Commonwealth of Massachusetts

STATE RECLAMATION AND MOSQUITO CONTROL BOARD

NORTHEAST MASSACHUSETTS MOSQUITO CONTROL AND WETLANDS MANAGEMENT DISTRICT

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2015 Best Management Practice Plan

Topsfield

FY16 Percentage of assessment allocated to specific measures as prescribed by individual municipalities Best Management Practice (BMP) in the Town of Topsfield

For 2016 the District is asking for a level funded budget. For FY16 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.

FY16 Estimated District Budget for the Town of Topsfield		$38,585.00
FY16 State Reclamation and Mosquito Control Board	3.60%	$ 1,389.00
FY16 Total Assessment for the Town of Topsfield		$39,974.00

District Breakdown of Control Measures
(Control measures specific to Topsfield 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 only with Board of Health approval)

Ditch Maintenance / Wetlands Management

Tire Recycling Program

Inspectional Services

Property Inspections

Mosquito Habitat Mitigation

Research and Development

Education and Outreach

Social Media

2014 Overall Mosquito & Arbovirus Surveillance Summary

Abundant snowfall and accumulations occurred during the winter of 2013-2014. However, drought conditions dominated from April through the rest of the spring and summer. With little water available for larval development, "Spring Brood" mosquito populations (those that emerge in May up to mid-June) were at the lowest levels ever recorded in the Distinct in the 21st Century. While the District was hit with heavy rains from hurricane Arthur during the Independence Day weekend, the ground was so dry that practically all the water that fell upon it was absorbed. Very little standing water remained long enough to activate and sustain the development of floodwater mosquitoes throughout most of the District. Furthermore, the summer stayed on the cooler side, with temperatures rarely reaching 90° F. which retarded development. In fact, a true heat spell with

temperatures and relative humidity into the 90's did not occur until the first full weekend in September. With much less standing water present and cooler-than-normal temperatures, overall mosquito populations were, with the exception of one species, the lowest since the current surveillance protocols were implemented in 2002.

Two species in eastern Massachusetts are found to be the most efficient vectors (i.e., "carriers") for West Nile Virus (WNV), *Culex pipiens* ("Northern House Mosquito") and *Cx. restuans*. Although these vectors in the District normally proliferate during drought conditions, the cooler temperatures restricted mosquito development and adult activity. Furthermore, the "blitzkrieg" campaign to treat all the District catch basins relatively early may have also contributed to the low numbers of West Nile vectors developing. These species develop in artificial containers that hold organically-polluted waters such as catch basins. The basins were treated again in 2014 with either bacterial or hormonal-like agents (product use depended on what each municipality favored) that eventually killed mosquito immatures while they were in the aquatic stage. Along with lower populations of vectors there was also a lower rate of amplification and transmission of WNV. As shown in Table 1, the numbers of mosquito-WNV detections were at the lowest since 2009, a remarkable reduction from what was recorded in 2011 through 2013. The majority of the 2014 virus "hits" occurred after 1 September, near the end of the surveillance season, which was normal. Arboviral abundance in an ecosystem is always at the highest just before the end of the summer since it takes several months to build up sufficient circulating virus that can be easily detected.

Although vector mosquito populations were at historic lows, there was one human case of West Nile-generated encephalitis from Saugus (confirmation of a second case, in Peabody is still pending at this date). This demonstrates that during peak arbovirus transmission season, from 1 August until 30 September, the risk for infection with WNV (as well as for EEEV) is always present regardless of how low the populations of vectors. This tells us that while vector species were at a minimum, if sufficient infected birds migrate into a community, the few mosquitoes present can still acquire and transmit the virus to residents. Such low populations usually do not warrant ground-based adulticiding operations therefore during the late summer/early fall, District residents should engage in personal protective measures when venturing outdoors for extended periods. Application of repellents and minimizing exposing one's skin to possible bites during the late afternoons and early evenings will aid in reducing the risk of infection.

Populations of the principal vector of Eastern Equine Encephalitis virus (EEEV), the Cedar Swamp mosquito *Culiseta melanura*, were also at record-low levels for 2014. The reason was the same as for the other mosquito species, the lack of abundant water. These mosquitoes develop inside the tree hummocks (inside the water-logged root zones, known as "crypts") in white cedar and red maple swamps. With water levels extremely low, the crypts had either little or no water. With insufficient breeding areas available, there was little development and emergence of relatively few vectors. The only two EEEV "hits" (Table 1 & Figure 3) occurred late in the season and were detected in communities that are adjacent to freshwater swamps in great abundance. In such habitats, there are usually pockets of abundant water present all season long and, if the appropriate environmental conditions are present, Cedar Swamp adults will develop.

Only one species of mosquito was present in great abundance at levels never reached before under the current surveillance protocols. This was the Cattail Swamp mosquito *Coquillettidia perturbans* (also known as the "Salt & Pepper" mosquito). This species is normally the most abundant species in our District, but its record populations in 2014 were a surprise. The biology of this species will not be discussed here; the reader can refer to BMPs of previous years for a complete description of the habits of this species. Since the adults of this species begin to emerge in mid-June and peak in

early July, it can be surmised that the freshwater swamps where these mosquitoes develop were yet to be hard hit by the drought. The mosquitoes are usually gone from the scene by mid-August; they only have one generation per year. Nonetheless, the drought seemed to have little-to-no impact on reducing the population of this species. One hypothesis to explain this phenomenon is that the increase of residential/business developments adjacent to cattail swamps has caused more water to accumulate at these swamps to enhance survival of *Cq. perturbans*; the same could be hypothesized for the increase in beaver impoundments.

Table 1. Detections of West Nile (WNV) and Eastern Equine Encephalitis (EEEV) viruses in infected mosquitoes in Northeast Massachusetts Mosquito Control District from 2002 through 2014.

	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

* “Pool” is a sample containing from 3 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.

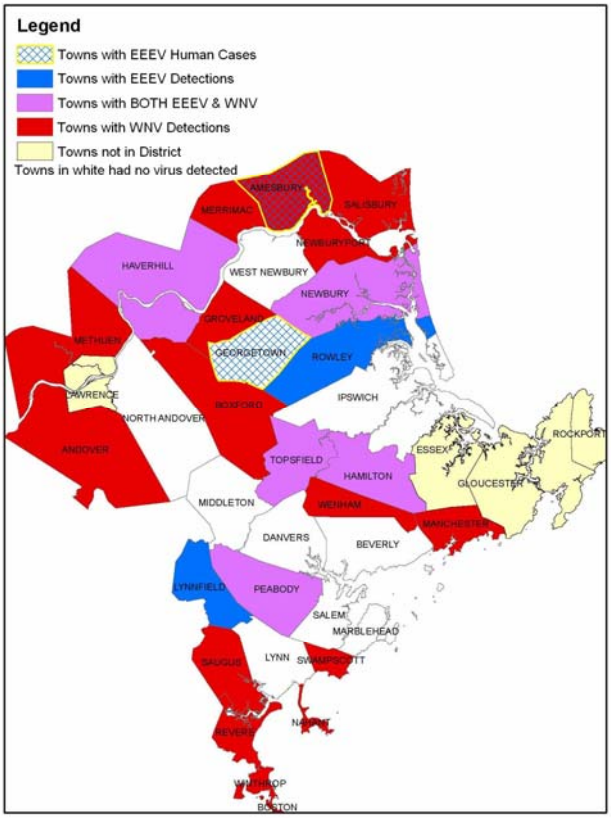
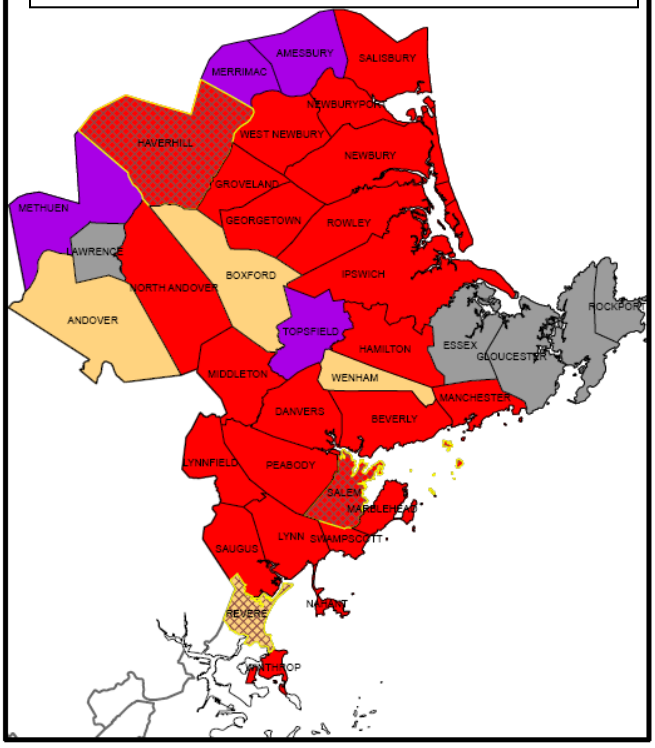


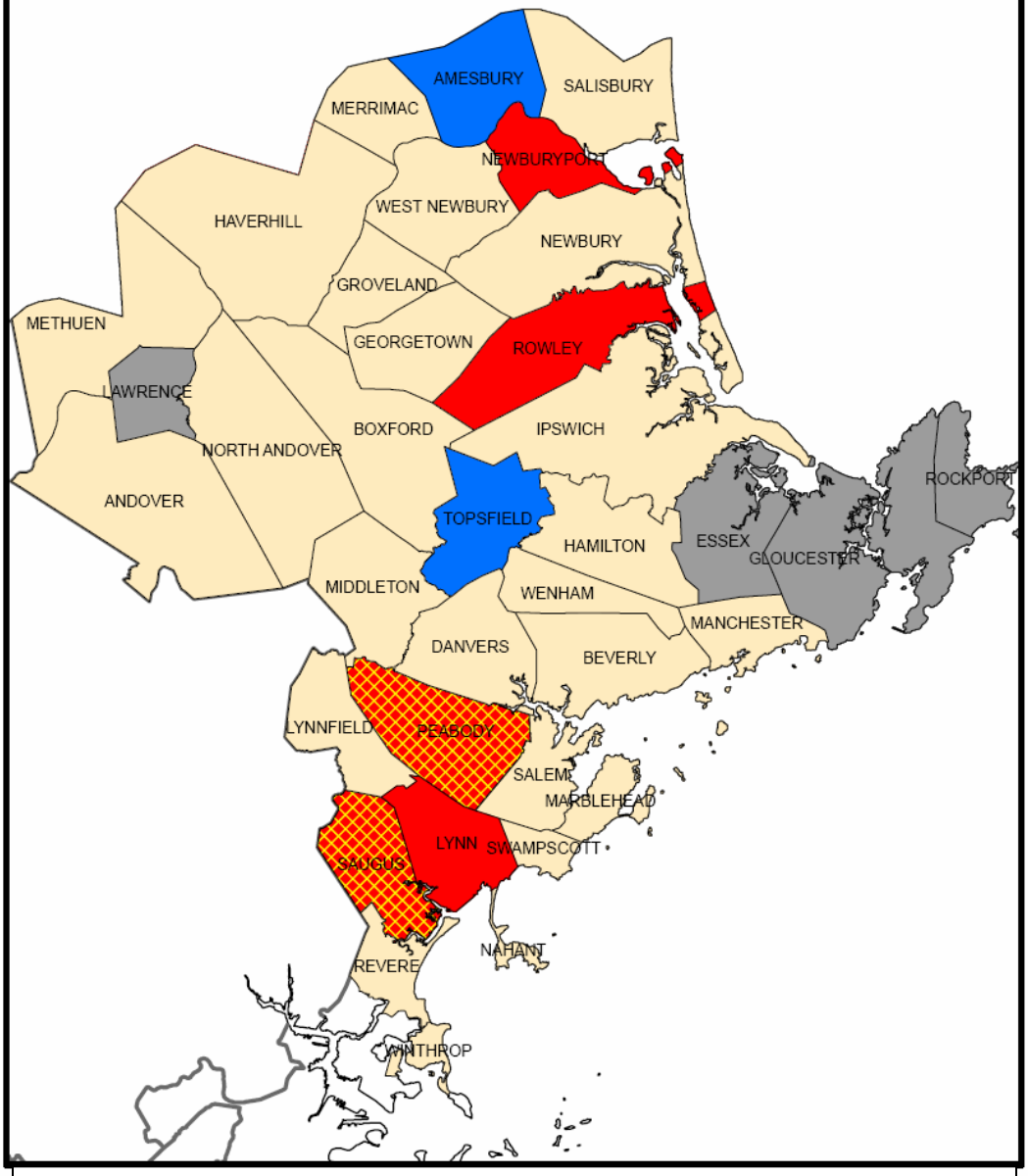
Figure 1. NE MA Mosquito Control District Municipalities reporting WNV and EEEV infections in 2012

Figure 2. NE MA Mosquito Control District Municipalities reporting WNV and EEEV infections in 2013.



Legend same as Figure 1 except cross hatching are WNV human cases.

Figure 3. NE MA Mosquito Control District Municipalities reporting WNV and EEEV infections in 2014.



Legend:
Red municipalities- WNV-mosquito detections
Blue municipalities- EEEV-mosquito detections
Cross-hatchings- Municipalities with WNV-human cases (final confirmation pending with Peabody human case)

Topsfield

As overall mosquito populations increased District-wide in 2014, they decreased in Topsfield by almost half from 2013 levels. The Cattail Swamp mosquito, *Coquillettidia perturbans*, experienced small decreases in population, unlike what was seen in most other District communities. Most of the species of concern exhibited major decreases in populations; the rest remained unchanged (and remained low). These included the principal encephalitis virus vectors *Culiseta melanura* and especially *Culex pipiens/restuans*. The season-long drought, as explained in the previous section, was the cause of the declines of these populations. The early-season treatments of catch basins with larviciding agents may also have contributed to keep populations of the WNV vectors to historic lows.

However, as reported in the previous section, virus presence and transmission in the District did not cease due to low populations of virus vectors. EEE virus was detected in a sample of eight *Culiseta melanura* adults sent for testing in mid-September. While there were no WNV detections in Topsfield in 2014, there was WNV collected from infected mosquitoes from nearby Peabody.

EEE virus has been collected in Topsfield mosquitoes in each of the past three years; WNV has been collected from Topsfield in three of the past four years. It is not yet known whether WNV is endemic to Topsfield but with extensive forested wetlands in Topsfield and in surrounding communities, there may be a local focus here of EEE virus. Thus, there will always be concern for transmission and human infection by EEE virus in Topsfield and all surrounding municipalities. Residents in areas endemic for WNV and EEEV must take the necessary precautions, especially during the late summer, to reduce the risk of infection from these viruses, regardless of low mosquito populations and/or aggressiveness of control. Recall that there is no treatment for West Nile or EEE infection, no vaccine to prevent infection, and that in many instances infected people of all ages become gravely ill and/or die from these infections!

Focus of Operations

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

Regional Control Measures

Regional Adult Mosquito Surveillance Program: The importance of surveillance data in reducing the risk of vector borne disease can not 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 (CO_2) surveillance system. This system incorporates a CO_2 modified light trap and gravid trap into one automated unit. CO_2 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.

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 twice a 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 CO_2 traps at those sites. Whereas *Cs. melanura* rarely bites humans they serve as an early indication of the presence of EEE in the environment. CO_2 traps attract human biting mosquitoes and mosquitoes testing positive from CO_2 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 Topsfield

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 Basins: Catch Basin treatments 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.

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 provided 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, Cx. restuans* and *Aëdes japonicus*. *Cx. pipiens* and *Cx. restuans* are considered to be the key vector species of both encephalitis viruses in the District. *Aëdes japonicus* is a new species to Massachusetts since 2000, and was originally thought to have been imported into the United States in used tires. *Aë. japonicus* has also shown to be a competent vector of West Nile virus.

The District has facilitated the removal and proper disposal of used tires from its service area for many years during the course of ground larviciding, manual ditch maintenance, coordinated clean-ups and petitioned wetland management projects. This practice is considered an important part of the District's source reduction efforts and a strong component to our integrated pest management (IPM) approach. Tire disposal can be costly to municipalities and may even be sacrificed as the current economic woes persist. The District hopes that this program will be well received amongst its communities and that it will find a valuable place within mosquito control best management practices.

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 Topsfield.

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/