

2022 Vermont Agency of Agriculture Statewide Surveillance for Tick Population Density and Tick-Borne Diseases

In 2022, the Vermont Agency of Agriculture, Food & Markets (VAAFM) completed the third 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 39 towns were surveyed in 2022, representing towns from 12 Vermont 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, through leaf litter, and over vegetation 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 318 blacklegged ticks collected during the 2022 spring and fall seasons. A total of 5 ticks had inconclusive results, leaving 313 blacklegged ticks successfully tested.

A total of 399 ticks were collected, including 8 nymphal and 310 adult blacklegged ticks, as well as 81 American Dog ticks (*Dermacentor variabilis*) 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 137, with an average of 8 ticks per town.

Table 1. Results of 2022 Tick Testing in Vermont, *n* = 313

Pathogens Found	# of Ticks	% Infected
<i>Borrelia burgdorferi</i>	180	57.5%
<i>Anaplasma phagocytophilum</i>	42	13.4%
<i>Babesia microti</i>	15	4.8%
<i>Borrelia miyamotoi</i>	6	1.9%
Deer Tick Virus	1	0.3%

Table 2. Coinfection Rates of Ticks Tested in 2022 (ticks testing positive for more than 1 pathogen), *n* = 313

Co-Infections	# of Ticks	% Coinfected
<i>Borrelia burgdorferi</i> – <i>Anaplasma phagocytophilum</i>	31	9.9%
<i>Borrelia burgdorferi</i> – <i>Babesia microti</i>	9	2.9%
<i>Borrelia burgdorferi</i> – <i>Borrelia miyamotoi</i>	1	0.3%
<i>Borrelia burgdorferi</i> – <i>Anaplasma phagocytophilum</i> – <i>Babesia microti</i>	4	1.3%
<i>Borrelia burgdorferi</i> – <i>Anaplasma phagocytophilum</i> – <i>Borrelia miyamotoi</i>	1	0.3%
<i>Borrelia burgdorferi</i> – <i>Babesia microti</i> – Deer Tick Virus	1	0.3%

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
Cavendish	Windsor	5	1	20.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Chester	Windsor	10	3	30.00%	1	10.00%	0	0.00%	0	0.00%	0	0.00%
Craftsbury	Orleans	0										
Derby	Orleans	0										
E Montpelier	Washington	5	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Fairlee	Orange	11	4	36.36%	2	18.18%	0	0.00%	0	0.00%	0	0.00%
Ferdinand	Essex	0										
Fletcher	Franklin	1	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Georgia	Franklin	1	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Glover	Orleans	0										
Granby	Essex	0										
Greensboro	Orleans	2	1	50.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Guildhall	Essex	0										
Halifax	Windham	0										
Hancock	Addison	0										

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
Highgate	Franklin	1	1	100.00%	1	100.00%	0	0.00%	0	0.00%	0	0.00%
Hubbardton	Rutland	5	1	20.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Huntington	Chittenden	0										
Irasburg	Orleans	4	2	50.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Leicester	Addison	7	1	14.29%	2	28.57%	0	0.00%	0	0.00%	0	0.00%
Lemington	Essex	0										
Lincoln	Addison	0										
Londonderry	Windham	2	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Lunenburg	Essex	0										
Lyndon	Caledonia	0										
Maidstone	Essex	0										
Marshfield	Washington	0										
Mendon	Rutland	0										
Middlesex	Washington	2	1	50.00%	0	0.00%	1	50.00%	0	0.00%	0	0.00%
Monkton	Addison	16	5	31.25%	0	0.00%	0	0.00%	2	12.50%	0	0.00%
Montpelier	Washington	6	4	66.67%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Moretown	Washington	0										
New Haven	Addison	26	17	65.38%	4	15.38%	0	0.00%	0	0.00%	0	0.00%
North Hero	Grand Isle	13	7	53.85%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Northfield	Washington	4	1	25.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Panton	Addison	9	4	44.44%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Pittsford	Rutland	137	103	75.18%	25	18.25%	12	8.76%	3	2.19%	1	0.73%
Plainfield	Washington	2	0	0.00%	0	0.00%	0	0.00%	1	50.00%	0	0.00%
Poultney	Rutland	44	24	54.55%	7	15.91%	2	4.55%	0	0.00%	0	0.00%
TOTAL		313	180	57.51%	42	13.42%	15	4.79%	6	1.92%	1	0.32%

Figure 1. Vermont Collection Sites Positive for *Borrelia burgdorferi* (Lyme disease), 2022

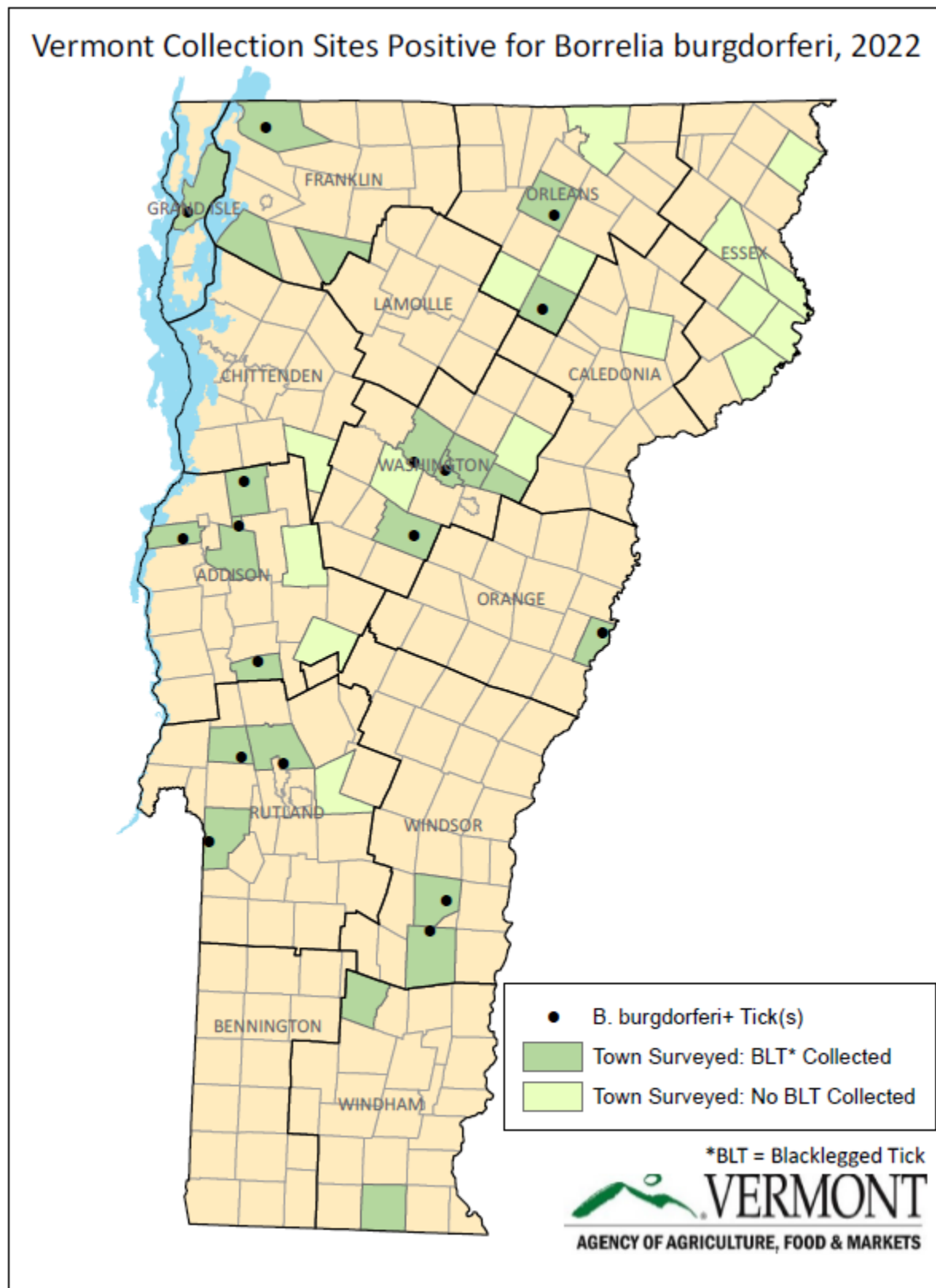


Figure 2. Vermont Collection Sites Positive for *Anaplasma phagocytophilum* (Anaplasmosis), 2022

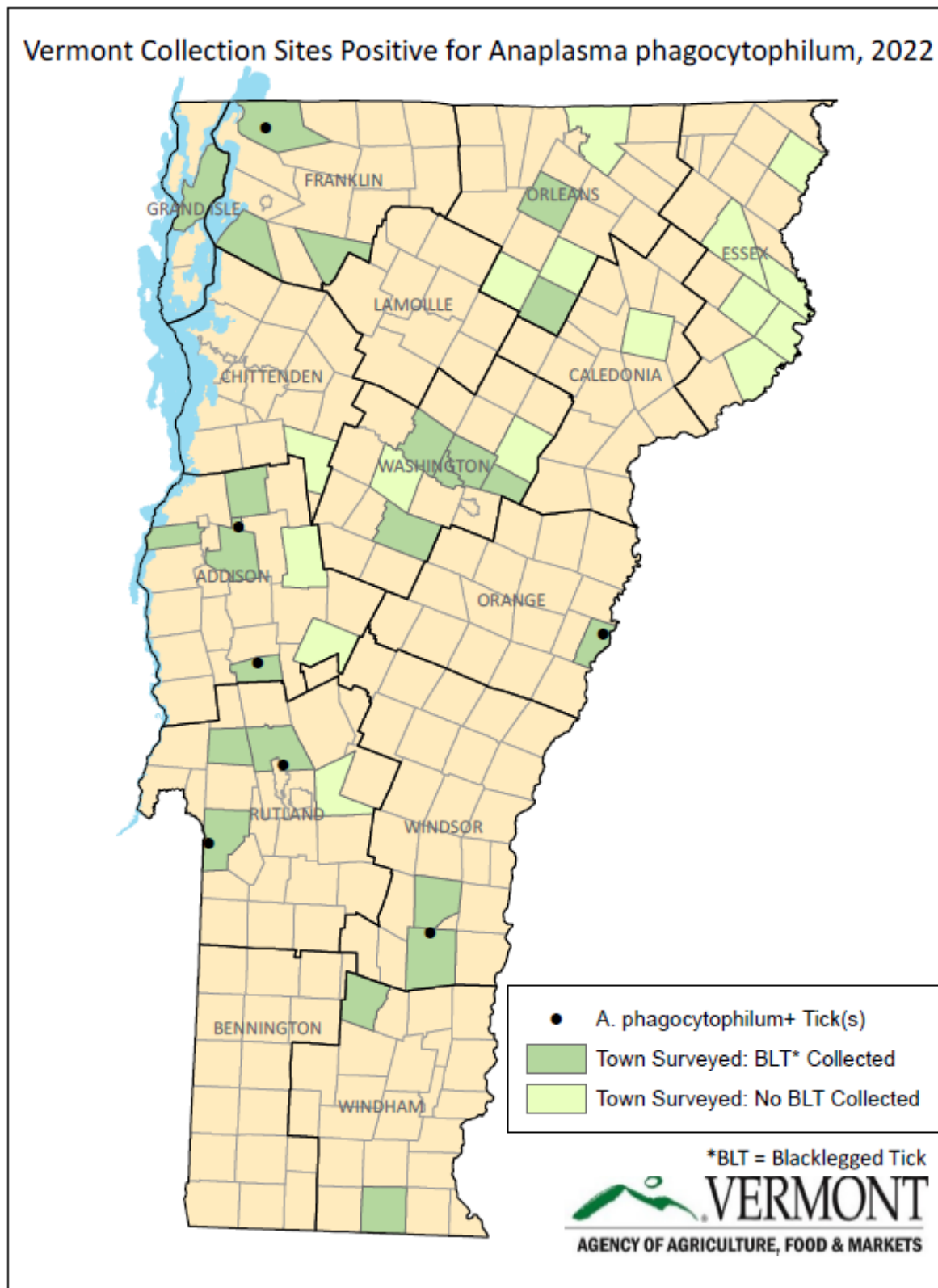


Figure 3. Vermont Collection Sites Positive for *Babesia microti* (Babesiosis), 2022

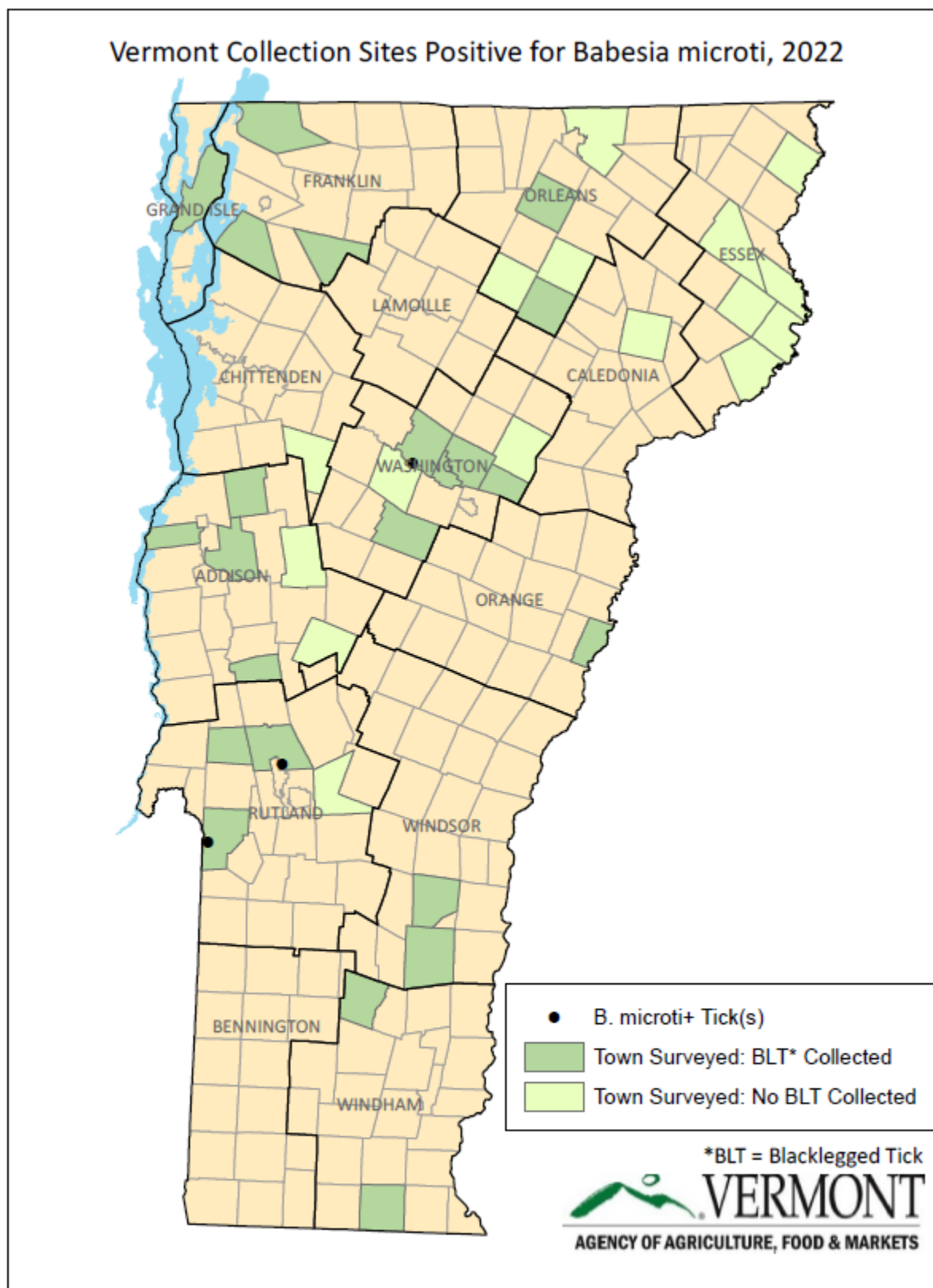


Figure 4. Vermont Collection Sites Positive for *Borrelia miyamotoi*, 2022

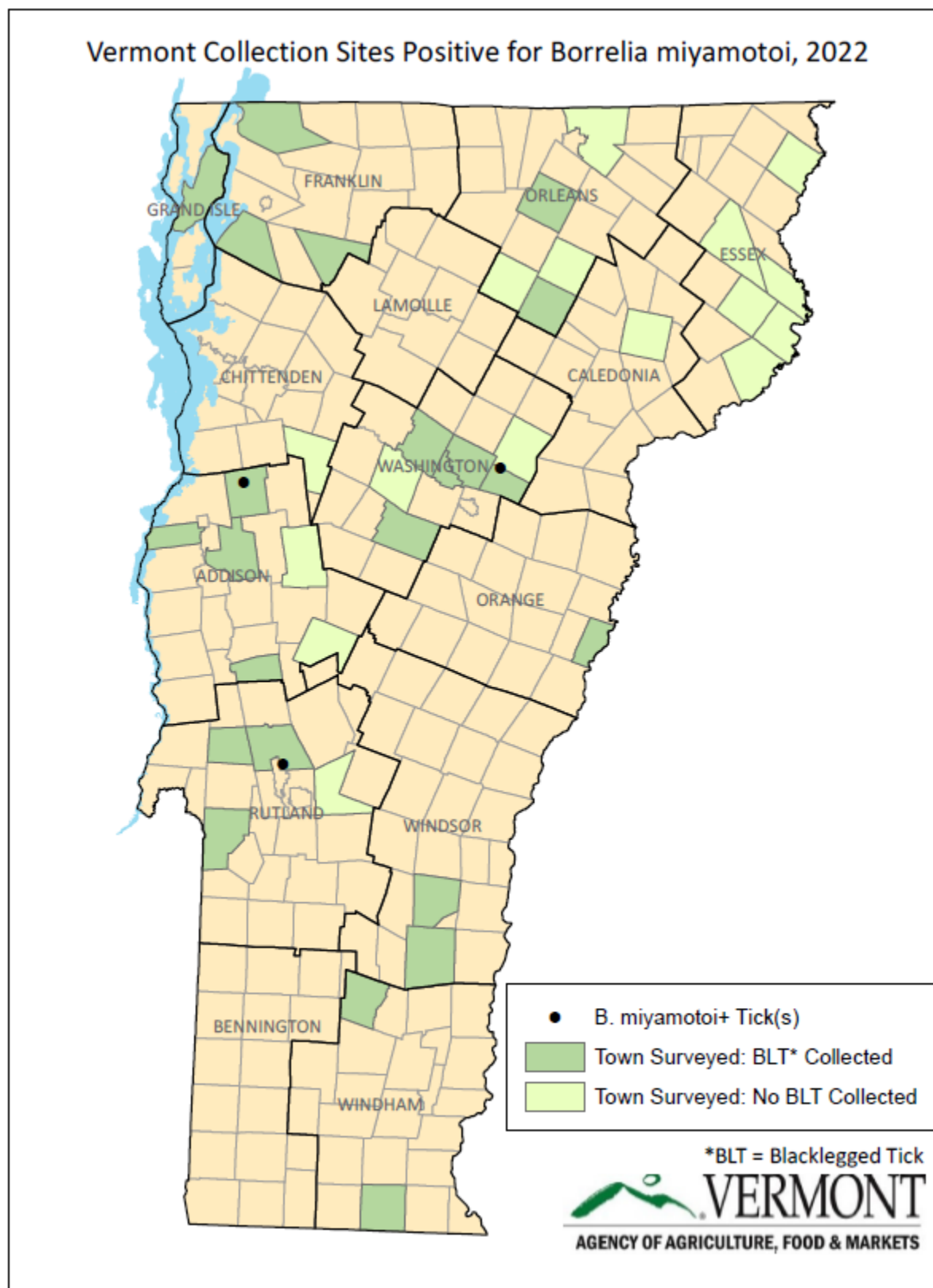
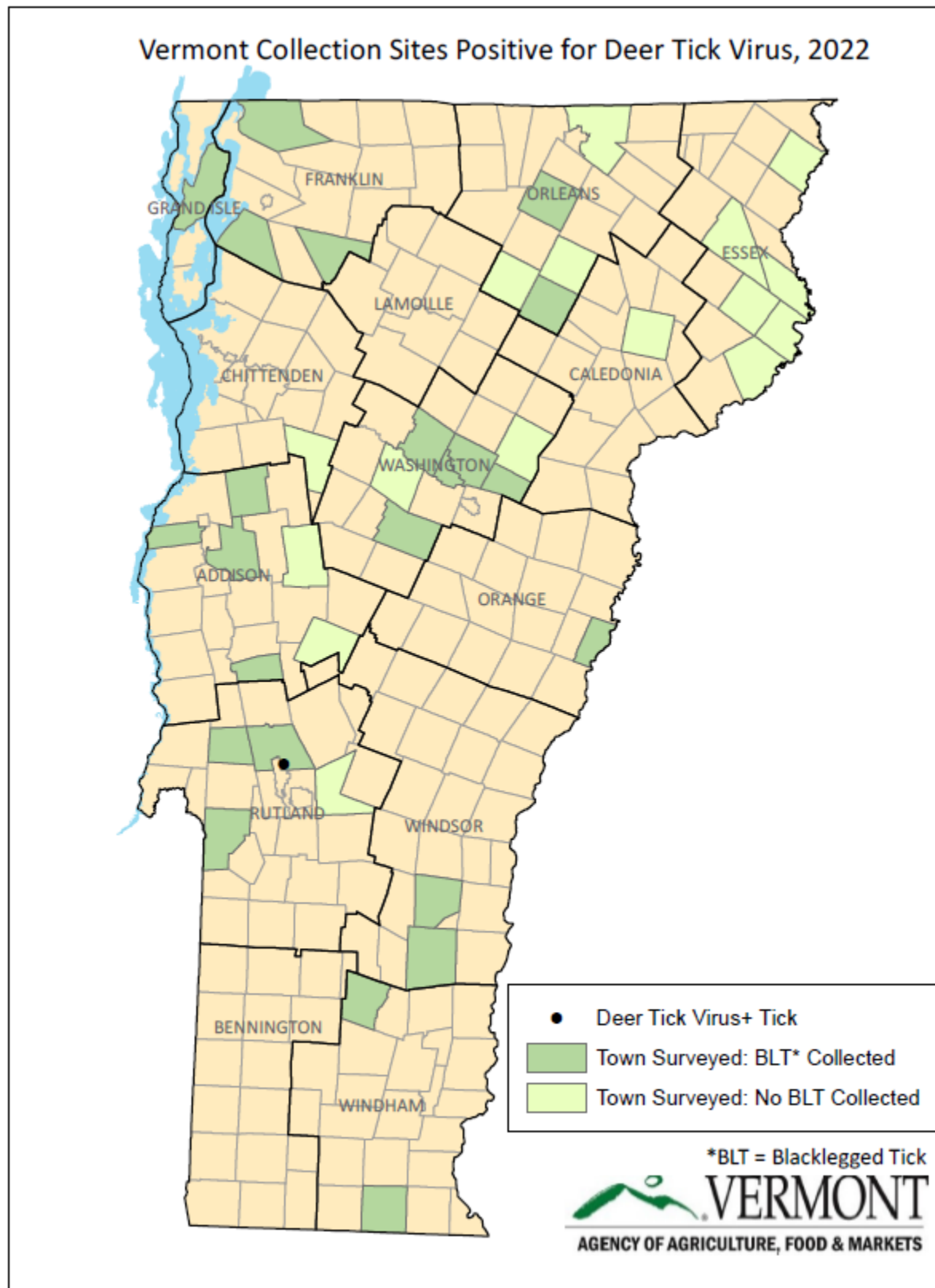


Figure 5. Vermont Collection Sites Positive for Deer Tick Virus, 2022



American Dog Tick (*Dermacentor variabilis*) Collections in Vermont, 2022

American Dog ticks (*Dermacentor variabilis*) are a common tick in Vermont. All American Dog ticks collected during 2022 were collected during the spring surveillance season (mid-May through mid-June).

Town	County	# American Dog Ticks Collected
Cavendish	Windsor	1
Glover	Orleans	3
Guildhall	Essex	4
Lyndon	Caledonia	71
Marshfield	Washington	2

