

2017 Mosquito Surveillance Report

Vermont Agency of Agriculture, Food & Markets
116 State Street
Montpelier, VT 05602

Compiled by Eliza Doncaster

The Vermont Agency of Agriculture, Food & Markets (VAAFAM) conducted a statewide survey of mosquitoes from June 05 through October 13, looking for West Nile Virus (WNV) and Eastern Equine Encephalitis (EEE) presence in the state. Mosquitoes were collected from 103 permanent trap site locations in 82 towns across the state. Three types of traps were used: resting box traps, reduced CDC light traps, and gravid traps. Resting box traps (RBTs) target the main vector of EEE. Reduced CDC light traps were collocated with RBTs at wetland locations, and were used as a sensing tool of the species present. Gravid traps were set at wastewater treatment facilities, targeting the main vector of WNV. Collections were made weekly and brought to the lab in Berlin. The collections were identified to species and the vector species were pooled into vials of 1 to 50 mosquitoes. The mosquito pool samples were sent to the Vermont Department of Health for arbovirus testing.

In addition to WNV and EEE surveillance, *Aedes albopictus* (the mosquito known to transmit the Zika virus) surveillance was conducted in southern Vermont. BG Sentinel traps and Oviposition cup traps were used. No *Aedes albopictus* was found.

2017 At-A-Glance Mosquito Arbovirus Data

- 89 mosquito pool samples were positive for West Nile Virus
- No Eastern Equine Encephalitis was found

2017 At-A-Glance Mosquito Surveillance Data

- Trapping season began June 05 and ended October 13
- Number of trap locations: 103
- All 14 counties in Vermont were surveyed (statewide coverage)
- Total towns trapped: 84
- CDC, Resting Box, and Gravid trap sites were surveyed for 19 weeks (CDC weeks 23 through 41)
- 2 BG Sentinel Trap sites were set up in southern Vermont for 19 weeks to survey for *Aedes albopictus*, the mosquito known to transmit the Zika virus; no *Ae albopictus* was found
- 9 oviposition-trap sites were set up in southern Vermont to survey for *Aedes albopictus* for 8 weeks within July 14 to September 21; again, no *Aedes albopictus* was found

2017 At-A-Glance Species Statistics

- Number of mosquitoes collected: 108,288
- Number of mosquitoes tested for arbovirus: 78,078
- Number of species collected: 26
- Number of species tested for arbovirus: 14
- The first *Culex erraticus* adult mosquito was found in Vermont

2017 Arbovirus Surveillance Findings

Figure 1. 2017 Towns with West Nile Virus positive pool samples

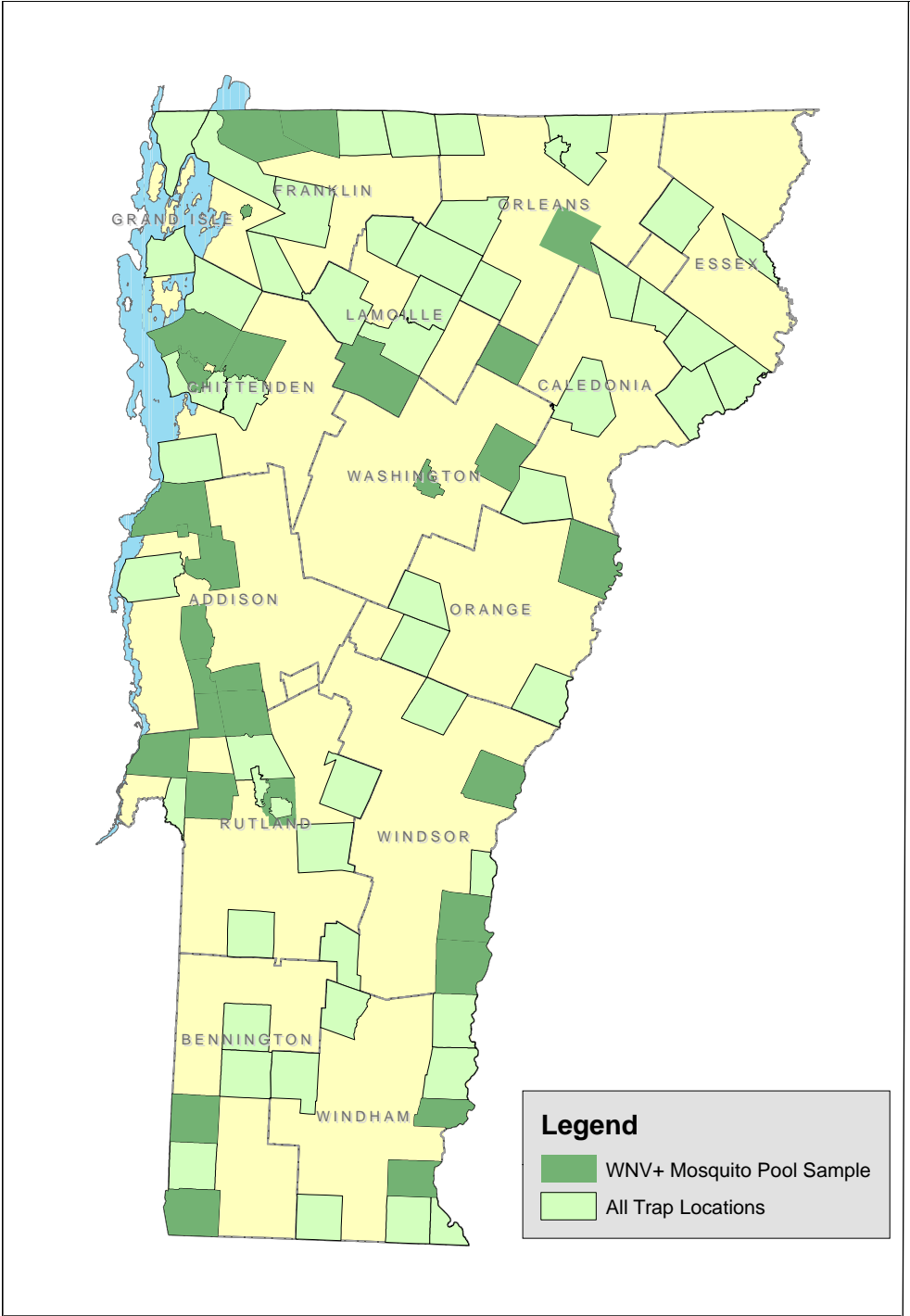


Table 1. 2017 Arbovirus testing results by CDC week number

CDC Week #	Beginning Sunday	Batches Tested	EEE+ Samples	WNV+ Samples	Cumulative Batches
24	11-Jun	0	-	-	0
25	18-Jun	125	-	-	125
26	25-Jun	181	-	-	306
27	02-Jul	162	-	1	468
28	09-Jul	185	-	2	653
29	16-Jul	250	-	2	903
30	23-Jul	338	-	1	1241
31	30-Jul	353	-	8	1593
32	06-Aug	405	-	6	1998
33	13-Aug	457	-	22	2455
34	20-Aug	457	-	21	2912
35	27-Aug	243	-	12	3155
36	03-Sep	243	-	5	3398
37	10-Sep	216	-	2	3614
38	17-Sep	118	-	1	3732
39	24-Sep	162	-	3	3894
40	01-Oct	216	-	-	4110
41	08-Oct	196	-	3	4306

Eastern Equine Encephalitis

- Number of mosquitoes tested for EEE: 78,078
- Total number of mosquito pool samples tested: 4,306
- Number of species tested for EEE: 14
- No EEE-positive mosquito pools were identified in Vermont in 2017

West Nile Virus

- Number of mosquitoes tested for WNV: 78,078
- Total number of mosquito pool samples tested: 4,306
- Number of species tested for WNV: 14
- Number of WNV-positive mosquito pools: 89
- WNV-positive mosquito pools were found in 30 towns
- WNV was found in mosquito pool samples containing *Aedes cinereus*, *Aedes vexans*, *Anopheles punctipennis*, *Anopheles quadrimaculatus*, *Coquillettidia perturbans*, a mixture of *Culex pipiens/restuans*, *Culex territans*, *Culiseta melanura*, *Culiseta morsitans*, *Ochlerotatus canadensis*, *Ochlerotatus japonicus*, and *Ochlerotatus trivittatus*.
- The first WNV-positive mosquito pool sample was collected on 04 July
- The last WNV-positive mosquito pool sample was collected on 11 October
- Essex had sustained WNV activity for 5 consecutive weeks. Montpelier had sustained WNV activity for 4 weeks. Rutland had sustained WNV activity for 3 weeks.

Table 2. 2017 West Nile Virus-positive statistics

Date Collected	Genus species	County	Town
4-Jul	Cx pipiens-restuans*	Windsor	Weathersfield
11-Jul	Cx pipiens-restuans	Windham	Brattleboro
11-Jul	Cx pipiens-restuans	Caledonia	Hardwick
18-Jul	Cx pipiens-restuans	Windsor	Springfield
21-Jul	Cq perturbans	Chittenden	Colchester
25-Jul	Cs melanura	Franklin	Franklin
1-Aug	Cx pipiens-restuans	Windsor	Springfield
1-Aug	Cx pipiens-restuans	Windsor	Weathersfield
3-Aug	Cq perturbans	Chittenden	Colchester
3-Aug	Cx pipiens-restuans	Chittenden	Essex
3-Aug	Cx pipiens-restuans	Chittenden	Essex
3-Aug	Cx pipiens-restuans	Chittenden	Essex
3-Aug	Cx pipiens-restuans	Addison	Vergennes
3-Aug	Oc japonicus	Chittenden	Essex
8-Aug	Cx pipiens-restuans	Addison	Ferrisburgh
8-Aug	Cx pipiens-restuans	Windham	Putney
8-Aug	Cx pipiens-restuans	Windsor	Springfield
9-Aug	An punctipennis	Rutland	Sudbury
10-Aug	Cq perturbans	Franklin	Highgate
10-Aug	Cx pipiens-restuans	Chittenden	Essex
14-Aug	Cq perturbans	Rutland	Benson
14-Aug	Cx pipiens-restuans	Rutland	Rutland
15-Aug	Cx pipiens-restuans	Windsor	Hartford
16-Aug	Ae cinereus	Addison	Whiting
16-Aug	Ae cinereus	Addison	Whiting
16-Aug	Ae vexans	Addison	Whiting
16-Aug	Cs morsitans	Orleans	Barton
16-Aug	Cs morsitans	Addison	New Haven
16-Aug	Cx pipiens-restuans	Chittenden	Burlington
16-Aug	Cx pipiens-restuans	Lamoille	Stowe
16-Aug	Cx pipiens-restuans	Addison	Vergennes
18-Aug	Cq perturbans	Bennington	Pownal
18-Aug	Cq perturbans	Bennington	Shaftsbury
18-Aug	Cs melanura	Franklin	Highgate
18-Aug	Cx pipiens-restuans	Chittenden	Essex
18-Aug	Cx pipiens-restuans	Chittenden	Essex
18-Aug	Cx pipiens-restuans	Chittenden	Essex
18-Aug	Cx pipiens-restuans	Chittenden	Essex
18-Aug	Cx pipiens-restuans	Franklin	St. Albans City

18-Aug	Cx pipiens-restuans	Franklin	St. Albans City
18-Aug	Oc canadensis	Bennington	Pownal
18-Aug	Oc canadensis	Bennington	Shaftsbury
21-Aug	Oc japonicus	Rutland	Rutland
22-Aug	Cq perturbans	Washington	Marshfield
22-Aug	Cq perturbans	Orange	Newbury
22-Aug	Cx pipiens-restuans	Washington	Montpelier
22-Aug	Cx pipiens-restuans	Washington	Montpelier
22-Aug	Cx pipiens-restuans	Washington	Montpelier
22-Aug	Cx pipiens-restuans	Windsor	Springfield
22-Aug	Cx pipiens-restuans	Windsor	Springfield
22-Aug	Cx pipiens-restuans	Windsor	Springfield
22-Aug	Cx pipiens-restuans	Windsor	Springfield
22-Aug	Oc japonicus	Windsor	Springfield
23-Aug	Cs melanura	Franklin	Franklin
23-Aug	Cs melanura	Addison	New Haven
23-Aug	Cs morsitans	Addison	New Haven
24-Aug	An quadrimaculatus	Addison	Ferrisburgh
24-Aug	Cx pipiens-restuans	Chittenden	Burlington
24-Aug	Cx pipiens-restuans	Chittenden	Burlington
24-Aug	Cx pipiens-restuans	Chittenden	Essex
24-Aug	Cx pipiens-restuans	Chittenden	Essex
24-Aug	Cx pipiens-restuans	Chittenden	Essex
24-Aug	Cx pipiens-restuans	Franklin	Highgate
28-Aug	Cx pipiens-restuans	Rutland	Rutland
29-Aug	Cx pipiens-restuans	Windsor	Springfield
30-Aug	Cx pipiens-restuans	Windsor	Hartford
30-Aug	Cx pipiens-restuans	Windsor	Hartford
30-Aug	Cx pipiens-restuans	Windsor	Hartford
30-Aug	Cx pipiens-restuans	Windsor	Hartford
30-Aug	Cx pipiens-restuans	Windsor	Hartford
30-Aug	Cx pipiens-restuans	Washington	Montpelier
30-Aug	Cx pipiens-restuans	Washington	Montpelier
30-Aug	Oc trivittatus	Addison	Cornwall
1-Sep	Cx pipiens-restuans	Chittenden	Essex
1-Sep	Cx pipiens-restuans	Chittenden	Essex
3-Sep	Cs melanura	Addison	Leicester
6-Sep	Cx pipiens-restuans	Washington	Montpelier
6-Sep	Cx pipiens-restuans	Washington	Montpelier
6-Sep	Cx pipiens-restuans	Washington	Montpelier
6-Sep	Oc japonicus	Washington	Montpelier

12-Sep	Cx pipiens-restuans	Washington	Montpelier
14-Sep	Cx pipiens-restuans	Chittenden	Burlington
19-Sep	Cx pipiens-restuans	Windsor	Springfield
25-Sep	Cs melanura	Addison	Whiting
26-Sep	Cs melanura	Rutland	Castleton
26-Sep	Cx pipiens-restuans	Rutland	Rutland
11-Oct	An punctipennis	Addison	Whiting
11-Oct	Cs morsitans	Addison	Whiting
11-Oct	Cx territans	Rutland	Brandon

*Cx pipiens-restuans: mix of Culex pipiens and Culex restuans

2017 Mosquito Surveillance Locations

Table 3. 2017 Towns trapped (n=84)

Town	County
Addison	Addison
Alburgh	Grand Isle
Bakersfield	Franklin
Barton	Orleans
Belvidere	Lamoille
Bennington	Bennington
Benson	Rutland
Berkshire	Franklin
Brandon	Rutland
Brattleboro	Windham
Brighton	Essex
Brookfield	Orange
Brunswick	Essex
Burke	Caledonia
Burlington	Chittenden
Cambridge	Lamoille
Castleton	Rutland
Charlotte	Chittenden
Colchester	Chittenden
Concord	Essex
Cornwall	Addison
Craftsbury	Orleans
Danby	Rutland
Danville	Caledonia
Derby	Orleans
Eden	Lamoille
Essex	Chittenden
Fair Haven	Rutland

Town	County
Fairfax	Franklin
Fairfield	Franklin
Ferrisburgh	Addison
Franklin	Franklin
Grand Isle	Grand Isle
Groton	Caledonia
Hardwick	Caledonia
Hartford	Windsor
Highgate	Franklin
Hyde Park	Lamoille
Jay	Orleans
Killington	Rutland
Leicester	Addison
Londonderry	Windham
Lowell	Orleans
Lunenburg	Essex
Manchester	Bennington
Marshfield	Washington
Milton	Chittenden
Montpelier	Washington
Morrisville	Lamoille
New Haven	Addison
Newbury	Orange
Newport City	Orleans
Pittsford	Rutland
Pownal	Bennington
Proctor	Rutland
Putney	Windham

Town	County
Randolph	Orange
Richford	Franklin
Rockingham	Windham
Royalton	Windsor
Rutland	Rutland
Shaftsbury	Bennington
Sharon	Windsor
Shrewsbury	Rutland
South Burlington	Chittenden
Springfield	Windsor
St. Albans City	Franklin
Stowe	Lamoille
Stratton	Windham
Sudbury	Rutland
Sunderland	Bennington
Sutton	Caledonia
Swanton	Franklin
Thetford	Orange
Vergennes	Addison
Vernon	Windham
Victory	Essex
Weathersfield	Windsor
Westminster	Windham
Weston	Windsor
Whiting	Addison
Whitingham	Windham
Williston	Chittenden
Windsor	Windsor

2017 Mosquito Species Statistics

Table 4. 2017 Mosquitoes species collected and tested for West Nile Virus and Eastern Equine Encephalitis Virus

Species	Collected (No.)	Collected (% of total)	Tested for WNV* (No.)	Tested for WNV (% of total)	Tested for EEE* (No.)	Tested for EEE (% of total)
<i>Culex pipiens-restuans</i>	23,749	21.93%	20,294	25.99%	20,294	25.99%
<i>Coquillettidia perturbans</i>	18,091	16.71%	16,365	20.96%	16,365	20.96%
<i>Anopheles punctipennis</i>	12,332	11.39%	10,275	13.16%	10,275	13.16%
<i>Ochlerotatus canadensis</i>	10,926	10.09%	7,809	10.00%	7,809	10.00%
<i>Ochlerotatus sticticus</i>	9,529	8.80%	0	0.00%	0	0.00%
<i>Anopheles quadrimaculatus</i>	5,725	5.29%	4,846	6.21%	4,846	6.21%
<i>Ochlerotatus trivittatus</i>	4,563	4.21%	3,934	5.04%	3,934	5.04%
<i>Culex territans</i>	4,192	3.87%	2,135	2.73%	2,135	2.73%
<i>Aedes cinereus</i>	3,364	3.11%	2,447	3.13%	2,447	3.13%
<i>Ochlerotatus japonicus</i>	3,055	2.82%	2,710	3.47%	2,710	3.47%
<i>Culiseta melanura</i>	2,864	2.64%	2,851	3.65%	2,851	3.65%
<i>Aedes vexans</i>	2,685	2.48%	2,391	3.06%	2,391	3.06%
<i>Culiseta morsitans</i>	1,923	1.78%	1,815	2.32%	1,815	2.32%
<i>Ochlerotatus stimulans</i>	1,846	1.70%	0	0.00%	0	0.00%
<i>Anopheles walkeri</i>	1,719	1.59%	25	0.03%	25	0.03%
<i>Psorophora ferox</i>	475	0.44%	0	0.00%	0	0.00%
<i>Ochlerotatus triseriatus</i>	326	0.30%	0	0.00%	0	0.00%
<i>Ochlerotatus provocans</i>	303	0.28%	0	0.00%	0	0.00%
<i>Culex salinarius</i>	270	0.25%	180	0.23%	180	0.23%
<i>Uranotaenia sapphirina</i>	128	0.12%	0	0.00%	0	0.00%
<i>Ochlerotatus fitchii</i>	111	0.10%	0	0.00%	0	0.00%
<i>Anopheles earlei</i>	84	0.08%	0	0.00%	0	0.00%
<i>Ochlerotatus excrucians</i>	16	0.01%	0	0.00%	0	0.00%
<i>Ochlerotatus intrudens</i>	10	0.01%	0	0.00%	0	0.00%
<i>Culex erraticus</i>	1	0.00%	0	0.00%	0	0.00%
<i>Culiseta minnesotae</i>	1	0.00%	1	0.00%	1	0.00%
Totals	108,288	100.00%	78,078	100.00%	78,078	100.00%

*EEE: Eastern Equine Encephalitis; WNV: West Nile Virus