MASSACHUSETTS MOSQUITO CONTROL

ANNUAL OPERATIONS REPORT

Year Report Covers: 2022 Date of Report: 1/31/2023

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

Address: 38R Forest Street

City/Town: Attleboro Zip: 02703

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

E-mail: Priscilla.Matton@mass.gov

Report prepared by: ***Priscilla Matton***

NPDES permit no. **MAG870009**

If you have a mission statement, please include it here:
Bristol County Mosquito Control Project's Mission Statement

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:

Commissioner names:

Joseph Barile
Christine Fagan
Gregory Dorrance
Dr. Henry Vallaincourt

Superintendent/Director name: Priscilla Matton
Superintendent/Director contact phone number: 508-823-5253 X3
Asst. Superintendent/Director name:

District/Project website: http://www.mass.gov/orgs/bristol-county-mosquito-control-project
Twitter handle: @BCMCPMosq
Facebook page: http://www.facebook.com/

Staffing levels for the year of this report:
Full time: 11
Part time: 1
Seasonal: 2
Other: (please describe)

Of the above, how many are:
(Please check off all that apply, and list employee name(s) next to each category)

☒ Administrative Barbara Johnson, Priscilla Matton
☒ Biologist Todd Duval, Priscilla Matton
☒ Educator Priscilla Matton, Todd Duval
☒ Entomologist Todd Duval
☒ Facilities Priscilla Matton, John Moniz, Drew Bushee, John Pereira, Matthew Gavaza, Larry Goss, Anthony Souza, Joshua Nickerson, Aaron Toth, Todd Duval
☒ Information technology Diana Brennan, Priscilla Matton
☒ Laboratory Todd Duval
☒ Operations Priscilla Matton, John Moniz, Drew Bushee, John Pereira, Matthew Gavaza, Larry Goss, Anthony Souza, Joshua Nickerson, Aaron Toth, Todd Duval, Diana Brennan
☒ Public relations Priscilla Matton, Todd Duval, Diana Brennan
☒ Wetland scientist Diana Brennan
☒ Other (please describe) Seasonal Mosquito Surveillance Technician- Christopher Beale, Seasonal Office Assitant- Theresa Beale

For the year of this report, the following were maintained (enter number in the column to the left):

3 Modified wetland equipment (list type) Low- ground pressure excavators
2 Larval control equipment (list type) Backpack Sprayers
11 ULV sprayers (list type) 2 Cougars (GPS), 4 London Fog (GPS), 2 Guardian (GPS), 1 Curtis DynaJet (GPS), 1 Beecomist, 1 London Air
10 Vehicles
Other (please be specific): 1 Dump Truck & Flatbed Trailer, 1 Utility Truck, 2 Mower Attachments for Excavators

Comments: _____

How many cities and towns are in your service area?* 20
Alphabetical list:
Acushnet
Attleboro
Berkley
Dartmouth
Dighton
Easton
Fall River
Fairhaven
Freetown
Mansfield
New Bedford
North Attleborough
Norton
Raynham

Rehoboth
Seekonk
Somerset
Swansea
Taunton
Westport

Were there any changes to your service area this year? No
Cities/towns added:
Cities/towns removed:

***Please attach a map of your service area (or a website link to that map).**

INTEGRATED PEST MANAGEMENT (IPM):

Check off all services that your district/project currently provides to member cities and towns as part of an IPM program (details will be provided in the sections below):

☒ **Adult mosquito control**
☒ **Adult mosquito surveillance**
☒ **Ditch maintenance**
☒ **Education, Outreach & Public education**
☒ **Larval mosquito control**
☒ **Larval mosquito surveillance**
☐ **Open Marsh Water Management**
☒ **Research**
☒ **Source reduction (tire removals)**
☒ **Other (please list): Salt Marsh Runnels**

Comments: _____

LARVAL MOSQUITO CONTROL:

If you have a larval mosquito control program, please fill out the section below, else skip ahead to the next section.

Describe the purpose of this program: The larval suppression program is one of our most effective methods to reduce the number of biting mosquitoes by preventing mosquitoes from maturing into adults. We employ larvidicing techniques to current and historical mosquito breeding sites to protect human health and improve the quality of life of our residents.

What months is this program active? April- September

Describe the types of areas where you use this program: BCMCP targets the following areas: freshwater wetlands, saltmarshes, cedar and red maple swamps, catch basins, other permanent and temporary water bodies, and artifical containers that hold water for extended periods of time.

Do you use:
☒ **Ground application (hand, portable and/or backpack, etc.)**

☒ **Aerial applications**
☐ **Other (please list):**
Comments: _____

List all products that you use for larval mosquito control in the table below (leave blank if not applicable)**:**

Product Name	**EPA #**	**Application Rate(s)**	**Application Method**	**Targeted life stage**	**Habitat Type**	**Total finished product applied**
FourStar CRG	85685-2	7.5- 20 lbs per acre	Hand	Larvae	☐ Catch basins ☐ Containers ☒ Wetland ☐ Other (please list):	3,598 lbs
VectoLex WSP	73049-20	1 per 50 sq. ft.	Hand	Larvae	☒ Catch basins ☐ Containers ☐ Wetland ☐ Other (please list):	523 lbs
VectoMax WSP	73049-429	1 per 50 sq. ft.	Hand	Larvae	☒ Catch basins ☐ Containers ☐ Wetland ☐ Other (please list):	7.65 lbs
VectoBac 12AS	73049-38	1 pint per acre	Aerial	Larvae	☐ Catch basins ☐ Containers ☒ Wetland ☐ Other (please list):	279.2 gallons
Altosid XR Briquets	2724-421	1 per 100 sq. ft.	Hand	Larvae/pupae	☐ Catch basins ☒ Containers ☐ Wetland ☐ Other (please list):	0.24 lbs
VectoLex FG	73049-20	14.8 lbs/acre	Aerial	Larvae	☐ Catch basins ☐ Containers ☒ Wetland ☐ Other (please list):	400 lbs
Altosid P35	89459-95	5 lbs/acre	Aerial	Larvae/pupae	☐ Catch basins ☐ Containers ☐ Wetland ☐ Other (please list):	240 lbs

List all products that you use for larval mosquito control in the table below (leave blank if not applicable)**:**

Product Name	EPA #	Application Rate(s)	Application Method	Targeted life stage	Habitat Type	Total finished product applied
				Choose one	☐ Catch basins ☐ Containers ☐ Wetland ☐ Other (please list):	
				Choose one	☐ Catch basins ☐ Containers ☐ Wetland ☐ Other (please list):	
				Choose one	☐ Catch basins ☐ Containers ☐ Wetland ☐ Other (please list):	
				Choose one	☐ Catch basins ☐ Containers ☐ Wetland ☐ Other (please list):	
				Choose one	☐ Catch basins ☐ Containers ☐ Wetland ☐ Other (please list):	
				Choose one	☐ Catch basins ☐ Containers ☐ Wetland ☐ Other (please list):	
				Choose one	☐ Catch basins ☐ Containers ☐ Wetland ☐ Other (please list):	

What is your trigger for larviciding operations? (check all that apply)
☒ Best professional judgment
☒ Historical records
☒ Larval dip counts – please list trigger for application: 1+ per 5 dips
☒ Other (please describe): Presence of Ae. albopictus larvae
Comments: An aerial larvicide application was conducted over the Hockomock and Bolton Swamps at the end of April 2022. Approximately 2,234 acres were treated to control a variety of spring species and Cs. melanura, an important EEE vector. A second application was made to Cq. perturbans specific habitat in May and September. This application covered 27 acres at a rate of 15 lbs/acre. These maps are included in the end of the season report referenced in the adult mosquito surveillance section.

Please attach a map of your service area (or a website link to that map). Figure 2

ADULT MOSQUITO CONTROL:

If you have a larval mosquito control program, please fill out the section below, else skip ahead to the next section.

Describe the purpose of this program: When larviciding is not a viable option, targeted adulticiding applications are used. BCMCP's program is designed to decrease the number of vector and nuisance mosquitoes. There has been consistent detection of West Nile virus and/or Eastern Equine Encephalitis in our county.

What is the time frame for this program? June- mid-September

Describe the types of areas where you use this program: BCMCP accepts requests for adult mosquito control applications from residents, businesses, town officials and other organizations within our 20 towns. ULV applications normally take place in residential, recreational areas and in response to increased populations, WNV or EEE detections from mosquitoes or positive animal/human cases.

Do you use:
☐ **Aerial applications**
☒ **Portable applications**
☒ **Truck applications**
☐ **Other (please list):**
Comments: Suspend Polyzone was used solely to treat tires and containers for Ae. albopictus and associated species.

For each product used, please list the name, EPA #, and application rate(s):

Product Name	EPA #	Application Rate(s)	Application Method	Total finished product applied
Zenivex E4 RTU	2724-807	1 oz/acres	Truck mounted ULV	695.9 gallons
Suspend Polyzone	432-1514	1.5oz/1 gallon water	Backpack	5.5 gallons

Please describe the maximum amounts or frequency used in a particular time frame such as season and areas
Frequency of applications are dependent upon vector control activities, physical characteristics of the area and/or environmental issues. Applications are made in accordance with label directions.

What is your trigger for adulticiding operations? (check all that apply)
☒ Arbovirus data
☒ Best professional judgment
☒ Complaint calls (Describe trigger for application: Upon resident's request and trap data)
☒ Landing rates (Describe trigger for application : Ae. albopictus- 2 adults within 5 minutes)
☒ Light trap data (Describe trigger for application See the EIR)
Comments: _____

Please attach a map of your service area (or a website link to that map). Figure 3

SOURCE REDUCTION (Tire Removals)

If you practice source reduction methods, such as tire removal, please fill out the section below, else skip ahead to the next section.

Please describe your program:
2019 brought the first dedicated tire removal program to BCMCP and continued into 2022. This program addresses source reduction via removal and disposal as BCMCP work crews find tires, containers and other articles that would serve as larval habitat. This tire program is limited to tires that BCMCP crews find in the course of their water management work and is not open to the public. We often inspect properties and offer advice to landowners and businesses on how to reduce and remove standing water or any other materials that would be conducive to mosquito habitat.

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

Comments: _____

WATER MANAGEMENT/DITCH MAINTENANCE

If you have a water management or ditch maintenance program, please fill out the section below, else skip ahead to the next section.

Please check all that apply:
☒ Inland/freshwater
☒ Saltmarsh
Please describe your program: Our goal is to remove debris, sediment and vegetation from drainage ditches throughout our service area to improve water flow, thus eliminating standing

water conducive to larval development. We also maintain previously excavated ditches. This includes both hand and mechanized work. We use erosion control materials and re-seed to stabilize soils disturbed by our operations. This is an important part of our IPM strategy and data and records are collected in accordance with the BMP.

For **inland/freshwater water management**, check off all that apply.

Maintenance Type	**Estimate of cumulative length of culverts, ditches, swales, etc. maintained (ft)**
☒ Culvert cleaning	
☒ Hand cleaning	88,545 ft
☒ Mechanized cleaning	12,365 ft
☒ Stream flow improvement	
☒ Other (please list): Reclaim	88,545 ft

Comments: Culvert cleaning and stream flow improvement cumulative length are included in mechanized and hand cleaning. Cumulative mechanized brush mowing 13.925 acres (20,640 linear feet).

For **saltmarsh ditch maintenance**, check off all that apply:

Maintenance Type	**Estimate of cumulative length of ditches maintained (ft)**
☒ Hand cleaning	8,725 ft
☒ Mechanized cleaning	2,595 ft
☒ Other (please list): Reclaim	10,545 ft

Comments: Mechanized and some hand work incorporated the Salt Marsh Runnel technique

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

Comments: Completed 26 mechanized water management projects.

Please attach a map of ditch maintenance areas (or a website link to that map). Ditch maintenance occurred throughout our County in all 20 towns/cities. Individual maps of specific areas are available upon request but are too large to attach.

OPEN MARSH WATER MANAGEMENT

If you have an Open Marsh Water Management program, please fill out the section below, else skip ahead to the next section.

Describe the purpose of this program: Bristol County Mosquito Control does not have an active Open Marsh Water Management program.

What months is this program active?

Please give an estimate of total square feet or acreage:

Comments: _____

Please attach a map of OMWM areas (or a website link to that map).

MONITORING (Measures of Efficacy)

Describe monitoring efforts for each of the following:

Aerial Larvicide – wetlands: Standard protocol is to take pre- and post- dip larval counts from predetermined locations within the treatment wetlands. Non-treated locations would be used to correct for normal variation in populations.

Ground ULV Adulticide: To monitor efficacy, species targeted mosquito traps are placed in a location where ground ULV applications will take place. Pre- and post- trapping is necessary as is comparing to a non-treatment site to determine normal fluctuations due to other factors such as temperature and wind speed.

Larvicide – catch basins: Random samples of water are taken from catch basins in each town to assess larval populations.

Larvicide-hand/small area BCMCP conducts pre- and post- application dipping at numerous locations throughout the treatment site using a standard 350ml dipper.

Open Marsh Water Management: We have no OMWM program.

Source Reduction: We return to mechanized water management sites regularly to check for blockages or debris that may obstruct the flow of water and to meet any additional recommendations in the BMP. In areas where containers or tires were removed, some sites are re-checked during the season.

Other (please list): Pesticide efficacy testing was completed for common species using CDC bottle bioassay protocols in August 2022 by CDC's Center of Excellence. Due to the presence of the invasive mosquito Ae. albopictus in our county, an aggressive adult monitoring effort using multiple trap types has been implemented in the affected area. Ae. albopictus samples were sent to CDC's Center of Excellence for testing of resistance enzymes.

Provide or list standard steps, criterion, or protocols regarding the documentation of efficacy (pre and post data), and resistance testing (if any):
Pre and post collection of data is analyzed for all types of applications. More information is available in the EIR. Efficacy testing for ULV pesticides is performed using CDC Bottle Bioassay methods and results are reported internally and to CDC.

Check the boxes below, indicating if your program has performed any of the following:

Research Project	Details
Bottle assays	Bottle assays were conducted using CDC protocols.
Efficacy testing	To monitor efficacy, mosquito traps, appropriate to a specific species, are placed in a location where ground ULV applications will take place. Pre- and post- trapping is necessary as is comparing to a non-treatment site to

	determine normal fluctuations due to other factors such as temperature and wind speed.
Other: Ae. albopictus	Pre- and post treatment larval and adult surveillance
Other: Aerial larvicide	Pre- and post treatment larval surveillance

ADULT MOSQUITO SURVEILLANCE

If you have an adult mosquito surveillance program, please fill out the section below, else skip ahead to the next section.

Describe the purpose of this program: Surveillance is the cornerstone of IPM and an important part of the services we offer to member municipalities. The purpose of surveillance is to monitor for human health threats from mosquito-borne arboviruses, as well as to determine mosquito populations and diversity for appropriate control methods.

What months is this program active? April- early November

Check off all trap types used this past season by your program:

Trap Type	**Canopy?** (check box for yes)	**Number of traps** (leave blank if zero)
☐ ABC light trap	☐	
☐ ABC light trap w/CO_2	☐	
☒ CDC light trap	☐	variable
☒ CDC light trap w/CO_2	☐	14 per week
☒ Gravid trap		64 per week
☒ Landing rate test		2 locations
☐ NJ light trap	☐	
☐ NJ light trap w/CO_2	☐	
☒ Ovitrap		48 per week
☒ Resting box		30 per week
☒ Other (please describe): BG Sentinel traps		5+ per week
☒ Other (please describe): GAT traps		3 per week
☐ Other (please describe):		

Do you maintain long-term trap sites in any of your areas? Yes
If yes, how many:
23

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. j. japonicus*
☒ *Oc. sollicitans*
☐ Others (please list):

☒ *Oc. taeniorhynchus*
☐ *Oc. triseriatus*
☐ *Oc. trivittatus*
☒ *Ps. ferox*
☐ *Ur. sapphirina*

Number of adult mosquitoes collected this season (whether submitted to DPH or not): 31,029
Number of adult mosquito pools collected this season (submitted and unsubmitted): 1,672
Number of ovitrap collections this season, if any: 136
Any other trap collections of note (please describe): 124 BG Sentinel traps

Do you participate in the MDPH Arboviral Surveillance program? Yes
Total number of adult mosquito pools submitted to DPH this past season: 337
How many pools do you submit weekly on average? 21.06

Number of traps in your service area **placed by MDPH**: 5
Were these long-term trap sites or supplemental trapping sites? long-term

Which arboviruses were found in your area during the previous mosquito season? Enter the number of pools/cases below:

Arbovirus	Positive Mosquito Pools	Equine Cases	Human Cases
☐ Eastern Equine Encephalitis (EEE)	0	0	0
☒ West Nile Virus (WNV)	5	0	0
☐ Other (please list):			

Comments: West Nile virus detections were 79.3% lower than 10-year average. There were no EEE virus detections this year.

For each arbovirus listed below, please list the risk levels in your project area at both the start and end of the season (if more than one, please list all):

Arbovirus	Start of Season	End of Season
EEE	Low	Low
WNV	Low	Low

Comments: Please see the attached end of the mosquito season report.

EDUCATION, OUTREACH & PUBLIC RELATIONS

If you have an education/outreach program, please fill out the section below, else skip ahead to the next section.

Describe the purpose of this program: The continuing covid-19 pandemic severely restricted our public outreach in 2022. Education is an important component of the Project's objectives to

reduce arbovirus risk in the County. Speaking with the public allows us the opportunity to address any questions and misunderstandings about the program and the pesticides we use. We educate our residents on ways they can protect themselves from mosquito bites and reduce their risk of illness. We also educate our residents on simple mosquito source reduction techniques for their own properties.

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

Check off all education/outreach methods that were performed by your program this year:
☒ Development/distribution of brochures, handouts, etc.
☒ Door-to-door canvassing (door hangers, speaking to property owners, etc.)
☒ Facebook page, Twitter, or other social media
☐ Mailings (Describe target audience(s):)
☒ Media outreach (interviews for print or online media sources, press releases, etc.)
☒ Presentations at meetings
☒ School-based programs, science fairs, etc.
☒ Tabling at events (local events, annual meetings, etc.)
☒ Website
☒ Other (please describe): Radio interviews and filmed PSA for local communities on mosquito control and prevention. Meet with new Board of Health agents in our County at our Project to explain our services.

Estimate the audience reached this year using the education/outreach methods above: ~1000+
Comments: We are unable to estimate the audience for our TV, radio and print media interviews.

List your program's top 3 education/outreach activities for this year:
1. Jim Marshall Show- New Bedford Local Access
2. Earth Day- Buttonwood Park
3. Dartmouth Select Board meeting

Were you involved in any collaborations with the following partners this year? Provide details below, including a list of technical reports, white/grey papers, journal publications, trade magazine articles, etc:
☒ Academia Priscilla is a member of the Bristol County Agricutural High School 's Natural Resource Management Advisory Board. She also presented "Vector Control for Mosquitoes" for Cornell University graduate class. Priscilla is a contributor on the CDC funded BMP manual "Mosquito Management during a Public Health Emergency". Also provided data for a AMCA and University of Florida application threshold study. Todd Duval collaborated on a paper with Connecticut Agricultural Experiment Station which was published in the journal NeoBiota in November 2022. This paper describes consistent genetic sequences within our local population which supports the presumed establishment of Ae. albopictus in Southeast MA, rather than repeat introductions as previously thought.

Gloria-Soria A, Shragai T, Ciota AT, Duval TB, Alto BW, Martins AJ, Westby KM, Medley KA, Unlu I, Campbell SR, Kawalkowski M, Tsuda Y, Higa Y, Indelicato N, Leisnham PT, Caccone A, Armstrong PM (2022) Population genetics of an invasive mosquito vector, Aedes albopictus in the Northeastern USA. NeoBiota 78: 99-127. https://doi.org/10.3897/neobiota.78.84986

Diana met with Brian Bastarache of Bristol County Agricutural High School to discuss the collaborative drone projects.

☒ Another mosquito control district/project Continuation of Cs. melanura surveillance and control in conjuction with Plymouth Co. MCP. Priscilla and Todd joined Plymouth County in Halifax and Lakeville for public meetings. Todd helped teach a mosquito ID workshop as part of the annual NMCA Mosquito Mayhem event in May. Diana advised Cape Cod Mosquito Control during the planning phase of their first Salt Marsh Runnel project.

☒ Another state agency (DCR, DPH, etc.) Steady cooperation with DPH and MDAR about seasonal activity. Worked with MDAR and DEP on PFAS container contamination in pesticides. Coordination with MassDOT on water management projects which incorporate state road drainage ditches. Working with OVM on fleet management.

☒ Environmental groups Diana is a member of the Buzzards Bay Coalition (BBC) Restoration Advisory Committee. She was co-author on a paper selected as an Editor's Choice paper by Estuaries and Coasts in coordination with BBC, Save the Bay (STB), and the Woodwell Climate Research Center (WCRC): Besterman, A.F., Jakuba, R.W., Ferguson, W. et al. Buying Time with Runnels: a Climate Adaptation Tool for Salt Marshes. Estuaries and Coasts 45, 1491–1501 (2022). https://doi.org/10.1007/s12237-021-01028-8

BCMCP continues to partner with BBC, Woodwell Climate Research Center, Save the Bay (STB), Buzzards Bay National Estuary Program (BBNEP), Dartmouth Natural Resources Trust (DNRT), the Town of Fairhaven, and the U.S. Geological Survey (USGS) during the monitoring phase of the SNEP Watershed Grant Salt Marsh Resilience Project at Little Bay in Fairhaven and Oceanview Farm in Dartmouth. BCMCP partnered with Mass Audubon, Save the Bay, DNRT, and U.S. Fish and Wildlife Service (FWS) on a SNEP Watershed Grant Salt Marsh Resilience Project at Allen's Pond, implemented in 2022 and now in the montioring phase. A workshop was held to edcuate stakeholders about this project in May 2022.

BCMCP is also coordinating with Save the Bay, the Town of Fairhaven, and the Fairhaven-Acushnet Land Preservation Trust (FALPT) on a runnel project, implementation planned for 2023.

☒ Industry American Mosquito Control Association (AMCA) is dedicated to providing leadership, information and education leading to the enhancement of public health and quality of life through the suppression of mosquitoes and is the lead organization for mosquito control in the US. Priscilla continued as the American Mosquito Control Associations' North Atlantic regional director representing the 9 states in the region. Priscilla presented at the AMCA, New

Jersey MCA, and Northeastern MCA conferences. Diana presented at the in-person Northeastern MCA annual meeting.

List any training/education your staff received this year: "Right to Know" and tick education was provided. Multiple state required training through PACE/Mass Achieves. Pesticide certification credits through the Northeastern Mosquito Control Association's annual scientific conference and Field Day. MDAR "Spotted Lantern Fly Training". EPA's training on reading and understanding a pesticide label. EPA's training on "ESA workplan update: nontarget species mitigationfor registration review and other FIFRA actions".

Please list the certifications and degrees held by your staff:
Priscilla Matton: B.S. Zoology, M.S. Entomology, MA Pesticide Applicator Certification (47)
Drew Bushee: MA Pesticide Certification (47), CDL license, Hoisting license
John Moniz: Licensed MA Pesticide Applicator, CDL license, Hoisting license
Todd Duval: B.A. Aquatic Biology, M.A. Biology, MA Pesticide Applicator Certification (47), OSHA 10 hour certification, CDC/AMCA Certified Trainer for Integrated Mosquito Management
Joshua Nickerson: Licensed MA Pesticide Applicator, CDL license, Hoisting license
Matthew Gavaza: Licensed MA Pesticide Certification (47), Hoisting license
Anthony Souza: Licensed MA Pesticide Certification (47)
Larry Goss: Licensed MA Pesticide Certification (47)
John Pereira: Licensed MA Pesticide Applicator
Aaron Toth: Licensed MA Pesticide Applicator
Diana Brennan: B.S. Environmental Science and Management, Licensed MA Pesticide Certification (47)

Comments: _____

INFORMATION TECHNOLOGY (IT)

Does your program use (check all that apply):
☒ Aerial Photography
☒ Databases
☐ Dataloggers (monitoring for temperature, etc.)
☒ GIS mapping (Describe: BCMCP maps water management projects, trap locations, larval and adulticide locations. ArcMap, ArcGIS Online, and QGIS have all been used for map creation and data sharing.)
☒ GPS equipment
☒ Smartphones
☒ Tablets/Toughbooks
☒ Other (please describe): Web-based service request system and automatic service request closing application from truck's GPS data.

Describe any changes/enhancements in IT from the previous year:

Describe any difficulties your program had with IT software/equipment this year:

Comments: _____

REVENUES & EXPENDITURES

Please enter your approved budgets for the current, previous, and future fiscal years.

	Date of Fiscal Year	Approved Budget	Notes
Previous	FY 21	$1,639,934.00	
Current	FY 22	$1,680,932.00	
Future	FY 23	$1,680,932.00	Level funding for FY23

List each member municipality, along with the corresponding (cherry sheet) funding assessment dollar amount, for the current fiscal year (or provide a web link to this information):
Please see attached FY 23 Cherry Sheet Assessment

Comments: _____

SERVICE REQUESTS

How many service requests did you receive this season? 7,506
How many were for larviciding? 172
How many were for adulticiding? 7,334

Was this an increase or decrease over last season? Decrease

Comments: This year we saw a 13% decrease in adult spray requests compared to 2021.

EXCLUSIONS

How many exclusion requests did you receive this season? 140

Was this an increase or decrease over last season? Increase

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. Large areas include the Canoe River and Hockomock ACEC and areas of priority habitat. Map of areas are attached, Figure 4.

SPECIAL PROJECTS

Did your program perform any of the following special projects? Check all that apply.

- ☒ Inspectional services (inspections at sewage treatment facilities, review of subdivision plans, etc.)

  Describe: BCMCP continued inspections and work on a source reduction plan with 2 separate tire facilities and an abandoned lot located in New Bedford where the invasive

Ae. albopictus has been collected. The plan includes reducing the amount of time tires remain before being processed, cleaning up the work site and pesticide interventions. Worked in residential yards in response to request. This is a long term plan to reduce the spread and abundance of Ae. albopictus in the area. Also responded to unique detections as they occurred. As a member of the BBC Restoration Advisory Committee, Diana provided review and comment on various proposed restoration projects.

- ☒ Work with DPW departments or other local or state officials to address stormwater systems, clogged culverts, or other areas identified as man-made mosquito problem areas

  Describe: Routinely work with and respond to requests from member Cities, Towns, and local government agencies such as; local DPW's, Health Boards, and Conservation Commissions. At the State level we have worked with and responded to requests from Mass DOT, DCR, and DER. Coordinate with these agencies to provide dump trucks to remove spoil and debris from work sites and clear culverts using specialized equipment. Some provide material in areas we are working in. Coordinated with the New Bedford Airport, Ames Free Library, and Raynham Sewer department on water management projects.

- ☒ Work with groups as described above on long term solutions?

  Describe: Working with local airports on long term ditch maintenance and vegetation plans. Work with the City and the Fall River Industrial Park to address their extensive drainage ditch system. Work with partners and landowners (DNRT, FALPT, BBC, Save the Bay, Mass Audubon, etc.) to evaluate long-term solutions to salt marsh ditch maintenance in a rapidly changing ecosystem.

- ☒ Conduct or participate in any cooperative research or restoration projects?

  Describe: Worked alone and with partners (DNRT, FALPT, BBC, Save the Bay, Mass Audubon, and others) to plan and/or execute salt marsh restoration/ditch maintenance projects and salt marsh resilience research projects. Diana was co-author on a research paper selected as an Editor's Choice paper by Estuaries and Coasts in coordination with BBC, Save the Bay (STB), and the Woodwell Climate Research Center (WCRC): Besterman, A.F., Jakuba, R.W., Ferguson, W. et al. Buying Time with Runnels: a Climate Adaptation Tool for Salt Marshes. Estuaries and Coasts 45, 1491–1501 (2022). https://doi.org/10.1007/s12237-021-01028-8

- ☒ Participate in any state/regional/national workgroups or panels, or attend any meeting pertaining to the above?

  Describe: Priscilla was appointed to the state's "Mosquito control for the 21st century" task force representing the Superintendents/Directors of a regional mosquito control. AMCA and NMCA annual meeting meetings. Cooperative research with MCPs, DPH, MDAR and NEVBD on solutions to control Cs. melanura and Cq. perturbans. Attended BBC Restoration Advisory Committee meetings. Attended project team meetings for the SNEP Salt Marsh Resilience Projects. Attended site meetings with MassDOT, member

towns and cities, and salt marsh project partners. Partcipated in MA DPH's ongoing surveillance meetings. Diana presented at the September 14 NE CASC Webinar and at the NMCA annual meeting.

- ☒ Work on any biological control projects, such as enhancement of habitat for native predators, release of predatory fish or invertebrates, etc.?

  Describe: Conducted water management activities, including the opening of beach crossings and the clearing of salt marsh ditches and runnels in many coastal towns to allow fish access.

CHILDREN AND FAMILIES PROTECTION ACT (CFPA)

Is your program impacted by the CFPA? Yes

If yes, please explain: Some local schools and day cares are out of compliance regarding our current mosquito control products, despite emails to administrators. The large number of schools and daycares create no spray zones that are marked on applicator's maps.

If you have data on compliance rates with the CFPA within your program area, please list here: MDAR's complaince rates for IPM development and submissions is approximately 98% and 94% for schools and daycares respectively.

Describe any difficulties you have had with the implementation of your program due to the CFPA, please elaborate here: When schools are not up to date on all the required information and notification policy, providing services to them in a timely manner, especially when virus is detected can be difficult and time consuming.

Comments: Figure 5 is a map of schools, daycares, certified organic farms and residential exclusions.

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT PROGRAM

Did your program report any adverse incidents during this reporting period? No

If yes, please list any corrective actions here: _____

GENERAL COMMENTS

Please add any comments here for topics not covered elsewhere in this report: _____

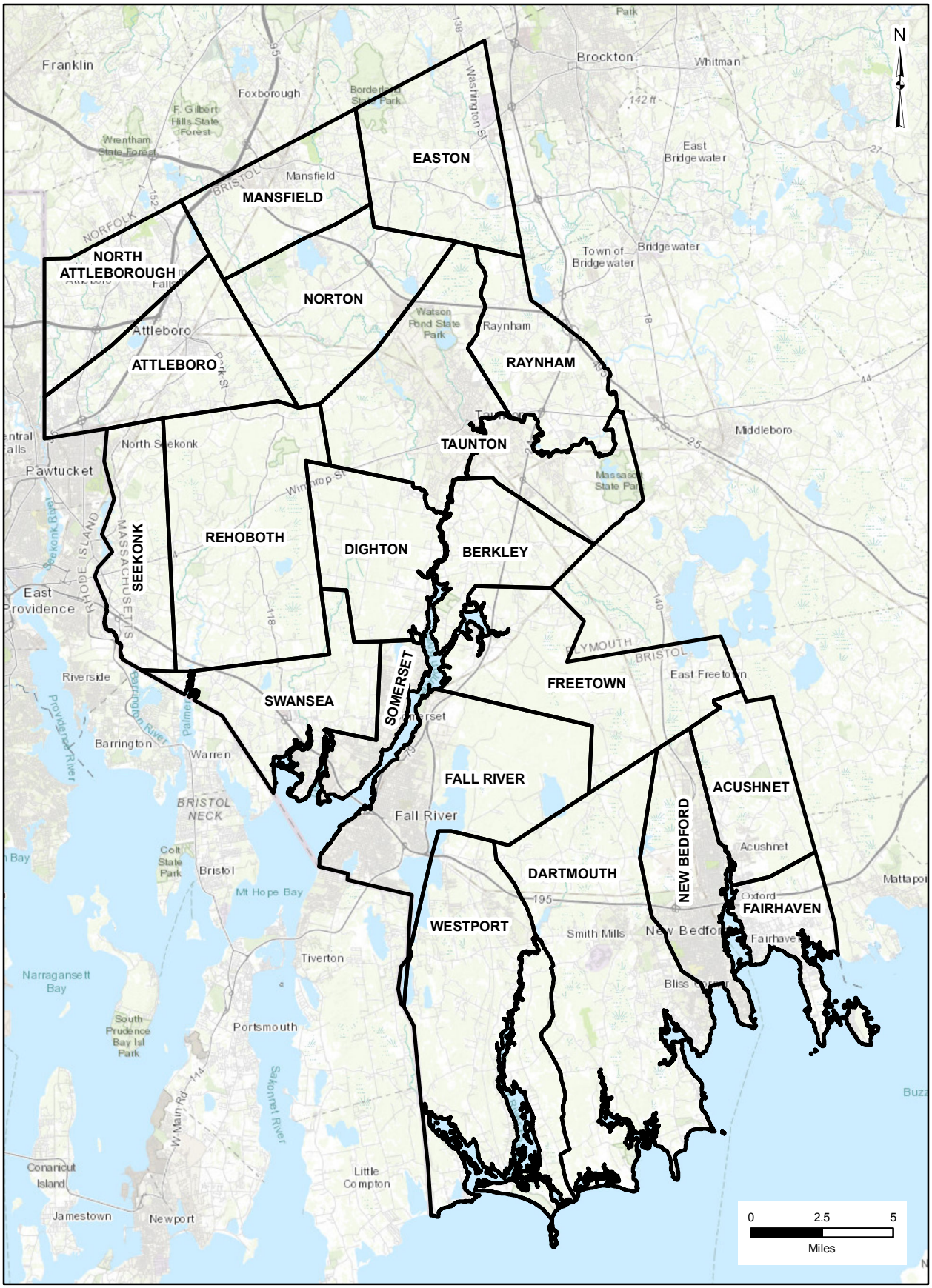

Figure 1. Bristol County

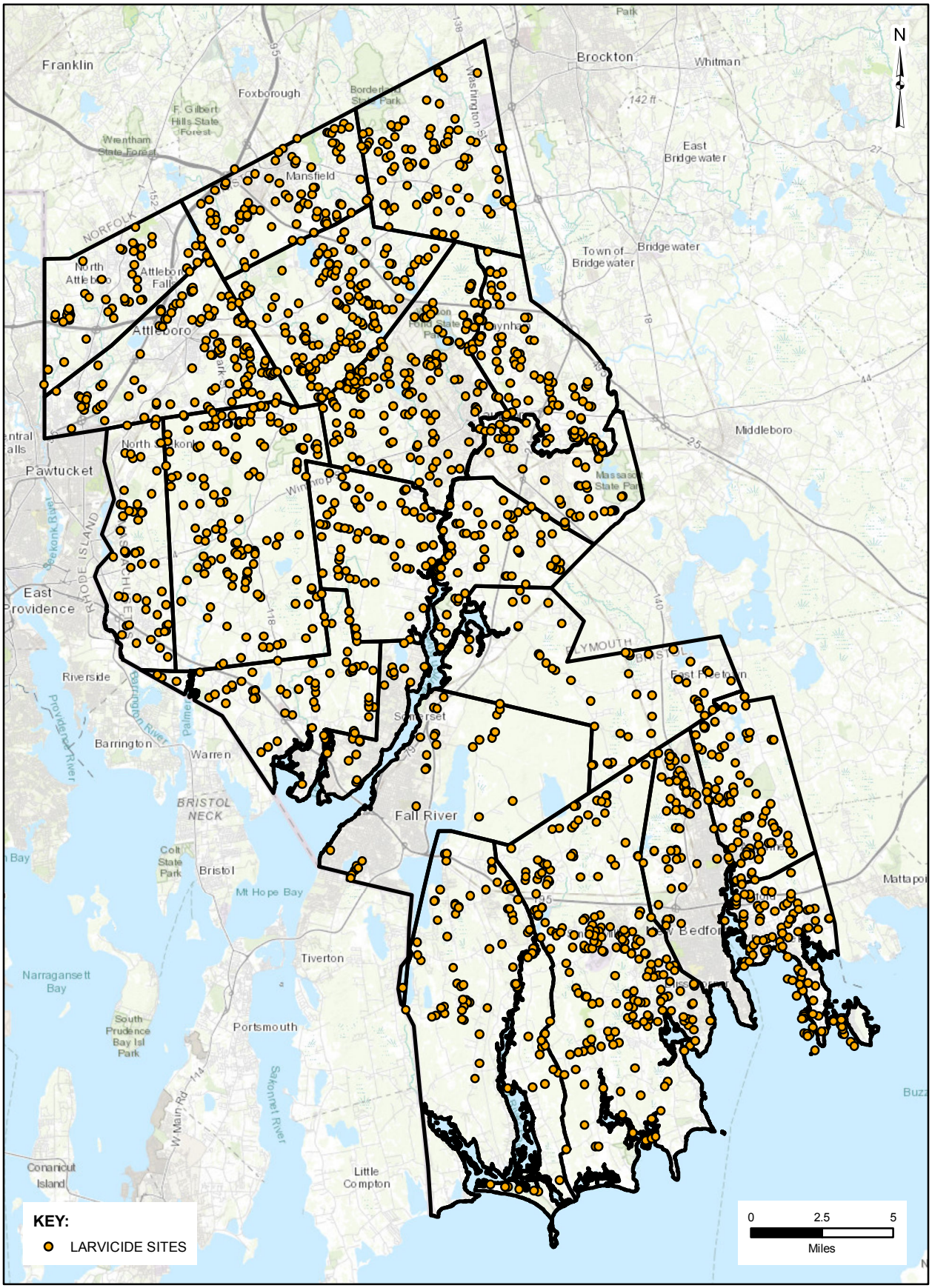

Figure 2. 2022 Larvicide Sites

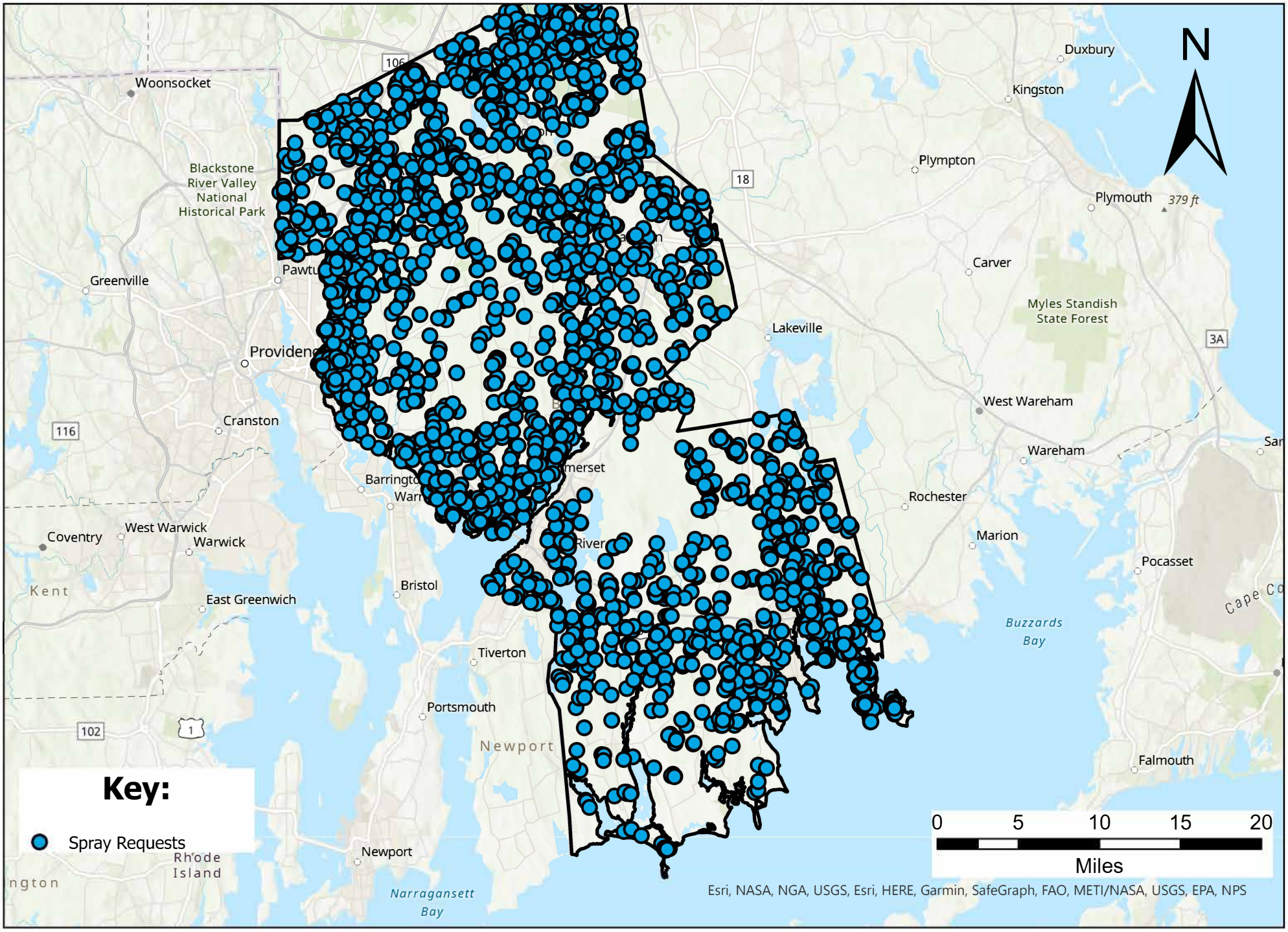

Figure 3. 2022 Spray Requests

THE COMMONWEALTH OF MASSACHUSETTS STATE
RECLAMATION AND MOSQUITO CONTROL BOARD

BRISTOL COUNTY MOSQUITO CONTROL PROJECT

38R FOREST STREET, ATTLEBORO, MA 02703 TEL: (508)823-5253 FAX: (508)828-1868

COMMISSIONERS

JOSEPH BARILE, CHAIRMAN

CHRISTINE A. FAGAN

GREGORY D. DORRANCE

HENRY R. VAILLANCOURT, MD MPH, FAAFP

SUPERINTENDENT

PRISCILLA MATTON, MS

Entomologist

Todd B Duval, MA

Monday, January 09, 2023

Bristol County Mosquito Control Project (BCMCP)

2022 Entomology Season Report

Season Summary

The winter of 2021-2022 was the second La Niña year, marked by above average temperature and normal precipitation. Bristol saw average precipitation through April and relatively high numbers of larvae were observed. Aerial applications occurred in May in the Hockomock and Bolton Swamps and our second helicopter treatment in Easton went on as scheduled. Reductions in larval populations were observed. While the season started normally, a deep drought set in and overall popualtions were down roughly 60% from normal. Mosquito populations continued a long, slow decline into another unusually warm fall. Overall population was very low and the lowest observed since 2010. There were 6 West Nile virus (WNv) detections and no Eastern Equine encephalitis (EEE) was found. First frost was also a few weeks later than normal, so surveillance trapping continued a few weeks later than normal. Winter 2022-23 will be our third La Niña year in a row, which could mean another mild, wet winter here in the Northeast. This report is based on data collected from CO_2-baited CDC traps, resting boxes, gravid traps, ovitraps and BG Sentinel™ Traps. Weather data from NOAA.

Table 1. Summary of mosquito sampling for 2022 season compared to previous year and 5 year average

		2022	*2021*	*5-year average*	*5-year change*
Trap events	Bristol MCP	651	615	632	+3.20%
Samples tested	Bristol MCP	337	499	503	-32.90%
	MA DPH	115	270	288	-60.10%
	Total	452	769	785	-42.40%
Mosquitoes tested	Bristol MCP	8,560	15,865	14,433	-40.70%
	MA DPH	3,636	9,474	11,491	-68.40%
	Total	12,196	25,339	25,924	-53.00%
Mosquitoes not tested	Bristol MCP	12,498	58,056	31,006	-59.70%
	MA DPH	6,335	23,640	20,822	-69.60%
	Total	18,833	81,696	51,828	-63.70%
Total population		31,029	107,035	63,407	-60.10%
Positive samples	West Nile Virus	5	16	24	-79.30%
	Eastern Equine	0	0	32	N/A

Mosquito activity/trends for the 2022 Season

Several named storms in late summer 2021 led to high mosquito populations and above-average water levels in last year's fall season. This pattern is typically a concern for the following season, because the high populations ensure high levels of reproduction and above-average water levels ensure plenty of larval habitat. We continued to have above normal rainfall through April 2022 and there were plenty of *Cs. melanura* and *Cq. perturbans* mosquito larvae in our monitored habitats before the spring larvicide.

The 2022 season started strong, with weekly population totals mostly above the 10-year mean. This continued even though our weather system became very dry around week 24 and we entered a moderate drought, which continued through the season.

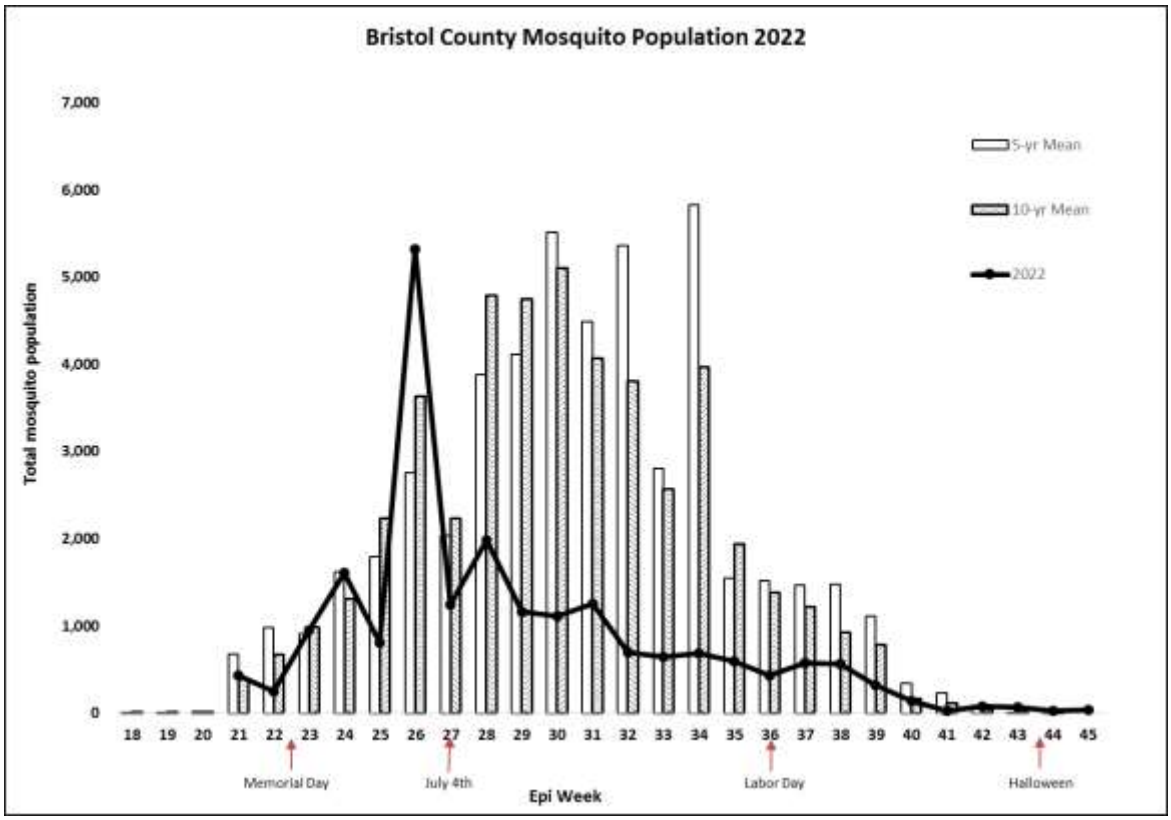

Figure 1. 2022 population totals per trap-night by epi week compared to 5- and 10-year average. The population dip at week 27 is an artifact of reduced trapping due to the July 4th holiday week.

After a large emergence of *Cq. perturbans* in week 26 (late June), mosquito populations crashed and remained low until very late in the season as the drought moved from moderate to extreme over the summer (Figure 1). This year was the lowest total population observed in Bristol County since 2010. The drought continued until week 43 (late October), by then the conditions for large mosquito populations were over. This season was notable for the lack of diversity in the population. Particularly absent this year were *Aedes, Anopheles* and *Ochlerotatus* species (Figure 2).

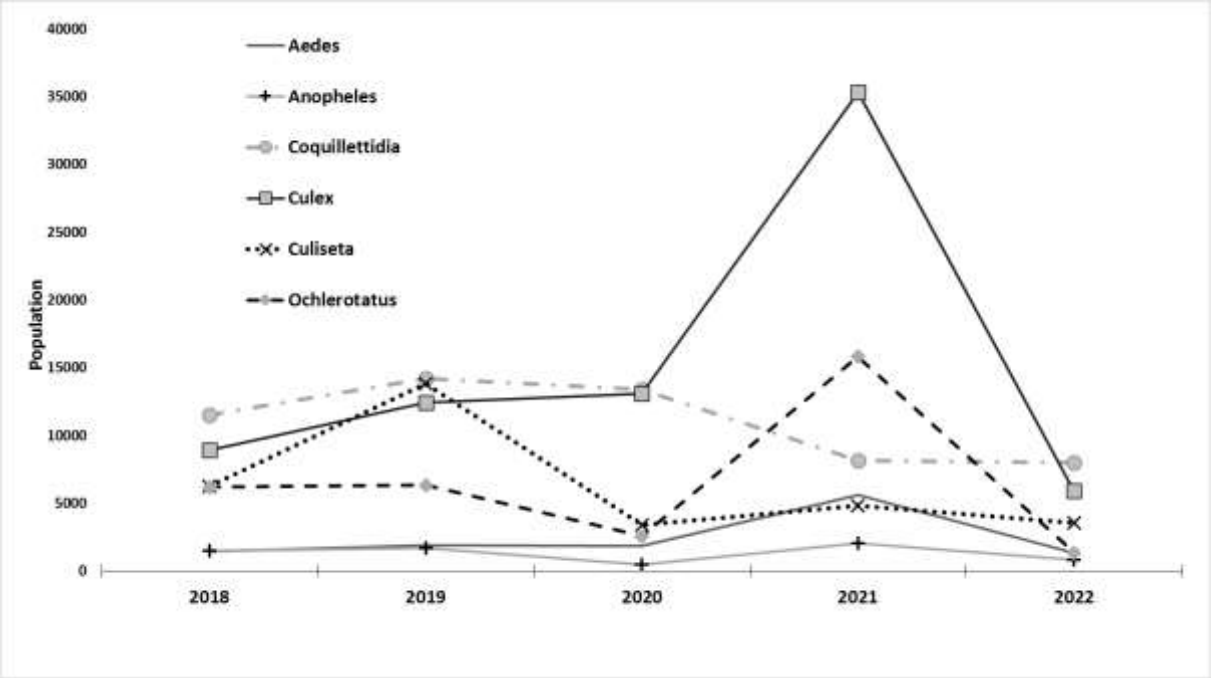

Figure 2. Total number of observed mosquitoes by genus captured by BCMCP and MA DPH in Bristol County, MA 2018 to 2022.

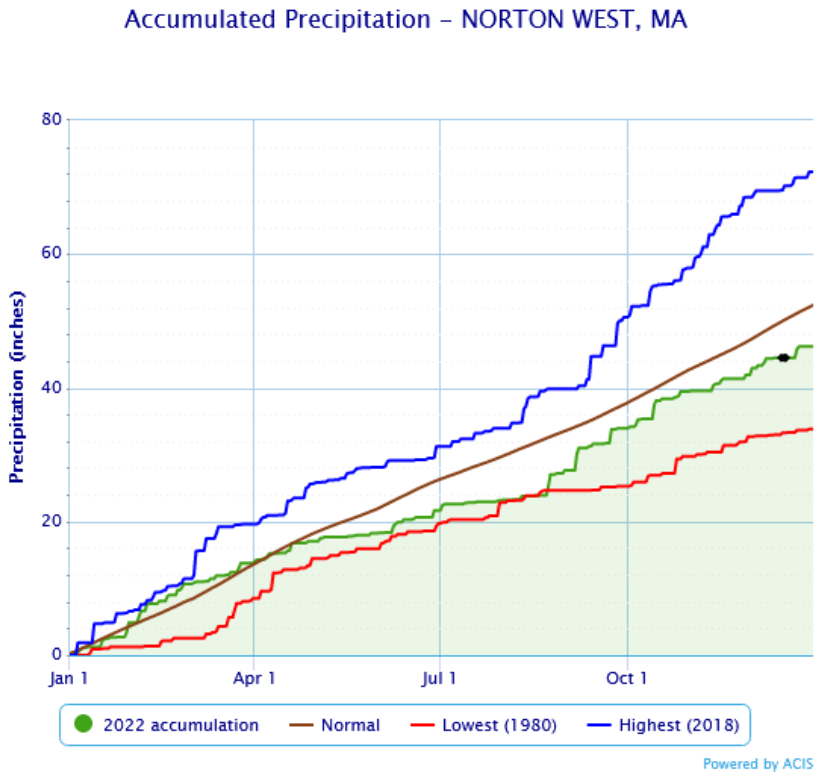

Figure 3. NOAA Annual Precipitation graph for Norton ASOS. Retrieved 1/9/23

Due to the drought, Bristol County finished the year with a fairly low average of 42.79 inches of precipitation, 5.74 inches below average (Table 2). Figure 3 shows the typical precipitation pattern for the countythis year, where the first 5 months were just above average and the rest very much drier. Although it was not quite as hot as 2021, average temperature was 1.5°F above average, with most of the above average heat distributed through the year. It should be noted that we are now in the third year of a La Niña cycle, which is unusual. Some of the effects of La Niña phases in the Northeast are higher average temperatures and a good chance of higher than average precipitation.

Table 2. Bristol County area average temperature, precipitation totals in inches and deviation from normal as of 1/9/23 (NOAA 2023). *This year's data substitutes the Norton weather station for the usual Taunton data as that station is offline for the time being.

	New Bedford	*Providence*	*Norton**	*Area average*
Precipitation total (in)	36.38	47.54	46.15	42.79
Deviation from normal	-20.41%	-3.60%	-11.83%	-12%
Change in inches	-9.33	-1.71	-6.19	-5.74
Change from previous year	-9.95%	-1.76%	-13.75%	-8%
Temperature average (F)	52.3	53.5	50.7	52.17
Deviation from normal	3.77%	2.69%	2.42%	2.96%
Change from previous year	-1.32%	-1.11%	-2.87%	-1.77%

Arbovirus activity, summer 2022

Based on high precipitation in late 2021, our expectations were that we would probably see some Eastern equine encephalitis virus (EEEv) activity in the county. The late spring and early summer drought changed that expectation. We had no detections of EEEv in the entire state this year. End of year risk levels for EEEv are found in Figure 4.

Overall, the WNV detected in Bristol County was about 75.2% lower than the 5-year average (Table 1), with no human cases reported in the county. WNV activity occurred in low levels

throughout Bristol (Table 3). All infected mosquitoes were *Culex pipiens/restuans* or *Culiseta melanura*.

Table 3. Towns and number of West Nile virus (WNV) positive samples in 2022.

Town	*WNV positives*
Attleboro	**2**
Berkley	**1**
Easton	**1**
Fall River	**1**
Norton	**1**
Total	***6***

At the end of the 2022 surveillance season, all cities or towns in Bristol County were reported by MA DPH to be in a Low WNV Risk category (Figure 5).

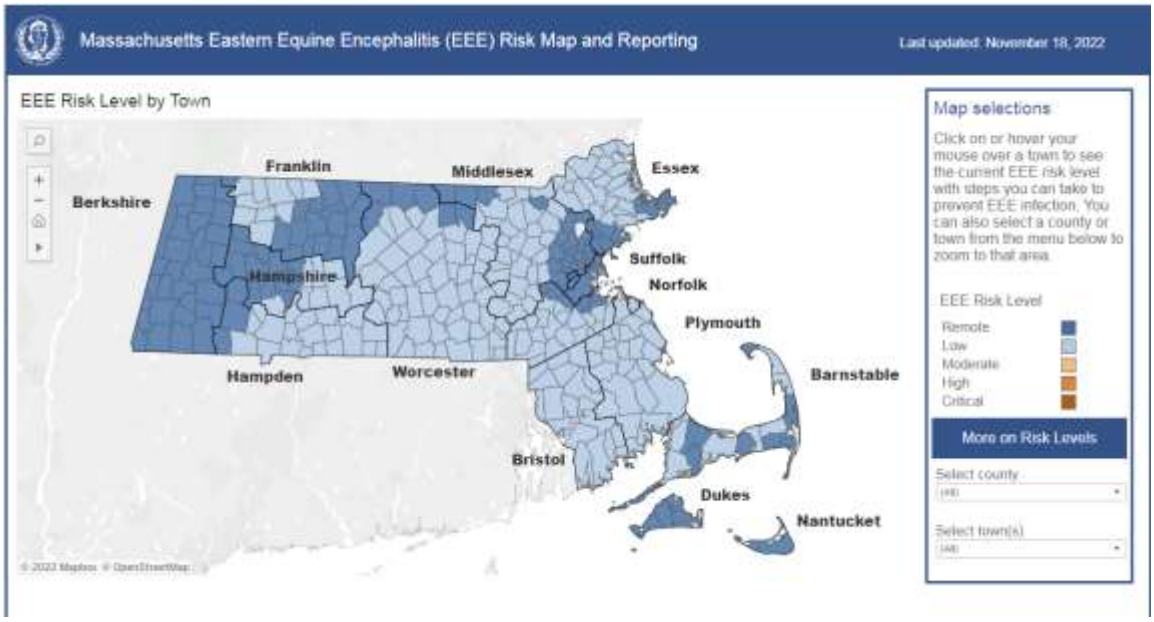

Figure 4. Massachusetts Dept. of Public Health Eastern Equine Encephalitis virus risk map for the end of the 2022 season. https://www.mass.gov/info-details/massachusetts-arbovirus-update. Retrieved 11/27/2022.

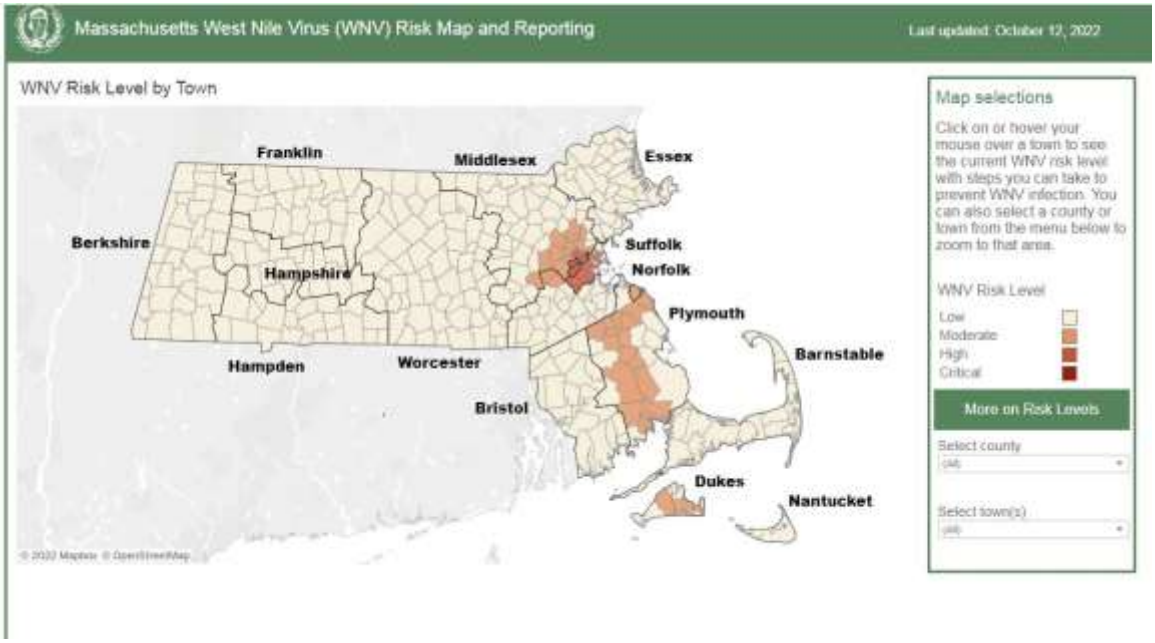

Figure 5. Massachusetts Dept. of Public Health West Nile virus risk map for the end of the 2022 season. https://www.mass.gov/info-details/massachusetts-arbovirus-update. Retrieved 11/28/22

Aerial larvicides, spring 2022

We planned for five separate aerial larvicide events and conducted three in spring 2022 and one in the fall. The first two were liquid Bti applications over large areas of mixed coniferous and hardwood swamps, the third was a small-scale pelletized *Bacillus sphaericus* (Bs) application over a small cattail swamp to control *Coquillettidia perturbans*, an important vector in Eastern Equine Encephalitis virus (EEEV) outbreaks. The 4th and final spring aerial application was a planned small-scale methoprene application to white-cedar habitats in the Hockomock to control *Cs. melanura.* This last application was canceled due to drought conditions.

The 2022 aerial Bti larvicide event in the Hockomock area was completed on 4/22/22. Plymouth County MCP aircraft deposited 224.6 gallons of VectoBac 12AS liquid larvicide, applied at a rate of 1.00 pint per acre over 1797 acres. In the Bolton Swamp, the larvicide took place on 4/25/22, covered 437 acres at 1.00 pint per acre using 54.6 gallons of VectoBac 12AS. Maps of the locations are in Figures 7 and 9. Total amount of VectoBac 12AS deposited in Bristol was 279.2 gallons over 2234 acres.

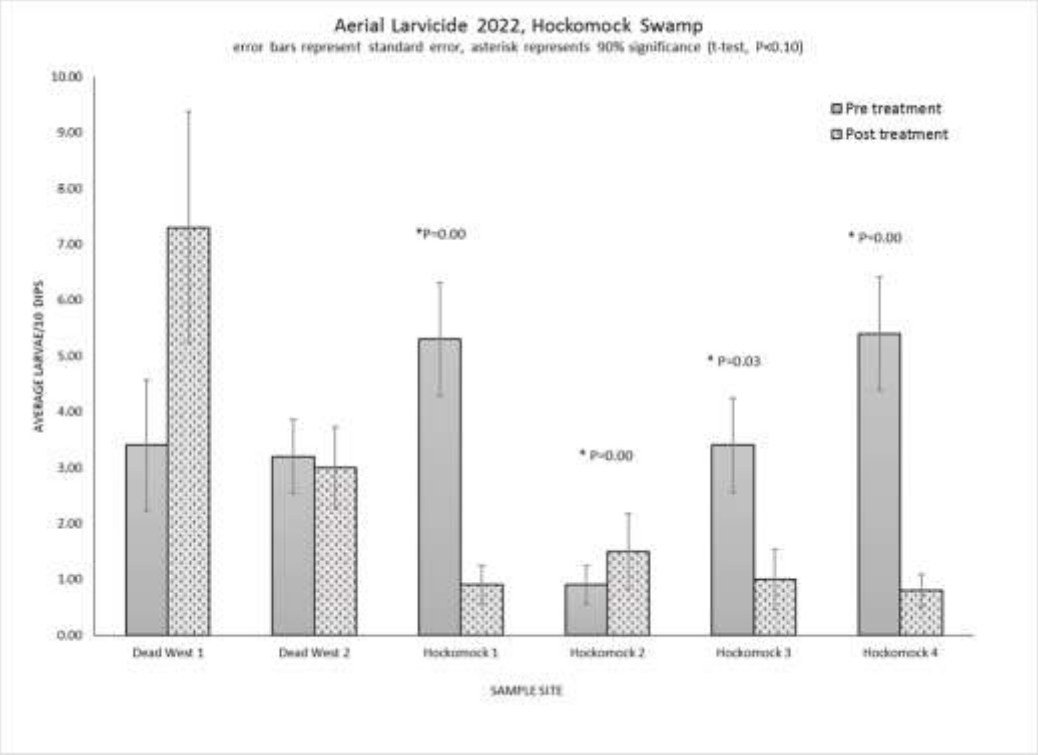

Figure 6. Pre- and post-treatment larval populations in the Hockomock and Dead Swamps April 2022. Error bars represent standard error.

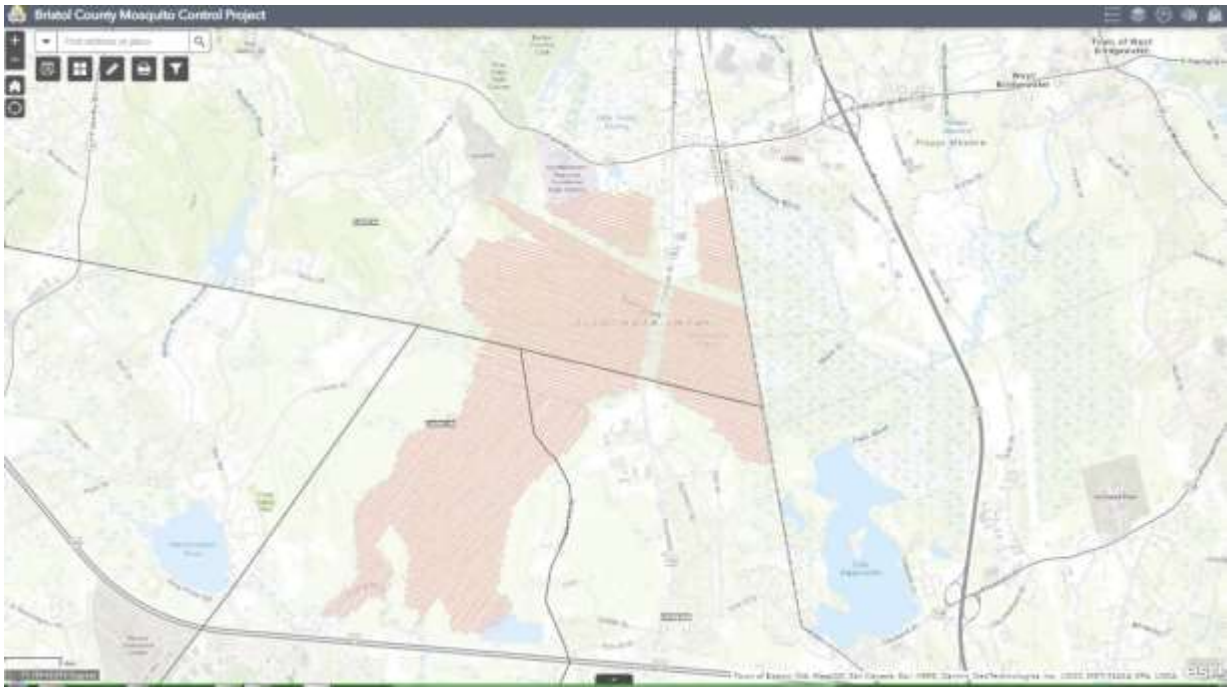

Figure 7. ArcGIS map of aerial Bti treated areas in Hockomock Swamp, April 2022.

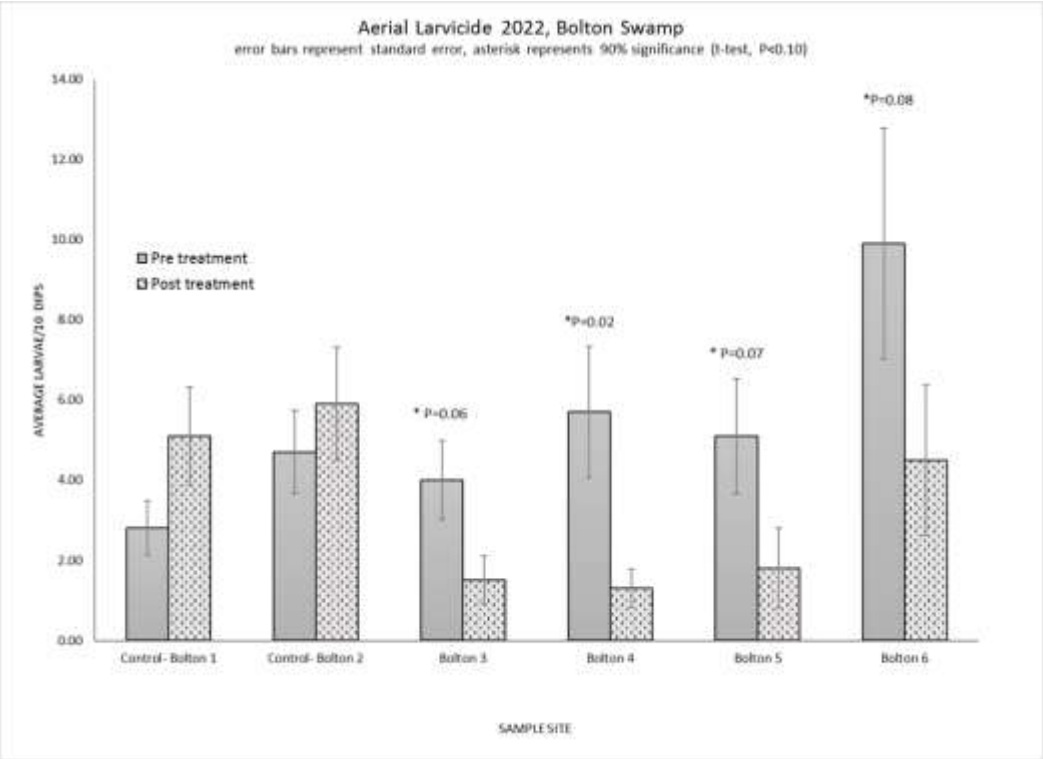

Figure 8. Pre- and post-treatment larval populations in the Bolton Swamp, April 2022. Error bars represent standard error, asterisks denote statistical significance (t-test, P<0.05).

Coquillettidia perturbans is commonly found to be a bridge vector of EEEv in Southeastern MA and are a source of concern for public health. Typically, *Cq. perturbans* emerge in large numbers around the first of July, a perfect time to contribute to the spread of EEEv. Because *Cq. perturbans* has a larval stage that is attached to the roots of emergent aquatic vegetation such as cattails, they are typically difficult to control with larvicide. Additionally, the dependence on emergent vegetation limits the habitat of larval *Cq. perturbans* to known areas with an abundance of the right habitat. Roughly 48% of all *Cq. perturbans* caught in Bristol County each year come from a single cattail marsh of about 29.5 acres.

Table 4. Results of aerial larvicide at three areas in Bristol, April-May 2022.

Location		*Abbot's*	*Henderson-Tilton*	*t-Test (P<0.10)*
Hockomock	Dead West 1	-313.29	-456.51	0.20
	Dead West 2			0.84
	Hockomock 1			0.00
	Hockomock 2			0.00
	Hockomock 3			0.00
	Hockomock 4			0.00
Bolton	Control- Bolton 1	-163.84	-956.83	0.10
	Control- Bolton 2			0.49
	Bolton 3			0.06
	Bolton 4			0.03
	Bolton 5			0.07
	Bolton 6			0.08
Spring	Maple- Control	-26.78	-865.67	0.80
	Foundry- Treatment			0.18
Fall	Maple- Control	-119.00	40.00	N/A
	Foundry- Treatment			N/A

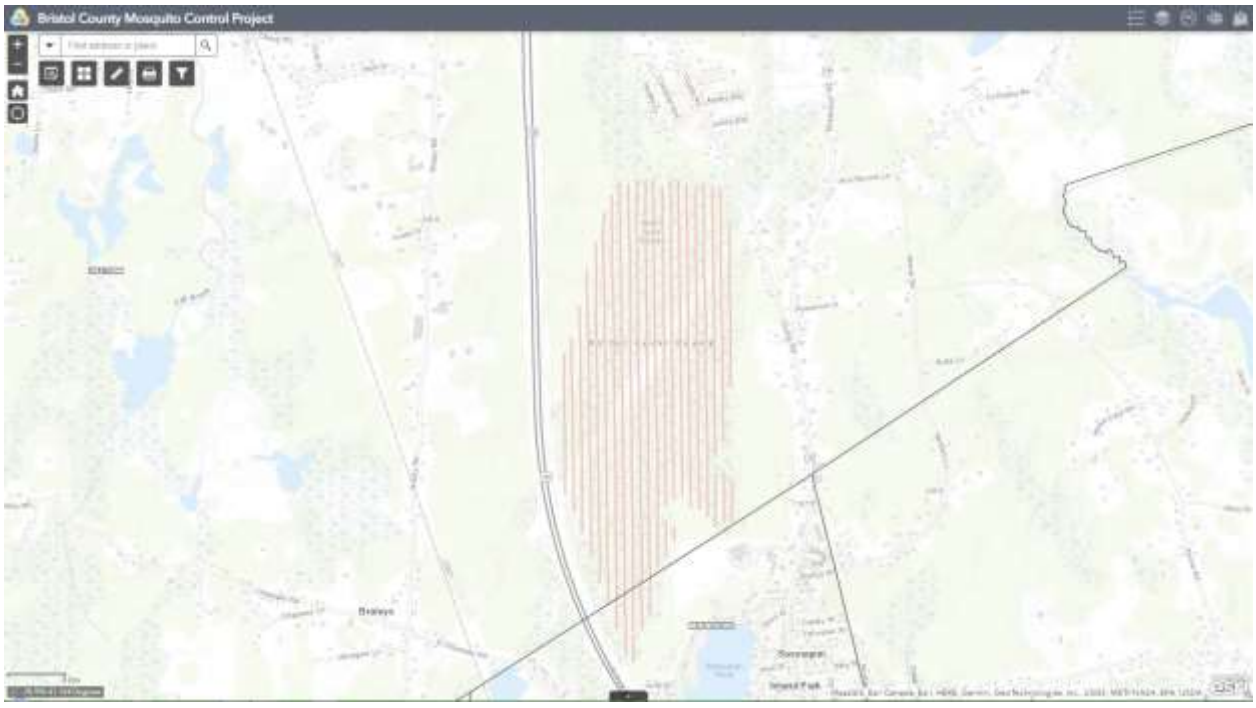

Figure 9. ArcGIS map of aerial Bti treated areas in Bolton Swamp, April 2022.

Recent work in Minnesota and Norfolk County, MA suggested that an application of a larvicide with a bio rational *Bacillus sphaericus* (Bs) active ingredient is capable of penetrating wetland soil and controlling *Cq. perturbans* larvae. These studies led us to use a granular formulation of Bs (VectoLex FG) to our problem cattail marsh in Easton in 2021. The resulting decrease in *Cq. perturbans* population we saw in the 2021 season led us to duplicate this effort in 2022 and an additional fall season application to try to control the early spring 2023 emergence. BCMCP hired North Fork Aviation's helicopter to deposit the product over 26.91 acres at a rate of 15 lbs. per acre on 4/22/2022 and again on 9/26/2022 (Figure 10).

Pre- and post-treatment sampling of each area showed decreases in larval abundance at all sites according to Abbott's and Henderson-Tilton tests, with the exception of the September helicopter application. Statistically significant ($P<0.10$) population reduction was found in all four treatment areas in the Bolton and Hockomock Swamps. Data from all pre- and post-larval dipping can be found in Table 4 and Figures 6 through 12.

Figure 10. ArcGIS map of aerial *Bacillus sphaericus* (BS) treated areas in Foundry Street Swamp, May and September 2022.

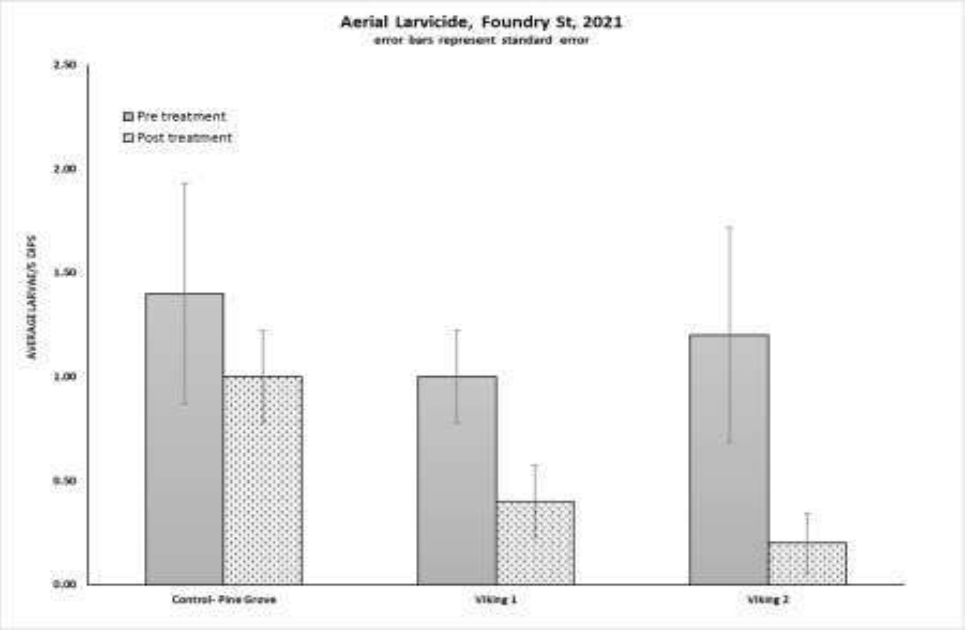

Figure 11. Pre- and post-treatment larval populations in the Foundry Street Swamp, May 2022. Error bars represent standard error.

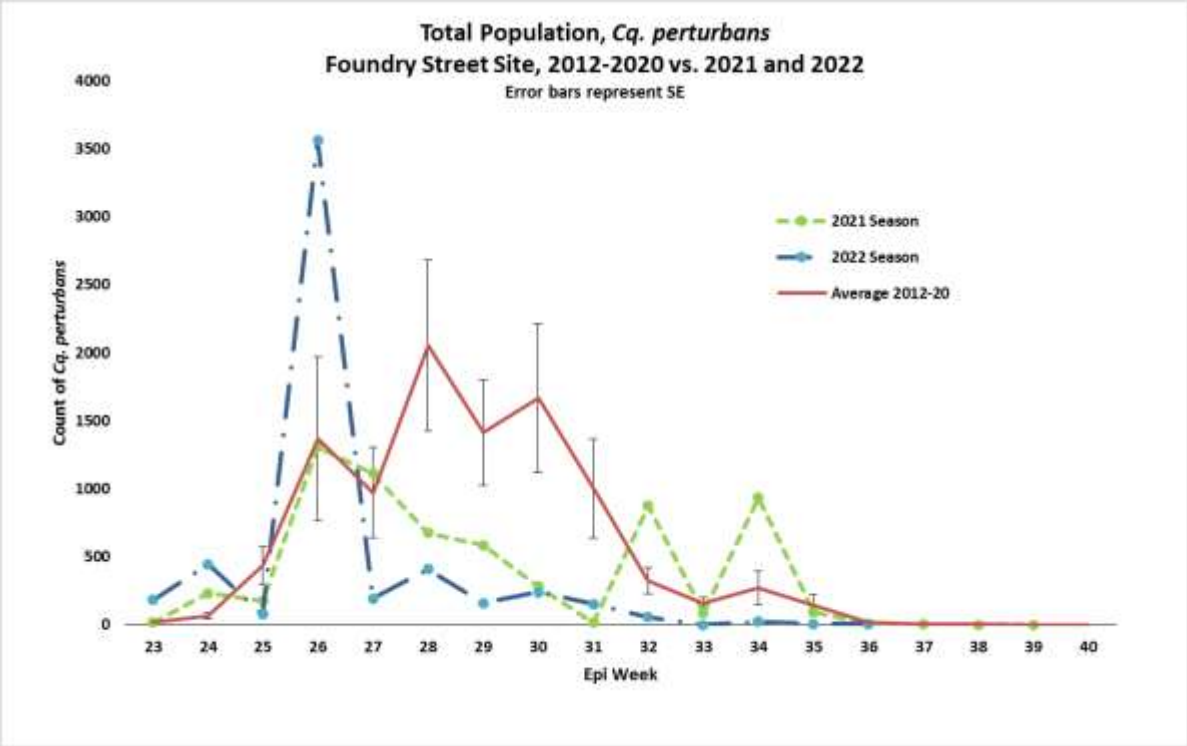

Figure 12. Difference in adult *Cq. perturbans* population at Foundry St., Easton. Historical data vs. posttreatment data.

Asian tiger mosquito (ATM) surveillance and treatment

Bristol County MCP continued monitoring the most southern and western towns in our region for the invasive Asian tiger mosquito, *Ae. albopictus*. This effort was expanded in 2016 through a combined effort between BCMCP and the MA Department of Public Health. The surveillance plan contained three parts: ovitrap cups placed throughout the region to determine presence/absence, BG Sentinel™ traps used as a follow-up where presence of eggs were detected, and routine monitoring of areas with historical population data. Larvicide treatments were conducted on a 3 week schedule at the two major infestations, the tire facilities along the waterfront as well as larvicidal treatments in other areas as detections warranted.

Continuing from 2016, ovitrap papers from all Massachusetts MCPs were collected and sent to MA DPH's Hinton State Lab for raising under controlled conditions in the lab's insectary. Ovitrap papers are attractive egg deposition sites not only for *Ae. albopictus,* but *Ae. japonicus* and *Ae. triseriatus* as well.

BCMCP set 136 ovitraps over the 20-week season across the South Coast in potential *Ae. albopictus* habitat. 25 papers from sites with presence of mosquito eggs were sent to the MA DPH insectary and 19 were raised in the BCMCP entomology lab. Of these papers, 7 had viable *Ae. albopictus* eggs, including repeat detections in Attleboro and Fall River and one new detection in Seekonk. In most cases, detections of viable eggs from ovitraps were followed up with BG Sentinel™ trap efforts. Adults were found in New Bedford, Fairhaven and Dartmouth as expected and new detections were found in Attleboro on the Rhode Island state line and near a tire pile in Somerset. We will monitor all of these new sites in 2023.

Routine BG trap surveillance in New Bedford continues to point to an established population along the waterfront area and around Acushnet Avenue as well as low-level occurrences in nearby areas. The data shown in Figure 13 has been averaged by trap-night to correct for the increased trapping effort that BCMCP has undertaken. This is showing that *Ae. albopictus* has lost ground for the second year.

A paper that we collaborated on was published in the journal *NeoBiota* in November 2022. This paper describes consistent genetic sequences within our local population which supports the

presumed establishment of *Ae. albopictus* in Southeast MA, rather than repeat introductions as previously thought. The citation is below.

Gloria-Soria A, Shragai T, Ciota AT, Duval TB, Alto BW, Martins AJ, Westby KM, Medley KA, Unlu I, Campbell SR, Kawalkowski M, Tsuda Y, Higa Y, Indelicato N, Leisnham PT, Caccone A, Armstrong PM (2022) *Population genetics of an invasive mosquito vector, Aedes albopictus in the Northeastern USA*. NeoBiota 78: 99-127. https://doi.org/10.3897/neobiota.78.84986

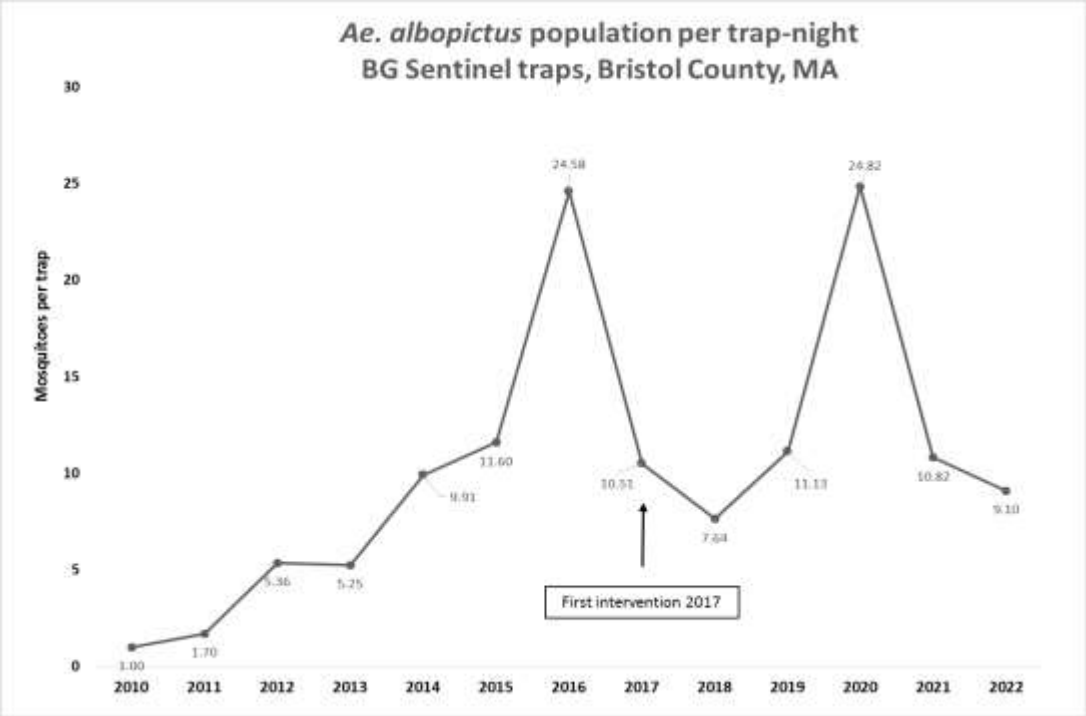

Figure 13. Historical population for Asian tiger mosquitoes in BG Sentinel traps in New Bedford, 2010-2022.

Requests for service

Bristol County MCP received 7,334 calls for service in 2022. Call numbers were 13% lower than the previous year and 35% lower than the 5-year average. 99.6% of all requests were completed, the uncompleted requests were generally too close to pesticide exclusion areas to treat safely. BCMCP stopped taking residential requests as of 9/2/22 and stopped ULV spray activities as of 9/9/22. In the past 5 years, Bristol has received 11,150 calls for service in 2017, 10,444 in 2018,

12,550 calls in 2019, 12,857 calls in 2020 and 8,416 calls in 2021. We have looked into weather patterns and mosquito abundance as drivers of fluctuating request numbers, but there does not seem to be any relationship.

Bristol County Mosquito Control Project's Outreach Program

Public outreach is an important part of our program. Educating people on how they can protect themselves and reduce mosquito breeding on their property is an effective step to combat virus transmission. Most in-person outreach activities for the year were limited due to the neverending covid-19 pandemic, however we were able to do several online workshops and present several webinars. We were able to do 9 in-person presentations and information tables, with an estimated reach of over 200 people. Priscilla was interviewed for television, we don't know the exact number of viewers.

Two papers were published with BCMCP employess as co-authors, the *Ae. albopictus* paper above and the following from Diana Brennan.

Besterman, A.F., Jakuba, R.W., Ferguson, W. *et al.* Buying Time with Runnels: a Climate Adaptation Tool for Salt Marshes. *Estuaries and Coasts* **45**, 1491–1501 (2022). https://doi.org/10.1007/s12237-021-01028-8

Coordination between BCMCP and the local Boards of Health was ongoing relative to control/surveillance options in the vicinity of WNV positive mosquito samples and high mosquito collections. Even though Labor Day is the unofficial end of summer, BCMCP continued to alert the public that the seasonality of mosquito borne disease continues until the first frost in fall. Educational materials have been provided to public and private entities as well as local Boards of Health. Twitter was used extensively to make the public aware of upcoming activities, mosquito news and public health notices, you can find us at @BCMCPMOSQ.

Project Name: Bristol County Mosquito Control Project
FY2023 Proposed Cherry Sheet Assessments Estimates
Based on the preliminary proposed Project budget
(2023 Equalized Valuations)

Name of Municipality	% of Total Budget	Project Share Amount*	State Reclamation Mosquito Control Board Share Amount*	Total Assessment Estimate*
ACUSHNET	2.61%	$44,044	$1,935	45,932
ATTLEBORO	6.05%	$105,012	$4,613	109,513
BERKLEY	2.18%	$36,663	$1,610	38,235
DARTMOUTH	10.11%	$167,433	$7,355	174,610
DIGHTON	2.79%	$47,783	$2,099	49,831
EASTON	5.26%	$92,079	$4,045	96,026
FAIRHAVEN	2.87%	$48,527	$2,132	50,607
FALL RIVER	7.73%	$121,919	$5,355	127,145
FREETOWN	4.36%	$74,684	$3,280	77,885
MANSFIELD	4.73%	$82,453	$3,622	85,987
NEW BEDFORD	6.84%	$113,769	$4,997	118,646
NORTH ATTLEBORO	4.83%	$80,803	$3,549	84,267
NORTON	4.49%	$78,200	$3,435	81,552
RAYNHAM	3.50%	$61,329	$2,694	63,958
REHOBOTH	5.63%	$95,934	$4,214	100,046
SEEKONK	3.48%	$60,439	$2,655	63,030
SOMERSET	3.04%	$40,999	$1,801	42,756
SWANSEA	3.79%	$64,033	$2,813	66,778
TAUNTON	8.49%	$144,268	$6,337	150,452
WESTPORT	7.22%	$120,561	$5,296	125,729
		$1,680,932	$73,837	$1,754,769

*Assessment estimates are preliminary and will only be finalized after the State Reclamation & Mosquito Control Board budget certification meeting held annually in May/June.

(2023 Equalized Valuations)

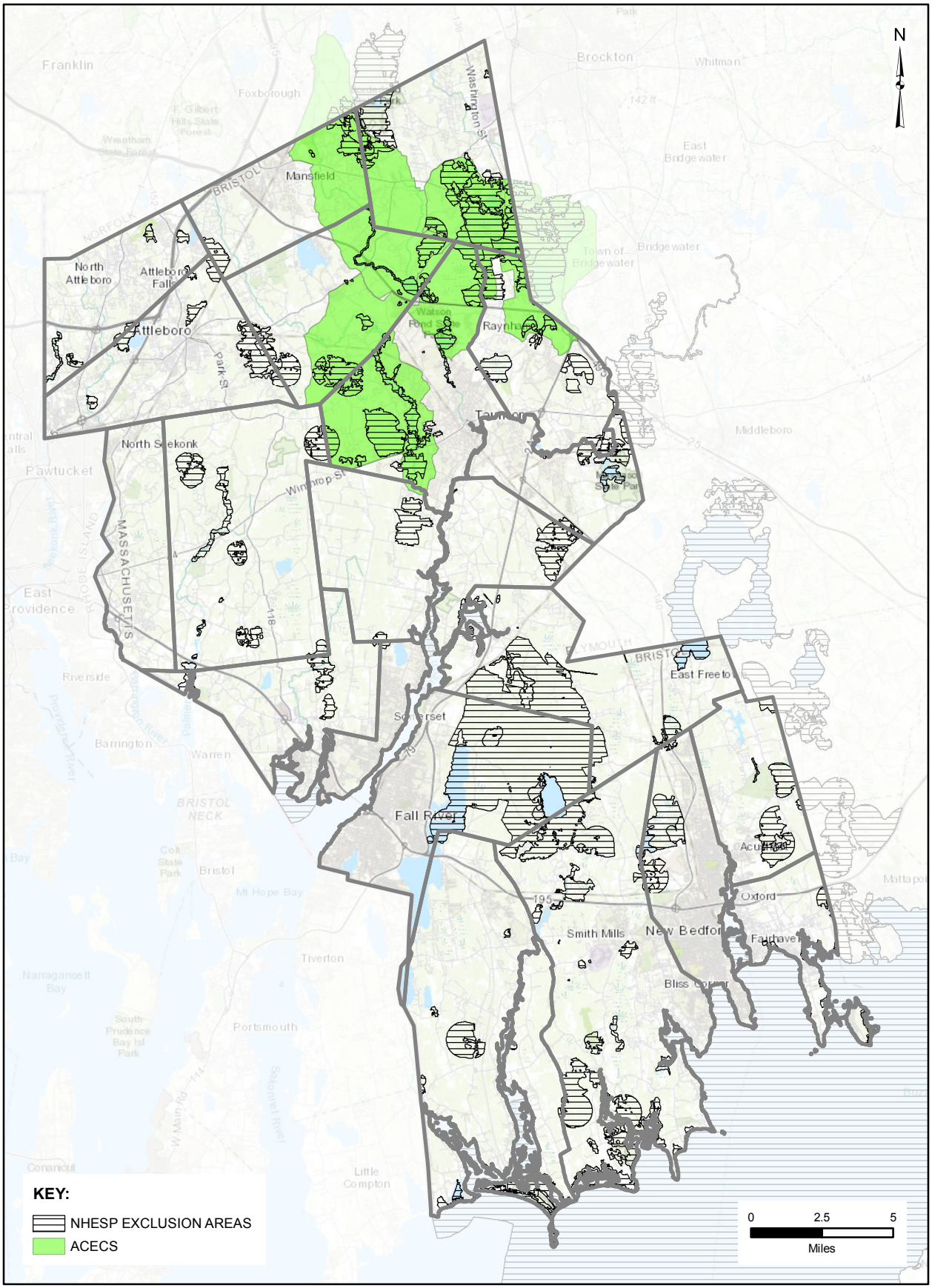

Figure 4. Exclusion Areas

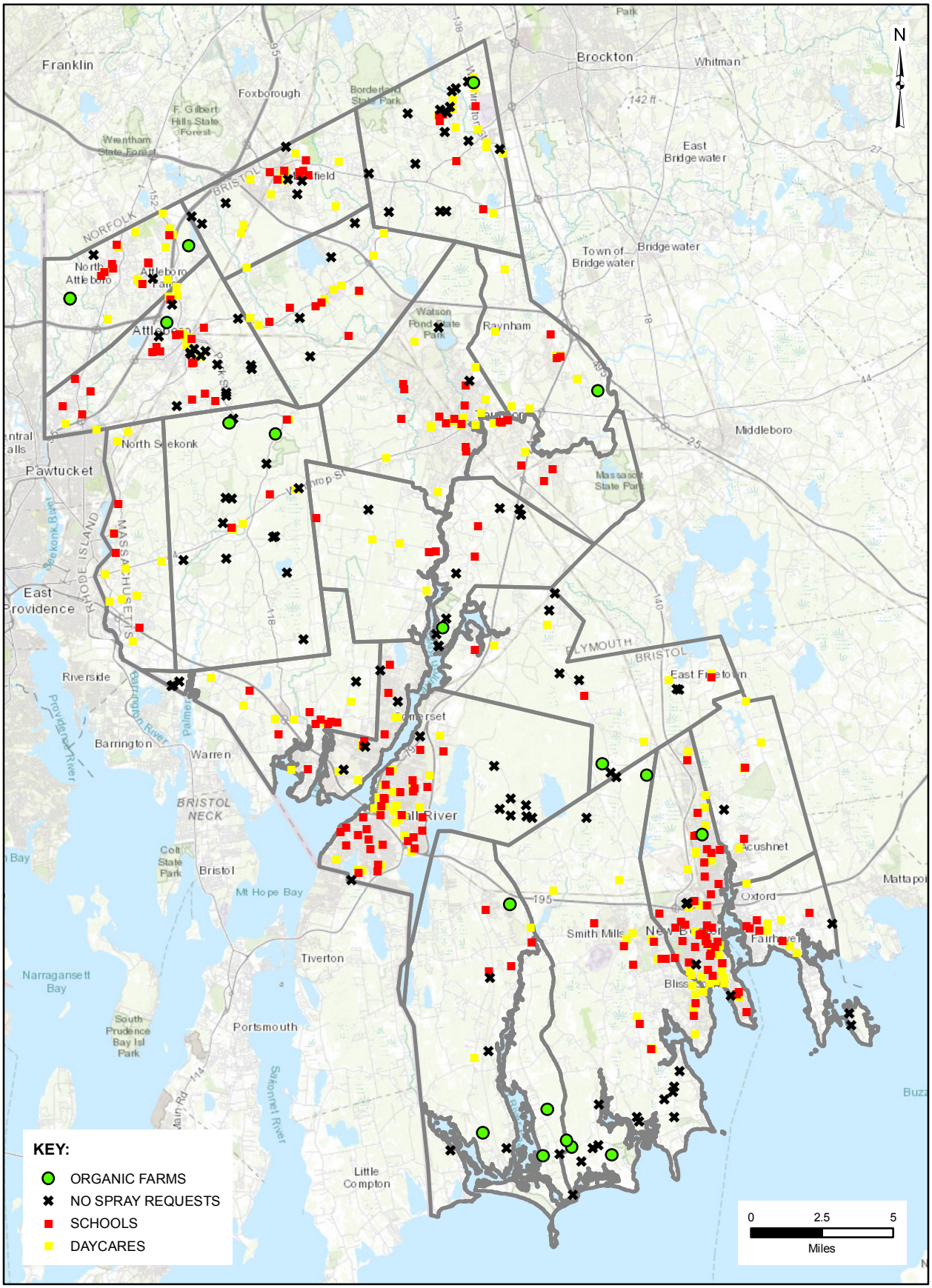

Figure 5. No Sprays