Commonwealth of Massachusetts

STATE RECLAMATION AND MOSQUITO CONTROL BOARD

NORTHEAST MASSACHUSETTS MOSQUITO CONTROL AND WETLANDS MANAGEMENT DISTRICT

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2016 Best Management Practice Plan
Hamilton

FY17 Percentage of assessment allocated to specific measures as prescribed by individual municipalities Best Management Practice (BMP) in the Town of Hamilton

For 2017 the District is asking for a level funded budget. For FY17, our primary goal is to protect our subscribing communities from virus. We will do all in our power to reduce the mosquito populations on a regional and town wide basis, thus reducing the virus risk to our residents. We look for continued support and understanding from all the communities we serve if we are to be successful.

Assessment: As estimated by the Massachusetts Department of Revenue, Division of Local Services, in accordance with Chapter 516 of the General Laws of the Commonwealth. The assessment formula is based on a regional concept, which considers square miles and evaluation. The District offers this breakdown as a general guide to how funds are allocated specific to your community.

FY17 Estimated District Budget for the Town of Hamilton	$43,988.87
FY17 State Reclamation and Mosquito Control Board (est.)	$ 1,567.19
FY17 Total Assessment for the Town of Hamilton	$45,556.00

-Committed to the principals of mosquito control and wetland management -

District Breakdown of Control Measures

(Control measures specific to Hamilton are **Bolded)**

General Operational Cost Share

Regional Adult Mosquito Surveillance Program

~~Regional Aerial Salt Marsh Larviciding Program~~

Regional Vector / Virus Intervention

Surveillance

Larviciding / Catch Basin Treatment / Manual Ditch Maintenance

Adulticiding / Barrier Treatment **(Virus Intervention with Board of Health approval only)**

Ditch Maintenance / Wetlands Management

Tire Recycling Program

Inspectional Services

Property Inspections

Mosquito Habitat Mitigation

Research and Development

Education and Outreach

Social Media

2015 Overall Mosquito & Arbovirus Surveillance Summary

Snowy and cold winter

Abundant snowfall occurred during the winter of 2014-2015. The Northeast was particularly snowy with below average seasonal temperatures, where Boston, Massachusetts had its snowiest February of any month since 1872 with 64.8 inches of snow. Because of these early below average temperatures, many cattail marshes froze into the root zone; reducing the survival of *Coquillitidia perturbans* AKA "cattail mosquito" (bridge vector for EEE/WNV) larvae for their July emergence period. The 2015 adult cattail mosquito numbers were reduced by 79%.

March cool and dry
April cool and dry
May hot and dry
Drought conditions dominated from March through May with below normal temperatures in March and April. Massachusetts saw the second driest and warmest May on record since 1895. With snowmelt pockets available for larval development, "spring brood" mosquito populations (those that emerge in May) increased slightly from 2014 but were at seasonal average numbers for 2015 (compared to 2010-2013 data). However, red maple swamps/acid bogs and sphagnum bogs were also hard hit with the cold winter months and with the very dry spring reduced the spring populations of *Culiseta melanura* (primary vector for EEE). EEE was not detected during 2015 in the District. EEE risk may increase during years of normal to above average precipitation.

June cool and wet
The Northeast went from a very dry May to a very wet and cool June. The Northeast saw 7.29 inches of rainfall, which was 173 percent of normal and made it the 3rd wettest June on record. Massachusetts ranked 10th wettest June on record.

July average temperature and dry
July continued to have average annual temperatures but below average precipitation. Due to the lack of precipitation, the rain/fresh floodwater mosquito, *Aedes vexans* (bridge vector EEE/WNV), was reduced from 2014 by 81%. Under drought conditions untreated salt marsh breeding areas are flooded only during the monthly high tides and hatching of the accumulated eggs produces hordes of mosquitoes. The District saw a large decrease (94% in *Oc. sollicitans* and 77% in *Oc. cantator*) in both species of salt marsh mosquitoes. This can be in part attributed to diligent larviciding efforts in all marsh district communities.

August hot and dry
Northeast Massachusetts had the 9th warmest August on record with moderate drought conditions by the end of August. The ***first positive WNV mosquito pool*** for the NE District was identified on August 24th, 2015 in *Culex pipiens* followed by 5 more mosquito pools (*Cx pipiens/restuans* complex and *Cx. salinarius*) on August 31st. Container breeding mosquito populations are negatively affected by drought conditions. However, during hot, dry seasons water supplies are in high demand for both mosquitoes and bird populations. They both congregate at the areas of contained water, potentially increasing urban WNV infections. Catch basin larviciding should be moved up to June to further reduce adult *Cx. pipiens*/*Cx. restuans* populations for July and August in the high risk municipalities. The District recommends a more closely coordinated catch basin management plan for those communities not participating in early larviciding.

September hot and near normal precipitation
Massachusetts saw the warmest September with some extreme temperature days recorded since 1895. The District was still experiencing moderate drought conditions and received about average rain for the month. The District had ***3 positive WNV mosquito pools*** of *Cx pipiens* on September 10th, 14th, and 24th and ***1 human WNV case*** on September 29th; bringing the districts 2015 season total to 9 WNV positive mosquito pools and 1 WNV confirmed human case. Populations of *Cx. salinarius*, an efficient bridge vector of WNV, were relatively similar to past years where the risk for WNV was increased thorough the state.

October near normal seasonal conditions

October temperatures and precipitation for northeast district were near normal. Even with some normal precipitation, drought conditions in the area remained. Due to lack of mosquitoes collected in all trap types, surveillance and submissions to the lab ceased on October 1st.

By the end of December 2015, the district remains unseasonably warm with moderate drought conditions in the area.

Total Mosquito Collected by NE Mosquito Control District*

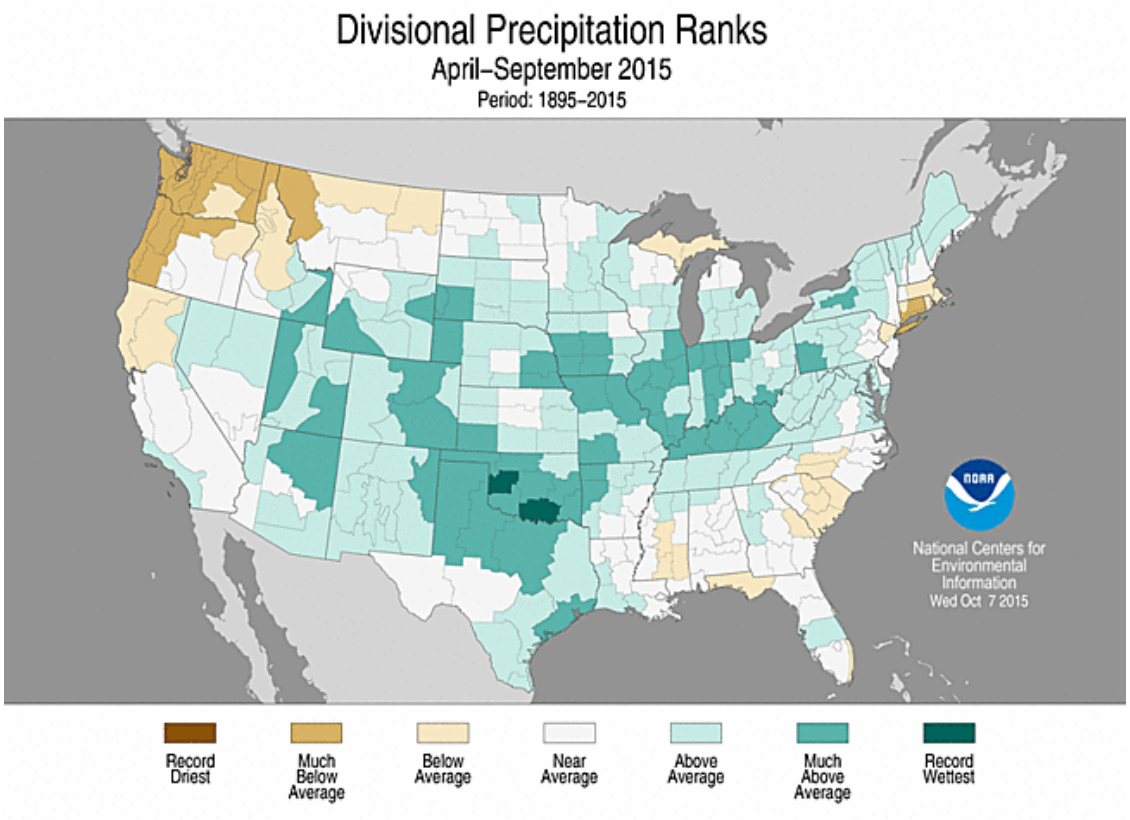
	2014	2015	% change
Resting Boxes	1244	370	70% decrease
NJ CO2 traps	73,894	19,573	74% decrease
Gravid Traps	7,856	3,480	56% decrease

*See 2016 Vector Management Plan for trap information

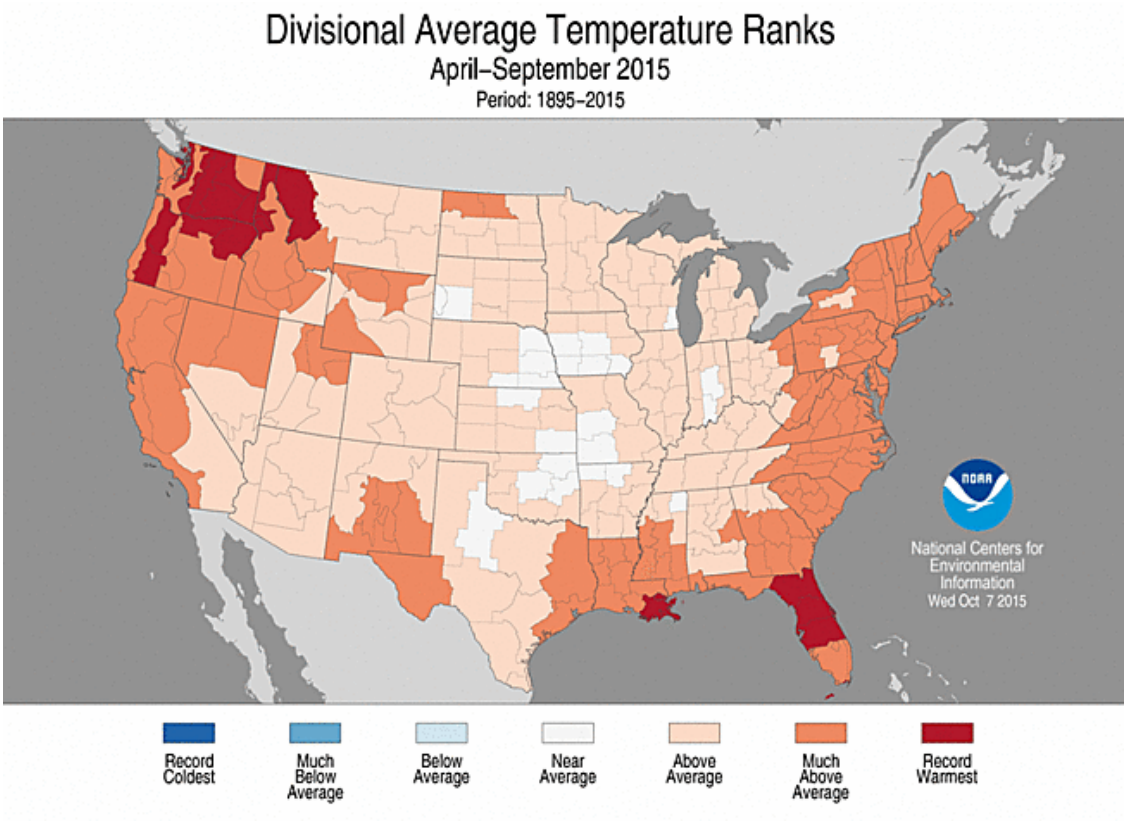
Pest and Medically Important Mosquito Species (habitat)*

	2014	2015	% change
Culiseta melanura (red maple /acid bog/sphagnum swamp)	1,480	552	63% decrease
Culex pipiens (container/catch basins)	4,104	1,860	55% decrease
Culex restuans (container/catch basins)	3,397	1,108	67% decrease
Culex salinarius (brackish water/phragmities/roadside ditches)	2,101	1,823	13% decrease
Coquillitidia perturbans (cattail)	45,685	9,463	79% decrease
Aedes vexans (rainwater/fresh floodwater)	4,934	916	81% decrease
Ochlerotatus japonicus (tree hole/container breeder)	2,014	489	76% decrease
Ochlerotatus sollicitans (salt marsh)	1,793	114	94% decrease
Ochlerotatus cantator (salt marsh)	12,980	3,007	77% decrease
Ochlerotatus canadensis (spring/summer woodland pool)	770	325	58% decrease

*Totals include all trap types in historical locations



Precipitation in Massachusetts 2015		Normal	Actual
April	State	3.81	2.58
	District	3.72	2.49
May	State	3.80	1.05
	District	3.54	1.75
June	State	3.86	6.11
	District	3.56	7.07
July	State	3.70	3.39
	District	3.48	2.71
August	State	3.91	2.60
	District	3.63	2.53
September	State	3.85	3.99
	District	3.56	4.18



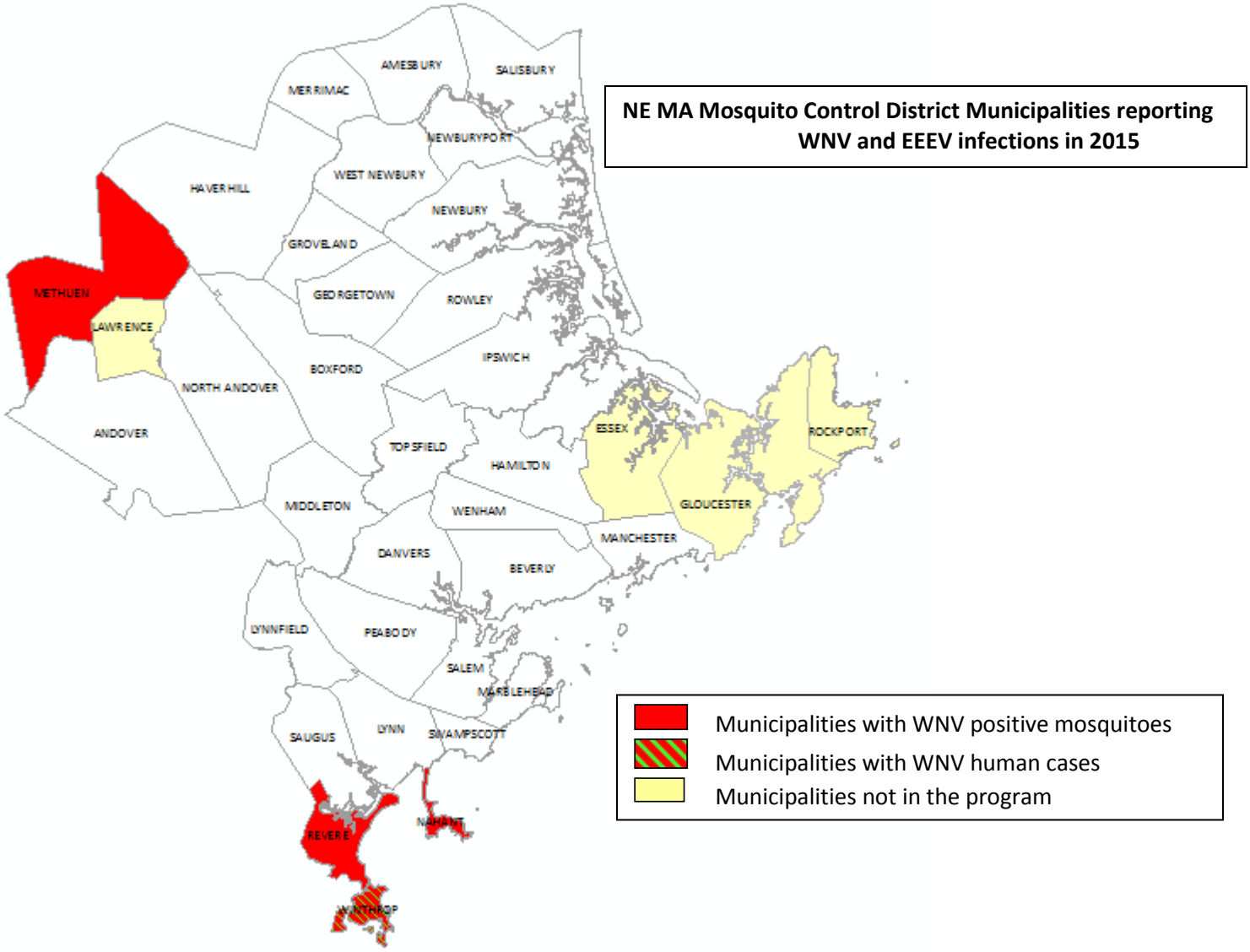
Georgetown, MA Monthly Temperature Averages (F)

	Actual 2015	Normal	Departure
April	47	48	-1
May	63	58	+5
June	65	68	-3
July	73	73	0
August	74	72	+2
September	68	64	+4

Detections of West Nile (WNV) and Eastern Equine Encephalitis (EEEV) viruses in infected mosquitoes in Northeast Massachusetts Mosquito Control District from 2002 through 2015.

	Number of pools* Submitted for	WNV Positive Pools		EEEV Positive Pools	
Year	Testing	No.	Percentage	No.	Percentage
2002	740	14	1.9	0	0.0
2003	646	2	0.3	0	0.0
2004	604	4	0.7	0	0.0
2005	870	11	1.3	2	0.3
2006	1,181	5	0.4	11	0.9
2007	850	16	1.9	0	0.0
2008	774	10	1.3	0	0.0
2009	567	2	0.4	13	2.3
2010	714	21	2.9	0	0.0
2011	1,009	58	5.7	0	0.0
2012	1,039	48	4.6	14	1.3
2013	1,315	76	5.8	4	0.3
2014	804	7	0.9	2	0.2
2015	**541**	**9**	**1.7**	**0**	**0.0**

* “Pool or batch” is a sample containing from 1 to 50 mosquitoes, all of the same species collected on the same date from the same location later tested by the Massachusetts Department of Public Health.



Positive Virus Events in NE Massachusetts District- 2015

7/27/2015 *Cx. pipiens* (1 pool) WNV- Winthrop, MA
8/24/2015 *Cx. pipiens* (1 pool) WNV- Winthrop, MA
8/31/2015 *Cx. salinarius* (2 pools), *Cx. pipiens/restuans* (2 pools) WNV- Winthrop, MA
9/10/2015 *Cx. pipiens* (1 pool) WNV- Methuen, MA
9/14/2015 *Cx. pipiens* (1 pool) WNV- Revere, MA
9/24/2015 *Cx. pipiens* (1 pool) WNV- Nahant, MA
9/29/2015 1 Human WNV case

-No Eastern Equine Encephalitis (EEE) identified in NE District in 2015

Hamilton

As overall mosquito populations decreased District-wide by 72% in 2015, they increased slightly in Hamilton by **less than 1%** from 2014 levels. *Cq. perturbans* populations, although up 69% for 2014, still remain at half the 2013 levels. The season-long drought, as explained in the previous section, was the cause of declines in most of these populations.

Total Mosquito Collected in Hamilton*	**2014**	**2015**	**% change**
Resting Boxes (8)	2,151	655	-70%
NJ CO2 Traps (1)	1,081	2,616	142%
Gravid Traps (1)	119	96	-19%
Totals	**3,351**	**3,367**	**.48%**

*See 2016 Vector Management Plan for trap information, () total # of traps

Mosquito Species- pest/disease list- Hamilton*	**2014**	**2015**	**% change**	**WNV/EEE +**	**District Total-2015**
Culiseta melanura (red maple swamp/acid bog)	566	174	-69%	NO	552
Culex pipiens (container/catch basins)	9	14	56%	NO	1,860
Culex restuans (container/catch basins)	14	11	-21%	NO	1,108
Culex salinarius (brackish water/phragmities/roadside ditches)	12	4	-67%	NO	1,823
Coquillitidia perturbans (cattail)	902	1,523	69%	NO	9,463
Aedes vexans (rainwater/fresh floodwater)	0	0	0%	NO	916
Ochlerotatus japonicus (tree hole/container breeder)	51	24	-53%	NO	489
Ochlerotatus sollicitans (salt marsh)	0	0	0%	NO	114
Ochlerotatus cantator (salt marsh)	25	20	-20%	NO	3,007
Ochlerotatus canadensis (snowmelt/woodland pool)	10	13	30%	NO	325

*Totals include all trap types in historical locations

There were **no WNV/EEE detections in Hamilton in 2015.** In the beginning of October, 2015, the arboviral risk level for Hamilton remained low for EEE and low for WNV. Risk Categories are described in Table 2 of the 2015 MDPH Surveillance and Response Plan.

Mosquito infection history (WNV/EEE) in Hamilton:

Collection Date	**Species**	**Test Type**	**Result**
8/27/2013	*Culiseta melanura*	WNV	Positive
9/17/2013	*Culiseta melanura*	WNV	Positive
8/14/2012	*Culiseta melanura*	EEE	Positive
8/28/2012	*Culiseta melanura*	EEE	Positive
9/02/2012	*Culiseta melanura*	EEE	Positive
9/02/2012	*Culiseta melanura*	WNV	Positive
9/02/2012	*Coquillettidia perturbans*	EEE	Positive
9/18/2012	*Culiseta melanura*	WNV	Positive
9/16/2009	*Culiseta melanura*	EEE	Positive

9/25/2006	*Culiseta melanura*	EEE	Positive

During 2014, EEE infected mosquitoes were collected from adjacent Topsfield and WNV was collected from infected mosquitoes in nearby Peabody.

It is not yet known whether WNV is endemic to Hamilton. With extensive forested wetlands in Hamilton and in surrounding communities, there may be a local focus here for EEE virus. Thus, there will always be concern for transmission and human infection by EEE/WNV virus in Hamilton and all surrounding municipalities. From August through the end of September, Hamilton residents should take necessary precautions to reduce the risk of infection from these viruses, regardless of low mosquito populations and/or aggressiveness of control.

Refer to the 2015 Massachusetts State Arbovirus (MDPH) Surveillance and Response Plan viewed online at http://www.mass.gov/eohhs/docs/dph/cdc/arbovirus/arbovirus-surveillance-plan.pdf

Focus of Operations

Regional control efforts will focus primarily on adult mosquito surveillance, virus testing and preemptive virus intervention strategies. Specific to Hamilton the primary focus of control efforts will be on freshwater larviciding, catch basin treatments and virus intervention for WNV and EEE.

Regional Control Measures

Regional Adult Mosquito Surveillance Program: The importance of surveillance data in reducing the risk of vector borne disease cannot be overstated. By focusing on areas of heightened viral activity, preemptive control measures can be timely, efficient and effective. In 2002 we expanded and greatly improved our surveillance program by developing and implemented an automated carbon dioxide (CO2) surveillance system. This system incorporates a CO2 modified light trap and gravid trap into one automated unit. CO2 traps are used to sample the general adult mosquito population, monitor both short and long term trends, and determine dominant species and population density.

Gravid traps are designed to collect adult female *Culex* species the primary vectors of WNV. One of these dual function units is placed in a fixed location in each member municipality for a total of 32 deployed throughout the District. Mosquitoes are collected and identified from each trap twice a week beginning in early May thorough early October and beyond if conditions and circumstances warrant.

To supplement *Culex* collections from fixed gravid trap locations, the District will deploy additional gravid traps at multiple random locations in communities with a history of WNV activity as conditions and circumstances warrant. In the event mosquitoes collected from these traps test positive for EEE or WNV the District will add supplemental CO2 traps at those sites.

The District will operate 128 resting boxes at 16 sites. Resting boxes are designed to collect blood fed female *Culiseta melanura* mosquitoes relevant to EEE transmission. The District began deployment of resting boxes in 2006 in response to the emergence of EEE in the Northeast and they have proven to be a valuable tool in early intervention. Six to eight resting boxes will be placed at each fixed location and there will be two fixed locations in communities bordering New Hampshire as well as other communities considered to be at risk. The District will collect and identify samples from each trap every week and the specimens will be tested for virus.

In the event *Cs. melanura* mosquitoes collected from resting box sites test positive for EEEV the District will deploy portable CO2 traps at those sites. Whereas *Cs. melanura* rarely bites humans they serve as an early indication of the presence of EEE in the environment. CO2 traps attract human biting mosquitoes and mosquitoes testing positive from CO2 traps indicate a heightened risk.

Virus Testing: Specimens from our trap collections will be sent to The Massachusetts Department of Public Health (DPH) to be tested for the presence of encephalitis viruses.

Regional Vector/Virus Intervention: Control efforts will focus on early intervention strategies in municipalities that have shown a greater risk to mosquito borne virus based on events of the previous seasons and surveillance data as prescribed in the District's VMP. This approach is in the best interest of all member municipalities as focused early intervention strategies seem to demonstrate containment of WNV, and may reduce the risk of EEE exposure to humans and the migration of virus to other municipalities.

Regional Aerial Salt Marsh Larviciding Program: Coastal salt marshes in neighboring communities from Ipswich to the New Hampshire border will be aerially larvicided to control salt marsh mosquitoes in accordance with the respective Best Management Practice Plans. Salt marsh mosquitoes are capable of flying up to 25 miles in search of a blood meal in order to lay eggs. Coastal communities as well as many inland cities and towns receive direct and immediate benefit from the control of salt marsh mosquitoes which, if left untreated, will inundate these communities.

Control Measures Specific to Hamilton

Ground Larviciding*: Larviciding sites from the District's data base and areas requested by the Board of Health will be checked and treated as necessary, not to exceed one day per week from April 1st to August 31st and beyond if circumstances warrant and conditions allow.

Catch Basin Larviciding*: Catch basin larviciding will be scheduled with local DPWs so that the town's annual cleaning of their basins does not jeopardize the treatment and effectiveness of the larvicide used to control mosquito larvae in these basins. Catch basins, retention ponds, detention basins, etc. will be checked and treated as necessary, not to exceed one day per week from May 1st to August 31st.

*Bacterial larviciding products containing only *Bacillus thuringiensis israelensis* (Bti) and/or in combination with *Bacillus sphaericus* (BS) will be used. No methoprene will be used (updated 5/2016).

Manual Ditch Maintenance: In the course of larviciding and catch basin treatments, roadside ditches and culverts will be manually cleared of manageable blockages and debris in order to reduce mosquito breeding habitat and / or potential habitat.

Adulticiding: Science based selective adulticiding for **virus intervention only** will be available to the town with recommendations from Northeast MA Mosquito Control of specific areas to be targeted **with approval of the Board of Health**, as circumstances warrant and conditions allow. Applications to schools must be in compliance with MGL ch85.

Barrier Treatment: The District uses a system called Ultra Low Volume (ULV) for ground adulticiding applications. ULV is designed to dispense very small amounts of pesticides over a large area. While this is a cost effective means of reducing mosquito populations on a large scale, it only affects those mosquitoes present at the time of the application and repeated applications are sometimes necessary to sustain the initial reduction in the mosquito population in some areas.

To reduce the need for repeated applications and provide more sustained relief from mosquitoes in high public use areas, the District will provide barrier treatments to public use areas such as schools (applications to schools must be incompliance with MGL ch85), playgrounds, athletic fields, etc., at the request of the Board of health and/or school departments.

Ditch Maintenance / Wetlands Management: The town may petition the District to undertake larger scale ditch maintenance projects, wetlands enhancement and restoration projects requiring specialized mechanized equipment and expertise. Petitioned sites will be evaluated and a site specific proposal will be written for acceptable projects. Wetlands management projects may be beyond the scope of any municipality's assessment and may require a separate and additional appropriation.

Tire Recycling Program: Tires have historically been discarded in any number of locations, on public and private properties, in both upland and wetland environments. Once a pile is started it can quickly grow into a substantial public health issue not only as a source of mosquito proliferation but also as a potential fire hazard or worse, as a source of toxic fumes that, once ignited, can be extremely difficult to extinguish.

Discarded tires almost always hold water and are a prime location for artificial container breeding mosquito species, most notably *Culex pipiens*, *Culex restuans* and *Ochlerotatus japonicus*. *Cx. pipiens* and *Cx. restuans* are considered to be the key vector species of both encephalitis viruses in the District. *Oc. japonicus* is a new species to Massachusetts since 2000, and is thought to have been imported into the United States in used tires. *Oc. japonicus* has also shown to be a competent vector of West Nile virus. Invasive mosquito species are known to travel in containers like tires. This season the district will be starting a tire water sample program in order to monitor any new species coming into the district.

Inspectional Services: While the District is authorized under the provisions of Chapter 252, section 4 of the General Laws of the Commonwealth to enter upon lands for the purpose of inspection, it is not a regulatory agency. Nor is it our intention to impose on any resident or business, but rather to be a resource for information and technology to help property owners prevent or abate mosquitoes to the mutual benefit of the property owner and the community.

The District will act as a technical advisor as requested by the Board of Health and represent the municipalities' public and animal health and human annoyance concerns relative to mosquito breeding, potential breeding and proposed development. The District, at the request of the Board of Health will also review site plans and inspect sites where storm water structures are planned or under construction. Upon completion of an inspection, the District will make and submit written recommendations to both the Board of Health and the property owner. District Field Technicians in the course of routine catch basin treatments and larviciding may inspect such facilities as time and circumstance allows or as requested by the local Board of Health.

Property Inspection: Socioeconomics often plays an important role in mosquito control and associated public health risks. Over the last few years the District has received many requests from Boards of Health to inspect abandoned properties.

The District has a long standing policy of property inspections at the request of Boards of Health. Given the current economic climate and the increased health risk associated with property abandonment the District will take a more aggressive approach to property inspections. In the course of our routine activities in your community, if we discover such properties, we will inspect and report these properties to the Board of Health. We understand that addressing concerns related to such properties is a matter of time and process. In the long term we will offer any support that may be appropriated to resolve mosquito problems related to such properties and in the short term with the Board of Health's support we will implement the necessary control measures to mitigate the immediate mosquito problem associated with such properties.

Mosquito Habitat Mitigation: The District will represent the town's mosquito control concerns in an advisory capacity relative to proposed development and where prudent as requested by local health officials.

Research and Development: The District will evaluate the efficacy and efficiency of current control methods, investigate new methods, procedures and technologies in mosquito control and wetlands management and evaluate their implications for use in Hamilton.

Education and Outreach: The District will present educational displays and programs on mosquito control and related wetlands management programs at the request of health officials, schools or civic organizations. The District will also monitor and update local schools, daycares etc. regarding IPM plans and current child protection requirements.

Social Media: In the recent past, the District has recognized the need to provide information on our activities in a timelier manner. Social media is proving to be the go to method of disseminating information for many companies and individuals. This past season the District started a Facebook page as a way of providing up to date information and opening up civil discussions on our operations. We chose to offer limited information to start, but through the page, we were able to let people know when and where we would be adulticiding each week.

The District is also looking at new website hosts in order to make our website more dynamic and also provide more timely updates in another format. We have found that many questions can be answered through the website and/or Facebook and will continue to increase our web presence.

https://www.facebook.com/pages/Northeast-Massachusetts-Mosquito-Control-and-Wetlands-Management-District
http://www.northeastmassmosquito.com/