

## 2018 Vermont Survey for Tick-Borne Diseases

In 2018, the Vermont Agency of Agriculture, Food & Markets (VAAFM) completed the fourth year of a five-year statewide tick survey in which every town in the state will be sampled. Ticks were collected in the spring and fall and tested for five tick-borne pathogens: *Borrelia burgdorferi*, *Anaplasma phagocytophilum*, *Babesia microti*, *Borrelia miyamotoi*, and Deer Tick Virus (a variant of Powassan virus; only ticks collected in the fall season were tested for DTV). A total of 35 towns were surveyed in 2018, representing towns from 11 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 VAAFM laboratory in Berlin and placed individually in vials for molecular testing for diseases. The VAAFM laboratory in Burlington did the testing using RT-PCR testing. The laboratory tested 97 blacklegged (deer) ticks collected during the 2018 season.

A total of 108 ticks were collected: 97 blacklegged ticks and 11 dog ticks. The total amount of ticks per town ranged from 0 to 22, with an average of 2 ticks per town.

**Table 1. Results of 2018 Tick Testing in Vermont**

	<b>Pathogens Found</b>	<b># of Ticks</b>	<b>% Infected</b>
Bo	<i>Borrelia burgdorferi</i>	55	56.70%
An	<i>Anaplasma phagocytophilum</i>	8	8.25%
Ba	<i>Babesia microti</i>	1	1.03%
Bm	<i>Borrelia miyamotoi</i>	3	3.09%
DTV	Deer Tick Virus *only ticks collected during the fall season were tested for DTV	1	1.72%

**Table 2. Coinfection Rates of Ticks Tested in 2018 (ticks that tested positive for more than one virus)**

<b>Co-Infections</b>	<b># of Ticks</b>	<b>% Infected</b>
Bo-An	5	5.15%
Bo-An-DTV	1	1.72%
Bo-Ba	1	1.03%

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

Numbers represent the amount of blacklegged ticks that tested positively from that town. The percentage is the number of ticks that tested positive for the virus 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 virus. Blank spaces represent towns where no blacklegged ticks were collected, thus no testing was done.

Town	County	# Blacklegged Ticks Tested	<i>Borrelia burgdorferi</i>	% <i>Borrelia burgdorferi</i>	<i>Anaplasma phagocytophilum</i>	% <i>Anaplasma phagocytophilum</i>	<i>Babesia microti</i>	% <i>Babesia microti</i>	<i>Borrelia miyamotoi</i>	% <i>Borrelia miyamotoi</i>	Deer Tick Virus	% Deer Tick Virus
Roxbury	Washington	0										
Salisbury	Addison	0										
Sheldon	Franklin	0										
Shoreham	Addison	0										
Shrewsbury	Rutland	0										
Springfield	Windsor	0										
St. Albans City	Franklin	0										
Starksboro	Addison	2	2	100.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Stockbridge	Windsor	2	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Sudbury	Rutland	0										
Tinmouth	Rutland	6	4	66.67%	2	33.33%	0	0.00%	1	16.67%	1	16.67%
Vergennes	Addison	2	1	50.00%	0	0.00%	0	0.00%	0	0.00%	*	*
Vershire	Orange	0										
Victory	Essex	0										
W Haven	Rutland	6	5	83.33%	1	16.67%	0	0.00%	0	0.00%	0	0.00%
W Rutland	Rutland	22	12	54.55%	2	9.09%	0	0.00%	0	0.00%	0	0.00%
Walden	Caledonia	0										
Wallingford	Rutland	3	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Waltham	Addison	4	1	25.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Wardsboro	Windham	1	1	100.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Warren	Washington	0										
Washington	Orange	0										
Waterford	Caledonia	0										
Wells	Rutland	11	9	81.82%	2	18.18%	0	0.00%	0	0.00%	0	0.00%
West Fairlee	Orange	0										
West Windsor	Windsor	8	5	62.50%	0	0.00%	0	0.00%	0	0.00%	*	*
Westminster	Windham	0										
Westmore	Orleans	0										
Weston	Windsor	1	1	100.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Weybridge	Addison	16	9	56.25%	1	6.25%	0	0.00%	0	0.00%	*	*
Wheelock	Caledonia	0										
Whiting	Addison	2	2	100.00%	0	0.00%	1	50.00%	0	0.00%	*	*
Whitingham	Windham	0										
Williamstown	Orange	0										
Windham	Windham	0										
Windsor	Windsor	10	4	40.00%	0	0.00%	1	10.00%	0	0.00%	*	*
Woodbury	Washington	0										
Woodford	Bennington	0										
Woodstock	Windsor	0										
Worcester	Washington	1	0	0.00%	0	0.00%	0	0.00%	0	0.00%	*	*

\*Ticks collected in spring 2018 were not tested for DTV

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

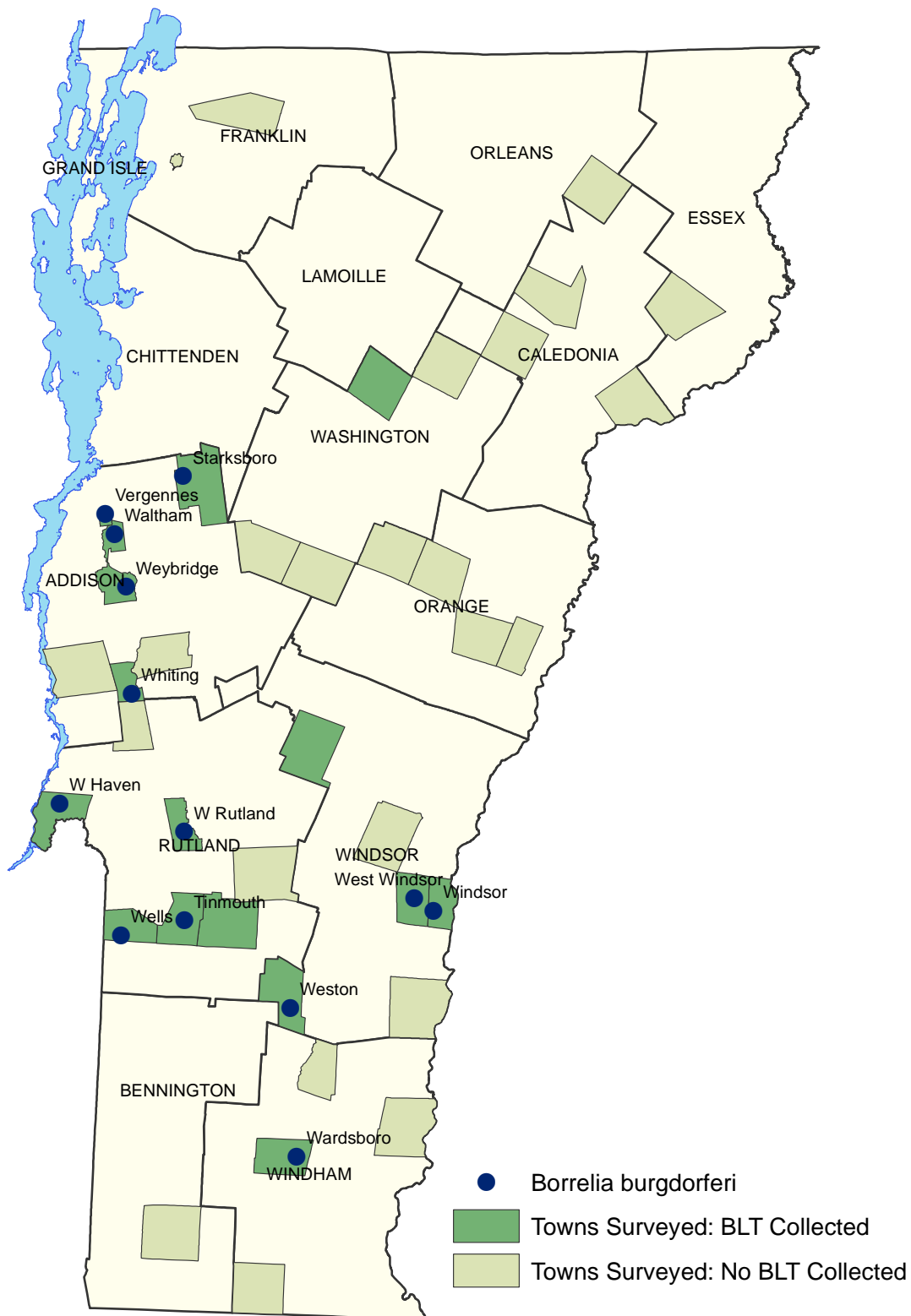
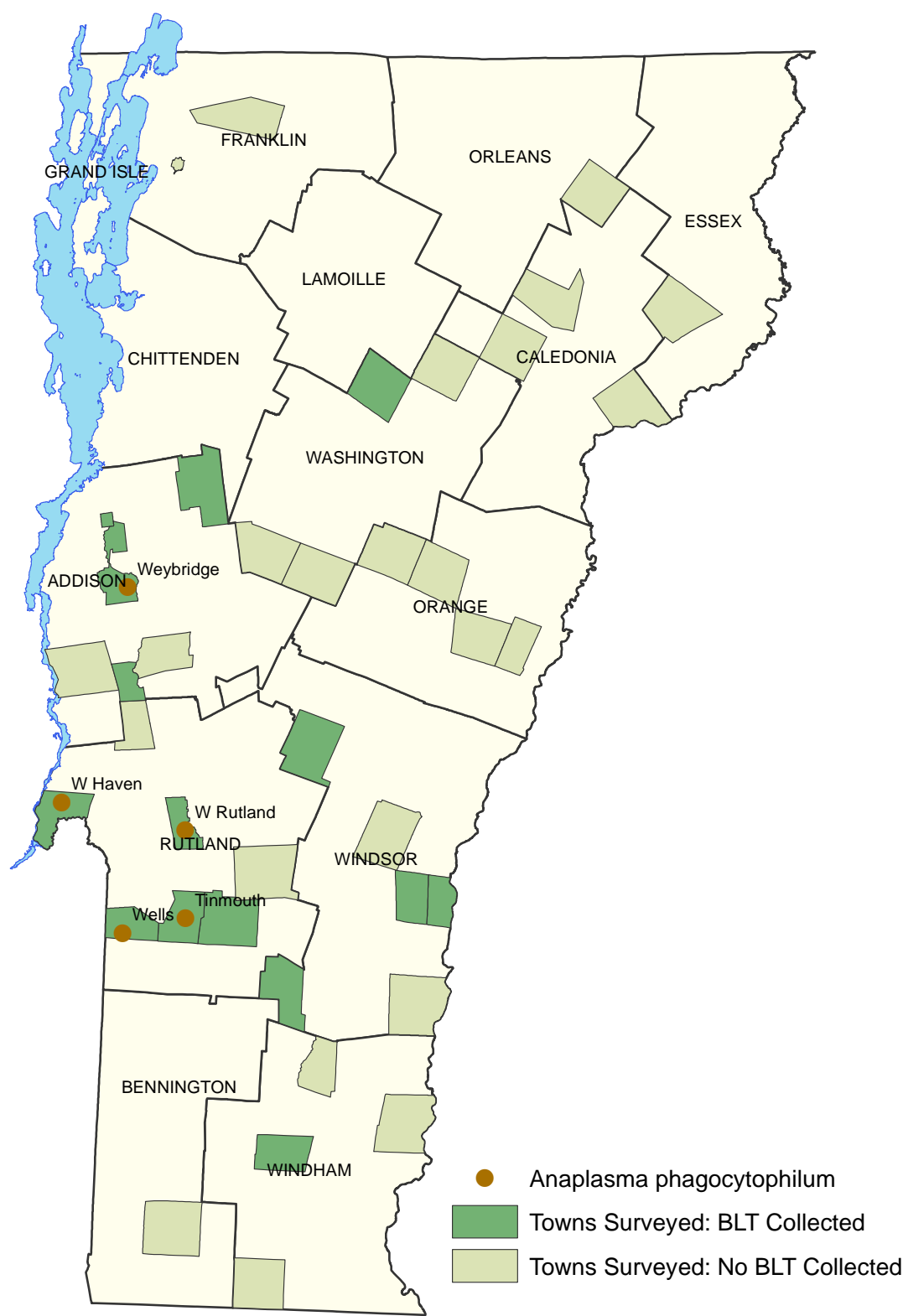
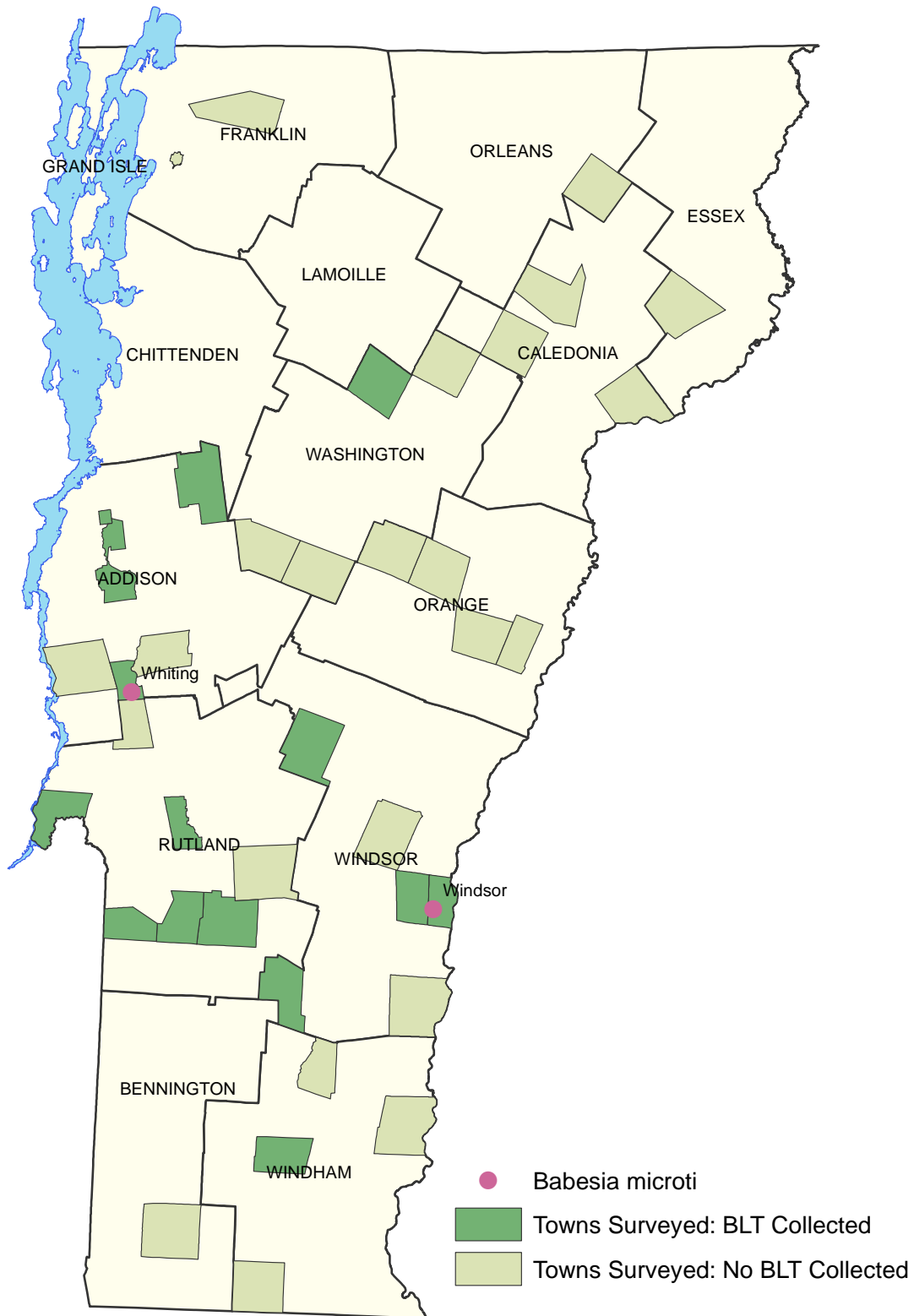


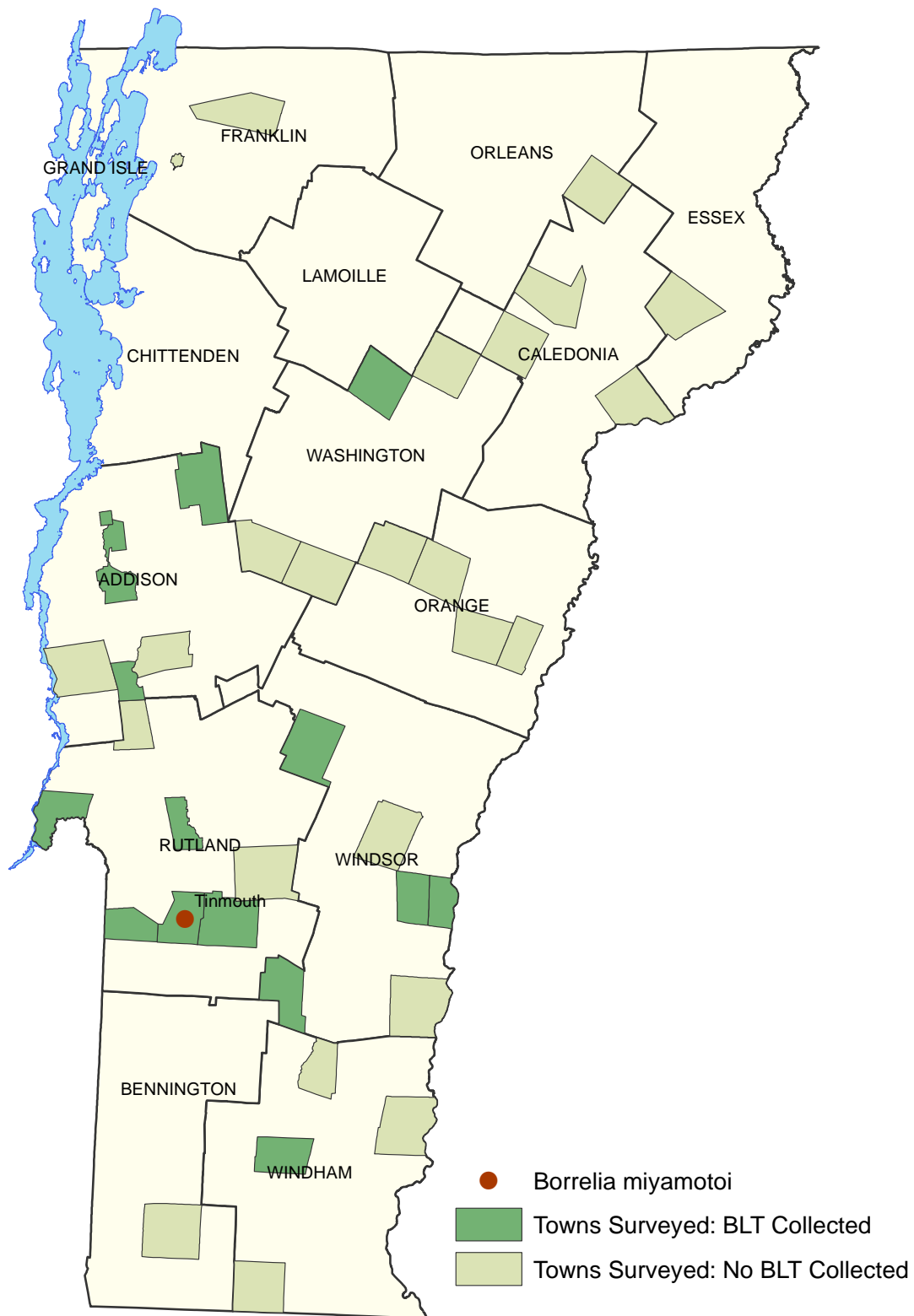
Figure 2. Vermont Collection Sites Positive for *Anaplasma phagocytophilum* (Anaplasmosis)



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



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



**Figure 5. Vermont Collection Sites Positive for Deer Tick Virus**

