



**Rhode Island Department of Health
Division of Infectious Disease Epidemiology
Arbovirus Surveillance: Epidemiologic Report, 2013**

Purpose: To monitor the epidemiology, incidence and geographic distribution of West Nile Virus (WNV) and other arboviruses in Rhode Island for early detection and prevention of any human transmission.

Quick Facts:

- The Rhode Island Department of Environmental Management (DEM) traps mosquitoes at various locations throughout Rhode Island. Mosquito traps are placed strategically throughout the state based on knowledge of environments conducive to West Nile Virus (WNV) and Eastern Equine Encephalitis (EEE) amplification in the mosquito population. Once the traps are collected, the mosquitoes collected in each trap are sorted by species into 'pools'. A pool can contain anywhere from 1 to 50 mosquitos. The State Health Laboratory tests each pool for the presence of virus by polymerase chain reaction (PCR).
- Mosquito traps were set weekly from June 9th through October 7th, 2013.
- In 2013, 2,311 mosquito pools were tested for the presence of arboviruses, of which seventeen tested positive (0.7%). Of the seventeen positive pools, 8 tested positive for WNV, 5 tested positive for Highlands J Virus (HJV) and 4 tested positive for EEE. In 2012, there were sixteen positive pools for arboviruses (EEE: 6, WNV: 5, HJV: 5).
- The first positive pool for the season (WNV in a Culex species) was collected on July 29, 2013. The last positive pool of the season (HJV, Culiseta morsitans) was collected on October 7, 2013.
- Culiseta species had the highest arboviral positivity rate (5.0%) followed by Culex species (1.5%).
- The greatest number of pools (11.7 % of total pools) were collected in Westerly; whereas the highest arboviral positivity rate of pools was noted in Hopkinton.
- A horse stabled in Richmond tested positive for EEE in September 2013.
- In 2013, the only human case was co-infected with neuro-invasive West Nile Virus (WNV) and Jamestown Canyon Virus (JCV). In 2012, there were four confirmed human cases of WNV (2 neuro-invasive, 2 non neuro-invasive) in Rhode Island.

Figures and Tables

Figure 1: Mosquito Pools by Type of Mosquito and Month

Between June 9th, 2012 and October 7th, 2013, The Rhode Island Department of Environmental Management submitted a total of 2,311 mosquito pools comprised of 21,920 individual mosquitoes to the Rhode Island State Health Laboratory where they were tested for WNV, EEE, HJV and JCV. The highest arboviral pool positivity was found in September (2.0%), followed by October (1.9%), August (1.0%) and July (0.1%).

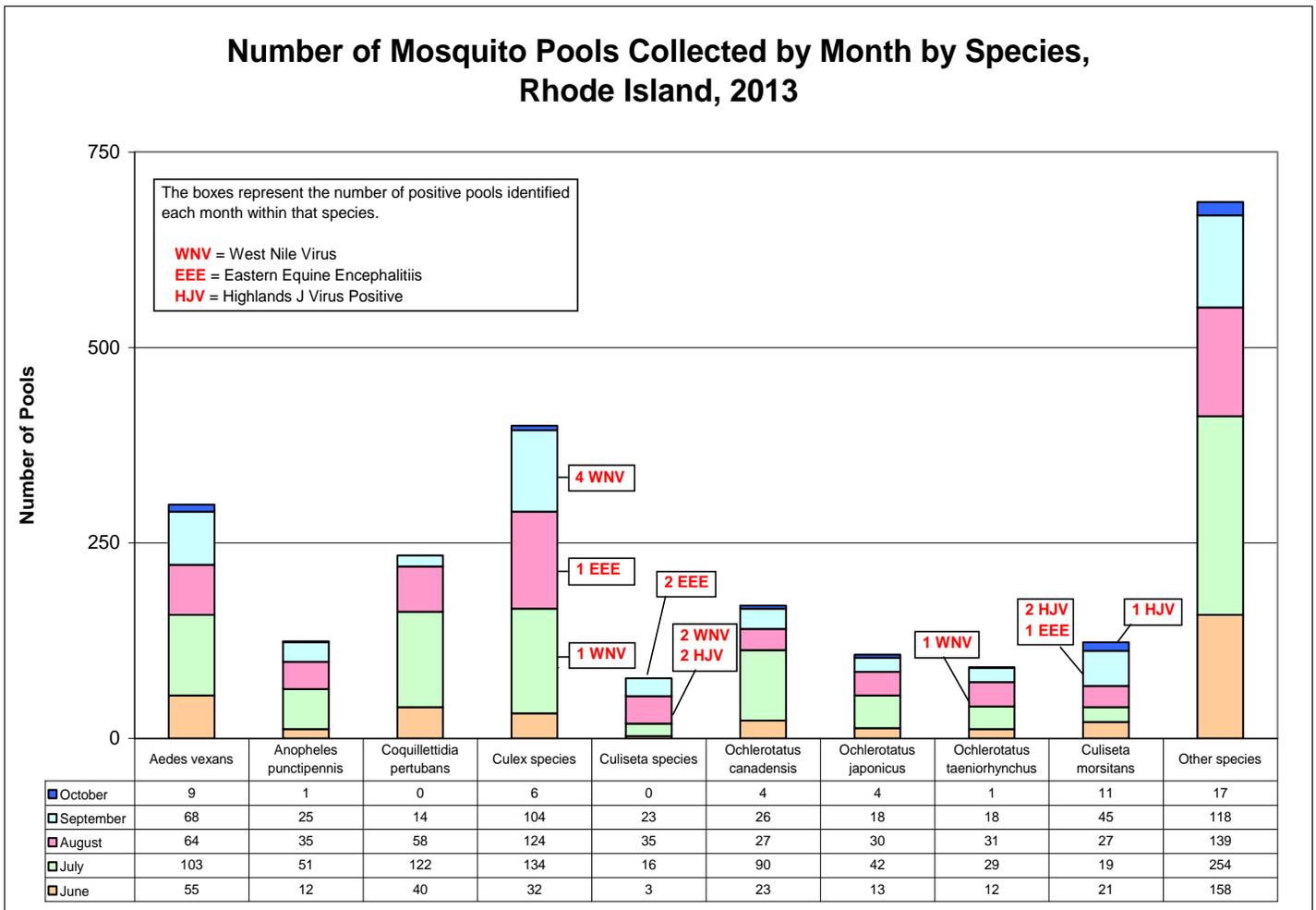


Figure 2: Mosquito Pools by Trap Night

As can be seen from the figure below, after reaching a peak of 231 mosquito pools collected on July 15th, 2013, the total number of mosquito pools collected each week gradually declined until reaching a low of 53 pools collected on September 30th and October 7th, 2013. This gradual decline is normal. During the later part of summer, mosquito populations decrease, but older mosquitos are more likely to carry arboviruses, thus increasing the risk of human infection. This is illustrated below. The five trap nights between August 19th, 2013 and September 9th, 2013 produced 6 positive WNV mosquito pools and 4 positive EEE mosquito pools.

As another illustration of the risk of human arboviral infection in late summer, Rhode Island’s only 2013 arboviral case (an individual co-infected with WNV and JCV) had an illness onset date of September 11, 2013. The incubation period of WNV after being bitten by an infected mosquito is between 3 to 14 days, while the incubation period of JCV is 5 to 15 days. Using the incubation periods above, Rhode Island’s arboviral case was probably bitten by an infected mosquito between August 27th, 2013 and September 8th, 2013.

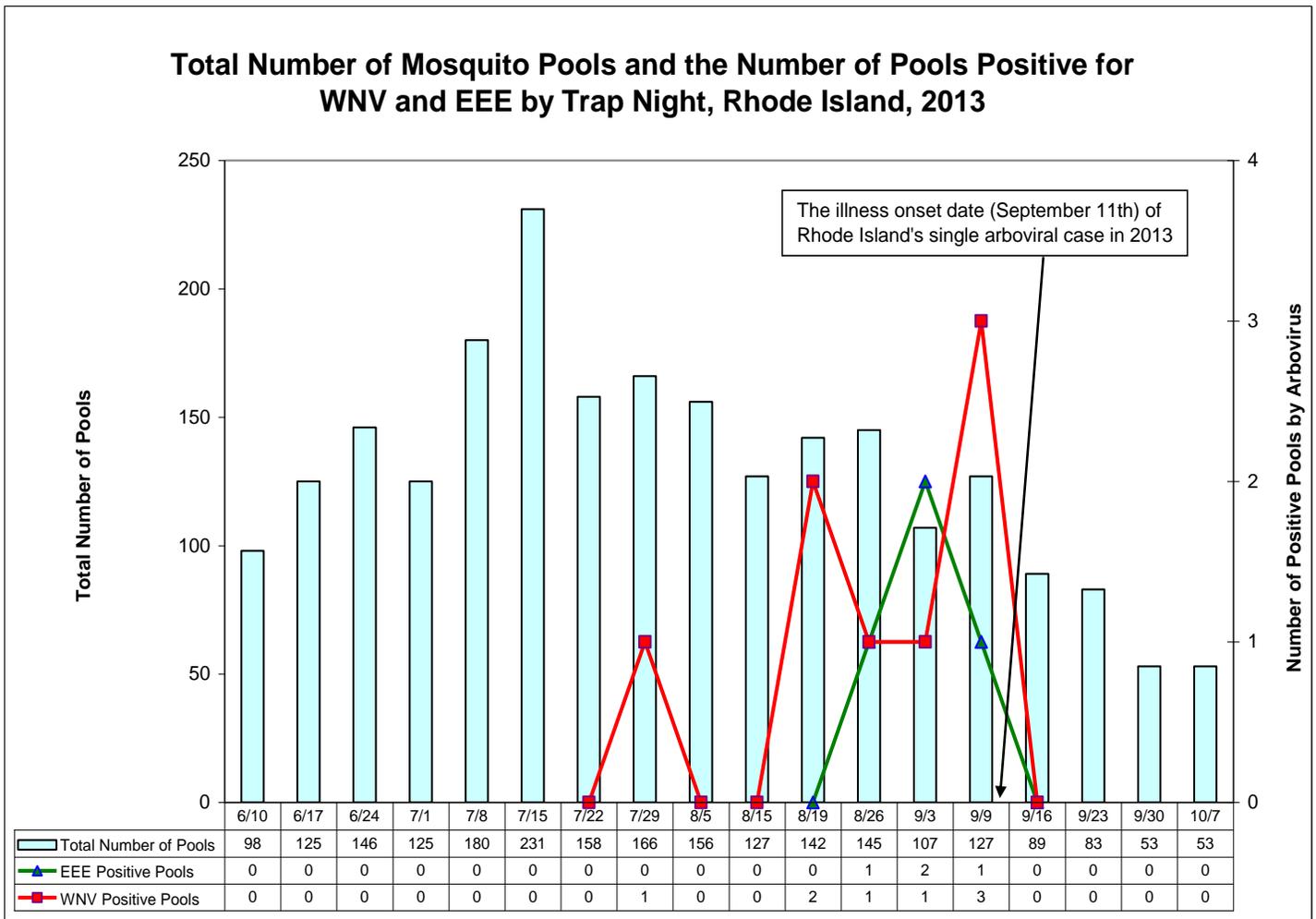


Figure 3: Mosquito Pools by Major Species of Mosquito and Positivity Rate

Of the 2,311 mosquito pools tested in 2013, seventeen (0.7%) tested positive for EEE, WNV or HJV. The figure below illustrates the EEE and WNV positivity for each mosquito species during the 2013 mosquito trapping season. Species included under “other” in the graph below are: *Ae. cinereus*, *An. barberi*, *An. crucians*, *An. quadrimaculatus*, *An. walkeri*, *Culiseta inornata*, *Culiseta melanura*, *Oc. abserratus*, *Oc. atropalpus*, *Oc. aurifer*, *Oc. cantator*, *Oc. communis*, *Oc. dorsalis*, *Oc. excrucians*, *Oc. fitshii*, *Oc. grossbecki*, *Oc. hendersoni*, *Oc. intrudens*, *Oc. provocans*, *Oc. punctor*, *Oc. sollicitans*, *Oc. sticticus*, *Oc. tribaulti*, *Oc. triseriatus*, *Oc. trivittatus*, *Ps. ferox* and *Ur. sapphirina*.

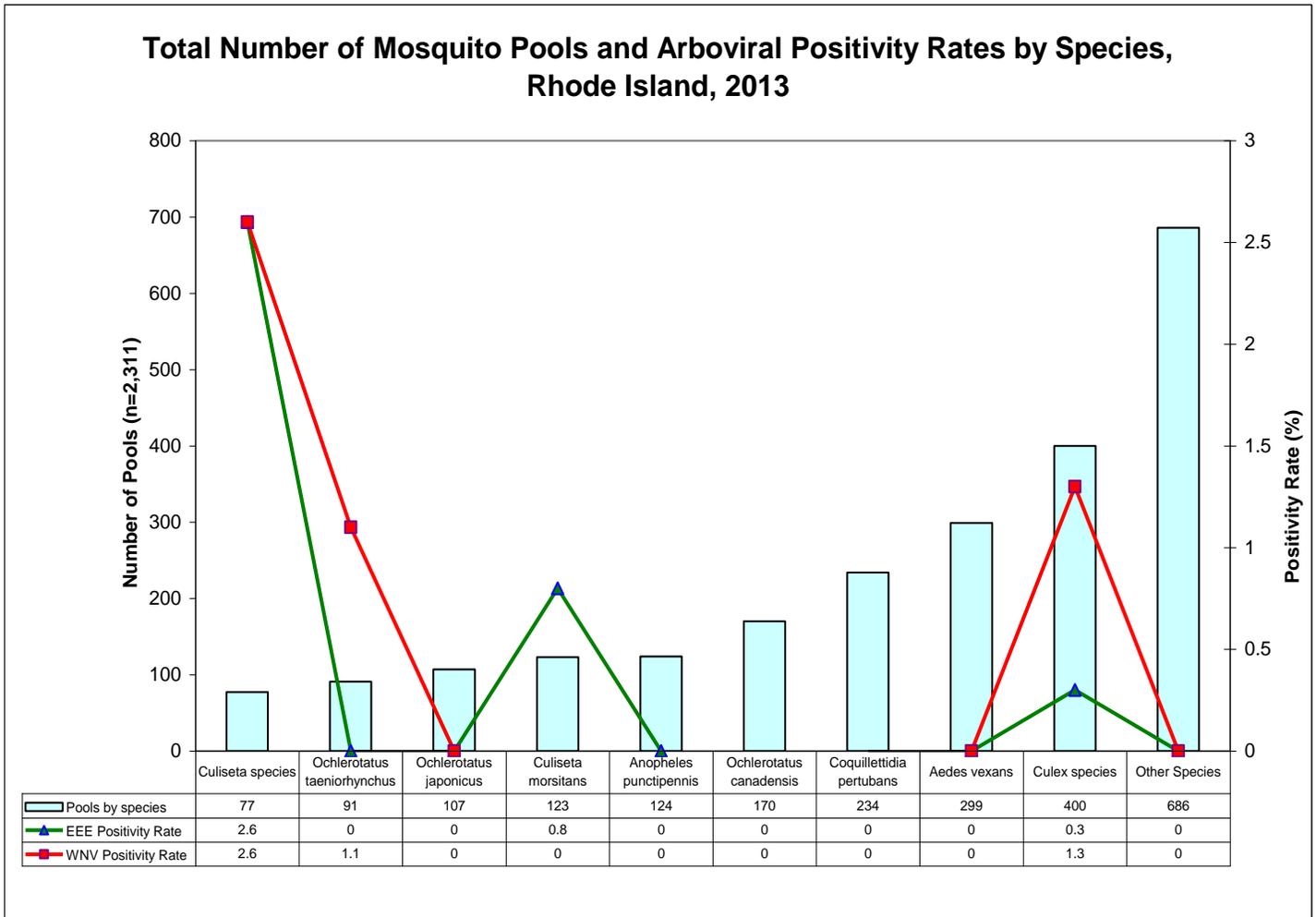


Figure 4

Arboviral Surveillance: Mosquito Pool Collection by Town, Rhode Island, 2013

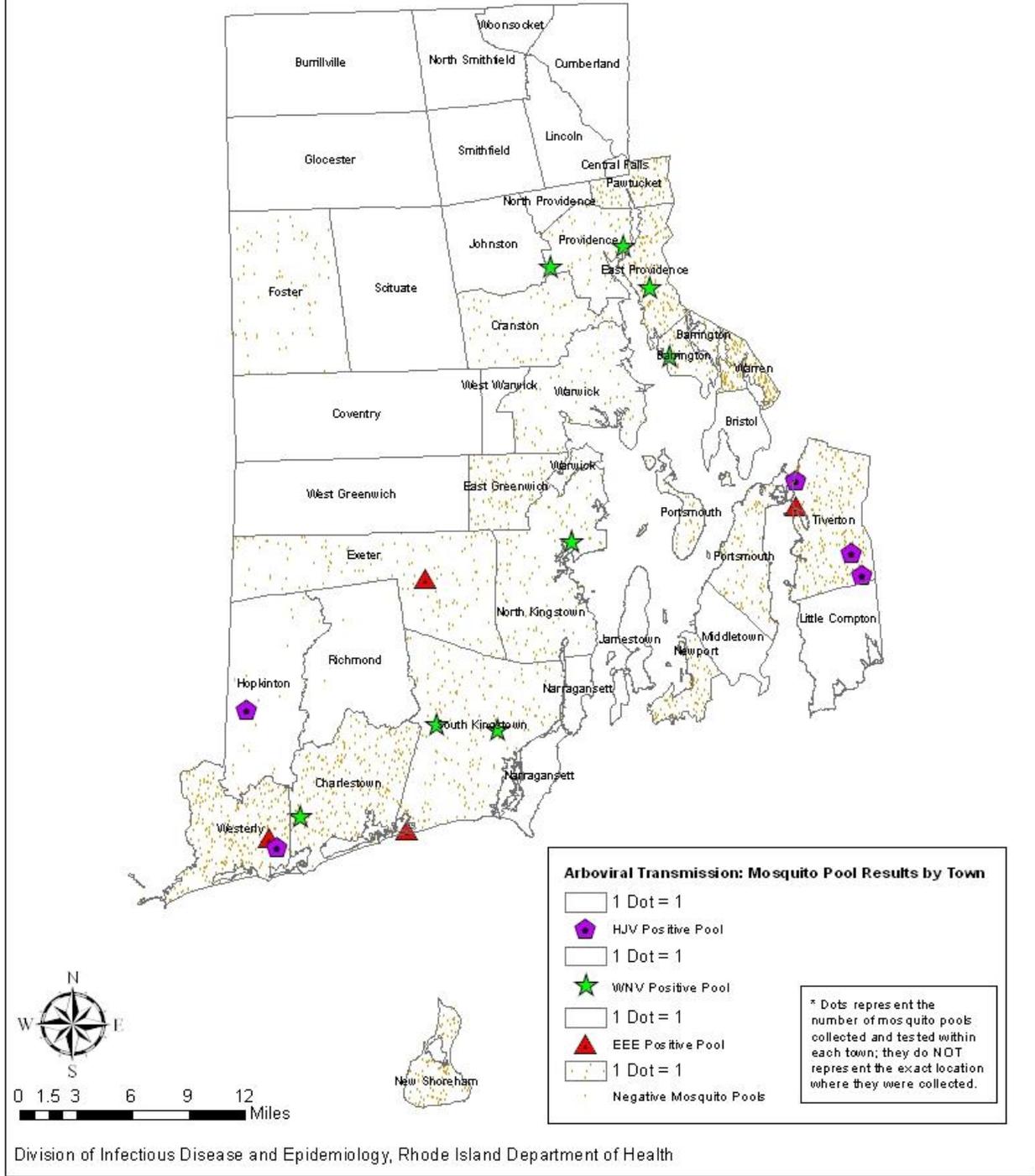
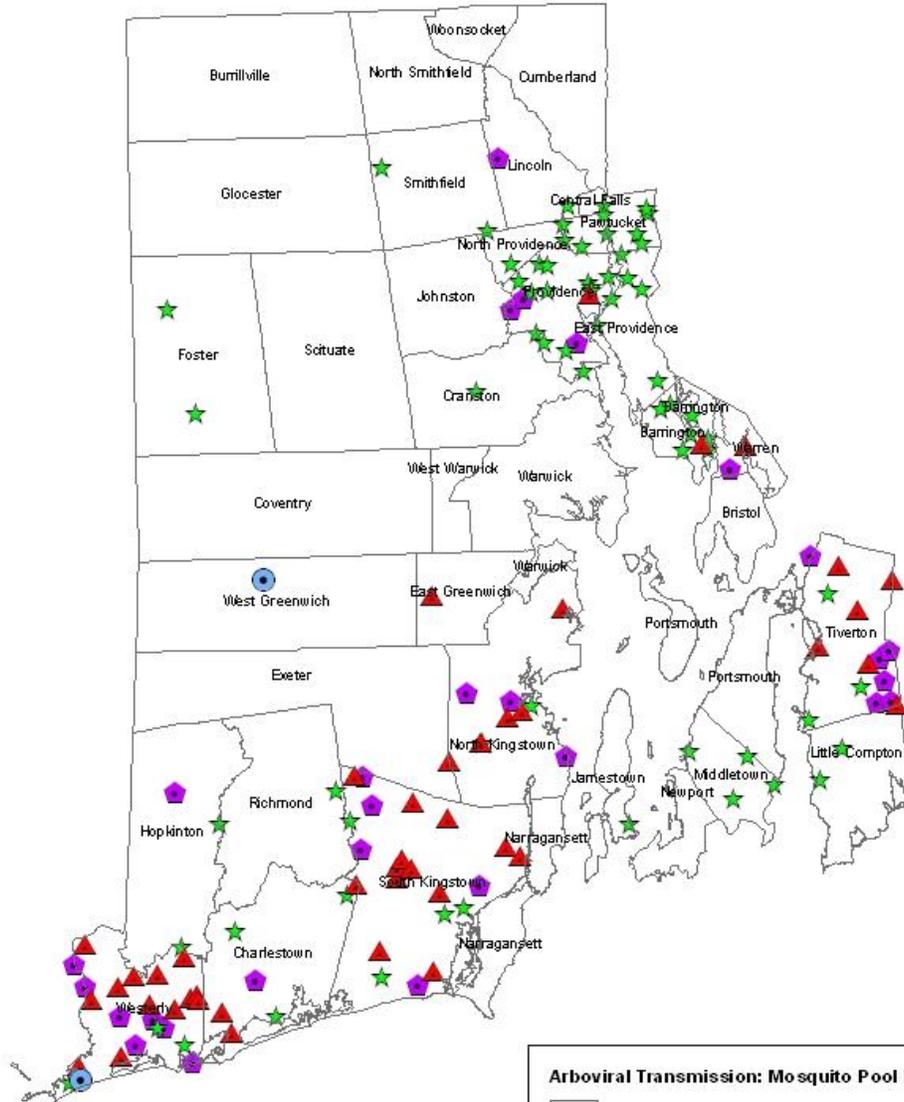


Figure 5

Arboviral Surveillance: Positive Mosquito Pools by Town, Rhode Island, 2001-2013



* Dots represent the number of positive mosquito pools collected within each town; they do NOT represent the exact location where they were collected.

Arboviral Transmission: Mosquito Pool Results by Town

- 1 Dot = 1
- Jamestown Canyon Virus Positive Pool
- 1 Dot = 1
- ▲ Eastern Equine Encephalitis Positive Pool
- 1 Dot = 1
- ★ West Nile Virus Positive Pool
- 1 Dot = 1
- ⬠ Highlands-J Virus Positive Pool



0 1.5 3 6 9 12 Miles



Figure 6

Arboviral Surveillance: Human Cases by Town, Rhode Island, 2013



0 1.75 3.5 7 10.5 14 Miles

Arboviral Transmission: Human Cases by Town

- No Human Arboviral Cases
- Single Co-infection with WNV and JCV, Neuro-invasive

WNV = West Nile Virus
JCV = Jamestown Canyon Virus

Table 1: Mosquito Surveillance: Pools by Towns, RI, 2013*

Town	Total Pools	Percentage of all Pools Collected	Positive Pools	Positivity Rate by Town
Westerly	271	11.7%	2	0.7%
Charlestown	268	11.6%	1	0.4%
Tiverton	228	9.9%	4	1.8%
South Kingstown	183	7.9%	3	1.6%
Warren	157	6.8%	0	0.0%
East Providence	153	6.6%	1	0.7%
Portsmouth	139	6.0%	0	0.0%
Exeter	129	5.6%	1	0.8%
North Kingstown	119	5.1%	1	0.8%
New Shoreham	100	4.3%	0	0.0%
East Greenwich	91	3.9%	0	0.0%
Pawtucket	90	3.9%	0	0.0%
Newport	76	3.3%	0	0.0%
Foster	67	2.9%	0	0.0%
Warwick	62	2.7%	0	0.0%
Cranston	55	2.4%	0	0.0%
Providence	51	2.2%	2	3.9%
Barrington	49	2.1%	1	2.9%
Hopkinton	20	0.9%	1	5.0%
Richmond	3	0.1%	0	0.0%
Total	2,311	100%	17	0.7%

* Towns without any mosquito pools collected have been excluded from the table.

Table 2: Mosquito Surveillance: Summary Data, RI, 2001-2013

Year	Number of pools tested	Number of positive counties	Total number of positive pools	Number of WNV positive pools	Earliest positive date for WNV	Number of EEE positive pools	Earliest positive date for EEE
2001	1856	3	14	14	7/16/2001	0	NA
2002	1417	2	4	4	8/28/2002	0	NA
2003	2383	4	27	7	8/21/2003	17	9/10/2003
2004	3062	2	7	0	NA	7	7/19/2004
2005	1466	2	2	1	9/19/2005	0	NA
2006	1382	4	19	10	8/8/2006	3	9/17/2006
2007	1048	2	5	5	8/20/2007	0	NA
2008	1207	2	10	10	8/26/2009	0	NA
2009	1138	2	14	3	9/8/2009	3	8/24/2009
2010	1621	3	9	2	8/30/2010	2	8/23/2010
2011	1690	3	3	2	8/22/2011	0	NA
2012	2234	4	16	5	7/9/2012	6	8/06/2012
2013	2311	4	17	8	7/29/2013	4	8/26/2013

Table 3: Human Cases by Age Group and City, Rhode Island, 2013

Case No.	Date of Onset	City	Classification	Age	Sex
1	09/11/2013	Exeter	WNV and JCV Co-infection, Neuro-invasive Disease	31-40	Male

*For questions/comments on data/methods, please contact Michael Gosciminski at 401-222-6056.
Division of Infectious Disease Epidemiology, Rhode Island Department of Health*