

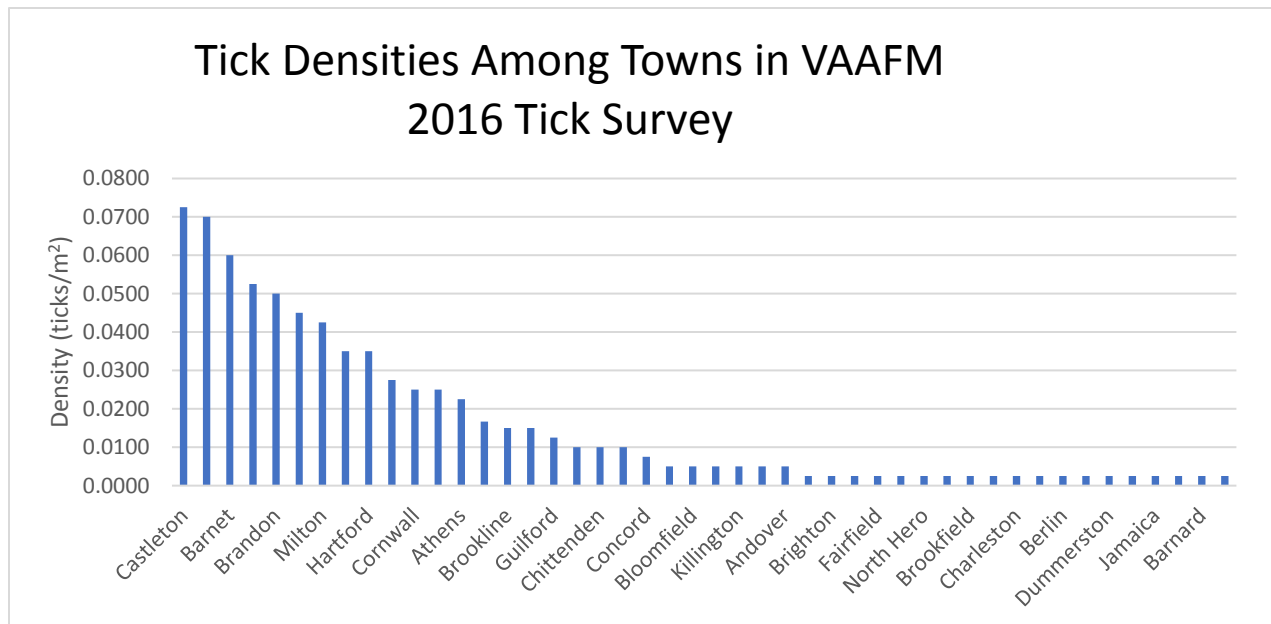
2016 Vermont Survey for Tick-Borne Diseases

In 2016, the Vermont Agency of Agriculture, Food & Markets (VAAFM) did a statewide survey for ticks in the spring and fall and tested for 5 tick-borne pathogens: *Borrelia burgdorferi*, *Anaplasma phagocytophilum*, *Babesia microti*, *Borrelia miyamotoi*, and deer tick virus (a variant of Powassan virus). A total of 85 towns were surveyed, representing towns from each of Vermont's 14 counties. A single site in each town was randomly 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-m² 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 244 ticks collected during the 2016 season.

Table 1. Results of 2016 Tick Testing in Vermont

	Pathogens Found	# Ticks	% Infected
Bo	<i>Borrelia burgdorferi</i>	130	53.28
An	<i>Anaplasma phagocytophilum</i>	16	6.56
Ba	<i>Babesia microti</i>	3	1.23
Bm	<i>Borrelia miyamotoi</i>	0	0
DTV	Deer Tick virus	3	1.23
	Co-Infections		
	An-Ba	1	0.41
	An-Ba-Bo	1	0.41
	An-Bo	52	21.31
	Ba-Bo	3	1.23
	Bo-DTV	2	0.82

Figure 1. Tick Densities in Selected Vermont Towns



All transects in the same town were combined to obtain tick densities. A density of 0.25 ticks/m² means there was an average of 1 tick every 4 m² (43 ft²). An additional 40 towns, not shown on this graph, were sampled and no ticks were collected in the transects.

Table 2. Vermont Town Tick Densities (Ticks/m²)

Town	Area Sampled (m ²)	# Ticks Collected	Density (ticks/m ²)
Addison	400	0	0.000
Albany	400	0	0.000
Alburgh	400	0	0.000
Andover	400	2	0.005
Arlington	200	14	0.070
Athens	400	9	0.023
Averill	400	0	0.000
Bakersfield	400	0	0.000
Baltimore	400	6	0.015
Barnard	400	1	0.003
Barnet	400	24	0.060
Barre City	400	0	0.000
Barre Town	400	2	0.005
Barton	400	0	0.000
Belvidere	400	0	0.000
Benson	400	2	0.005
Berkshire	400	1	0.003
Berlin	400	1	0.003
Bloomfield	400	2	0.005
Bolton	400	21	0.053
Bradford	400	4	0.010
Braintree	400	0	0.000
Brandon	400	20	0.050
Bridgewater	400	0	0.000
Bridport	400	11	0.028
Brighton	400	1	0.003
Bristol	400	2	0.005
Brookfield	400	1	0.003
Brookline	400	6	0.015
Brownington	400	0	0.000
Brunswisck	400	0	0.000
Buel's Gore	400	0	0.000
Burke	400	10	0.025
Burlington	400	0	0.000
Cabot	400	1	0.003
Cambridge	400	1	0.003
Castleton	400	29	0.073
Charleston	400	1	0.003
Charlotte	400	0	0.000
Chelsea	400	1	0.003
Chittenden	400	4	0.010
Clarendon	400	14	0.035
Concord	400	3	0.008

Town	Area Sampled (m ²)	# Ticks Collected	Density (ticks/m ²)
Corinth	400	0	0.000
Cornwall	400	10	0.025
Coventry	400	0	0.000
Danby	400	4	0.010
Danville	400	0	0.000
Dorset	600	10	0.017
Dover	200	0	0.000
Dummerston	400	1	0.003
Duxbury	400	0	0.000
East Haven	400	0	0.000
Eden	400	0	0.000
Elmore	400	0	0.000
Enosburgh	400	0	0.000
Fair Haven	400	1	0.003
Fairfield	400	1	0.003
Fayston	400	1	0.003
Ferrisburgh	400	0	0.000
Franklin	400	0	0.000
Glastenbury	400	0	0.000
Goshen	400	0	0.000
Grafton	400	1	0.003
Grand Isle	400	1	0.003
Granville	400	0	0.000
Groton	400	0	0.000
Guilford	400	5	0.013
Hardwick	400	0	0.000
Hartford	400	14	0.035
Hyde Park	400	0	0.000
Jamaica	400	1	0.003
Jay	400	0	0.000
Jericho	400	18	0.045
Johnson	400	0	0.000
Killington	400	2	0.005
Kirby	400	0	0.000
Landgrove	400	1	0.003
Marlboro	400	1	0.003
Milton	400	17	0.043
North Hero	400	1	0.003
Orange	400	0	0.000
Peru	400	0	0.000
Readsboro	400	0	0.000
Rochester	400	0	0.000

Figure 2. Vermont Collection Sites Positive for *Borrelia burgdorferi* (Lyme disease)

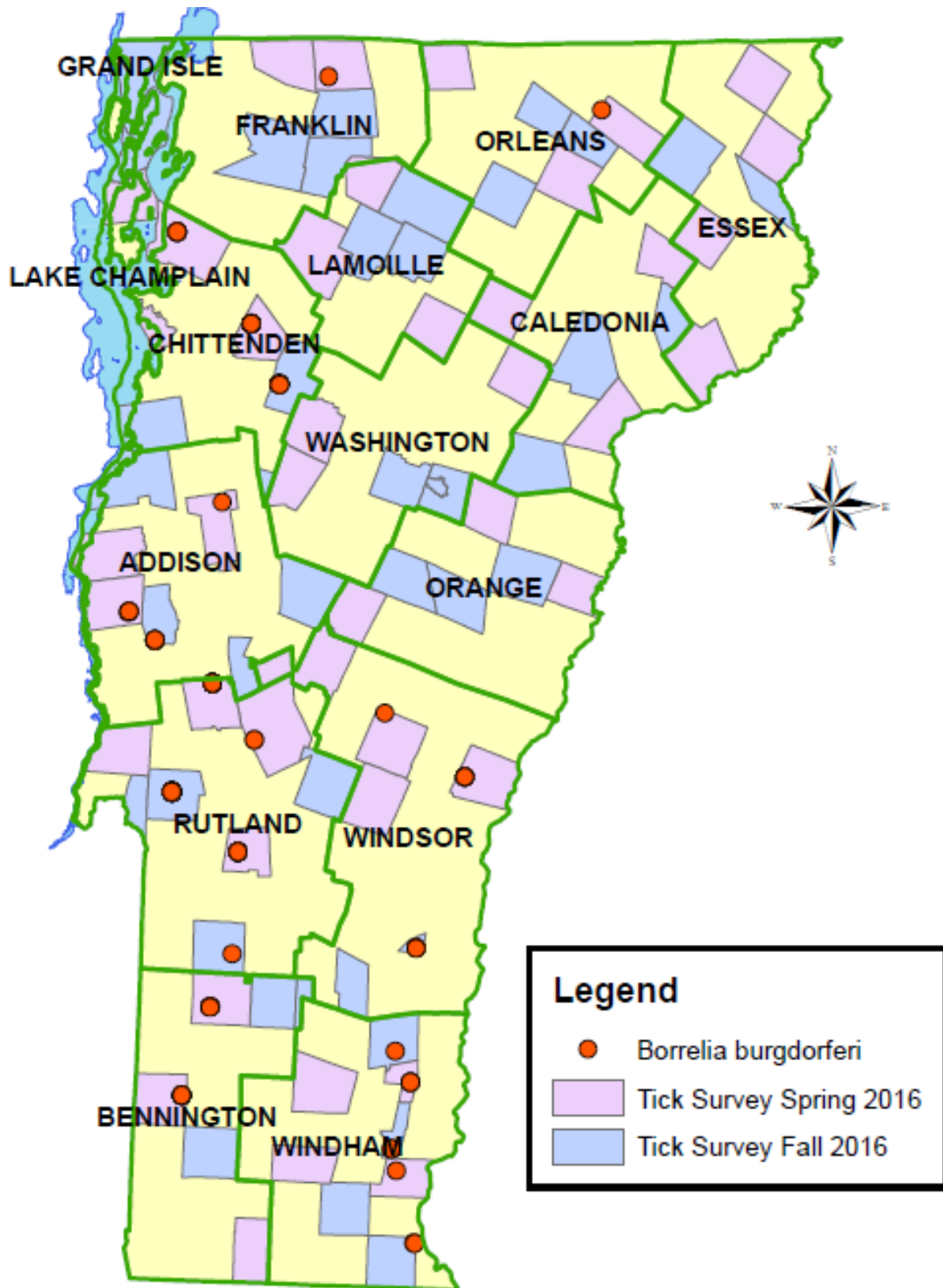


Figure 3. Vermont Collection Sites Positive for *Anaplasma phagocytophilum* (Anaplasmosis)

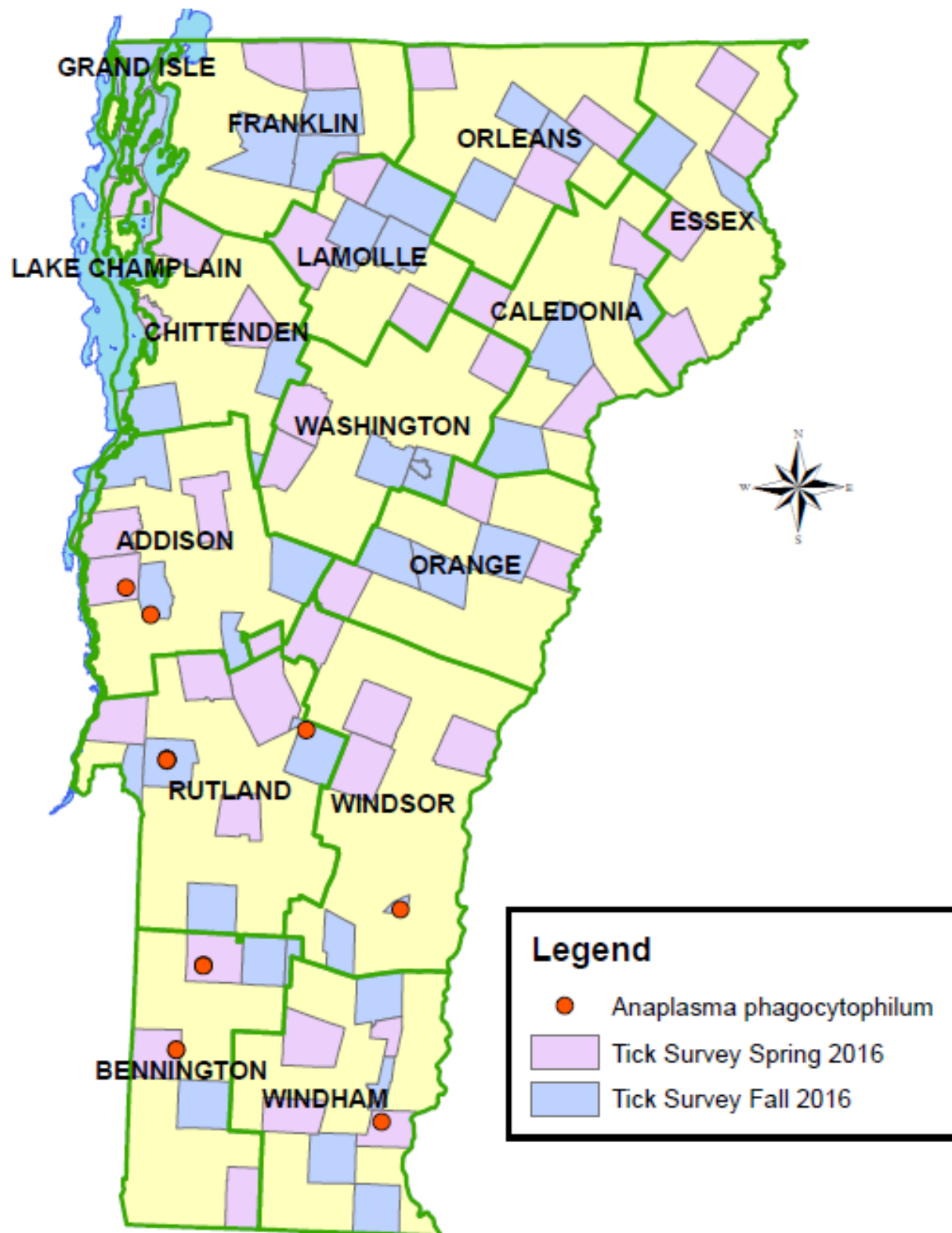


Figure 4. Vermont Collection Sites Positive for *Babesia microti* (Babesiosis)

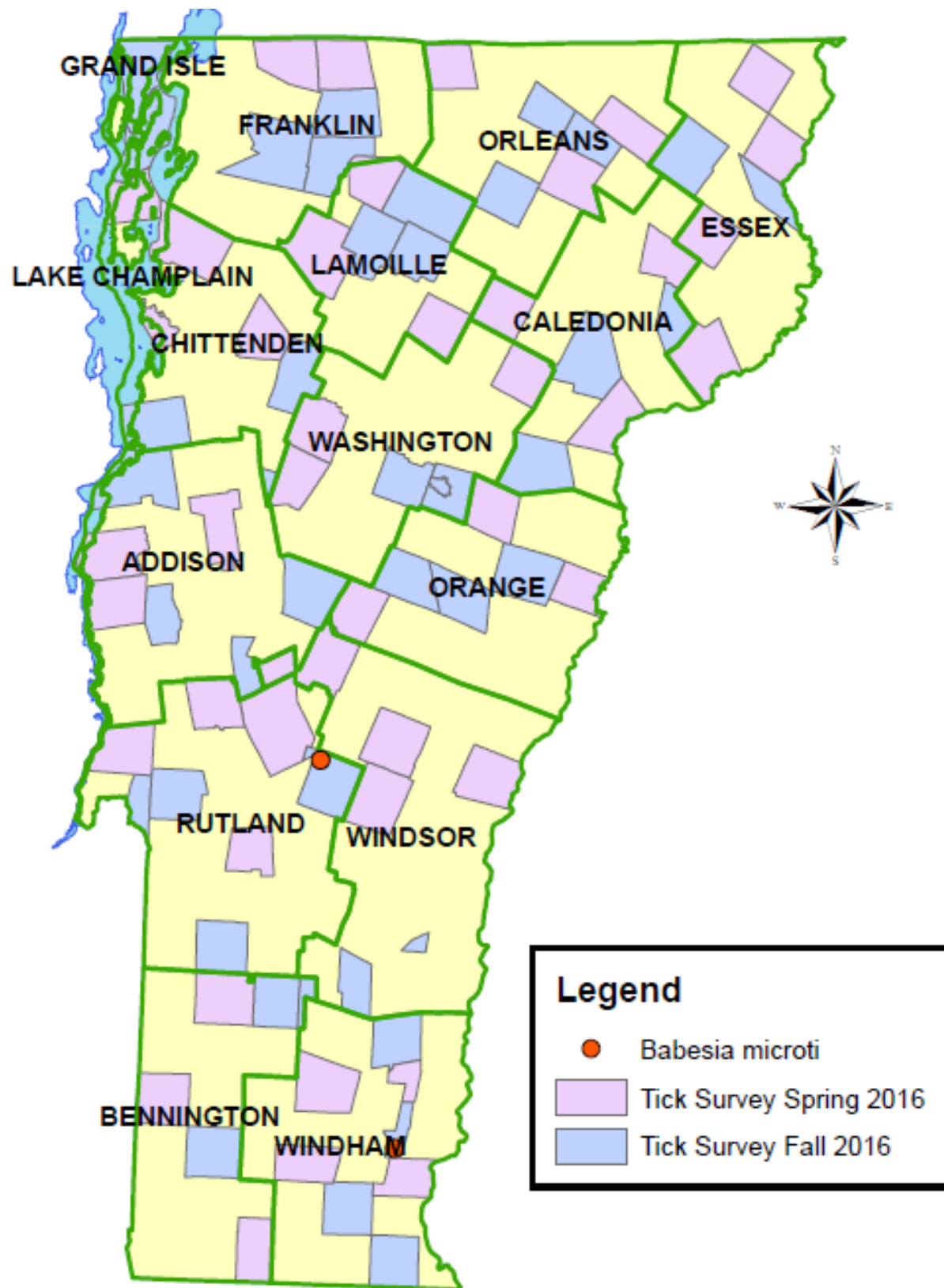


Figure 5. Vermont Collection Sites Positive for Deer Tick Virus (Variant of Powassan Virus)

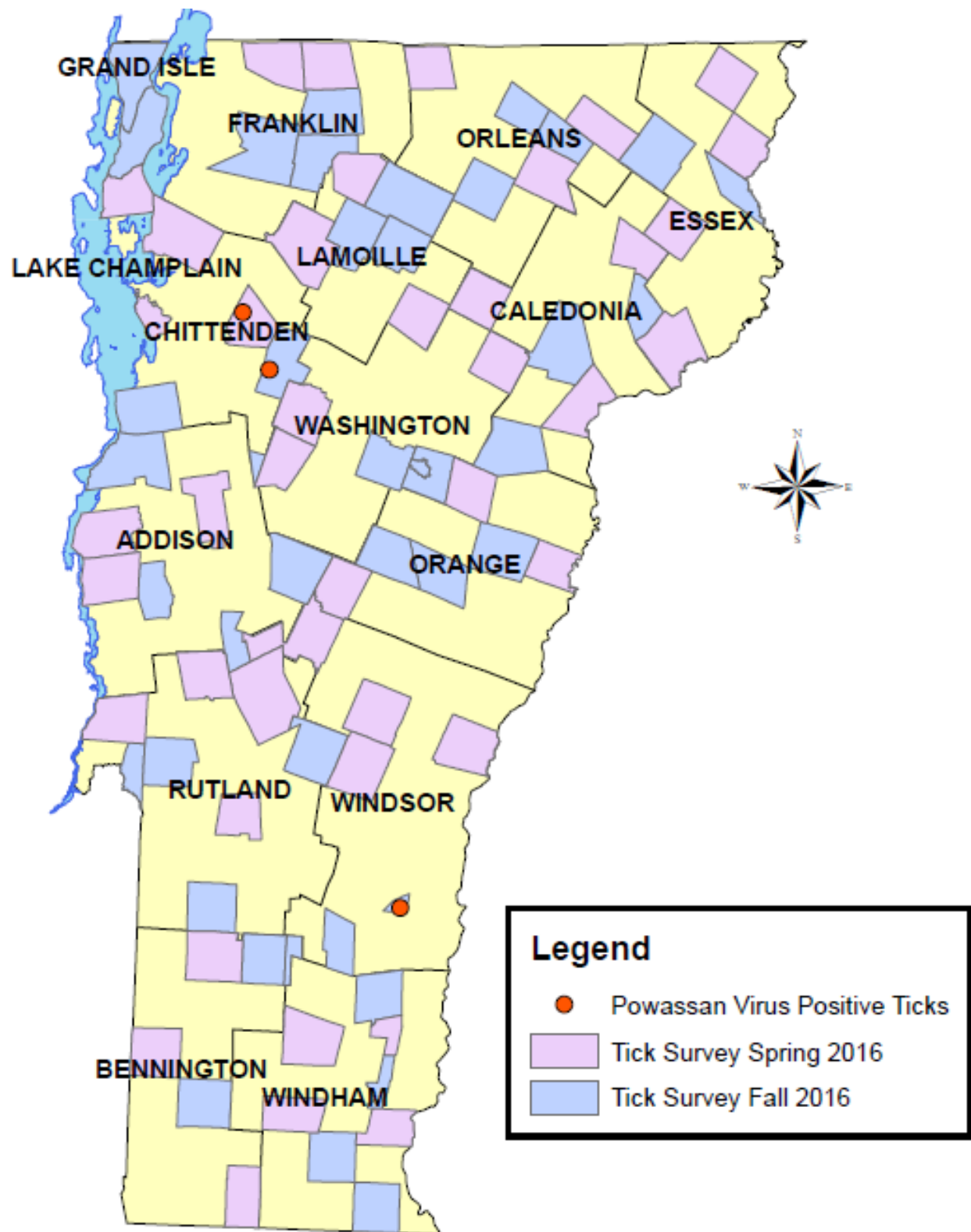


Table 3. Risk for Tick Pathogens by Vermont Town

Town	<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>	Deer Tick Virus	% Deer Tick Virus
Addison									
Albany									
Alburgh									
Andover									
Arlington	11	78.57%	2	14.29%					
Athens	4	44.44%							
Averill									
Bakersfield									
Baltimore	6	100.00%	1	16.67%				1	16.67%
Barnard	1	100.00%							
Barnet									
Barre City									
Barre Town									
Barton									
Belvidere									
Benson									
Berkshire	1	100.00%							
Berlin									
Bloomfield									
Bolton	11	52.38%						1	4.76%
Bradford									
Braintree									
Brandon	14	70.00%							
Bridgewater									
Bridport	6	54.55%	1	9.09%					
Brighton									
Bristol									
Brookfield									
Brookline	2	33.33%			1	16.67%			
Brownington									
Brunswick									
Buel's Gore									
Burke									
Burlington									
Cabot									
Cambridge									
Castleton	17	58.62%	6	20.69%					
Charleston	1	100.00%							
Charlotte									
Chelsea									
Chittenden	2	50.00%							
Clarendon	9	64.29%							
Concord									
Corinth									
Cornwall	7	70.00%	1	10.00%					
Coventry									
Danby	1	25.00%							

Town	<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>	Deer Tick Virus	% Deer Tick Virus
Danville									
Dorset	7	70.00%	3	30.00%					
Dover									
Dummerston	1	100.00%	1	100.00%					
Duxbury									
East Haven									
Eden									
Elmore									
Enosburgh									
Fair Haven									
Fairfield									
Fayston									
Ferrisburgh									
Franklin									
Glastenbury									
Goshen									
Grafton	1	100.00%							
Grand Isle									
Granville									
Groton									
Guilford	2	40.00%							
Hardwick									
Hartford	7	50.00%							
Hyde Park									
Jamaica									
Jay									
Jericho	13	72.22%						1	5.55%
Johnson									
Killington			1	50.00%	2	100.00%			
Kirby									
Landgrove									
Marlboro									
Milton	6	35.29%							
North Hero									
Orange									
Peru									
Readsboro									
Rochester									

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