MASSACHUSETTS MOSQUITO CONTROL
ANNUAL OPERATIONS REPORT

2010 Year of Report Date of Report: 1/21/2011

Project/District Name: **Northeast Mass. Wetlands Mgmt. Mosquito Control**

Address: 261 Northern Blvd. P.I.

City/Town: Newburyport Zip: 01950

Phone: (978) 463 - 6630 Fax: (978) 463 - 6631

E-mail: nemmc@comcast.net

Report prepared by: ***Jack A. Card, Dennis Gallant***

If you have a mission statement, please include it here: The Northeast Massachusetts Mosquito Control and Wetlands Management District represents the mosquito control and wetlands management interest of those communities that choose to subscribe to it's services. The prime directive of the District is to protect its citizens from mosquito-borne diseases by targeting specific, measured, and preemptive responses to specific risk as prescribed by the Districts annually-revised "Vector Management Plan" (VMP). To insure our citizens quality of life and the regional economy is not severely impacted by abundant pestiferous mosquito outbreaks, strategies targeted to reduce dominant mosquito populations are implemented as prescribed by the Districts annually-revised "Best Management Practice" (BMP) plans. BMP's are designed to incorporate the Districts environmentally sensitive and cost effective mosquito control strategies and the specific needs and concerns of each community..

ORGANIZATION SETUP:

Please list your Commissioner's names:

John W. Morris, CHO	Chairman
Vincent J. Russo, MD, MPH	Vice Chairman
Peter M. Mirandi, RS, MPH	
Sharon Cameron, RS, MPA	

Please list the Supt./Director's name: Walter Montgomery
Please list the Supt./Director's contact phone number: (978) 463-6630
Please list your Asst. Supt./Asst. Director's name: Jack A. Card,Jr

Do you have a website? Yes

If yes, please list the web address here: http://www.northeastmassmosquito.com

Please list your staffing levels for the year of this report:

Full time: 9
Part time: 1
Seasonal: 5
Other: (please describe)

Please break these down into the following areas:

Administrative staff: 1.5
Field staff: 15

Please check off all that apply, and list employee name(s) next to each category:
☒ Public relations Walter Montgomery, Esteban Cuebas-Incle, Jack Card (Emily Sullivan, Robyn Januszewski in varying capacities)
☒ Information technology Jack Card, Emily Sullivan, Robyn Januszewski
☒ Entomologist Esteban Cuebas-Incle
☒ Wetland Scientist (Emily Sullivan - Wetlands Project Coordinator)
☒ Biologist Robyn Januszewski
☒ Education Esteban Cuebas-Incle, Robyn Januszewski
☒ Laboratory Esteban Cuebas-Incle, Anthony Corricelli
☒ Operations Walter Montgomery, Esteban Cuebas-Incle, Jack Card, Emily Sullivan, Robyn Januszewski, Anthony Corricelli, Horrace Baxter (Seasonal) Thaddeus (Ted) Tatarzzuk (seasonal), William Montgomery (Seasonal), William Mehaffey Jr., Tim Hay, Maureen Douglas, Dennis Gallant, Richard Caron (Seasonal), Ross Mehaffey (Seasonal)
☒ Facilities Jack Card - (all employees)
☐ Other (please list)

For the year of this report, we maintained:
22 vehicles
16 modified wetland equipment (list type) 4/99 Smally 808-D Excavator/rotary ditcher (out of service), Kassboher DR170 Flail mower/ditcher/grader(out of service), Kassboher DR270 Flail mower/grader, Kassboher PB270 Flail mower/Rotary ditcher/grader, Kassboher PB260 Dump Body/grader, 77 Bombardier Muskeg (out of service), 87 Bombadier Muskeg Backhoe/Dump Body, 99 Link Belt 1600 Excavator,74 Eager Beaver Heavy Equipment Trailer (out of service), 95 Eager Beaver Heavy Equipment Trailer (rebuilt in 2007), 95 Hudson Spray Trailer, 97 Karavan Boat Trailer, 98 Car Mate Utility Trailer, 95 Alumacraft 13 foot Boat with 25 hp outboard motor, Wayne wood chipper, 96 Rokon all-terrain motor cycle, 1987 ARGO 6 wheel amphibious ATV, Clark type G fork lift
ULV sprayers (list type)

Type	Mod#/ Serial #	Purchased	Usage	Status
Vehicle(Yr)				
Electromist	#000445	2003	Spare Parts(fire)	Shelf #9

Electromist #000442 2003 Adulticiding Shelf #3

Electromist #000443 2003 Adulticiding Shelf #10

Electromist #000444 2003 Adulticiding Shelf #16(05)

Electromist #000411 NH 2005 Spare parts Shelf

Leco Model HD Series D 70001047 NH 06/20/06 Barrier Active #18
(Blower Model 26-3210 S/N 6498C85)

Leco S/N # 7200373 ULV 1100 NH 01/22/08 Barrier Active #02
(Blower Model RAI 89D S/N 93534 Roots ID # 865-105-20)

London Air XKE London Fog # 1783 (Adapco) 2005 Adulticiding Shelf #09

London Air XKE London Fog #1781 (Adapco) 2005 Adulticiding Shelf

Beco Mist Model 250 S/N 3534 (# C55409) 2006 Adulticiding Active #16

Beco Mist Model 250 S/N 3561 (# C55411) 2006 Adulticiding Active #13

Beco Mist Model 250 S/N 3565 (# C55408) 2006 Adulticiding Active #6

Beco Mist Model 250 S/N 3601 2006 Adulticiding Active #14
Replaced (06) with 3535

Beco Mist Model A002S S/N (# C55554) 2008 Adulticiding Active #01

Beco Mist Model A002S S/N (# C55555) 2008 Adulticiding Active #22

Ag Sprayer Veg. Control Active Tr.
Larval control equipment (list type) Birchmire Backpack - Pump Sprayers, Orchard Sprayers (Reel) Hand Application Devices
Other (please be specific):

Comments: _____

How many cities & towns in your service area? 32
Please list: Amesbury, Andover, Beverly, Boxford, Danvers, Georgetown, Groveland, Hamilton, Haverhill, Ipswich, Lynn, Lynnfield, Manchester-by-the-Sea, Marblehead, Merrimac, Methuen, Middleton, Nahant, Newbury, Newburyport, North Andover, Peabody, Revere, Rowley, Salem, Salisbury, Saugus, Swampscott, Topsfield, Wenham, West Newbury, Winthrop

***Please attach a link to a map of your service area if possible.**
http;//northeastmassmosquito.com

INTEGRATED PEST MANAGEMENT (IPM):

DEFINITION: a comprehensive strategy of pest control whose major objective is to achieve desired levels of pest control in an environmentally responsible manner by combining multiple pest control measures to reduce the need for reliance on chemical pesticides; more specifically, a combination of pest controls which addresses conditions that support pests and may include, but is not limited to, the use of monitoring techniques to determine immediate and ongoing need for pest control, increased sanitation, physical barrier methods, the use of natural pest enemies and a judicious use of lowest risk pesticides when necessary.

Please check off all of the services that you currently provide to your member cities and towns as part of your IPM program; details of these services are in the next sections.

☒ **Larval mosquito control**
☒ **Adult mosquito control**
☒ **Source reduction**
☒ **Ditch maintenance**
☐ **Open Marsh Water Management**
☒ **Adult mosquito surveillance**
☒ **Education, Outreach & Public education**
☒ **Research**
☒ **Other (please list): Inspectional Services, Development Plan Reviews, Invasive Vegetation Control, Wastewater and Water Treatment Facility inspections and treatments, Site Reviews, Greenhead Fly Control, Beaver Problem Managemant**

Comments: INSPECTIONAL SERVICES

INSPECTIONAL SERVICES

The old saying an ounce of prevention is worth a pound of cure is very true in mosquito control. Early intervention or preemptive action to prevent a potential mosquito breeding site from becoming an actual breeding site is as much a control strategy as an application or treatment is. 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 cause an imposition to any citizen or business, but rather to be a resource for information and technology to help property owners prevent and/or reduce mosquitoes to the mutual benefit of the property owner, the community and mosquito control.

The District acts as a technical advisor at the request of local Boards of Health and represents the municipalities public and animal health concerns relative to mosquito breeding issues and proposed developments. The District, at the request of a local Board of Health, will also review site plans and inspect sites under construction relative to mosquito breeding issues. Upon inspection of a site the District will make written recommendations and submit these recommendations to the Board of Health and the land owner.

The primary vector species of West Nile Virus, Culex pipiens typically breeds in artificial containers such as catch basins, storm water structures, etc. This species seems to thrive where others fail, due to their ability to survive in highly organic and polluted water. These conditions are often associated with industrial or office parks, commercial or agricultural livestock facilities. The District will routinely inspect these areas due to the increased potential for Culex species mosquito breeding in and around these areas.

LARVAL MOSQUITO CONTROL:

Do you have a larval mosquito suppression program? Yes

If yes, please describe the purpose of this program: To control mosquito populations pre-emptively, before they become adults.

Please give the time frame for this program: March - October

Describe the areas that this program is used: Fresh water wetlands, Upland, Salt Marsh, Man Made Structures.

Do you use:
☒ **Ground applied (includes hand, portable and/or backpack)**
☒ **Helicopter applications**
☐ **Other (please list):**
Comments: The District conducts a full range of wetland management activities in accordance with Massachusetts General Laws Chapter 252, in compliance with established federal guidelines and in coordination with local Conservation Commissions and municipal officials. The objectives of the District's Wetland Management Program are to abate mosquito populations, decrease potential mosquito larval habitat and reduce insecticide applications as part of its integrated pest management, (IPM) strategy. The District offers a range of mechanized and manual strategies for both fresh and salt water habitats. The fresh water program includes ditch maintenance (pre-existing ditches), problem beaver management as well as fresh water restoration which aims to improve flow, reduce flooding and enhance predator access and habitat. The salt water program includes selective salt marsh ditch maintenance (pre-existing ditches) and salt marsh restoration which aims to improve tidal exchange and enhance predator access and refugia. The District is a strong advocate for encouraging

partnerships with other local, state and federal agencies that incorporate mosquito control activities while simultaneously improving the ecological integrity of fresh and salt water wetlands.

Policy and Procedure for Mechanized Wetland Management
Revised January 7, 2011

Introduction:
Although Mosquito Control Districts are considered state agencies, they are unique in the fact that they are directly accountable to member municipalities. As such, the needs and concerns of participating communities drive operational policy and strategies. For several years now our program has been in transition from what once was considered a primarily nuisance mosquito control program, to a primarily public health based program. Transmission and transplantation of world-wide mosquito-borne viruses to the United States is on the increase. West Nile virus (WNV) is now endemic to northeast Massachusetts. And since 2004, Eastern Equine Encephalitis virus (EEEV) has a presence here as well. In response, the District has enhanced its Adult Mosquito Surveillance Program. Warmer weather trends have also contributed to an increase in significant virus activity beyond the traditional "season". This results in extending control operations by about two months annually. The extent of the District's Wetland Management Program capacity has also been restricted by ever tightening regulations for operating in aquatic habitats. This problem is further compounded by an increase in site complexity as aging infrastructure, lack of maintenance and decreased funding for DPWs contribute to long term neglect of drainage statewide. Increased demands on the District's resources have limited the District's availability and ability to conduct mechanized and manual wetlands management, i.e. ditch maintenance, as well as the ability of the District to fund these operations through standard member municipality annual assessment. Water management expenses have increased considerably; purchases of specialty equipment and associated maintenance and fuel costs fluctuate dramatically.

Site Specific Appropriation:
In some cases, the District may propose mechanized wetland management projects that necessitate a request for member municipality funding by means of separate and additional appropriation. Though the District understands that this may be a burden to some communities, project solutions will be proposed which consider as many non-funded activities as possible. In order to ensure equal opportunity for each member municipality projects of this type will be considered by the following petition process only.

Petition:
The District operates under the authority of Chapter 252 of the General Laws of the Commonwealth of Massachusetts. To be consistent with the provisions of Chapter 252 and because of reasons described above, wetlands management projects by means of specialized low ground pressure equipment will be considered by site specific petition only. A petition is simply a brief written request from a municipality's Petitioning

Body requesting District investigation into a site specific ditch maintenance project or particular location. A municipality may petition for one project at a time and no other petitions will be considered from that municipality until the District deems that project complete.

Petitioning Body:
In an effort to avoid confusion municipalities should consider designating a petitioning body. In the event a municipality wishes to change their designated petitioning body they may do so once annually. Changes should be made at the time of the annual review of each municipality's Best Management Practice Plan (BMP), usually around the end of March or first of April. The District suggests that the local Board of Health, (BOH) is the most appropriate designee. In the event a municipality does not designate a petitioning body, the District will default to the BOH as the petitioning body.

Wetlands Management Proposal:
Once a petition is received by the District a site number will be issued and we will begin an evaluation process. The District will make recommendations to the Petitioning Body regarding wetlands management strategies for the petitioned site. If necessary, the District will develop a site specific proposal outlining the proposed project including but not limited to a site description, site history, scope of services and a “not to exceed” projected cost for implementing said project. The proposal will be submitted to the Petitioning Body for distribution to other appropriate municipal authorities for review, comments and approval indicating the acceptance of the terms and conditions of said project as put forth in the Proposal before implementation of any such project will commence. All wetland management projects will be conducted in accordance with Massachusetts General Law Chapter 252, established federal guidelines and in coordination with local Conservation Commission and municipal officials.

FRESH WATER
The District has evolved its wetland management activities over the years to reflect the most effective and environmentally sensitive best management practices (BMPs). These BMPs are based on the accumulation of years of lessons learned in the field, suggestions provided by regulatory representatives and others in the professional industry, current trends, evolving equipment sophistication, and increased knowledge of environmental response. The District followed recommendations outlined in its own Standards for Ditch Maintenance for years. But since the latest GEIR update it now follows the recommendations outlined in the "Massachusetts Best Management Practices and Guidance for Freshwater Mosquito Control" and "Mechanized Wetland Management Activity Post Monitoring Guidelines".

Problem Beaver Management
Policy and Procedure for Problem Beaver Management
(Originally an amendment to the District's Policy and Procedures for Mechanized Ditch Maintenance, Revised: 01/07/04, 02/23/05, 11/08/05 and 01-06-2011)

Introduction:

Since the adoption of the anti-trapping ballot referendum in 1996, the beaver population in Massachusetts has nearly tripled. Waterways subject to beaver activity are often altered from free flowing systems to large, slow or no flow systems. As a result, many areas adjacent to wetlands have now become flooded, resulting in the potential of increased breeding habitat for mosquitoes. The District established a pilot program to investigate the relationship between mosquito breeding habitat and beaver habitat; their potential impacts on increased mosquito populations and mosquito borne viruses and their relevance to human populations.

Observations revealed that in many instances beaver active waterways were not of tremendous concern in terms of mosquito development. Water depths typically increase with beaver presence and can promote populations of mosquito predators. In some cases however, local topography supports habitat that is more suitable for mosquito development and likely increases prevalence for flooding of adjacent areas which can be more prone to larval activity. Careful examination of each site is warranted. The District will continue to investigate the correlations between beaver, mosquito and predator.

Petition:
Municipalities may petition the District to investigate locations associated with beaver activity in accordance with the District's Policy and Procedures for Wetlands Management. Upon determination that mosquito breeding or a potential for mosquito breeding exists, the options listed below may be recommended to the Petitioning Body (PB). All wetland management activities conducted on beaver impacted wetlands and waterways will be performed in full cooperation with the Massachusetts Division of Fisheries and Wildlife as well as in partnership with the petitioning municipality.

A. Trapping: Removal of beavers from an area will occur prior to beginning any wetland management activity. Trapping can be done by certified District personnel.

B. Ditch Maintenance: Dams, dikes, blockages, etc. may be cleared from existing ditches to manage the level of water within a wetland or waterway.

C. Water-Flow Devices: In certain circumstances, depending on the site, water-flow devices may be installed to maintain a desired level of water within a wetland or waterway while still allowing beavers to remain in the system.

SALT WATER
In lieu of Coastal Zone Management's decision to issue a negative determination for federal consistency on Open Marsh Water Management, the District's federal permit renewal application was denied in 2008 and we have begun evaluating sites for selective salt marsh ditch maintenance. Parameters for selecting sites include mosquito prone areas that are difficult to treat by helicopter (see Aerial Salt Marsh Larviciding Program) and/or that are subject to salt marsh haying. Reclamation of ditches in hayed areas promotes drainage and firmer ground conditions, alleviating potentially damaging operation of equipment which lends itself to creation of larval habitat.

What products do you use in – (please use product name and EPA#)

Wetlands: 5% Skeeter Abate #8329-15, VectoMax WSP #73049-429, Vectobac G #275-50, Vectobac CG #275-70, Altosid Pellets #2724-448-64833, Vectobac 12 AS #73049-38
Catch basins: Vetolex WSP #73049-20, VectoMax WSP #73049-429, Fourstar Briquets (90) #83362-3
Containers: VectoMax WSP #73049-429, Vectobac G #275-50, Altosid WSP # 2724-448, Vetolex WSP #73049-20

Other (please list):

Please list the rates of application for the areas listed above:

Wetlands: (Vectobac 12 AS 1qt./acre), (Vectobac G, Vectobac CG, Altosid Pellets 2.5 - 10 lbs/acre) (5% Skeeter Abate 2 - 10 lbs per acre)
Catch basins: (Vectolex WSP 10gr./basin), (Vectomax WSP 1 pkt. per basin),(Fourstar (90) 1 briquet per basin),
Containers: (application rate / container type & size)
Other: storm water structures - (application rate / type & size)

What is your trigger for larviciding operations? (check all that apply)

☒ Larval dip counts – please list trigger for application: one or more per dip depending on type of mosquito, type of habitat, type of conditions.
☒ Historical records
☒ Best professional judgment

Comments: _____

***Please attach a link to maps of treatment areas if possible.**

ADULT MOSQUITO CONTROL:

Do you have an adult mosquito suppression program? Yes

If yes, please describe the purpose of this program: To control amounts and species for management purposes and resident complaints

Please give the time frame for this program: one half hour after sunset to one half hour before sunrise (as conditions warrant)

Describe the areas that this program is used: Outdoors only in communities that participate in the NEMMC+WMD. As per city or town and residents request, as per individual cities or towns BMP and as advised by the NEMMC+WMD based on surveilance data and/or MDPH information or other applicable conditions.

Do you use:
☒ **Truck applications**
☐ **Portable applications**
☐ **Aerial applications**
☐ **Other (please list):**
Comments: _____

Please list the names of the products used with EPA #:
1). Anvil 10 + 10 # 1021-1688-8329
2). Suspend SC # 432-763
3).
4).
5).
6).

Please list your application rates for each product:
1). Anvil 10 + 10 - 0.42, 0.62, 0.21 fl oz. / acre ULV variable flow 15 mph 3.8 oz / min
2). Suspend SC - 1 oz./gal. 1 Gal / min (water mix)
3).
4).
5).
6).

Please describe the maximum amounts or frequency used in a particular time frame such as season and areas

Anvil 10 + 10 - 110.41 gal. Active Per Season
Suspend SC - 189.5 oz. Active Per Season

What is your trigger for adulticiding operations? (check all that apply)

☐ Landing rates - please list trigger for application
☒ Light trap data - please list trigger for application - increaseing amount of disease carrying vectors
☒ Complaint calls - please list trigger for application - 2 or more on street or neighborhood.
☒ Arbovirus data
☒ Best professional judgment

Comments: POLICY AND PROCEDURE FOR GROUND ADULTICIDING
Revised 1/98 1/06 3/06 1/07 1/10

General: Adulticiding applications shall be executed in accordance with the Districts Vector Management Plan (VMP) and/or individual municipalities Best Management Practice Plan (BMP) consistent with the provisions of The Generic Environmental Impact Report (GEIR) for mosquito control.

Ultra Low Volume (ULV) Applications: ground ULV applications will done by means of truck mounted ultra low volume (ULV) non thermal aerosol sprayers capable of delivering from 1 to 6 ounces per minute equating to 1 to 6 ounces per acre. ULV will be used for selective, targeted areas and wide area applications.

Selective, Targeted ULV Applications: Shall be done in response to either residents request or request from a municipal health department or board in accordance with that municipalities BMP. A minimum of two request from residents in the same vicinity are required to trigger an application of a street, section of a street, neighborhood, block or area or as otherwise requested by the health department or board.

Wide Area ULV Applications: Shall be done in response to surveillance data, multiple residents request, municipal health department or board request in accordance with that municipalities BMP. Or as recommended by the District in response to a specific vector/virus threat in accordance with the Districts VMP.

Time of Application: ULV applications will be conducted during evening hours, after dusk. If circumstances or conditions make an evening application impractical or unsafe then predawn application may be warranted.

Barrier Applications: Barrier applications will be done by means of backpack or truck mounted barrier spray equipment capable of delivering 1 gallon per minutes. Barrier applications will be used to achieve control over a longer period of time and thereby reduce the need for repeated ULV applications. Barrier applications will be used on public use areas such as, parks, play grounds, athletic fields and school grounds in response to request from school officials and municipal health departments or boards in accordance with individual municipalities BMP or the Districts VMP.

Time of Application: Barrier spray applications will be conducted after dusk and before dawn.

Post-Application procedure: Technician will complete an Adulticiding Report and a Record of Pesticides Applied. Technicians, on their next return trip to headquarters, will submit reports, down load all GPS and computer data.

Disable ULV sprayer: When not in use all ULV sprayers will be disabled for security reasons.

***Please attach a link to maps of treatment areas if possible.**

SOURCE REDUCTION

Do you perform source reduction methods such as tire/container removal? Yes

If yes, please describe your program: By hand, as needed, during inspections, treatments, ditch maintenance, OMWM or in conjunction with organized wetland clean ups.

What time frame during the year is this method employed? Year round.

Comments: _____

DITCH MAINTENANCE

Do you have a ditch maintenance program? Yes

Please check all that apply:
☒ Inland/freshwater
☒ Saltmarsh

If yes, please describe: The District conducts a full range of wetland management activities in accordance with Massachusetts General Laws Chapter 252, in compliance with established federal guidelines and in coordination with local Conservation Commissions and municipal officials. The objectives of the District's Wetland Management Program are to abate mosquito populations, decrease potential mosquito larval habitat and reduce insecticide applications as part of its integrated pest management, (IPM) strategy. The District offers a range of mechanized and manual strategies for both fresh and salt water habitats. The fresh water program includes ditch maintenance (pre-existing ditches), problem beaver management as well as fresh water restoration which aims to improve flow, reduce flooding and enhance predator access and habitat. The salt water program includes selective salt marsh ditch maintenance (pre-existing ditches) and salt marsh restoration which aims to improve tidal exchange and enhance predator access and refugia. The District is a strong advocate for encouraging partnerships with other local, state and federal agencies that incorporate mosquito control activities while simultaneously improving the ecological integrity of fresh and salt water wetlands.

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Problem Beaver Management
Policy and Procedure for Problem Beaver Management
(Originally an amendment to the District's Policy and Procedures for Mechanized Ditch Maintenance, Revised: 01/07/04, 02/23/05, 11/08/05 and 01-06-2011)

Introduction:
Since the adoption of the anti-trapping ballot referendum in 1996, the beaver population in Massachusetts has nearly tripled. Waterways subject to beaver activity are often altered from free flowing systems to large, slow or no flow systems. As a result, many areas adjacent to wetlands have now become flooded, resulting in the potential of increased breeding habitat for mosquitoes. The District established a pilot program to investigate the relationship between mosquito breeding habitat and beaver habitat; their potential impacts on increased mosquito populations and mosquito borne viruses and their relevance to human populations.

Observations revealed that in many instances beaver active waterways were not of tremendous concern in terms of mosquito development. Water depths typically increase with beaver presence and can promote populations of mosquito predators. In some cases however, local topography supports habitat that is more suitable for mosquito development and likely increases prevalence for flooding of adjacent areas which can be more prone to larval activity. Careful examination of each site is warranted. The District will continue to investigate the correlations between beaver, mosquito and predator.

Petition:
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A. Trapping: Removal of beavers from an area will occur prior to beginning any wetland management activity. Trapping can be done by certified District personnel.

B. Ditch Maintenance: Dams, dikes, blockages, etc. may be cleared from existing ditches to manage the level of water within a wetland or waterway.

C. Water-Flow Devices: In certain circumstances, depending on the site, water-flow devices may be installed to maintain a desired level of water within a wetland or waterway while still allowing beavers to remain in the system.

SALT WATER
In lieu of Coastal Zone Management's decision to issue a negative determination for federal consistency on Open Marsh Water Management, the District's federal permit renewal application was denied in 2008 and we have begun evaluating sites for selective salt marsh ditch maintenance. Parameters for selecting sites include mosquito prone areas that are difficult to treat by helicopter (see Aerial Salt Marsh Larviciding Program) and/or that are subject to salt marsh haying. Reclamation of ditches in hayed areas promotes drainage and firmer ground conditions, alleviating potentially damaging operation of equipment which lends itself to creation of larval habitat.

Please check off all that apply INLAND DITCH MAINTENANCE:

☒ **Hand tools**
☒ **Mechanized equipment**
☐ **Other (please list):**
Comments: _____

Please check off all that apply SALTMARSH DITCH MAINTENANCE:

☒ **Hand cleaning**
☒ **Mechanized cleaning**
☐ **Other (please list):**

Comments: _____

Please give an estimate of cumulative length of ditches maintained from the list above **INLAND**:

Hand cleaning 765'
Mechanized cleaning 432'
Other (please list):

Comments: _____

Please give an estimate of cumulative length of ditches maintained from the list above **SALTMARSH**:

Hand cleaning 2550'

Mechanized cleaning 2882'

Other (please list):

What time frame during the year is this method employed? year round

Comments: _____

***Please attach a link to maps of ditch maintenance areas if possible.**

MONITORING (Measures of Efficacy)

Please describe monitoring efforts for each of the following:

Aerial Larvicide – wetlands: **Two Biological materials Vectobac 12AS and Vectobac G were used as larvicides on the Salt Marsh. Vectobac 12AS, a liquid BTI was the material used in our Aerial applications with an efficacy rate average of 98.6% using Pre and Post application data from various site locations. Vectobac G, a dry granular form of BTI was used for hand treatments with an efficacy of 100%.**
Larvicide – catch basins: **Catch basin mosquito breeding was monitored beginning in late April and continued throughout the breeding season as determined by larval counts. Samples were taken from catch basins**

throughout the District and reared in the laboratory to determine the efficacy of and duration of efficacy of larviciding products. Catch basin counts were low in 2010 due to the number of and duration of rain events. Efficacy for all catch basins tested fell between 92 - 100% efficacy in growth to adult stages. Product efficacy averaged two and a half months from date of application.

Larvicide-hand/small area **Data was collected by District technicians prior to treating sites containing mosquito larvae. Data was again collected by the District Biologist within 24 hours of treatment to determine the efficacy of the products used in freshwater. Efficacy for all sites fell between 87% - 100%. Sites with lower efficacy ratings typically held larvae in later growth stages where feeding has diminished or ceased altogether.**

Ground ULV Adulticide: **Efficacy tests for adulticiding products were not conducted in 2010. Field trials will be scheduled during the 2011 mosquito breeding season to test all adulticiding products currently used by the District.**

Source Reduction: **as applicable in accordance with the "Mechanized Wetland Management Activity Post Monitoring Guidelines"**
Open Marsh Water Management: **Not available at this time.**
Other (please list): **VectoMax WSP and FourStar Briquets are combination products formulated with products currently used by the District (Bacillus thuringiensis spp. israelensis and Bacillus sphaericus). During the 2010 breeding season eighty (80) basins were selected based on the number of larvae they contained. Forty (40) were treated with VectoMax WSP, a thirty day product, and the remaining forty (40) were treated with FourStar Briquets, a 90 day product. Basins were selected throughout the district, in both rural and urban areas, and treated from 11 – 28 June 2010.**

Basins were sampled on a weekly basis through 05 October 2010. Samples containing larvae were brought back to the District lab and grown out to adult stage. The number of larvae and/or adults was recorded on a daily basis through 25 October 2010 to determine the efficacy and duration of the products tested. Adults were also identified to species and sex.

Efficacy for VectoMax WSP averaged 92% for all basins throughout the breeding season. There were four (4) basins that showed 100% control throughout the entire breeding season (no larvae observed). The first larval collection occurred thirteen (13) days after treatment, with an average of 46 days to first collection. The product is formulated to provide control for 30 days.

Efficacy for FourStar Briquets averaged 93% for all basins throughout the breeding season. There were five (5) basins that showed 100% control throughout the entire breeding season (no larvae observed). The first larval collection occurred one (1) day after treatment, with an average of 25 days to first collection. This product is formulated to provide control for 90 days.

Provide or list standard steps, criterion, or protocols regarding the documentation of efficacy, (pre and post data) and resistance testing (if any): **see above**

OPEN MARSH WATER MANAGEMENT

Do you have an OMWM program? No

If yes, please describe:

Please give an estimate of total square feet or acreage:

What time frame during the year is this method employed?

Comments: OMWM Update
In 2008 the District was denied the renewal of its federal permit to conduct Open Marsh Water Management, (OMWM) for the first time since the programs inception in 1983, marking the end of an era for long term control of salt marsh mosquitoes. Over those 20 + years the District was able to evaluate over 140 sites and complete approximately 70 OMWM sites. At issue were the original Standards for Open Marsh Water Management. The scientific community felt the Standards were insufficiently rigorous despite the fact that there is little evidence that OMWM impacts illustrate cause for concern. The District worked diligently to resolve the issue and helped develop a new Standard. The new Standard calls for extensive monitoring which substantially increase the cost of OMWM implementation. The District is considering re-applying for its OMWM permit but any new project will require financial support beyond the scope of the District's current budget.

History:

The following information comes directly from the District's "Fact Sheet 10: Open Marsh Water Management" revised 1-07-2011.

Open Marsh Water Management was originally developed in New Jersey as an environmentally sensitive alternative to grid ditching salt marshes and has also been used in the Mid Atlantic States for many years. A 3 year study of OMWM was initiated in 1982; a collaborative effort with mosquito control, the Town of Rowley Massachusetts, the Manomet Bird Observatory and the Massachusetts Audubon Society. Based upon positive results demonstrated in this study a program was developed incorporating Standards based on the principles established in New Jersey and the Mid Atlantic States but specific to the needs of salt marshes in New England.

The objective of OMWM is to abate mosquito populations and reduce the need for insecticides by enhancing the tidal food web and providing refugia for predatory fish within previously ditched, altered or degraded salt marshes. The OMWM Program is

implemented in strict accordance to the Standards for OMWM; a step by step guide defining proper methodology for personnel to follow including data collection, timing, and types of alteration. After a site is monitored the data is analyzed and if necessary a site plan is developed with specific alterations that address mosquito concerns specific to the location. OMWM uses site specific alterations that enhance existing characteristics and/or creates new features such as ponds, pools and pans. These improved habitats not only serve as refugia for mosquito eating fish but also offer water fowl and wading shore bird improved feeding opportunities. Installation of shallow radial ditch connectors to improve predatory fish movement provides direct access to identified mosquito larval habitat on the marsh's surface. Designed alterations are implemented by customized low ground pressure equipment which is environmentally sensitive and ensures minimal impact to the salt marsh substrate.

***Please attach a link to maps of OMWM areas if possible.**

ADULT MOSQUITO SURVEILLANCE

Do you have an adult mosquito surveillance program? Yes

Please list the number (not location) of MDPH traps in your service area: none

Please check off all the types of surveillance that apply to your program:

☒ Gravid traps	
☒ Resting boxes	
☒ CDC light traps	☐ Canopy
☒ CDC light traps w/CO_2	☒ Canopy
☐ ABC light traps	☐ Canopy
☐ ABC light traps w/CO_2	☐ Canopy
☐ NJ light traps	☐ Canopy
☒ NJ light traps w/CO_2	☐ Canopy

Other (please describe):

Please describe the purpose of this program: To monitor population levels and species / locations for management purposes and public health testing

Do you maintain long-term trap sites in any of your areas? Yes

If yes, please describe how you chose these long-term sites. focal point, location, accesability, type, security, power access
FACT SHEET #5

Adult Mosquito Surveillance

General: There are many different species of mosquitoes. The District has collected 47 different species in our area, of these there are around 12 mosquito species important to human health, nuisance and quality of life. All mosquitoes species have one thing in common, the female must have a blood meal before she can lay eggs. Different mosquitoes have different breeding habitat and host seeking behavior. The key to managing mosquito populations efficiently and effectively is understanding the interaction between mosquitoes and human populations. Adult Mosquito Surveillance is the means by which we gather this information which is then used in determining operational strategies.

Light Trap: A light trap is a device used to collect adult mosquitoes. It consist of a fan, a light, a Carbon dioxide dispensing device and a collection net. Female mosquitoes looking for a blood meal are attracted to the C02 and are drawn into the net by the fan. The District has one light trap in each member municipality in a fixed location. This fixed location light trap is useful in monitoring long term trends and the effectiveness of control measures as well as short term events which require response. The District also has portable traps which can be deployed at short notice in response to data from fix light trap, complaints or vector surveillance.

Gravid Trap: A gravid trap is a device used to collect a particular species of mosquito. It consist of a pan of highly organic water and a collection chamber which bridges the pan of water. Some mosquito species lay their eggs in artificial container such as catch basins and prefer highly populated or organic water. Female mosquitoes landing on the surface of this water to deposit eggs are drawn into the collection chamber by the Fan. The District has one gravid trap in each member municipality in a fixed location. This fixed location GD is useful in monitoring long term trends, the effectiveness of control measures and vector surveillance. The District also has portable traps which can be deployed at short notice in response to data from fix light trap, complaints or vector surveillance.

Resting Boxes: A resting box is a device designed to collecting blood fed female Culiseta melanura mosquitoes who are the principle vectors of Eastern Equine Encephalitis Virus, EEE. Resting boxes have demonstrated to be an efficient and affective tool. Most of the EEE virus isolations in the District to date were from mosquitoes collected in resting boxes. EEE outbreak cycles in Northeast Mass cannot yet be predicted. Therefore resting boxes will continue to be deployed in areas of concern using historical data as indicators.

Landing rates counts: A landing rate count is exactly what it sounds like. A Field Technician counts the number of mosquitoes which land on an exposed arm for one to five minutes, The mosquitoes can be collected in a device called an aspirator for species identification. this method is often used in response to a specific complaint and is useful in determining the source of the mosquito problem.

Species Identification: Live mosquitoes from fixed location CO2 traps, gravid traps and resting boxes are collected twice weekly from around May 1st. to September 30th.. Mosquitoes are identified and samples sent to the Massachusetts Department of Public Health were they are tested for virus.

VECTOR MANAGEMENT PLAN

2010

Introduction: The U.S. Department of Health and Human Services' Centers for Disease Control and Prevention (CDC) declared that the introduction of West Nile Virus (WNV) to the United States in 1999 raised the issue of how prepared are public health agencies to identify and respond quickly to outbreaks of vector-borne disease. The CDC concluded that "mosquito control is the most effective way to prevent transmission of West Nile" and "the most effective and economical way to control mosquitoes is .... through locally funded abatement programs" (1).

Mosquito control projects and districts in Massachusetts, although considered state agencies, are unique in that they are accountable directly to the subscribing member communities. As such, the needs and concerns of those communities drive operational policy and strategies. That is the operational “mantra” that has presided over the Northeast Massachusetts Mosquito Control District for almost twenty years. As the needs of our member communities have changed and evolved, so have the services we’ve provided. With the invasion and establishments of new arthropod-borne viruses (“arboviruses”) threatening our communities in the past decade, we have transformed our operational strategy from \ primarily nuisance mosquito control to protecting public health. Consider the World Health Organization (WHO) definition of health as “a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity” (2). It is not a stretch of the imagination to say that astronomical numbers of mosquitoes affecting quality of life is not only a nuisance, but is in fact a health issue! The Federal Insecticide, Fungicide and Rodenticide Act defines “vector” as “any organism capable of transmitting the causative agent of human disease or capable of producing human discomfort or injury, including mosquitoes…” (3). This make clear that by definition, all mosquitoes are potential vectors and all mosquito control activities are in the interest of public health.

The invasion, transmission, and establishment of arboviruses to the United States is on the increase. WNV is now endemic to northeast Massachusetts and since 2004, Eastern Equine Encephalitis Virus (EEEV) has had an almost annual presence here as well; 2009 marked the most EEEV-mosquito isolations ever in Northeast Massachusetts! According to Dr. Jean-Paul Mutebi of the CDC, there are currently three circulating international arboviruses with the greatest potential of establishing themselves in the US, namely those causing Chikungunya, Rift Valley Fever, and Japanese Encephalitis (4). Mosquito species that can easily spread the causative

viruses are all found in abundance in the US, most of these species are found in New England as well! Therefore, the purpose of this year's Vector Management Plan (VMP), updated for 2010, is to present both our current and revised mosquito and arbovirus surveillance strategies, outline our specific responses to these arboviruses, and how we will direct our limited resources effectively and efficiently toward implementing these responses. We begin first with an overview of our surveillance, focusing on both currently and potentially new invading species, then on potential arboviral threats and finally, our plan for response. Our surveillance and responses specifically to the current circulating arboviruses, WNV and EEEV, are specifically addressed as well.

Regional Adult Mosquito Surveillance: The District will again in 2011 continue its surveillance of mosquito vectors based on protocols established by the CDC and Massachusetts Department of Public Health (DPH). The District's Surveillance Program will again operate and maintain 32 historical trapping stations (HTS) across the region at fixed locations. As done previously, there will be one HTS in each subscribing municipality and each HTS will have two traps. The first is the CO2-baited "New Jersey trap", designed to attract nearly all species of host-seeking female mosquitoes. All mosquitoes collected are identified and tallied. NJ traps are used to sample the general adult mosquito population to determine dominant human-biting and disease-carrying mosquito species. Because the traps are at the same location every year, population trends can be studied and compared between years as well as during a single year. The other trap is the gravid trap designed to attract bloodfed females that lay their eggs in containers of some sort, either natural or artificial. These traps are baited with aged organic material-filled water to attract primarily Culex species mosquitoes that are most responsible for West Nile Virus transmission. Gravid traps have been our most successful tool in identifying WNV-infected mosquitoes. Egg-laying mosquitoes have already fed on blood and thus have a higher probability of being infected with WNV they acquired from biting infected birds. Additional portable gravid traps may be deployed, as necessary, in areas with disturbing Culex population trends and in response to virus activity. The District will collect and identify samples from each trap twice a week from early May through the end of September and all specimens of key vector species (principally from Culex and Culiseta species, described below) will be submitted to DPH for virus testing.

In addition for 2011 the District will enhance gravid trap surveillance in communities that have demonstrated a higher risk for WNV. Five additional pre-chosen stations will be established in each of these communities and portable gravid traps will be set there in a random rotation pattern. In the short term, this will provide us with a broader view of Culex mosquito population distributions and densities in these communities; over the long term, better historical data for background on vector populations and viral activity trends will be recorded.

Resting boxes form our third principal surveillance tool and are an effective tool of monitoring mosquitoes for EEEV. The boxes have proven to be invaluable as an early warning system for viral presence in the District. Since 2004 we have set out between

60 and 80 resting boxes in fixed historic locations in communities immediately bordering southeastern New Hampshire; these are our primary EEEV monitoring stations we call our “EEEV Front Line Surveillance”. Southeastern NH is a new epicenter for EEEV and from here, the virus migrates south into our District. Culiseta melanura mosquitoes are primarily responsible for the transmission and amplification of EEEV in local bird populations.

These mosquitoes, especially after bloodfeeding, rest in tree holes and cavities during the heat of the midday and resting boxes are designed to simulate this habitat. This arrangement allows for effective and abundant collecting. How the data collected is interpreted for response is discussed in the EEEV section below.

In 2011, the District will set up again resting boxes in the “Front Line” communities. Eight resting boxes will be placed at each fixed location, with two locations in each of Front Line community with the exception of Salisbury, which will have just one location. Resting boxes will again be visited twice weekly from June through the end of September; the contents will be collected, identified, and tallied, and vector species (Cs. melanura and the closely related Cs. morsitans) will be sent to DPH for virus testing. With the 72 boxes set in the “Front Line” sites, together with the supplemental sites described below with at least another 56 boxes, a total of at least 128 boxes will be used. Additional boxes are ready and sites already selected if resting box surveillance is needed to be expanded.

Last year, in response to the increase in EEEV-infected mosquito pools, additional Resting Box sites were established in eleven communities directly south of the “Front Line”, as specified in the 2010 VMP. Collections from these additional sites were made in September. Only one site, Hamilton, had an EEEV isolation in Cs. melanura and only in one instance, in mid-September. We have planned for 2011 expanded season-long Resting Box surveillance beyond the “Front Line”. But because of current budgetary constraints, expanded surveillance will proceed only in three areas with (and adjacent to) recent EEEV activity. These areas are Hamilton-Topsfield-Boxford (one site in each), West Peabody-Lynnfield (up to two sites each), and the Byfield-Newbury (at least one site).

In mid September 2009, a horse died of EEEV in West Peabody. Previous, there was no history of EEEV activity in Peabody or in adjacent towns. However, a week after the horse fatality, the East Middlesex Mosquito Control District recovered EEEV from a pool of mosquitoes collected from Reading, which borders Lynnfield and west of Peabody. Therefore, we will conduct season-long resting box surveillance in West Peabody-Lynnfield.

On December 4, 2009, another EEEV animal fatality was announced by DPH. This was an alpaca that lived in the Byfield section of Newbury and died on 14 October 2009. The cause of death was not conclusive at that time and only after repeated tests by the CDC was it confirmed that EEEV had stricken the animal. When and how the animal became infected is not known, but it is assumed that it became ill in September during

the height of the EEEV transmission season. Therefore, we will also expand our EEEV surveillance in 2010 to include the Byfield and adjacent areas.

In an attempt to gain an understanding of the “infection status” of other mosquito species in established “EEEV-habitats”, we will again place portable CO2 traps at resting boxes locations where infected Cs. melanura mosquitoes have been collected. These traps will collect other species which upon identification, will be sent to DPH for testing. Whereas Cs. melanura rarely bites humans, they have been biting and infecting local birds which in turn serve as bloodmeal sources for other species which then can bite humans the next time they feed. These additional species with the potential of infecting humans are known as “bridge vectors”.

While infected Cs. melanura specimens have compelled us to take action against them, it may be more prudent to target responses against infected bridge vectors so knowing the “infection status” of bridge vectors in EEEV-known habitats will result in more effective targeted adulticiding responses.

Risk Communications and Public Relations: Access to and effective dissemination of mosquito and arbovirus information is paramount to any mosquito control operation. With the speed which information, as well as rumors and even disinformation, can be conveyed in all public informational media, it is crucial that Boards of Health, as well as subscribing municipality residents, are kept correctly informed. To that end, the District has improved its methods of communication regarding mosquito species, potential arboviral threats, and details of larviciding and adulticiding operations. At the end of every winter, the District sends detailed “Best Management Practice Plans” to each District subscribing municipality which includes summaries of the previous year’s mosquito and arbovirus activities, descriptions of current year control operations suggested and agreed-upon, as well as their costs. Every spring, the District conducts an “Arbovirus Surveillance Workshop” (at Endicott Park in Danvers), targeted to health agents and Board members of District subscribing communities. This workshop informs the audience on potential arboviral threats and how the District will plan to combat these threats. The District operates a website (http://www.northeastmassmosquito.com) with all relevant information on mosquitoes, arboviruses, and operations (both larvicidal and adulticidal) however, it is difficult to be updated regularly throughout the summer due to obligations by District personnel to the various control operations. Therefore, a “District Bulletin” is prepared periodically and sent electronically to all subscribing Boards of Health describing current mosquito and arboviral problems, both current and potential, as well as information on current control operations. And finally, our phones line remains open at all times and while we are often unable to respond immediately, being that we are all in the field, we return all our calls.

Emergent Exotic and Recent Immigrant Mosquito Species: Through our Surveillance Program, we will also be vigilant for the appearance of mosquito species new to the region. Within the past ten years, we have seen the appearance and rapid spread of an exotic species, Aëdes japonicus, the "Japanese Rock Pool Mosquito", throughout our

District. While this species is a competent disease vector in other areas, there is little to suggest it is currently a disease vector in the Northeast.

Another competent disease vector that could become established in northeast Massachusetts is the “Asian Tiger Mosquito”, Aëdes albopictus. It was first found in Houston in 1985 and has spread rapidly throughout the temperate regions of the world (5), including the U.S. up to southeastern New England; it has become the dominate mosquito species in New Jersey. Aë. albopictus is the principal vector of a Chikungunya pandemic in countries along the Indian Ocean basin and an outbreak in Northern Italy in 2007. Although this species has yet been readily collected in our district, the possibility of its arrival is very real and its potential as a disease causing agent should not be underestimated.

In 2007 District personnel collected specimens believed to be Aë. albopictus and targeted surveillance was conducted in 2008 in the attempt to collect additional specimens and possibly locate breeding sites. Towards this endeavor, the District deployed a new type of surveillance trap called the “BG Sentinel trap” (BGS trap). While these traps have been reported being effective in attracting Aë. albopictus, our experience with them was disappointing. In 2010, we tested the effectiveness of the BGS traps for our general surveillance, both alone and in conjunction with our other traps and baits. Again our experience with these traps was disappointing and we have no plans to use these traps in 2011. Instead, we plan to survey for Aë. albopictus in potential breeding areas, namely those facilities that import and recycle used tires. Gravid traps will be deployed randomly at these facilities and collections will be carefully inspected. Imported used tires were the means by which this species entered the US and facilitated its spread throughout the country. Discarded water-filled tires simulate tree-holes, the natural breeding site for this species, and after eggs are deposited inside the tires, the tires are collected and transported to new locations, they are then again left outside to become filled with water and the eggs subsequently hatch, facilitating the invasion! (5) Therefore, if Aë. albopictus is to become established in the District, it will most likely be that the “beachhead” will be at recycled tire depositories.

Therefore, the possibility of additional mosquito species establishing in our area, some even more effective at transmitting virus and other disease causing agents, cannot be dismissed. Such ignorance of history and arrogance against reality had led to successful invasions and establishment of exotic species. Thus, our Surveillance Program will carefully monitor mosquitoes we collect, not only to measure unusually high populations or unusual distributions, but also to detect any new species.

Virus Testing: Specimens from our trap collections will be sent weekly to Arbovirus Surveillance Laboratories of the Department of Public Health in Jamaica Plain in Boston, to be tested for the presence of encephalitis viruses. The District was charged last year, for the first time, a fee for each mosquito sample submitted (“pool”), $25 per submitted pool with minimum number of ten individuals in each pool (to a maximum of fifty); we are still limited to sending a maximum of sixty pools per week. And the species to be submitted for testing was restricted primarily to the principal WNV vectors,

Cx. pipiens and Cx. restuans, and the EEEV vectors, Cs. melanura and Cs. morsitans. However, during suspected peak transmission periods, the District has an agreement with DPH to increase the number of pools, as well as the number of species, including bridge vectors, to be tested.

Emergent Virus: West Nile Virus was introduced to New York City in 1999 and within five years it has spread to all fifty US states! It was first isolated in Massachusetts in 2000 and is now endemic in Northeast MA, specifically the Boston metro area. Prior to 2004 there were no serious concerns about Eastern Equine Encephalitis in the Essex County. Every year since 2004, EEEV-infected mosquitoes have been recovered, often in multiple scores, from southeastern New Hampshire and "spilling over" into our District in two of the past five years. World-wide, the threat of mosquito-borne disease is on the rise and the possible introduction into our District of other exotic vector borne disease can no longer be disregarded and deemed as heresy, but must now be seriously considered.

Earlier in this discussion, three exotic arboviral diseases were listed as having the greatest potential of becoming established in the US in the near future: Chikungunya, Rift Valley Fever, and Japanese Encephalitis. The one generating the most concern is Chikungunya (CHIK). While CHIK is rarely fatal, it has the potential to infect large numbers of people very quickly. It is a debilitating illness, causing excessive and prolonged fatigue and extreme pain in joints lasting up to several weeks. (5,6) In 2005 and 2006 it sickened almost one third of the 800,000 inhabitants of the French island of La Reunion, off the east African coast (7). There is still a CHIK pandemic in countries along the Indian Ocean basin (and with nearly 2 million people infected).
A CHIK epidemic broke out in northern Italy in September of 2007 (with over 200 cases); the Italian epidemic is the first known outbreak of this virus outside the tropics (8). According to Dr. Randy Gaugler, director of the Center for Vector Biology at Rutgers University, it is likely we will have outbreaks of CHIK in the U.S. within the next five years (9).

Rift Valley fever virus (RVF) is a fast-developing ("acute") fever causing mosquito-borne viral disease that affects livestock animals and humans. Whereas many infected persons do not exhibit symptoms, others develop fever, generalized weakness, back pain, dizziness and extreme weight loss at the onset of illness. Some suffer a mild illness with liver abnormalities while a small percentage may suffer hemorrhagic fever (10). Approximately 1% to 10% of affected patients may have some permanent vision loss. Approximately 1% of humans that become infected with RVF die of the disease. There is no established treatment for infected patients and there is neither a cure nor a vaccine currently available.

RVF was first identified in 1931 and has historically been confined primarily in eastern and southern Africa. However, in 2000, there was an outbreak of RVF in the Arabian peninsula and since then, there has been concerns of RVF spreading into North America. The virus is transmitted primarily via floodwater mosquitoes (Aëdes species). While no mosquitoes in RVF endemic regions are found in the US, several common

species have been infected experimentally and at least one species found in Massachusetts has demonstrated the ability to infect laboratory animals (11).

Japanese encephalitis virus (JEV) is similar to St. Louis Encephalitis virus and whose infection causes signs and symptoms similar to that of West Nile Virus, namely encephalitis to the minority of human cases which can progress to paralysis, seizures, coma, and death. The case fatality rate averages about 30%. It is the leading cause of encephalitis in Asia (Japan west through Korea, eastern China to India and south through Indonesia to New Guinea) averaging between 30,000 to 50,000 cases annually (12). Although its vector is not found in the United States, several domestic species have shown the capacity to transmit this virus (4).

Through our affiliations and associations with the scientific and mosquito control communities, we will monitor these potential threats. Necessary and appropriate vector/virus intervention measures will continue to be developed and implemented when required.

West Nile Virus

Introduction: According to the CDC, since 1999 WNV has infected 29,584 people killing 1,144 as of 8 December 2009 (13). 12,011 have been inflicted with encephalitis and meningitis, 16,795 have suffered with serious and longer than normal fever, and 778 have manifested other clinical disorders. It was previously thought that WNV-associated neurological ailments were short-lived and affected only a small percentage of those infected. However, recent studies suggest that neurological disorders may be more prolonged and serious, affecting more victims then original thought (14). Another recent study has shown that renal disease can be manifested in patients several years after infection with WNV and thought to have recovered (15). WNV, primarily an avian virus, has been far deadlier for birds with dramatic declines in seven species (16). WNV has had a devastating ecological impact in North America and avian populations have yet to recover.

Culex species are primarily responsible for the amplification of virus in birds and are vectors to humans in endemic areas. Dr. Ted Andreadis of the Connecticut Agriculture Experiment Station, concluded that a WNV vector, Culex salinarius feed on mammals 55% of the time. This supports an earlier study by his group that suggested that Cx. salinarius may be the primary vector of WNV in the northeast U.S. (17).

Catch Basin Treatments: While spraying against infected adult mosquitoes is the short-term approach for immediate risk reduction, the preferred long-term and more cost-effective strategy is to eliminate larvae before they become adults. Culex mosquitoes can develop in a variety of freshwater habitats, but the greatest concentration of Culex breeding in the District is in the estimated 80,000 catch basins. While Cx. salinarius can be present in catch basins, this is not its preferred breeding habitat. Instead, the basins are well populated by the two principal urban Culex mosquitoes, Cx. pipiens and Cx. restuans. Cx. pipiens/restuans breed in highly organic or polluted water that collect in

artificial containers such as catch basins; they can also breed in storm water structures including detention and retention ponds, as well as discarded tires, gutters, bird baths, etc. With the ability to proliferate in basins to produce massive adult populations, we are confident that these are the principal vectors of WNV in our District, and thus the target of our long-term WNV control strategy.

Treating of catch basins consist of applying either bacteria that are effective towards killing exclusively mosquito larvae or a “growth regulator” that retards or completely ceases their development into adults. Short term surveillance data shows an 80% reduction in Culex species in communities where basins are treated as compared to communities with untreated basins. In a study conducted in Portsmouth NH in 2007 by Municipal Pest Management Services Inc., there was demonstrated a 75% reduction in mosquitoes breeding in treated catch basins compared to untreated basin and that 92% of the species breeding in the basins are Cx. pipiens/restuans; only 5% of mosquitoes tallied in this study were Cx. salinarius.

Contrary to what one would think, drought conditions do not deter breeding of Cx. pipiens /restuans but instead, may enhance it! In a drought, expansive wetlands dry becoming numerous smaller, shallow pools concentrated with more organic debris, providing Culex with far more breeding habitats. More importantly, catch basins continue to accumulate water during droughts from car washing, lawn watering and concentrated sheet flow from minor rainfall events, etc. Breeding area are therefore always in abundance, even in the driest of circumstances! This is why human WNV-infections are at their highest during a drought. Targeting Culex in basins will eventually reduce adult Culex populations, reduce the transmission of virus from bird-to-bird, reduce the number of infected mosquitoes and ultimately, reduce risk of infection to humans.

Long term surveillance data has shown that the continued annual treatment of basins has gradually and significantly decreased Culex populations throughout the District. The result is fewer WNV positive mosquitoes when compared to areas bordering our district, as seen in Figures 1 and 2. This translates to reduced risk of infection to District residents. It is for this reason our early-season intervention strategy of treating catch basin has been successful in reducing Cx. pipiens/restuans populations, and therefore reducing virus amplification in birds and reducing risk to humans. This early-season basin-treatment strategy will continue in 2011.

Catch basin treatments in 2011 will be prioritized as follows. As previously stated, WNV is endemic in the Boston metro area and it is clear that the WNV epicenter in our District is the urban coastal communities of Winthrop, Revere, Lynn, Nahant, Saugus, Swampscott, Marblehead, Salem, and to a lesser degree Danvers and Beverly. The basins in these communities will be treated first, starting in May. Another area of concern is the Merrimack River Valley, specifically Andover and North Andover and basins here will be treated early as well. A WNV isolation in North Andover in the late 2009 season may indicate a potential for renewed WNV activity in the area in 2011.

Waste Water Treatment Facilities Inspection: An additional “preemptive strategy” to reduce WNV risk, the District will request to inspect all wastewater treatment facilities. This way, actual or potential Culex breeding can be reduced or eliminated in these facilities. 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 inspections, we are not a regulatory agency. It is not our intention to cause any imposition to the management of wastewater facilities. Rather, we wish to be a resource of information and technology to assist wastewater facility managers to prevent and/or abate mosquito breeding to the mutual benefit of the facility, the community and mosquito control.

Property Inspection: Socioeconomics often plays an important role in mosquito control and associated public health risk. This is evident by a study conducted in California in 2007 in which there was a 276% increase in the number of human WNV cases in association with a 300% increase in home foreclosures (18). Within most foreclosed properties in Bakersfield (Kern County, CA) were neglected swimming pools which led to increased breeding and population increases of Cx. pipiens/restuans.

In recent year we have received several requests from Boards of Health to inspect abandoned properties. The district has had a policy of property inspections, albeit a passive approach, at the requests of Boards of Health. Given the current economic climate and likelihood of increasing properties abandonment (with the potential for increased health risk associated with properties abandonment), the District in 2011 will again apply a more aggressive approach to property inspections. In the course of our routine activities in your community, we will be “on the lookout” and report such properties to your Board of Health. We understand that addressing abandoned properties is a matter of time and process. In the long term, we will offer any support that may be appropriate to resolve mosquito problems related to such properties.
In the short term, with the support of the Board of Health, we will implement the necessary control measures to mitigate the immediate mosquito problem associated with such properties.

Selective Ground Adulticiding: As a final preemptive measure, the District may recommend selective and targeted adulticiding applications to reduce Culex populations when WNV isolations in mosquitoes are discovered. The District uses a system called Ultra Low Volume (ULV) for ground adulticiding applications which dispenses very small amounts of pesticides over a large area. The District may recommend a targeted application within a municipality based on the following criteria: two or more WNV-mosquito isolations in close proximity; one or more human cases of WNV. On occasions, when WNV has yet been recovered but Culex populations are seen increasing at higher-than-usual rates, we have recommended that adulticiding operations be commenced. These operations would only be recommended only during high WNV-transmission periods (late July through September) in communities with historical WNV activity.
Barrier Treatment: While ULV is a cost-effective means of reducing mosquito populations on a large scale, it only affects those mosquitoes active at the time of the

application; repeated applications are sometimes necessary to sustain the initial reduction in some areas. To reduce the need for repeated applications and provide more sustained relief from mosquitoes in high public use areas, the District may recommend a “barrier spray treatment”. This application would be made to public use areas such as schools (applications to schools must be in compliance with MGL Ch. 85), playgrounds, athletic fields, etc. A barrier spray may reduce mosquitoes for up to two or more weeks. The District strongly recommends member municipalities take advantage of this service when offered.

Eastern Equine Encephalitis Virus

Introduction: From what we have experienced over the past five years, EEEV has become a serious public health threat in our area. It is clear that the current EEEV focus is Southern New Hampshire, in particular area including the towns of Exeter, Kingston and Newton. There has been EEEV activity in these towns from the beginning of the current cycle in 2004 to the present; see Figures 3 through 5. Figure 6 is a summary of the combined isolations in the past six years and it can be clearly seen where the “epicenter” of the EEEV is and how the northern portion of our District is in risk to EEEV.

EEEV was first discovered in horses thus, the basis for the name “Equine Encephalitis”. This however is a misnomer as horses are not the source of infection, but unsuspected innocent casualties. When it was later discovered that this same virus caused the same type of encephalitis in humans, the horse discovery superseded and the name “equine” stuck. Humans and horses are not sources of infection and are considered “dead end hosts”, meaning that the virus cannot be transmitted from infected horses or humans. Like West Nile Virus, EEEV is an avian virus, transmitted from bird to bird principally by the Cedar Swamp mosquito, Culiseta melanura. While Cs. melanura mosquitoes are primarily responsible the amplification of virus in bird populations, they typically do not bite humans. It is other mosquitoes that feed on both birds and humans, referred to as “bridges vectors”, that are responsible for human infections. Nonetheless, it is our judgment that while risks to human from infected Cs. melanura are extremely low, we will continue to take preemptive protective operations when infected Cs. melanura are detected. Lack of early intervention activity can result in accelerated EEEV amplification which later in the season can increase human risk to infection.

In last year’s VMP it was stated that “we do not anticipate any EEEV activity in our service area in 2010 but we are prepared for any contingence.” This prediction was made in part because in areas where EEEV has historically been a problem, its appearances have followed a cyclical pattern. In southeast Massachusetts, EEEV occurs in outbreaks lasting about three years, followed by almost no activity for 15 to 20 years. With little activity in New Hampshire in 2007 and 2008, we assumed that EEEV was in a “dormant” phase and would stay as such for an extended period. In fact EEEV escalated in 2009, demonstrating that the cyclical model used for southeast MA does not yet apply to New Hampshire and northeast MA. The 2009 outbreak also

demonstrated the need for continued vigilance in surveillance and readiness to implement preemptive strategies. Beginning in late August and escalating into September there were numerous EEEV isolations in mosquitoes throughout southern New Hampshire cumulating in a human case. EEEV-infected mosquitoes were found in Massachusetts communities bordering New Hampshire in late August through September and appropriate measures, coordinated with boards of health of these communities, were taken. As describe earlier, a horse died in West Peabody from EEEV and virus was found in mosquitoes in nearby Reading. As there was no previous history of EEEV activity in Peabody and surrounding areas (it was considered to be outside the EEEV risk area), it is more than clear that previously reliable predictive models of EEEV cycles and distribution may no longer apply.

Habitat Surveillance: While predictive models of EEEV cycles and distributions no longer reliable, one consistent observation still valid is that higher populations of Cs. melanura are a good indicator of EEEV activity. Cs. melanura is one of only a few mosquitoes that survive ("overwinter") in the larval stage. They develop not in open water, but in flooded root meshes, holes and tunnels ("crypts") under tree hummocks in Atlantic white cedar and red maple swamps. These habitats are relatively abundant in northeast MA, although they are remote, isolated and difficult to access. With greater numbers that usual of Cs. melanura adults appearing last September, one result was that they laid more eggs in more habitats; more habitats became available thanks to abundant ground water from last summers rains. Hence, there are currently more larvae developing at this time (winter 2010-2011) which, depending on the severity of the winter, could lead to greater adult populations emerging in the spring. A higher that normal spring adult emergence of Cs. melanura may commence the EEEV transmission cycle earlier than normal and ultimately result in earlier (and more abundant) human infections of EEEV.

Since 2004 when EEEV first became a serious concern in our area, we have been searching for Cs. melanura habitat in the winter to be monitored. Trying to find Cs. melanura larvae breeding in crypts in cedar swamps is very much like trying to find a needle in a hay stack; to date we have been unsuccessful in locating such sites with consistency. In the winter of 2010/2011, we will narrow our focus to areas within a one mile radius of resting box location in communities bordering NH. The objective is to find breeding locations associated with each of our resting boxes location from which we can monitor larval populations through the winter and make better projections of what we may happen and what we can do.

Selective Ground Adulticiding: Because of the elusive nature of Cs. melanura larval breeding habitat in our area, larviciding is not a viable option as a preemptive strategy. Therefore, the District may recommend selective and targeted adulticiding applications to reduce Cs. melanura populations in an effort to break the bird-to-bird transmission phase of the virus cycle. Often by the time there are horse and human infections, other mosquito species, the "bridge vectors" are also transmitting the virus and are targeted for adulticiding. But it is late in the season when these intervention efforts are made and their effectiveness in reducing risk are limited at best and often nonexistent. The

District will recommend a targeted adulticide application in a subscribing municipality (-ities) based on the following criteria: above average Cs. melanura populations in a year of anticipated EEEV activity; one or more EEEV isolations in Cs. melanura mosquitoes; one or more EEE virus isolations in horses; one or more human EEE cases. As with WNV intervention, the District uses Ultra Low Volume (ULV) for ground adulticiding applications.

Barrier Treatment: While ULV is a cost-effective means of reducing mosquito populations on a large scale, it only affects those mosquitoes active at the time of the application; repeated applications are sometimes necessary to sustain the initial reduction in some areas. To reduce the need for repeated applications and provide more sustained relief from mosquitoes in high public use areas, the District may recommend a "barrier spray treatment". This application would be made to public use areas such as schools (applications to schools must be in compliance with MGL Ch. 85), playgrounds, athletic fields, etc. A barrier spray may reduce mosquitoes for up to two or more weeks. The District strongly recommends member municipalities take advantage of this service when offered.

Emergency Response Aerial Adulticiding Plan: In the event that the risk level escalates to a point that ground adulticiding is insufficient to reduce that risk, an emergency aerial adulticiding application may be warranted. To be implemented, it would require a consensus of the District, the State Reclamation and Mosquito Control Board (SRB), the Massachusetts Department of Health, an independent advisory board and a declaration of a Public Health Emergency from the Governor.

Typically, once the decision is made, the need for action is immediate and the window of opportunity is short. It is imperative that the complex logistics of executing the application are already in place. There are four components to this plan; 1) Global Positioning Satellite (GPS) mapping; 2) Securing airport facilities and use; 3) Availability of aircraft and pesticides; 4) Last but not least, availability of necessary funds.

1. The District has in place and continually revises a Global Positioning Satellite (GPS) mapping program that designates areas to be excluded from an aerial adulticide operation, such as reservoirs, endangered species areas, etc. The areas to be sprayed would be determined by the current mosquito and risk data and circumstances; the GPS program would be supplemented immediately prior to the operation. This data can be quickly downloaded into an aircraft's navigation system to direct the aircraft and pilot to areas to be sprayed and areas to be avoided.

2. The District has in place and annually revises a "Memorandum of Understanding" (MOU) with the Lawrence and Beverly Airports. In the event an aerial adulticiding application is necessary, Lawrence airport would be closest to the likely target area. In the event Lawrence airport is unavailable or the target area has broadened, then Beverly Airport would be used.

3. Through the state's procurement program, contracts are in place for the acquirement of aircraft and pesticides. If events warrant, the District will communicate with aircraft and pesticide contractors to inform them that an aerial adulticiding application may be necessary and equipment and materials are to be made available for our use.

4. The District has resources in its stabilization fund to conduct an aerial adulticiding application in the communities bordering the New Hampshire most likely to be treated to contain EEEV spread. In the event further applications are needed, additional funding would be necessary.

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(http://www.scienceblog.com/cms/west-nile-infection-may-persist-kidneys-after-initial-infection-28072.html)
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(17) Goudarz Molaei et al. 2007. Host feeding patterns of Culex mosquitoes and West Nile Virus transmission, Northeastern United States. Emerging Infectious Diseases. 12: 468- 474.
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Please check off the species of concern in your service area:

- ☐ *Ae. albopictus*
- ☐ *Ae. cinereus*
- ☒ *Ae. vexans*
- ☒ *An. punctipennis*
- ☒ *An. quadrimaculatus*
- ☒ *Cq. perturbans*
- ☒ *Cx. pipiens*
- ☒ *Cx. restuans*
- ☒ *Cx. salinarius*
- ☒ *Cs. melanura*
- ☒ *Cs. morsitans*
- ☐ *Oc. abserratus*
- ☒ *Oc. canadensis*
- ☒ *Oc. cantator*
- ☐ *Oc. excrucians*
- ☐ *Oc. fitchii*
- ☒ *Oc. j. japonicus*
- ☐ *Oc. punctor*
- ☒ *Oc. sollicitans*
- ☐ *Oc. stimulans*
- ☐ *Oc. taeniorhynchus*
- ☒ *Oc. triseriatus*
- ☐ *Oc. trivittatus*
- ☐ *Ps. ferox*
- ☐ *Ur. sapphirina*

☐ Other (please list):

Do you participate in the MDPH Arboviral Surveillance program? Yes

How many pools do you submit weekly on average? 48

Please check off the arboviruses found in your area in the past 5 years:

- ☒ West Nile Virus
- ☒ Eastern Equine Encephalitis
- ☐ Other Please list:

Did the above listed diseases cause human or horse illnesses? Yes

Please explain: EEE - Horse in West Peabody, and Alpaca in Byfield in 2009
WN - Human case in Revere in 2010

At what arbovirus risk level did the year begin in your area? (If more than one please list)

WNV: - LOW Risk: All District towns (32)

EEE: - REMOTE: Ipswich; Manchester; Wenham; Marblehead; Swampscott
(Non-District towns also REMOTE Risk: Essex, Gloucester, Rockport)
- LOW: All remaining District-subscribing municipalities
- MODERATE: Methuen; Haverhill; Merrimac; Amesbury; West Newbury; Newbury; Peabody;

At what arbovirus risk level did the year end in your area? (If more than one please list)

WNV: - LOW Risk: All remaining District-subscribing municipalities

- MODERATE: Lynn, Saugus, Winthrop
- HIGH: Revere

EEE: - REMOTE: Ipswich; Manchester; Wenham; Marblehead; Swampscott

(Non-District towns also REMOTE Risk: Essex, Gloucester, Rockport)

- LOW: All remaining municipalities
- MODERATE: Methuen; Haverhill; Merrimac; Amesbury; West Newbury; Newbury; Peabody

What time frame during the year is this method employed? May till October

Comments: _____

***Please attach a link to maps of surveillance areas if possible.**

EDUCATION, OUTREACH & PUBLIC RELATIONS

Do you have an education/public outreach program program? Yes

If yes, please describe: POLICY AND PROCEDURE FOR EDUCATIONAL OUTREACH

General: The District will provide educational outreach on mosquito control and related environmental science to schools, civic organization and public officials upon request.

Website: The District will maintain a Website www.northeastmassmosquito.com which will provide general information about operational strategies and procedures.

Other Media: the District has various DVD's available which will be provided to schools and civic groups, etc. at their request.

Outreach Programs: During the off season the Districts Entomologist and /or Biologist will present educational programs tailored to the specific needs of schools, civic organization and public officials. This includes

Greenhead trap assistance (Maine), Plastic Barrel offering to city/towns

NMCA (Esteban, Emily)

AMCA (Esteban)

BOH Arbovirus annual presentation

North Andover Board of Health Public Meeting

North Andover Senior Citizen Center Meeting

Tick presentation at Groveland Garden Club

Tick Presentation at West Newbury Garden Club

Mosquito/Arbobirus Workshop at Endicott Park in Danvers

Paper presentation MCD Wetland Mgmt. + Restoration Specialists

Please check off all that apply:

☒ School based program
☒ Website
☒ PR brochures/handouts
☒ Community events
☒ Science fairs
☒ Meeting presentations
☒ Other (please describe): As requested by school / town / associations / agencies / board of health ect.

Please give an estimate of attendance/participants in this program: 5 to 500

Please list some events you participated in for the year of this report: NMCA, AMCA,Eel River Headwaters Restoration Project: AMWS, Zombie Flowers: Association of MA Wetlands Scientists (AMWS), Identifying Bog Species: Association of MA Wetlands Scientists, Breaking Through Barriers - A Roadmap to Invasive Plant Control:NH Coastal Watershed Invasive Plant Partnership (CWIPP), Coastal Vernal Pools: Association of MA Wetlands Scientists, Coastal Resources: Association of MA Wetlands Scientists

What time frame during the year is this method employed? Year Round

Have you performed any research projects, efficacy, bottle assays, etc.? Yes

If yes, please elaborate on your research projects: Mddleton Tire Pile, Testing Frommer Updraft Gravid Trap, VectoMax WSP and Four Star (90 day) briquets efficacy Study.

Are you involved in any collaboration with academia, industry, environmental groups, etc.? Yes

If yes, please elaborate on your collaborations this past year: Collaboration with Harvard Extension Graduate Student, Mary Robinson Haight (also a Methuen High School teacher) to review our surveillance data for a project in a graduate course she has taken in Summer 2010; study the changes in species abundance and distribution, and make recommendations for communications and control. Greenhead Trap Assistance (Maine), Plastic Barrel offering to cities and towns.

Please provide a list of technical reports, white/grey papers, publication in journal or trade magazines, etc. Papers at the NMCA Conference

Does your staff participate in educational opportunities? Yes

If yes, please list the training and education your staff received this year: NMCA Annual Conference, Clarke Mosquito Control annual seminar, Field Day (PCMC), AMCA Annual Conference,Eel River Headwaters Restoration Project: AMWS, Zombie Flowers: Association of MA Wetlands Scientists (AMWS), Identifying Bog Species: Association of MA Wetlands Scientists, Breaking Through Barriers - A Roadmap to Invasive Plant Control:NH Coastal Watershed Invasive Plant Partnership (CWIPP), Coastal Vernal Pools: Association of MA Wetlands Scientists, Coastal Resources: Association of MA Wetlands Scientists

Please list the certifications and degrees held by your staff: Doctorate, Bachelor, Associate degree

Comments: ____

BIOLOGICAL CONTROL EFFORTS

Do you have a biological control program? Yes

If yes, please describe: Wetlands Management Program: Fresh and Salt Water

Is this program the introduction of mosquito predators or the enhancement of habitat for native predators? Enhancement of habitat for native predators in combination with improved flow as appropriate

Please check off all that apply:

☒ Predatory fish
☒ Predatory invertebrates
☐ Other (please describe):

What time frame during the year is this method employed? year round

Comments: _____

INFORMATION TECHNOLOGY

Does your program use (check all that applies):

☒ Computers
☒ GIS mapping
☒ GPS equipment
☒ Computer databases
☒ Aerial Photography
☐ Other (please describe):

Please describe your capabilities in these areas: Though District staff is still training our capabilities continue to grow fairly consistently. GIS is used for mapping projects particularly in the District's Wetland Management Program. Available MA GIS layers such as sensitive areas, wetlands, topography etc. are overlaid on project locations and examined to reveal data which can then be used to help define the project. Data are also collected in the field and eventually will be mapped to illustrate recoverable dip stations, recoverable photo stations, project bounds, etc.

Please describe your current GIS abilities: Intermediate

Give details if possible on your GIS abilities: The District has ArcMap 9.3. We can prepare professional looking maps, add layers for analysis of data, calculate acreage and determine linear footage. The district is also working on becoming more proficient

with digitizing, creating/using attribute tables and adding shapefiles. In addition, we have been working on developing a functional geodatabase that might eventually incoprorate all aspects of the District's mosquito control operations.

Please describe any changes/enhancements in this area from the previous year: The District has added laptops to spray trucks to aid in a more effective and accurate adulticiding effort, i.e., spray exemptions are continually updated and these are delineated on the mapping program. We are also developing data collection in other aspects of mosquito control. The District recently acquired a Trimble unit which should make data communication with other ESRI mapping products much simpler and more effective.

Comments: ____

REVENUES & EXPENDITURES

Please give a concise statement of revenues & expenditures for the prior fiscal year ending June 30.

Proposed Budget $1,523,983 $1,523,983.00

Account 2520/1500 Line Item Budget Spending Plan
Encumbances
AA - Full Time Payroll 43% $660,000.00 FT Payroll - 3.5% $660,000.00

BB - Travel 0.6% $10,000.00 $10,000.00

CC-Com/Contract Employes 3% $45,768.00 Com Meetings +20% $3,000.00
Contract Emp +2.4% $42,768.00

DD-Retire/Ins/Fringe 16% $250,951.18

Retirement Retirement +17% $106,943.58
Group Ins 20.26% of FT payroll Group Ins + 13% $133,716.00
Fringe 1.38% FT/Con Emp Fringe Benefits + 6% $10,291.60

Office/Administration 1.8% $28,520.00

Network consulting/maint GU Network + 50% $3,000.00
Computers/accessories Dell $7,500.00
Office Supplies NE Office Supply $4,500.00
Office Supplies Office Max $2,400.00
Paper Lindenmeyer - 100%
Printing G&G Printing $1,000.00
Postage U.S. Post Office $600.00
Out of Pocket Expenses Employee Reim -50% $5,000.00
Legal Notice Community News $1,000.00

Pre registration/dues NMCA Associations $3,520.00

Litigation $309.31 $309.31

Facility Operation/Utilities 1.5% $24,630.00

Electric service National Grid $8,000.00
Propane gas heat Osterman Gas $3,000.00
Heat Oil Dennis K Burke $3,000.00
Dumpsters Allied Waste $1,500.00
Water Bill Town of Andover $100.00
Long dsitance phone AT&T $200.00
Internet service Comcast $830.00
Cell and direct connect service Nextel $6,500.00
Office Phones Verizon $1,500.00

Facilitiy Maintenance 0.7% $10,000.00

Maint tools/supplies Home Depot $5,000.00
Heating/cooling maintenance Johnson Controls $5,000.00
Ops Fleet Maint/Repair 4% $62,000.00

Vehicle Maintenance/repair Fleet Response $10,000.00
Welding Gunderson Welding $5,000.00
Welands Equip maint/repair Kassborher $20,000.00
Hydraulic hoses & connections Tech Hydraulics $2,000.00
Equip hauling/towing/maint Coady's Towing $5,000.00
Vehicle Maintenance/repair MHQ $1,000.00
Excavator maint/repair Chadwick BaRoss $3,000.00
Misc equip/parts/supplies Granger $3,000.00
Auto Glass J.N. Phillps $500.00
Misc equip/parts/supplies Salisbury Auto $5,000.00
Misc equip/parts/supplies Suppliers Auto $5,000.00
Tires Goodyear $2,500.00

Operations Fleet Fuel 3.6% $55,000.00

Fleet Fuel gas/diesel Wright Express $55,000.00

Ops Support/Contractors 10.8% $175,000.00

Helicopter Contract JBI Helicopter $110,000.00
GIS Mapping True North Mapping $20,000.00
Co2 surveillance Airgas $12,000.00
Virus Testing DPH $20,000.00
Airport user Fee Plum Island Airport

Field equipment & Supplies	Forestry Suppliers	$3,000.00
Surveillance/Lab supplies	Fisher Scientific	$1,000.00
Surveillance/Lab supplies	Bio Quip	$3,000.00
Surveillance/Lab supplies	BioSensory	$1,000.00
Erosion Control materials	E.J. Prescott	$2,000.00
Work gear / uniforms	Armark	$3,000.00

Ops Pest/Spray equip/parts 9.8% $150,000.00

Pesticicdes / Sprayer parts	Clarke	$125,000.00
Pesticicdes / Sprayer parts	Adapco	$25,000.00

Lease/Purchase 0.9% $14,145.04

3rd of 5 payments Kass 260 Telp #908 $14,145.04

Capital Equipment 3.3% $37,661.47 $37,661.47

Total Spending $1,527,199.00 $1,527,199.00

Budget Alotment $1,527,199.00 $1,527,199.00

FY09 Stabilization Fund $117,485.44 $117,485.44

Total Budget $1,644,684.44 $1,644,684.44

List each **member municipality along with the corresponding (cherry sheet) funding assessment** dollar amount for the prior fiscal year.

Comments:

Amesbury	**$39,883**
Andover	**$107,180**
Beverly	**$65,298**
Boxford	**$68,632**
Danvers	**$51,191**
Georgetown	**$38,137**
Groveland	**$26,444**
Hamilton	**$43,293**
Haverhill	**$109,364**
Ipswich	**$93,891**
Lynn	**$54,884**
Lynnfield	**$35,505**
Manchester	**$32,189**
Marblehead	**$32,915**

Merrimac	**$24,818**
Methuen	**$77,405**
Middleton	**$42,603**
Nahant	**$6,407**
N Andover	**$85,862**
Newbury	**$67,680**
Newburyport	**$35,235**
Peabody	**$70,270**
Revere	**$35,013**
Rowley	**$51,812**
Salem	**$39,193**
Salisbury	**$45,642**
Saugus	**$44,185**
Swampscott	**$17,681**
Topsfield	**$37,572**
Wenham	**$23,035**
West Newbury	**$37,870**
Winthrop	**$12,933**

PESTICIDE USAGE

Please total your pesticide usage with information from your Mass. Pesticide Use Report, WNV Larvicide Use records and contracted pesticide applications. Applications methods include; hand/backpack, aerial, ULV, mistblower, other (please explain)

Product Name: Altosid Pellets
EPA Reg. #: 2724-448-64833
Application method: hand
Targeted life stage: Larvae
Total amount of concentrate applied: 485 lbs.
Comments: _____

Product Name: Vectolex WSP
EPA Reg. #: 73049-20
Application method: hand
Targeted life stage: Larvae
Total amount of concentrate applied: 153 lbs
Comments: _____

Product Name: 5% Skeeter Abate
EPA Reg. #: 8329-15
Application method: hand
Targeted life stage: Larvae
Total amount of concentrate applied: 2.75 oz.
Comments: _____

Product Name: Vectobac G
EPA Reg. #: 73049-10
Application method: hand
Targeted life stage: Larvae
Total amount of concentrate applied: 1,148.375 lbs.
Comments: _____

Product Name: Vectolex CG
EPA Reg. #: 73049-20
Application method: hand
Targeted life stage: Larvae
Total amount of concentrate applied: 6 lbs.
Comments: _____

Product Name: VectoMax WSP
EPA Reg. #: 73049-429
Application method: hand
Targeted life stage: Larvae
Total amount of concentrate applied: 342,260 Grams
Comments: _____

Product Name: Four Star Briquets
EPA Reg. #: 82262-3
Application method: hand
Targeted life stage: Larvae
Total amount of concentrate applied: 5,105 briquets
Comments: _____

Product Name: Vectobac 12 AS
EPA Reg. #: 73049-38
Application method: Aerial
Targeted life stage: Larvae
Total amount of concentrate applied: 3,300 Gallons
Comments: _____

Product Name: Anvil 10 + 10
EPA Reg. #: 1021-1688-8329
Application method: ULV
Targeted life stage: Adult
Total amount of concentrate applied: 109.7 Gallons
Comments: _____

Product Name: Suspend SC
EPA Reg. #: 432-763
Application method: ULV Barrier (retro fit)

Targeted life stage: Adult
Total amount of concentrate applied: 1.48 Gallons
Comments: _____

LARGE AREA EXCLUSIONS

Do you have large areas of pesticide exclusion, such as estimated or priority habitats? No

If yes, please explain, and attach maps or a web link if possible.

SPECIAL PROJECTS

Do you perform any inspectional services such as inspections at sewage treatment facilities or review sub division plans? Yes

If yes, please elaborate INSPECTIONAL SERVICES

The old saying an ounce of prevention is worth a pound of cure is very true in mosquito control. Early intervention or preemptive action to prevent a potential mosquito breeding site from becoming an actual breeding site is as much a control strategy as an application or treatment is. 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 cause an imposition to any citizen or business, but rather to be a resource for information and technology to help property owners prevent and/or reduce mosquitoes to the mutual benefit of the property owner, the community and mosquito control.

The District acts as a technical advisor at the request of local Boards of Health and represents the municipalities public and animal health concerns relative to mosquito breeding issues and proposed developments. The District, at the request of a local Board of Health, will also review site plans and inspect sites under construction relative to mosquito breeding issues. Upon inspection of a site the District will make written recommendations and submit these recommendations to the Board of Health and the land owner.

The primary vector species of West Nile Virus, Culex pipiens typically breeds in artificial containers such as catch basins, storm water structures, etc. This species seems to thrive where others fail, due to their ability to survive in highly organic and polluted water These conditions are often associated with industrial or office parks, commercial or agricultural livestock facilities. The District will routinely inspect these areas due to the increased potential for Culex species mosquito breeding in and around these areas.

The District also inspects Waste Water Treatment Plants, compost facilities, recycling centers, and junkyards. The District may also inspect private farms at the request of the

local Board of Health, farmowner, or in the event of increased mosquito and/or virus activity in the area.

Do you work with DPW departments or other local or state officials to address stormwater systems, clogged culverts or other areas that you have identified as man-made mosquito problem areas? Yes

If yes, please elaborate: The District works very closely with local Boards of Health, Conservation Commissions and DPWs in this function. Complaints are received and issued to District technicians. Inspections are completed and appropriate actions taken to alleviate conditions warranting treatment. District technicians frequently clear culverts and blocked grates to improve flow and limit flooding. Some cases warrant larval treatment. In some cases, Inspectional Service Reports are written to outline recommendations for municipality action such as cleaning of catch basin systems, etc. Occasionally larger areas require more significant effort and recommendations to the appropriate official for petitioning of a wetland management project may be made. See District's Policy and Procedure for Mechanized Wetland Management.

Have you worked with these departments on long term solutions? Yes

If yes, please elaborate: The District has been and will continue to be a strong advocate in favor of maintenance to these systems. The District voices its concern to numerous agencies including MA Highway, MA DEP, local DPWs, planning boards and Conservation Commissions. We offer all of our communities an Inspectional Service including review and recommendations for new development plans.)

Did you conduct or participate in any cooperative research or restoration projects?

If yes, please elaborate: Beaver impacted waterway - stream restoration, emergency swail restoration, removal of fill pile at the request of a local Conservation Commission, 2 salt marsh clean-ups, invasive species mapping and control.

Did you participate on any **State/Regional/National workgroups or panels or attend any meeting pertaining to the above**?

If yes, please elaborate: yes,

Clarke 2010 Community Mosquito Control Update
Chainsaw training and field equipment day for 2010
NMCA Annual Meeting
Florida Mosquito Control Annual Meeting
the Merrimac River Watershed Council
the Great Marsh Team
the MA-NH-ME Invasives Workgroup
the Partnership to Restore Massachusetts Aquatic Habitats

CHILDREN AND FAMILIES PROTECTION ACT

Is your program impacted by the Children and Families Protection Act? Yes

If yes, please explain: Not able to address mosquito control in a timely fashion due to protocols and compliance.

If you have data on compliance with this Act and your program, please list here: The District sends an annual notice, including the recommended amendment for mosquito control, to all schools and day care facilities in our jurisdiction asking that they update their IPM plans to include mosquito control.

If you had difficulties with implementation of your program due to this law, please elaborate here: Due to increased health risks with mosquitos, it puts more of a demand on Mosquito Control Agencies. Complying with School property issues is a constant challenge.

Comments:

GENERAL COMMENTS

Please list any comments not covered in this report: _____