
EEE Outbreak in Connecticut: Risk Assessment and Response to a Rapidly Evolving Crisis

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Eastern Equine Encephalitis (EEE)

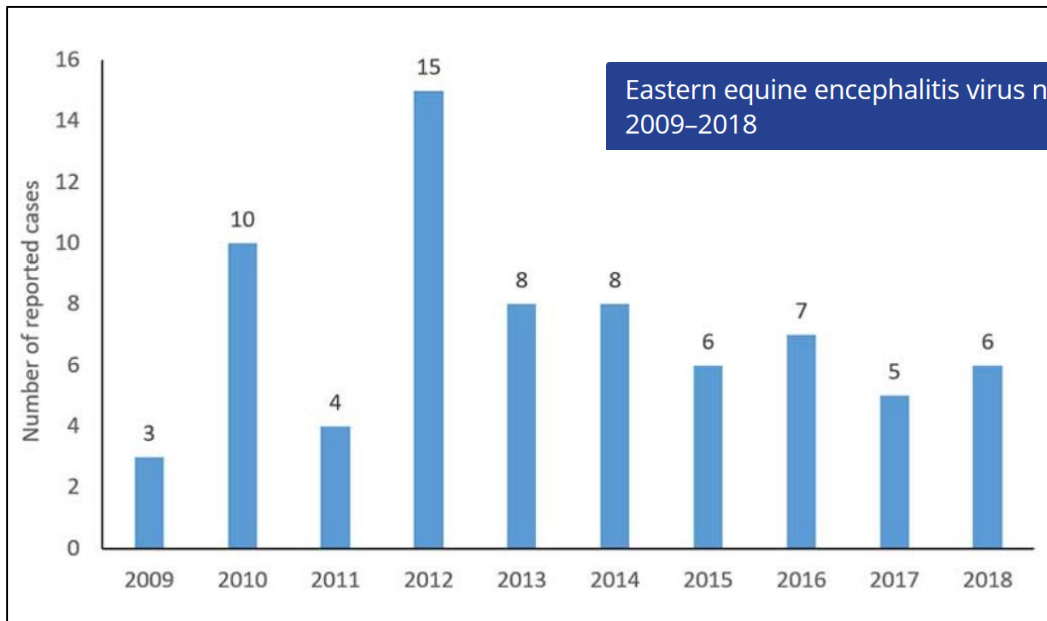
- First identified in 1938, Massachusetts
 - Sporadic outbreaks
 - Largest recorded outbreak occurred in New Jersey in 1959, with 32 lab-confirmed cases in 8 weeks
 - 1959 serosurvey in NJ - 23 'inapparent' infections to every 1 case
 - 58 human cases that year in US
 - ~5% of people infected develop severe disease
-

EEE Illness in humans

- Onset of disease - 4 to 10 days after bite from infected mosquito

Case study of 36 patients:

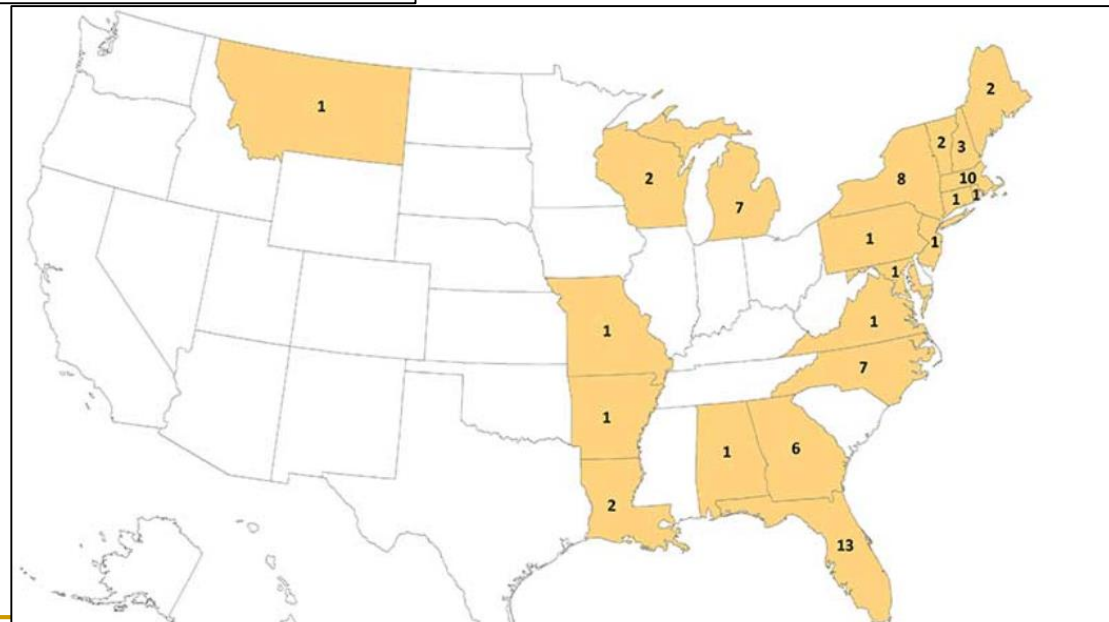
- Short prodrome ~5 days
 - Fever, headache, abdominal distress
 - Neurologic onset
 - Confusion, somnolence, focal weakness, seizures
 - One neurologic symptoms begin, decline is rapid
 - Stuperous, coma at admission or within 2 days
 - Seizures in almost ½
 - 30 - 40% mortality
-



Eastern equine encephalitis virus neuroinvasive disease cases reported by year, 2009–2018

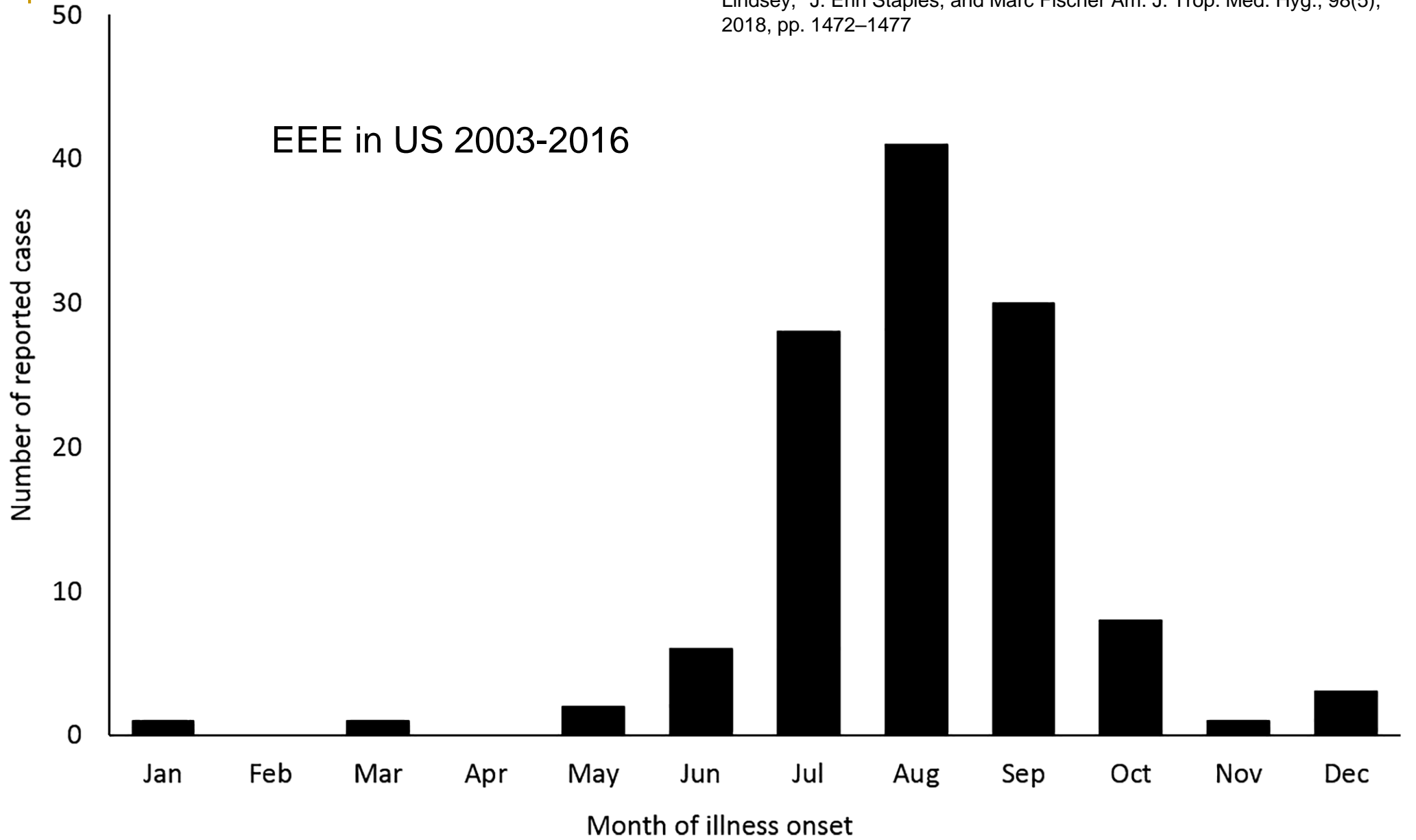
~0.03 neuroinvasive cases / million population

Source: ArboNET, Arboviral Diseases Branch, Centers for Disease Control and Prevention; <https://www.cdc.gov/easternequineencephalitis/tech/epi.html>

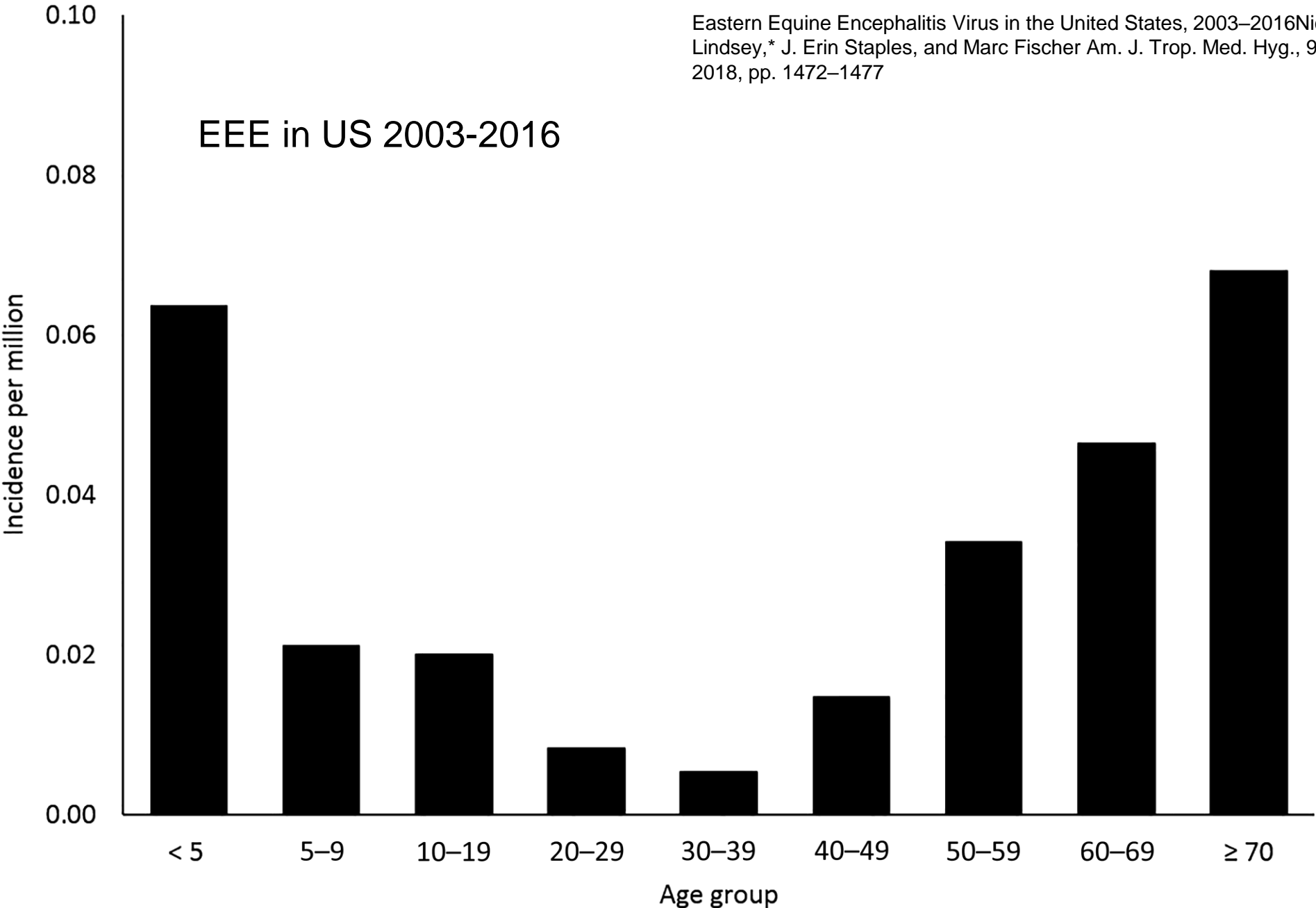


Eastern equine encephalitis virus neuroinvasive disease cases reported by state of residence, 2009–2018

EEE in US 2003-2016



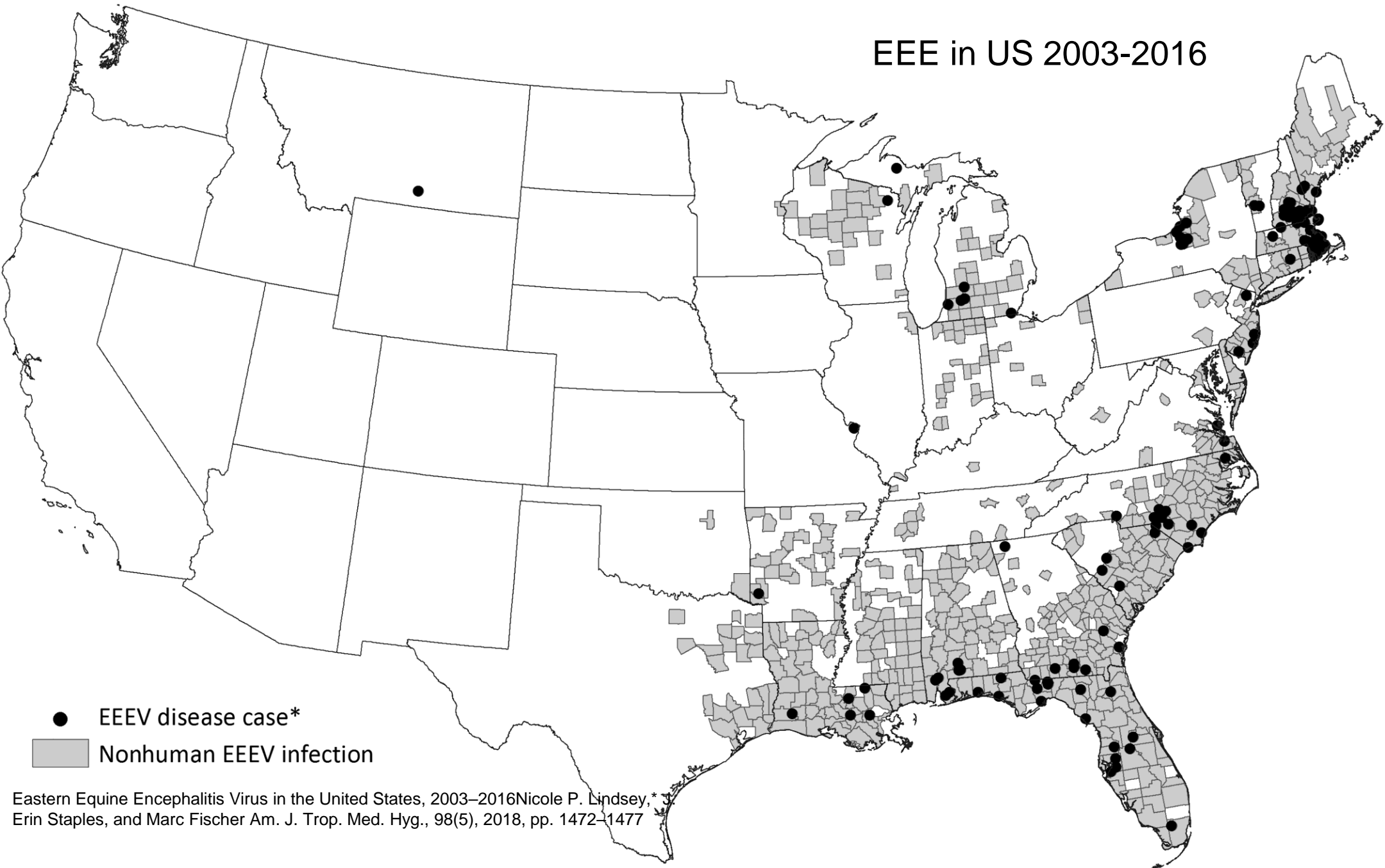
EEE in US 2003-2016



EEE in US 1999 - 2007

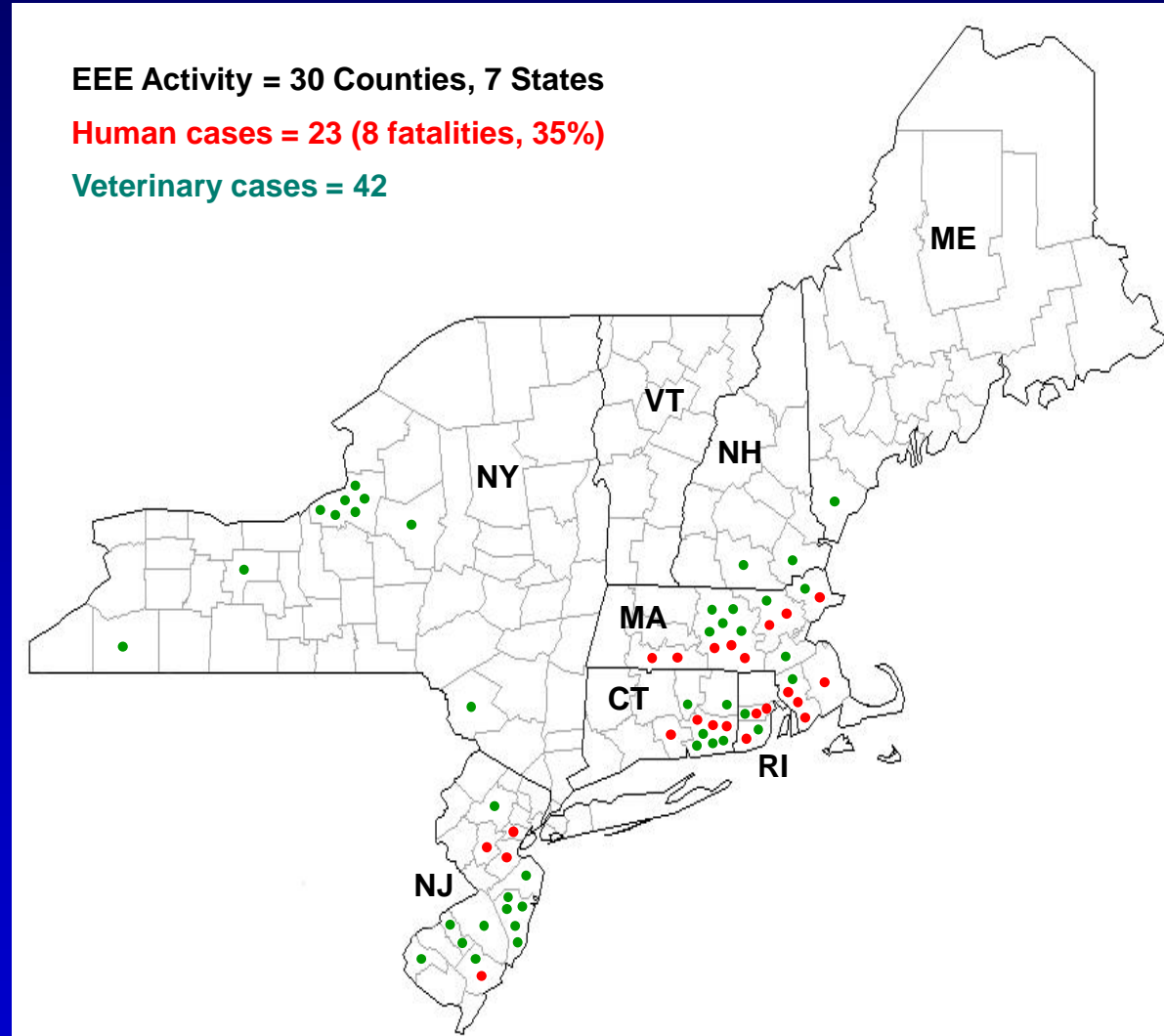
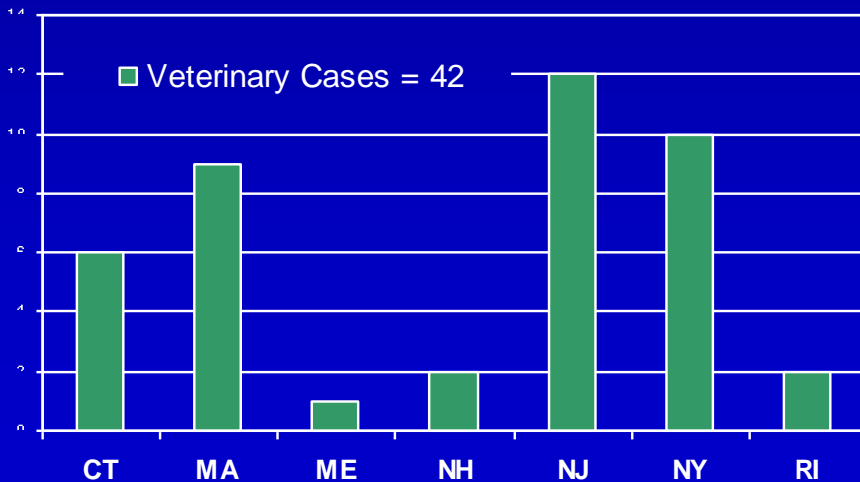
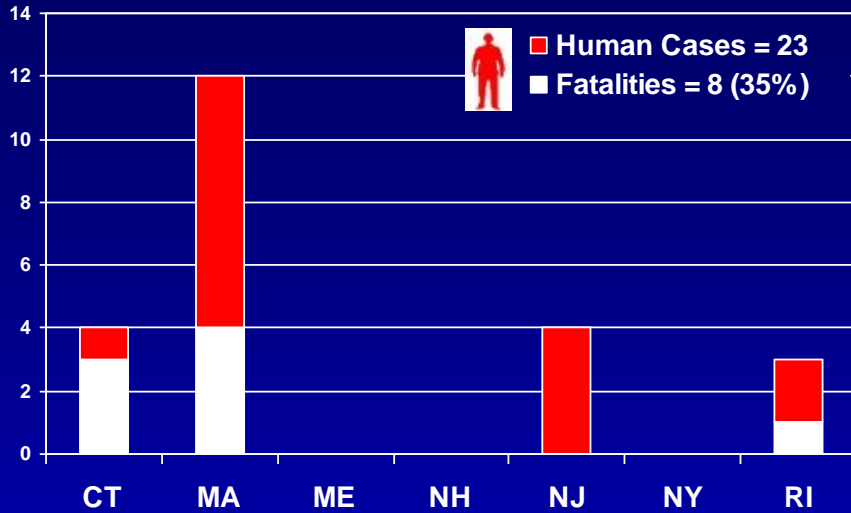


EEE in US 2003-2016



Eastern Equine Encephalitis Virus in the United States, 2003–2016
Nicole P. Lindsey,*
Erin Staples, and Marc Fischer Am. J. Trop. Med. Hyg., 98(5), 2018, pp. 1472–1477

Human and Veterinary Cases of EEE in the Northeastern US - 2019

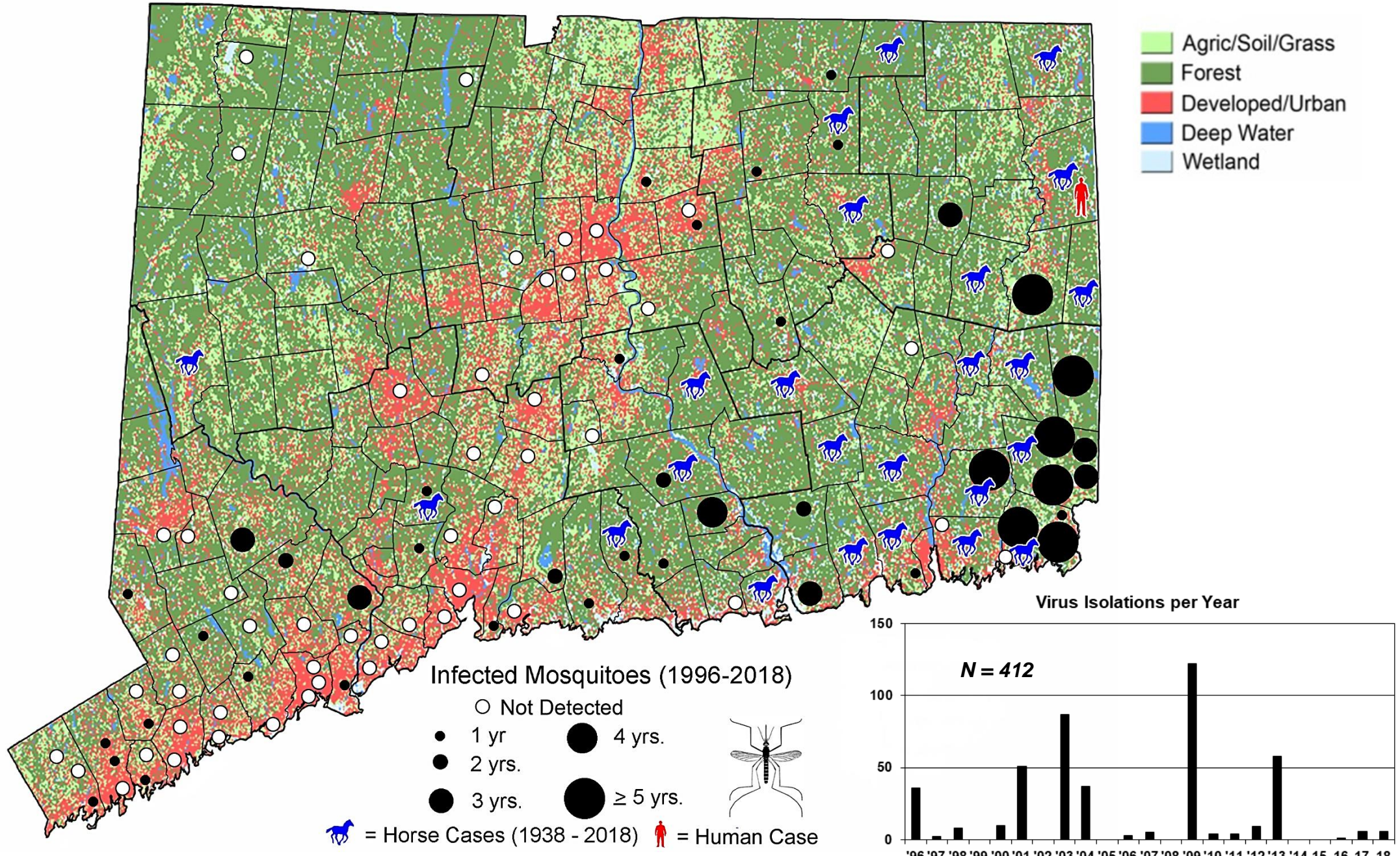


CT Mosquito Monitoring Program

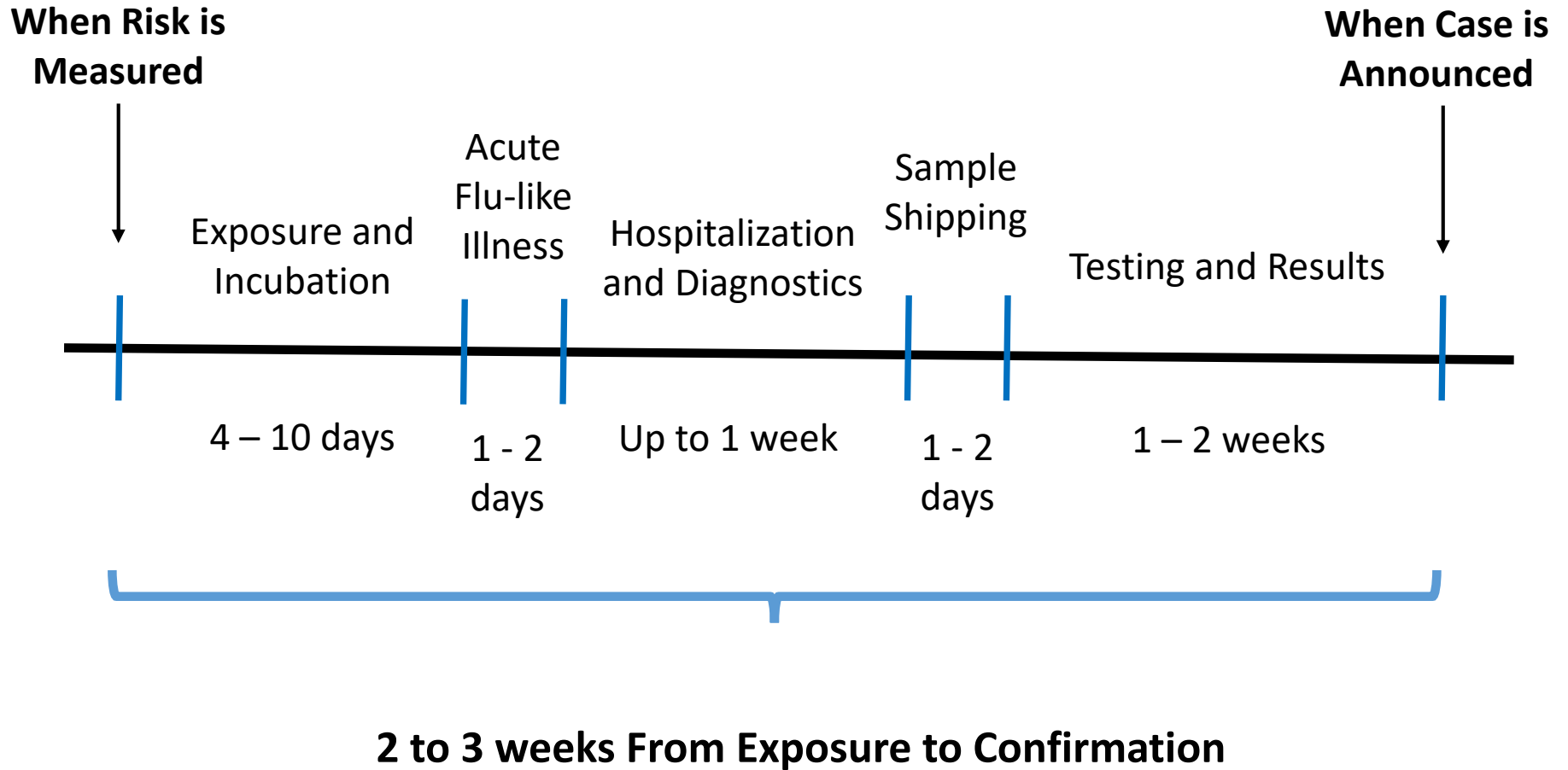
- Established in response to EEE outbreak in 1996
- Mosquito trapping June-October
- 92 trapping stations
 - Two types of mosquito traps- light and gravid traps
- Mosquitoes sorted and identified to species level
 - 50 mosquito species in CT
- Mosquitoes tested for virus infection in BSL-3 containment lab
- Information on virus-infected mosquitoes:
 - Early warning system
 - Assess risk of human infection
 - Guide mosquito control and disease prevention efforts



Eastern Equine Encephalitis Activity 1996-2018



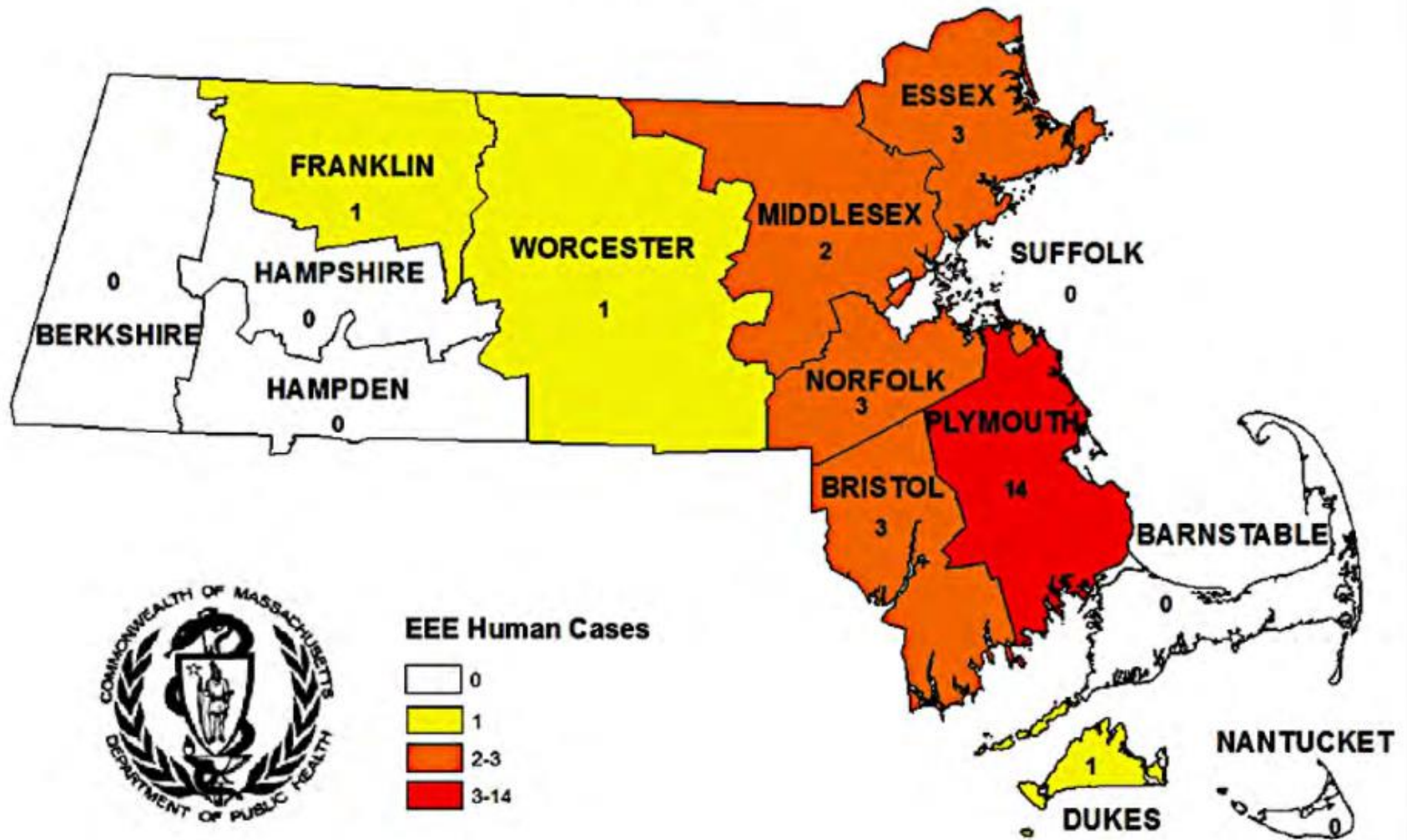
EEE Illness Timeline



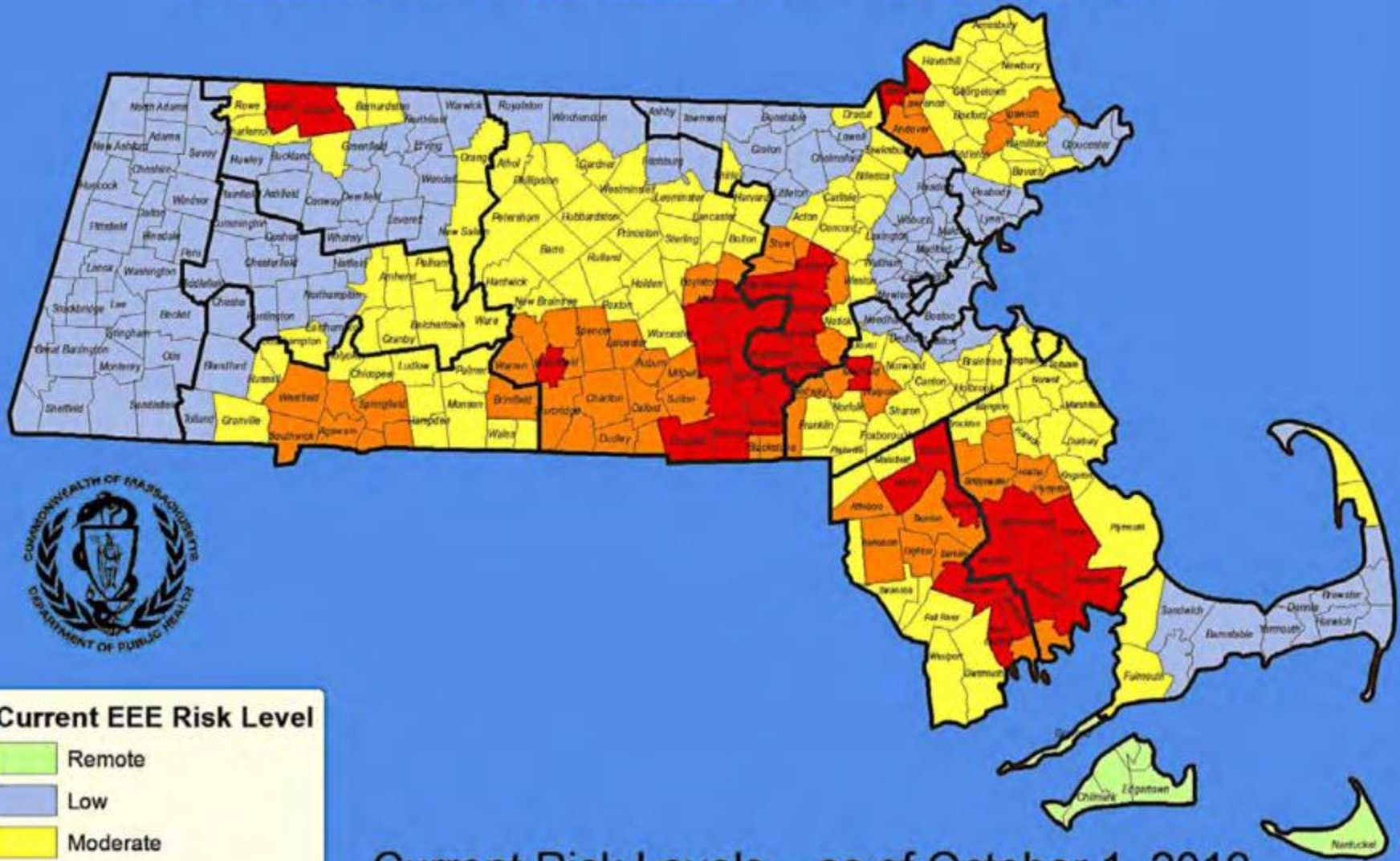
Massachusetts Eastern Equine Encephalitis Experience

| Year(s) | Human EEE Cases | Human EEE Deaths |
|-----------|--------------------------|------------------|
| 1938-39 | 35 | 25 |
| 1955-56 | 16 | 9 |
| 1973-74 | 6 | 4 |
| 1982-84 | 10 | 3 |
| 1990-92 | 4 | 1 |
| 2000-01 | 2 | 0 |
| 2004-06 | 13 | 8 |
| 2008 | 1 | 1 |
| 2010-11 | 2 (plus 2 non-residents) | 1 |
| 2012 | 7 | 3 |
| 2013 | 1 | 1 |
| 2014-2018 | 0 | 0 |
| 2019 | 12 | 3 |

Human EEE Cases in Massachusetts 2000 - 2018



Massachusetts EEE Risk Categories



Current EEE Risk Level

- Remote
- Low
- Moderate
- High
- Critical

Current Risk Levels – as of October 1, 2019

PRESS RELEASE

State Public Health Officials Announce First Human Case of EEE in the Commonwealth

Residents in high-risk areas encouraged to take precautions

FOR IMMEDIATE RELEASE:


8/10/2019

Department of Public Health


BOSTON — The Massachusetts Department of Public Health (DPH) today announced that laboratory testing confirmed the first case of Eastern Equine Encephalitis (EEE) virus infection, in a male over 60 from southern Plymouth County. This is the first human case of EEE in Massachusetts since 2013. The risk level in nine communities has been raised to critical as a result.

MEDIA CONTACT

**Ann Scales, Director of
Media Relations**

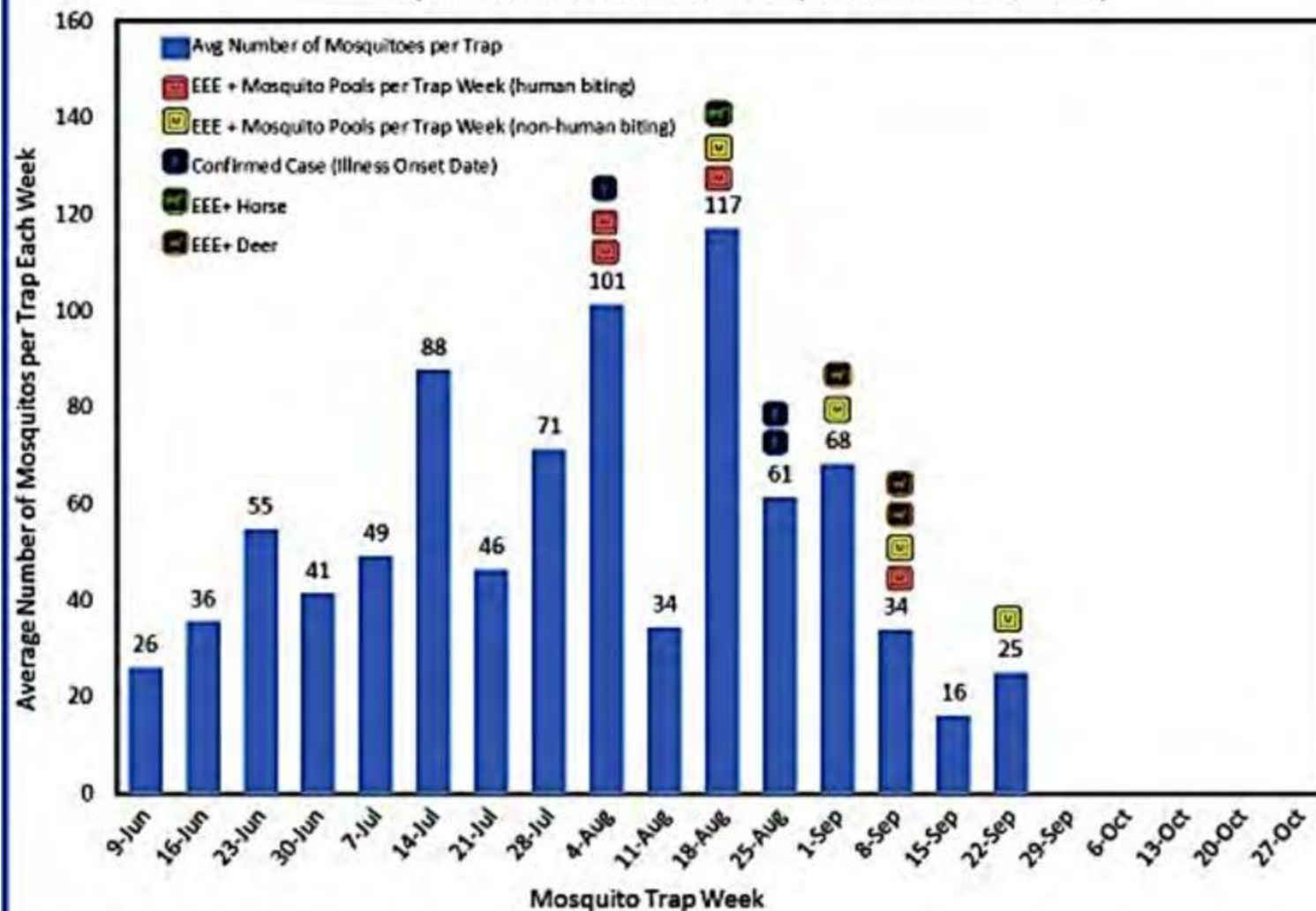
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Average Number of Mosquitoes per Trap and EEE Positive Findings by Week, Rhode Island, 2019 (as of October 4, 2019)



* Mosquito traps results from this week are not yet available

The graph above displays the average number of mosquitoes per trap per week this season, as well as weekly positive EEE findings. Human cases are displayed by the week of their illness onset.

RHODE ISLAND PRESS RELEASE, AUGUST 29, 2019

DEM CONFIRMS EEE IN A HORSE AND A THIRD MOSQUITO TRAP, BOTH IN WESTERLY

DEM and RIDOH continue to advise all Rhode Island communities to take extra precautions to prevent mosquito bites.

PROVIDENCE – The Rhode Island Department of Environmental Management (DEM) today confirmed that a horse in Westerly tested positive for Eastern Equine Encephalitis (EEE) August 24. DEM also is confirming that the third positive finding of EEE in Rhode Island in 2019 has been detected in a mosquito pool trapped at Chapman Swamp, in Westerly, on August 19. The horse, a male 6-month-old Belgian, was too young to be vaccinated for EEE.

RHODE ISLAND PRESS RELEASE, AUGUST 30, 2019

DEM RIDOH CONFIRMS FIRST HUMAN CASE OF EASTERN EQUINE ENCEPHALITIS (EEE); DEM RAMPS UP MOSQUITO TESTING AND CONTROL MEASURES

Today the Rhode Island Department of Health (RIDOH) announced the state's first human case of Eastern Equine Encephalitis (EEE) in a person over the age of 50 from West Warwick. This is the first human case of EEE in Rhode Island since 2010. The Centers for Disease Control and Prevention (CDC), which performs the EEE testing, notified RIDOH today of the positive result.

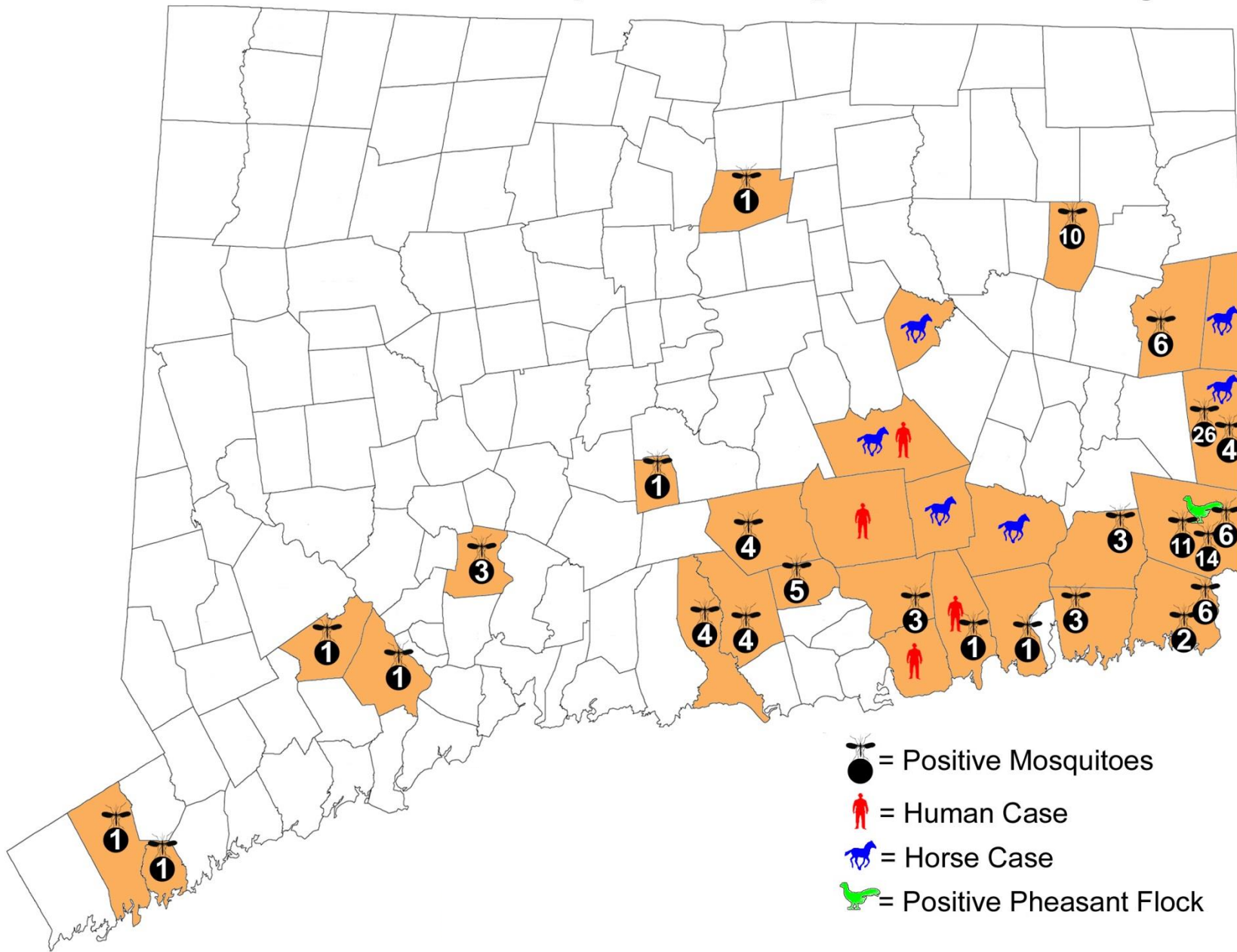
RHODE ISLAND PRESS RELEASE, SEPTEMBER 17, 2019

TWO ADDITIONAL HUMAN EEE CASES DIAGNOSED IN RHODE ISLAND

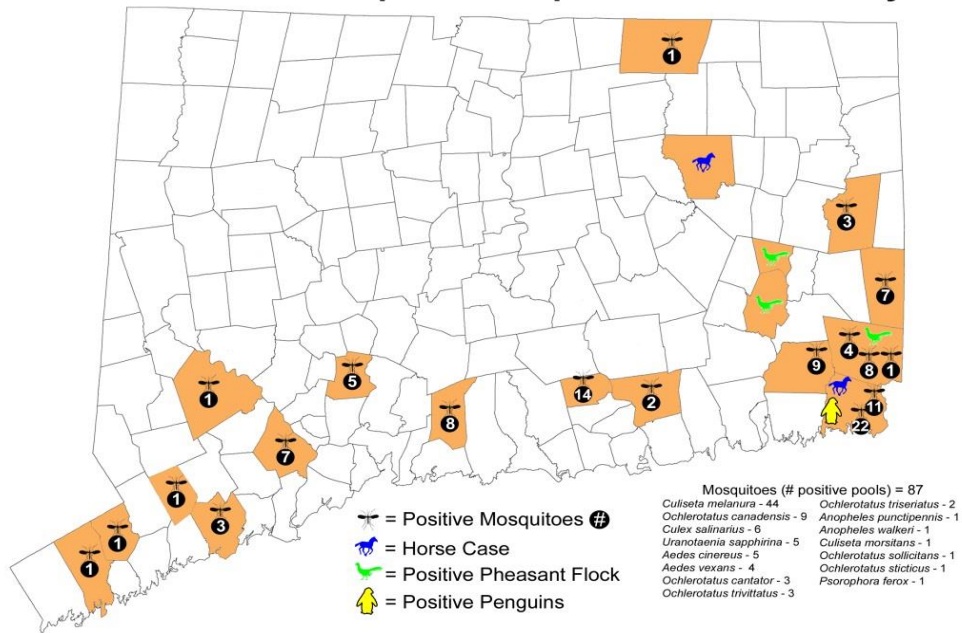
The two people whose diagnoses are being announced today have both been discharged from the hospital and are recovering. Based on the time of symptom onset, it is believed that both people contracted EEE in late August. The first person is a child younger than 10 years old who lives in Coventry. The second person is in their 50s from Charlestown.

All three people contracted the illness before areas of critical risk for EEE were aerially sprayed with pesticide between September 8th and September 10th.

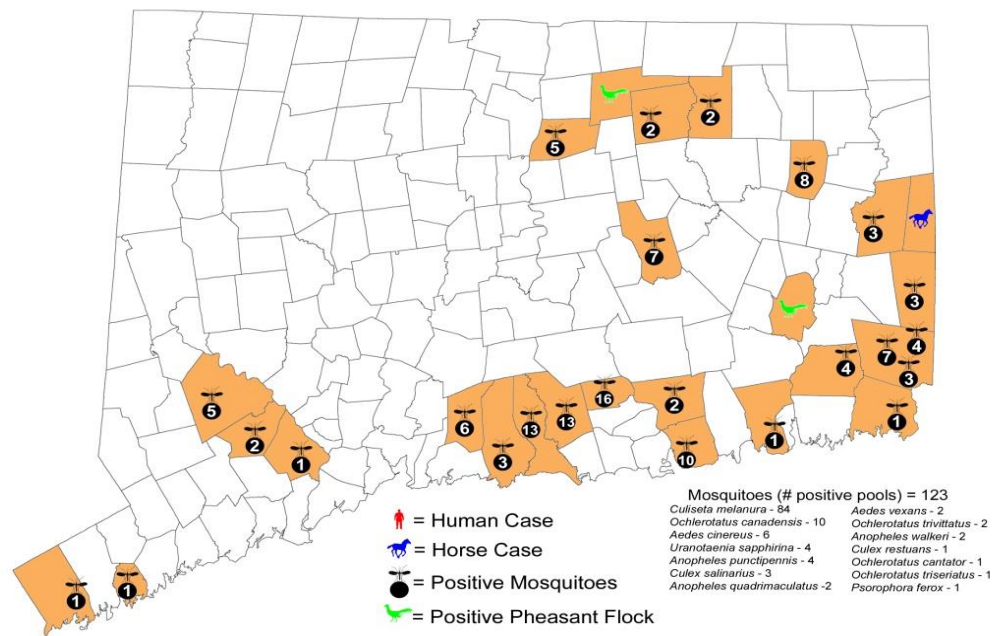
2019 Eastern Equine Encephalitis Activity



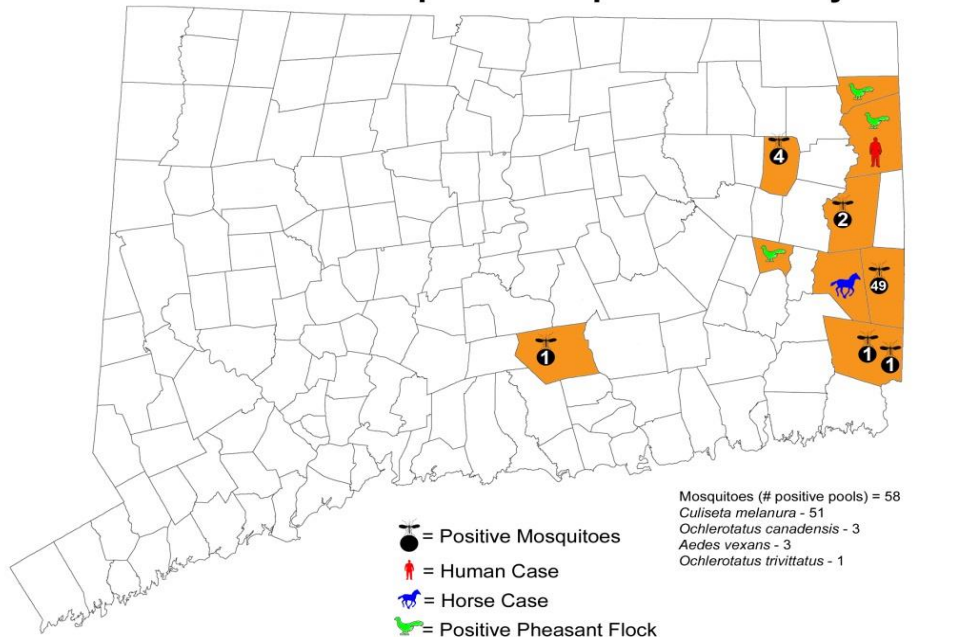
2003 Eastern Equine Encephalitis Virus Activity



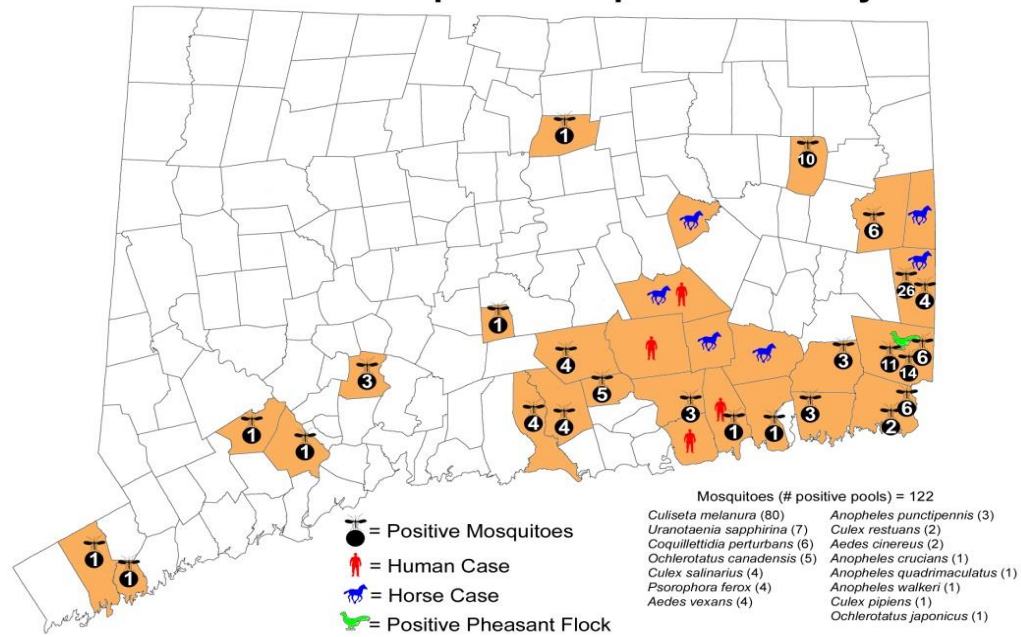
2009 Eastern Equine Encephalitis Activity



2013 Eastern Equine Encephalitis Activity



2019 Eastern Equine Encephalitis Activity



Press Releases

09/16/2019

DPH Announces First Human Case of Eastern Equine Encephalitis Identified In Connecticut This Season

Residents are Advised to Protect Themselves and Their Children by Avoiding Outdoor Activity from Dusk to Dawn, When Mosquitoes are Most Active

Department of Public Health (DPH) Commissioner Renée D. Coleman-Mitchell today is announcing that an adult resident of the town of East Lyme has tested positive for Eastern Equine Encephalitis (EEE). This is the first human case of EEE identified in Connecticut this season. The patient became ill during the last week of August with encephalitis and remains hospitalized. Laboratory tests, which were completed today at the Centers for Disease Control and Prevention (CDC) Laboratory in Ft. Collins, Colorado, confirmed the presence of antibodies to the virus that causes EEE.

DPH ANNOUNCES DEATH OF THE THIRD PERSON DIAGNOSED WITH EASTERN EQUINE ENCEPHALITIS (EEE) THIS YEAR AND THE DIAGNOSIS OF EEE IN A FOURTH PERSON WHO REMAINS HOSPITALIZED AFTER FIVE WEEKS -- 10/01/2019

Department of Public Health (DPH) State Epidemiologist Dr. Matthew Cartter today is announcing that an East Haddam resident who died during the third week of September was confirmed today to have had Eastern Equine Encephalitis (EEE) by the Centers for Disease Control and Prevention (CDC). This person, who is between 60 and 69 years of age, became ill during the second week of September 2019.

The Department also learned today that the CDC has confirmed EEE to be the cause of illness for a resident of Colchester who became ill during the third week of August and who remains hospitalized. This person is between 40 and 49 years of age.

2019 Eastern Equine Encephalitis Activity per Week

■ Non-mammalian biter (n=90)



= Human Case* (n=4)



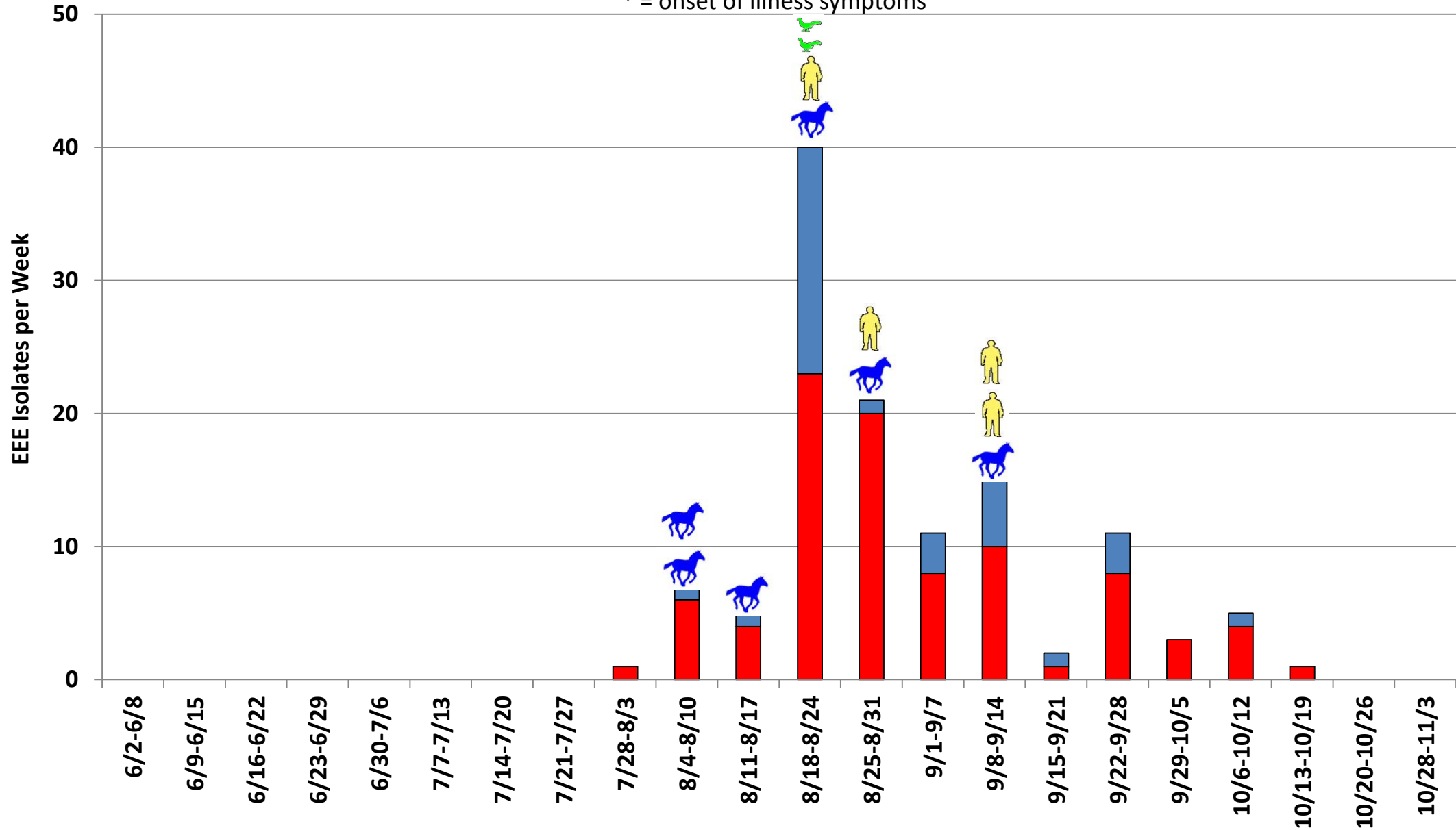
= Horse Case* (n=6)



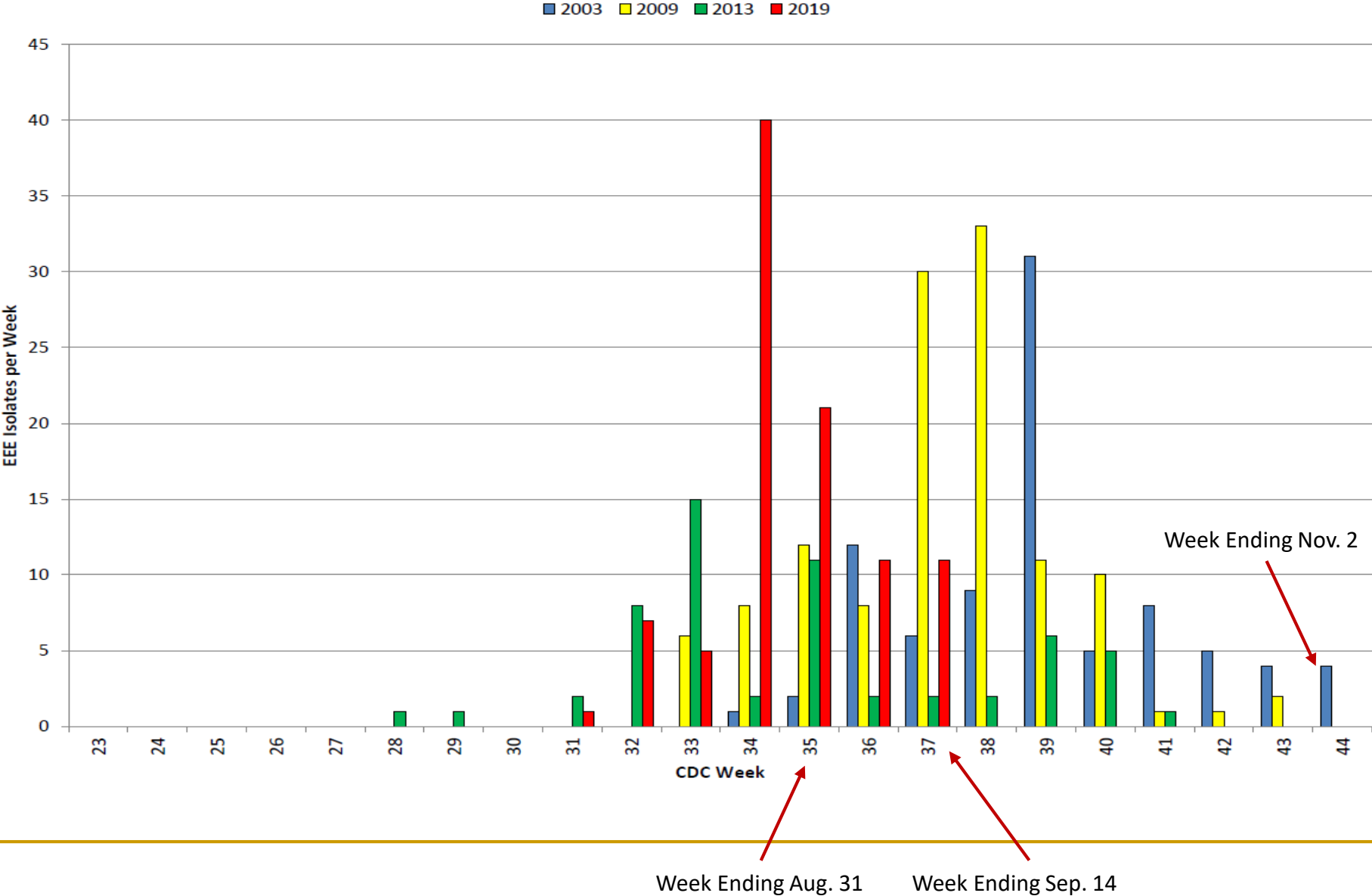
= Pheasant or Partridge* (n=2)

■ Mammalian biter (n=32)

* = onset of illness symptoms

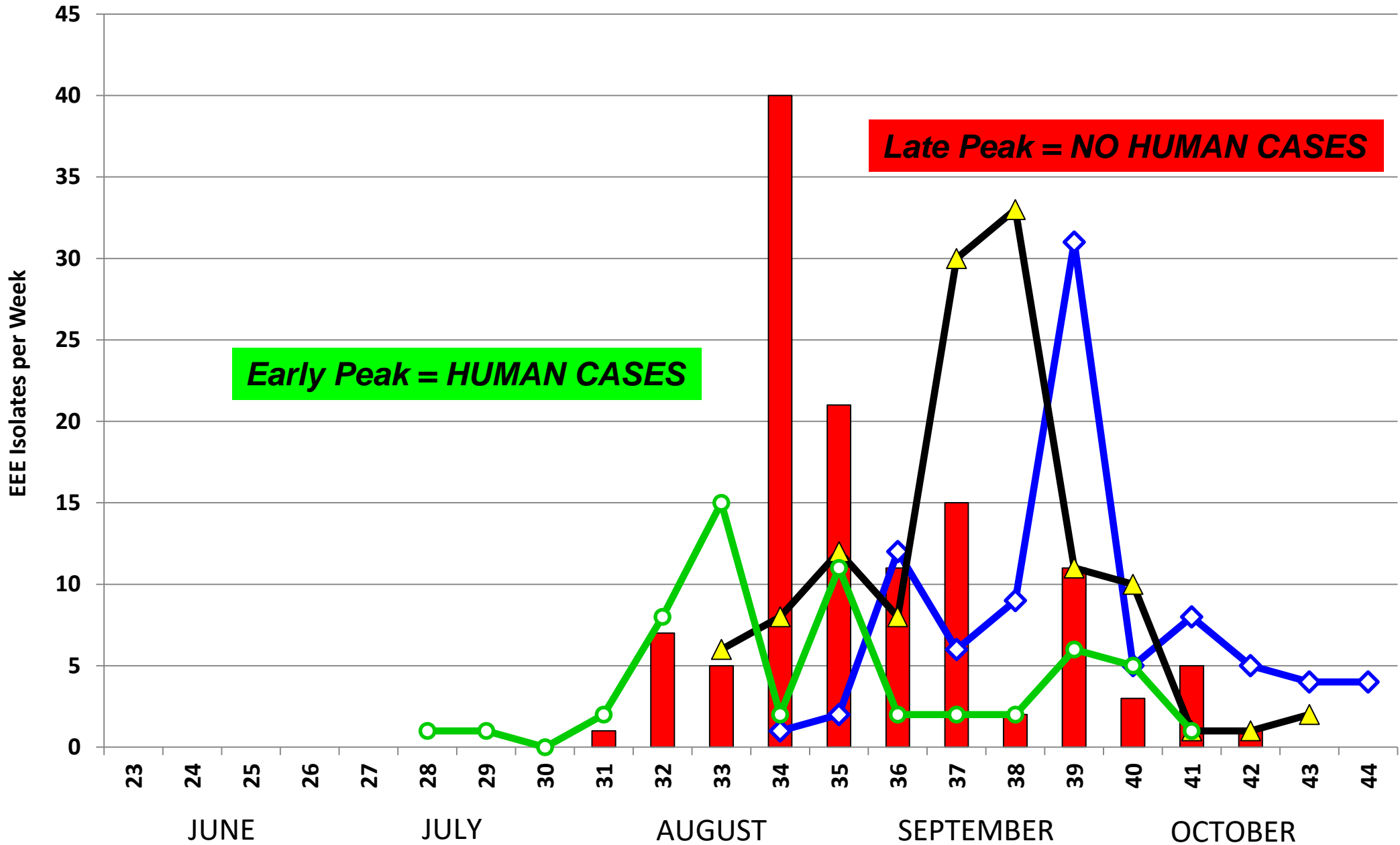


Eastern Equine Encephalitis Isolates per Week



EEE Virus Detection in Mosquitoes per Week

2019 2003 2009 2013



Laboratory Findings of 4 Patients Hospitalized with EEE Infection

| Case | Date Illness onset | Sample Day, Type | Commercial Lab | | CDC | | Outcome (day) |
|------|--------------------------|------------------------|-------------------------------|-------------------------------|---------------------|--------------------------|--------------------|
| | | | EEE IgM (IFA) ^a | EEE IgG (IFA) ^b | EEE IgM (MIA) | EEE PRNT ^c | |
| 1 | 29-Aug | 3, CSF | Negative | Negative | Positive | 1:04 | Death (22) |
| | | 3, serum | Negative | Negative | ND | ND | |
| 2 | 12-Sep | 4, CSF | Negative | Negative | Positive | 1:32 | Death (10) |
| 3 | 12-Sep | 5, CSF | Negative | Negative | Positive | 1:16 | Death (8) |
| | | 7, serum | Negative | Positive 1:16 | Positive (day 6) | ND | |
| 4 | 21-Aug | 10, CSF | Negative | Negative | Positive | ND | Severe sequelae |
| | | 22, CSF | ND | ND | Positive | 1:4096 ^f | |

EEE Response: Communication and Public Messaging

1. Local health districts notified when EEE positive mosquitoes or when human or equine cases are identified
2. Weekly conference calls with local health directors and elected officials
3. Website on surveillance findings
4. Press releases issued and interviews to update and inform the public and municipal leaders.
5. Warning signs posted along interstate highways



EEE Response: Interventions

1. Truck-mounted spraying at Pachaug State Forest in response to mosquito findings
2. Shut down overnight camping in state parks in high risk areas
3. Local municipalities/schools rescheduled or cancelled outdoor events during periods of peak risk (dusk-dawn)
4. Municipalities sprayed limited areas or for special events
5. Aerial applications of insecticides considered if a confirmed human case and high levels of EEE infection in mosquitoes
 - First human case diagnosed in 16th September
 - By then, mosquito populations were already in decline
6. Pre-season treatment with larvicides not considered
 - Difficult to effectively target mosquito larvae in forested swamp habitats



EEE Response: Communication Challenges

1. Cases identified after highest risk period

- First human case diagnosed in 16th September
- By then, mosquito populations were already in decline

2. Highway signs

3. Dusk and Dawn

4. First Frost

Acknowledgements

The Connecticut Agricultural Experiment Station

Mosquito Collection and Identification

John Shepard
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Virus Isolation and Identification (BSL-3)

Angela Bransfield
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Station Director

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Seasonal Staff

| | |
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Local Health Departments

CT Department of Public Health

Dr. Matthew Cartter
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Brenda Esponda-Morrison

CT Dept. of Energy & Environmental Protection

Roger Wolfe
Steve Rosa

CT Department of Agriculture

Dr. Mary Jane Lis

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HM3 Hunter Baughman
HM1 James Limer



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