

State Reclamation and Mosquito Control Board 2015 Annual Report

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The State Reclamation and Mosquito Control Board (SRMCB) oversees mosquito control districts/projects in the Commonwealth of Massachusetts and establishes administrative and technical policy, guidelines, and best management practices to insure that mosquito control programs are effective and safe. The SRMCB also appoints the Commissioners of each of the regional mosquito control districts/projects. The SRMCB is led by a three-member board comprised of representatives from the Massachusetts Department of Agricultural Resources (MDAR), the Department of Conservation and Recreation (DCR), and the Department of Environmental Protection (DEP).

Although the SRMCB is an independent board, MDAR provides significant support to the SRMCB through staff time and resources, including the Chairperson of the SRMCB. MDAR's Division of Crop and Pest Services provides an Environmental Biologist and an Operations Coordinator, and additional CPS staff lend technical support by providing meteorological data, enforcement support during wide-area aerial treatments, review of mosquito pesticide products, and health and environmental assessments. MDAR staff also provides Legal and Financial staff, and GIS and IT support. These support activities are not charged to mosquito district budgets.

SRMCB and Mosquito Control

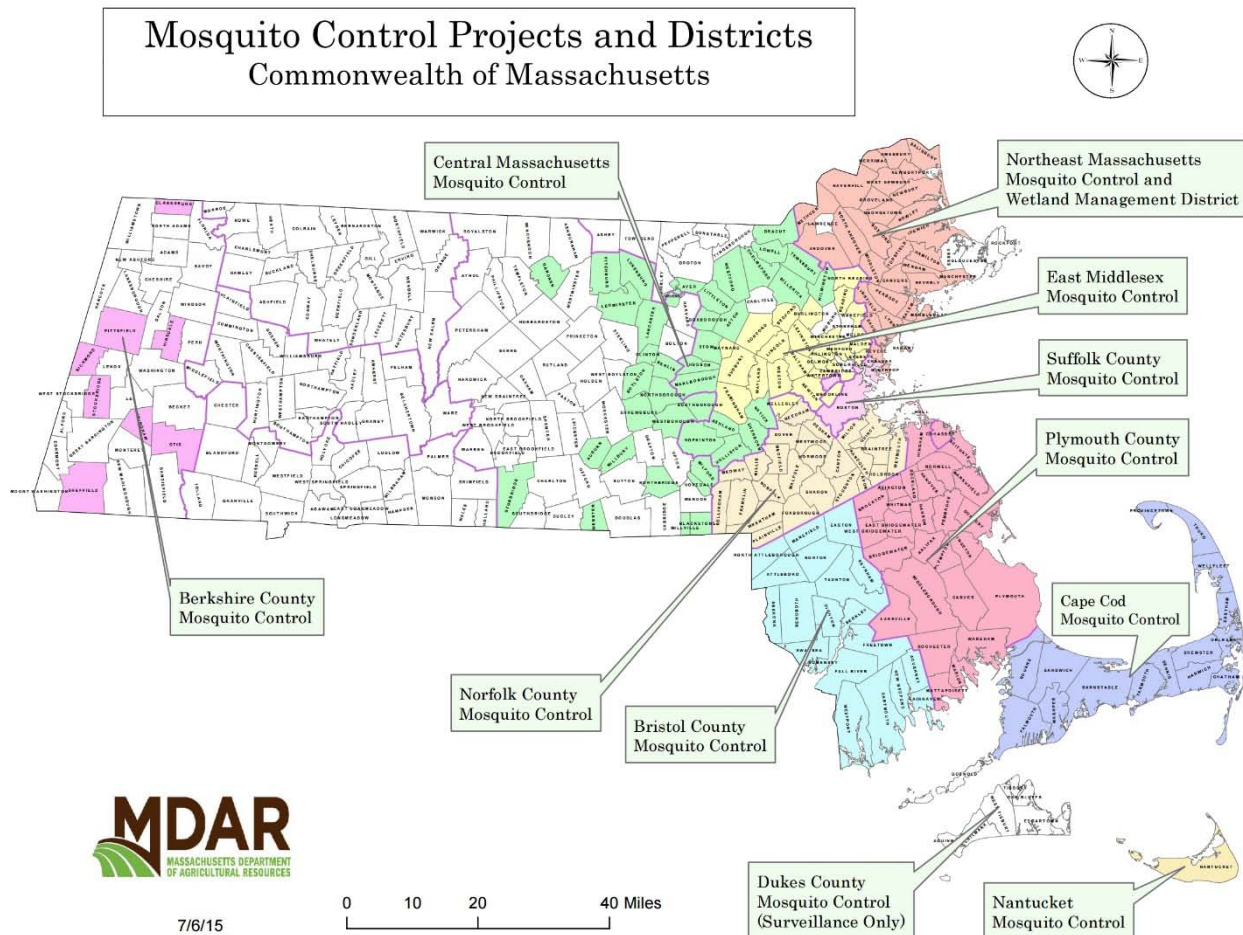
Mosquito control activities serve a vital public health function. Of the 51 species of mosquitoes found in Massachusetts, several species (*Aedes vexans*, *Coquillettidia perturbans*, *Ochlerotatus canadensis*, *Culex pipiens*, and *Ochlerotatus japonicus*) are capable of carrying dangerous arthropod-borne viruses (arboviruses) such as West Nile virus (WNV) and Eastern Equine Encephalitis virus (EEEV). The Asian tiger mosquito (*Aedes albopictus* or ATM) has also been documented repeatedly over the past few years in Bristol County (New Bedford), and the ability of this species to carry EEEV and WNV in addition to other diseases including Dengue Fever, Chikungunya Virus, and Zika Virus, is a cause of concern.

Each year, regional mosquito programs worked closely with DPH to collect and submit mosquito samples for laboratory testing for the purpose of detecting arbovirus, identifying areas at risk of mosquito-borne disease, and to guide decision making regarding the most effective response to arbovirus detection. Today's mosquito control programs also bear the challenge and responsibility to conduct a balanced approach to control mosquitoes through Integrated Pest Management (IPM), a strategy that can control mosquitoes effectively and at the same time minimize environmental impacts through monitoring and management techniques that include application of acceptable pesticide products.

Mosquito Control Districts/Projects, and Member Municipalities

In the Commonwealth, there are 11 regional districts/projects providing mosquito control services to municipalities. The areas covered by mosquito control services coincide with major population areas, well-known tourist areas, and areas where mosquito-borne diseases such as EEEV and WNV are known to have occurred.

One additional municipality, the town of Gardner, voted to join an established mosquito control program (Central MA) during 2015, resulting in a slight increase in total membership to 197 (56%) of the state's 351 municipalities. A map of all mosquito control districts/projects is below:



Each regional mosquito control project employs a director or superintendent to manage day-to-day operations, employ staff, and retain equipment, or contracts out for those services. The scope and type of tactic used to control mosquitoes varies between projects/districts due to differences in geographic location, topography, budgets, and mosquito species present. For example, management strategies for inland fresh water mosquitoes typically includes source reduction (freshwater water management, elimination of used tires), larviciding or adulticiding, while strategies for salt marsh or coastal site management would typically rely heavily on larviciding to thwart emergence of mosquitoes that can migrate inland. Wetland/water management may be employed as a way of reducing the shallow, non-flowing or stagnant water mosquitoes need to complete their life cycle from egg to adult. Mosquito control also involves maintenance of ditches, culverts and man-made ponds to improve water quality and increase water flow, in order to reduce the potential for mosquito development. Surveillance, where districts/projects set traps and collect mosquitoes for arbovirus testing, remains the cornerstone of Massachusetts mosquito control programs. This effort supplements the long-term trapping program led by DPH.

Public education is also a key part of mosquito control activities. Mosquito control programs educate the public about mosquitoes and their biology. School-aged children are given information about how to reduce mosquitoes in and around their homes and how to use personal protection. Informational brochures are distributed to town Boards of Health or directly to homeowners. Mosquito control staff meet with civic organizations, town/city boards, and participate in other events such as Health Fairs and media interviews. DPH provides alerts, arbovirus surveillance data, and mosquito prevention fact sheets on their website (www.mass.gov/dph/mosquito), and also uses an alert system to notify pertinent officials, including local Boards of Health, about confirmed mosquito positives.

2015 Mosquito Control Season

Weather and Mosquito Populations

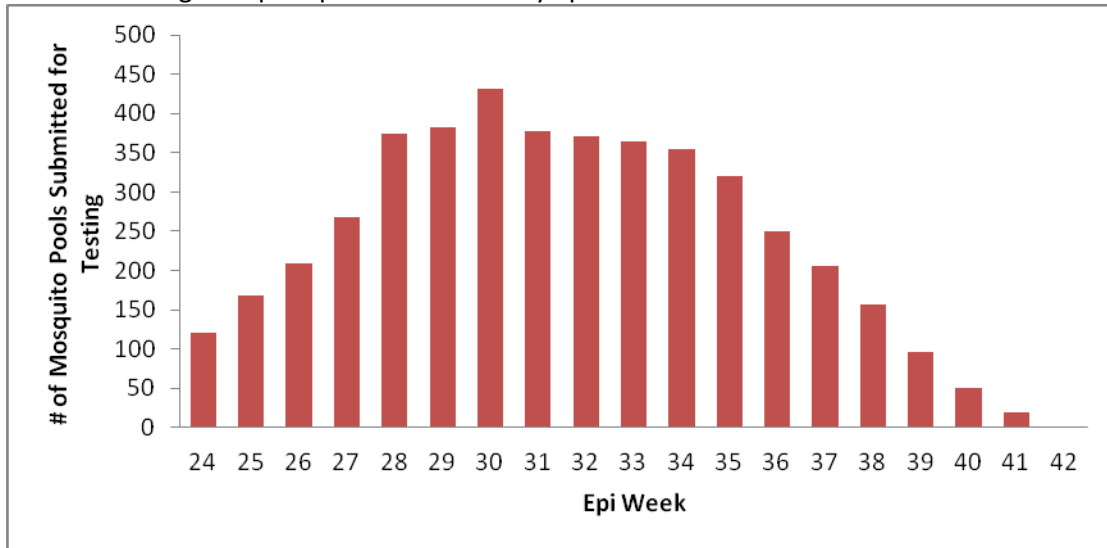
The massive snowpack left behind by numerous significant snow events during the 2014-2015 season left many anticipating a melt that would lead to an abundance of mosquito habitat. However, a spring with virtually no rain left us with a lot less habitat with which to start the 2015 season. Instead, conditions were similar to 2014, with low levels of mosquitoes and habitat that was dryer than average in most spots. Some precipitation around Epi Week 25 led to a small uptick in floodwater species, but overall it was a very quiet year, with only 1 EEEV-positive mosquito pool reported for the entire season. The continued lack of precipitation accompanied by a hot July and August eventually led to an uptick in WNV-positive mosquito pools, as catch basin water levels dropped, creating more stagnant water that was prime mosquito breeding habitat for *Culex* spp. that are known to carry WNV. By Epi Week 36, WNV was widespread throughout the state, with hotspots detected within the East Middlesex Project area and isolated WNV-positive mosquito pool finds by DPH in communities outside of existing mosquito control districts. That said, we had yet another quick and cool end to the season, with testing wrapping up in Epi Week 41 due to lack of collections of adult mosquitoes during surveillance and lack of ability to perform adulticiding given low nighttime temperatures.

Over the course of the 2015 season, the districts/project collected over 370,000 mosquitoes during surveillance. Below is a table showing mosquitoes collected and submitted for testing*:

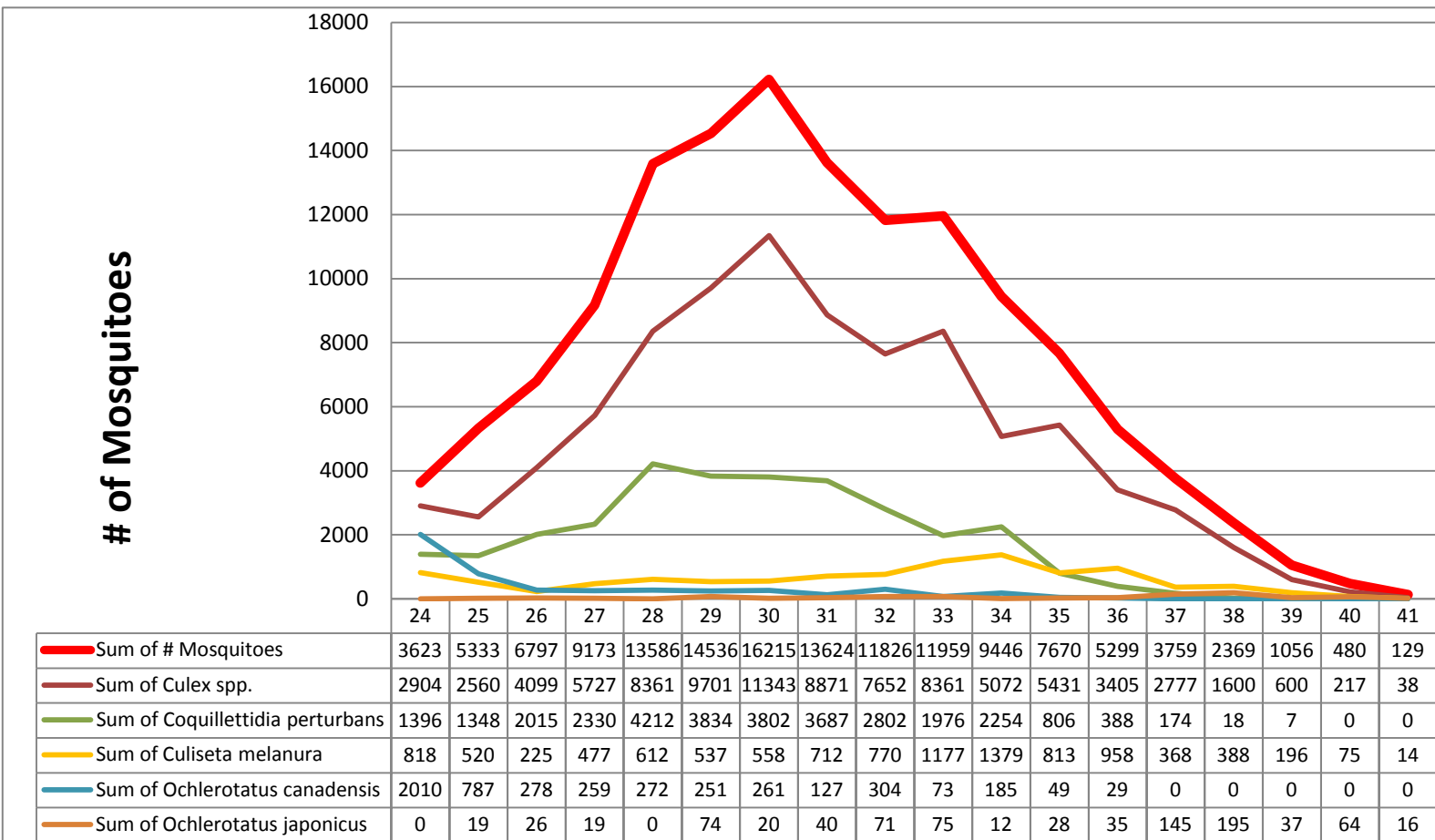
| Mosquito Control District/Project | total mosquitoes collected | total pools submitted | total mosquitoes tested | total mosquitoes not submitted |
|-----------------------------------|----------------------------|-----------------------|-------------------------|--------------------------------|
| Berkshire | 35,979 | 369 | 16,700 | 19,279 |
| Bristol | 35,671 | 432 | 18,063 | 17,608 |
| Cape Cod | 25,970 | 362 | 12,386 | 13,584 |
| Central | 76,060 | 1,319 | 33,810 | 42,250 |
| Martha's Vineyard | not available | 12 | 112 | not available |
| East Middlesex | 89,213 | 243 | 9,014 | 80,199 |
| Nantucket | 9,022 | 25 | 482 | 8,540 |
| Norfolk | 15,696 | 229 | 5,357 | 10,339 |
| Northeast | 24,323 | 540 | 4,641 | 19,682 |
| Plymouth | 48,575 | 401 | 16,892 | 31,683 |
| Suffolk | 18,585 | 127 | 3,695 | 14,890 |
| | | | | |
| TOTAL | 379,094 | 4,059 | 121,152 | 258,054 |
| AVERAGE | 37,909 | 369 | 11,014 | 23,460 |

* Note that it is normal surveillance protocol to only submit a subsample of what is collected for testing. Also, mosquitoes collected in each district/project area will be dependent on a number of factors, including size of project area, habitat types, and weather conditions, meaning that numbers are not directly comparable between projects.

A chart showing mosquito pools submitted by Epi Week is below:



The graph below shows the top 6 mosquito species (or species complexes) submitted for testing, Epi Weeks 24-41. Both Cape Cod and Plymouth County reported record levels of *Culex* spp. collected from gravid traps around Epi Weeks 27-28, and Plymouth had a similar peak in Epi Weeks 33-35.



Asian tiger mosquito (*Aedes albopictus* or ATM) remained in the spotlight in 2015. Numbers of adult mosquitoes collected in BG Sentinel traps set in New Bedford (Bristol County) were about on par with 2014 (238 mosquitoes) even though only half the number of traps were set in 2015. DPH also collected ATM from a trap set in Worcester. Given the renewed interest in this species following media coverage of Zika Virus, this species will continue to be under close scrutiny in 2016.

Mosquito Management

Due to low arbovirus levels, aerial adult mosquito control operations by aircraft were not necessary during 2015. The districts/projects were able to keep mosquito populations suppressed (and arbovirus load low) using standard techniques of larviciding (either aerial operations or by hand) accompanied by ULV spraying of adulticides in response to finds of arbovirus-positive mosquitoes. Bristol County, Cape Cod, Berkshire County, Central MA, and the Northeast all participated in some level of response to arbovirus positives this past season, as indicated by the chart below:

| District/Project | Catch Basin Larviciding | Ground ULV Adulticiding | Inspections | Public Outreach | Supplemental Trapping |
|------------------|-------------------------|-------------------------|-------------|-----------------|-----------------------|
| Berkshire | X | X | X | X | X |
| Bristol | | X | | X | |
| Cape Cod | X | | X | X | |
| Central | X | X | | X | X |
| Northeast | | X | | | X |

This data was collected through our online arbovirus response reporting form, developed in 2013 as a tool to rapidly collect information about where and when treatments directly related to arbovirus-positive mosquito pools are taking place, and to pass this on to the SRB, DPH, the Governor's office, and EOEEA.

Several districts/projects also performed ditch maintenance and other management techniques over the course of the season (managing stormwater systems, clearing clogged culverts), in an effort to reduce mosquito-breeding habitat. By mid-September (Epi Week 38 and beyond), cool temperatures led to most districts/projects suspending ULV spraying operations.

Specific details of mosquito management efforts are provided by each district/project in their annual operations reports, which can be accessed at

<http://www.mass.gov/eea/agencies/agr/pesticides/mosquito/annual-operation-reports.html>

Arbovirus Detections

The first 2015 detection of WNV in a mosquito pool did not occur until Epi Week 28, the same as in 2014, though it was noted in 2014 that this is later than is typical. That detection was made in Sheffield, a town in Berkshire County, and was in a *Culex pipiens/restuans* mosquito. The first EEEv detection was delayed even longer, until Epi Week 39, and was the only EEEv detection of the season, the first time in well over a decade that this has happened in Massachusetts. It was detected in the town of Northbridge, in Worcester County (part of the Central MA Mosquito Control Project), and was also *Culex pipiens/restuans*.

Out of the 4059 total pools submitted for testing in 2015, there were a total of 164 WNV-positive mosquito pools (3.63%) and 1 EEEv-positive mosquito pool (.02%). Again, these numbers are far below

arbovirus levels in past years, as are mosquito levels themselves. A table with data spanning 2012-2015 is provided below:

| Year | # Pools Submitted | # WNV+ | # EEEv+ | Total Mosquitoes Submitted | % WNV+ | % EEEv+ |
|------|-------------------|--------|---------|----------------------------|--------|---------|
| 2015 | 4059 | 164 | 1 | 120,670 | 3.63% | .02% |
| 2014 | 5038 | 56 | 33 | 132,776 | 1.1% | .66% |
| 2013 | 6090 | 335 | 61 | 154,324 | 5.5% | 1% |
| 2012 | 6746 | 305 | 262 | 150,565 | 4.52% | 3.88% |

Almost all mosquitoes testing positive for WNV (95%) were *Culex pipiens/restuans*, possibly an indicator of the outbreak levels we had of this species. A summary table of arbovirus positives by species is below:

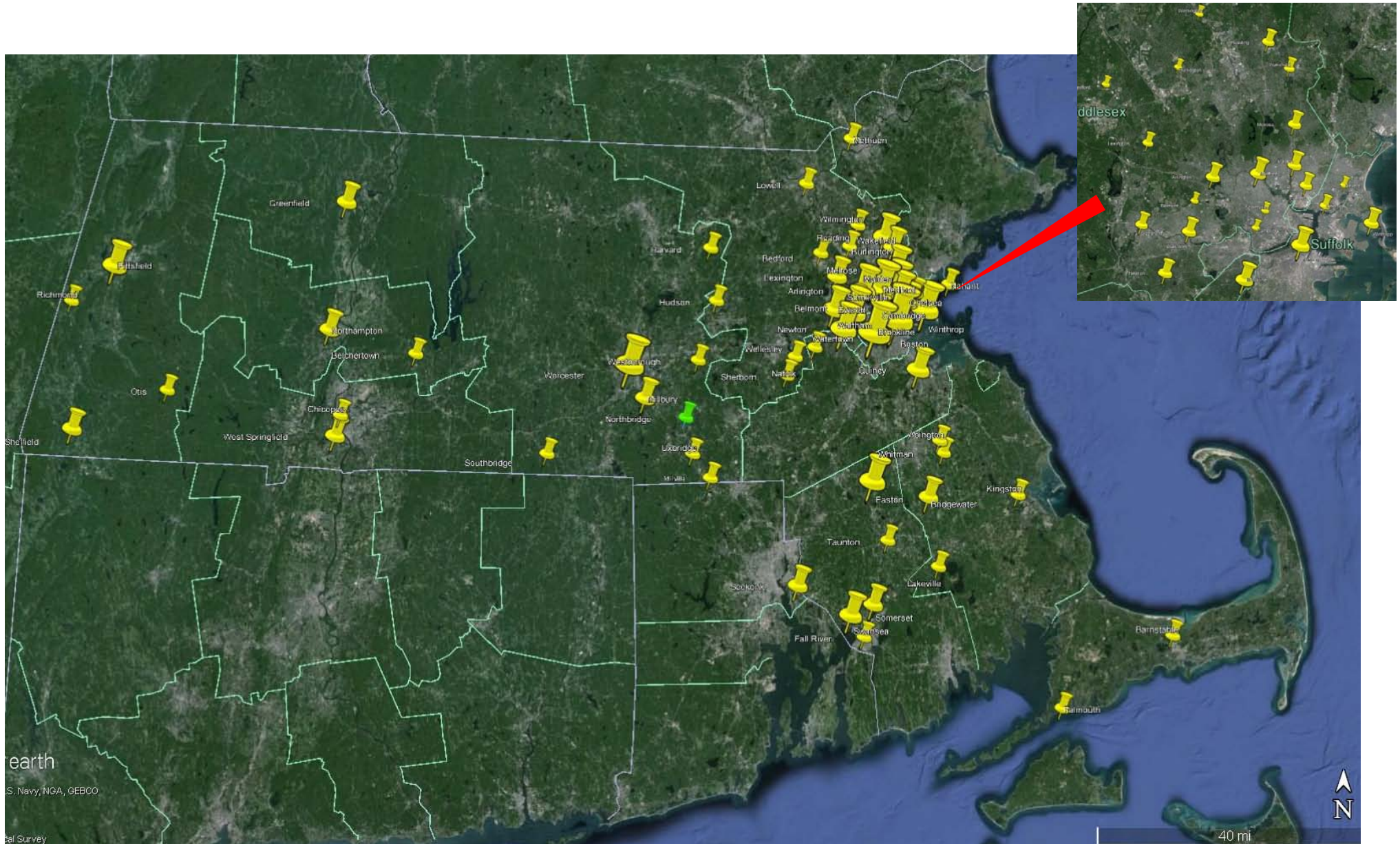
| | # pools | % |
|---------------------------------------|------------|------|
| EEE, RTD-PCR | 1 | |
| <i>Culex pipiens/restuans</i> complex | 1 | 100% |
| WNV, RTD-PCR | 164 | |
| <i>Coquillettidia perturbans</i> | 1 | 1% |
| <i>Culex pipiens/restuans</i> complex | 155 | 95% |
| <i>Culex salinarius</i> | 3 | 2% |
| <i>Culiseta melanura</i> | 5 | 3% |

The first human case of WNV was announced around Epi Week 34, in a man in his 40s from Middlesex County. The second human case occurred in Epi Week 35, another man in his 40s that likely contracted the disease in Hampden County. There were a total of nine human WNV cases in 2015. There were no human cases of EEEv in 2015, and no cases of EEEv or WNV in animals.

The map on the next page shows all arbovirus-positive mosquito pools confirmed during the 2015 season, with EEEv+ pools in blue and WNV+ pools in yellow. A larger map tack indicates multiple positive pools found in that municipality over the course of the season. Note that geolocation is centered on each municipality and should not be interpreted as an exact location of mosquito collections.

In late 2015, reports began to emerge from Brazil regarding a possible outbreak of Zika Virus tied to cases of microcephaly in infants. Zika Virus remained very much in the news for the remainder of the year and beyond. However, there have yet to be any US cases of this virus locally transmitted to humans via mosquitoes.

Map of 2015 arbovirus-positive mosquito pools (EEEv+ pools in blue, WNV+ pools in yellow). A larger pin in the map indicates multiple positive pools found in that municipality. Geolocation is centered on each municipality and should not be interpreted as an exact location of mosquito collections. The inset map is provided to show detail of the high levels of WNV+ pools in the East Middlesex/Norfolk/Suffolk region.



Legislative Updates

In spring 2015, as dictated by Ch. 425 M.G.L., Amendment to 132B (AN ACT RELATIVE TO PESTICIDE LICENSING AND MOSQUITO CONTROL), MDAR staff put the final touches on the Catch Basin Applicator Permit Program, which allows a government employee (state, city or town) to use MDAR-approved dry formulation mosquito larvicides in storm drains and catch basins, provided that employee is working under the supervision of a certified or licensed pesticide applicator. An exam and study materials were developed, exam locations and proctors were secured, and several exams were held. Of the 19 people who signed up for an exam, 17 took the exam and 16 passed it. The majority of those who signed up for an exam were from East Middlesex County, with a few people from Plymouth and Suffolk and 1 each from Bristol and the Northeast.

Talks also continued with Board of Health officials from several municipalities in Franklin, Hampden and Hampshire County regarding the potential interest of forming a Mosquito Control District in the Pioneer Valley region.

FY16 Budget

Mosquito control budgets are derived from state funding in the form of local aid distributions, which are intercepted for the purpose of funding mosquito control assessments and other charge programs. The Department of Revenue (DOR) provides municipalities with estimates of cherry sheet receipts (the official notification by the Commissioner of Revenue to municipalities and school districts of estimated state aid to be paid and charges to be assessed over the next fiscal year) and assessments for mosquito control services.

The SRMCB receives proposed budgets from the projects/districts, including year to date spending, prior year estimated balance forward (funds rolling over), and past and present salary increases. Feedback from member municipalities is also obtained, via a standard form required as part of the SRMCB Budget Notification and Compliance Policy, to document whether or not communities support the proposed budgets. The mosquito control districts/projects send the standard form to their local member communities. The SRMCB typically requires two-thirds of the member communities in any mosquito control service area to support a budget, particularly a budget with a large increase, as an indication that local communities support this spending.

The FY16 budgets for the 9 regional programs plus the SRB Administrative Fund totaled \$11,917,200, an increase of about 3% over FY15 (\$11,608,459). FY16 budget increases for the districts/projects ranged from 0% to 4%. The SRB budget increased about 14% due to the backfilling of positions that remained open during much of FY14. The following table highlights FY16 budget amounts approved and certified by the SRMCB during 2015:

| District | FY2016 SRMCB Certified Budget |
|----------------|-------------------------------|
| Berkshire | \$249,403 |
| Bristol | \$1,322,814 |
| Cape Cod | \$1,961,964 |
| Central Mass | \$2,079,795 |
| East Middlesex | \$681,782 |
| Norfolk | \$1,669,691 |
| Northeast | \$1,589,540 |
| Plymouth | \$1,685,369 |
| Suffolk | \$265,264 |
| SRB Admin | \$411,578 |
| Total: | \$11,917,200 |