



Commonwealth of Massachusetts  
Department of Public Health

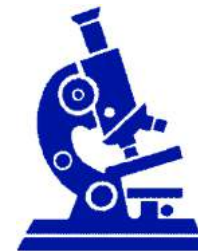
Helping People Lead Healthy Lives In Healthy Communities

## Update: Tick-borne Disease Surveillance in Massachusetts



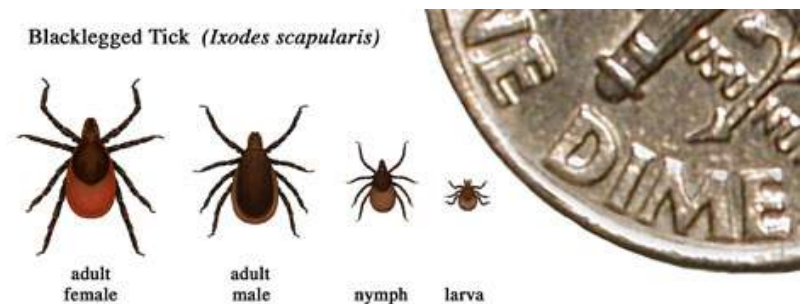
William A. Hinton State Laboratory Institute

**Catherine M. Brown, DVM, MSc, MPH**  
Deputy State Epidemiologist and  
State Public Health Veterinarian  
Department of Public Health  
Bureau of Infectious Disease

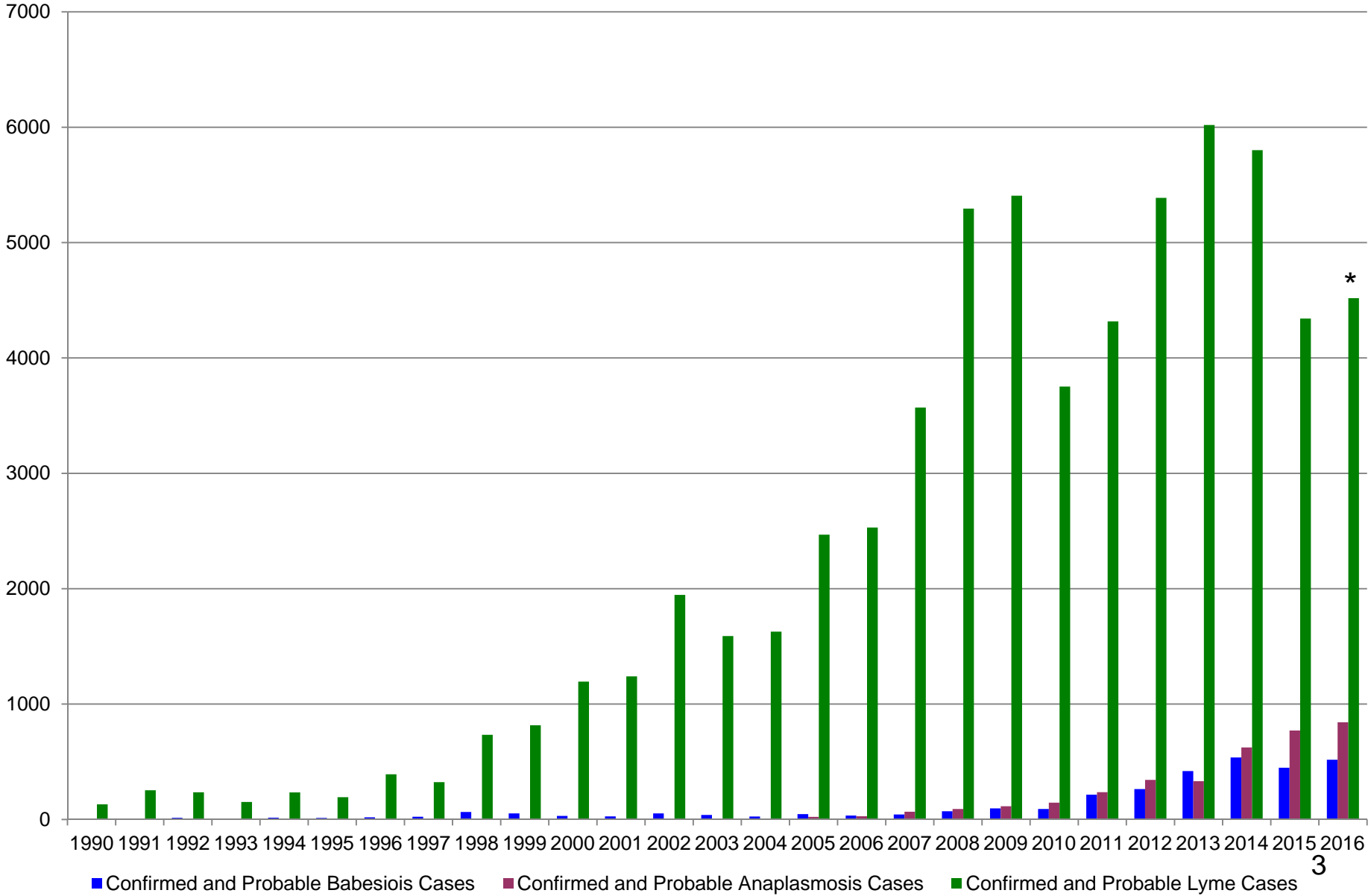


# Tick-borne Diseases Transmitted by *Ixodes scapularis*

- Lyme Disease (*Borrelia burgdorferi*)
  - Early and late manifestations, persistent symptoms in some
- Babesiosis (*Babesia microti*)
  - Red blood cell parasite: fever, chills, anemia
- Anaplasmosis (*Anaplasma phagocytophilum*)
  - Bacteria that invades white blood cells: fever, headache, muscle aches, chills, sweating, nausea, and vomiting
- *Borrelia miyamotoi*
  - Newly recognized bacteria as a human pathogen, relapsing fever
- Powassan/Deer Tick Virus
  - Flavivirus related to WNV

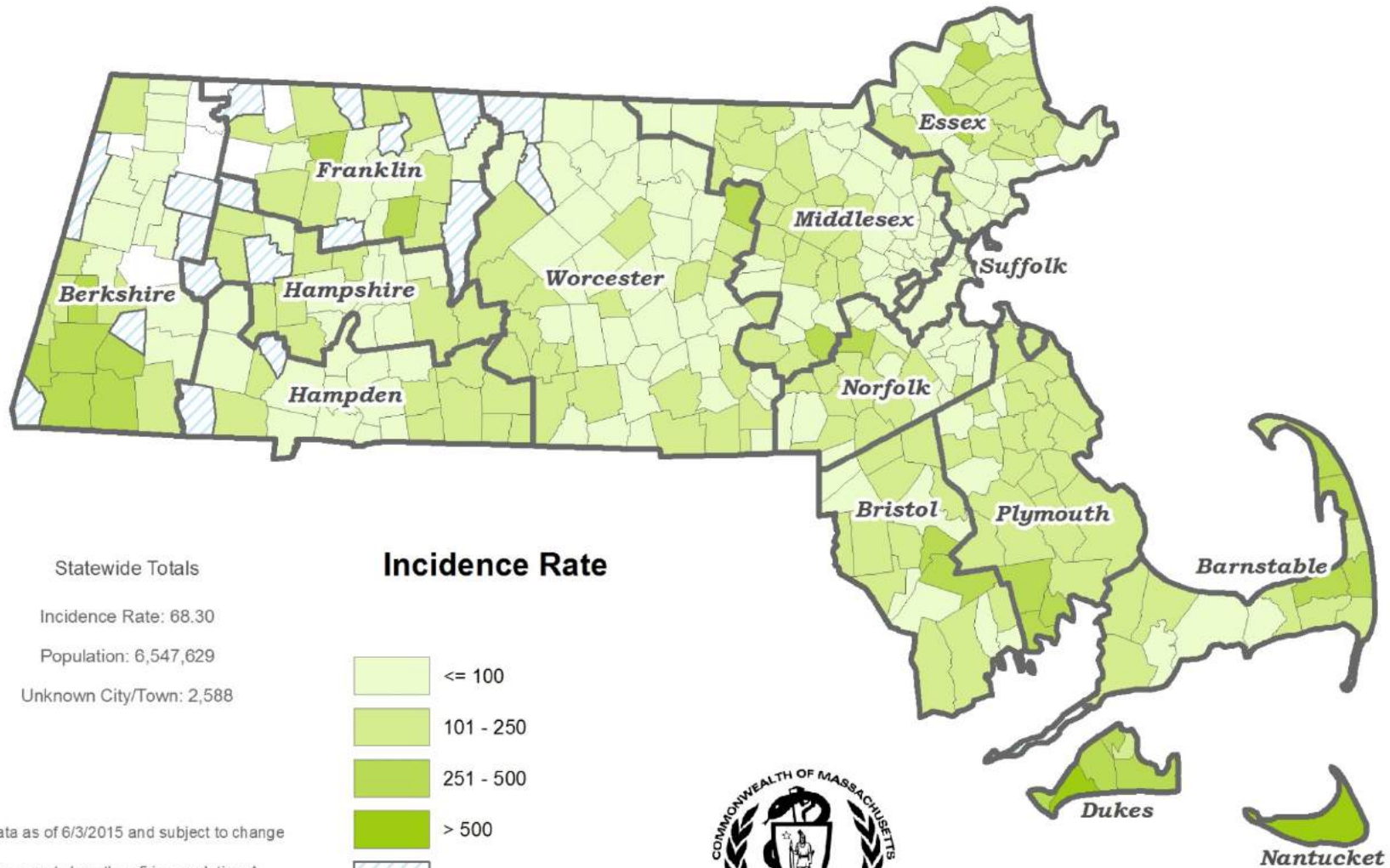


# Confirmed and Probable Cases of Lyme Disease, Anaplasmosis and Babesiosis by Year, Reported to MDPH



3

## Incidence Rates (per 100,000 population<sup>^</sup>) for Confirmed and Probable Lyme Disease in Massachusetts 2010-2014\*



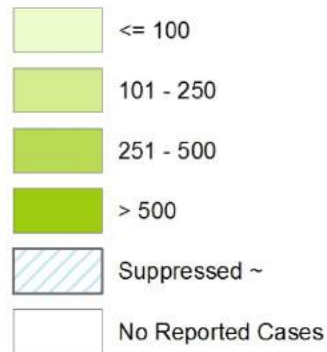
### Statewide Totals

Incidence Rate: 68.30

Population: 6,547,629

Unknown City/Town: 2,588

### Incidence Rate



\* Data as of 6/3/2015 and subject to change

~ Case counts less than 5 in populations<sup>^</sup> less than 50,000 are suppressed to maintain patient confidentiality.

<sup>^</sup> Population based on 2010 Census data.

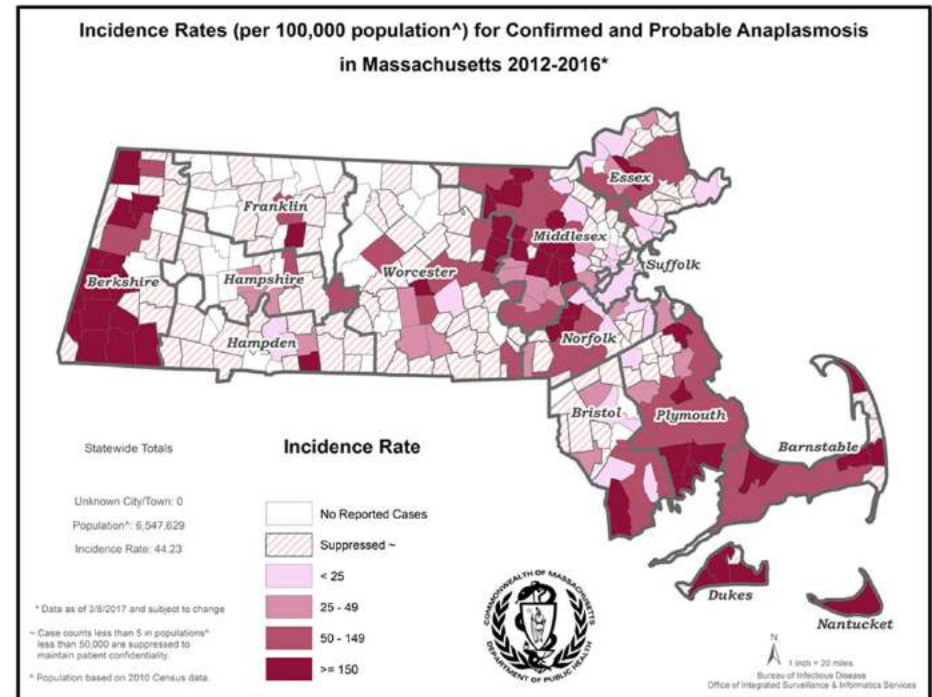
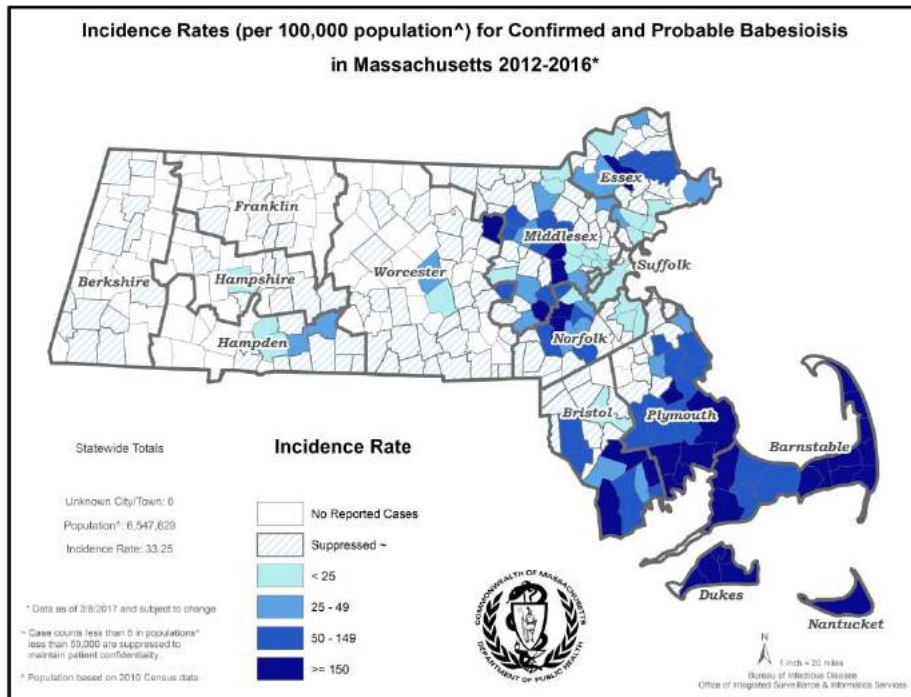


1 inch = 20 miles

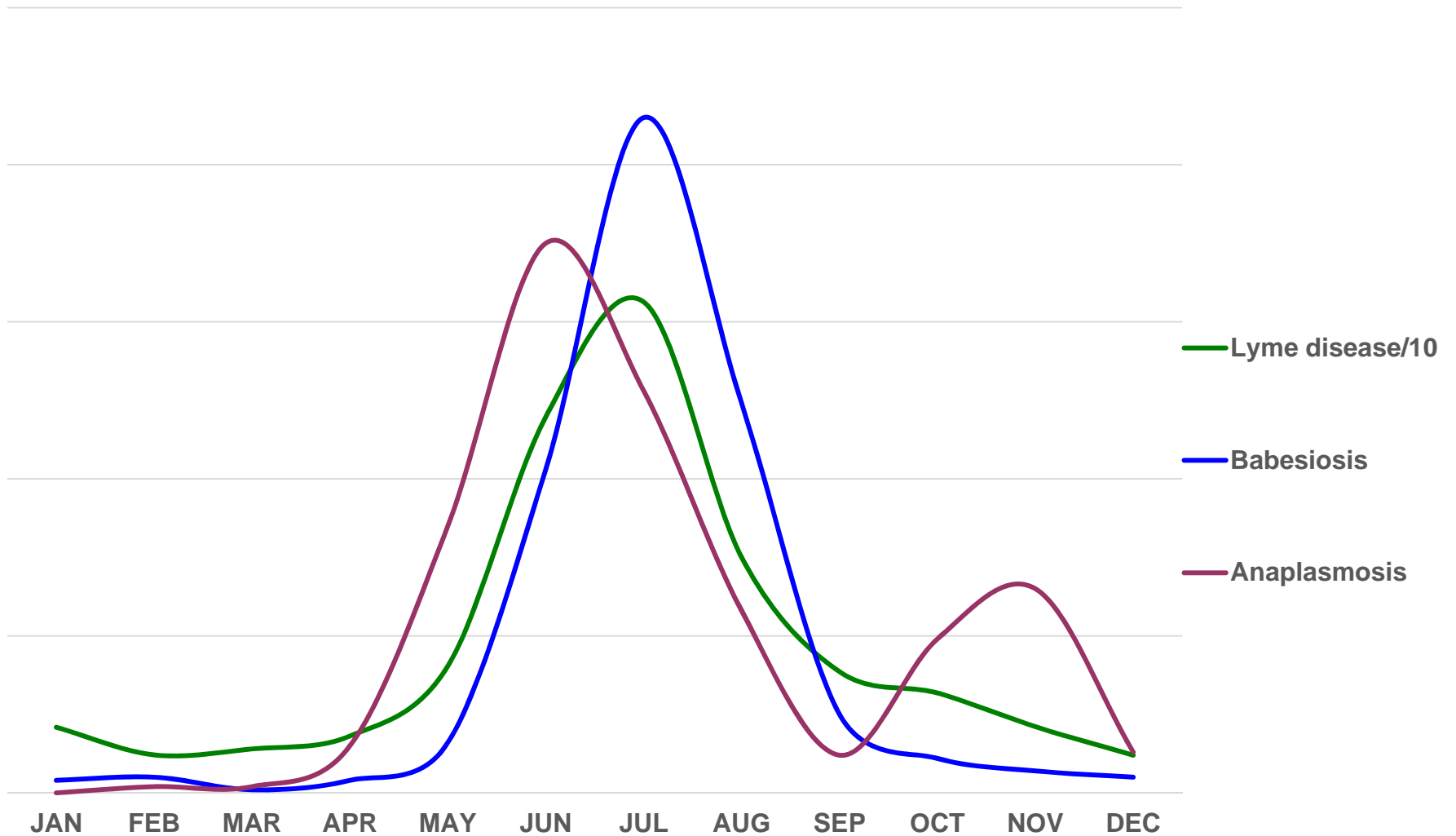
Bureau of Infectious Disease  
Office of Integrated Surveillance & Informatics Services



# Incidence Rates for Babesiosis and Anaplasmosis MA 2012-2016



# Reported Cases of Lyme Disease (divided by 10), Babesiosis and Anaplasmosis, by Month, MA

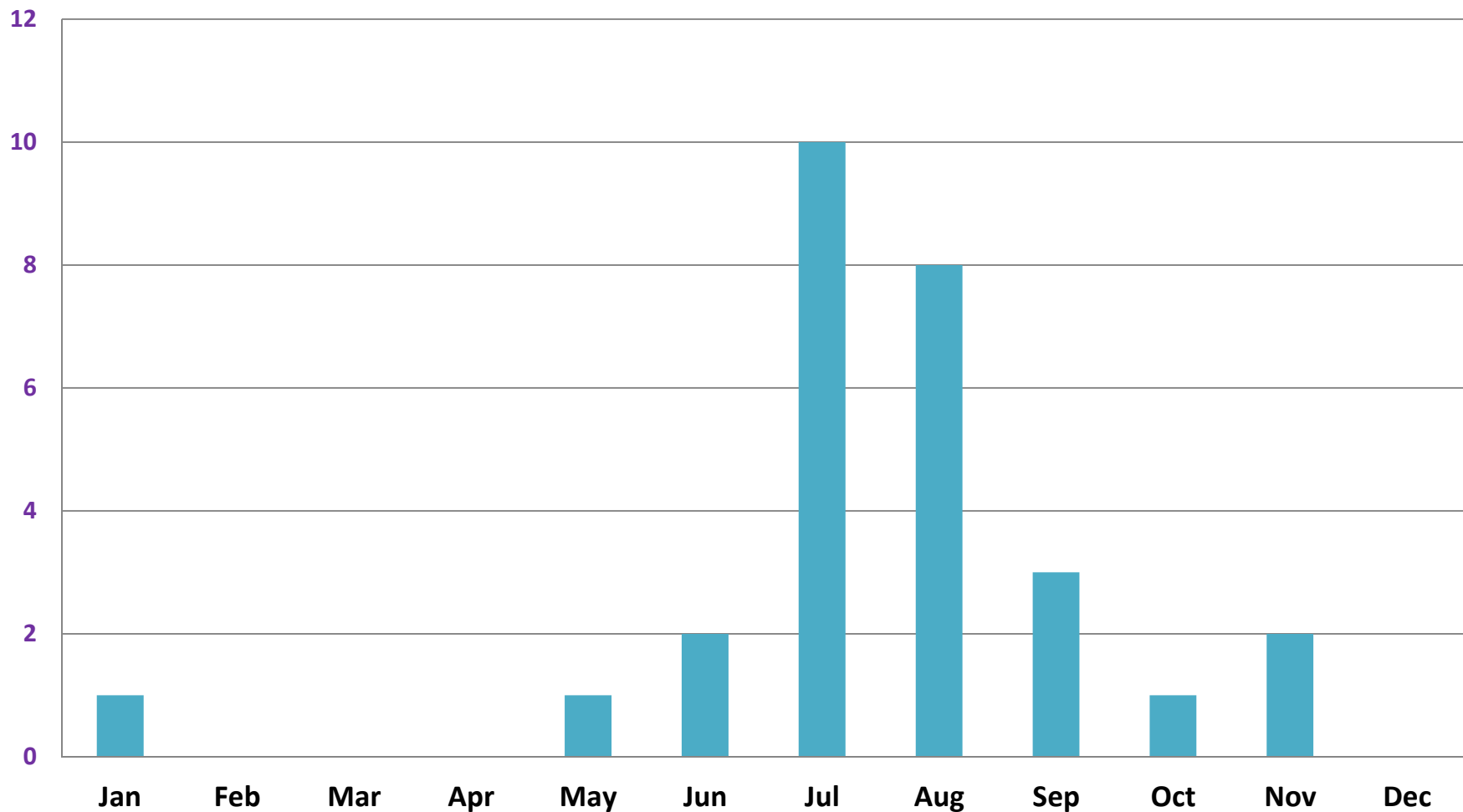


# *Borrelia miyamotoi*

- species of spiral-shaped bacteria that is closely related to the one that causes tick-borne relapsing fever (TBRF)
- distantly related to the bacterium that causes Lyme disease
- first identified in 1995 in ticks from Japan
- detected in the black-legged or “deer” tick (*Ixodes scapularis*)
- fever, chills, and headache, body and joint pain and fatigue; rash reported less commonly than with Lyme
- responds to doxycycline
- knowledge evolving – likely incomplete reporting

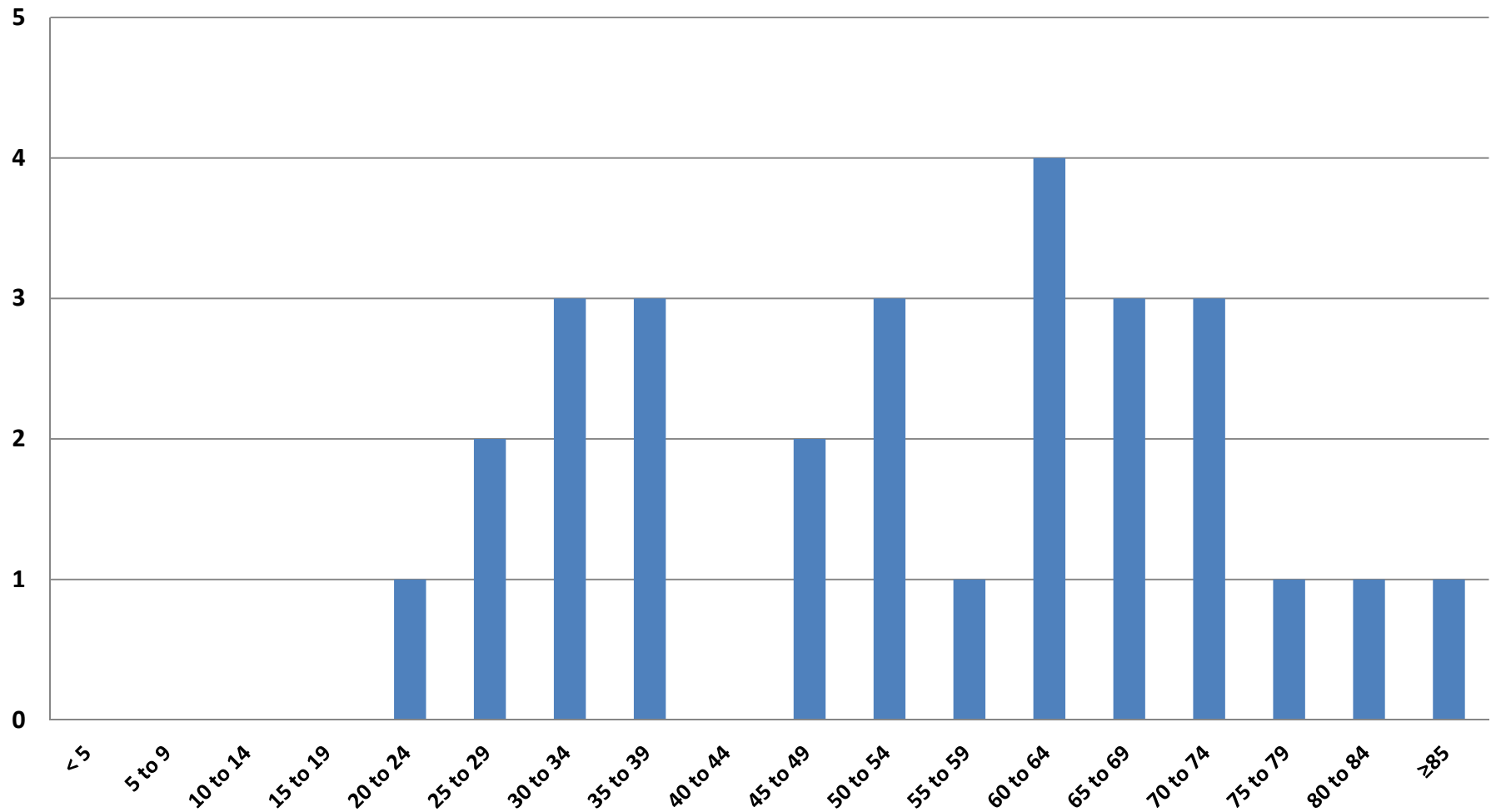
# Confirmed and Probable Cases *B. miyamoto* by Month of Onset Massachusetts, 2014-2016

■ Confirmed and Probable





# Reported Confirmed and Probable *B. miyamotoi* Infection Cases by Age Group in Years, Massachusetts, 2014-16

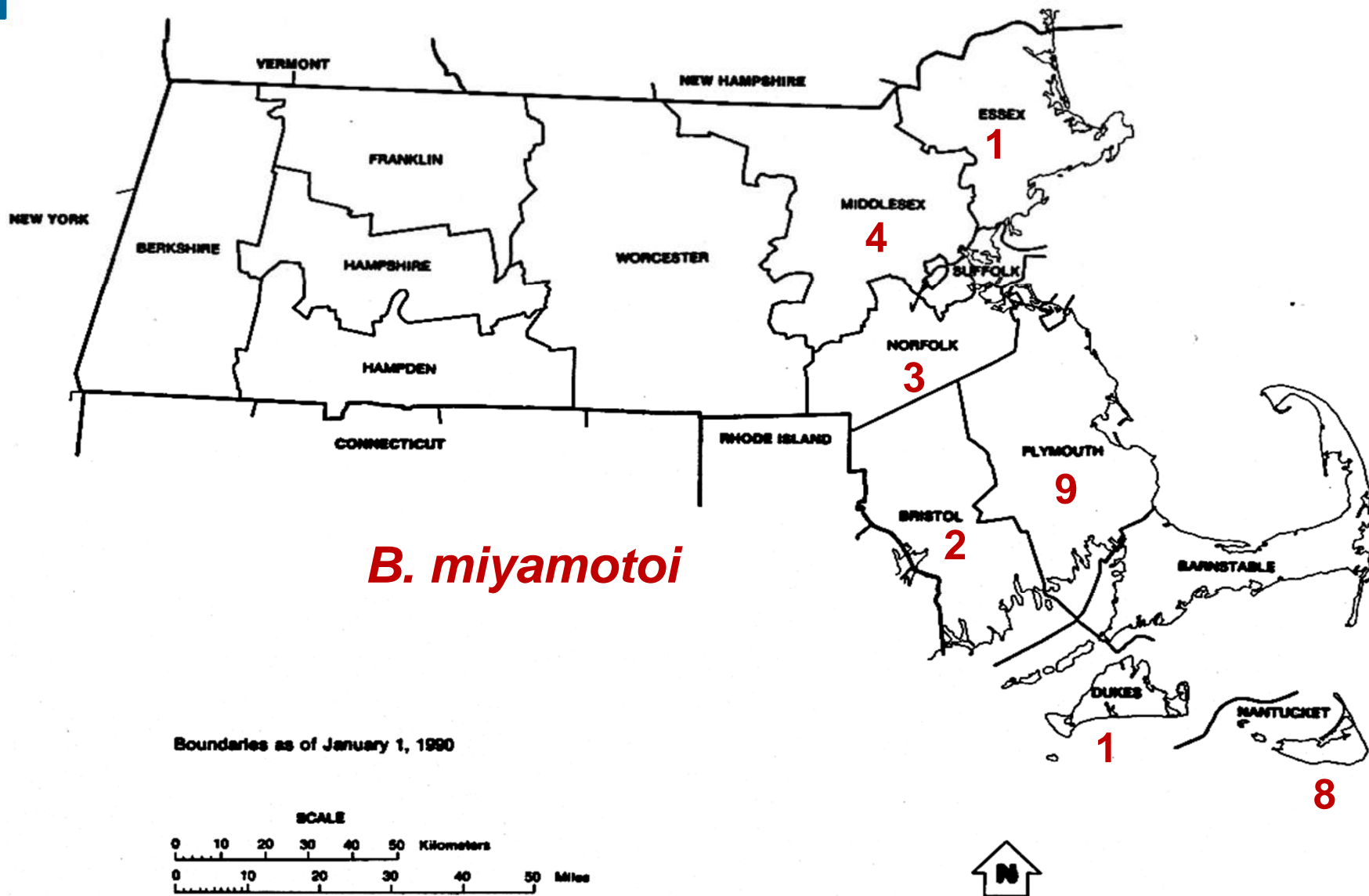


<b>SIGN/SYMPTOM</b>	<b>Number of MA Reports</b>	<b>MA % (n=28)</b>	<b>Published % (n=51)</b>
<b>FEVER</b>	<b>26</b>	<b>93%</b>	<b>96%</b>
<b>HEADACHE</b>	<b>26</b>	<b>93%</b>	<b>96%</b>
<b>FATIGUE</b>	<b>23</b>	<b>82%</b>	<b>82%</b>
<b>MYALGIA</b>	<b>19</b>	<b>68%</b>	<b>84%</b>
<b>SWEATS</b>	<b>18</b>	<b>64%</b>	
<b>CHILLS</b>	<b>17</b>	<b>61%</b>	
<b>ARTHRALGIA</b>	<b>17</b>	<b>61%</b>	<b>76%</b>
<b>RASH</b>	<b>10</b>	<b>36%</b>	<b>8%</b>
<b>NECK PAIN</b>	<b>9</b>	<b>32%</b>	
<b>ANEMIA</b>	<b>2</b>	<b>7%</b>	
<b>THROMBOCYTOPENIA</b>	<b>2</b>	<b>7%</b>	<b>60%</b>
<b>ELEVATED LFTs</b>	<b>2</b>	<b>7%</b>	<b>82%</b>
<b>ABDOMINAL PAIN/NAUSEA</b>	<b>2</b>	<b>7%</b>	<b>6%</b>
<b>SYNCOPE</b>	<b>2</b>	<b>7%</b>	<b>6%</b>
<b>ENCEPHALITIS</b>	<b>1</b>	<b>4%</b>	<b>8%</b>

Hospitalized: MA = 2% Published = 24%

*Ann Intern Med.* 2015;163:91-98. doi:10.7326/M15-0333

# Cases by County

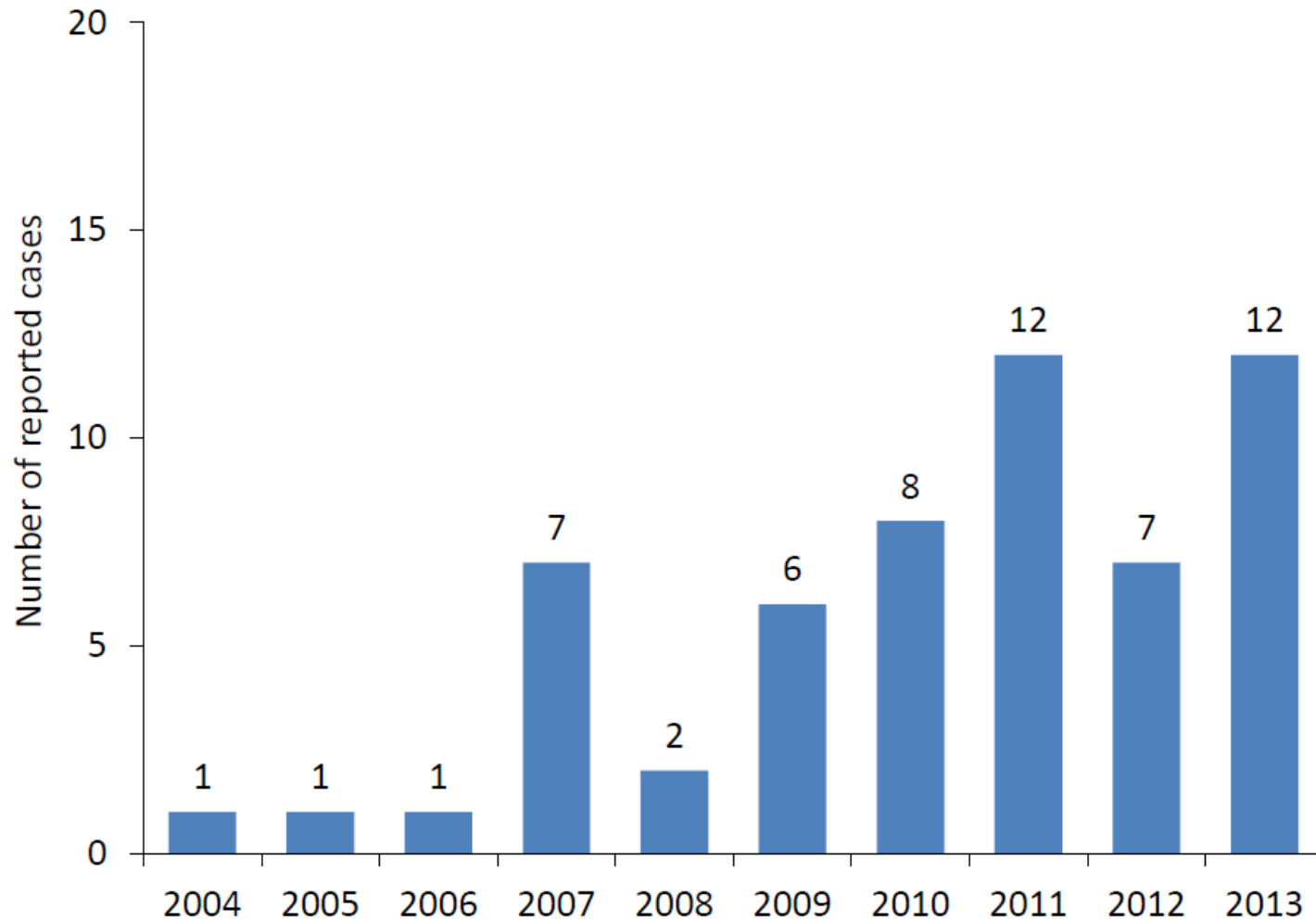


# Powassan/Deer Tick Virus

- North American flavivirus
- High seroprevalence in burrowing mammals in New England
- Rare disease in humans – but
  - severe illness associated with marked neurological sequelae
  - 10-15% case-fatality rate in recognized cases
- Increased recognition with increased evaluation of encephalitis because of WNV

# Powassan Cases Reported Nationally, 2004-2013

Powassan virus neuroinvasive disease cases reported by year, 2004–2013



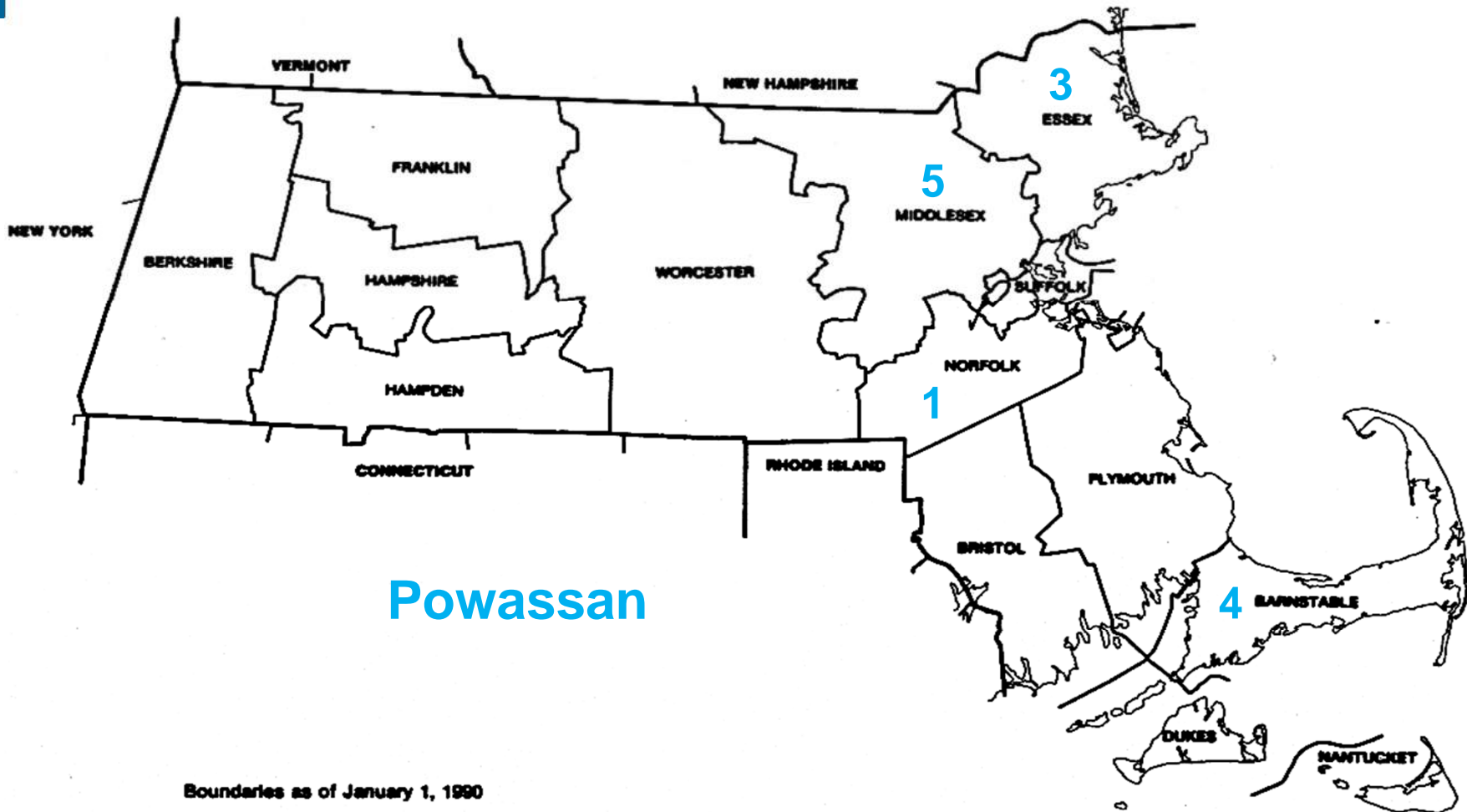
Source: ArboNET, Arboviral Diseases Branch, Centers for Disease Control and Prevention

# Confirmed Powassan Virus Infection Reported in Massachusetts

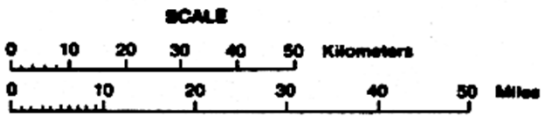
- Made reportable in 2013
  - 2013 – 1 case
  - 2014 – 4 cases
  - 2015 – 3 cases
  - 2016 – 5 cases
- All encephalitis/meningoencephalitis
- Male 12/female 1
- Ages 21-82 years (mean 64)
- 3 fatalities
- Powassan Encephalitis in New England
  - CID 2016:62 (15 March) 707



# Cases by County



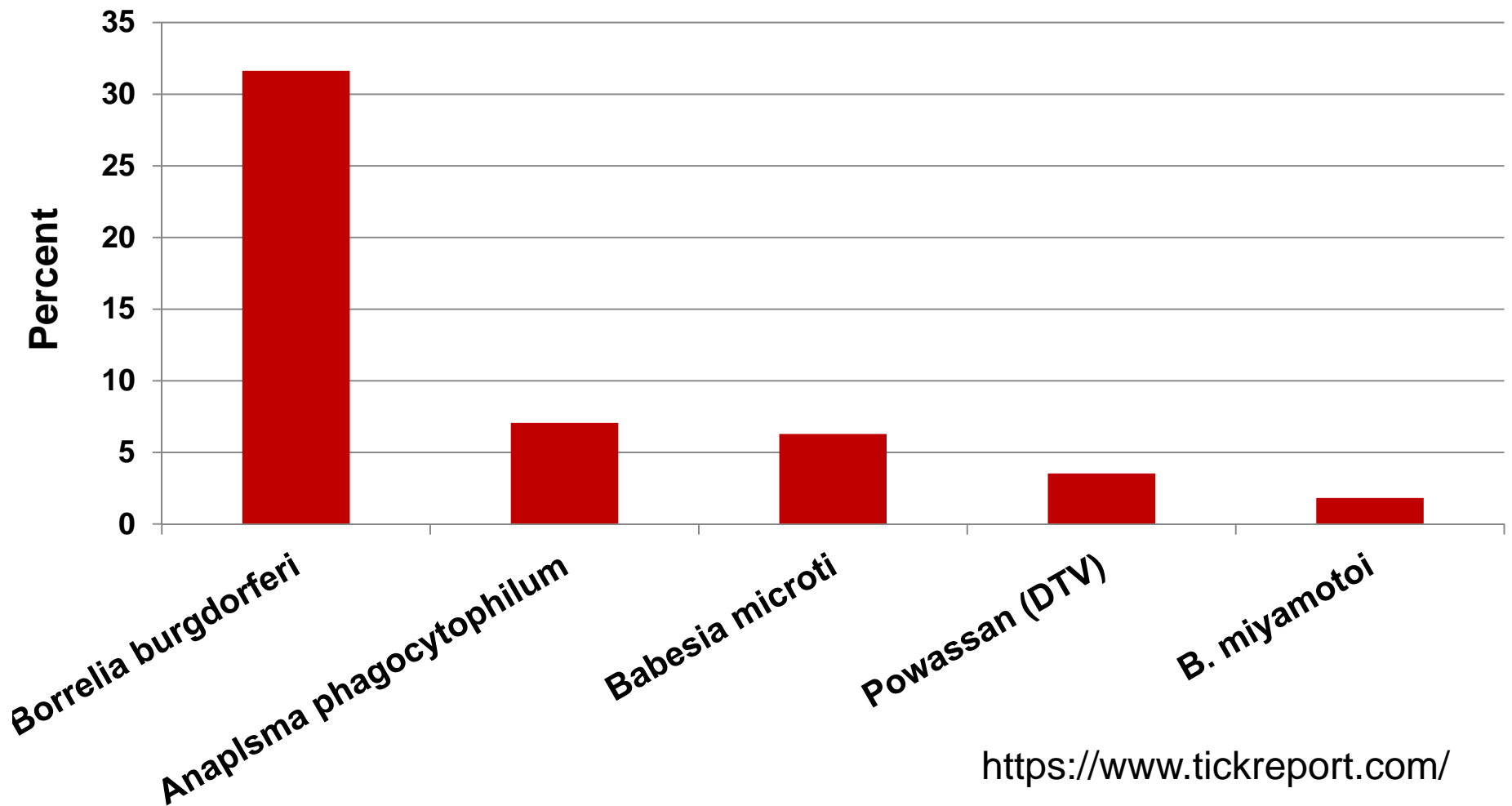
Boundaries as of January 1, 1990



# New Approaches to Lyme Disease Surveillance

- Estimates based on laboratory test reports
- Evaluation of alternate data sets
  - Insurance data sets
- Electronic Health Record extracts (ESPNet)
  - in initial evaluation stages

Massachusetts *Ixodes scapularis* Ticks Tested in the Laboratory of Medical Zoology, 2015-2016, Percent Positive by PCR  
(N=3,783 ticks tested, except Powassan=85)



# But there are simple risk reduction tools....

- Awareness
- Repellents
- Showers/Clothes in Dryer
- Tick Checks
- Removal
- Identification
- Healthcare Provider
- Habitat Modification
- And don't forget your pets



R.W. Van Devender