

Emerging *Borrelia miyamotoi* is widely dispersed throughout New England with a geographic range comparable to *Borrelia burgdorferi*

Borrelia miyamotoi and *Borrelia burgdorferi* Seroprevalence in New England

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Background

Tick-borne diseases have increased in the Northeast and have slowly been encroaching into non-endemic areas. It is critical to understand the frequency and geographic range of these diseases, including that caused by the recently described *Borrelia miyamotoi* pathogen.

Method

- Obtain 100-200 human serum samples from laboratory outpatients from 11 laboratory outpatient clinics in New England over two years.
- We determined *B. miyamotoi* IgG antibody using by Multiplex Luminex technology and *B. burgdorferi* by a two-tiered Zeus ELISA kit
- We analyzed seroprevalence by patient residential study site and county

Results

- Out of 1300 samples tested 29 (2.3%) tested positive for *B. miyamotoi* while 53 (4.1%) tested positive for *B. burgdorferi* with evidence of *B. miyamotoi* found in every site location.
- We did not find an East to West dispersal gradient for *B. miyamotoi* ($p=0.18$, Fisher exact test), or *B. burgdorferi* ($p=0.67$, Fisher exact test)

Conclusion

We have found serologic evidence of widespread range of *B. miyamotoi* and *B. burgdorferi* human infection throughout New England. Identification of the geographical locations alerts health care workers and the general public to the risk of these infections in their residential areas.

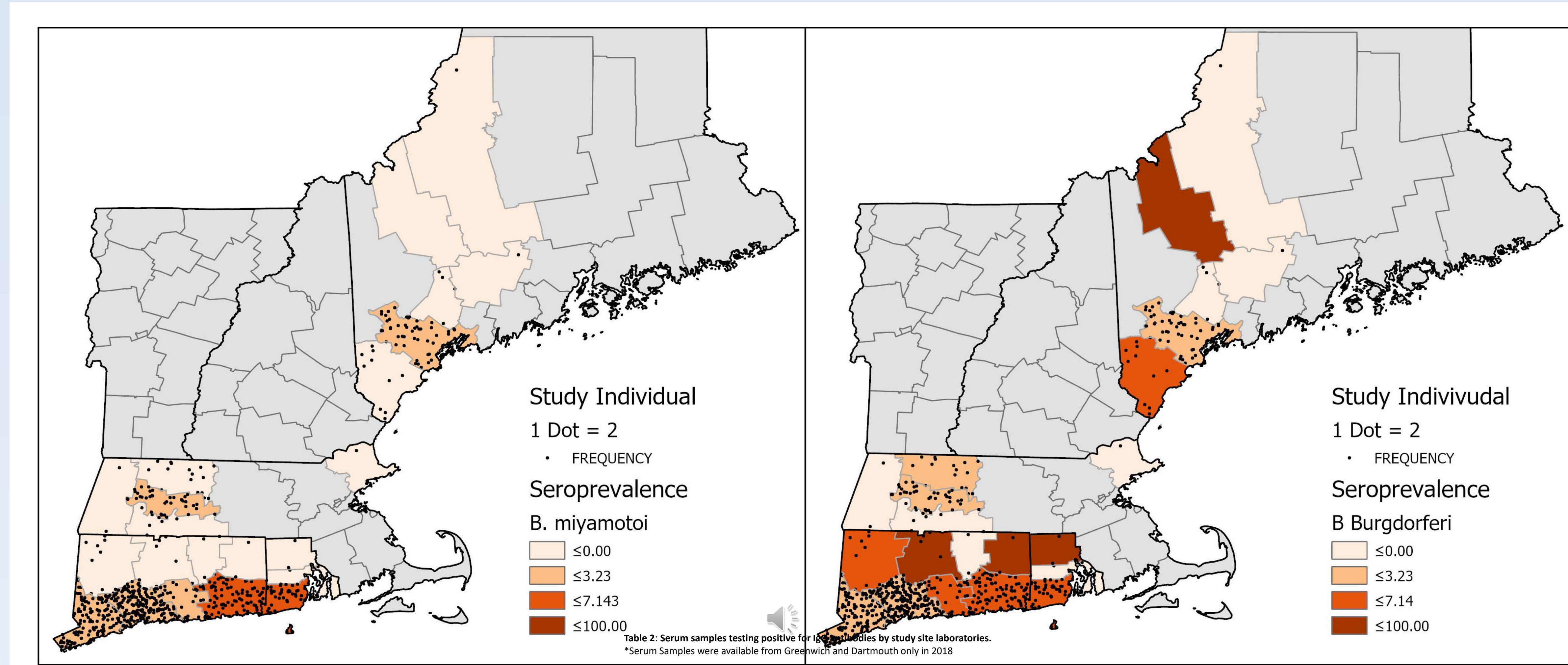


Figure 1a: County distribution of *B. miyamotoi* and *B. burgdorferi* seroprevalence by total sampled counties demonstrating country reliability. One dot is equal to two individuals.

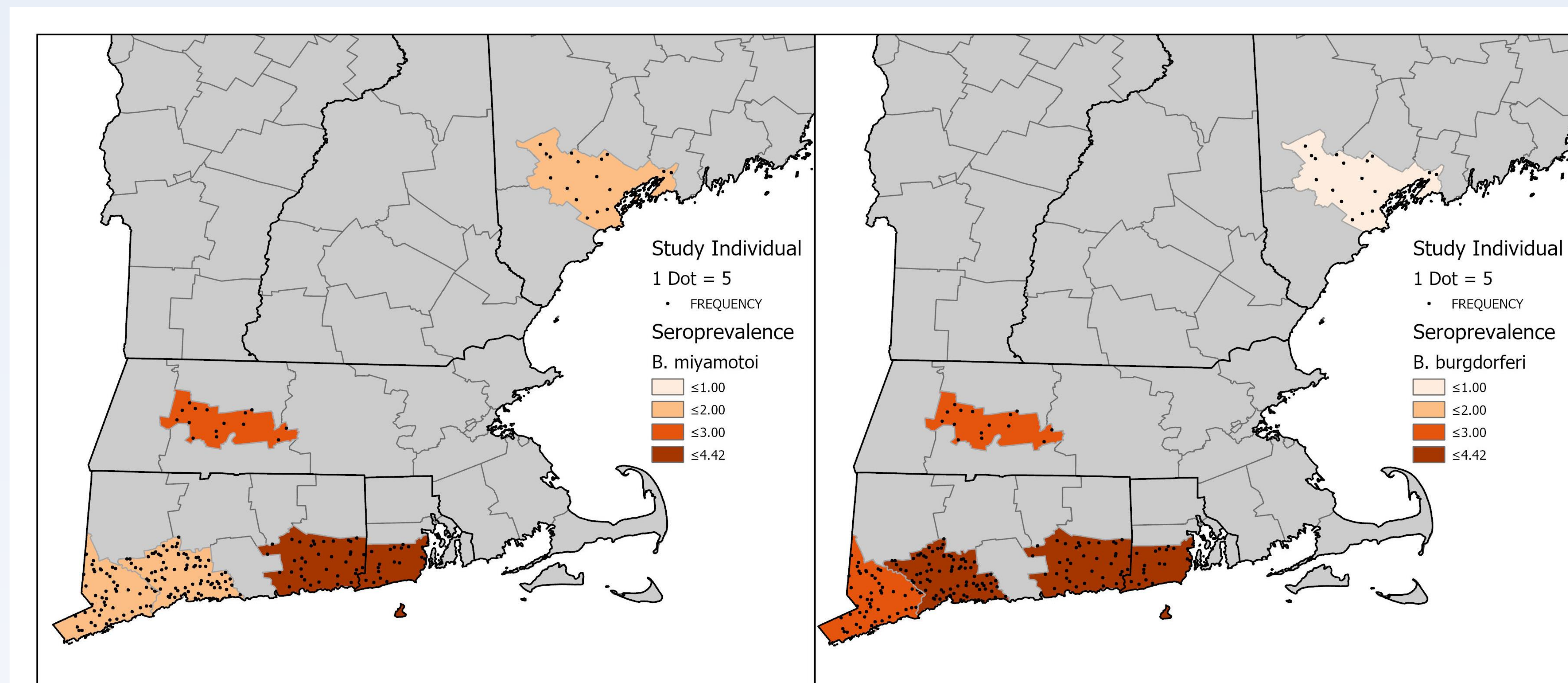


Figure 1b: Residential county distribution of *B. miyamotoi* and *B. burgdorferi* seroprevalence. Counties displayed are reliable with 50 or more individuals tested for antibodies, with each dot representing 5 individuals. The counties are Fairfield, New Haven, and New London counties in Connecticut; Washington county in Rhode Island; Hampshire county in Massachusetts; and Cumberland county in Maine.

Study site	B. miyamotoi 2018 and 2019	B. miyamotoi 2018	B. miyamotoi 2019	B. burgdorferi 2019
Number seropositive/number tested (%)				
Westerly, RI	8/324 (2.5)	3/193 (1.6)	5/131 (3.8)	6/131 (4.6)
Lawrence Memorial, CT	10/248 (4.0)	3/106 (2.8)	7/142 (4.9)	8/142 (5.6)
Guilford, CT	8/299 (2.7)	6/141 (4.3)	2/158 (1.3)	7/158 (4.4)
New Haven, CT	6/286 (2.1)	4/123 (3.3)	2/163 (1.2)	8/163 (4.9)
North Haven, CT	8/275 (2.9)	4/126 (3.2)	4/149 (2.7)	4/149 (2.7)
Bridgeport, CT	3/326 (0.9)	2/147 (1.4)	1/179 (0.6)	4/179 (2.2)
Danbury, CT	6/224 (2.7)	2/100 (2.0)	4/124 (3.2)	9/124 (7.3)
Greenwich, CT*	3/141 (2.1)	3/141 (2.1)	NA	NA
Dartmouth, NH*	2/142 (1.4)	2/142 (1.4)	NA	NA
Northampton, MA	8/324 (2.5)	6/149 (4.0)	2/125 (1.6)	4/125 (3.2)
Maine Medical Center, ME	5/251 (2.0)	3/122 (2.5)	2/129 (1.6)	3/129 (2.3)
Total	67/2790 (2.4)	38/1,490 (2.6)	29/1,300 (2.3)	53/1,300 (4.1)

Table 1: Serum samples testing positive for IgG antibodies by study site. *Serum Samples were available from Greenwich and Dartmouth Laboratories only in 2018

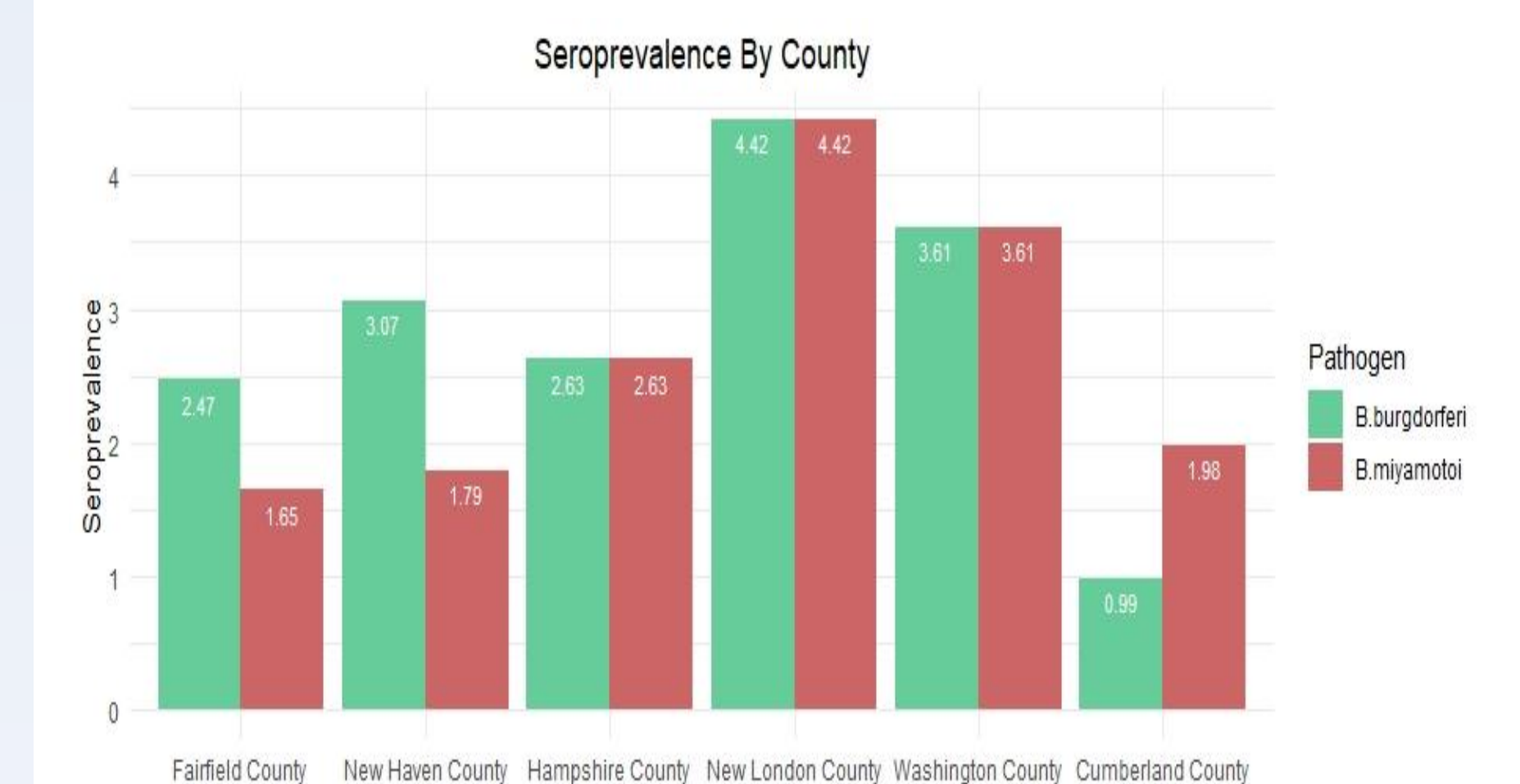


Figure 2: Seroprevalence of *B. miyamotoi* and *B. burgdorferi* by county with 2019 sampling data in order of West to East

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