VECTOR SURVEILLANCE IN NEW JERSEY

EEE, WNV, SLE, LAC, DENV, CHIK and ZIKV

Prepared by Lisa M. Reed and Dina Fonseca
Center for Vector Biology, Rutgers University

CDC WEEK 36: 3 September to 9 September, 2017

This New Jersey Agricultural Experiment Station report is supported by Rutgers University, Hatch funds, funding from the NJ State Mosquito Control Commission and with the participation of the Department of Health, Department of Agriculture and of the 21 county mosquito control agencies of New Jersey.

Culiseta melanura and Eastern Equine Encephalitis

SITE/Boxes	Inland or Coastal	Historic Population Mean	Current Weekly Mean	Total Tested* (Collected)	Total Pools Tested* (Submitted)	EEE Isolation Pools	MFIR
Bass River (Burlington Co.)/5	**Coastal**	0.74	0.80	14 (18)	4 (5)		
Green Bank (Burlington Co.)/18	**Coastal**	3.41	0.76	114 (133)	8 (9)		
Corbin City (Atlantic Co.)/25	**Coastal**	2.36	1.56	223 (262)	14 (15)		
Dennisville (Cape May Co.)/50	**Coastal**	5.07	0.02	98	10		
Winslow (Camden Co.)/50	**Inland**	1.59	0.72	813	24		
Centerton (Salem Co.)/50	**Inland**	2.97	2.18	526	20	3	5.70
Turkey Swamp (Monmouth Co.)/50	**Inland**	1.95	0.28	183 (197)	13 (14)		
Glassboro (Gloucester Co.)/50	**Inland**	0.51	0.62	158	14		

*Current week (in parentheses) results pending. ‡ corrected from previous week NC=no collection

Remarks: A total of seven positive EEE pools have been detected in a *Culiseta melanura*. The latest two positives were found at the Centerton resting box site. One horse cases was previously reported in Cumberland County. NOTE: Despite impending cooler weather, due diligence is required as *Culiseta melanura* is a cold tolerant species and will be active late into the season.

Statewide, 5,220 *Cs. melanura* from 436 pools have been tested, with seven positive pools detected for an overall *Cs. melanura* MFIR of 1.341. 9,986 specimens from 16 other species have also been tested, with no positives detected. Overall MFIR for all species statewide is 0.460.

Traditional Resting Box Sites: 2,129 *Cs. melanura* from 107 pools have been tested for EEE, with 76 additional *Cs. melanura* from 4 pools to be tested. Three positive pools were detected at the Centerton site; the last two positive pools were collected 6 Sept.

	Additional *Cs. melanura* trapped by counties *traps with positives indicated in **BOLD.**				
County	**Trap types***	**Pools**	**Mosquitoes**	**Positives**	**MFIR**
Atlantic	GR, LT, RB	27	342		
Burlington	CO_2, **UVLT**	42	1331	2	1.50
Cape May	GR, RB	132	506	1	1.98
Cumberland	LT, RB	11	94	1	10.64
Gloucester	RB	39	299		
Middlesex	RB	17	295		
Monmouth	CDC	1	1		
Morris	ABC	1	1		
Ocean	GR, LT, RB	16	43		
Passaic	RB	3	3		
Salem	LT	4	34		
Sussex	ABC, BGS, GR, RB	35	129		
Warren	LT	1	13		
TOTAL		**329**	**3091**	**4**	**1.29**

Additional County-set *Cs. melanura*: Counties maintain trap sites for *Cs. melanura* in other areas, using a variety of traps. Previously, four positive pools were collected from county-set sites - Cape May and Cumberland counties were both collected on 17 Aug. First county-set detection occurred in Burlington County UVLTs.

Horses and Humans: One horse has been detected with EEE in New Jersey. This was a 5 yo mare from Cumberland County, with onset date of 23 Aug, euthanized on 28 Aug. There was no vaccination history. Nearly all of the horse cases from previous years include those horses who were either not vaccinated or had incomplete vaccination histories. ***Horse owners are urged to make sure their horses are up to date on their vaccinations. Horse cases are known to occur through October and sometimes into November (see link below).*** Other sensitive species are non-native birds, such as Ostriches/Emus and Gallinaceous birds such as pheasants of Eurasian origins.

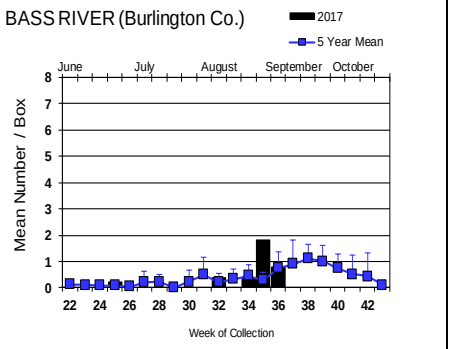
Horses and Vaccinations: The fate of unvaccinated equids reinforces the necessity of maintaining a vaccination schedule for arboviruses. For vaccination schedules recommended by the American Association of Equine Practices, see: http://www.aaep.org/vaccination_guidelines.htm

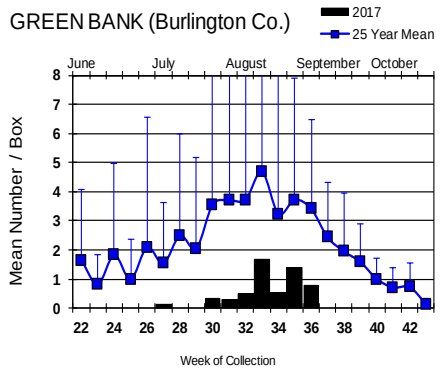
Additional Species: Sixteen additional species were tested for EEE. No additional positives were detected. Previously reported *Aedes provocans* was re-assigned to *Anopheles punctipennis.*

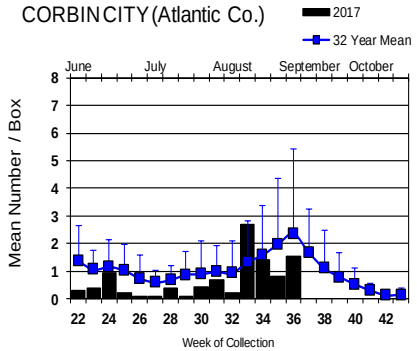
Species other than *Cs. melanura*	Pools	Mosquitoes	Positives	MFIR
Aedes canadensis canadensis	6	61		
Aedes cantator	10	26		
Aedes japonicus	2	20		
Aedes sollicitans	7	25		
Aedes taeniorhynchus	1	8		
Aedes triseriatus	1	4		
Aedes vexans	3	113		
Anopheles bradleyi	109	773		
Anopheles crucians	2	18		
Anopheles punctipennis	30	240		
Anopheles quadrimaculatus	14	177		
Coquillettidia perturbans	73	1353		
Culex erraticus	54	922		
Culex pipiens	562	4777		
Culex salinarius	215	1342		
Culex sp.	32	118		
Psorophora cyanescens	1	1		
Psorophora ferox	2	8		
State Total	**1124**	**9986**		

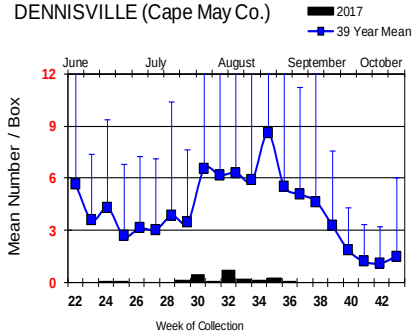
Culiseta melanura Population Graphs

Coastal

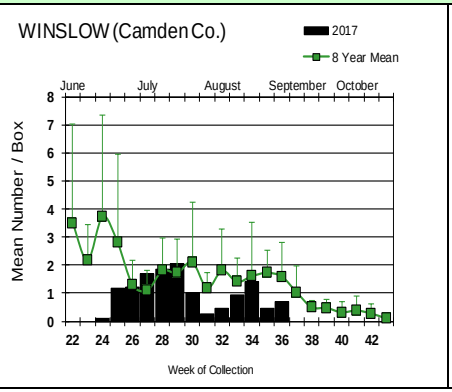


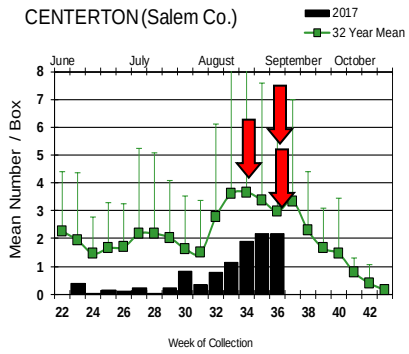


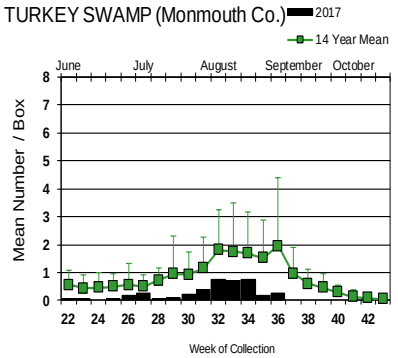


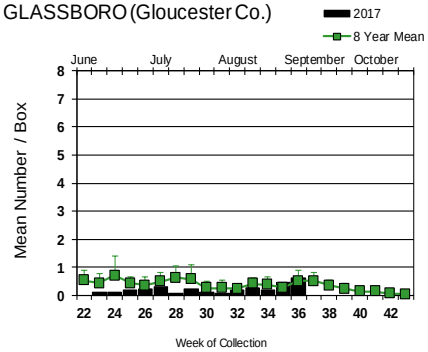


Inland









Three detections of EEE has occurred at Centerton, the last two collected 6 September. Mosquito populations at the traditional resting box sites increased or did not change at 5 out of the 8 locations. One positive horse was previously reported and due diligence should be continued even when temperatures decrease – *Culiseta melanura* is a cold tolerant species. Positive pools continue to be in the southern half of the state..

= Positive pool(s) detected (red = melanura, purple = other species).

EEE in US (2017 cumulative cases): (Black or Red = previous + new reported cases occurring)

- equine: FL(2/1 deer) GA(4) LA(2) MI(2) NC(1) OH(1) SC(5) TX(1) WI(10)
- mosquito pools: MA(1) NJ(7) NY(25) RI(2)
- sentinel: FL(29) TX(6)
- human:

West Nile Virus Positive Organisms in US, 2017

West Nile in US (2017 cumulative cases): Single black values indicate no change from previous week. Black values / red values equals previous week/New totals.
Note: Data reported by all states should be considered provisional and subject to change. Sources for this table can be found here.

	Birds	Mosquito Pools	Sentinels	Horses	Humans
Alabama					14/20
Alaska					
Arizona	0	135/245		0	404/50
Arkansas				0	6
California	264/298	2545/2828	155/189	9/10	87/108
Colorado	5	70/125		1/5	6/21
Connecticut		79/100			0
Delaware					
DC					
Florida	1	2	25/39		0
Georgia		0		1	7/19
Hawaii					
Idaho		108/113		5	3/6
Illinois	14	1525/1680			16/18
Indiana	0	420/494		5	6
Iowa	1	39/56		1	4/5
Kansas		13		0	6
Kentucky				5/6	4
Louisiana	27/36	373/378			28/33
Maine		0		0	0
Maryland					
Mass.		217/246		0	1
Michigan	148	86		9/13	4
Minnesota					3/13
Mississippi		214/220		1	37/47
Missouri		0		1/2	8

	Birds	Mosquito Pools	Sentinels	Horses	Humans
Montana					7
Nebraska	1	54/69		0	26/30
Nevada					6/24
New Hampshire		4		0	0
New Jersey		411/498		0	1
New Mexico					2/9
New York		865/1003			3/5
North Carolina					2
North Dakota	11	15		1	45
Ohio		600			1/7
Oklahoma					12/13
Oregon		53/66		5	5
Pennsylvania	25	2223		0	4
Rhode Island		2		0	0
South Carolina	7	42			5
South Dakota	2	55			10/49
Tennessee					3/12
Texas		786		2	48/56
Utah		268/336		4	8/9
Vermont					
Virginia				1	1/5
Washington	1/3	22/30		7	0
West Virginia					
Wisconsin	74/76	28/35		6/12	1/2
Wyoming				1	1

* Can include other species (e.g., dogs, cows) reported positive.

Protocol: New Jersey Department of Health (NJDH Public Health Environmental and Agricultural Laboratories, PHEAL) and the Cape May County Department of Mosquito Control tests mosquito pools using RT-PCR Taqman techniques.

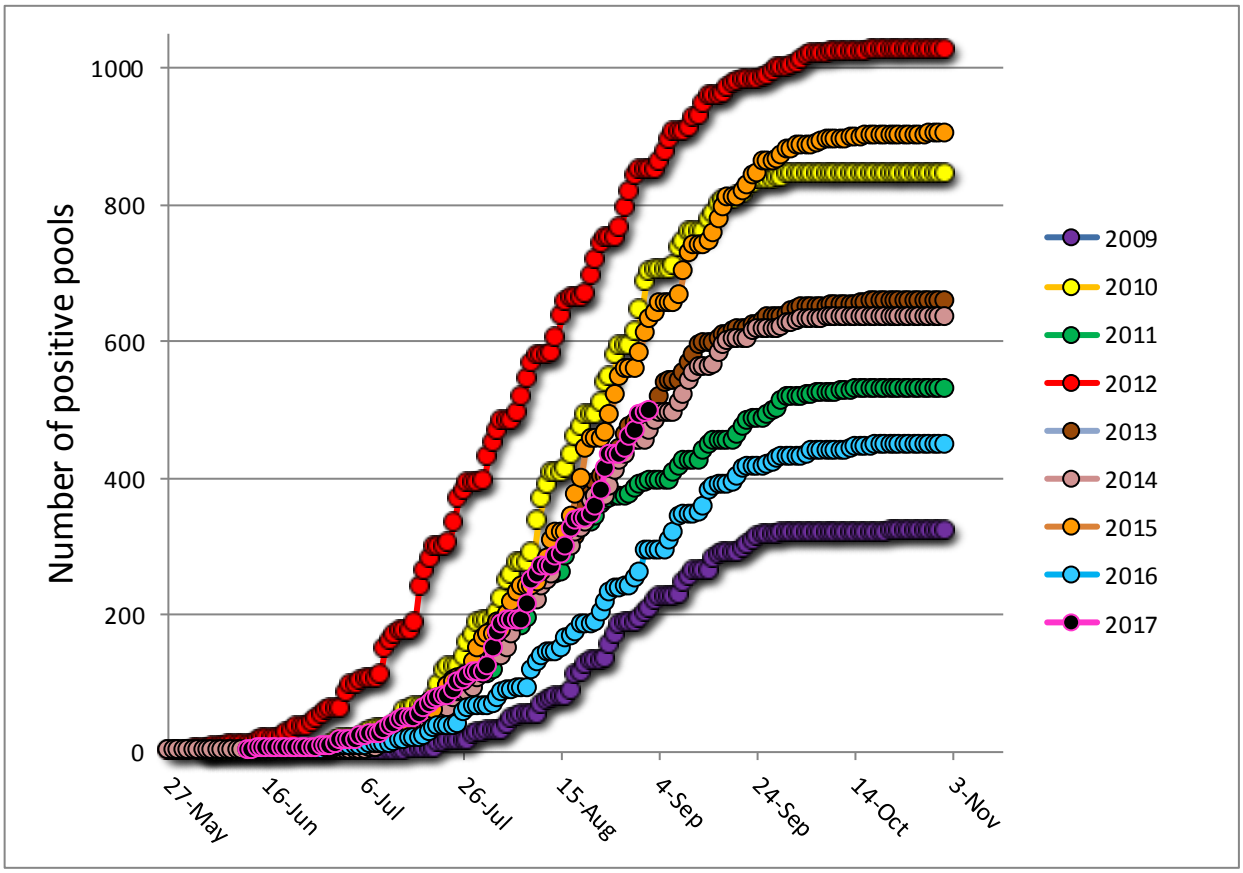
Mosquito Species Submitted and Tested for West Nile Virus Testing through 9 September 2017.

Species	Pools	Mosquitoes	Positives	MFIR
Aedes albopictus	989	11288	11	0.974
Aedes atlanticus	9	30		
Aedes atropalpus	21	94		
Aedes canadensis canadensis	45	455		
Aedes cantator	28	240		
Aedes cinereus	1	54		
Aedes grossbecki	2	4		
Aedes japonicus	307	1280	2	1.563
Aedes sollicitans	26	625		
Aedes stimulans	1	10		
Aedes taeniorhynchus	12	90		
Aedes triseriatus	221	538		
Aedes trivittatus	3	5		
Aedes vexans	84	886		
Anopheles barberi	3	3		
Anopheles bradleyi	121	1088		
Anopheles crucians	3	93	1	10.753
Anopheles earlei	1	1		
Anopheles punctipennis	71	347		
Anopheles quadrimaculatus	134	964		
Coquillettidia perturbans	84	1380		
Culex erraticus	66	991		
Culex pipiens	667	7181	11	1.532
Culex restuans	496	2545	6	2.358
Culex salinarius	237	1965	2	1.018
Culex spp.	2059	86182	459	5.326
Culex territans	42	109		
Culiseta inornata	1	1		
Culiseta melanura	439	5227	5	0.957
Orthopodomyia signifera	6	6		
Psorophora ciliata	3	3		
Psorophora columbiae	19	74	1	13.514
Psorophora cyanescens	1	1		
Psorophora ferox	15	274		
Uranotaenia sapphirina	2	23		
Grand Total	**6219**	**124057**	**498**	**4.014**

Remarks: To date, 6,219 pools of 124,057 mosquitoes from 34 species have been tested. 498 positive pools have been detected. Most continue to be in the enzootic vector, *Culex* (Mix, *pipiens* or *restuans* = 96%). A positive pool of *Anopheles crucians* was detected this past week. Overall MFIR for New Jersey is at 4.014, up from 3.602 of last week. First positive *Culex* Mix pool was detected in Sussex County on 12 June. Last year, the first positive pool of *Culex* Mix was collected on 14 June in Monmouth County.

Humans, Horses and Wild Birds: One human case of WNV was detected in a person from Atlantic County. No horse cases have been detected yet. Last year, human cases were first reported in CDC week 20, but under unusual circumstances. First typical case occurred in CDC week 27. For further information, see http://www.nj.gov/health/cd/statistics/arboviral-stats/ .

Birds are no longer routinely tested in New Jersey.



Above is a graph showing cumulative number of positive pools for the last 9 years, inclusive of the most active (2012) and least active (2009) years. While it is still early, there was a decrease in the cumulative positives, suggesting a possible low to moderate activity (black markers with pink borders for current year).

WNV Results by County through 9 September 2017.

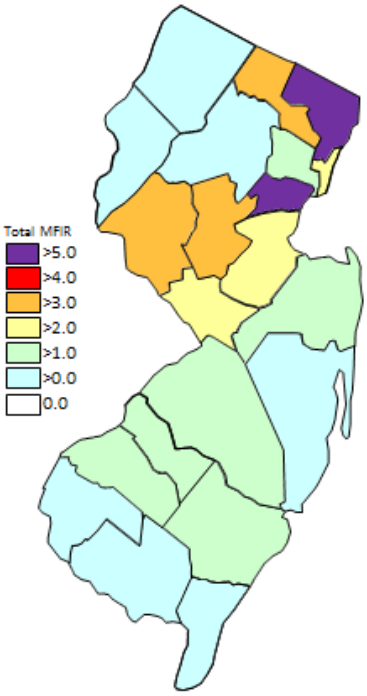
County	Species	Pools	Mosquitoes	Positives	MFIR
Atlantic		**149**	**3624**	**1**	**0.276**
	Aedes albopictus	13	87		
	Aedes japonicus	3	118		
	Aedes sollicitans	6	318		
	Aedes taeniorhynchus	3	71		
	Aedes triseriatus	1	12		
	Aedes vexans	6	274		
	Anopheles bradleyi	9	284		
	Coquillettidia perturbans	13	456		
	Culex erraticus	6	153		
	Culex pipiens	24	719		
	Culex salinarius	6	73		
	Culex spp.	15	420		
	Culiseta melanura	41	565	1	1.770
	Psorophora columbiae	1	1		
	Psorophora ferox	2	73		

Bergen		**150**	**7050**	**81**	**11.489**
	Aedes albopictus	4	129		
	Aedes japonicus	9	86		
	Culex spp.	137	6835	81	11.851
Burlington		**172**	**5925**	**17**	**2.869**
	Aedes albopictus	9	182		
	Aedes canadensis canadensis	4	55		
	Aedes cantator	2	18		
	Aedes japonicus	4	92		
	Aedes taeniorhynchus	1	8		
	Aedes triseriatus	3	34		
	Aedes vexans	2	112		
	Anopheles bradleyi	2	150		
	Anopheles crucians	2	18		
	Coquillettidia perturbans	1	49		
	Culex erraticus	2	140		
	Culex salinarius	10	569		
	Culex spp.	75	3038	14	4.608
	Culiseta melanura	54	1459	3	2.056
	Orthopodomyia signifera	1	1		
Camden		**143**	**5376**	**30**	**5.580**
	Aedes albopictus	20	121	4	33.058
	Aedes japonicus	14	58	1	17.241
	Culex spp.	85	4384	25	5.703
	Culiseta melanura	24	813		
Cape May		**2508**	**11073**	**11**	**0.993**
	Aedes albopictus	433	1174		
	Aedes atlanticus	9	30		
	Aedes atropalpus	20	84		
	Aedes canadensis canadensis	18	28		
	Aedes cantator	8	8		
	Aedes japonicus	156	336		
	Aedes sollicitans	5	5		
	Aedes taeniorhynchus	3	3		
	Aedes triseriatus	154	256		
	Aedes vexans	30	58		
	Anopheles bradleyi	108	568		
	Anopheles punctipennis	8	11		
	Anopheles quadrimaculatus	98	691		
	Coquillettidia perturbans	17	22		
	Culex erraticus	33	489		
	Culex pipiens	563	4778	7	1.465
	Culex restuans	425	1199	3	2.502
	Culex salinarius	199	527	1	1.898
	Culex spp.	21	41		
	Culex territans	42	109		
	Culiseta melanura	143	605		
	Orthopodomyia signifera	4	4		
	Psorophora columbiae	6	7		
	Psorophora ferox	3	17		
	Uranotaenia sapphirina	2	23		

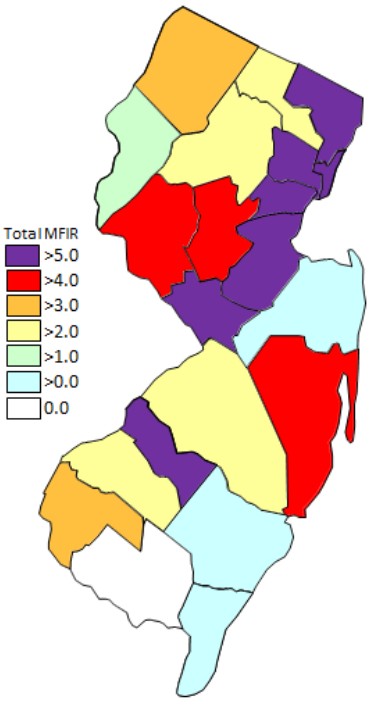
Cumberland		**131**	**1741**		
	Aedes albopictus	16	211		
	Aedes japonicus	8	36		
	Aedes sollicitans	2	20		
	Aedes triseriatus	1	2		
	Aedes vexans	17	286		
	Anopheles bradleyi	1	75		
	Anopheles punctipennis	1	5		
	Anopheles quadrimaculatus	10	62		
	Coquillettidia perturbans	9	103		
	Culex erraticus	3	16		
	Culex salinarius	6	246		
	Culex spp.	39	459		
	Culiseta melanura	11	94		
	Psorophora columbiae	2	22		
	Psorophora ferox	5	104		
Essex		**126**	**880**	**6**	**6.818**
	Aedes albopictus	52	225		
	Aedes japonicus	8	13		
	Culex spp.	66	642	6	9.346
Gloucester		**326**	**12897**	**37**	**2.869**
	Aedes albopictus	64	1697	2	1.179
	Aedes atropalpus	1	10		
	Aedes japonicus	10	112		
	Aedes triseriatus	3	34		
	Aedes vexans	1	1		
	Anopheles crucians	1	75	1	13.333
	Anopheles punctipennis	22	203		
	Anopheles quadrimaculatus	13	176		
	Coquillettidia perturbans	3	8		
	Culex pipiens	13	767	1	1.304
	Culex spp.	140	9281	33	3.556
	Culiseta melanura	53	457		
	Psorophora ferox	2	76		
Hudson		**111**	**5207**	**43**	**8.258**
	Culex spp.	111	5207	43	8.258
Hunterdon		**203**	**9547**	**46**	**4.818**
	Culex spp.	203	9547	46	4.818
Mercer		**175**	**2765**	**16**	**5.787**
	Aedes albopictus	8	87		
	Aedes japonicus	31	104		
	Culex pipiens	15	206	1	4.854
	Culex restuans	43	856	1	1.168
	Culex spp.	78	1512	14	9.259
Middlesex		**159**	**6450**	**36**	**5.581**
	Culex spp.	142	6155	35	5.686
	Culiseta melanura	17	295	1	3.390
Monmouth		**465**	**7370**	**6**	**0.814**

	Aedes albopictus	196	4868		
	Aedes canadensis canadensis	23	372		
	Aedes cantator	17	176		
	Aedes grossbecki	2	4		
	Aedes japonicus	22	88		
	Aedes sollicitans	13	282		
	Aedes taeniorhynchus	5	8		
	Aedes triseriatus	12	15		
	Aedes trivitattus	2	2		
	Aedes vexans	23	61		
	Anopheles barberi	3	3		
	Anopheles bradleyi	1	11		
	Anopheles earlei	1	1		
	Anopheles punctipennis	35	96		
	Anopheles quadrimaculatus	6	21		
	Coquillettidia perturbans	8	18		
	Culex erraticus	6	13		
	Culex salinarius	3	58	1	17.241
	Culex spp.	56	1039	5	4.812
	Culiseta inornata	1	1		
	Culiseta melanura	16	190		
	Orthopodomyia signifera	1	1		
	Psorophora ciliata	3	3		
	Psorophora columbiae	8	37		
	Psorophora cyanescens	1	1		
	Psorophora ferox	1	1		
Morris		**216**	**7349**	**20**	**2.721**
	Aedes albopictus	25	120		
	Coquillettidia perturbans	12	429		
	Culex spp.	178	6799	20	2.942
	Culiseta melanura	1	1		
Ocean		**168**	**2589**	**11**	**4.249**
	Aedes albopictus	61	1259	2	1.589
	Aedes japonicus	6	40		
	Aedes triseriatus	4	12		
	Anopheles punctipennis	1	1		
	Coquillettidia perturbans	5	103		
	Culex erraticus	5	75		
	Culex spp.	70	1056	9	8.523
	Culiseta melanura	16	43		
Passaic		**102**	**918**	**2**	**2.179**
	Aedes albopictus	4	31		
	Aedes japonicus	18	119		
	Aedes triseriatus	3	11		
	Coquillettidia perturbans	8	12		
	Culex erraticus	2	4		
	Culex pipiens	48	613	2	3.263
	Culex restuans	10	65		
	Culex spp.	6	60		
	Culiseta melanura	3	3		
Salem		**155**	**2040**	**7**	**3.431**
	Aedes albopictus	37	216	1	4.630

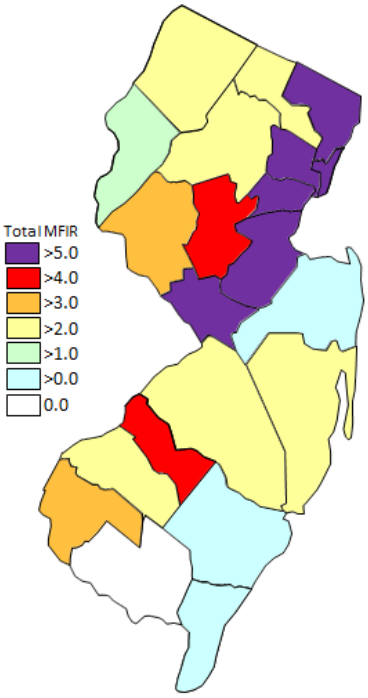
	Aedes japonicus	8	20	1	50.000
	Aedes triseriatus	13	30		
	Aedes vexans	3	6		
	Anopheles quadrimaculatus	6	11		
	Coquillettidia perturbans	6	66		
	Culex erraticus	9	101		
	Culex pipiens	1	1		
	Culex restuans	1	3		
	Culex spp.	44	1017	4	3.933
	Culiseta melanura	24	560		
	Psorophora columbiae	2	7	1	142.857
	Psorophora ferox	1	2		
Somerset		**176**	**5194**	**23**	**4.428**
	Aedes albopictus	7	39		
	Aedes japonicus	7	44		
	Aedes triseriatus	3	8		
	Anopheles punctipennis	3	21		
	Culex spp.	156	5082	23	4.526
Sussex		**195**	**4141**	**15**	**3.622**
	Aedes albopictus	9	18		
	Aedes triseriatus	24	124		
	Culex pipiens	3	97		
	Culex restuans	17	422	2	4.739
	Culex salinarius	13	492		
	Culex spp.	94	2859	13	4.547
	Culiseta melanura	35	129		
Union		**150**	**9186**	**69**	**7.511**
	Aedes albopictus	30	823	2	2.430
	Culex spp.	120	8363	67	8.011
Warren		**239**	**12735**	**21**	**1.649**
	Aedes albopictus	1	1		
	Aedes cantator	1	38		
	Aedes cinereus	1	54		
	Aedes japonicus	3	14		
	Aedes stimulans	1	10		
	Aedes trivittatus	1	3		
	Aedes vexans	2	88		
	Anopheles punctipennis	1	10		
	Anopheles quadrimaculatis	1	3		
	Coquillettidia perturbans	2	114		
	Culex spp.	223	12386	21	1.695
	Culiseta melanura	1	13		
	Psorophora ferox	1	1		
Grand Total		**6219**	**124057**	**498**	**4.014**



Cumulative WNV activity in 2016.



WNV activity to 9 September 2017.



WNV activity last week, 2017

Saint Louis Encephalitis (SLE) to 9 September 2017.

New Jersey will be primarily testing for SLE this year only when adjacent states show human activity (Cape May tests mosquitoes in the Cape May lab independently). SLE has had previous activity in New Jersey, most notably in 1964 and 1975 (CDC's SLE website), the latter prompting the surveillance reporting by Rutgers. SLE is a flavivirus and has a similar transmission pattern to West Nile, with *Culex* species as the predominant vectors.

No pools of SLE have tested positive for 2017. No human cases have been reported.

County	Species	Pools	Mosquitoes	Positives	MFIR
Burlington		**12**	**721**		
	Culex spp.	12	721		
Cape May		**583**	**4818**		
	Culex pipiens	562	4777		
	Culex spp.	21	41		
Grand Total		**595**	**5539**		

La Crosse Encephalitis (LAC) to 9 September 2017.

New Jersey will be primarily testing for LAC this year only when adjacent states show human activity (Cape May tests mosquitoes in the Cape May lab independently). New Jersey has had 3 cases of this encephalitic disease since 1964 (see CDC's LAC website). The mortality is low but like other encephalitides, LAC can have both personal (lasting neurological sequelae) and economic impacts. LAC is a bunyavirus with a transmission cycle involving mosquitoes such as *Aedes triseriatus* and small mammals such as squirrels and chipmunks. LAC can not only infect *Aedes albopictus* but transovarial transmission was also demonstrated.
(Tesh and Gubler 1975 Laboratory studies of transovarial transmission of La Crosse and other arboviruses by *Aedes albopictus* and *Culex fatigans.* American Journal of Tropical Medicine and Hygiene 24(5):876-880).

No pools of SLE have tested positive for 2017. No human cases have been reported.

County	Species			Positives	MFIR
Burlington		**15**	**297**		
	Aedes albopictus	8	171		
	Aedes japonicus	4	92		
	Aedes triseriatus	3	34		
Sussex		**24**	**124**		
	Aedes triseriatus	24	124		
Grand Total		**39**	**421**		

Dengue (DENV) to 9 September 2017.

New Jersey will be selectively testing for DENV (including serotypes) this year. Dengue has not had a history of local transmission here in New Jersey, but each year, travelers can bring virus back from areas in the world with virus activity. This is significant as humans are NOT dead-end hosts and thus there is the potential for local transmission (i.e., New Jersey mosquitoes biting a sick person and then biting and transmitting the disease to someone else) to be established. DENV is a flavivirus but unlike WNV, *Aedes* mosquitoes are predominant vectors. In New Jersey, *Aedes albopictus* is a candidate for local transmission. There are 4 serotypes tested for Dengue.

Note Same pools of *Ae. albopictus* are tested for the four serotypes of Dengue as well as Chikungunya.

No pools of Dengue have tested positive in 2017. There are 3 travel-related human cases in NJ.

County	Species	DENV1		DENV2		DENV3		DENV4		Pos.	MFIR
		Pool	Mos.	Pool	Mos.	Pool	Mos.	Pool	Mos.		
Mercer		**8**	**87**	**8**	**87**	**8**	**87**	**8**	**87**		
	Aedes albopictus	8	87	8	87	8	87	8	87		
Grand Total		**8**	**87**	**8**	**87**	**8**	**87**	**8**	**87**		

Chikungunya (CHIK) to 9 September2017.

New Jersey will be selectively testing for CHIK this year. Chikungunya is similar in symptoms to Dengue, a “breakbone” fever and has a low mortality rate. But this virus has had recent worldwide activity, and in the past year has come to the Western Hemisphere. As with Dengue, transmission can occur when a mosquito bites an infected human, then bites an uninfected human who subsequently becomes ill. CHIK is an alphavirus with *Aedes* mosquitoes as potential vectors. In New Jersey, *Aedes albopictus* is the mosquito of interest.

No pools of CHIK have tested positive in 2017. There are 3 travel-related human cases in NJ.

County	Species	Pools	Mosquitoes	Positives	MFIR
Cape May		**432**	**1173**		
	Aedes albopictus	432	1173		
Mercer		**8**	**87**		
	Aedes albopictus	8	87		
Grand Total		**440**	**1260**		

Zika (ZIKV) to 9 September 2017.

New Jersey will be selectively testing for ZIKV this year. Zika is an emerging arboviral threat with significant health consequences for fetuses and recent activity in the Western Hemisphere. Humans are potential hosts that can transmit through sexual activity. ZIKV is a flavivirus with *Aedes* mosquitoes as potential vectors. In New Jersey, *Aedes albopictus* is the mosquito of interest.

No pools have tested positive in 2017. There are 21 travel-related human cases in NJ.

County	Species	Pools	Mosquitoes	Positives	MFIR
Cape May		**432**	**1173**		
	Aedes albopictus	432	1173		
Mercer		**8**	**87**		
	Aedes albopictus	8	87		
Grand Total		**440**	**1260**		