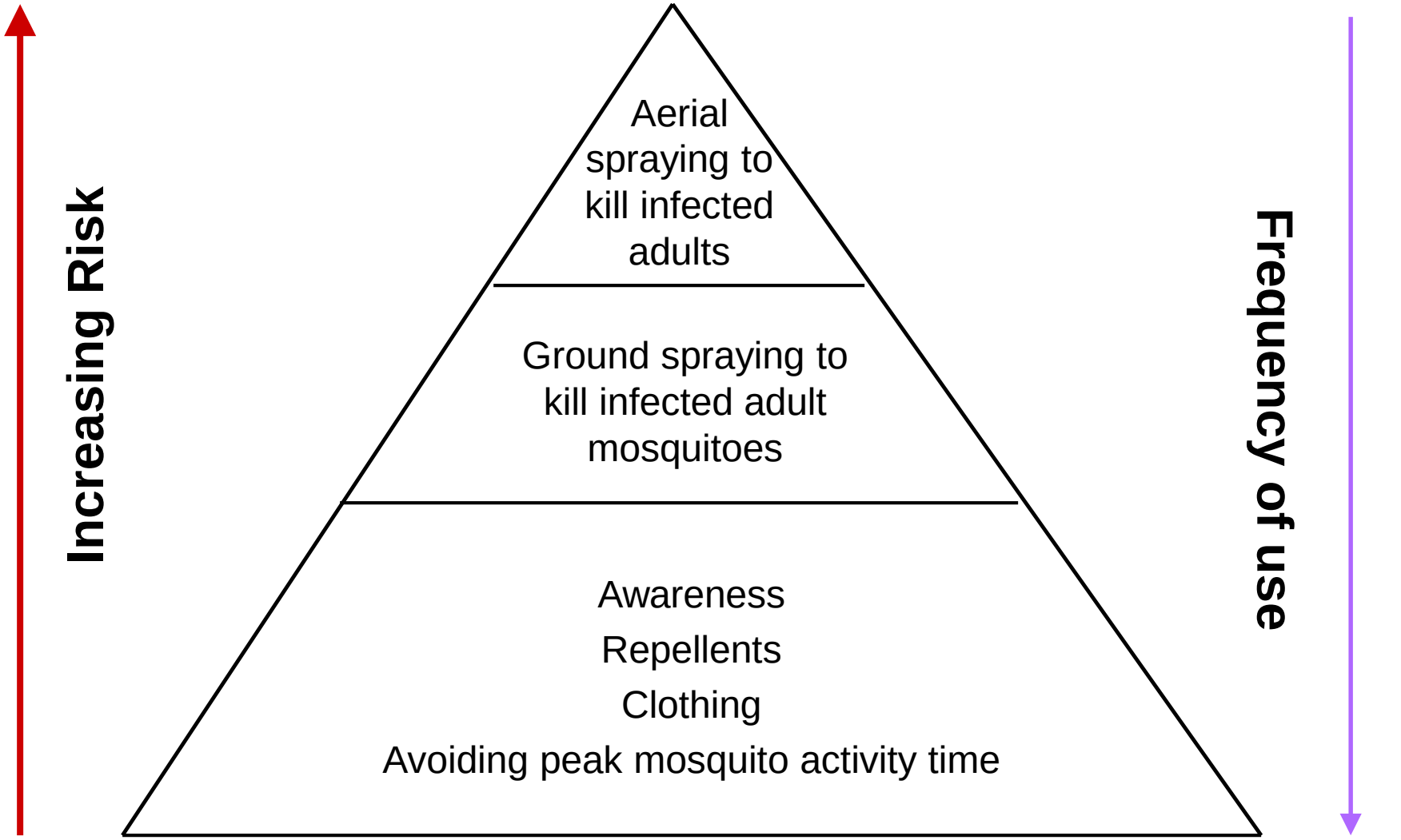
Human and Mosquito WNV, 2000-2019



Risk Analysis Allows for Phased Response

Key to Color Coding on EEE Risk Map		
Risk	**What it Means**	**What You Can Do**
Remote	EEE is not usually found in your area	**TO Prepare** • Know your risk – check regularly at www.mass.gov/dph/wnv • Repair screens
Low	EEE may occur in your area	**TO Prevent** • Wear mosquito repellent between dusk to dawn • Wear long sleeves and long pants from dusk to dawn • Use mosquito netting on baby carriages and playpens
Moderate	EEE occurred in your area within the last year AND/OR there is EEE in mosquitoes in your area now	**TO Prevent – add this** • Wear mosquito repellent when outdoors, especially between dusk and dawn • Avoid outside areas with obvious mosquito activity
High	Conditions likely to lead to infection of a person with EEE are occurring in your area	**TO Prevent – add this** • Adjust outdoor activity to avoid peak mosquito hours (from dusk to dawn) • Avoid overnight camping, particularly near freshwater swamps where EEE activity is most likely
Critical	**Excessive risk from EEE virus exists, a person with EEE infection has been identified in your area**	**TO Prevent – add this** • Cancel or reschedule outdoor gatherings, organized sporting events, etc. to avoid peak mosquito hours (dusk to dawn)

Prevention Tools



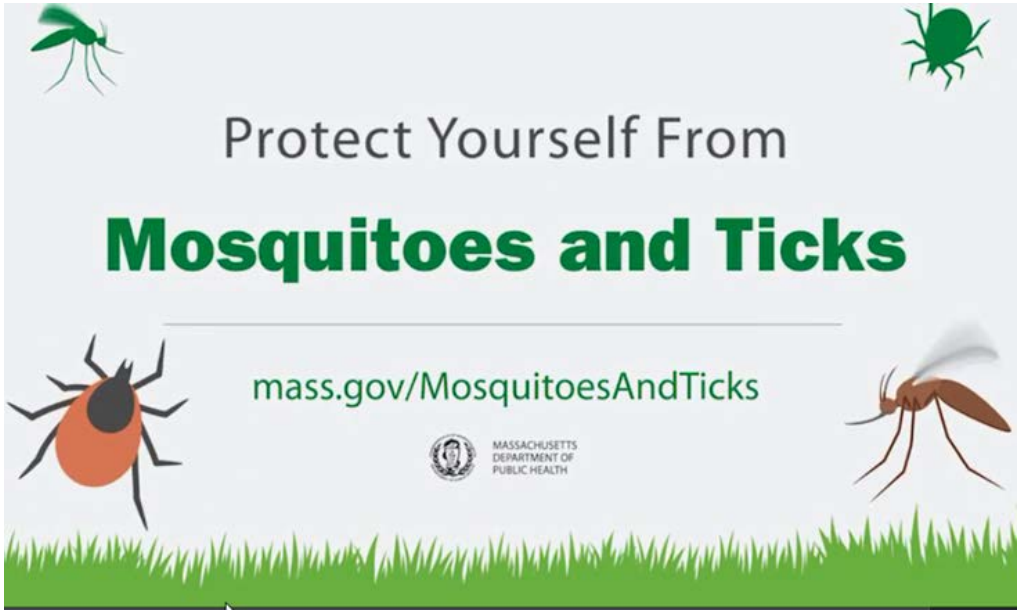
Larviciding in EEE environments has shown limited efficacy to date but the data are also limited. Given the unique level of EEE activity that occurs in MA, research is being done to investigate & seek to expand available tools.

2020 Public Communications Campaign

- Newly designated website
- Press release on summer safety: mosquito/tick safety awareness
- Video assets with Dr. Brown
- TV, paid social media and digital media
- DOT billboards, electronic signs, infographics, printed materials
- Stakeholder-specific calls, fact sheets

www.mass.gov/mosquitoesandticks

Public Communications – Sample Materials



www.mass.gov/dph/mosquito

EEE risk map

TOP

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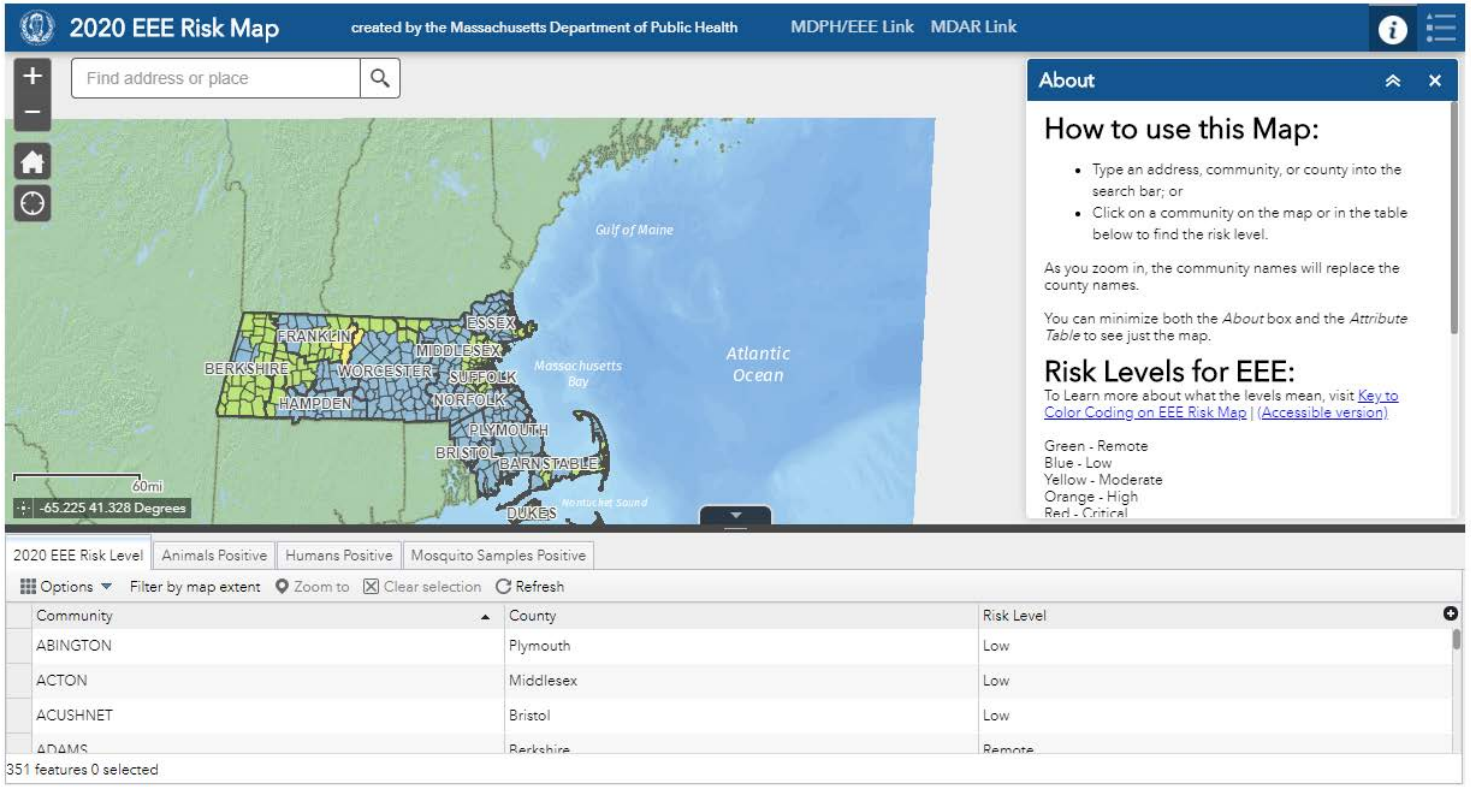
If you are on a mobile device, you can Link to the Mobile View of the EEE Risk Map.



What does your city or town's EEE risk level mean? View the Key to Color Coding on EEE Risk

Precautions

- **Apply insect repellent when outdoors.** Use a repellent with an EPA-registered ingredient (DEET, permethrin, picaridin, oil of lemon eucalyptus)
  - https://www.epa.gov/insect-repellents
  - http://npic.orst.edu/ingred/ptype/repel.html

- **Reduce exposed skin**. Wear long-sleeves, long pants and socks when outdoors.

- **Avoid peak mosquito hours**. The hours from dusk to dawn are peak biting times for many mosquitoes. Consider rescheduling outdoor activities.

- **Reduce mosquito breeding.** Dump standing water; stagnant water is used by mosquitoes to lay their eggs.

Truck-based spraying

- **Only readily available in municipalities that belong to MCDs**
- **Done in response to evidence of virus**
- **Spraying done along roads; spray can reach about 300 feet from road**
  - May be less depending on vegetations and building
- **May not address areas where EEE activity is generated (swamps)**
- **Does reduce mosquito populations and kills infected mosquitoes where people are**

Aerial spray decision making

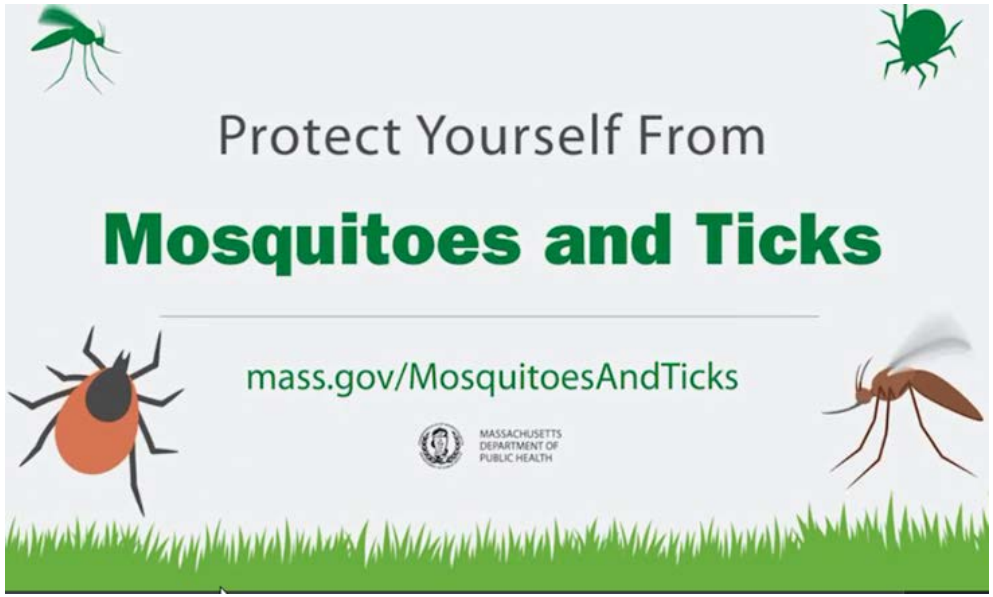
- **Mosquito abundance – how large are the populations of concern?**
- **Mosquito infection rates – how much EEE virus is in the populations?**
- **Geography – is risk widespread +/- occurring in areas where truck-based mosquito control is not available or unlikely to be effective due to habitat?**
- **Weather**
- **Time of season**

Aerial spray decision-making inputs:

- DPH – risk assessments and geographic distribution of virus
- MDAR/State Reclamation & Mosquito Control Board – pesticide regulation and subject matter expertise
- Mosquito Control Districts – field condition awareness and mosquito control expertise
- Mosquito Advisory Group – mosquito control expertise advisory group

Questions and Discussion

Thank you!



DPH Contact: catherine.brown@mass.gov