2023 Vermont Agency of Agriculture Statewide Surveillance for Tick Population Density and Tick-Borne Diseases

In 2023, the Vermont Agency of Agriculture, Food & Markets (VAAFM) completed the fourth 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 mid-November). Nymphal and adult 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 53 towns were surveyed in 2023, 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-m^2 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 205 blacklegged ticks collected during the 2023 spring and fall seasons.

A total of 445 ticks were collected, including 58 nymphal and 147 adult blacklegged ticks, as well as 43 American Dog ticks (*Dermacentor variabilis*) and 197 larval ticks that were not tested (only nymphal and adult blacklegged ticks are tested, as larval ticks and American Dog ticks are not known to transmit disease). The total number of blacklegged ticks per town ranged from 0 to 177, with an average of 8 ticks per town.

Table 1. Results of 2023 Tick Testing in Vermont, *n* = 205

Pathogens Found	# of Ticks	% Infected
Borrelia burgdorferi	69	33.7%
Anaplasma phagocytophilum	15	7.3%
Babesia microti	9	4.4%
Borrelia miyamotoi	0	0.0%
Deer Tick Virus	0	0.0%

Table 2. Coinfection Rates of Ticks Tested in 2023 (ticks testing positive for more than 1 pathogen), *n* = 205

Co-Infections	# of Ticks	% Coinfected
Borrelia burgdorferi – Anaplasma phagocytophilum	9	4.4%
Borrelia burgdorferi – Babesia microti	8	3.9%

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	# *Borrelia burgdorferi*	% *Borrelia burgdorferi*	# *Anaplasma phagocytophilum*	% *Anaplasma phagocytophilu*	# *Babesia microti*	% *Babesia microti*	# *Borrelia miyamotoi*	% *Borrelia miyamotoi*	# Deer Tick Virus	% Deer Tick Virus
Holland	Orleans	0										
Lowell	Orleans	0										
Ludlow	Windsor	1	1	100.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Marlboro	Windham	0										
Middletown Springs	Rutland	9	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Montgomery	Franklin	0										
Morgan	Orleans	0										
Morristown	Lamoille	0										
Mt Holly	Rutland	4	2	50.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Mt Tabor	Rutland	13	10	76.92%	2	15.38%	5	38.46%	0	0.00%	0	0.00%
Newark	Caledonia	0										
Newbury	Orange	1	1	100.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Newfane	Windham	11	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Norwich	Windsor	1	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Pawlet	Rutland	0										
Peacham	Caledonia	0										
Pittsfield	Rutland	1	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Plymouth	Windsor	5	1	20.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%

Town	County	# Blacklegged Ticks Tested	# Borrelia burgdorferi	% Borrelia burgdorferi	# Anaplasma phagocytophilum	% Anaplasma phagocytophilu	# Babesia microti	% Babesia microti	# Borrelia miyamotoi	% Borrelia miyamotoi	# Deer Tick Virus	% Deer Tick Virus
Pownal	Bennington	4	3	75.00%	2	50.00%	0	0.00%	0	0.00%	0	0.00%
Proctor	Rutland	1	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Putney	Windham	27	3	11.11%	1	3.70%	0	0.00%	0	0.00%	0	0.00%
Randolph	Orange	3	1	33.33%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Richford	Franklin	1	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Richmond	Chittenden	4	1	25.00%	1	25.00%	0	0.00%	0	0.00%	0	0.00%
Ripton	Addison	2	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Roxbury	Washington	0										
Royalton	Windsor	0										
Rutland City	Rutland	1	1	100.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Rutland Town	Rutland	2	1	50.00%	1	50.00%	0	0.00%	0	0.00%	0	0.00%
S Burlington	Chittenden	2	1	50.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Salisbury	Addison	3	2	66.67%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Sandgate	Bennington	8	2	25.00%	1	12.50%	0	0.00%	0	0.00%	0	0.00%
Searsburg	Bennington	8	1	12.50%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Sharon	Windsor	1	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Sheffield	Caledonia	0										
Shelburne	Chittenden	1	1	100.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Sheldon	Franklin	1	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Shoreham	Addison	2	1	50.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Shrewsbury	Rutland	0										
Springfield	Windsor	21	8	38.10%	3	14.29%	1	4.76%	0	0.00%	0	0.00%
St George	Chittenden	5	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
St Johnsbury	Caledonia	3	2	66.67%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Stannard	Caledonia	0										
Starksboro	Addison	1	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Stowe	Lamoille	1	1	100.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Strafford	Orange	0										
Sudbury	Rutland	4	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Thetford	Orange	31	15	48.39%	2	6.45%	2	6.45%	0	0.00%	0	0.00%
Tinmouth	Rutland	11	5	45.45%	1	9.09%	0	0.00%	0	0.00%	0	0.00%
Vernon	Windham	4	2	50.00%	1	25.00%	1	25.00%	0	0.00%	0	0.00%
Wallingford	Rutland	7	3	42.86%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Waterville	Lamoille	0										
Wolcott	Lamoille	0										
TOTAL		205	69	33.66%	15	7.32%	9	4.39%	0	0.00%	0	0.00%

Figure 1. Vermont Collection Sites Positive for *Borrelia burgdorferi* (Lyme disease), 2023

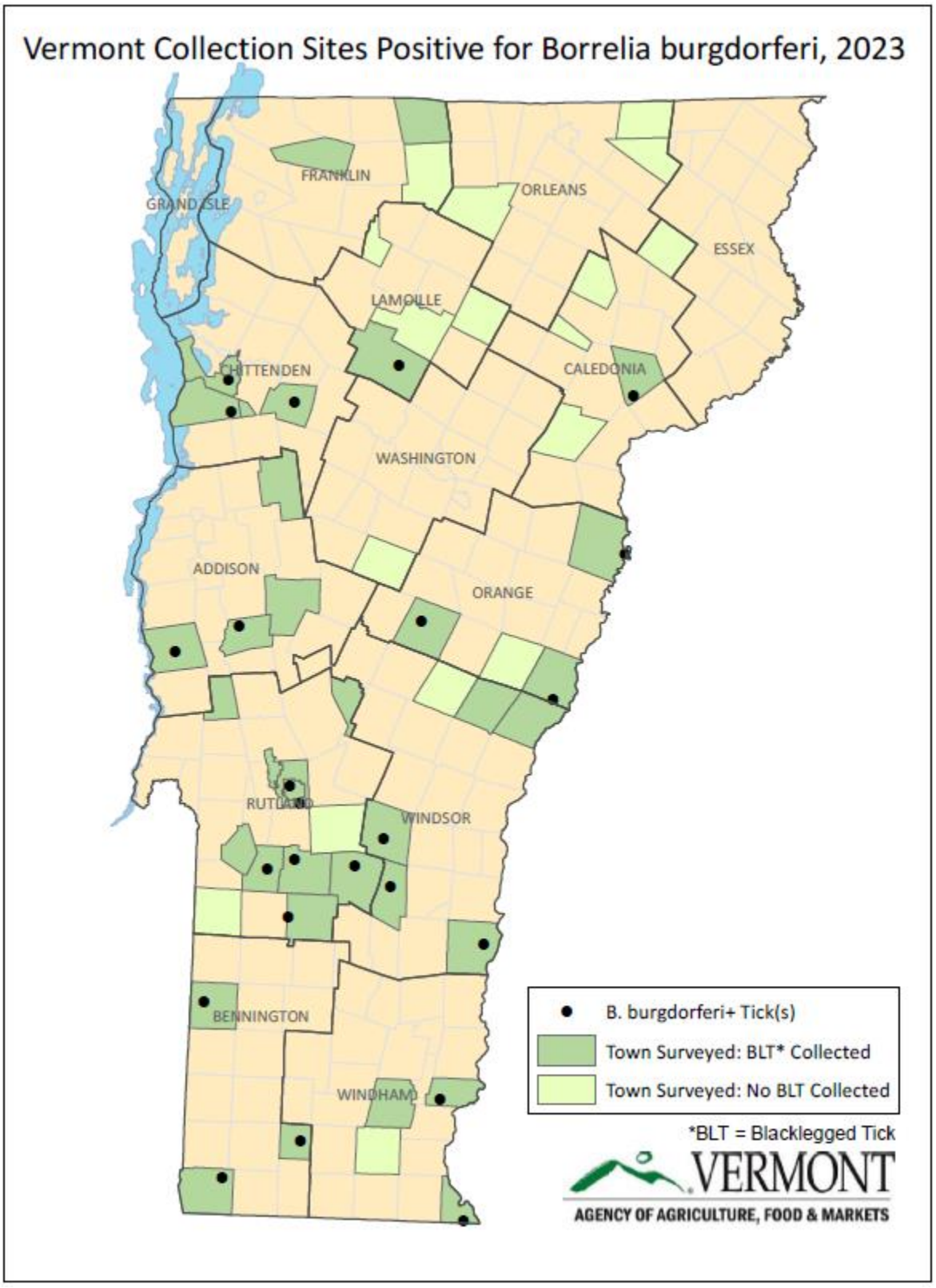


Figure 2. Vermont Collection Sites Positive for *Anaplasma phagocytophilum* (Anaplasmosis), 2023

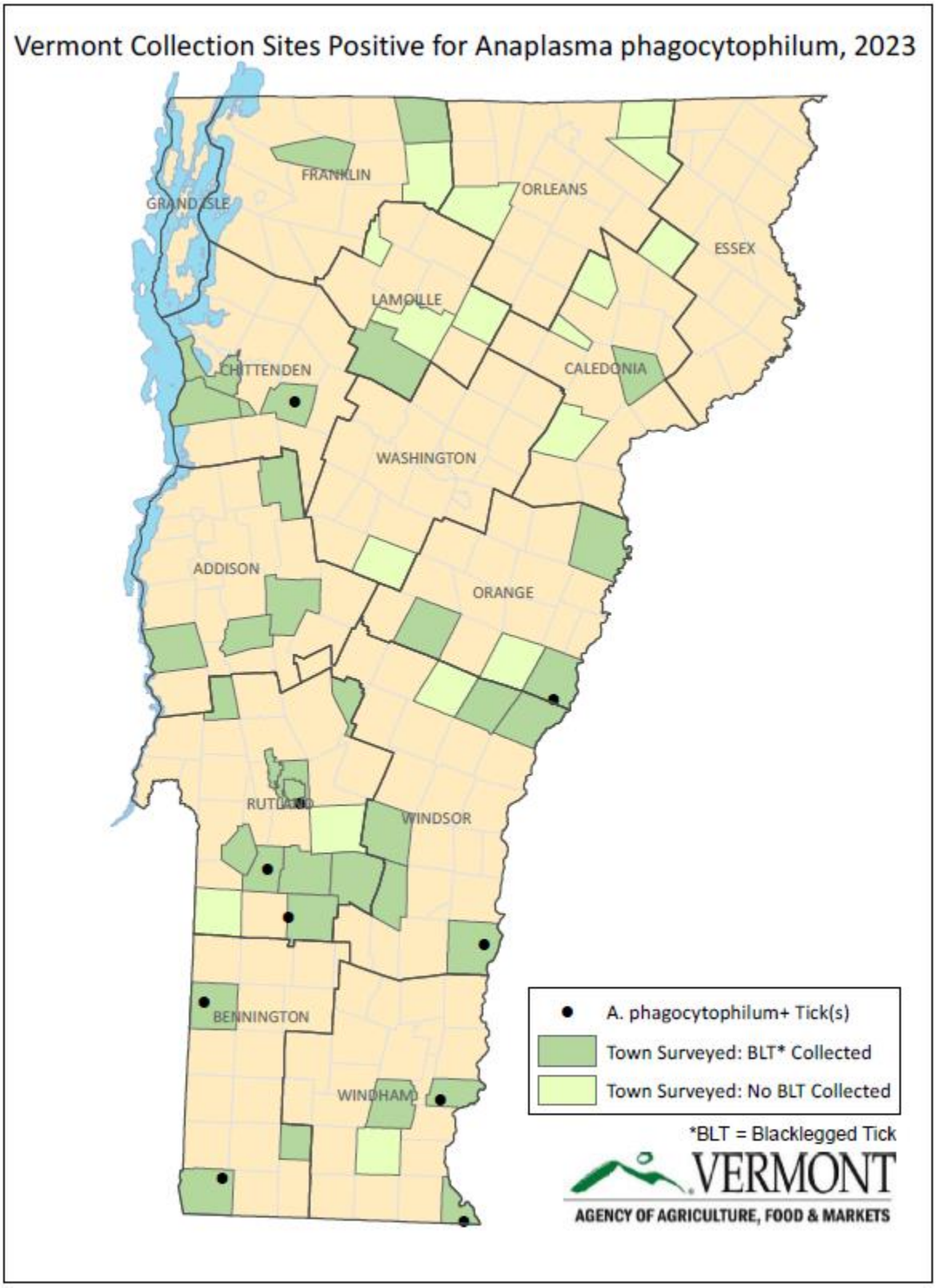
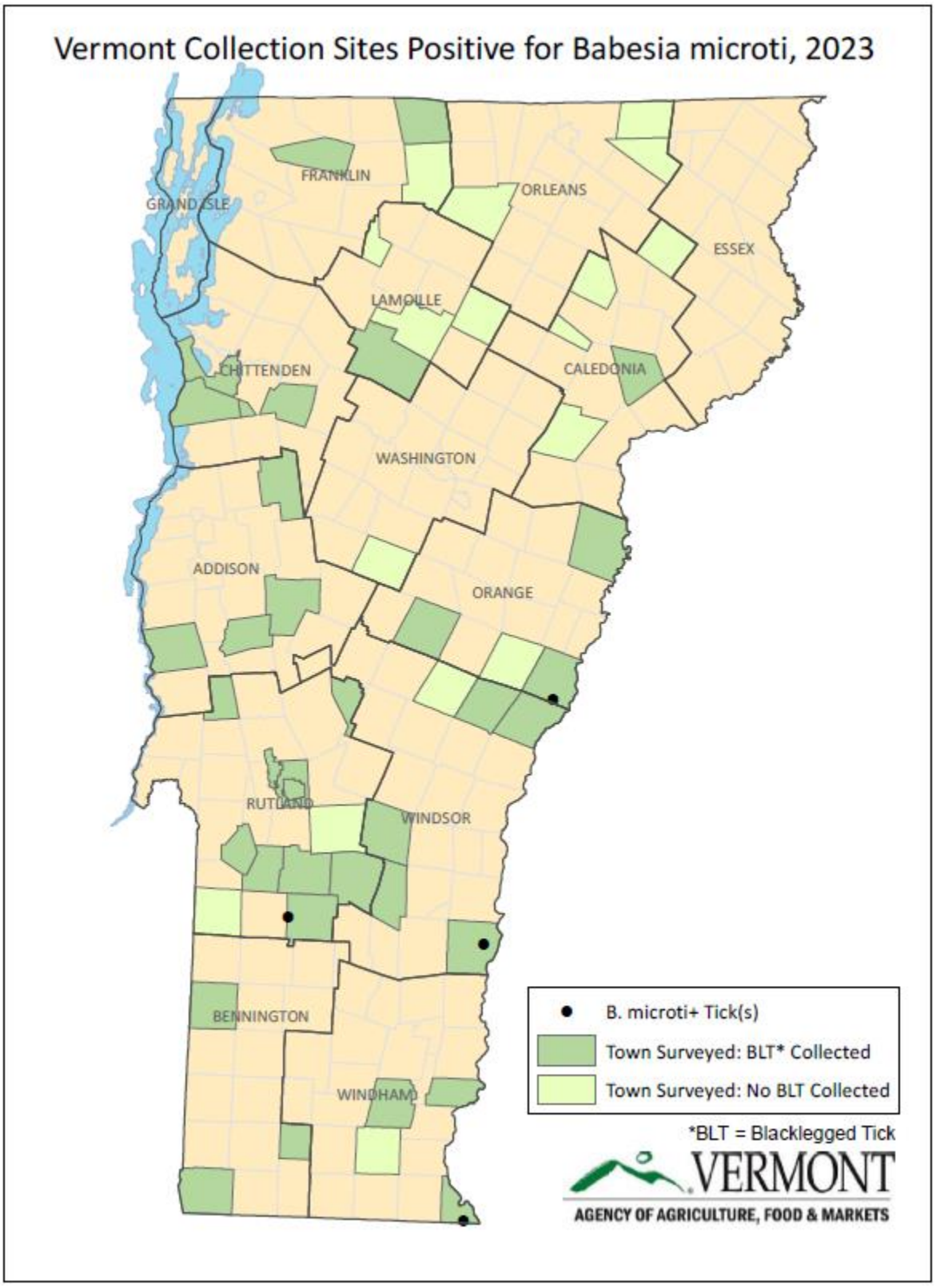


Figure 3. Vermont Collection Sites Positive for *Babesia microti* (Babesiosis), 2023



American Dog Tick (*Dermacentor variabilis*) Collections in Vermont, 2023

American Dog ticks (*Dermacentor variabilis*) are a common tick in Vermont. All American Dog ticks collected during 2023 were collected during the spring surveillance season (mid-May through mid-June).

Town	County	# American Dog Ticks Collected
Mt Tabor	Rutland	6
Newark	Caledonia	6
Newbury	Orange	1
Pawlet	Rutland	1
Peacham	Caledonia	4
Pownal	Bennington	1
Putney	Windham	1
Randolph	Orange	8
Roxbury	Washington	2
Salisbury	Addison	2
Shelburne	Chittenden	3
Shoreham	Addison	1
Springfield	Windsor	4
Stowe	Lamoille	1
Strafford	Orange	2