MASSACHUSETTS MOSQUITO CONTROL
ANNUAL OPERATIONS REPORT

2009 Year of Report Date of Report: January 22, 2010

Project/District Name: **Bristol County Mosquito Control Project**

Address: 140 North Walker Street

City/Town: Taunton Zip: 02780

Phone: 508-823-5253 Fax: 508-828-1868

E-mail: brismosqmt@comcast.net

Report prepared by: ***Wayne N. Andrews, M.Sc., Priscilla Matton, M.Sc. & Stephen Burns***

If you have a mission statement, please include it here:
In conjunction with the belief that mosquito control is an important public health issue, the Bristol County Mosquito Control Project, under the guidance of the State Reclamation and Mosquito Control Board, strives to serve their membership communities by suppressing both nuisance and disease carrying mosquito populations.

Our goal is to bring mosquito populations to tolerable levels using a variety of scientifically effective methodologies consistent with applicable laws. Surveillance, water management, biological and chemical controls are performed in an environmentally sensitive manner to minimize potential effects on people, wildlife and the environment.

It is acknowledged that commissioners live or work in the county and that all decisions be made in a fiscally responsible manner. The Project advocates public outreach and education through cooperative efforts with local officials, school departments and the news media.

ORGANIZATION SETUP:

Please list your Commissioner's names:

Arthur F. Tobin- Chairman
Gregory D. Dorrance
Christine A. Fagan
Joseph Barile
Robert F. Davis

Please list the Supt./Director's name: Wayne N. Andrews, M.Sc.
Please list the Supt./Director's contact phone number: 508-823-5253
Please list your Asst. Supt./Asst. Director's name: Stephen Burns

Do you have a website? No

If yes, please list the web address here: http://

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

Full time: 9
Part time: 15 hours per week
Seasonal: 1
Other: 1 (please describe) Temporary Administative Assitant

Please break these down into the following areas:

Administrative staff: 1.5
Field staff: 7.5

Please check off all that apply, and list employee name(s) next to each category:
☒ Public relations Wayne Andrews, Priscilla Matton
☒ Information technology Priscilla Matton, Wayne Andrews
☒ Entomologist Priscilla Matton, Wayne Andrews
☒ Wetland Scientist Priscilla Matton
☒ Biologist Wayne Andrews, Priscilla Matton
☒ Education Priscilla Matton, Wayne Andrews
☒ Laboratory Wayne Andrews, Priscilla Matton
☒ Operations Stephen Burns
☒ Facilities Stephen Burns
☒ Other (please list) GIS- Priscilla Matton; Administrative Assistant- Barbara Johnson

For the year of this report, we maintained:
11 vehicles
2 modified wetland equipment (list type) (2) low ground pressure excavators, (1) low ground pressure mower, (1) Truck and trailer to transport , (1) Bulldover
8 ULV sprayers (list type) (4) Beecomist, (4) London Fog (GPS)
Larval control equipment (list type)
Other (please be specific):

Comments: _____

How many cities & towns in your service area? 20
Please list: North Attleborough, Attleboro, Seekonk, Rehoboth, Mansfield, Norton, Dighton, Somerset, Swansea, Easton, Taunton, Raynham, Berkley, Freetown, Fall River, Westport, Dartmouth, New Bedford, Acushnet, Fairhaven

***Please attach a link to a map of your service area if possible. Attached**

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): GIS and Mapping**

Comments: None

LARVAL MOSQUITO CONTROL:

Do you have a larval mosquito suppression program? Yes

If yes, please describe the purpose of this program: To reduce the emergence of adult mosquitoes in areas where larval mosquitoes are present, using biorational techniques. This includes applications to catch basins and storm water structures, primarily to control Culex mosquitoes, a vector of WNV in the area. A database of mosquito larval development sites are checked, treated as necessary, and recorded for historical information.

Please give the time frame for this program: See Timeline at the end of the document.

Describe the areas that this program is used: Throughout Bristol County in wetlands, salt marshes, catch basins, storm water structures, containers, tires, and any other areas holding water.

Do you use:
☒ **Ground applied (includes hand, portable and/or backpack)**
☐ **Helicopter applications**
☐ **Other (please list):**
Comments: None

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

Wetlands: Vectobac G #73049-10
Catch basins: VectoLex WSP #73049-20
Containers: VectoLex WSP #73049-20
Other (please list): Cattail areas: Altosid Pellets #2724-448

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

Wetlands: 2.5 lbs/acre
Catch basins: 1 pouch per catch basin
Containers: 1 pouch per 50 sq ft
Other: 2.5 lbs/acre

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

☒ Larval dip counts – please list trigger for application: 1+ per 5 dips
☒ Historical records
☒ Best professional judgment

Comments: All of the approximately 2,000 larval monitoring sites have GPS coordinates and are mapped for use in the truck computers. Some mosquitoes, like Cq. perturbans are difficult to sample and applicators use other indicators when making applications.

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

ADULT MOSQUITO CONTROL:

Do you have an adult mosquito suppression program? Yes

If yes, please describe the purpose of this program: Vector Control 90%; Nusiance 10%

Please give the time frame for this program: See Timeline at the end of the document.

Describe the areas that this program is used: Area wide and targeted adulticide.

Do you use:

☒ **Truck applications**
☐ **Portable applications**
☐ **Aerial applications**
☐ **Other (please list):**
Comments: More aerial adultciding should be done. Culiseta melanura & Cq. perturbans are difficult to control in the larval stage.

Please list the names of the products used with EPA #:
1). Anvil 10+10 ULV, EPA Reg # 1021-1688-8329
2).
3).
4).
5).
6).

Please list your application rates for each product:
1). 0.62 fluid oz per acre
2).
3).
4).
5).
6).

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

It is application rate dependent and only applied every other day in the same area.

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 5 per trap
☒ Complaint calls - please list trigger for application 2 per square mile
☒ Arbovirus data
☒ Best professional judgment

Comments: The Project received 15,964 adulticiding spray request in 2009.

***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: Containers and tire removal from problem areas, sometimes in conjuction with town programs. Property inspections are an important

component in source reduction. Educate home and business owners how to reduce and remove standing water on their property conducive to larval habitat.

What time frame during the year is this method employed? See Timeline at the end of the document.

Comments: Source reduction is an important component of an IPM plan, however source reduction does not equal permenant control.

DITCH MAINTENANCE

Do you have a ditch maintenance program? Yes

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

If yes, please describe: Our goal is to remove debris, silt and vegetation from drainage ditches throughout our service area, to improve water flow through the areas. This includes both hand and mechanized work. Proper water flow will eliminate standing water conducive to larval mosquito development.

Please check off all that apply INLAND DITCH MAINTENANCE:

☒ **Hand tools**
☒ **Mechanized equipment**
☒ **Other (please list): Erosion Control Materials**
Comments: The Project has contiuned to implement the use of environmentally sensitive silt and erosion control materials to stabilizes soils disturbed by our operations. This includes but not limited to: straw and coconut blankets, straw bales, jute mats, conservation seed and sedi-stop rolls within the waterway.

Please check off all that apply SALTMARSH DITCH MAINTENANCE:

☒ **Hand cleaning**
☒ **Mechanized cleaning**
☐ **Other (please list):**
Comments: None

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

Hand cleaning 48,470 feet
Mechanized cleaning 6,895 feet
Other (please list): Brush cut 20,756 feet

Comments: _____

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

Hand cleaning 4,350 feet
Mechanized cleaning 6,929 feet
Other (please list): Brush cut 1,610 feet

What time frame during the year is this method employed? See Timeline at the end of the document.

Comments: Bristol County Mosquito Control Project completed 33 mechanized ditch maintenance projects within our member communities. We worked in conjunction with Mass Audubon on their Allens Pond property to complete a saltmarsh ditch maintenance project. We have created a Best Management Practice document to better explain how and why we perform water management. We work closely with the member towns to find sites that will benefit the communities. MA MCDs wetlands coordinators meet regularly to discuss issues and techniques used in our water management projects.

***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: **N/A**
Larvicide – catch basins:
Larvicide-hand/small area **Larvicide monitoring is done at approximately 10% of treatment locations. Before and after an application, a standard issue white 350 ml "dipper" is used to dip for immature mosquitoes. A dip is typically one smooth motion into the water / submerged vegetation and out keeping the dipper level upon exiting so that the sample does not spill. If there is no available water to sample at the site it is considered dry. The observer specifically notes dip samples that contain mosquito pupae. The observer will count and may indicate developmental stages of the larvae (instar – 1st, 2nd, 3rd, or 4th) or indicate "pupae". The observer may indicate condition of the sample i.e., live, moribund or dead as applicable.**
Ground ULV Adulticide: **The Project places mosquito traps in locations where an application will take place, to check if the pesticide is coming into contact with the mosquitoes. When the trap is collected, the number of dead or dying mosquitoes are noted on the collection form. We conduct pre and post traps collections in certain ecological areas to assess efficacy.**

Source Reduction: **On water management projects, 100% of the locations are monitored for efficacy.** **At approximately 10% of our source reduction locations, the Project applicators will return to a site to look for temporary and permenant containers that have returned.**
Open Marsh Water Management: **Please see the attached 2006 OMWM Standards**
Other (please list):

Provide or list standard steps, criterion, or protocols regarding the documentation of efficacy, (pre and post data) and resistance testing (if any): **Bottle Bioassay procedures and results are included at the end of the document.**

OPEN MARSH WATER MANAGEMENT

Do you have an OMWM program? Yes

If yes, please describe: No projects were completed in 2009. However the goal of the program is to create greater access for mosquito-eating fish to areas on the marsh that support mosquito larval development. The Projects has attached their current OMWM standards at the end of the document.

Please give an estimate of total square feet or acreage: None

What time frame during the year is this method employed? See Timeline at the end of the document. Activities may take place based on time restrictions for endangered species or other environmental factors.

Comments: Participating with MA Coastal Zone Management and other MCDs with OMWM programs to establish new standards.

***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: 10

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
☐ NJ light traps w/CO_2
☐ Canopy
☐ Canopy

Other (please describe): UV light trap with and without CO2

Please describe the purpose of this program: There are two reasons to do surveillance: to monitor mosquito populations and virus levels in these mosquitoes. We work in conjunction with the MA Department of Public Health for testing of samples that are collected. This helps us monitor the EEE and WNV activity in the local mosquito populations. With this information we make pesticide applications, public outreach and water management decisions. Participate in an annual collection survey for Cs. melanura with MA DPH, to estimate the population and risk of EEE.

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

If yes, please describe how you chose these long-term sites. Originally based on EEE human cases in these areas.

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? 15

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

☒ West Nile Virus
☒ Eastern Equine Encephalitis
☒ Other Please list: Highlands J

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

Please explain: We have had more EEE activity in our County in the last 5 years or 50 years then any other mosquito control program in the US. We have collected over 100 isolations from both WNV and EEE in the past 5 years. We had 6 reported WNV human cases and 2 EEE human cases.
2008 Horse case- Freetown

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

WNV: Fall River and New Bedford are in the Moderate-risk category. Remaining towns are in the Low-risk category.
EEE: Freetown and New Bedford are in the Moderate-risk category. Remaining towns are in the Low-risk category.

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

WNV: Fall River, Dartmouth and New Bedford are in the Moderate-risk category. Remaining towns are in the Low-risk category.
EEE: Easton, Raynham, Freetown, Acushnet, Fairhaven and New Bedford are in the High-risk category. Taunton, Berkley, Westport and Dartmouth are in the Moderate-risk category.
Remaining towns are in a Low-risk category.

What time frame during the year is this method employed? See Timeline at the end of the document.

Comments: A total of 411.2 square miles (263,168 acres) were at a Moderate/High risk for EEE and WNV in 2009. There are no reported human or horse cases for WNV or EEE in Bristol County. The highly invasive Asian Tiger Mosquito (Aedes albopictus) was collected in New Bedford on three separate dates in 2009.

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

EDUCATION, OUTREACH & PUBLIC RELATIONS

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

If yes, please describe: Numerous radio, TV and newspaper events.

Please check off all that apply:

☒ School based program
☐ Website
☒ PR brochures/handouts

☒ Community events
☒ Science fairs
☒ Meeting presentations
☒ Other (please describe): Meetings at the request of organizations, Boards of Health, schools and Town/City officials. Press Releases

Please give an estimate of attendance/participants in this program: +5,000

Please list some events you participated in for the year of this report:
Clarke Mosquito Training and Tick Bite Prevention, Central, MA, April 2009 for CEUs
American Mosquito Control Association Annual Meeting, New Orleans, LA, April 2009 (presented and attended)
Presented "New England Mosquitoes and Control" at the Spring Pre-State FIFRA Issues Research and Evaluation Group.
Washington Day Conference, Washington, D.C., May 2009
Presented at the 2009 Public Health Forum in September 2009.
Northeastern Mosquito Control Association Annual Meeting, Sturbridge, MA, December 2009 (presented and attended)
Radio Talk Show with residental call in, covering several towns within our membership area.
NE-IPM Competitive Grants Program Relevancy Panel
Allens Pond Association with members of Mass Audubon, Town Officials and residents.
Beekeepers Association
Fall River Celebrates America which included handouts and personal interaction.
Open Marsh Water Management working group with Coastal Zone Management, Mass Audubon, Mosquito Controls and other State organizations.
Water Management meeting with Mosquito Control Districts and Army Corp of Engineers.
Best Management Practices for Inland Freshwater Maintenance working group.
Aquatic Restoration Task Force
Maine Municipal Association presentation on "Lessons Learned about EEE", October 2009.
Fall River and Duke's County Public Safety Day presentation
Health Fairs in member cities and towns.

What time frame during the year is this method employed? See Timeline at the end of the document.

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

If yes, please elaborate on your research projects: Determining the suseptibilty of Culiseta melanura to Bacillus sphaericus (Serotype H5a5b Strain 2362) in a laboratory bioassay. Work was completed at the Project's laboratory in conjunction with Valent BioSciences Corporation. (Poster is attached)

Aedes albopictus survey in member towns to check for new introduction and establishment.
Bottle Bioassay data is included at the end of the document.

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

If yes, please elaborate on your collaborations this past year: Determining the suseptibilty of Culiseta melanura to Bacillus sphaericus (Serotype H5a5b Strain 2362) in a laboratory bioassay. Work was completed at the Project's laboratory in conjunction with Valent BioSciences Corporation.

Please provide a list of technical reports, white/grey papers, publication in journal or trade magazines, etc. None

Does your staff participate in educational opportunities? Yes

If yes, please list the training and education your staff received this year:
American Mosquito Control Association, IPM webinar, January 20, 2009
EJ Prescott, Jobsite Erosion Control seminar, Worcester, MA, March 2009
Clarke Mosquito Training and Tick Bite Prevention, Central, MA, April 2009 for CEUs
American Mosquito Control Association Annual Meeting, New Orleans, LA, April 2009
Washington Day Conference, Washington, D.C., May 2009
Chain Saw Safety Workshop sponsored by the Northeastern Mosquito Control Association, Carver, MA, October 2009. The day long training was arranged by staff at the Bristol County Mosquito Control Project.
Northeastern Mosquito Control Association Annual Meeting, Sturbridge, MA, December 2009

Please list the certifications and degrees held by your staff:
Wayne Andrews- B.S in Biology, M.Sc. in Entomology, Certified Pesticide Applicator
Stephen Burns- B.S. in Business Management, Certified Pesticide Applicator, CDL license, Hoisting Engineer License, FEMA certified, Chainsaw Certification
Priscilla Matton- B.S in Zoology, M.Sc. in Entomology, Certified Pesticide Applicator
Jonathan Gibbs- Certified Pesticide Applicator, CDL license, Hoisting Engineer License, Chainsaw Certification
Drew Bushee-Certified Pesticide Applicator, CDL license, Hoisting Engineer License, Chainsaw Certification
John Moniz- Licensed Pesticide Applicator, CDL license, Hoisting Engineer License, Chainsaw Certification
John Raposo- Licensed Pesticide Applicator, Chainsaw Certification
Joshua Nickerson- Licensed Pesticide Applicator, CDL license, Hoisting Engineer License, Chainsaw Certification
Edward Onley- Licensed Pesticide Applicator

Comments: Participated in science fairs in member towns as judges and mentors. Provide annual Town Reports to member communities outlining the activities that have taken place within their towns. Hold monthly public commission meetings were the residents are encourage to participate and comment.

BIOLOGICAL CONTROL EFFORTS

Do you have a biological control program? Yes

If yes, please describe: Ditch maintenance to remove blockages that restrict the movement of fish, allowing them to reach mosquito larvae.

Is this program the introduction of mosquito predators or the enhancement of habitat for native predators? Enhancement of habitat for native predators.

Please check off all that apply:

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

What time frame during the year is this method employed? See Timeline at the end of the document.

Comments: _____

INFORMATION TECHNOLOGY

Does your program use (check all that applies):

☒ Computers
☒ GIS mapping
☒ GPS equipment
☒ Computer databases
☒ Aerial Photography
☒ Other (please describe): Create maps and posters

Please describe your capabilities in these areas: Handheld and ULV based GPS for pesticide applications. MapPoint is used in the truck mounted computers to guide applicators when making pesticide applications.

Please describe your current GIS abilities: Advanced

Give details if possible on your GIS abilities: ArcMap and MapPoint are used to create maps, application locations and provide guidance. A Tremble with meter accuracy and the Pathfinder program are used to record locations.

Please describe any changes/enhancements in this area from the previous year: Field technicians learned new GIS and GPS training through True North Mapping.

Comments: _____

REVENUES & EXPENDITURES

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

See Fiscal Year Spreadsheet and corresponding cherry sheet at the end of the document.

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

Comments: _____

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: Anvil 10+10 ULV
EPA Reg. #: 1021-1688-8329
Application method: Truck-based GPS guided ULV
Targeted life stage: Adult
Total amount of concentrate applied: 392.84 gallons
Comments: <u>There has been an increase in the amount used represening a substantial increase in service requests because of virus isolations.</u>

Product Name: VectoBac G
EPA Reg. #: 73049-10
Application method: Hand
Targeted life stage: Larvae
Total amount of concentrate applied: 2,842.92 lbs
Comments: _____

Product Name: VectoLex WSP
EPA Reg. #: 73049-20

Application method: Hand
Targeted life stage: Larvae
Total amount of concentrate applied: 491.72 lbs
Comments: A total of 22,304 pouches were used in catch basins, retention/ detention ponds and abandoned swimming pools.

Product Name: Altosid Pellets
EPA Reg. #: 2724-448
Application method: Hand
Targeted life stage: Larvae
Total amount of concentrate applied: 46 lbs
Comments: For Cq. perturbans control and detention/retention ponds.

Product Name:
EPA Reg. #:
Application method:
Targeted life stage: Choose one
Total amount of concentrate applied:
Comments: _____

Product Name:
EPA Reg. #:
Application method:
Targeted life stage: Choose one
Total amount of concentrate applied:
Comments: _____

Product Name:
EPA Reg. #:
Application method:
Targeted life stage: Choose one
Total amount of concentrate applied:
Comments: _____

Product Name:
EPA Reg. #:
Application method:
Targeted life stage: Choose one
Total amount of concentrate applied:
Comments: _____

Product Name:
EPA Reg. #:
Application method:
Targeted life stage: Choose one
Total amount of concentrate applied:

Comments: _____

LARGE AREA EXCLUSIONS

Do you have large areas of pesticide exclusion, such as estimated or priority habitats? Yes

If yes, please explain, and attach maps or a web link if possible. Map of Canoe River and Hockomock ACEC's and areas of Priority Habitat.

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 Perform entomological work when requested by member towns. Review, inspect and treat detention/ retention ponds in sub divisions.

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: Extensive work is done with member towns and local governmental agencies such as the DPW, Boards of Health, Conservation Commissions, Engineering departments and Mass Highway District 5. We are often contacted to clean drainage ditched that are clogged with sand and debirs before it is discharged into the adjacent wetland.

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

If yes, please elaborate: Developed long term solutions and control stratigies for city and towns. This can included a treatment schedule for specific or sensitive areas.

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

If yes, please elaborate: The control of Cs. melanura using biorational products. Two salt marsh restoration projects with NOAA in Fairhaven.

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

If yes, please elaborate: Priscilla Matton is a member of the Northeastern Mosquito Control Association's Executive Board and the American Mosquito Control Association's Training and Member Education Committee. She presented "New England Mosquitoes and Control" at the Spring Pre-State FIFRA Issues Research and Evaluation Group.

She also presented information at the Maine Municipal Association on "Lessons Learned about EEE", October 2009.
Wayne Andrews presented information at the 2009 Public Health Forum held in Norton in September 2009. Also a member of the EPA NE-IPM Competitive Grants Program Relevancy Panel.
Consulted and provided technical information to the NOAA Restoration Center on two projects in Fairhaven.
We currently sit on a variety of workgroups within the state including but not limited to: Open Marsh Water Management working group with Coastal Zone Management, Mass Audubon, Mosquito Controls and other State organizations; Water Management meeting with Mosquito Control Districts and Army Corp of Engineers; Best Management Practices for Inland Freshwater Maintenance working group; Aquatic Restoration Task Force and MA DPH joint workgroups.

CHILDREN AND FAMILIES PROTECTION ACT

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

If yes, please explain: We have approximately 265 day cares and 150 locations of private, parochial and public school properties.

If you have data on compliance with this Act and your program, please list here: Most of our schools have an IPM plan on file with the state, however approximately 50% contain any mosquito control language. Only schools and daycares the request larviciding or adulticiding from Bristol County Mosquito Control have the proper compliance language.

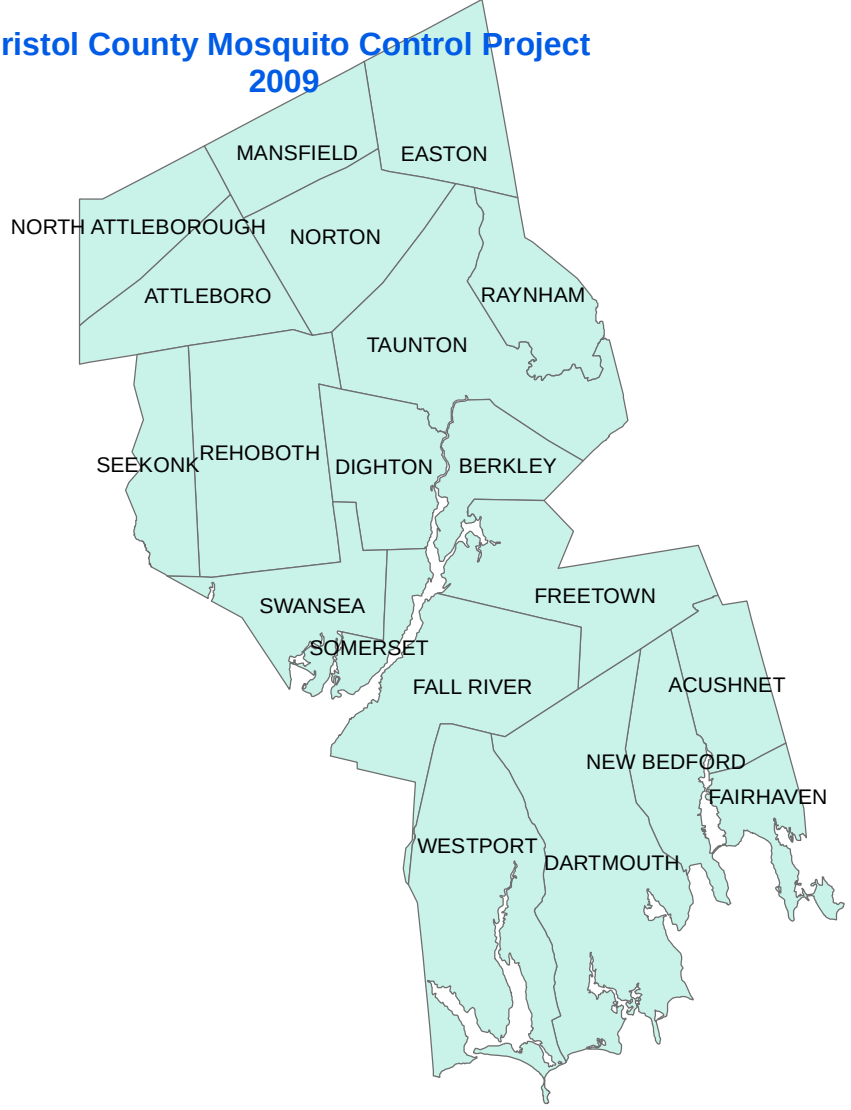
If you had difficulties with implementation of your program due to this law, please elaborate here: Avoiding this many locations at night makes adulticiding applications very difficult. With the addition of computers in the trucks, applicators are better able to locate these areas.

Comments: Map included at end of document with schools and no-sprays. The amendments to the Children and Families Protection Act on notification has grealty reduced the paper work required by the schools. This has allowed for applications in areas of high viral activity, to be made on school property in a more timely and cost efficient manner.

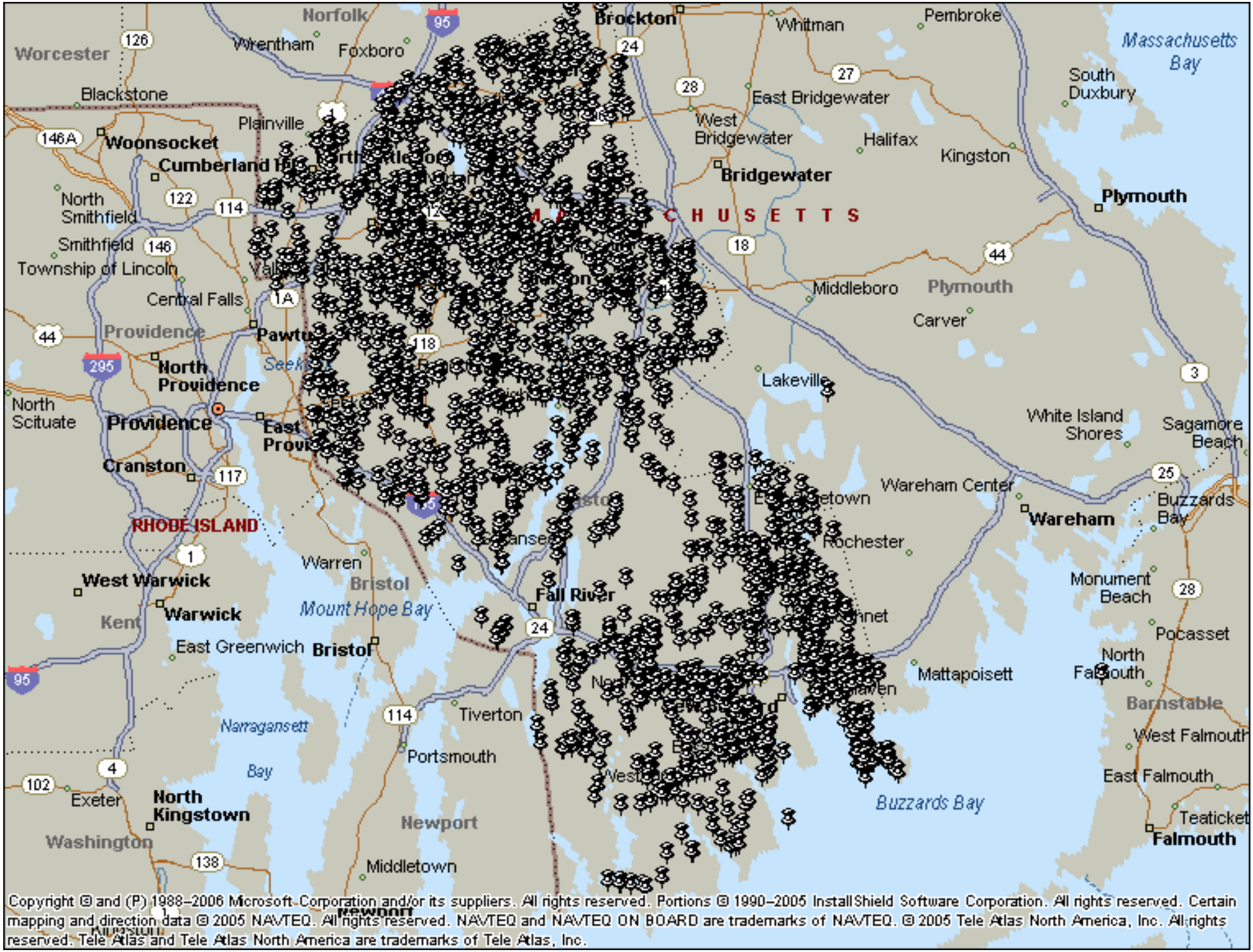
GENERAL COMMENTS

Please list any comments not covered in this report: Bristol County has 691 sq miles. It has 556 sq miles of land and 135 sq miles of water. It also has 74,000 acres of DEP wetlands plus an additional 25,000 acres of re-flood that supports Aedes vexans. In 2009, 411.2 sq miles were in a High/ Moderate risk for WNV and EEE.
There is a 39 page appendix accompanying/attached to this annual report.

Bristol County Mosquito Control Project
2009



BCMCP's Computerized GPS Larval Sites



Bristol County Mosquito Control Project

Standards for Open Marsh Water Management (OMWM)

Adapted from "Guidance for Meeting U.S. Fish and Wildlife Service Trust Resource Needs When Conducting Coastal Marsh Management for Mosquito Control on Region 5 National Wildlife Refuges" and OMWM Standards of The Northeast Massachusetts Mosquito Control and Wetlands Management District.

Complied by: Priscilla Matton, M.S.
Entomologist/ Wetlands Coordinator
Bristol County Mosquito Control Project
140 North Walker Street
Taunton, MA 02780
Phone: 508-823-5253
Fax: 508-828-1868

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Bristol County Mosquito Control Project

Standards for Open Marsh Water Management (OMWM)

Adapted from "Guidance for Meeting U.S. Fish and Wildlife Service Trust Resource Needs When Conducting Coastal Marsh Management for Mosquito Control on Region 5 National Wildlife Refuges" and OMWM Standards of The Northeast Massachusetts Mosquito Control and Wetlands Management District.

Bristol County Mosquito Control Project services 13 communities that have coastal salt marshes (Acushnet, Berkley, Dartmouth, Dighton, Fall River, Fairhaven, Freetown, New Bedford, Rehoboth, Seekonk, Somerset, Swansea, and Westport). Many of these areas have been adversely impacted by human activities and been altered in some way. The construction of roads and bridges either without culverts or with undersized culverts also have negatively impacted salt marshes by cutting off or severely reducing saltwater flow, resulting in drastic changes such as *Phragmites* invasion or conversion to other habitats (USDA Soil Conservation Service, 1994).

Bourn and Cottom (1950) estimated that over ninety percent of salt marshes in the northeastern United States were parallel-grid-ditched by 1938 for mosquito control under various state and federal programs. It is unknown how many acres of marsh have been manipulated for salt hay farming in the northeast. Grid ditching was completed at a time when little was known about the ecology or importance of salt marshes to coastal ecosystems. Parallel-grid ditches for mosquito control were typically constructed at 100-150 foot intervals with cross ditches installed to drain permanent water areas (Whitman, 1995). In many marshes, grid-ditches eliminated, reduced, and/or prevented pan and pool formation. For example, in Delaware's Great Marsh, over 40 acres of pond habitat existed in 1926. When reevaluated in 1986, only 10 acres remained due to the installation of grid-ditches (Meredith and Savelkis, 1987). The adverse impacts that indiscriminate salt marsh grid ditching had on waterfowl, water birds, and shorebirds were recognized over fifty years ago in Massachusetts (Bradbury, 1938).

Examples of negative impacts to migratory birds from marsh ditching include vegetation changes such as shrub or exotic species invasions replacing valuable habitat for: wintering waterfowl (Widjeskog, 1994), sparrows (Burger et al. 1978), and clapper rail reproduction (Shisler et al. 1979). In a Massachusetts study comparing avian use in ditched marshes versus unditched marshes, results showed significant decreased habitat use by shorebirds, herons, ibises, terns, and aerial insectivores in grid-ditched marshes (Clark et al. 1984). This study also investigated invertebrate abundance, suggesting that the cause of low avian use was loss of foraging opportunities due to prey inaccessibility rather than reduction in the abundance of invertebrates in the grid-ditched marsh. Migratory bird use impacts are still prevalent in many refuge coastal marshes that remain ditched and in some locations where ditching is still occurring. However, plugging these ditches or incorporating existing ditches into properly designed channels to facilitate water movement will encourage mosquito-eating fish without lowering the water table. The establishment of pools to provide semi-permanent

reservoirs or sumps for these predatory fish also can furnish feeding and resting sites for migratory birds, resulting in both wildlife habitat improvement and mosquito control.

Marsh ditching results in the loss of submerged aquatic vegetation (SAV) with the loss of permanent pond habitat in the high marsh. SAV provides a vital link in the marsh food web for many small organisms that are eaten by fish, crustaceans and other predators. SAV is a broad category that includes attached macrophytes, epibenthic and floating algal mats, epiphytes, phytoplankton, benthic-diatoms and dinoflagellates (Mahaffy, 1987). Current studies evaluating parallel-ditch restoration (plugging of the ditch) show the return of wildlife and plant diversity such as fish, wading birds, shorebirds, waterfowl, and SAV to high salt marshes (Parker River NWR, Long Island Coastal Complex, and Great Bay NWR unpublished data 1995-1997).

The increase in the *Phragmites spp*. population has the ability to out compete native plant species and provide mosquito-breeding habitat by preventing the infiltration by predatory fish. Generally, *Phragmites spp*. cannot survive in soil that is saturated with water with a salinity of 35 parts per thousand or more. Proper use of ditches can increase salt water flow to these areas and reduce the abundance of invasive *Phragmites spp*.

After approximately 40 years of parallel-grid ditching for mosquito control, a new approach called Open Marsh Water Management began to emerge in the late 1960's in New Jersey (Ferrigno and Jobbins, 1968). This water management technique controls mosquitoes without using chemicals by altering the mosquito-breeding habitat and by providing mosquito predaceous fish access to the managed areas. Biological control is achieved by fish predation (typically mummichogs (*Fundulus heteroclitus*), and other cyprinodontiform fish) on mosquito larvae. Since the inception of these techniques and modifications to the original techniques, northeastern states from Maryland to Massachusetts have increasingly used variations of OMWM for mosquito control, significantly reducing the need for chemical control. OMWM has evolved into a collection of marsh management techniques that facilitate source reduction and biological mosquito control and address specific high marsh problems (e.g., invasive plants), while improving fish and wildlife habitat.

There are numerous variations in the marsh management techniques between, and even within, the coastal states. The following Standards are adapted from The Northeast Massachusetts Mosquito Control and Wetlands Management District Standards for OMWM. The original Massachusetts standard for Open Marsh Water Management (OMWM) was written in 1982 by the then Essex County Mosquito Control Project, ECMCP. OMWM was seen by ECMCP as a long-range salt marsh mosquito control strategy, and an environmentally sensitive alternative to the practice of maintaining grid ditches, which were primarily constructed during the 1930’s.

Environmental advocates saw OMWM as a means of discontinuing the practice of grid ditching, and possibly even restoring some marshes to more naturally functioning ecosystems. A growing consensus that grid ditching had negative impacts on the salt marsh was the impetus for a cooperative effort between the ECMCP and many other groups and agencies, beginning in the early 1980’s (Hruby et al. 1985). Since OMWM had not previously been practiced in New England, and the fact that New England salt marshes were somewhat different environments from mid-Atlantic salt marshes, some modifications to techniques were required, as well as some preliminary test plots to determine if the method

would be effective in New England. Several successful tests plots and studies, led ECMCP to abandon grid ditching and OMWM became the preferred method from both the mosquito control and environmental perspective.

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I. SITE SELECTION: From one or more of the sources listed below. The source of each site selection will be recorded with each site plan.
   A. District larviciding site files.
   B. District field technician's observations.
   C. Investigation of residents, Federal, State or local public officials' complaints.
   D. Marsh restoration proposal.

II. FIELD SURVEY: (Pre) To determine the need for and feasibility of OMWM alterations and to collect base line data for future considerations. The following procedure will be followed and recorded weekly for a 2-5 months period between May and September on an OMWM Field Survey Data Sheet, prior to any OMWM alterations.

   A. SITES- Will not exceed 9 acres.

   B. PHOTOGRAPHIC RECORDS- A panoramic record of each site from one or more pre-chosen, fully recoverable stations.

   C. SITE MAP- Each site will have an aerial photograph or a map indicating vegetation types and their distribution on each site, using symbols indicated in the standard legend.

   D. MOSQUITO LARVAE- Five to ten dips stations will be flagged on the marsh within each site. The locations of these dip stations will be recorded on a transparent overlay and attached to the aerial photograph or map.
      i. Procedure- At each dip station, 3 dips will be taken within a 3-yard radius around the station. The maximum larvae to be counted per dip will be 30. A subset of mosquitoes will be collected and identified to species and recorded in the laboratory.

   E. FLOODING EVENTS- A determination of tide height during the spring high tide event should be made, to ensure water will be able to reach all areas of a closed system. A black stake with chalk on 2 sides will be placed within the site to help determine the height of flooding events between site visits. A measurement of the marsh surface to a mark on the chalk stake will be used as a predetermined standard.
      i. Procedure- The observer will measure and record the distance from the marsh surface to the base of the remaining chalk line. The stake will be re-chalked for the next reading.

   F. RAINFALL- A standard rain-gauge attached to the chalk stake will be used to monitor rainfall.
      i. Procedure- Observer will visit each site after rainfall events to measure and record inches. (A rain gauge in an adjacent preliminary site can be used to measure rainfall in post sites if in close proximity.)

   G. ADULT MOSQUITO- Will be monitored by means of a light trap placed within the site to collect adult mosquitoes. Landing rates will no longer be used for concern of potential viral activity encountered from mosquito bites.

i. Procedure- A light trap will be placed at the site and collected at least once a week before and after completion. The adult mosquitoes will be identified and recorded by species with a possibility that some maybe submitted for viral testing of West Nile virus and Eastern Equine Encephalitis.

H. WATER TEMPERATUER/ SALINITY/ (and where applicable) DISSOLVED OXYGEN – by means of a temperature meter, refractometer and a dissolved oxygen meter.

i. Procedure- Observer will take and record readings at 1 or more stations depending on the diversity of the marsh habitat. If possible readings will be taken form the same station during each site visit.

Example- If the site consists of a grid ditched marsh only 1 of each reading is necessary. If the site consists of 2 or more marsh habitats, such as open marsh, salt ponds, pans depression and or grid ditches, 2 or more of each reading will be necessary at different habitats.

I. FISH POPULATIONS – General observations.

i. Procedure- Observer will look for and record the presence of predatory fish in salt ponds or pans, stagnant ditches or flooded marsh surface within the site. (See codes for pre and post data sheets.)

J. SHOREBIRD ACTIVITY – General observations.

i. Procedure- Observer will look for and record the presence of shorebirds within the site which are resting, feeding or otherwise utilizing the site. (See codes for pre and post data sheets.)

K. HUMAN ACTIVITY – General observations.

i. Procedure- Observer will look for and record the presence of human activity within or in the immediate vicinity of the site such as salt marsh haying, recreational activity, etc. (See codes for pre and post data sheets.)

III. SITE SURVEY SUMMARY

All data recorded on the Field Survey Data sheet will be summarized on an OMWM Site Summary Sheet for evaluation in order to determine the best abatement procedure. If the site does not meet the criteria listed below, OMWM alternations will not be warranted.

A. Site must produce 2 or more broods per season.
B. Dominant species must be *Ochlerotatus sollicitans*, *Ochlerotatus cantator*, *Ochlerotatus taeniorhynchus* and/or other salt marsh or brackish water type species of nuisance or public health concern.
C. Vegetation must consist mainly of *Spartina patens* or *Spartina alterniflora* or types of similar vegetation that are irregularly flooded by rains, spring or storm tides.

D. Ground conditions must be firm enough to support equipment necessary to implement OMWM alternations. Other considerations may be necessary according to conditions of the site.

IV. SITE PLAN

Considering all data and pre-existing conditions alterations will be designed to meet OMWM objectives on all accepted sites.

A. Designed alterations will be flagged or staked on the marsh; color and placement indicated the type of alteration.
B. OMWM Design Map – A hand drawn scale map or transparent overlay will be attached to an aerial photograph or map indicating alterations. (See legend and key).
C. Dig safe will be notified to determine if there are any utilities or easements crossing the salt marsh.

V. OMWM ADVISORY COMMITTEE

A committee consisting of federal, state and local agencies established to review each OMWM site's data and site before any alterations are made. Once annually all data pertaining to OMWM sites will be submitted to the committee for review. Any updates/ revisions to this standard will be submitted to the committee for review.

i. PROCEDURE
    a. Submit site notification form including site pre-data summary and topographic map indicating location of site to Advisory Committee.
    b. Review site data, conditions and proposed work during annual Advisory Committee meeting.
    c. Map and design overlay available upon request and site visits will be arranged as necessary.

VI. ALTERATIONS:

There are eight types of alterations- Site preparation, Ponds, Reservoirs, Circuit Radials, Radials, Selective Ditches, Gutter Ditches and Sill Ditches.

All alterations will be implemented with suitable equipment, preferably low ground pressure (LGP). Standard equipment may be used if operated on mats or other suitable device designed to improve weight displacement. In any case, equipment operating directly on the marsh surface will not exceed an operating weight of three and a half pounds per square inch (3.5 P.S.I.). Alterations will make use of existing topography, such as; ponds, depressions, and excavations, such as; perimeter ditches and grid ditches, whenever possible. Spoil will be used to fill adjacent breeding depressions, plug unnecessary ditches or broadcast evenly over the marsh surface as thinly as possible. When alterations are in close proximity to the upland edge spoil will be moved to the upland and deposited off the marsh. When completed, alteration will be left open to tidal fluctuation for a period of one month or the next flooding tide to flush

the alterations of silt and sediment and promote higher levels of oxygen for predatory fish when system is closed.

1. SITE PREPARATION: It may be necessary to prep a site prior to implementing alterations.

    A. Access and Egress- Bordering vegetation may be cut at a minimum necessary to provide safe operation of equipment to and from the site. Using only existing materials earthen ramps may be constructed only as necessary to provide safe operation of equipment to and from site. Upon completion of work on site ramps will be re-graded to approximate original condition.

    B. Vegetation Management- Invasive stands of *Phragmites spp*. may be mowed or plowed for improved visibility, line site for laser level operation or safe operation of equipment. Also mowing may result in short term stress to *Phragmities spp.*, which is considered to be detrimental to a healthy salt marsh, in lieu of long-term gradual reduction that may occur as a result of completed OMWM alterations.

    C. Fill Removal- Fill material and debris may be excavated and removed from the site. The existing salt marsh grade adjacent to the fill area will be approximately replicated to promote restoration of a healthy marsh.

    D. Vegetation Removal- In the course of implementing OMWM designed alterations and at the discretion of the property owners, vegetation plugs may be removed from designed areas where ponds, pans or radials are to be excavated as directed by or under the supervision of District/ Project personnel and used for salt marsh restoration projects within a one hundred mile radius of the removal site. State, municipal and non-profit groups will have priority over private (for profit) companies. Private (for profit) companies may charge contracted parties reasonable labor cost for removal, transport and planting but may not charge for the plugs that are removed from OMWM sites.

2. PONDS:

    A. Ponds will have a three (3) feet deep area below marsh surface to provide adequate habitat for predatory fish during drought and graduate up to marsh grade promoting wading shore birds and waterfowl use.
    B. Ponds will be utilized on sites having depressions and will take the shape of existing vegetation outline and profile.
    C. Overflow ponds will be used to divert excess tidal water away from a plug during out going tide.

3. RESERVOIR:

    A. Reservoirs will be three (3) feet deep to eliminate mosquito breeding and provide adequate habitat for predatory fish during drought.
    B. A reservoir can be utilized in areas when there are no existing depressions on or in close proximity to the breeding marsh. Preferably adjacent to the upland edge and can be placed in a radial to enhance fish movement and survival.

4. CIRCUIT RADIAL:

    A. Circuit radials will be eighteen (18) inches deep, and can vary in width and be meandering or straight.
    B. Circuit radials will be utilized to connect three (3) or more ponds or reservoir around the extremity of a large breeding area.
    C. Additional radials can be connected to a circuit radial to provide access to the interior of the circuit for predatory fish.

5. RADIAL:

    A. Radial ditches will be eighteen (18) inches deep, and can vary in width. They should preferably be meandering but can be straight if there are constraints that limit a meandering ditch.
    B. Radials can be utilized to promote access and egress of predatory fish by connecting a pond or reservoir to another pond or reservoir. Connect a pond or reservoir to a breeding depression or connect a breeding depression to a circuit radial.

6. SELECTIVE DITCH:

    A. Selective ditches may vary in depth and width depending on the particular circumstances associated with a specific site. Most often and whenever possible existing ditches or creeks will be used and the depth and width will conform to approximate original dimensions not to exceed four (4) feet deep and six (6) feet wide.
    B. Selective ditches may be utilized to enhance tidal flow to an isolated breeding depression usually in close proximity to a tidal channel or where a selective ditch would require less of an alteration than a radial connecting to a closed system.
    C. Selective ditches may be utilized in areas where retention of surface water is impractical or undesirable, such as areas where a discharge or culvert from a roadside or other upland drainage system empties onto the marsh. Retention of surface water in such an area would reduce the efficiency of the upland drainage system.
    D. Selective ditches may be utilized to divert fresh water from an OMWM closed system in order to reduce encroachment of upland fresh water vegetation, in particular *Phragmites spp.*, which could cause habitat change and introduce upland species of mosquitoes to a closed system.

E. Selective ditches may be utilized to enhance or restore tidal ebb and flow to a tidal restricted salt marsh.

7. GUTTER DITCH:

A. Gutter ditches will be utilized to maintain diversity by diverting surface fresh water or sheet runoff away from an OMWM close system. This will retard the advancement of fresh water vegetation on to the salt marsh while preserving the integrity of the bordering fresh water wetlands. In this instance a gutter ditch will be implemented on the "Palustrine Estuarine Interface"*. It may vary in width and depth sufficient only to divert surface runoff (not ground water) depending on the particular circumstances associated with a specific site.

* The original permit was a result of working directly with numerous federal, state, local and private environmental agencies and groups over a three-year period. One of the major concerns of the U.S. Fish and Wildlife Service at that time was that in the process of implementing OMWM, fresh water wetlands bordering OMWM sites not be adversely impacted. The debate over the value of Phragmites was just beginning and there were two schools of thought. Some felt that Phragmites invasion on a salt marsh might be beneficial while others felt it would have an adverse impact.

As a compromise it was agreed that the term "Palustrine Estuarine Interface" would be used to describe and define this line of demarcation to be preserved. Since the time the original permit was issued attitudes about *Phragmites* have changed and while the debate over the value of *Phragmites* goes on it is now widely recognized that its invasion onto the salt marsh has a negative impact. For this reason a gutter ditch will not apply to monoculture Phragmites' stands.

8. SILL DITCH:

A. Sill ditches will be utilized to enhance tidal flow to a closed system in an area of low tide range.
B. Depth of the sill will be calculated by the height of the "mean high tide" in relationship to the marsh level of the target area. Sill ditches can vary in width and can be meandering or straight.

VII. AFTER ALTERATIONS FIELD SURVEY (Post)

To determine efficiency and effect of OMWM the procedure listed in Section II., FIELD SURVEY will be followed for the below listed criteria and recorded monthly during the 2-5 month period between May and September on an OMWM After Alteration Field Survey Data sheet for two (2) breeding seasons after the alterations are completed.

A. PHOTOGRAPHIC RECORDS
B. MOSQUITO LARVAE (Breeding levels and ID)
C. ADULT MOSQUITO (Light trap counts and ID)

D. WATER TEMPERATUER/ SALINITY AND DISSOLVED OXYGEN (where applicable)
E. FISH POPULATIONS
F. SHOREBIRD ACTIVITY
G. HUMAN ACTIVITY
H. SITE REVIEW (Existing conditions, corrections needed, system effectiveness)

VIII. AFTER ALTERATIONS SITE SURVEY SUMMARY

All data recorded on the After Alterations Field Survey Data sheet will be summarized on an After Alterations Site Summary sheet.

IX. EXAMPLE SHEETS AND CODES- Indexed in order of use

A. Index of codes for OMWM site Summary sheet
B. OMWM Field Survey Data sheet
C. OMWM Site survey Summary sheet
D. After Alterations Field Survey sheet
E. After Alterations site survey summary sheet
F. Alteration Dimensions and Profile

CODES FOR DATA SHEETS:

OWNERSHIP (of marsh)

(10)- Private, unspecified use
(11)- Private, agricultural (salt hay, grazing, etc.)
(12)- Private, conservation
(20)- Public, unspecified use
(21)- Public, agricultural (salt hay, grazing, etc.)
(22)- Public, conservation
(23)- public, wildlife refuge

LAND USE (Major land use along upland edge)

(1)- Business or industrial
(2)- Residential, developed
(3)- Residential, undeveloped
(4)- Agricultural
(5)- Transportation (docks, warehouses, etc.)
(6)- Conservation

MARSH TYPE

(1)- No ditches, natural marsh
(2)- Ditched, but poorly drained
(3)- Ditched and well drained

(An “R” is placed after the code number if the tidal flow on the marsh is restricted by culverts, stone piers, etc.)

VEGETATION TYPE (species that are most common on the site)

(1)- *Spartina patens*
(2)- *Spartina alterniflora*, short form

(3)- *Spartina alterniflora*, long form
(4)- Glasswort
(5)- 1 and 2
(6)- 1 and 3
(7)- 1, 2, and 3
(8)- 1 and 4
(9)- 1 and other plants (black grass, spike grass, sedges, etc.)
(10)- 1, 2 and other plants

The vegetation types listed here are the ones where mosquitoes generally breed. If you are sampling a marsh with a different combination of vegetation types than listed here record all appropriate code numbers.

GROUND CONDITIONS
(1)- Firm
(2)- Soft
(3)- Very soft

HABITAT (code has two symbols, combine Section I and II)

I. Section I.
1) Permanent ponds present (larger than ½ square yard)
2) Semi-permanent pond (water present 8 days after flooding)
3) All ponds temporary (dry out in less than 8 days)
4) 1 and 2
5) 1 and 3
6) 1, 2, and 3

II. Section II.
(A)- Cover more than 60% of site
(B)- Cover between 30% and 60% of site
(C)- Cover up to 30% of site

FRESHWATER MARSHES
(1)- No freshwater marshes (cattails or Phragmites)
(2)- Freshwater marshes extend less than ½ the length of the upland edge
(3) Freshwater marshes extend for more than ½ the length of the upland edge

UPLAND TYPE
(1)- Hilly (mostly rock)
(2)- Hilly (soil and glacial deposits)
(3)- River or coastal valley
(4)- Man-made (causeway, railroads, etc.)

OMWM FIELD SURVEY DATA SHEET

Site Name: _____ Date: _____

Observer: _____Date of Last Spring Tide: _____

High Tide today: _____ Low Tide today: _____

Rainfall during last week (in.) _____ Air Temperature: _____

Time Begin: _____ Time End: _____

STATIONS

	1	2	3	4	5	
DIPS	_____ _____ _____	_____ _____ _____	_____ _____ _____	_____ _____ _____	_____ _____ _____	
Mean per station						Mean of Total Dips _____
Adults Present (Yes or No)						
Water Temperature						
Salinity						
Dissolved Oxygen						
Fish Present						

Code for Fish presence: (A)bundant, (C)ommon, (O)ccasional, (N)one

Shorebirds within site: _____

Human activity within site: _____

COMMENTS:

OMWM FIELD SURVEY SUMMARY

Site Name: _____ Town: _____ County: _____

Ownership: _____Land Use: _____ Marsh Type:_____

Vegetation Type: _____Ground Condition: _____ Habitat:_____

Freshwater Marshes: _____ Upland Type: _____

DATE

# of Dips Taken						
Mean Larvae per dip						
Max. per dip						
Min. per dip						
Dominant Species						
Adults Present						
Days since last flooding						
Range of Water Temp. Stations Ditches Pools	_____ _____ _____	_____ _____ _____	_____ _____ _____	_____ _____ _____	_____ _____ _____	_____ _____ _____
Range of Salinity Stations Ditches Pools	_____ _____ _____	_____ _____ _____	_____ _____ _____	_____ _____ _____	_____ _____ _____	_____ _____ _____
Range of Dis. O_2 Stations Ditches Pools	_____ _____ _____	_____ _____ _____	_____ _____ _____	_____ _____ _____	_____ _____ _____	_____ _____ _____
Birds (+ or -)						
Fish (+ or -)						
Humans (+ or -)						

AFTER ALTERATIONS FIELD DATA SHEET

Site Name: _____ Date: _____

Observer: _____ Date of Last Spring Tide: _____

High Tide today: _____ Low Tide today: _____

Rainfall during last week (in.) _____ Air Temperature: _____

Time Begin: _____ Time End: _____

STATIONS

	1	2	3	4	5	
DIPS	_____ _____ _____	_____ _____ _____	_____ _____ _____	_____ _____ _____	_____ _____ _____	
Mean per station						Mean of Total Dips _____
Adults Present (Yes or No)						
Water Temperature						
Salinity						
Dissolved Oxygen						
Fish Present						

Code for Fish presence: (A)bundant, (C)ommon, (O)ccasional, (N)one

Shorebirds within site: _____

Human activity within site: _____

COMMENTS:

AFTER ALTERATIONS FIELD SURVEY SUMMARY

Site Name: _____ Town: _____ County: _____

Ownership: _____Land Use: _____ Marsh Type:_____

Vegetation Type: _____Ground Condition: _____ Habitat:_____

Freshwater Marshes: _____ Upland Type: _____

DATE

# of Dips Taken						
Mean Larvae per dip						
Max. per dip						
Min. per dip						
Dominant Species						
Adults Present						
Days since last flooding						
Range of Water Temp. Stations Ditches Pools	_____ _____ _____	_____ _____ _____	_____ _____ _____	_____ _____ _____	_____ _____ _____	_____ _____ _____
Range of Salinity Stations Ditches Pools	_____ _____ _____	_____ _____ _____	_____ _____ _____	_____ _____ _____	_____ _____ _____	_____ _____ _____
Range of Dis. O_2 Stations Ditches Pools	_____ _____ _____	_____ _____ _____	_____ _____ _____	_____ _____ _____	_____ _____ _____	_____ _____ _____
Birds (+ or -)						
Fish (+ or -)						
Humans (+ or -)						

LEGEND = SITE MAP

S	Spoil Island
+I+	Isolated Island
AS	Add on Island
MD	Main Ditch
PD	Perimeter Ditch
	Open Water, Depression
	Upland Edge
CT	Cattail
Phrag	Phragmites
MS	Marsh Grasses (Spartina alterniflora, Spartina patens, Glasswort, Lavender, Sedges, Black grass, Spike grass etc.)
ME	Marsh Elder

LEGEND = OMWM DESIGN OVERLAY

1	Dip Station
____	Three (3) feet deep
------	Six to Eighteen inches deep
= = =	Sill Ditch
[ ]	Plug
P	Pond
R	Reservoir
CR	Circuit Radial
RA	Radial
SD	Selective Ditch
GD	Gutter Ditch
RC	Re-Cut
RP	Restoration Plug
SL	Spoil Location
STP	Spoil to Plug
PS	Plug Spoil
OP	Overflow Pond

PROCEDURE FOR CALCULATING TIME-MORTALITY CURVES BY THE BOTTLE BIOASSAY

James Dukes, Mike Greer and Jack Petersen

Getting Started:

1. Start with clean, dry bottles. If possible, heat bottles to 350 degrees F in an oven for 15-20 min. before use. Allow the bottles to return to room temperature.
2. Prepare the stock solutions. If stock solutions are already made and have been refrigerated, make sure you allow enough time for them to come to room temperature before use.
3. Formulations of insecticides are given as appendices in another part of this procedural guide. Once the stock solution is prepared, it can be stored in the refrigerator in light-proof bottles until needed.
4. Mark your bottles. Make sure you mark the cap as well so you can keep individual bottles and their caps together. This is important because you will be coating the entire bottle, including the inside of the cap. To ensure the bottle has the proper dosage you must keep the cap with its respective bottle.

Preparing the Bottle:

1. Pipette into the bottle 1 ml of A.C.S. acetone plus the active ingredient (A.I.) to be tested. The precise amount of A. I. to be added to each bottle depends on the chemical. See Table 1.
2. Also prepare one or more control bottles that contain 1 ml of acetone, but no active ingredient. These bottles are an important test of proper preparation.
3. Make sure the bottle cap is secure so that no acetone evaporates until you are ready for it to do so.
4. Swirl the bottle gently so that the acetone evenly coats the bottom.
5. Continue turning the bottle while inclining the bottle so that the sides are evenly coated. Do this slowly and carefully, looking for streaks. The interior of the bottle must be evenly coated.
6. Incline the bottle so that the acetone puddles in the “shoulder.” Rotate the bottle several times to distribute the acetone evenly.
7. Turn the bottle completely up side down. Did any acetone escape? If it did, reject that bottle and start over again with another bottle.
8. Coat the inside of the cap.
9. Turn the bottle on its side and lay it on a flat surface.
10. Gently vent the bottle by unscrewing the cap. You should hear an audible “pssst!”
11. Now roll the bottle to keep the insecticide evenly distributed on the walls while the acetone evaporates.
12. Follow this procedure with all the bottles until no liquid acetone is visible.
13. Allow the bottles to dry with lids off for at least two (2) hours before proceeding. Store the bottles in a dark, cool, dry place

The Bioassay:

1. Aspirate 10-15 mosquitoes into each bottle. Use a number you can easily count with accuracy as the mosquitoes fly about. It works best to collect all of the mosquitoes for one bottle in a mouth aspirator and introduce them all at once with a gentle puff of air. Try to avoid adding excessive moisture from your breath. A mechanical aspirator works best.
2. Examine the bottle to be sure all mosquitoes survived the transfer process. If you find any dead mosquitoes, record the number. You will need to substract this number from each timed reading.
3. Start a timer and record every 15 minutes how many mosquitoes are dead or alive (whichever is easier to count). Continue until all mosquitoes are dead. In some cases, when mosquitoes are resistant to the pesticide, it may be necessary to set an arbitrary maximum time limit such as five hours.
4. Record your counts on the data sheet that accompanies this procedure.
5. Continue until all mosquitoes are dead or a pre-determined time has expired.
6. Count the total number of mosquitoes in each bottle and calculate the percent mortality for each 15 minute interval.
7. Plot the percent mortality (y axis) against time (x axis) using a logarithmic scale for the percent mortality.
8. Compare the test mosquitoes with baseline date established for susceptible mosquitoes of the same species.

Clean up:

1. When you are finished with your bottles or the pesticide is too degraded to use any longer, triple rinse them with acetone, wash them with warm soapy water and rinse. Place them in an oven to thoroughly dry before using them again.
2. If you are uncertain whether the bottles are completely clean, introduce some susceptible mosquitoes into the bottles after you dry them. The mosquitoes should not die in three hours or less. If they do, clean the bottles again.

Table 1. Recommended bottle dosages.

Active Ingredient	**Final concentration/bottle**
Malathion	474 µg/bottle
Naled	25 µg/bottle
Permethrin	43 µg/bottle
Resmethrin	30 µg/bottle
d-Phenothrin	22 µg/bottle
DEF	125 µg/bottle
TPP	125 µg/bottle
PBO	400 µg/bottle

drjack3@hotmail.com
http://www.pherec.org/

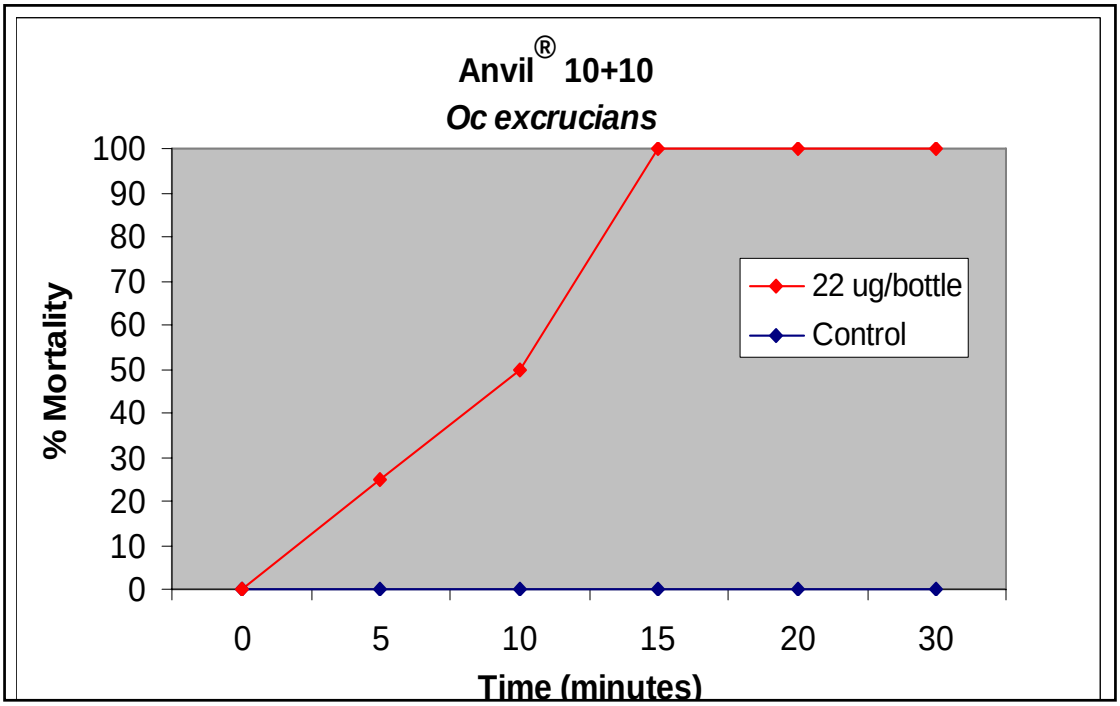
DILUTION of ANVIL 10+10® for the BOTTLE BIOASSAY

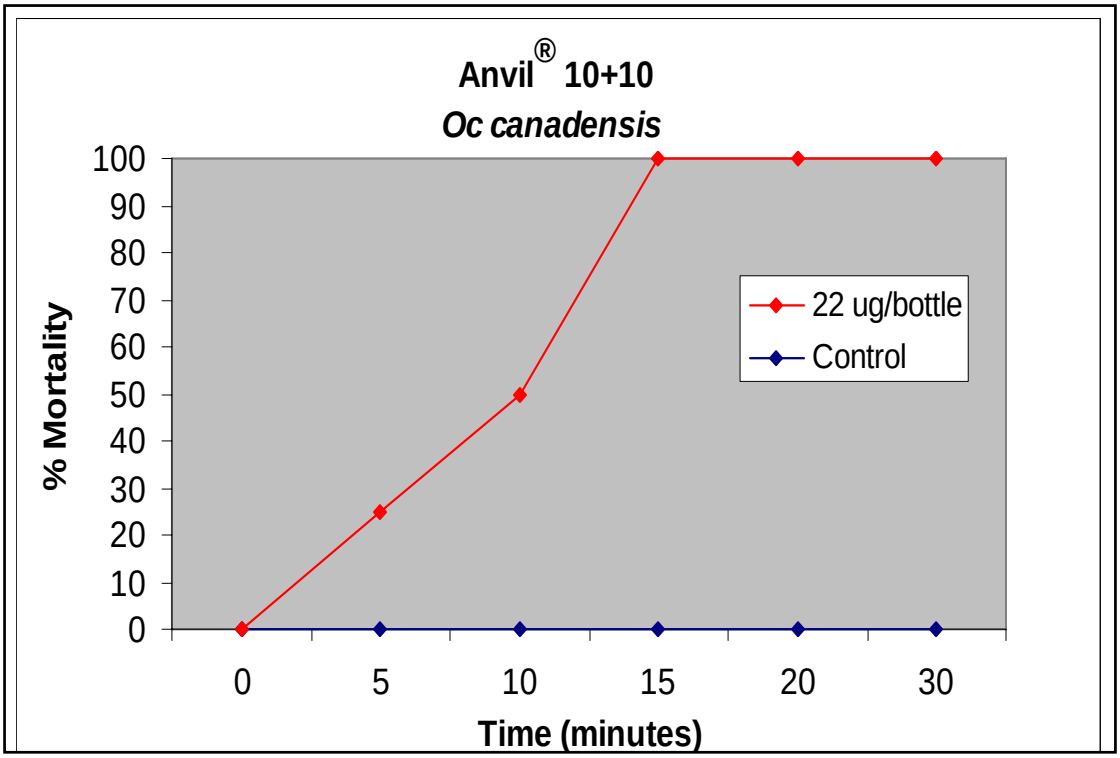
PHEREC Technical Memorandum # 1

During September 2001, three Florida Mosquito Control Programs requested assistance in evaluating ANVIL 10+10® as a mosquito adulticide. Workshops were conducted focusing on carrying out serial dilutions of ANVIL 10+10® to determine the diagnostic concentration to be applied to the interior surface of each 250 ml Wheaton bottle following the CDC protocol as modified by Dukes and Greer that is posted to the PHEREC Web site http://pherec.org/bottleassay/bottlebioassay.html
This brief technical memorandum reports the results of those workshops.

OBJECTIVE: Determine the diagnostic dose of ANVIL 10+10® for the bottle bioassay.

1. **START with the LABEL.** ANVIL 10+10® contains 0.74 pounds of Technical SUMITHRIN® per gallon.
2. 0.74 lbs/gal. X 1 gal./3.785 liters X 453.6 grams/ 1 lb = 88.68 grams/liter
3. 88.68 grams/liter X 1 liter/1000 ml = 0.08868 grams/ml.
4. There are 0.08868 grams of SUMITHRIN® in each ml of ANVIL 10+10® from the tank.
5. Convert grams to milligrams. 0.08868 g/ml X 1000 mg/gram = 88.68 mg/ml
6. PREPARE the STOCK solution by pipetting 1 ml of ANVIL 10+10® into a 100 ml volumetric flask and filling to the 100 ml mark with A.C.S. acetone.
7. The STOCK solution contains 0.8868 mg SUMITHRIN®/ 1 ml.
8. Convert milligrams to micrograms. 0.8868 mg/ml X 1000 ug/1 mg = 886.8 ug/ml
9. We used 1 ml, 2.5 ml, 5 ml and 10 ml of the STOCK solution to prepare TEST solutions.
10. TEST solutions were prepared by pipetting the STOCK solution into a volumetric flask and filling to the 100 ml mark.
11. One ml of TEST solution was pipetted into each Wheaton bottle for the bottle bioassay.


Anvil® 10+10
Oc excrucians
% Mortality
100
90
80
70
60
50
40
30
20
10
0
0
5
10
15
20
30
Time (minutes)
22 ug/bottle
Control


Anvil® 10+10
Oc canadensis
% Mortality
100
90
80
70
60
50
40
30
20
10
0
0
5
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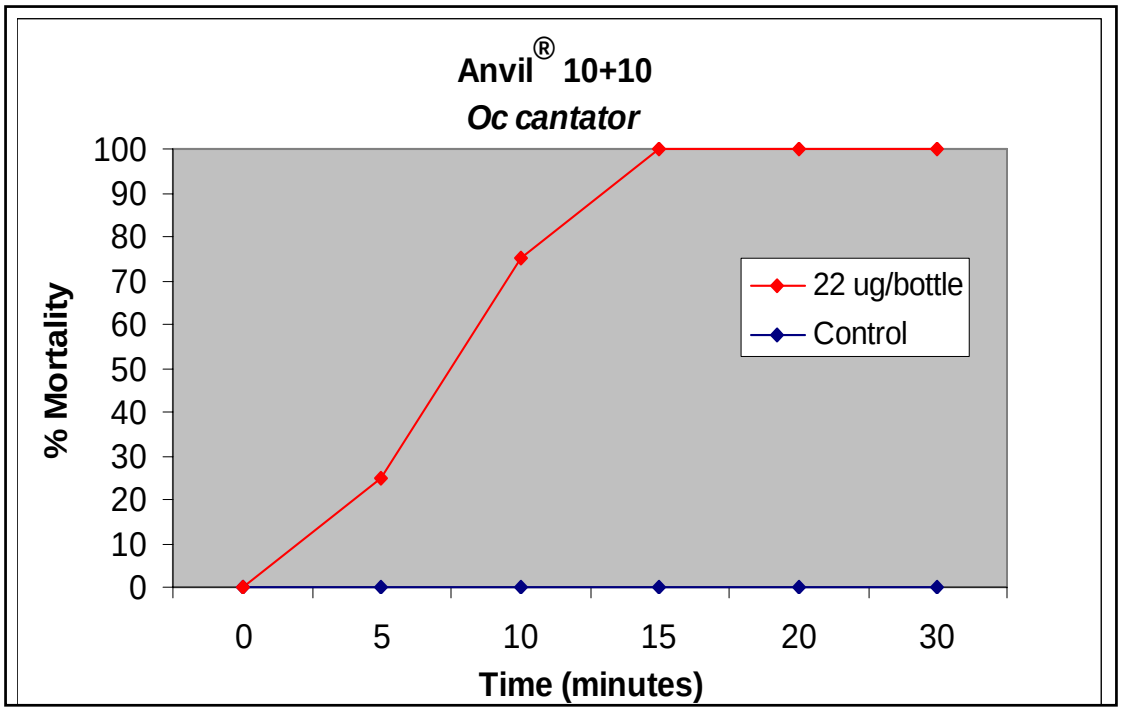
15
20
30
Time (minutes)
22 ug/bottle
Control


Anvil® 10+10
Oc cantator
% Mortality
100
90
80
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60
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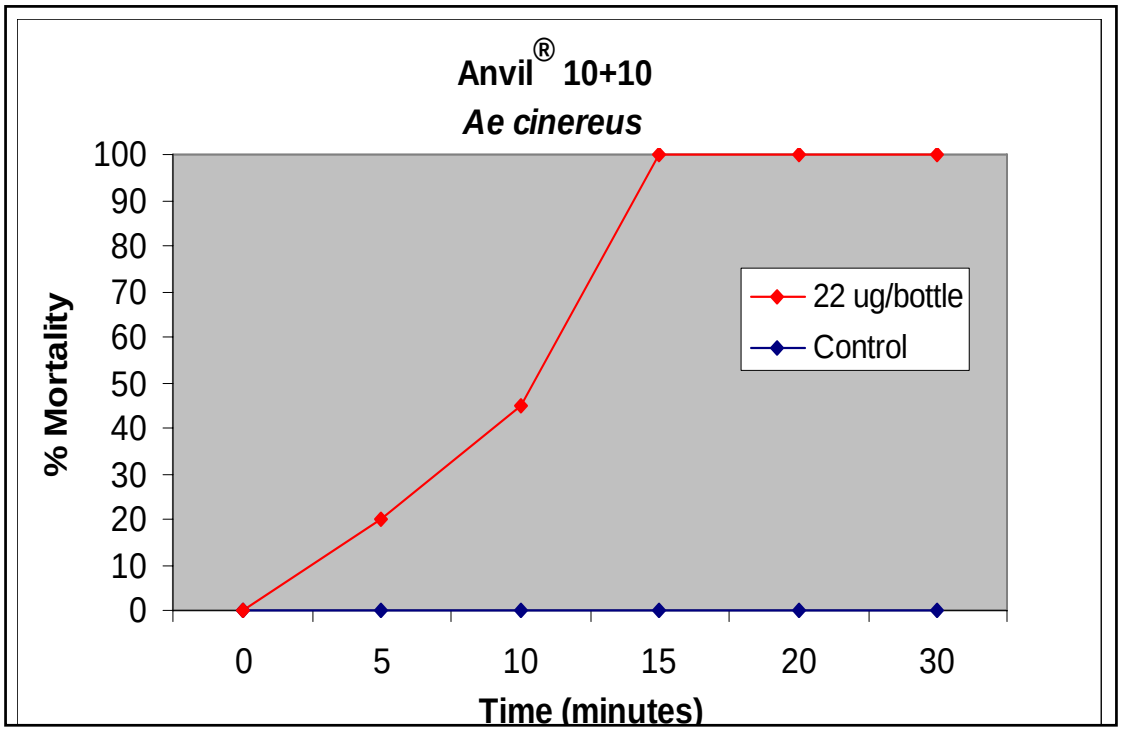
40
30
20
10
0
0
5
10
15
20
30
Time (minutes)
22 ug/bottle
Control


Anvil® 10+10
Ae cinereus
% Mortality
100
90
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30
20
10
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0
5
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15
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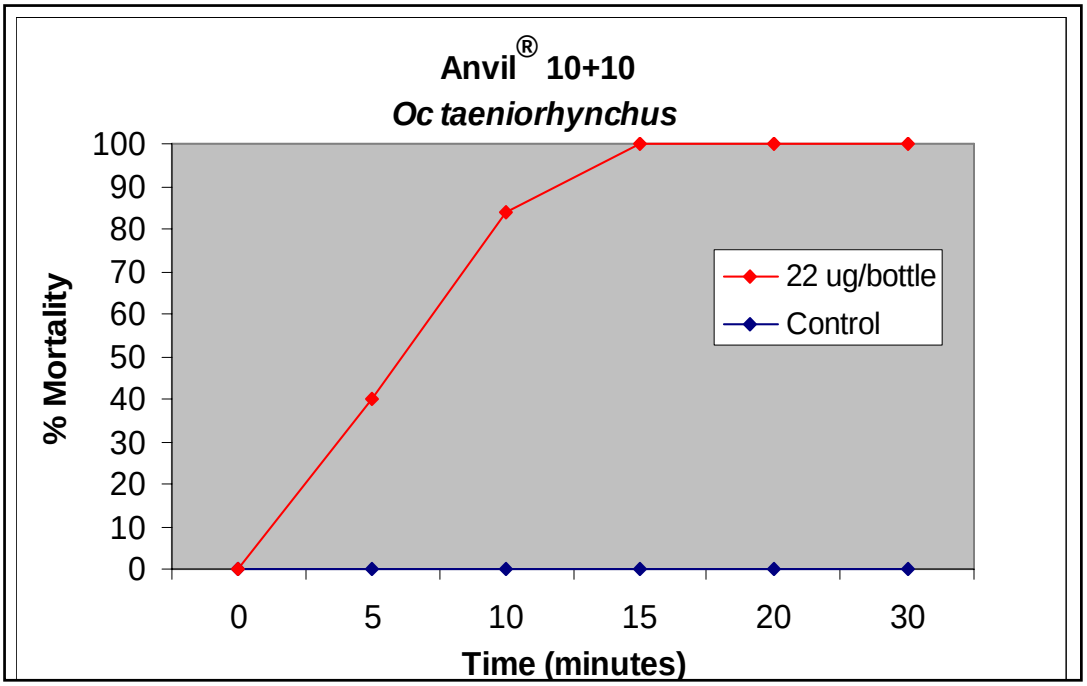
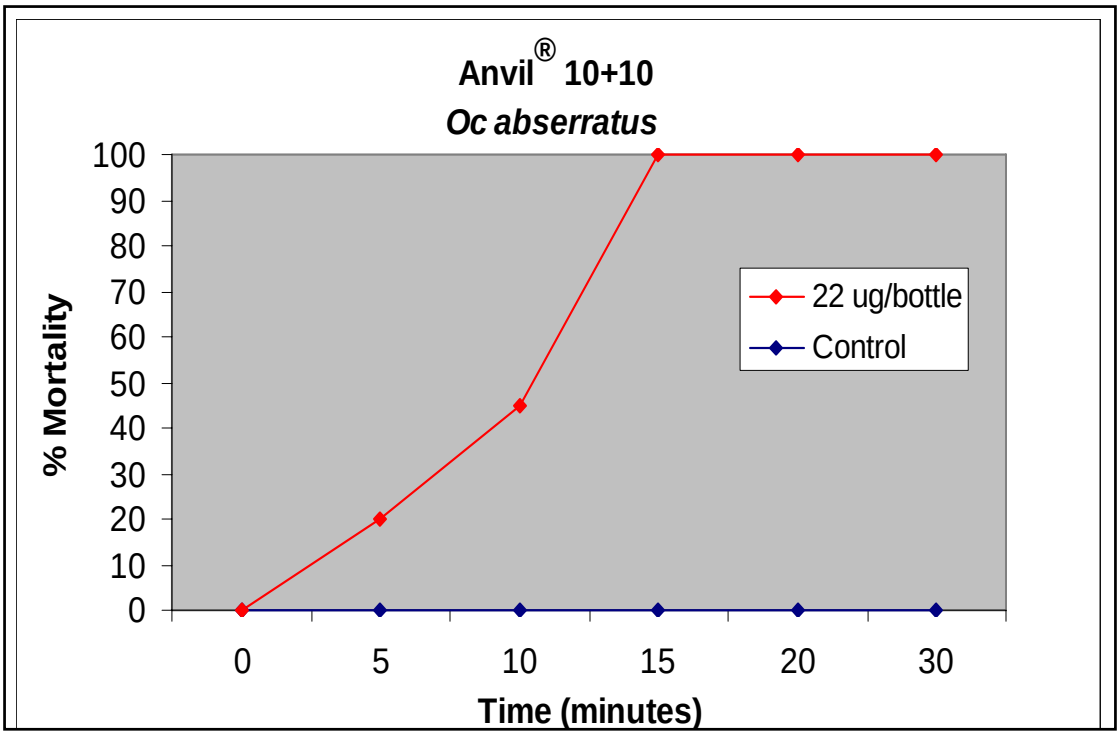
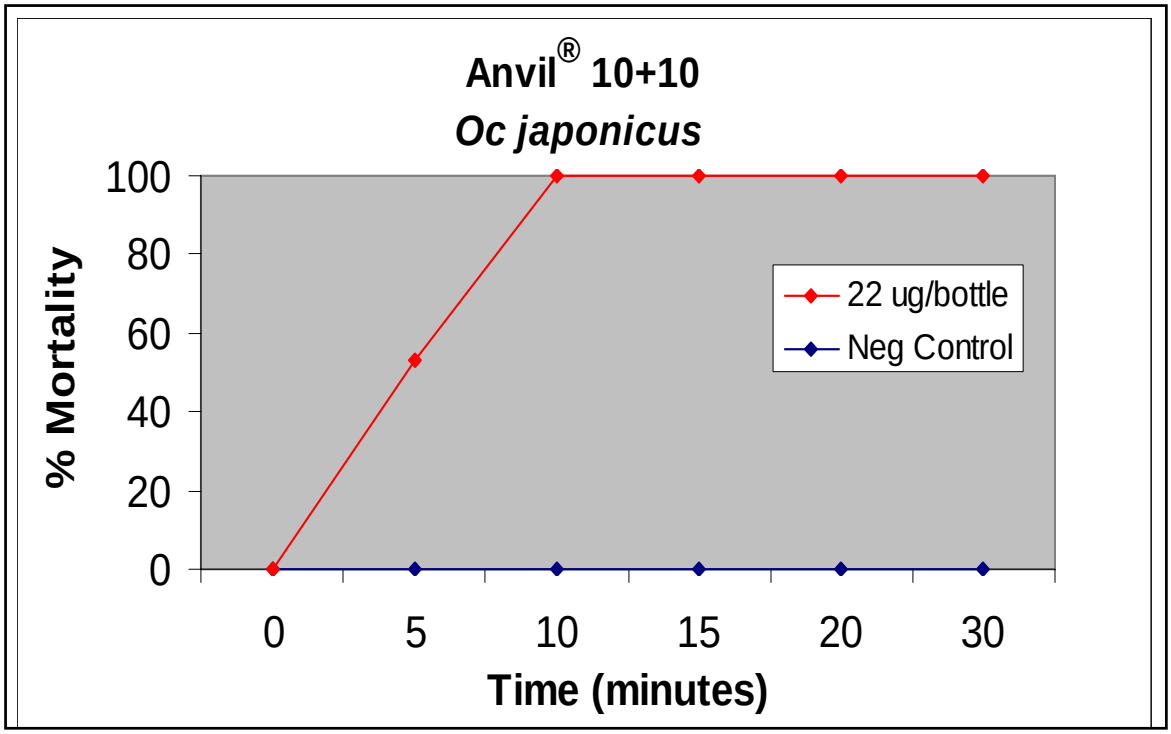
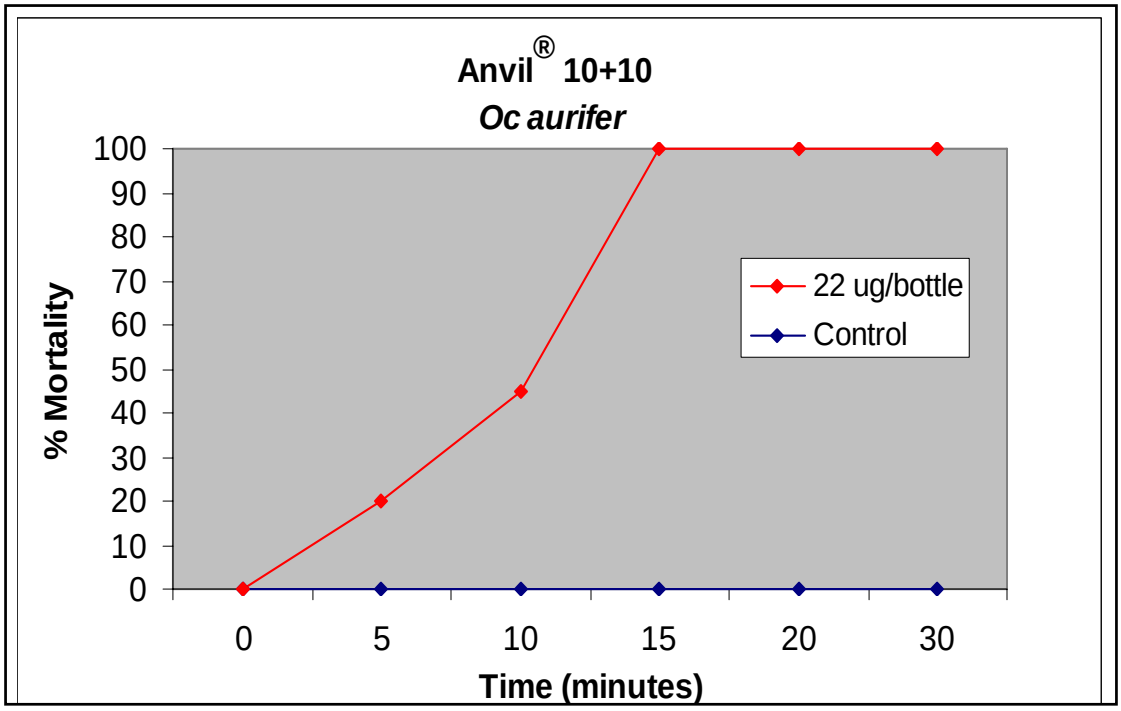
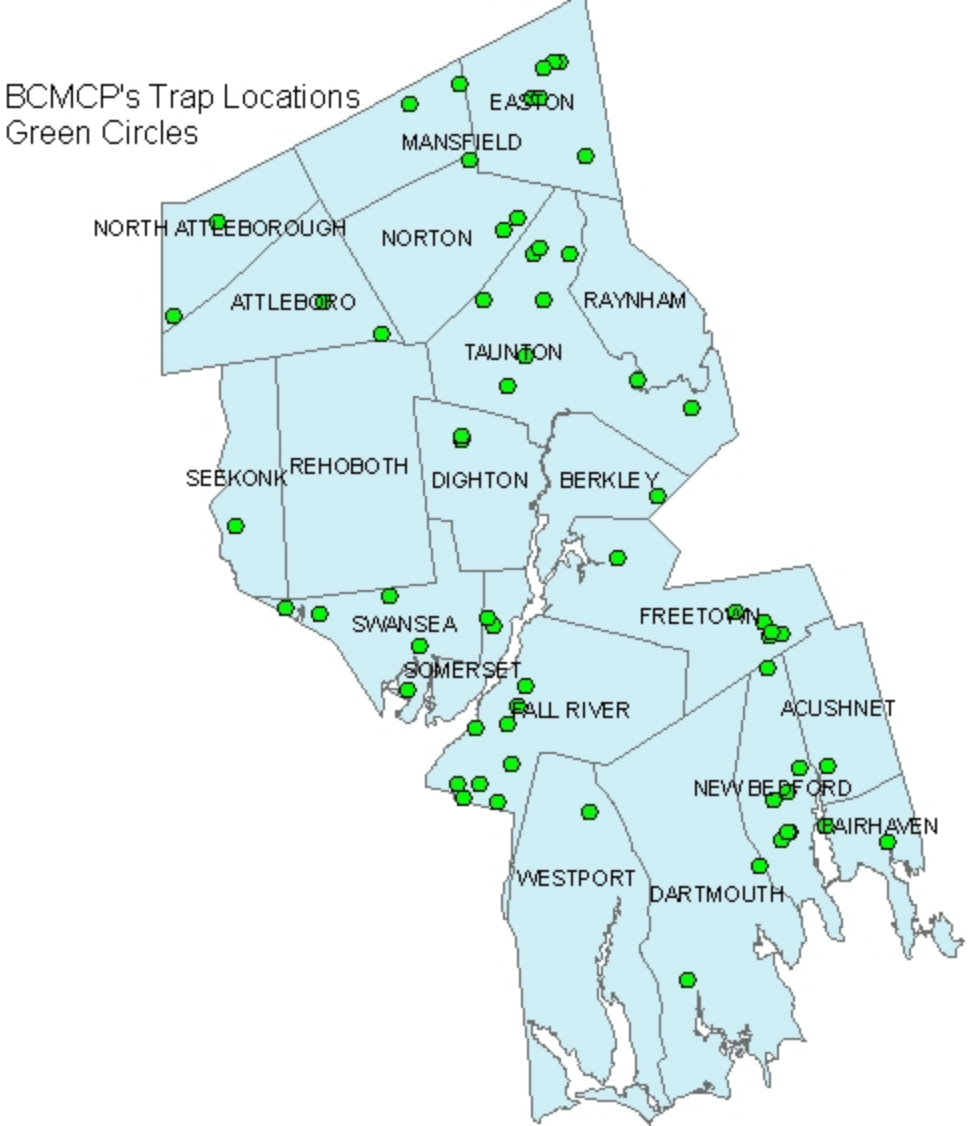
30
Time (minutes)
22 ug/bottle
Control


Anvil® 10+10
Oc taeniorhynchus
% Mortality
100
90
80
70
60
50
40
30
20
10
0
0
5
10
15
20
30
Time (minutes)
22 ug/bottle
Control

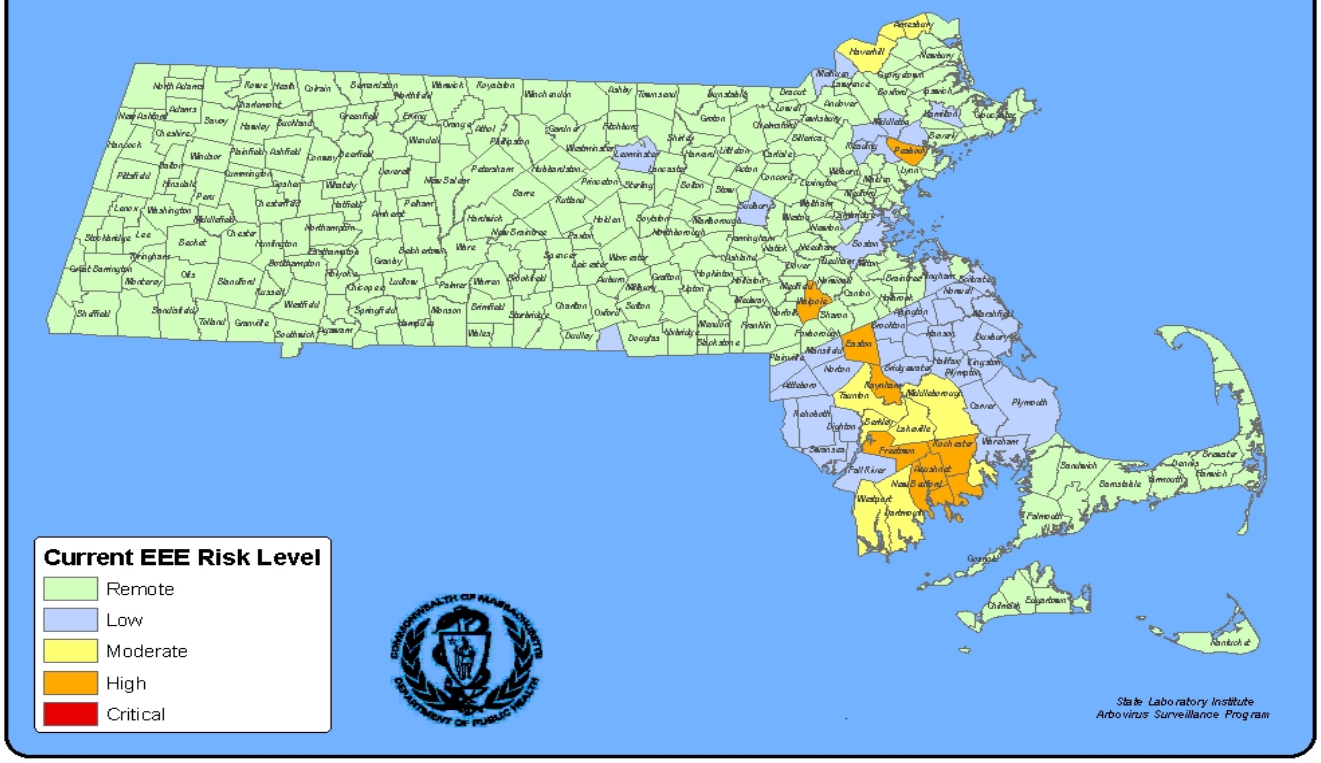

Anvil® 10+10
Oc abserratus
% Mortality
100
90
80
70
60
50
40
30
20
10
0
0
5
10
15
20
30
Time (minutes)
22 ug/bottle
Control


Anvil® 10+10
Oc japonicus
% Mortality
100
80
60
40
20
0
0
5
10
15
20
30
Time (minutes)
22 ug/bottle
Neg Control

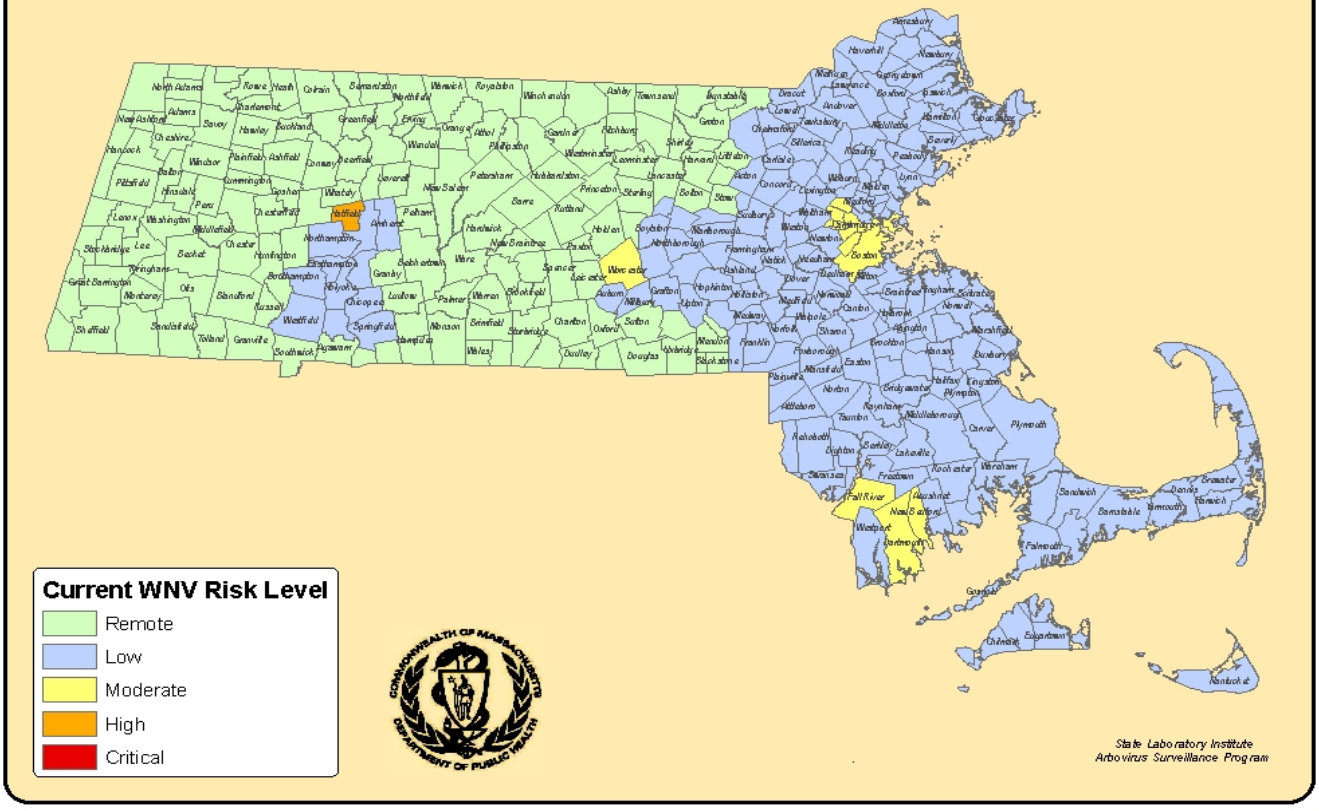

Anvil® 10+10
Oc aurifer
% Mortality
100
90
80
70
60
50
40
30
20
10
0
0
5
10
15
20
30
Time (minutes)
22 ug/bottle
Control


BCMCP's Trap Locations
Green Circles
EASTON
MANSFIELD
NORTH ATTLEBOROUGH
NORTON
ATTLEBORO
RAYNHAM
TAUNTON
SEEKONK
REHOBOTH
DIGHTON
BERKLEY
SWANSEA
FREETOWN
SOMERSET
FALL RIVER
ACUSHNET
NEW BEDFORD
FAIRHAVEN
WESTPORT
DARTMOUTH

Massachusetts EEE Risk Categories



Massachusetts WNV Risk Categories



Bristol County Mosquito Control
2009 Season Review – For Immediate Release

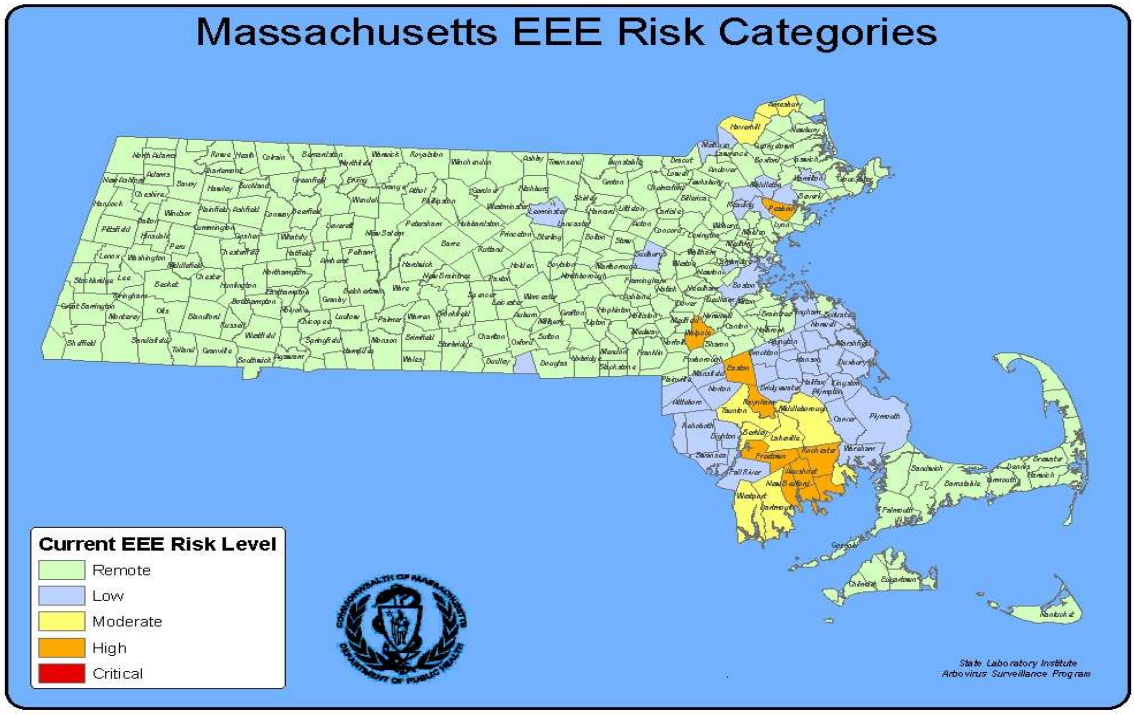
The Asian tiger mosquito (*Aedes albopictus*) was collected in New Bedford on three separate dates in 2009. The Asian Tiger Mosquito is an invasive day-biting species with significant disease transmission implications.

Bristol County accounted for 63% of the EEE isolations and 75% of the WNV isolations collected from Southeastern Massachusetts.

Bristol County had 411.2 square miles (263,168 acres) in Mod/High risk for EEE and WNV in 2009. There was a total of 32 isolates from BCMC.

EEE was present for 12 epidemiological weeks in 2009 (July 16 – October 5).

In 2002 there were 3,672 spray requests in 2009 there were 15,964 spray requests.



Bristol County Mosquito Control, 140 North Walker Street, Taunton, MA 02780
508-823-5253

Bristol County Mosquito Control, Massachusetts

Total Square miles: 695.
Total Cost/Square Mile: $1,590.00.
Total Wetlands: 85,000 acres, numerous urban centers, fresh water, salt marsh, Atlantic White Cedar Bogs and other types.
Levels WNV/EEE: Critical/High Levels of West Nile Virus/Eastern Equine Encephalitis (2005-2009) throughout the entire County.

Problem/Source Determination Costs:

Cost associated with monitoring, location of breeding sites, mapping, etc
$79,539

Cost of surveillance - larval & adult
$95,496

Cost of Disease surveillance
$58,234

Cost associated with water management - elimination of standing water
$78,456

Cost associated with vegetation/land management - dredging, etc
$71,234

Cost of ULV – Adulticiding
$213,456

Cost of Larval Control Operations
$234,223

Cost associated with public notifications/public outreach
$34,567

Cost associated with email notification updates
$8,790

ULV sprayers, vehicles
$89,567

Licensing, training, etc.
$7,234

There are many other costs that are not reported above which are associated with our operations.
$134,000

Total Budget
$1,104,796

Prepared by: Wayne N. Andrews, M.S. brismosqwa@comcast.net

Determining the susceptibility of *Culiseta melanura* to *Bacillus sphaericus* (Serotype H5a5b Strain 2362) in a laboratory bioassay

Wayne Andrews and Priscilla Matton

Bristol County Mosquito Control Project, Taunton, Massachusetts 02780

Introduction

There is a close association between Eastern Equine Encephalitis virus and cedar swamps, in particular white cedar swamps along the East coast of the United States. The main reason for this association is the mosquito *Culiseta melanura*, principal enzootic vector of EEEv, utilizes these cedar swamps for their larval habitat. Larvae tend to favor crypts under mature cedar trees where the pH is 5.0 or lower. The adaptation to living in this environment provides protection from pathogens and predators. In many regions, cedar wetlands are refugia for species that are rare, endangered, or threatened locally or nationally (Laderman 1989). The need for biorational mosquito control products for use in these environmentally sensitive areas is important.

Figure 1. Distribution of *Chamaecyparis thyoides*. Records were compiled from field observations, herbarium records, published sources, and personal communications. Counties in which Atlantic white cedar has been found are inked in black (from Laderman 1982).

Purpose

A series of experiments were conducted to determine if *Cs. melanura* 4th instar larvae are susceptible to the bacteria *Bacillus sphaericus* and at what concentration.

Materials and methods

Culiseta melanura Susceptibility Test Protocol

Test System:

Bioassay will be carried out in standard bioassay cups (120 ml plastic). Each cup will first be filled with 80 ml of field collected crypt water (pH 4.3). Twenty 3rd instar or early 4th instar *Cs. melanura* in de-ionized distilled water (no more than 5 ml) will be added to each cup. One drop of larval food (2 g of mortar and pestle ground TetraMin® fish food in 20 ml distilled water) will also be added to each cup.

Appropriate quantities of the serial dilutions of test material will be added to produce the desired concentrations. De-ionized, distilled water will then be added to produce a final volume of 100 ml per cup. All concentrations tested in the final bioassays, including the untreated controls, will be replicated three times.

Test Material:

VectoLex® WDG – 650 *B. sphaericus* ITU Water Dispersible Granule will be used in performance of the bioassays.

Test Concentrations:

Test concentrations should be selected following a non-replicated, range finding assay using the following concentrations of test material: 0.25 ppm, 0.2 ppm, 0.15 ppm, 0.1 ppm, 0.05 ppm, 0.025 ppm, and 0.00 ppm (UTC). Results of this assay will be used to select a range of five concentrations for the final assays with the objective of having the LC_{50} and LC_{90} fall within the selected range.

Materials and methods (cont.)

Range-finding Stock Suspensions and Dilutions:

Initial suspension (1%) will be prepared by adding 1 g of test material to 99 ml of de-ionized, distilled water and vigorously shaking the suspension in a flask for 1 minute. Gentle agitation using a magnetic stirrer will be maintained to keep this and subsequent dilutions in suspension. A second serial dilution will be made by adding 1 ml of the first suspension to 99 ml of de-ionized, distilled water under moderate agitation to produce a concentration of 100 ppm (mg/L). A final range-finding stock suspension with a concentration of 2.5 ppm will be produced by adding 1 ml of the second dilution to 39 ml of deionized, distilled water and maintaining under similar agitation.

Sample Weight 1 Gram	GMS or ml	INTO	FINAL CONC.
FIRST DILUTION (1:99)	1	100 ml	10000 mg/L
SECOND DILUTION (1:99)	1	100 ml	100 mg/L
STOCK CONC. (1:39)	**1**	**40 ml**	**2.5 mg/L**

Preparation of Range-finding Dilutions:

A single, non-replicated set of cups containing the range-finding concentrations will be prepared as described above under "Test System". Concentrations to be used are shown below.

TOTAL VOLUME	100 ml
HIGHEST CONC.	0.25 mg/L
MAX. STOCK APPLIED	10 ml
STOCK CONC.	2.5 mg/L

CONC. mg/L	mg/CUP	STOCK APPLIED
0.250	0.0250	10.0 ml
0.200	0.0200	8.0 ml
0.150	0.0150	6.0 ml
0.100	0.0100	4.0 ml
0.050	0.0050	2.0 ml
0.025	0.0025	1.0 ml
0	0	0.0

Bioassay Conditions:

Treated cups with larvae will be held in low-light conditions at 15 to 20°C between treatment and taking mortality readings.

Mortality Readings:

Mortality of larvae will be read at 24, 48, 96, 144 and 192 hours after treatment. Moribund larvae that do not surface to breathe or elicit an evasive response when probed will be counted as dead. Both live and dead larvae will be counted and recorded, but only live larvae will be considered in calculations, to avoid errors due to potential larval cannibalism.

Selection of Final Concentrations:

Range-finding bioassay results will be plotted in order to estimate in which range the LC_{50} and LC_{90} will be found. It may be necessary to repeat the range-finding assay before selecting the final concentrations.

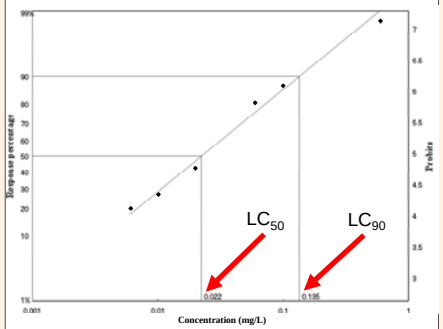
Final Bioassays:

Final bioassays will be carried out similarly to the range-finding assays replicating each treatment three times simultaneously. It will be important to attempt to complete final bioassays with larvae of approximately the same age/instar as the range-finding assays.

Data Analysis:

Mean percent mortality will be calculated for each concentration tested, and data will be subject to log/dose/probit analysis to estimate LC_{50} and LC_{90} values and associated 95% confidence intervals for the materials tested.

Results



DATA

NUMBER	TREATED	CONC. * 1000	% OBSERVED RESPONSE	% LINEAR RESPONSE	LOG (Con.* 1000)	LINEAR PROBITS
1	60	6	20.00	17.48	0.78	4.064
2	60	10	26.67	28.38	1.00	4.428
3	60	20	41.67	46.89	1.30	4.922
4	60	60	80.00	75.95	1.78	5.705
5	60	100	86.67	85.73	2.00	6.068
6	60	600	98.33	99.05	2.78	7.345

STATISTICS

Slope	1.64	+/-	0.162
Chi	1.934	tabulated	9.5
p	0.748		
h	0.483		
g	0.038		
Cycles	5		
r	0.995	tabulated	0.811

LETHAL CONCENTRATION (95 % CI)

LC	CONC. (mg/L)	LOWER LIMIT (mg/L)	UPPER LIMIT (mg/L)
25	0.009	0.006	0.011
50	0.022	0.018	0.028
75	0.058	0.045	0.079
90	0.135	0.096	0.217
95	0.225	0.149	0.404
99	0.585	0.336	1.303

Conclusions

Culiseta melanura 4th instar larvae are susceptible to the biorational *Bacillus sphaericus* (Serotype H5a5b Strain 2362). We screened field collected 4th instar *Cs. melanura* from 0.6 mg/L to 0.006 mg/L. We found that this mosquito has a LD_{50} of 0.022 mg/L and a LD_{90} of 0.135 mg/L. Mortality could not be determined until day 7 at an average temperature of 16.2°C. These concentrations are 10 to 100 times lower when compared to application rates for control of *Culex pipiens*, and well within the recommended application rates.

Performing the laboratory experiment with field collected crypt water provided additional information. The pH of 4.3 did not adversely effect the efficacy of VectoLex® WDG.

To date, there are only a few successful products shown to control *Cs. melanura* in field studies. Methoprene (2 lbs/acre) (Woodrow et al. 1995), granular heptachlor (1 lb/acre), and granular dieldrin (1 lb/acre) (Hayes 1962) were effective in controlling the larvae. Wettable DDT dust was unsuccessful as a winter prehatch control measure at a rate of 1 to 2 lbs/acre (Hayes 1962).

Future field studies would include placing quantified amounts of *B. sphaericus* in *Cs. melanura* crypts. The deposition and diffusion of the larvicide into the larval crypts would be measured. The bioassay technique employed in this study could be used to determine developing resistance of *B. sphaericus* in other mosquito species, such as *Cx. pipiens* and *Cx. tarsalis*.

Literature cited

Hayes, R.O. 1962. Studies of the control of larvae of *Culiseta melanura* (Coquillett). Mosq. News 22:137-141.

Laderman, A.D. 1982. Comparative community structure of *Chamaecyparis thyoides* bog forests: canopy diversity. Wetlands 2:216-230.

Laderman, A.D. 1989. The ecology of Atlantic White cedar wetlands: a community profile. U.S. Fish Wildl. Serv. Biol. Rep. 85(7.21).

Woodrow, R.J., J.J. Howard, D.J. White. 1995. Field trials with methoprene, temephos, and *Bacillus thuringiensis* serovar *israelensis* for the control of larval *Culiseta melanura*. J. Am. Mosq. Control Assoc. 11(4):424-427.

Acknowledgments

We would like to thank Peter DeChant,Valent BioSciences Corporation for protocol development and preparation of sample material, John Smith, Norfolk County Mosquito Control Project for assistance in the collection of *Cs. melanura*.

For further information

Please contact *brismosqwa@comcast.net* More information on this and related projects can be obtained at *www.nmca.org/AMCA09poster.pdf*

Bristol County Mosquito Control

FY 2009 MONTHLY EXPENSE REPORT

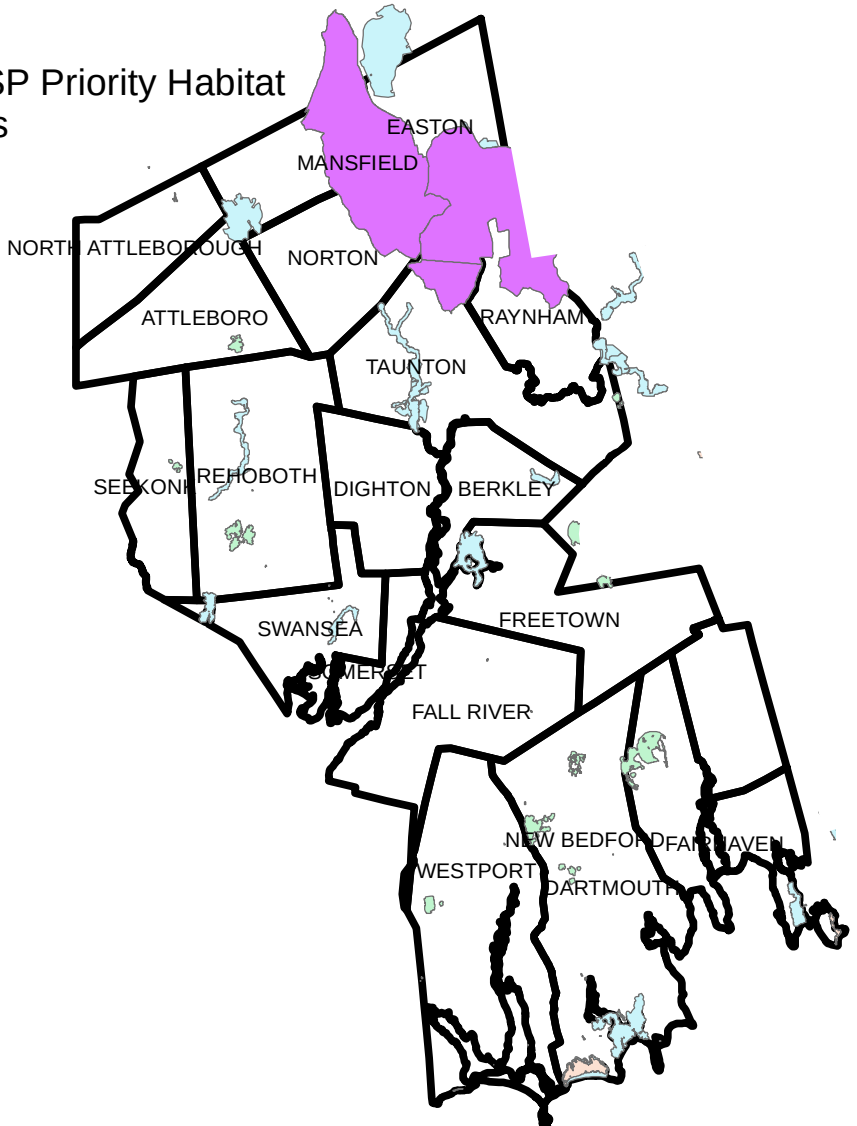
FY 2009		
	FY2009 BUDGET	1,116,868.04
	CARRYOVER	595,151.66
	TOTAL BUDGET	1,712,019.70

	APPROP.	JULY	AUG	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APRIL	MAY	JUNE		YTD TOTAL
SUB AA															
PAYROLL		32,123.67	74,808.24	38,449.91	36,092.16	34,373.63	34,326.17	51,711.43	34,573.98	35,104.65	36,869.72	37,649.53	57,616.40		503,699.49
SUB BB															
EXPENSES, TRAVEL		173.46	79.98	492.94	108.40	115.54	272.01	152.03	194.47	146.80		178.97	228.64		2,143.24
SUB AMTS															
COMMISSIONERS				1,500.00			1,300.00			1,200.00			1,200.00		5,200.00
SUB DD															
RET.; INS.; TAXES		110,651.75	4,855.39	6,972.27	10,011.40	6,575.49	6,317.15	6,319.45	6,539.90	6,386.31	18,709.42	6,661.65	6,513.49		196,513.67
SUB EE															
OFFICE EXPENSES		638.84	17.65	240.87	1,828.08	52.29	21,057.36	102.70	842.92	263.60	509.99	440.24	892.95		26,887.49
SUB FF															
VEHICLE MAINT-REPAIR		559.60	449.39	651.92	567.78	524.23	334.11	398.78	1,481.37	379.63	1,126.62	1,609.27	12,369.52		20,452.22
SUB GG															
RENT; FUEL; UTILITIES		7,281.29	7,494.29	7,246.98	5,085.60	3,813.04	4,562.55	4,198.83	5,094.64	4,693.77	5,465.34	4,263.55	5,564.43		64,764.31
SUB HH															
CONSULTANT SERV.															-
SUB JJ															
OPERATIONAL SERV.		450.00	225.00									698.25	2,953.23		4,326.48
SUB KK															
EQUIPMENT							38,655.00								38,655.00
SUB LL															
LEASE-PURCHASE			542.03	2,254.38	120.47	66.31	76.39	76.62	1,082.05	154.57	143.81	3,537.38	10,077.21		18,131.22
SUB NN															
INSECTICIDES												26,830.54	1,626.07		28,456.61
FACILITY-MAINT & REPAIR		719.74	110.55	198.47	2,378.17	1,354.89	511.20	1,825.26	215.94	40.47	897.48	77,149.71	7,334.53		92,736.41
SUB UU															
INFORMATION TECH		1,104.77	11,206.69	16,065.48	5,955.30	6,849.85	5,186.81	2,601.42	3,968.53	862.97	932.89	1,929.88	5,187.89		61,852.48
		153,703.12	99,789.21	74,073.22	62,147.36	53,725.27	112,598.75	67,386.52	53,993.80	49,232.77	64,655.27	160,948.97	111,564.36	-	1,063,818.62

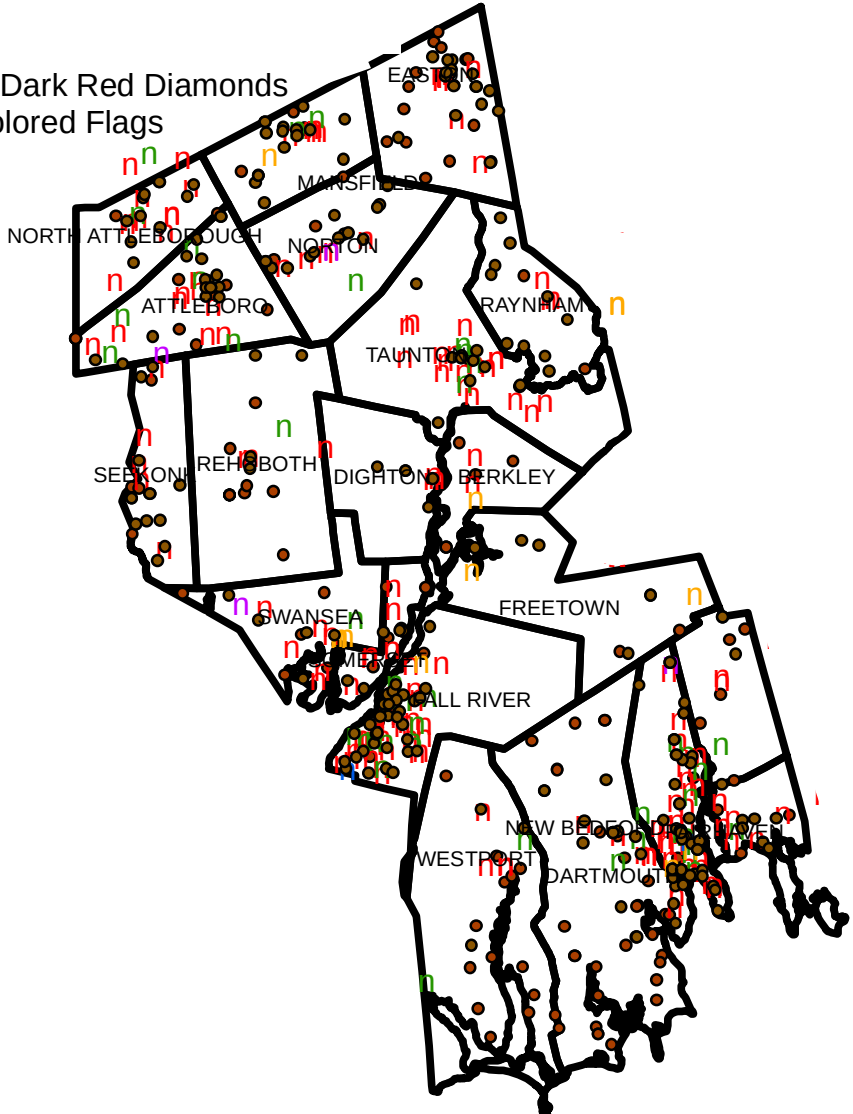
BCMCP BUDGET FUNDING CONTRIBUTIONS/CHERRY SHEET

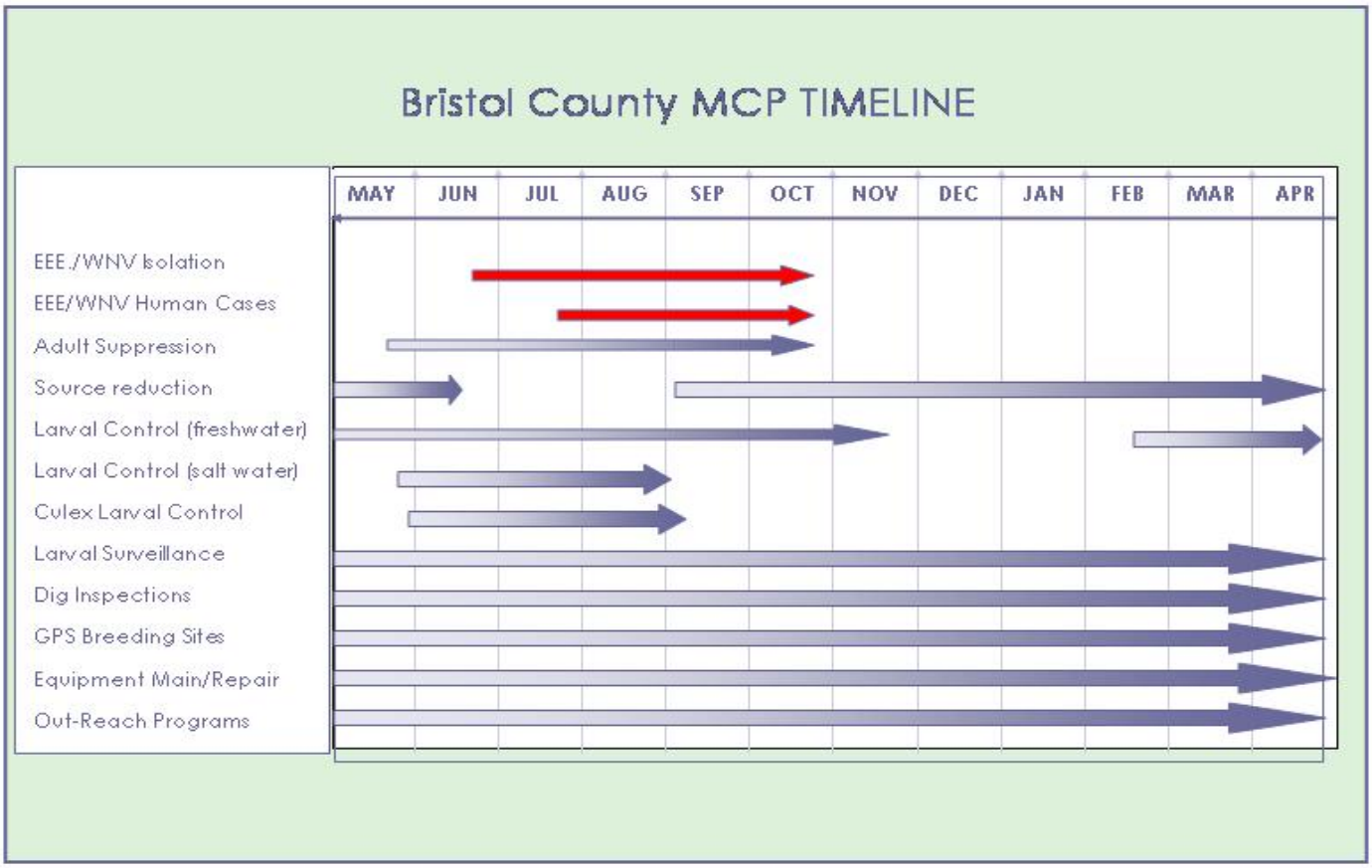
TOWN	CITY/TOWN	FY2009	FY2010
ACUSHNET	TOWN	$29,993	$21,230
ATTLEBORO	CITY	$68,450	$49,027
BERKLEY	TOWN	$24,701	$17,465
DARTMOUTH	TOWN	$116,145	$81,872
DIGHTON	TOWN	$31,501	$22,204
EASTON	TOWN	$58,321	$41,274
FAIRHAVEN	TOWN	$31,933	$22,921
FALLRIVER	CITY	$90,327	$64,625
FREETOWN	TOWN	$49,689	$35,138
MANSFIELD	TOWN	$53,115	$37,113
NEW BEDFORD	CITY	$78,305	$56,276
NORTH ATTLEBOROUGH	CITY	$55,634	$39,694
NORTON	TOWN	$51,231	$35,425
RAYNHAM	TOWN	$39,692	$28,482
REHOBETH	TOWN	$63,460	$45,831
SEEKONK	TOWN	$38,275	$27,870
SOMERSET	TOWN	$33,986	$22,804
SWANSEA	TOWN	$44,251	$30,703
TAUNTON	CITY	$103,113	$72,543
WESTPORT	TOWN	$80,730	$57,779
TOTAL CONTRIBUTION		**$1,142,852**	**$810,276**
Less 2.5%		**$28,571**	**$20,257**
BCMCP FINAL BUDGETS		**$1,114,281**	**$790,019**

BCMCP's NHESP Priority Habitat and ACEC areas



BCMCP's:
No Sprays- Dark Red Diamonds
Schools- Colored Flags




Bristol County MCP TIMELINE
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
JAN
FEB
MAR
APR
EEE./WNV Isolation
EEE/WNV Human Cases
Adult Suppression
Source reduction
Larval Control (freshwater)
Larval Control (salt water)
Culex Larval Control
Larval Surveillance
Dig Inspections
GPS Breeding Sites
Equipment Main/Repair
Out-Reach Programs