

2018 Mosquito Surveillance Report

The Vermont Agency of Agriculture, Food & Markets (VAAFAM) conducted a statewide survey of mosquitoes from June 04 through October 12, looking for West Nile Virus (WNV) and Eastern Equine Encephalitis (EEE) presence in the state. Mosquitoes were collected from 102 permanent trap site locations in 83 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 two towns in southern Vermont. BG Sentinel traps were used. No *Aedes albopictus* was found.

2018 At-A-Glance Mosquito Arbovirus Data

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

2018 At-A-Glance Mosquito Surveillance Data

- Trapping season began June 04 and ended October 12
- Number of trap locations: 102
- All 14 counties in Vermont were surveyed (statewide coverage)
- Total towns trapped: 83
- 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

2018 At-A-Glance Species Statistics

- Number of mosquitoes collected: 75,637
- Number of mosquitoes tested for arbovirus: 52,003
- Number of species collected: 30
- Number of species tested for arbovirus: 14

2018 Arbovirus Surveillance Findings

Figure 1. 2018 Towns with West Nile Virus positive pool samples

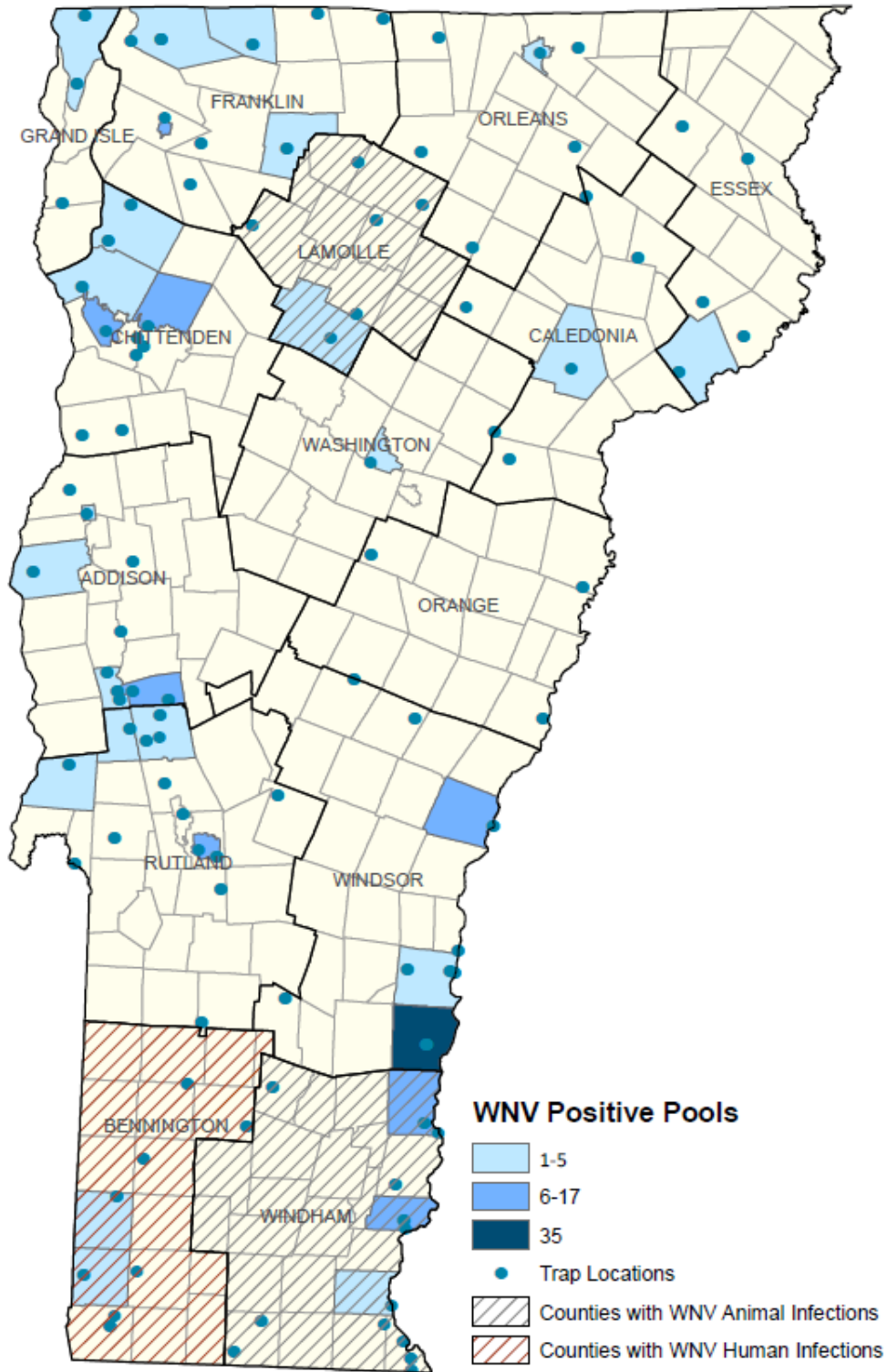


Table 1. 2018 Arbovirus testing results by CDC week number

CDC Week #	Beginning Sunday	Batches Tested	EEE+ Samples	WNV+ Samples	Cumulative Batches
23	3-Jun	60	0	0	60
24	10-Jun	95	0	0	155
25	17-Jun	239	0	5	394
26	24-Jun	199	0	0	593
27	1-Jul	227	0	0	820
28	8-Jul	208	0	3	1028
29	15-Jul	229	0	17	1257
30	22-Jul	200	0	5	1457
31	29-Jul	219	0	14	1676
32	5-Aug	157	0	22	1833
33	12-Aug	188	0	14	2021
34	19-Aug	147	0	10	2168
35	26-Aug	212	0	19	2380
36	2-Sep	170	0	18	2550
37	9-Sep	149	0	13	2699
38	16-Sep	120	0	11	2819
39	23-Sep	92	0	2	2911
40	30-Sep	38	0	4	2949
41	7-Oct	48	0	0	2997

Eastern Equine Encephalitis

- Number of mosquitoes tested for EEE: 52,003
- Total number of mosquito pool samples tested: 2,997
- Number of species tested for EEE: 14
- No EEE-positive mosquito pools were identified in Vermont in 2018

West Nile Virus

- Number of mosquitoes tested for WNV: 52,003
- Total number of mosquito pool samples tested: 2,997
- Number of species tested for WNV: 14
- Number of WNV-positive mosquito pools: 157
- 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*, *Culiseta melanura*, *Culiseta morsitans*, *Ochlerotatus canadensis*, *Ochlerotatus japonicus*, and *Ochlerotatus trivittatus*.
- The first WNV-positive mosquito pool sample was collected on 19 June

- The last WNV-positive mosquito pool sample was collected on 02 October
- Springfield had sustained WNV activity for 5 consecutive weeks. Essex and Rockingham had sustained WNV activity for 4 weeks. Hartford had sustained WNV activity for 3 weeks.

Rapid Response Mosquito Collections

In September, a WNV-related animal death prompted rapid response mosquito trapping at the site. Gravid traps and CDC light traps were set for 4 nights over two weeks. 78 mosquitoes were collected and separated into 26 pools for testing.

Table 2. 2018 West Nile Virus-positive statistics

Date Collected	Genus species	Town	County
19-Jun	Cx pipiens-restuans	Springfield	Windsor
19-Jun	Cx pipiens-restuans	Springfield	Windsor
19-Jun	Cx pipiens-restuans	Springfield	Windsor
19-Jun	Cx pipiens-restuans	Springfield	Windsor
19-Jun	Cx pipiens-restuans	Springfield	Windsor
9-Jul	An quadrimaculatus	Sudbury	Rutland
10-Jul	Cx pipiens-restuans	Springfield	Windsor
10-Jul	Oc japonicus	Springfield	Windsor
16-Jul	Oc japonicus	Hartford	Windsor
17-Jul	Cx pipiens-restuans	Rockingham	Windham
17-Jul	Cx pipiens-restuans	Weathersfield	Windsor
17-Jul	Cx pipiens-restuans	Springfield	Windsor
17-Jul	Cx pipiens-restuans	Springfield	Windsor
17-Jul	Oc japonicus	Springfield	Windsor
17-Jul	Cx pipiens-restuans	Springfield	Windsor
17-Jul	Cx pipiens-restuans	Springfield	Windsor
17-Jul	Cx pipiens-restuans	Springfield	Windsor
17-Jul	Cx pipiens-restuans	Springfield	Windsor
17-Jul	Oc japonicus	Springfield	Windsor
17-Jul	Cx pipiens-restuans	Danville	Caledonia
18-Jul	Cs melanura	Milton	Chittenden
18-Jul	Cs melanura	Colchester	Chittenden
18-Jul	Cs melanura	Alburgh	Grand Isle
18-Jul	An quadrimaculatus	Alburgh	Grand Isle
19-Jul	Cs melanura	Franklin	Franklin
23-Jul	Cx pipiens-restuans	Burlington	Chittenden
24-Jul	Cx pipiens-restuans	Brattleboro	Windham
24-Jul	Cx pipiens-restuans	Springfield	Windsor
24-Jul	Cx pipiens-restuans	Rockingham	Windham
26-Jul	Cx pipiens-restuans	Essex	Chittenden

30-Jul	Cx pipiens-restuans	Montpelier	Washington
30-Jul	Cx pipiens-restuans	Vergennes	Addison
30-Jul	Cx pipiens-restuans	Burlington	Chittenden
30-Jul	Cx pipiens-restuans	Brandon	Rutland
31-Jul	Cx pipiens-restuans	Putney	Windham
31-Jul	Cx pipiens-restuans	Springfield	Windsor
31-Jul	Cx pipiens-restuans	Rutland	Rutland
2-Aug	Cx pipiens-restuans	St Albans City	Franklin
2-Aug	Cx pipiens-restuans	St Albans City	Franklin
2-Aug	Cx pipiens-restuans	Essex	Chittenden
2-Aug	Cx pipiens-restuans	St Albans City	Franklin
3-Aug	Cq perturbans	Shaftsbury	Bennington
3-Aug	An punctipennis	Shaftsbury	Bennington
3-Aug	Cq perturbans	Bennington	Bennington
7-Aug	Cx pipiens-restuans	Springfield	Windsor
7-Aug	Cx pipiens-restuans	Rockingham	Windham
7-Aug	Cx pipiens-restuans	Brattleboro	Windham
7-Aug	Oc japonicus	Brattleboro	Windham
7-Aug	Cx pipiens-restuans	Springfield	Windsor
7-Aug	Cx pipiens-restuans	Springfield	Windsor
7-Aug	Cx pipiens-restuans	Springfield	Windsor
7-Aug	Cx pipiens-restuans	Springfield	Windsor
7-Aug	Cx pipiens-restuans	Springfield	Windsor
7-Aug	Oc japonicus	Springfield	Windsor
7-Aug	Cx pipiens-restuans	Putney	Windham
7-Aug	Cx pipiens-restuans	Putney	Windham
7-Aug	Cx pipiens-restuans	Putney	Windham
8-Aug	Cx pipiens-restuans	Rutland	Rutland
8-Aug	Cx pipiens-restuans	Rutland	Rutland
8-Aug	Oc japonicus	Rutland	Rutland
8-Aug	Cx pipiens-restuans	Highgate	Franklin
8-Aug	Cs melanura	Highgate	Franklin
8-Aug	Cq perturbans	Benson	Rutland
8-Aug	Cq perturbans	Benson	Rutland
8-Aug	Cq perturbans	Benson	Rutland
8-Aug	Cx pipiens-restuans	Essex	Chittenden
13-Aug	Cx pipiens-restuans	Hartford	Windsor
13-Aug	Cx pipiens-restuans	Burlington	Chittenden
14-Aug	Cx pipiens-restuans	Weathersfield	Windsor
14-Aug	Cx pipiens-restuans	Rockingham	Windham
15-Aug	Cx pipiens-restuans	Newport City	Orleans
15-Aug	Cx pipiens-restuans	St Albans City	Franklin
15-Aug	Cx pipiens-restuans	St Albans City	Franklin
15-Aug	Cx pipiens-restuans	St Albans City	Franklin
16-Aug	Ae vexans	Leicester	Addison
16-Aug	Cq perturbans	Leicester	Addison

16-Aug	Ae cinereus	Leicester	Addison
16-Aug	Oc trivittatus	Leicester	Addison
16-Aug	Ae vexans	Leicester	Addison
16-Aug	Cx pipiens-restuans	Leicester	Addison
20-Aug	Cx pipiens-restuans	Addison	Addison
20-Aug	Cx pipiens-restuans	Vergennes	Addison
20-Aug	Cx pipiens-restuans	Hartford	Windsor
20-Aug	Oc japonicus	Hartford	Windsor
20-Aug	Cs melanura	Leicester	Addison
21-Aug	Cx pipiens-restuans	Putney	Windham
21-Aug	Cx pipiens-restuans	Weathersfield	Windsor
23-Aug	Cx pipiens-restuans	Essex	Chittenden
23-Aug	Cx pipiens-restuans	Essex	Chittenden
24-Aug	Cx pipiens-restuans	Stowe	Lamoille
27-Aug	Cx pipiens-restuans	Hartford	Windsor
27-Aug	Cx pipiens-restuans	Vergennes	Addison
27-Aug	Cx pipiens-restuans	Burlington	Chittenden
27-Aug	Cx pipiens-restuans	Burlington	Chittenden
27-Aug	Cs morsitans	Whiting	Addison
28-Aug	Cx pipiens-restuans	Springfield	Windsor
28-Aug	Cx pipiens-restuans	Springfield	Windsor
28-Aug	Cx pipiens-restuans	Springfield	Windsor
28-Aug	Cx pipiens-restuans	Springfield	Windsor
28-Aug	Cx pipiens-restuans	Springfield	Windsor
28-Aug	Cx pipiens-restuans	Rockingham	Windham
28-Aug	Cx pipiens-restuans	Rutland	Rutland
28-Aug	Cx pipiens-restuans	Rutland	Rutland
29-Aug	Cx pipiens-restuans	Essex	Chittenden
29-Aug	Cx pipiens-restuans	Essex	Chittenden
29-Aug	Cx pipiens-restuans	Essex	Chittenden
29-Aug	Cx pipiens-restuans	St Albans City	Franklin
29-Aug	Cx pipiens-restuans	St Albans City	Franklin
29-Aug	Oc japonicus	St Albans City	Franklin
4-Sep	Cx pipiens-restuans	Burlington	Chittenden
4-Sep	Cx pipiens-restuans	Weathersfield	Windsor
4-Sep	Cx pipiens-restuans	Springfield	Windsor
4-Sep	Cx pipiens-restuans	Rutland	Rutland
4-Sep	Cx pipiens-restuans	Rutland	Rutland
4-Sep	Cx pipiens-restuans	Rockingham	Windham
4-Sep	Cx pipiens-restuans	Putney	Windham
4-Sep	Cx pipiens-restuans	Brandon	Rutland
4-Sep	Oc canadensis	Brandon	Rutland
4-Sep	Cx pipiens-restuans	Springfield	Windsor
4-Sep	Cx pipiens-restuans	Montpelier	Washington
6-Sep	Cx pipiens-restuans	Essex	Chittenden
6-Sep	Cx pipiens-restuans	Essex	Chittenden

6-Sep	Cx pipiens-restuans	Essex	Chittenden
6-Sep	Cx pipiens-restuans	Essex	Chittenden
6-Sep	Cx pipiens-restuans	Essex	Chittenden
6-Sep	Oc japonicus	Essex	Chittenden
7-Sep	Cs morsitans	Bakersfield	Franklin
9-Sep	Ae vexans	Whiting	Addison
9-Sep	Oc trivittatus	Leicester	Addison
9-Sep	Cs morsitans	Leicester	Addison
10-Sep	Cx pipiens-restuans	Vergennes	Addison
12-Sep	Cx pipiens-restuans	St Albans City	Franklin
12-Sep	Cx pipiens-restuans	St Albans City	Franklin
12-Sep	Cx pipiens-restuans	St Albans City	Franklin
12-Sep	Cx pipiens-restuans	Essex	Chittenden
12-Sep	Cx pipiens-restuans	Essex	Chittenden
12-Sep	Cx pipiens-restuans	Essex	Chittenden
12-Sep	Oc canadensis	Concord	Essex
12-Sep	Cx pipiens-restuans	Newport City	Orleans
14-Sep	Cs melanura	Franklin	Franklin
17-Sep	Cx pipiens-restuans	Hartford	Windsor
17-Sep	Oc japonicus	Hartford	Windsor
17-Sep	Cx pipiens-restuans	Burlington	Chittenden
17-Sep	Cx pipiens-restuans	Burlington	Chittenden
17-Sep	Cx pipiens-restuans	Vergennes	Addison
18-Sep	Cx pipiens-restuans	Putney	Windham
18-Sep	Cx pipiens-restuans	Springfield	Windsor
18-Sep	Cx pipiens-restuans	Rockingham	Windham
18-Sep	Cx pipiens-restuans	Brattleboro	Windham
18-Sep	Oc japonicus	Brattleboro	Windham
19-Sep	Cx pipiens-restuans	St Albans City	Franklin
28-Sep	Cx pipiens-restuans	Bennington	Bennington
28-Sep	Oc japonicus	Bennington	Bennington
2-Oct	Oc japonicus	Springfield	Windsor
2-Oct	Cx pipiens-restuans	Springfield	Windsor
2-Oct	Cx pipiens-restuans	Springfield	Windsor
2-Oct	Cx pipiens-restuans	Rockingham	Windham

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

2018 Mosquito Surveillance Locations

Table 3. 2018 Towns trapped (n=83)

Town	County	Town	County	Town	County
Addison	Addison	Fairfax	Franklin	Randolph	Orange
Alburgh	Grand Isle	Fairfield	Franklin	Richford	Franklin
Bakersfield	Franklin	Ferdinand	Essex	Rockingham	Windham
Barton	Orleans	Ferrisburgh	Addison	Royalton	Windsor
Belvidere	Lamoille	Grand Isle	Grand Isle	Rutland	Rutland
Bennington	Bennington	Groton	Caledonia	Shaftsbury	Bennington
Benson	Rutland	Hardwick	Caledonia	Shrewsbury	Rutland
Berkshire	Franklin	Hartford	Windsor	South Burlington	Chittenden
Brandon	Rutland	Highgate	Franklin	Springfield	Windsor
Brattleboro	Windham	Hyde Park	Lamoille	St. Albans City	Franklin
Brighton	Essex	Jay	Orleans	Stowe	Lamoille
Brookfield	Orange	Killington	Rutland	Stratton	Windham
Burke	Caledonia	Leicester	Addison	Sudbury	Rutland
Burlington	Chittenden	Londonderry	Windham	Sunderland	Bennington
Cambridge	Lamoille	Lowell	Orleans	Sutton	Caledonia
Castleton	Rutland	Lunenburg	Essex	Swanton	Franklin
Charlotte	Chittenden	Manchester	Bennington	Thetford	Orange
Colchester	Chittenden	Marshfield	Washington	Vergennes	Addison
Concord	Essex	Milton	Chittenden	Vernon	Windham
Cornwall	Addison	Montpelier	Washington	Victory	Essex
Craftsbury	Orleans	Morrisville	Lamoille	Weathersfield	Windsor
Danby	Rutland	New Haven	Addison	Westminster	Windham
Danville	Caledonia	Newbury	Orange	Weston	Windsor
Derby	Orleans	Newport City	Orleans	Whiting	Addison
Eden	Lamoille	Pittsford	Rutland	Whitingham	Windham
Enosburg	Franklin	Pownal	Bennington	Williston	Chittenden
Essex	Chittenden	Proctor	Rutland	Windsor	Windsor
Fair Haven	Rutland	Putney	Windham		

2018 Mosquito Species Statistics

Table 4. 2018 Mosquitoes species collected and tested for West Nile Virus and Eastern Equine Encephalitis Virus

Species	Collected (No.)	Collected (% of total)	Tested for WNV and EEE (No.)	Tested for WNV and EEE (% of total)
<i>Coquilletidia perturbans</i>	24,923	32.95%	16,324	31.39%
<i>Culex pipiens-restuans</i>	23,374	30.90%	19,264	37.04%
<i>Anopheles quadrimaculatus</i>	3,756	4.97%	3,104	5.97%
<i>Anopheles punctipennis</i>	3,071	4.06%	1,670	3.21%
<i>Culiseta melanura</i>	2,666	3.52%	2,666	5.13%
<i>Ochlerotatus sticticus</i>	2,522	3.33%	0	0.00%
<i>Ochlerotatus japonicus</i>	2,442	3.23%	2,164	4.16%
<i>Ochlerotatus canadensis</i>	2,159	2.85%	2,159	4.15%
<i>Anopheles walkeri</i>	1,774	2.35%	0	0.00%
<i>Ochlerotatus trivittatus</i>	1,750	2.31%	1,547	2.97%
<i>Aedes cinereus</i>	1,616	2.14%	1,239	2.38%
<i>Culex territans</i>	1,329	1.76%	555	1.07%
<i>Ochlerotatus stimulans</i>	965	1.28%	0	0.00%
<i>Culiseta morsitans</i>	724	0.96%	724	1.39%
<i>Aedes vexans</i>	687	0.91%	530	1.02%
<i>Ochlerotatus fitchii</i>	466	0.62%	0	0.00%
<i>Psorophora ferox</i>	393	0.52%	0	0.00%
<i>Ochlerotatus provocans</i>	230	0.30%	0	0.00%
<i>Ochlerotatus triseriatus</i>	192	0.25%	51	0.10%
<i>Ochlerotatus aurifer</i>	184	0.24%	0	0.00%
<i>Ochlerotatus excrucians</i>	118	0.16%	0	0.00%
<i>Uranotaenia sapphirina</i>	87	0.12%	1	0.00%
<i>Anopheles earlei</i>	65	0.09%	0	0.00%
<i>Culex salinarius</i>	65	0.09%	5	0.01%
<i>Ochlerotatus communis</i>	57	0.08%	0	0.00%
<i>Ochlerotatus species</i>	13	0.02%	0	0.00%
<i>Ochlerotatus abserratus</i>	3	0.00%	0	0.00%
<i>Ochlerotatus atropalpus</i>	3	0.00%	0	0.00%
<i>Ochlerotatus diantaeus</i>	1	0.00%	0	0.00%
<i>Ochlerotatus intrudens</i>	1	0.00%	0	0.00%
<i>Ochlerotatus punctor</i>	1	0.00%	0	0.00%
Total	75,637		52,003	