

2021 Vermont Agency of Agriculture Statewide Surveillance for Tick Population Density and Tick-Borne Diseases

In 2021, the Vermont Agency of Agriculture, Food & Markets (VAAFAM) completed the second year in the second round of our ongoing 5-year statewide tick survey in which every town in the state is sampled. Ticks were collected in the spring (late April through mid-June) and fall (mid-October through late November). Blacklegged ticks (*Ixodes scapularis*) were tested for 5 tick-borne pathogens: *Borrelia burgdorferi* (the pathogen that causes Lyme disease), *Anaplasma phagocytophilum*, *Babesia microti*, *Borrelia miyamotoi*, and Deer Tick (Powassan) Virus, lineage 1. A total of 57 towns were surveyed in 2021, representing towns from all of Vermont’s 14 counties. Each site was visited 5 years prior. If the site composition had changed since the initial visit (housing developments, thick undergrowth unsuitable for dragging, etc), a suitable site within a half mile of the original site was found. Four transects of 100 meters each were established and then surveyed for ticks every 10 meters with a 1-m² white flannel tick flag gently waved on the ground by the surveyor. Ticks were removed from the flag at each 10-meter interval and preserved in vials containing 95% ethyl alcohol. The ticks were identified to species at the Vermont Agricultural and Environmental Laboratory (VAEL) in Randolph Center and blacklegged tick nymphs and adults were placed individually in vials for molecular testing for diseases. VAEL conducted all tests using RT-PCR testing. VAEL tested 255 blacklegged ticks collected during the 2021 spring and fall seasons.

A total of 383 ticks were collected, including 23 nymphal blacklegged ticks and 232 adult blacklegged ticks, as well as 128 American Dog ticks that were not tested, as they are not known to readily vector diseases in Vermont. The total number of blacklegged ticks per town ranged from 0 to 55, with an average of 4.5 ticks per town.

Table 1. Results of 2021 Tick Testing in Vermont, n = 255

Pathogens Found	# of Ticks	% Infected
<i>Borrelia burgdorferi</i>	127	49.8%
<i>Anaplasma phagocytophilum</i>	34	13.3%
<i>Babesia microti</i>	15	5.9%
<i>Borrelia miyamotoi</i>	5	2.0%
Deer Tick Virus	0	0.0%

Table 2. Coinfection Rates of Ticks Tested in 2021 (ticks testing positive for more than 1 pathogen), n = 255

Co-Infections	# of Ticks	% Infected
<i>Borrelia burgdorferi</i> – <i>Anaplasma phagocytophilum</i>	16	6.3%
<i>Borrelia burgdorferi</i> – <i>Babesia microti</i>	9	3.5%
<i>Borrelia burgdorferi</i> – <i>Borrelia miyamotoi</i>	1	0.4%
<i>Anaplasma phagocytophilum</i> – <i>Babesia microti</i>	1	0.4%
<i>Anaplasma phagocytophilum</i> – <i>Borrelia miyamotoi</i>	1	0.4%
<i>Borrelia burgdorferi</i> – <i>Anaplasma phagocytophilum</i> – <i>Babesia microti</i>	2	0.8%
<i>Borrelia burgdorferi</i> – <i>Anaplasma phagocytophilum</i> – <i>Borrelia miyamotoi</i>	1	0.4%

Table 3. Risk for Tick Pathogens by Vermont Town

Numbers represent the number of blacklegged ticks that tested positive 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	# <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
Averill	Essex	0										
Barton	Orleans	0										
Bethel	Windsor	3	1	33.33%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Bloomfield	Essex	0										
Brookfield	Orange	7	5	71.43%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Brookline	Windham	15	8	53.33%	4	26.67%	2	13.33%	0	0.00%	0	0.00%
Brownington	Orleans	0										
Brunswick	Essex	0										
Buels Gore	Chittenden	0										
Burke	Caledonia	1	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Calais	Washington	1	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Canaan	Essex	0										
Castleton	Rutland	33	19	57.58%	5	15.15%	1	3.03%	0	0.00%	0	0.00%
Charleston	Orleans	0										
Charlotte	Chittenden	5	3	60.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Chelsea	Orange	3	1	33.33%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Chittenden	Rutland	12	3	25.00%	1	8.33%	0	0.00%	1	8.33%	0	0.00%
Clarendon	Rutland	16	9	56.25%	3	18.75%	0	0.00%	0	0.00%	0	0.00%
Concord	Essex	0										
Corinth	Orange	12	9	75.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%

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
Cornwall	Addison	11	5	45.45%	1	9.09%	1	9.09%	0	0.00%	0	0.00%
Coventry	Orleans	1	1	100.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Danby	Rutland	13	4	30.77%	4	30.77%	0	0.00%	0	0.00%	0	0.00%
Danville	Caledonia	2	0	0.00%	1	50.00%	0	0.00%	0	0.00%	0	0.00%
Dorset	Bennington	9	3	33.33%	2	22.22%	4	44.44%	1	11.11%	0	0.00%
Dover	Windham	0										
Dummerston	Windham	4	1	25.00%	1	25.00%	0	0.00%	0	0.00%	0	0.00%
Duxbury	Washington	3	1	33.33%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
East Haven	Essex	0										
Eden	Lamoille	1	1	100.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Elmore	Lamoille	0										
Enosburg	Franklin	2	2	100.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Fair Haven	Rutland	7	1	14.29%	1	14.29%	0	0.00%	1	14.29%	0	0.00%
Fairfield	Franklin	1	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Fayston	Washington	0										
Ferrisburgh	Addison	1	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Franklin	Franklin	0										
Glastenbury	Bennington	0										
Goshen	Addison	4	2	50.00%	2	50.00%	0	0.00%	0	0.00%	0	0.00%
Grafton	Windham	1	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Grand Isle	Grand Isle	1	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Granville	Addison	0										
Groton	Caledonia	0										
Guilford	Windham	55	28	50.91%	7	12.73%	7	12.73%	1	1.82%	0	0.00%
Hardwick	Caledonia	0										
Hartford	Windsor	12	10	83.33%	2	16.67%	0	0.00%	1	8.33%	0	0.00%
Hyde Park	Lamoille	0										
Jamaica	Windham	0										
Jay	Orleans	0										
Jericho	Chittenden	8	4	50.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Johnson	Lamoille	0										
Killington	Rutland	2	1	50.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Kirby	Caledonia	1	1	100.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Milton	Chittenden	7	3	42.86%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Orange	Orange	0										
Readsboro	Bennington	0										
Rochester	Windsor	1	1	100.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
TOTAL		255	127	49.80%	34	13.33%	15	5.88%	5	1.96%	0	0.00%

Figure 1. Vermont Collection Sites Positive for *Borrelia burgdorferi* (Lyme disease), 2021

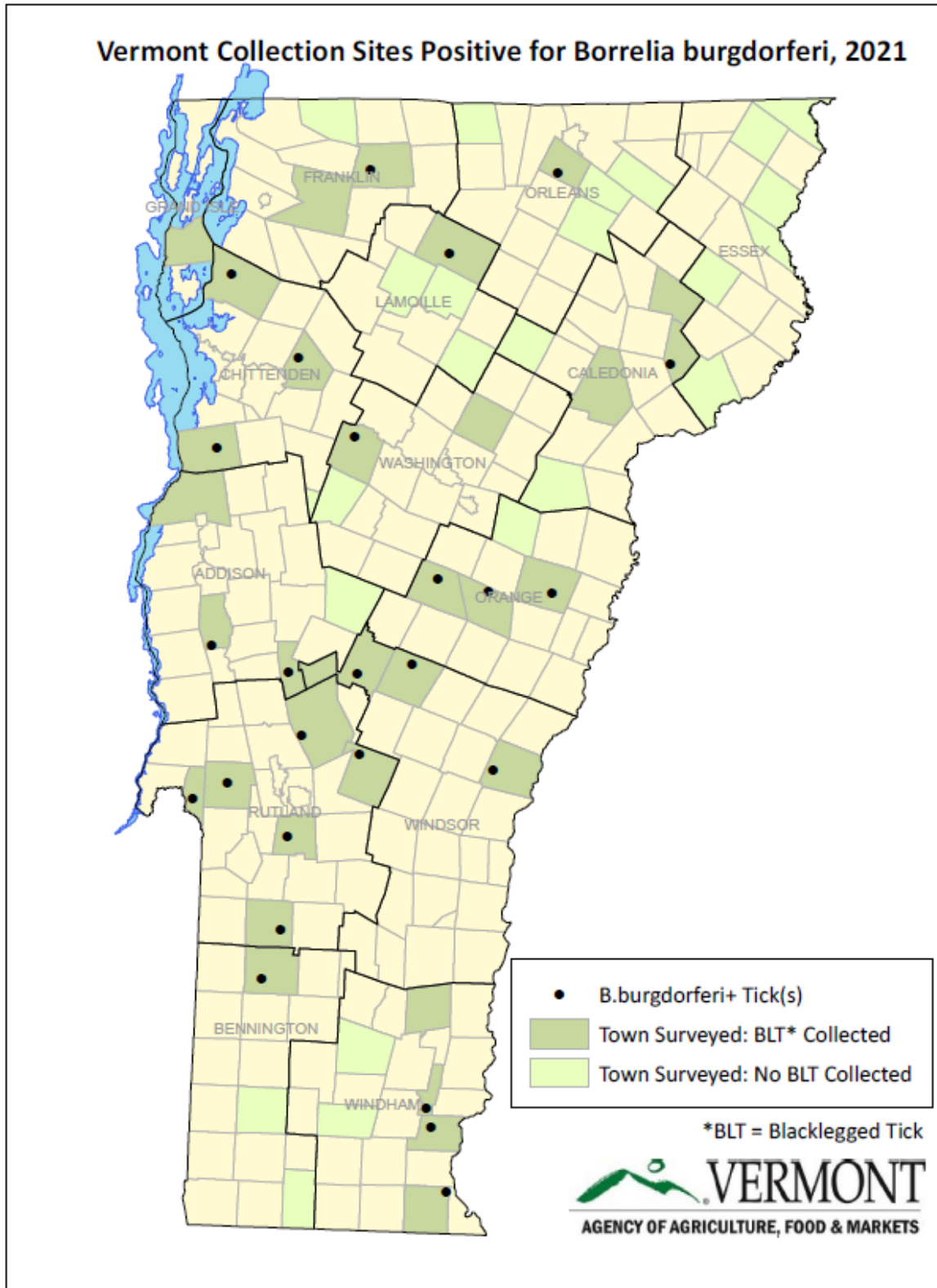


Figure 2. Vermont Collection Sites Positive for *Anaplasma phagocytophilum* (Anaplasmosis), 2021

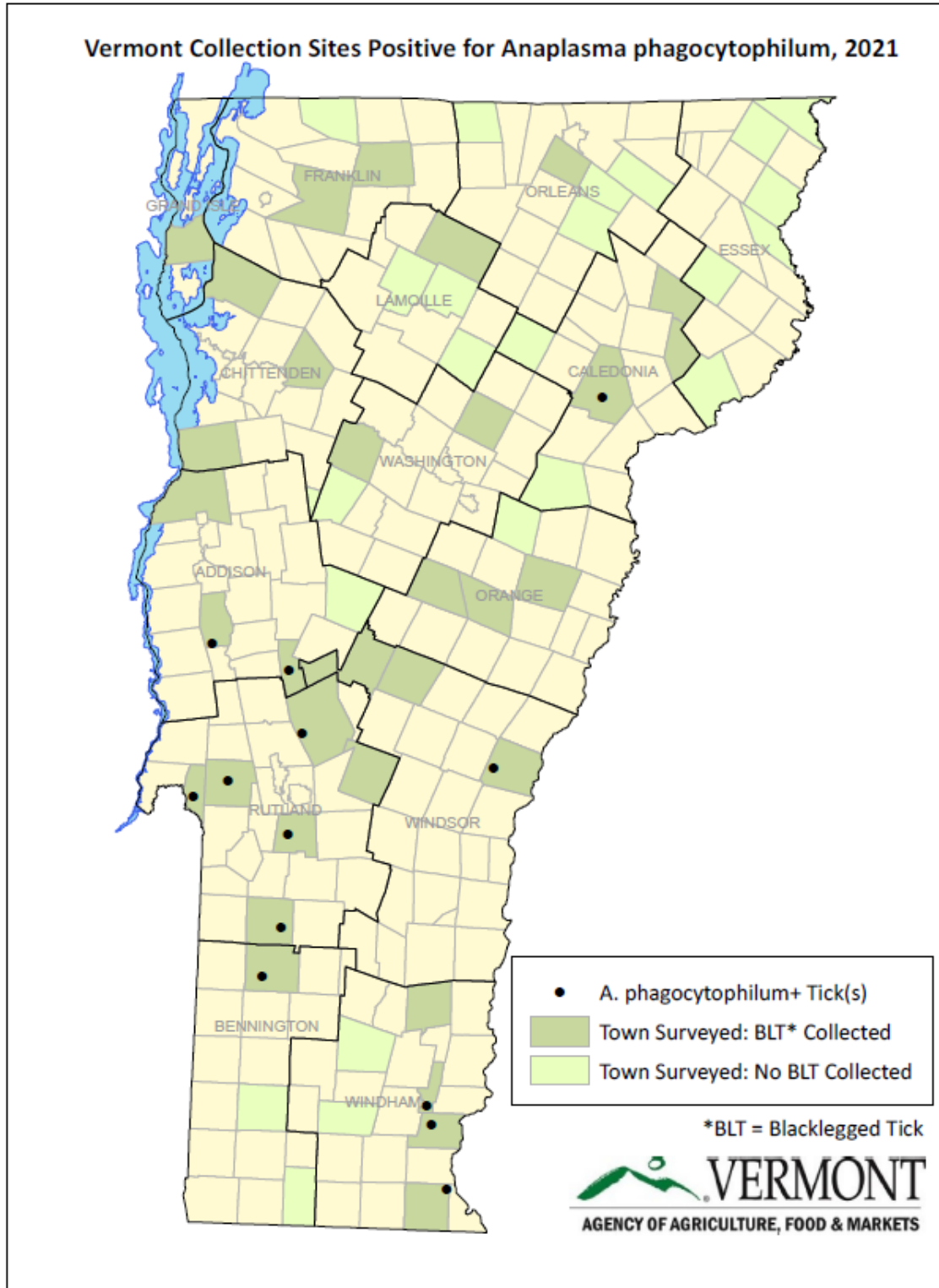


Figure 3. Vermont Collection Sites Positive for *Babesia microti* (Babesiosis), 2021

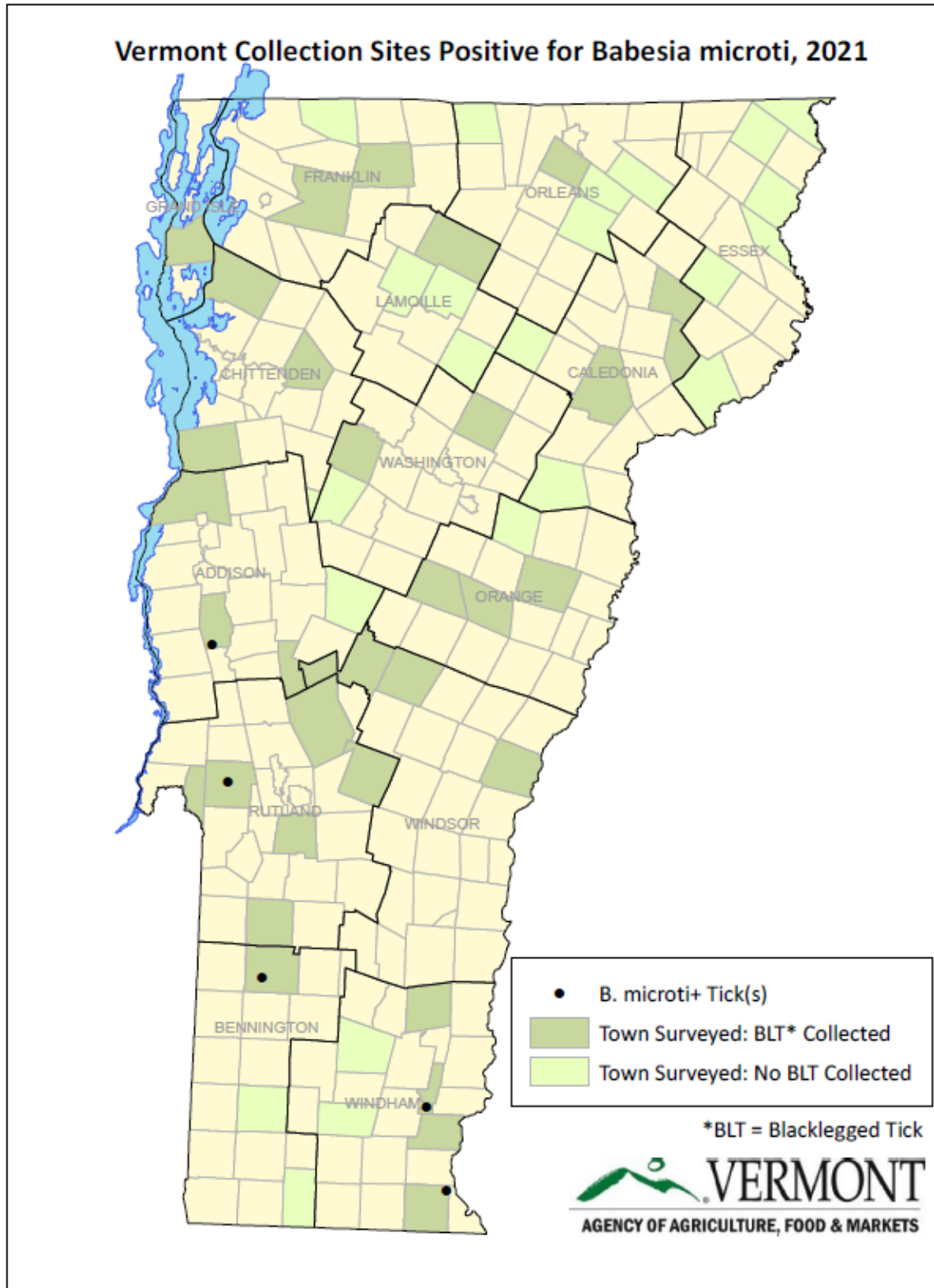
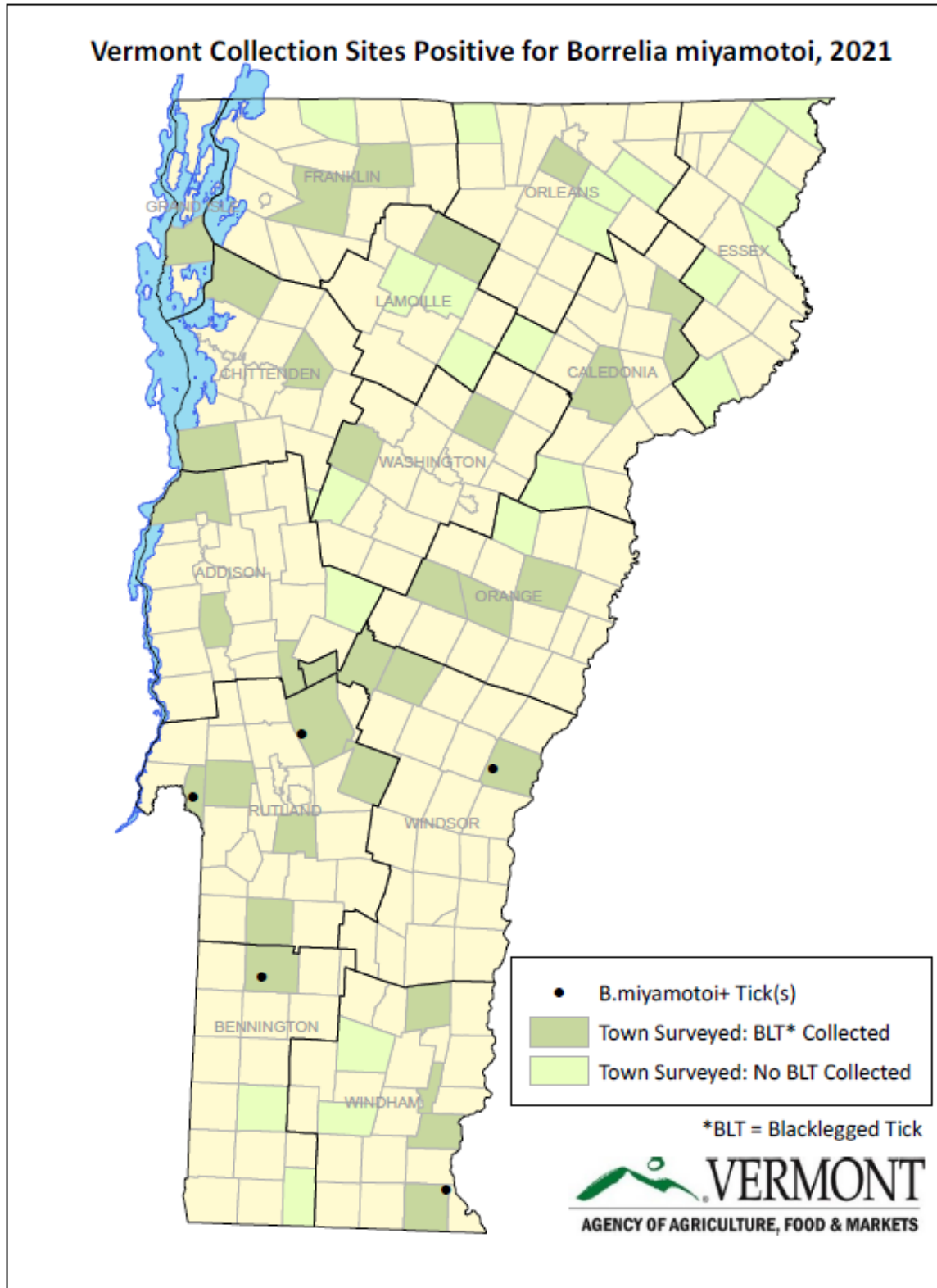


Figure 4. Vermont Collection Sites Positive for *Borrelia miyamotoi*, 2021



American Dog Tick (*Dermacentor variabilis*) Collections in Vermont, 2021

American Dog ticks (*Dermacentor variabilis*) are a common tick in Vermont. While collections occur each year in Vermont, increased American Dog tick activity was noticed during routine tick surveys in 2021. All American Dog ticks collected during 2021 were collected during the spring surveillance season (mid-May through mid-June).

Table 4. American Dog Tick Collections in Vermont, 2021

Town	County	# American Dog ticks Collected
Barton	Orleans	2
Bloomfield	Essex	40
Burke	Caledonia	4
Calais	Washington	59
Canaan	Essex	7
Charleston	Orleans	7
Chittenden	Rutland	1
Dover	Windham	1
Dummerston	Windham	1
Hartford	Windsor	1
Jamaica	Windham	2
Orange	Orange	3

Figure 5. Vermont Collection Sites with American Dog Ticks, 2021

