Regional Mosquito Control Conference Report

Conference Summary:

The Uxbridge Board of Health hosted a regional conference about mosquito control and vector borne illness on Wednesday July 22, 2020. The conference featured an introductory presentation by conference organizer Andy Dey, followed by presentations individuals who shared three important perspectives of mosquito control: the perspective of professional mosquito control, presented by Chris Horton from the Berkshire County Mosquito Control Project; the ecological perspective, presented by Heidi Ricci and Dr. Martha Gach from Mass Audubon; and the human public health perspective, presented by Dr. Catherine Brown from the Massachusetts Department of Public Health. After the presentations, the Uxbridge Board of Health led a discussion that focused on the municipalities' concerns about preventing mosquito borne illness, interest in shared vector control activities, and the format such a collaboration might take.

The conference was attended by 54 individuals representing 19 towns, 15 non-governmental organizations as well as well as staff members from the office of U.S. Congressman Jim McGovern; Massachusetts State Representative Michael Soter; and the office of Massachusetts Senator Ryan Fattman.

You may view all of the presentation slides at https://www.uxbridge-ma.gov/board-health/pages/mvp-grant-2. The slides are listed under Task 4: Regional Conference, as well as at the bottom of the webpage under Attachments.

You may watch the complete recording of the conference at http://bit.ly/mosquitocon.

Presentations:

This section summarizes all three the presentations. At the end of each presentation, you may also see the questions asked during and after the presentation, along with their answers. Answers to the questions are paraphrased from the respondent's answers unless indicated by quotes.

Introduction

Presented by Andy Dey, a member of the Academic Public Health Volunteer Corps on behalf of the Uxbridge Board of Health.

Summary: Mr. Dey talked about how and why the conference was created. The conference was organized because of the current threat of Eastern Equine Encephalitis (EEE) and West Nile Virus (WNV), the lack of mosquito control coverage in many of the areas designated as critical risk for EEE in 2019, the complexity of mosquito control and the importance of collaboration. Mr. Dey also explained the rationale for speakers with three different perspectives on mosquito control: the mosquito management perspective, the ecological perspective, and the public health perspective. He finished the introduction by outlining the conference agenda and explained how to ask questions during the presentations.

Sub-topics:

- Acknowledgements
- Background
- Why these perspectives?
- Importance of Collaboration
- Conference Agenda

Integrated Mosquito Management in Massachusetts

Presented by Chris Horton, Director of the Berkshire County Mosquito Control Project

Presentation Summary:

Mr. Horton talked about the basics of mosquito control. He described how mosquito control methods have developed and changed over time from mechanical to chemical, which evolved into the modern approach known as Integrated Mosquito Management (IMM). He then went into detail about how integrated mosquito management works.

Mr. Horton described each element of Integrated Mosquito Management: knowledge of the mosquito life cycle and patterns; surveillance and the use of resources; emphasizing that mosquito control can be resource intensive. He also discussed the environmental impacts of mosquito control, the purpose and methods behind larvicide and adulticide use,

standing water management, source reduction, outreach, and public education. He finished by discussing the organization of mosquito control in MA, how membership in a regional mosquito control project works, and what that membership entails for the towns and communities.

Sub-Topics:

- Development of Mosquito Control
    - Mechanical, Chemical and Integrated Mosquito Control
- Integrated Mosquito Management
    - Mosquito Biology
    - Surveillance
    - Resources
- Regulation of Mosquito Control Methods
- Environmental Impact of Mosquito Control Practices
    - Generic Environmental Impact Review (GEIR)
- Larval Control
- Adulticide
- Water Management
- Source Reduction
- Surveillance
- Outreach and Education
- How Mosquito Control is Organized in MA

Questions:

Question 1: Water striders and dragonflies can also be used as a non-toxic method to control mosquitoes. Have you seen any investigations or use of these natural biological controls?

- Answer: At the moment, the major universities in Massachusetts are not focused on mosquito control, and the main centers of mosquito control research are currently elsewhere. We are applying proven technologies with known results. There are great universities researching mosquito control, and they look into these types of methods. We know that there is not a satisfactory natural control for mosquitoes, mosquitoes have a reproductive strategy that can overwhelm almost any predatory mechanism. In the mosquito world, there is not going to be a natural balance. As a control mechanism, that would have to be developed and approved by the State based on scientific data, efficacy, and environmental impact before it could be used by regional mosquito control projects.

Question 2: What is the minimum water depth for a mosquito to breed? Can they breed in a half inch of water, or is there a number for that?

- Answer: “The Culex, *Aedes aegypti*, and Asian Tiger mosquitoes have been found breeding in an upside-down bottle cap, so basically a minimal amount of water.”

Question 3: To what extent do mosquito control districts develop their plans using guidance or requirements from that state and/or input from towns?

- Answer: Generally speaking, we have guidance from the state through the Generic Environmental Impact Review, that has the components that are approved for use in MA. In terms of their interaction with towns, different districts work differently in that respect. I think that all districts would be open to any input from towns, but this is a science that is used universally through the United States, and the superintendent [of the mosquito control project] is responsible to a town to ensure that they achieve the goal. There would be discussion of priorities and product use within that framework.

Mosquito Control from the Ecological Perspective

Presented by Heidi Ricci, Acting Director of Advocacy at Mass Audubon, and Dr. Martha Gach, Conservation Coordinator at Mass Audubon

Presentation Summary:

Ms. Ricci and Dr. Gach presented on the ecological impacts of mosquito control. They began by describing mosquitoes and mosquito borne disease in MA, noting that most species of mosquitoes have nothing to do with mosquito borne illness. The presentation then addresses the geographic spread of EEE in Massachusetts and the areas it affects, noting that the areas west of I-495 - where membership in a regional mosquito control program is more sparse than to the east - also contain a greater amount of habitat that support a wide array of plants and animals, including birds and mosquitoes that may carry EEE. These are often heavily wooded, rural or suburban areas where truck-based spraying is only able to penetrate to at most 300 feet. The presenters then went into detail about the ecosystems of those habitats: the energy flow, food chain, biodiversity, species interactions, mosquito predators, and the key role that insects play in these ecosystems.

After the detailed look at these important ecosystems, Ms. Ricci and Dr. Gach presented ecologically based approaches to mosquito control and the impact of different mosquito control measures on the ecology of major mosquito habitats. The approaches they discussed focused on promoting healthy wetlands and supporting a diverse array of wildlife including mosquito predators. These approaches emphasize practices with multiple benefits, including improving infrastructure such as culverts; low impact development; carefully planning new developments especially near wetlands and floodplains; stormwater management; and tailoring mosquito control to specific sites

according to wetland quality and the species of mosquitoes found breeding there.

They discussed the ecological effects of larvicide, aerial spraying, poor infrastructure such as old culverts, and the pitfalls of human development in wetlands floodplains and other habitats where mosquitoes and other ecologically important insects and mosquito predators naturally breed and live.

They finished their presentation discussing what is likely to change since the passing of Massachusetts mosquito reform amendment H.4851. The changes include broad powers given to the Massachusetts Department of Public Health (MDPH) to engage in preventive, management and eradication methods anywhere in the Commonwealth when there is an increased risk of arbovirus, opportunities for communities to opt out if they have alternative mosquito control plans approved by the MDPH and the creation of a task force to review the entire mosquito control system in Massachusetts.

Sub-Topics

- EEE Activity in MA
- A Changing Climate
- Biodiversity: Wetlands, Invertebrates, Pollinators and Ecology
    - Wetlands Energy Flow
    - Mosquito Predators: Odonates, Water Striders
    - Crane Flies
    - Wetlands Biodiversity
    - Importance of Insects
    - Wetlands Food Chain
- Ecologically Based Approaches to Mosquito Control
    - Mosquito Disease Management Techniques vs. Non-Target Impacts
    - Categorizing Wetlands and Breeding Sites
    - Larvicide (Bti)
    - Source Reduction
    - Human Development Siting and Design
    - Stormwater Management
    - Infrastructure
    - Low Impact Development
- Concerns About Aerial Spraying
- Effect of Mosquito Control on Non-Target Insects
- H. 4851, Mosquito Reform Bill
- Recommendations

Questions:

Question 1: Regarding collateral impacts of mosquito control: What are the impacts on insects of mosquito control/spraying in people's private yards?

- Answer: **Dr. Gach -** The substances used by those companies are not targeted towards mosquitoes so the collateral damage is any insect that comes into contact with that chemical: bees, caterpillars, flies: almost any insect can become collateral damage.

Question 2: Dr. Gach, you mentioned that more biodiversity can lead to lower mosquito populations, can you expand upon that?

- Answer: **Dr. Gach -** There were a couple studies abroad that found that higher biodiversity, especially of crustaceans, is connected with a lower population level of mosquito larva and it can also interfere with mosquito egg laying. Those studies are a couple years old, and they open up a promising field of research.

Question 3: About the small insect control companies: Are they putting pressure on state and local entities to allow for this to happen?

- Answer: **Ms. Ricci**- Marketing campaigns reinforce a general belief that the spray used is safe for everything but mosquitoes. This is not true.
  Mr. Horton - The products used by the Mosquito Control Programs are pre-approved and the mosquito control project is confident that if they are used under the terms of the label instructions that they are not posing undue risk to people and the environment. If there is a question about the label's accuracy the question needs to be directed at the regulating authority.

Current state of EEE and West Nile Virus in MA

Presented by Dr. Catherine Brown, an epidemiologist at the Massachusetts Department of Public Health.

Presentation Summary:

Dr. Brown began her presentation by describing the transmission cycles, habitats, and this year's forecast of the two mosquito borne diseases in Massachusetts, EEE and West Nile Virus. She noted that while EEE can be sometimes be predicted, West Nile Virus is nearly impossible to predict in advance. The prevalence of EEE and WNV in birds and mosquitoes and the incidence of the diseases in humans in a given year depends on several factors including infection rate in birds, temperature and rainfall patterns, and temperature.

Next, Dr. Brown talked about the specifics of WNV and EEE: incubation periods, symptoms, severity, how they can have different effects across age groups, and their geographic distributions in Massachusetts and the United States as a whole.

Dr. Brown then moved on to talk about multi-agency arbovirus surveillance and response in Massachusetts. She talked about the several agencies involved in arbovirus prevention including the Executive Office of Health and Human Services (which includes the Department of Public Health), the Executive Office of Energy and Environmental Affairs, local mosquito control projects, and local health departments. She gave an overview of the Massachusetts state plans, one of which is created and spearheaded by the Department of Public Health, and the other by the Department of Agricultural Resources.

After giving an overview of the two arbovirus plans, Dr. Brown focused on the Department of Public Health (MDPH) response plan, going into detail about how it conducts surveillance and tests mosquitoes for arbovirus, then what the MDPH does with that information: how MDPH uses that data to analyze the risks for human disease and communicates that risk and MDPH's recommendations to the relevant agencies and the general public via the 2020 risk communications campaign. The 2020 public communications campaign features a new website, video assets, TV, paid digital media, DOT billboards, social media, and stakeholder specific calls.

She finished her presentation by describing mosquito spraying. She described how truck-based spraying works and what its limitations are, and the decision-making process that leads to aerial spraying.

Sub-Topics

- Habitats for EEE vs WNV
- Forecast for the Year
- West Nile Virus Infection Human Disease
- Geographic Distribution of WNV in Massachusetts
- Eastern Equine Encephalitis Human Disease
    - EEE in the United States 1964-2019
    - EEE by Massachusetts County 2000-2019
    - EEE's Expanding Activity
- Multi Agency Arbovirus Surveillance and Response
    - MA State Plans: DPH and MDAR/SRMCB
    - Arbovirus Surveillance and Response Plan
    - MDPH Arbovirus Program Overview
        - Surveillance and Trapping
        - Lab Testing
        - Risk Analysis and Communication
        - Prevention Tools
        - 2020 Public Communications Campaign
            - Interactive Online Mosquito Borne Disease Map
        - Precautions
    - Truck-Based Spraying
    - Aerial Spraying Decision Making

Questions:

Question 1: What is the current daily risk or probability of any current resident of MA for contracting EEE? How can that risk be mitigated by joining mosquito control projects?

- Answer: Nobody has yet come up with a way to specify, for any individual, in an area at the highest risk during the highest risk time, the risk of any individual getting EEE. It is very small, and the risk is very low. There is also no way to get more granular about the risk assessments. When you track and test a mosquito in one area, we know it is representative of what EEE activity could be over a larger area. In previous years, aerial spraying did seem to prevent additional human cases. Mosquito districts are important because they help provide surveillance which is absolutely critical for understanding this risk. The regional mosquito control projects also provide knowledge about area habitats.

Question 2: Who will serve on the mosquito control task force?

- Answer: That is in the statute, and has broad representation across many groups and communities.

Question 3: Have there been any good studies looking at the long-term effects of DEET application to human skin?

- Answer: DEET is one of the oldest repellants, so we have a lot of experience with it. When used according to the directions on the label, the data do not indicate that there is a problem. However, there are a lot of people who prefer not to use DEET, and there are a number of alternatives available. Remember to look at all the possible active ingredients that are available to you. Oil of lemon eucalyptus is her recommendation for those who want a more natural repellant.

Question 4: Is the state switching over all the mosquito results to the webpage with the map?

- Answer: Yes, all the results will be on the map this year. It is not on the mosquitoresults.com site. if you scroll down, you will see a table with the positives for humans, animals and mosquitoes. If you click on the mosquito positive it will take you to that list. (The map is found at mass.gov/dph/mosquito).

Question 5: Is there available data about mosquito borne diseases for neighboring states?

- Answer: We talk on a regular basis with all our surrounding states. What we don't have is a one stop regional website that shows the activity for the region.

Question 6: Will mosquito spraying affect organic farmers, and will they no longer be able to advertise their products as organic?

- Answer**: Mr. Horton -** The state has a list of organic farms, and there is a list for exclusion in organic farms, beekeepers and farmers. Any beekeepers, organic farmers and partially organic farmers are encouraged to get a spray exclusion. There is no problem keeping the property outside the effective range of the MC equipment.
  Dr. Brown - During an aerial spray, organic farms were excluded
  Ms. Ricci - A lot of people grow food organically but are not registered, so if there is spraying, they cannot opt out. We [at Mass Audubon] also heard about myriad issues with beehives that were dismissed. Of greater concern are also the smaller pollinators that are not surveilled at all, so we have no idea of the effects of spraying on their populations.

Discussion

The discussion was designed to start a conversation among representatives of the towns in attendance for what aspects of mosquito control are of interest for collaboration and to brainstorm ideas for how that collaboration could take shape.

The discussion was centered on three questions:

1. Municipalities: What are your greatest concerns about preventing mosquito-borne illness in your community?
2. What areas and activities would you be interested in collaborating on?
3. How would you like to organize mosquito control collaboration?

Comments, suggestions and ideas for each question

Municipalities: What are your greatest concerns about preventing mosquito-borne illness in your community?

- The negative impacts on agricultural environment within the community, particularly collateral damage to the bees and other insects
  - Though, we must acknowledge the difficult balance between protecting the agricultural environment and the human population
- The degree of public anxiety and interest in mosquitoes once the spraying started was immense and impressive
  - Key concern: turning that energy into education early in the season.
    - It was mentioned several times that education has the greatest positive effect for the least harm, so early, widespread and targeted education should be a focus
  - This education could be more effective than any kind of plan or spraying
  - The personal responsibility and public education are the areas that are most lacking
- Would you like to share materials among towns?

        - Yes, and the materials should also be sent to multiple other local organizations to be distributed to their members

What areas and activities would you be interested in collaborating on? Examples may include: Surveillance; Education and outreach; Availability of personal protective measures; Sharing a licensed applicator specialist

- Educational Materials:
    - The state DPH and Mass Audubon, and the Central MA Mosquito Control Project have good educational materials already available
    - More than one person expressed interest in collaborating on sharing materials
    - COVID-19 has taught boards of health a lot about how to collaborate, and this is a great time to work together on mosquito control as well
    - Consider engaging with the Academic Public Health Volunteer Corps
- Surveillance
    - Surveillance could be an important area to collaborate
    - It would likely have much more public support than pesticide use
    - There is interest from more than one town about collaborating on surveillance
- A big concern with truck mounted spraying is that it may not be necessary or effective
    - There are areas where truck mounted spraying hasn't happened in a long time, and yet the mosquito populations have declined
    - There could be an opportunity to share lessons learned about mosquito control between towns
- Cost of being a part of mosquito control program is also an insurmountable obstacle for many towns

How would you like to organize mosquito control collaboration?

- A committee representing each of the towns
    - Another committee may be too much work or too time consuming
- It is nice to have someone championing the effort, so maybe having one person working as a coordinator would be effective

Next Steps

At the end of the discussion, Mr. Dey mentioned the possibility of further discussion about mosquito control collaboration. He encourages towns whose representatives are interested in a future discussion to email him at atdey@bu.edu. Additionally, if there are any further questions or comments from the conference, please send them to Mr. Dey.

All conference participants were given the opportunity to comment on the draft of this conference report. This report, along with the comments, will be used to plan future actions among towns whose representatives wish to collaborate on mosquito control.

All materials from the conference including this report, the presentation slides, and a recording of the conference will be available on the Uxbridge MVP 2 Grant webpage.

List of Conference Attendees

Andrew Pelletier, Southbridge Board of Health

Bill Fredericks, Office of Senator Ryan C. Fattman

Cameron Clark, Uxbridge Conservation Commission

Dave, Dave Lewcon Apiaries

David Small

David Tapscott, Uxbridge Board of Health

Diane Tiernan, Upton Board of Health

Donald Makowski, Warren Board of Health

Fran Fortino, Whately Board of Health

Garry Kessler, Westborough Conservation Commission

Gary Menin, Sr., Sterling Board of Health

Hillary King, MA EOEEA

James Philbrook, Charlton Board of Health

Jane Rascal, EcoHealth Advocates

Jeff Paster, Lancaster Board of Health

Jennifer Sullivan, Town of Webster

JenniferForman Orth, MA Department of Agricultural Resources

Joann Lindenmayer, Uxbridge Board of Health

Judith Eiseman, Kestrel Land Trust

Judy Bater, Town of Sutton

Kathleen Walker, Charlton Board of Health

Kavya Elangovan, Academic Public Health Volunteer Corps

Kimberly Buccini, Charlton Board of Health

Kimberly Putney, Academic Public Health Volunteer Corps

Kristin Kustigian, Charlton Board of Health

Laureen Gilbert, Oxford Board of Health

Lauren, Uxbridge Conservation Commission

Laurie Sanders, Conservation Works LLC

Lindsay Sabadosa, State Representative, 1st Hampshire District

Lisa Daoust, Spencer Board of Health

Lyndsy Butler, City of Gardner

Marcelino “Tex” Sarabia, Hardwick Board of Health

Marcella Stasa

Mark Richardson, Tower Hill Botanic Garden

Maureen Doyle, Southbridge Conservation Commission

Michael Soter, Massachusetts House of Representatives

Michelle Buck, Town of Leicester

Missy Kakela-Boisvert, Mendon Board of Health

Neil Angus, Devens Enterprise Commission

Oxford Board of Health

Paige Dolci, Mass Audubon

Paul Hutnak, Uxbridge Department of Public Works

Peter Demers, Sanofi

Roberta Armenti, Westhampton Board of Health

Seth Nadeau, Office of Congressman Jim McGovern

Stephanie Granger, Academic Public Health Volunteer Corps

Steven Sette, Uxbridge Town Manager

Timothy Deschamps, Central MA Mosquito Control Project

Tom Fichtner, Mendon Board of Health

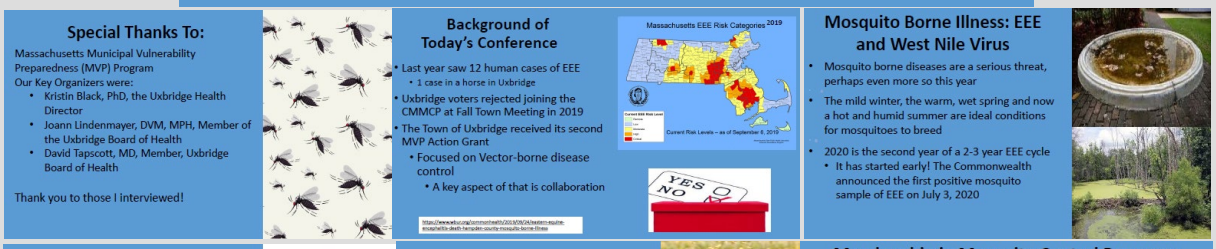
Key Presentation Slides:

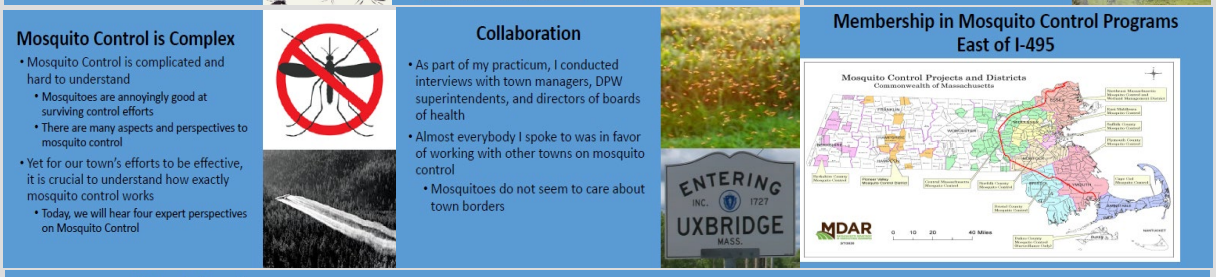
This section contains an overview of the presentations' slides. For the full slide decks, visit the Uxbridge MVP 2 Grant webpage at https://www.uxbridge-ma.gov/board-health/pages/mvp-grant-2.

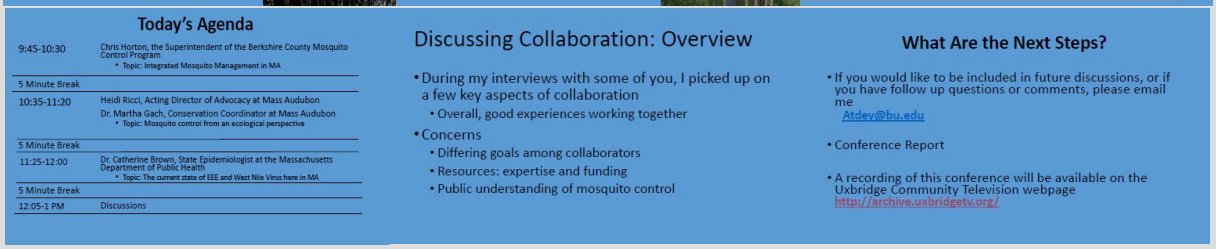
Note: All slides below are separate images that can be copied and pasted. The presenters have agreed to allow their slides to be reused and shared by conference attendees.

Conference Introduction

By Andy Dey, Academic Public Health Volunteer Corps, Uxbridge Board of Health







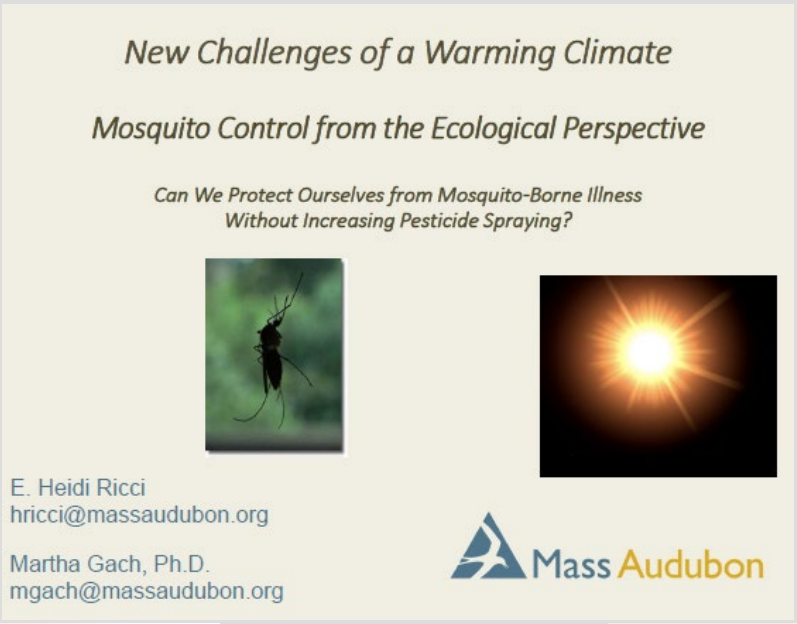
Integrated Mosquito Management in Massachusetts

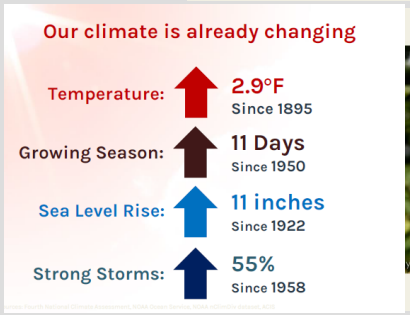
By Chris Horton, Superintendent of the Berkshire County Mosquito Control Program

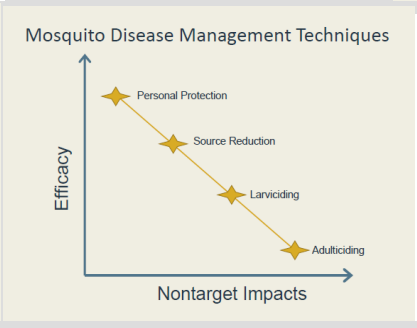
Mosquito Control from the Ecological Perspective

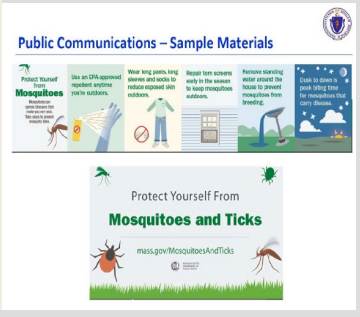
By Heidi Ricci, the Acting Director of Advocacy at Mass Audubon, and Dr. Martha Gach, the Conservation Coordinator at Mass Audubon

Additional Information and public education materials can be found at https://www.massaudubon.org/our-conservation-work/advocacy/priority-legislation/mosquitoes/frequently-asked-questions









Larviciding - Bti

- Bacterial based pesticide
- More targeted, less nontarget impacts than broad spectrum chemical pesticides

But recent literature finds:

- Toxicity to tadpoles
- Reduced biodiversity in treated wetlands – 50-80% overall reduction in insect density
- Targets all aquatic fly larvae (Nematocera), including non-biting midges (Chironomidae) – more than 100 species, many are important food for other species e.g. fish and birds
- Beneficial zooplankton and microcrustaceans impacted

Source Reduction – Good Housekeeping

Common items of trash provide mosquito breeding sites

Culverts – undersized, perched, clogged

- barriers to fish passage
- stagnant water

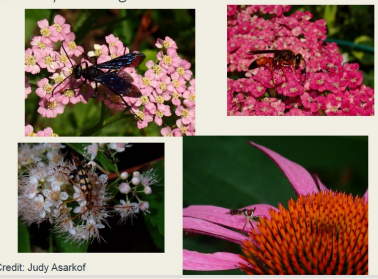
Low Impact Development

- Minimize impervious surfaces
- Maintain naturally vegetated buffers
- Filter runoff through plants and soils

Rain gardens collect stormwater and enhance the beauty of a neighborhood

- Toxic to fish
- Toxic to bees
- PBO synergist – suspected human carcinogen
- Respiratory irritant

So Many Amazing Insects



Credit: Judy Asarkof

And many are nocturnal

Credit: Judy Asarkof

H.4851

An Act to Mitigate Arbovirus in the Commonwealth

- Broad powers to DPH if there is an elevated risk of arbovirus
- Amendments:
  - Notification
  - Opt-out provisions
  - Mosquito Control for the Twenty-first Century Task Force.

What Needs to be Done

- Keep development out of harm's way.
- Restore and maintain healthy and diverse wetlands ecosystems to keep nature in balance.
- Restore and maintain free-flowing streams.
- Low Impact Development (LID).
- Improve monitoring of impacts of spraying on local ecosystems.
- Public education

Current state of EEE and West Nile Virus in MA

Presented by Dr. Catherine Brown, the State Epidemiologist and State Public Health Veterinarian at the Massachusetts Department of Public Health.