

# 2019 Vermont Survey for Tick-Borne Diseases

In 2019, the Vermont Agency of Agriculture, Food & Markets (VAAFM) completed the fifth year of a five-year statewide tick survey in which every town in the state will be sampled. Ticks were collected in the fall and tested for five tick-borne pathogens: *Borrelia burgdorferi*, *Anaplasma phagocytophilum*, *Babesia microti*, *Borrelia miyamotoi*, and Deer Tick Virus. A total of 17 towns were surveyed in 2019, representing towns from 9 of Vermont's 14 counties. A single site in each town was chosen by selecting a road from the Vermont Delorme Atlas and then going to that road to look for suitable habitat for ticks. We looked for areas with a field edge, next to a stone wall, adjacent to a forest, or a combination of these characteristics. Four transects of 100 meters each were established and then surveyed for ticks every 10 meters with a 1-m<sup>2</sup> white flannel tick flag gently waved on the ground in front of the surveyor. Ticks were removed from the flag at each 10-meter interval and preserved in vials containing 95% ethyl alcohol. The ticks from the survey were identified to species at the Vermont Agricultural and Environmental Laboratory (VAEL) in Randolph Center and placed individually in vials for molecular testing for diseases. VAEL conducted all tests using RT-PCR testing. The laboratory tested 132 blacklegged (deer) ticks collected during the fall 2019 season.

A total of 132 ticks were collected, all of which were adult blacklegged ticks. The total amount of ticks per town ranged from 0 to 59, with an average of 7.76 ticks per town.

**Table 1. Results of 2019 Tick Testing in Vermont**

Pathogens Found	# of Ticks	% Infected
<i>Borrelia burgdorferi</i>	78	59.1%
<i>Anaplasma phagocytophilum</i>	9	6.8%
<i>Babesia microti</i>	11	8.3%
<i>Borrelia miyamotoi</i>	1	0.8%
Deer Tick Virus	0	0.0%

**Table 2. Coinfection Rates of Ticks Tested in 2019 (ticks that tested positive for more than one virus)**

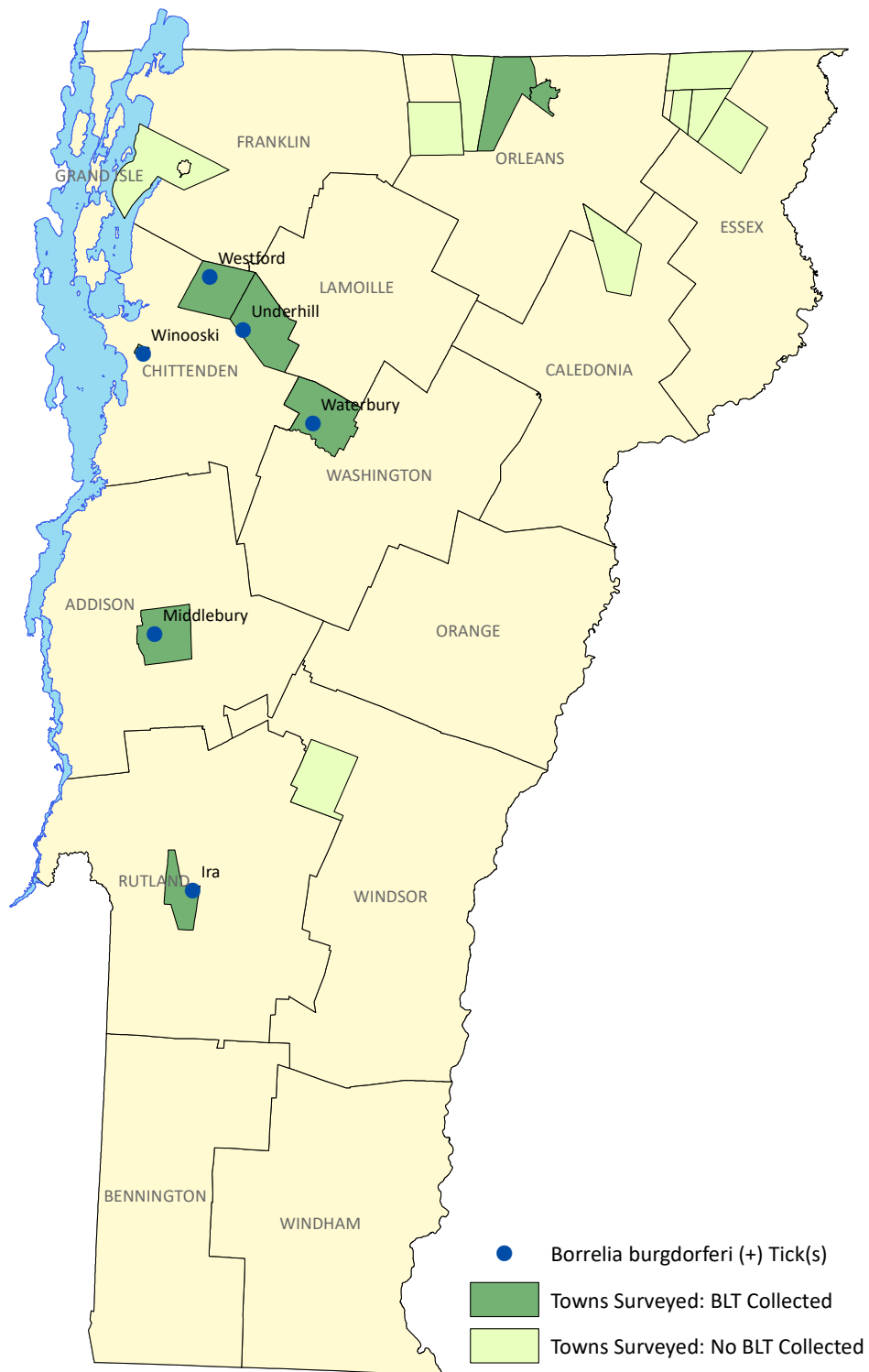
Co-Infections	# of Ticks	% Infected
<i>Borrelia burgdorferi</i> – <i>Anaplasma phagocytophilum</i>	8	6.1%
<i>Borrelia burgdorferi</i> – <i>Babesia microti</i>	8	6.1%
<i>Borrelia burgdorferi</i> – <i>Borrelia miyamotoi</i>	1	0.8%
<i>Borrelia burgdorferi</i> – <i>Anaplasma phagocytophilum</i> – <i>Babesia microti</i>	1	0.8%

**Table 3. Risk for Tick Pathogens by Vermont Town**

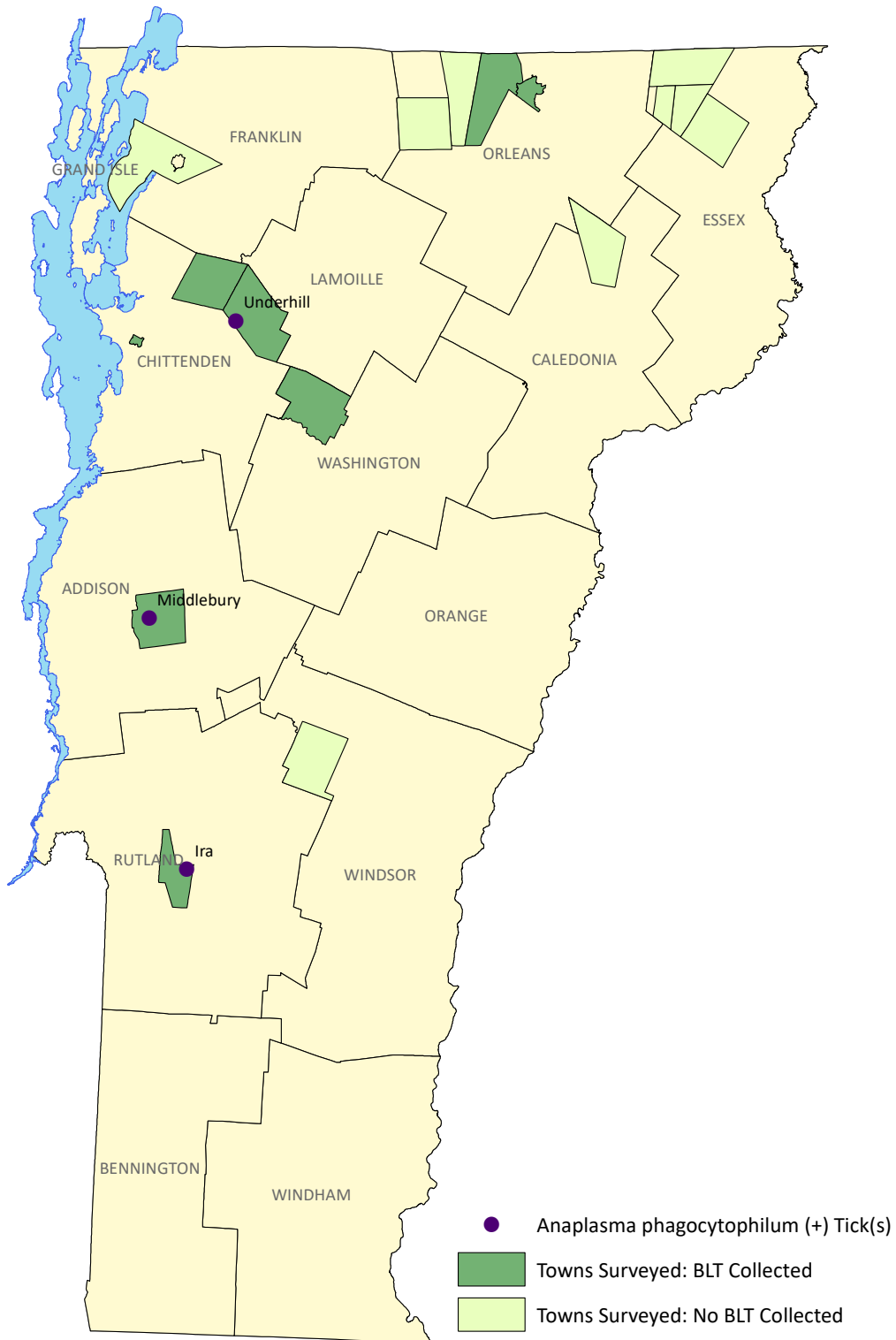
Numbers represent the amount of blacklegged ticks (BLT) that tested positively from that town. The percentage is the number of ticks that tested positive for the pathogen in that town over the total number of blacklegged ticks that were tested from that town. A (0) means that the blacklegged ticks collected from that town tested negative for the pathogen. Blank spaces represent towns where no blacklegged ticks were collected, thus no testing was done.

Town	County	# Blacklegged Ticks Tested	Borrelia burgdorferi	% Borrelia burgdorferi	Anaplasma phagocytophilum	Anaplasma phagocytophilum	Babesia microti	% Babesia microti	Borrelia miyamotoi	% Borrelia miyamotoi	Deer Tick Virus	% Deer Tick Virus
Averys Gore	Essex	0										
Ira	Rutland	16	8	50.00	1	6.25	2	12.50	1	6.25	0	0.00
Lewis	Essex	0										
Middlebury	Addison	59	35	59.32	7	11.86	9	15.25	0	0.00	0	0.00
Newport City	Orleans	1	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Newport Town	Orleans	1	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Norton	Essex	0										
St Albans Town	Franklin	0										
Stockbridge	Windsor	0										
Sutton	Caledonia	0										
Troy	Orleans	0										
Underhill	Chittenden	16	13	81.25	1	6.25	0	0.00	0	0.00	0	0.00
Warren Gore	Essex	0										
Waterbury	Washington	9	5	55.56	0	0.00	0	0.00	0	0.00	0	0.00
Westfield	Orleans	0										
Westford	Chittenden	26	16	61.54	0	0.00	0	0.00	0	0.00	0	0.00
Winooski	Chittenden	4	1	25.00	0	0.00	0	0.00	0	0.00	0	0.00
<b>TOTAL</b>		<b>132</b>	<b>78</b>	<b>59.10</b>	<b>9</b>	<b>6.82</b>	<b>11</b>	<b>8.33</b>	<b>1</b>	<b>0.76</b>	<b>0</b>	<b>0.00</b>

**Figure 1. Vermont Collections Sites Positive for *Borrelia burgdorferi* (Lyme disease)**



**Figure 2. Vermont Collections Sites Positive for *Anaplasma phagocytophilum* (Anaplasmosis)**



**Figure 3. Vermont Collections Sites Positive for *Babesia microti* (Babesiosis)**



**Figure 4. Vermont Collections Sites Positive for *Borrelia miyamotoi***

