BERKSHIRE COUNTY MOSQUITO CONTROL PROJECT

19 HARRIS ST.
PITTSFIELD, MA. 01201

SERVICES PROVIDED TO THE CITY OF PITTSFIELD SHERWOOD GREENS ROAD MANAGEMENT DISTRICT AND THE TOWNS OF CLARKSBURG, HINSDALE, LANESBOROUGH, OTIS, RICHMOND, SHEFFIELD, STOCKBRIDGE, TYRINGHAM

2020 ANNUAL REPORT

PREFACE

The 2020 annual report of the Berkshire County Mosquito Control Project has been prepared to provide the citizens and officials of member towns with information pertaining to the project's procedures and related activities.

As you read through this report you will notice that the project is committed to an Integrated Mosquito Management Program, IMM. This approach involves intervention in each stage of the mosquito life cycle using a variety of control techniques and evaluation procedures. When these techniques are properly implemented the process is safe and scientifically proven to reduce mosquito populations before they bite humans. No control effort is undertaken before surveillance data is collected and analyzed. Control decisions are made based on the exact need that exists at each specific site. Environmental considerations are paramount when prescribing various control techniques.

The BCMCP board of commissioners is appointed to represent the interests of each community. The commissioners meet with the superintendent on a regular basis to discuss and formulate policies and to provide their expertise in the operation of the project. The commissioners welcome your input, and we encourage you to contact us or visit the project headquarters.

Copies of this report are distributed to key officials in member towns. The report is also available to the public by contacting the project offices.

Our goal is to provide effective and environmentally sound mosquito control, reducing mosquito annoyance and the potential for the transmission of mosquito borne diseases. Our staff of well- trained, competent employees are known throughout member communities as individuals who take great pride in their work.

Thank You,

Wally Terrill, Chairman

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Organizational Setup

The Berkshire County Mosquito Control Project was created under chapter 454 of the Acts of 1945 and operated under MGL chapter 252 Improvement of Lowland and Swamps.

The project is administered by the State Reclamation and Mosquito Control Board located in Boston, MA. Membership in the project is accomplished by a majority vote at either an annual or special town meeting, or by the majority vote of a city council. The project is funded by an annual assessment which is determined by a formula administered by the Division of Local Services (DOR) and is calculated by equalized valuations. An amount is withheld from the State Cherry Sheet Assessment for each member city or town each fiscal year and is placed in a trust account for the project.

The State Reclamation and Mosquito Control Board (SRMCB) is comprised of three members, one each from The Department of Environmental Protection DEP, Department of Conservation and Recreation (DCR), and the Department of Agricultural Resources (DAR). The representative appointed from the DAR is by default the chair of the SRMCB. The SRMCB is charged with the appointment of the Berkshire County Mosquito Control Project Board of Commissioners. This is a three-member board that meets quarterly at the project office. SRMCB contacts all member towns in the project area when there is an opening on the commission. Commissioners are appointed after an interview with SRMCB where qualifications are reviewed. Each commissioner is appointed to a three-year term. The composition of the board varies and represents a wide range of expertise. Current commissioners include members of boards of health, selectmen, former project superintendents, private citizens, mosquito control industry representatives, and DPW directors or commissioners. The quarterly meeting of the commission is an open public meeting. Notice of each meeting is sent to the office of the Secretary of State. The commission is charged with the appointment of the superintendent, who is charged with the day-to-day operations of the project.

At the quarterly meeting the commission approves minutes of previous meetings, employee payrolls and all other expenditures. The superintendent outlines the current status of operations at the project, and all relevant topics are brought to the attention of the commission for review, discussion and a vote if necessary. All discussions and votes are recorded in the meeting minutes and are considered the official record of the commission.

COMMONWEALTH OF MASSACHUSETTS

STATE RECLAMATION AND MOSQUITO CONTROL BOARD

251 CAUSEWAY ST. SUITE 500

BOSTON, MA 02114

SRMCB MEMBERS

JOHN LEBEAUX (DAR)

NANCY LIN (DEP)

JAMES STRAUB (DCR)

JENNIFER FORMAN-ORTH, ENVIRONMENTAL BIOLOGIST

COMMISSIONERS OF BERKSHIRE COUNTY MCP

MR. RYAN GRENNAN
PITTSFIELD, MA

MR. JAMES MCGRATH
PITTSFIELD, MA

MR. WALLY TERRILL, CHAIRMAN
OTIS, MA.

PROJECT SUPERINTENDENT

CHRISTOPHER J. HORTON

EXPENDITURES 2020

ITEM	COST
PAYROLL	$ 105,450
COMMISSION	$ 1,200
RENT	$ 29,316
HEAT/ELECTRIC	$ 3,000
HEALTH INS./FRINGE BENEFITS	$ 15,500
LIABILITY/VEHICLE INS.	$ 16,500
POSTAGE	$ 300
AUTO PARTS / REPAIR	$ 1,500
FUEL VEHICLES/EQUIPMENT	$ 5,000
PESTICIDES	$ 65,000
PROFESSIONAL ASSN.	$ 150
PESTICIDE LICENSES	$ 450
SOFTWARE / IT LICENSE	$ 22,000
TRAVEL	$ 1,500
RETIREMENT ASSESSMENT	$ 12,500
OFFICE SUPPLIES/PRINTING	$ 802
DPH TESTING	$ 11,000

THE TARGET PEST

All mosquitoes found within the project boundaries belong to one of two groups:

-Floodwater mosquitoes lay their eggs on dry ground in areas that are subject to flooding. These eggs lay dormant until inundation, when hatching is initiated. Hatching is synchronized and development from egg to blood-feeding adult can occur within 7 days when temperatures are high. Areas within the project that favor the development of floodwater mosquitoes include swamp and marsh margins, roadside ditches, vernal pools, and the floodplains of rivers and brooks. From a nuisance perspective, these are the most prolific and bothersome mosquitoes for member town residents.

-Permanent or semi-permanent water mosquitoes lay their eggs directly on the water surface, either singly or in a cluster called a raft. The developing population is continually being replenished resulting in the constant emergence of new adult mosquitoes. The most important species occurring in the project area are *Anopheles* and *Culex* mosquitoes, which are found in catch basins, stagnant polluted water areas that form the margins of lakes and ponds and in unmounted tires, discarded containers and plugged gutters. *Culex* mosquitoes are considered a major vector in the transmission of West Nile Virus.

THE TACTICS

Operations of the Berkshire County Mosquito Project are modeled on the principles of Integrated Pest Management. Primary emphasis is placed on the decimation of target pests when they are in their most vulnerable and concentrated stage of development. In the case of mosquitoes this is the larval stage. Principal focus is placed on periodic surveys of the project area to locate permanent and temporary mosquito sources and then to routinely inspect these areas, treating only those sources found to hold mosquitoes. Additional efforts are made to eliminate sources through water management practices whenever possible. Finally, temporary relief can be provided through adult control measures in those areas where surveillance shows a need.

OPERATIONAL OVERVIEW

1. Mapping

An effective mapping system to aid personnel in locating mosquito breeding sites sources is crucial to any mosquito abatement operation. BCMCP implemented an automated mapping system in 2012 which uses ARC Geographic Information System technology to identify, measure, and record surveillance and Treatment data using handheld devices in the field. To date, over 550 breeding locations and 7,962 catch basins are mapped in member towns. Since 2013 all surveillance and treatment data has been recorded using this system. A program in the system automatically calculates application rates for each site based on the size of the site, the product being used, and the terrain type. Reports of work progress and treatment data can easily be generated from the project office.

Another benefit to the use of this system is that schedules for inspection and records of treatment are available in the field through handheld GPS units. Multiple technicians are able to work in the same zone efficiently. The GIS system has been upgraded in 2020 to cloud based technology.

2. Larval Control

Once an accurate mapping system has been established a routine inspection and treatment program can be implemented to control mosquitoes while concentrated, relatively immobile and accessible in the larval stage. Larval control is a major component of the BCMCP program and requires approximately fifty percent of our manpower during the breeding season. We strive to inspect each potential breeding site on a seven-to-ten-day interval. Only those sites found to harbor mosquito larvae are treated. All sites inspected and treated are recorded each day and are on file at the project headquarters.

3. Adult Control

To determine the necessity for adult control, the project utilizes a procedure known as the “landing count” to determine the number of adult mosquitoes present at a particular location. (Adult mosquitoes are actually counted over a fixed interval at a specific location.) Placement of mosquito traps in areas that have the potential to produce large mosquito populations provide general

population trends and are also a source of species information. Service requests from residents in member towns are also a valuable tool in determining where adult mosquito control may be necessary. The decisions to initiate adult control measures are based on information collected from all of these sources. Adult mosquito control is a vital component of Integrated Mosquito Management and accounts for approximately thirty percent of our manpower during the breeding season.

When WNV or EEE are detected in a particular area, an immediate adulticide response is recommended. Follow up surveillance measures and continued adulticide applications are used to limit virus amplification and exposure of human populations to viral agents. When virus is detected landing counts are curtailed and trapping data is used to evaluate mosquito populations.

4. Source Reduction

Source reduction involves habitat manipulation to eliminate or modify places that support adult mosquitoes. When source reduction methods are used appropriately they provide the most effective and long-lasting mosquito control of all methods of management. In addition, source reduction is the least expensive method in the long term despite higher initial costs because it need not be repeated frequently. Source reduction usually consists of maintenance of existing drainage systems to restore traditional flow patterns by removing accumulated debris and obstructions. All work performed for source reduction by the project is done in a manner designed to cause minimal disturbance to the existing environment. We use only hand tools and all work is done in compliance to established best management practices. Source reduction projects are usually carried out in the fall months after the mosquito breeding season has ended.

5. Arbovirus Surveillance

The mosquito is considered the most important disease carrying vector on earth. Until the early part of the twentieth century little was known about the existence of mosquito borne diseases and their effects on human populations. Fortunately, most of these diseases are not prevalent in our area. There are however, two diseases that have become cause for concern in Massachusetts, and more recently in Berkshire County; West Nile Virus, WNV and Eastern Equine Encephalitis, EEE. The Massachusetts Department of Public Health administers a statewide program to monitor mosquito populations for the presence of WNV and EEE, establish risk levels for local communities and disseminate information to the public and local boards of health concerning mosquito borne disease. The

BCMCP participated in this program in 2019. The arbovirus surveillance season Began on June 4, 2020 and continued to September 17, 2020 in Berkshire County. Each week 15 to 20 gravid mosquito traps and 10 to 12 C02baited light traps were deployed at locations throughout member towns to collect mosquito samples that were prepared and shipped to MDPH labs for analysis. A total of 227 samples were tested from Berkshire County in 2020. There were no isolations of West Nile Virus or Eastern Equine Encephalitis in Berkshire County in 2020.

Both West Nile Virus and Eastern Equine Encephalitis follow cyclical Patterns of prevalence. Surveillance data for 2020 suggests that Berkshire County is in a quiet interval in this cycle. The 2017 and 2018 seasons showed record levels of WNV in the environment. Continued vigilance in the areas of surveillance and response are necessary to ensure that when WNV comes into the community it does not amplify which can lead to human or animal infection. Additional trapping to target *Culiseta melanura* and *Coquillettidia perturbans* became a priority in 2014 after Eastern Equine Encephalitis was found in both of these species in 2013. This is of particular concern in that EEE has been found in *C. perturbans* which is considered a bridge vector for EEE and could spread the disease to mammals (humans). Surveillance will remain a high priority for 2021 and future years in order to identify the presence of mosquito borne disease and to effectively target potential disease vectors.

6. Public Outreach

The goal of public outreach is to increase understanding and cooperation among constituents. The goal of Integrated Mosquito Management (IMM) is to improve the health and quality of life of our human community. It is important that as many people as possible know the basics of mosquito biology, the diseases that mosquitoes can potentially carry and transmit, and the methods and materials that we use to control them. Our challenge is to have the public understand that IMM is a unified process that is scientifically developed to ensure adequate results while simultaneously protecting the safety of humans and the natural world around us. We use every opportunity available, such as media interviews, public events, or even personal contacts made while in the field to describe our activities.

MOSQUITO MANAGEMENT AROUND THE HOME

There are several ways that homeowners can minimize the number of biting mosquitoes around the house. One of the easiest ways to manage mosquitoes is to eliminate standing water where mosquitoes can lay eggs.

Some common breeding sites are:

-Artificial containers (pails, paint cans, discarded tires, open cesspools or septic tanks, boats, pool covers, bird baths, and wading pools)

Without standing water mosquitoes cannot reproduce. Old containers should be disposed of or recycled. Swimming pool filter systems should be maintained and in good working order. Openings to water sources can be sealed as in rain barrels or septic tanks. Rotten tree holes or stumps should be filled with sand. Old tires should be disposed of or stacked and covered to prevent rainwater from collecting inside. Ornamental pools and aquatic gardens can also breed mosquitoes if the water is allowed to stagnate. Water should be changed regularly, or an aerator should be installed. Biological control can be achieved by stocking fish that will eat mosquito larvae.

There are also ways that the homeowner can minimize the annoyance of adult mosquitoes. Mosquitoes must rest in shady calm areas and will avoid breezy or sunny locations. Removing trees and mowing tall grass will reduce the number of places where mosquitoes can rest. Mosquitoes are most active in the hours around dusk and dawn. Simply avoiding outdoor activity during these times of peak activity can minimize contact with mosquitoes.

For more information on mosquito control techniques or the products used by the Berkshire County Mosquito Control Project please call or email us.

Berkshire County Mosquito Control Project
(413) 447-9808
chris@berkshiremosquito.org

2020 MOSQUITO SEASON SUMMARY

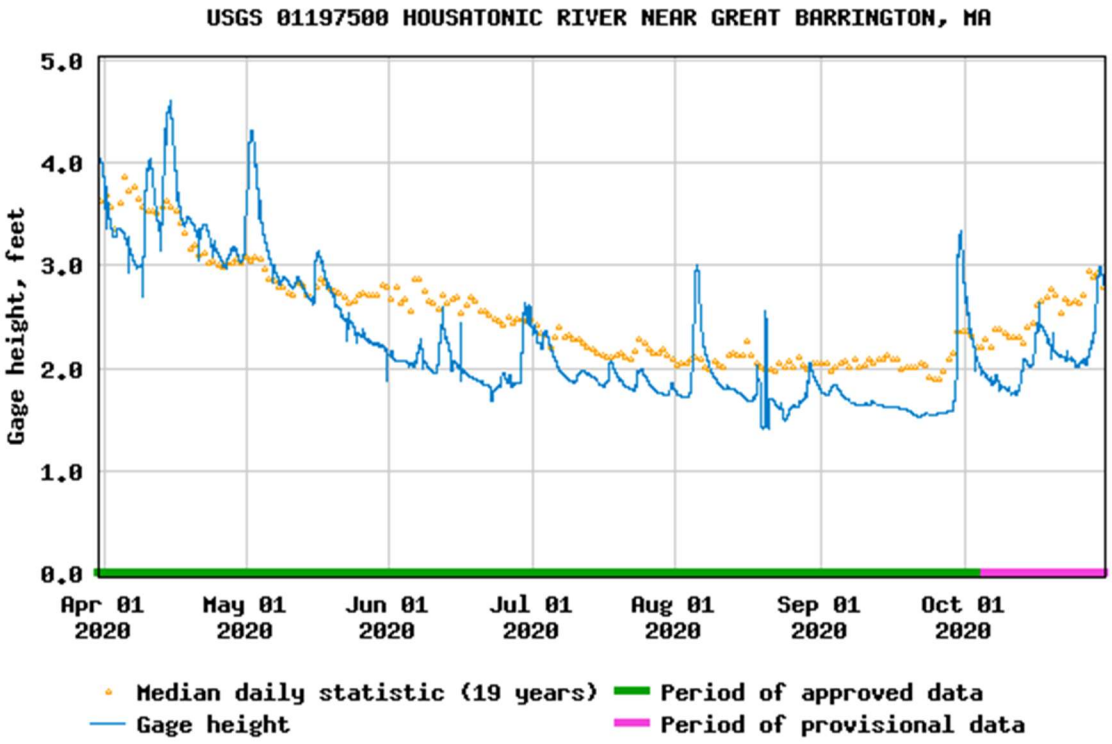

Figure 1. USGS 01197500 Housatonic River Near Great Barrington

The Berkshire County Mosquito Control Project began operations in early April 2020 with surveillance of over 500 known breeding sites in the member towns. Figure 1 clearly represents the overall pattern of precipitation for the 2020 season. (When the Gage height in Figure 1 exceeds 5 ft. the Housatonic begins to flood the low fields in Great Barrington and Sheffield.) The season began with average precipitation and somewhat above average soil moisture. Spring larval treatments were able to address the majority of a robust spring brood. By mid-May a drying trend had set up and Cs. melanura habitat was targeted for larval control. Surface water continued to diminish through June and the seasonal emergence of Cq. perturbans was noticeably less than in the 2019 season. When resident requests indicated increased adult mosquito populations, verification was made with site visits and trapping. ULV treatments were used to address the adult mosquitoes. Culex species, which generally increase in numbers through June and July were scarce. Lack of precipitation being a major factor contributing to the smallest population of Culex pipiens / restuans mosquitoes that we have seen in this district over the past ten years. By the third week in July, trapping data showed

populations below threshold levels and in decline. With populations of potential vectors low, and no evidence of mosquito borne disease, the final ULV application for the season was made on August 14th. Catch basin treatments and larval control continued to pressure Culex populations through the end of the season.

Surveillance trapping for West Nile Virus and Eastern Equine Encephalitis began June 4th, 2020. All trap locations that have a history of isolations for WNV or EEE are considered permanent trap locations with samples being tested weekly. Gravid traps which capture egg bearing mosquitoes are used to sample *Culex pipiens/restuans* which are vectors for WNV, while CO2 baited light traps are used in an effort to collect *Culiseta melanura* which is known to be the species responsible for EEE transmission in birds. These traps are also capable of capturing other species of mosquito that are known to be vectors of EEE. Following years of record levels of WNV and EEE in Massachusetts, efforts focused on collecting and testing as many possible vector mosquitoes as possible. BCMCP staff trapped and submitted 227 samples from member towns during 2020 which is well below the number of submissions for 2019. Trapping effort was the same as in the previous year with all locations being sampled weekly but the mosquitoes simply were not there. Berkshire County saw no isolations of WNV or EEE during the 2020 season.

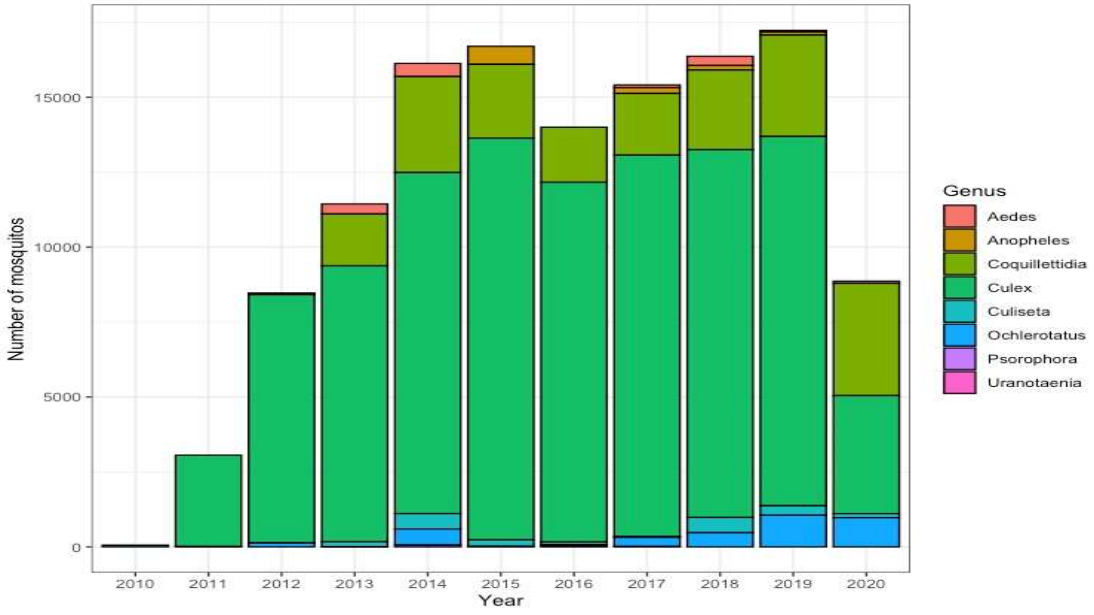

Figure 2. Mosquito Submissions Over 10 Years BCMCP Wiles

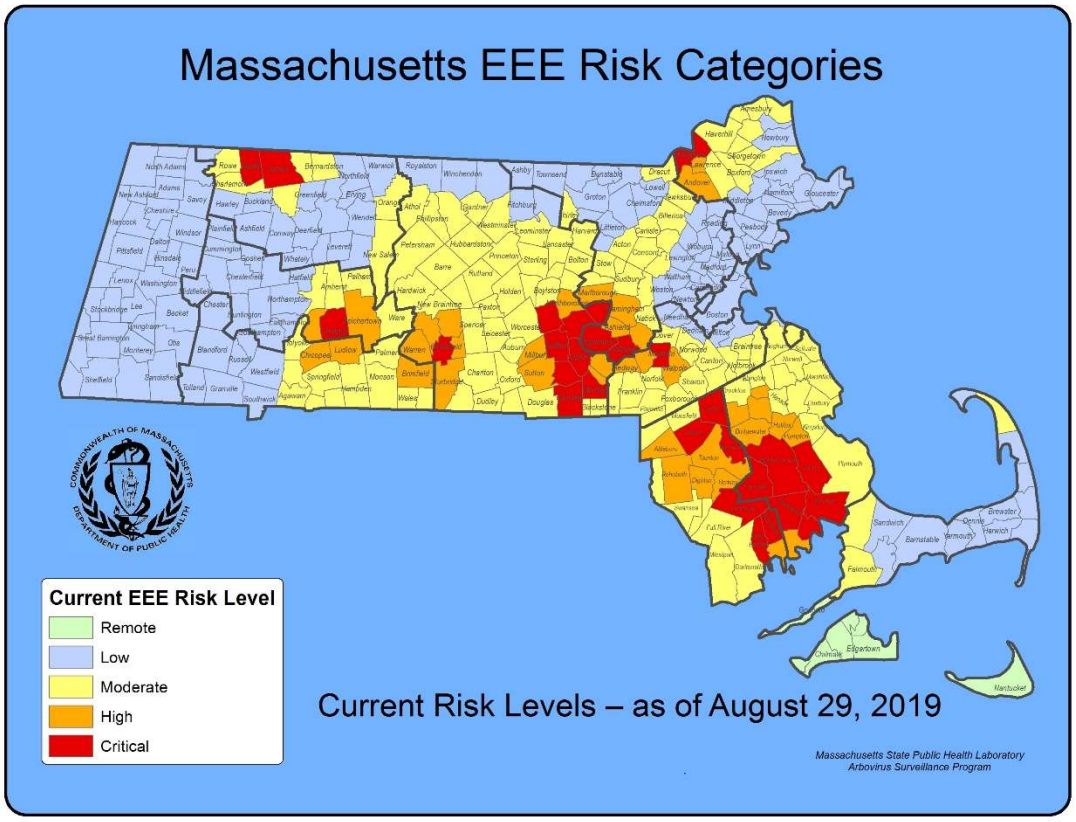

Figure 3. MADPH Arbovirus Risk Map (Late August 2019)

The events related to the EEE outbreak of 2019 demonstrate the importance of an effective system of surveillance and control in order to protect populations from mosquito borne disease. This disease threat was detected early, determined to be critical and a rapid commensurate response of communication and vector control was initiated to protect public health. The 2018 mosquito season saw the highest threat levels of WNV ever seen in Massachusetts and 2019 likely saw highest threat levels of EEE ever seen. It is important that we remain prepared for future challenges.

Source reduction is a term used to describe work performed in wetlands and drainage systems to reduce breeding habitat for mosquitoes. The process involves cleaning and maintenance of ditches and waterways to prevent flooding and backups which would favor mosquito breeding. Mosquito control districts in the state of Massachusetts have statutory authority to work in wetland environments through exemptions granted through

the Wetlands Protection Act. The Berkshire County Mosquito Control Project does however consult with the Natural Heritage and Endangered Species Program when work is performed in high priority Natural Heritage areas. All work is performed using hand tools according to accepted "best management practices "which are designed to accomplish project goals while minimizing disturbance to the environment. BCMCP Currently maintains over 17,000 linear feet of ditch to reduce breeding habitat. In addition, Berkshire County Mosquito Control Project worked with cities and towns in 2020 at several locations where beaver activity had caused drainage problems by restoring beaver exclusion devices, removing debris and restoring water flow.

Education and outreach are essential to the mission of mosquito control especially when mosquito borne disease is present. Employees of the Berkshire County Mosquito Control Project are always encouraged to interact with the public whenever possible to explain our work, to describe our methods, the products we use and explain how they work. In 2020 Berkshire County Mosquito Project contributed to and participated in several virtual meetings related to mosquito control and public health.

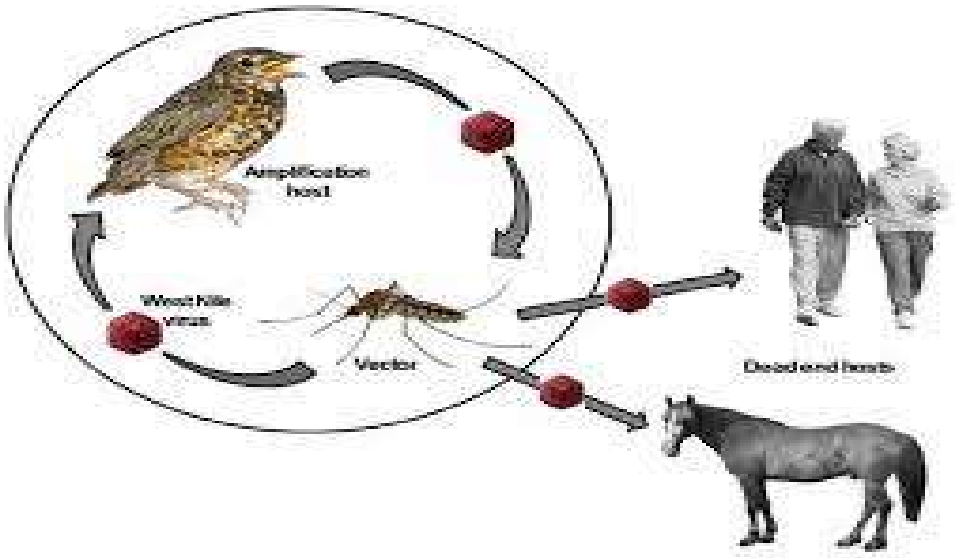

Figure 4. Enzootic Cycle of West Nile Virus

MATERIALS USED

The most effective way to deal with mosquitoes is to control the population in the larval stages, before they become flying adults that cause annoyance and can possibly spread disease. For larval control the Berkshire County Mosquito Control Project uses an organic larvicide, Vectobac which is a *formulation* of the bacteria *Bacillus thuringiensis* and is extremely effective against larval populations. The product is introduced directly into the water column where it is ingested by mosquito larvae. The active ingredient interrupts the gut lining of the mosquito larvae causing them to stop feeding and die within hours. This product does not affect species other than mosquitoes, black flies, and midges and does not accumulate in the environment. For catch basin larval treatments in 2020 the Project used Fourstar 90-day Bti briquets which provide a time release application of Bti.

In 2020 the Berkshire County Mosquito Control Project applied 1,112.1 lbs. of Vectobac G to 155.18 acres of larval habitat in member towns. Larval control continues throughout the season and breeding areas are treated each time surveillance indicates larval development. BCMCP treated a total of 4,593 catch basins in the months of June, July, and August.

In addition to these larval treatments BCMCP evaluated two additional larval control formulations in a field study focused on *Culiseta melanura* habitat. Thirty pounds of Natular G30 an organically certified bacterial larvicide was used in selected areas. Twenty pounds of Vectomax FG, a formulation of Bti and Bs, which is also organically certified was used at another *Cs. melanura site.*

Unfortunately, all mosquito breeding sites are not able to be treated because of either size or accessibility issues. From time to time the populations of adult mosquitoes present a public health risk or increase above tolerable levels and adult treatments become necessary. The tolerance of individuals to mosquito annoyance varies throughout the population but research has shown that if from three to five mosquitoes land on a person at a particular location over the course of one minute intervention is warranted. When surveillance indicates this condition is present, adulticide applications are in order. For adult mosquito control the Berkshire County Mosquito Control Project uses Duet which is a formulation of Prallethrin and Sumithrin which are synthetic pyrethroids. These chemicals are synthetic versions of the natural insecticides found in chrysanthemum flowers. Duet is an advanced product that has been shown to be extremely effective at controlling adult mosquito population across the globe. The combination of Prallethrin and Sumithrin cause a condition known as “benign agitation” in which mosquitoes are drawn from their resting state allowing greater control of the population. This product kills mosquitoes by interrupting neural transmissions causing paralysis. This product was

chosen because it has a very low toxicity to humans and mammals and breaks down rapidly in the environment. This product does have the potential, however, to impact non target organisms such as fish and honeybees. To prevent adverse effects on the environment and species other than mosquitoes, applications are made only when necessary and strictly according to label instructions prescribed by the Environmental Protection Agency. These label instructions provide wide margins of safety for humans and the environment. The project applied 102.2 gal. Duet in 2020 over an area of 25,101 acres.

RESISTANCE TESTING 2020

Mosquitoes and other insects share a reproductive strategy that allows their population to increase rapidly when environmental conditions favor their life cycle. A single Culex mosquito can lay from 100 to 300 eggs and produce as many offspring in one week. Within these offspring are carried a variety of characteristics that favor or hinder their survival. When we work to control the size of these mosquito populations using Integrated Mosquito Management we are focused on the vulnerabilities of the mosquito at each stage of the life cycle. When we use pesticides, either biological or chemical, it is possible that there is a capacity to resist the particular active ingredient inherent in the population. If resistance is present it is possible to favor this resistance through continued use of the subject active ingredient. The resistant individuals will continue to reproduce and replace their susceptible siblings and eventually the active ingredient will not control the population.

The active ingredients used in today's IMM are the result of many decades of research and development. Whether they are biological pesticides such as Bacillus thuringiensis, Spinosad, insect growth regulators such as Altosid or natural and synthetic pyrethroids they are effective, offer relatively low toxicity to non-target species and do not accumulate in the environment. When their use is targeted and focused, impacts on non-target organisms and the environment a limited and short term. The list of active ingredients deemed acceptable for use in IMM is short and so their use must be stewarded.

Berkshire County Mosquito Control Project partnered with the Northeast Center of Excellence for Vector Borne Disease in 2020 to determine resistance to currently used larval control active ingredients. Specimen samples of the local Culex mosquito population were collected during the 2020 season and submitted for testing at NEVBD labs at Cornell University. Bioassays were performed using BTI and Bacillus Sphaericus. Resistance to these agents was not found in the local Culex population.

If resistance is found, it can be overcome by alternating treatment with a product that uses a different mode of action. Recently the use of Spinosad products in catch basin treatments and wetlands has offered this variety in mode of action. Moving forward BCMCP plans to continue resistance testing and integrate product rotation as a resistance prevention strategy.

FIELD RESEARCH PROJECT

Following the EEE outbreak of 2019 Massachusetts Department of Public Health and the State Reclamation and Mosquito Control Board evaluated the situation that developed into this public health emergency. It was well known that weather conditions had favored *Cs. melanura*, the primary vector of EEE during the fall and winter of 2018. Trapping and population surveys had indicated that this mosquito had increased in prevalence across the state. It was this large population of *Cs. melanura* that facilitated the amplification of the virus when it arrived in birds in 2019. The response to the increase threat from EEE was to remove the adult mosquito vectors using aerial adulticide applications in targeted communities where risk of contracting EEE was considered critical. These applications were continued from early August 2019 through the end of the 2019 mosquito season. The process, while successful, proved to be expensive, complex, and problematic mainly due to the necessity of acceptable weather conditions.

Figure 5. Cryptic Habitat BCMCP Wiles

The question was asked; could the situation have been prevented? The response being that control of arbovirus is vector control, and if the vector mosquitoes could be controlled in the larval state, the likelihood of virus amplification through adult mosquitoes would be reduced. The problem being that due to the unique characteristics of the *Cs. melanura* cycle larval control has not been accomplished to date. This mosquito develops the cryptic environment formed in permanent water swamps of either red maple of white cedar. The crypt is formed under a root dome formed at the base of these trees as they grow in extremely wet conditions. The adult *Cs. melanura* enters these crypts through small openings in the root dome to rest in a shaded moist environment and deposit her eggs in the pooled water of this sheltered environment. The eggs hatch and larvae develop in this cryptic environment while the adults emerge in the evening to target bird hosts for the bloodmeal which is essential to their reproductive process. These swamps are all but impossible to navigate on foot and experience has shown that conventional aerial larval treatments have shown limited efficacy due to the fact that sufficient larvicide does not enter the crypt due to the shielding effect of the root dome. A hypothesis was developed that applications of larvicide at higher rates, perhaps up to the maximum allowable label rate would introduce enough active ingredient to the crypt to provide larval control. Another idea was that applications of recently introduced time-release larvicide could be introduced to the crypt through the water column during a significant precipitation event.

Several Massachusetts mosquito control districts volunteered to develop studies to investigate the possibility that *Cs. melanura* can be control in the larval state through novel applications of larvicide. Berkshire MCP designed a study to apply time release larvicides to *Cs. melanura* habitat and determine the efficacy of the treatment through chemical analysis of water samples as well as bench bioassays using water from within the crypts as well as outside of the crypt in the treated wetland. Chemical analysis was performed at the University of Massachusetts Pesticide Analysis Laboratory and bench bioassays were performed at NEVBD, Cornell and Benzon Research of Pennsylvania.

Thirty crypts were identified and labeled according to protocols developed by NEVBD. Ten crypts served as control, ten crypts were treated with a time release BTI/Bs formulation and ten crypts were treated with a Spinosad formulation. Application was made with powered backpack application equipment to encompass an area around each crypt by forty feet. Water samples were taken immediately after treatment and weekly for the lifespan of the product. A second application was conducted over the Spinosad test area on July 10th prior to a forecast rain event. Water samples were collected several days post treatment on July 14th.

The chemical analysis of the of water samples in the Spinosad treatment area showed that levels of larvicide collected outside of the crypts were far higher than those from within the crypt. As expected, larval mortality was also higher in bioassays using water collected

outside of the crypts. Overall average mortality 47 percent. No significant larval control occurred inside crypts in the Spinosad treatment area. Overall mortality 11 percent. Chemical analysis of water samples collected on the third week post treatment indicated only trace levels of Spinosad. Bioassay results from the area treated with BTI/Bs indicated 64 percent overall mortality for water collected outside of the crypts. Overall mortality for water collected inside the crypts was 33 percent. Another observation related to backpack application was that due to the twisting and turning required to maintain balance in this environment the equipment did not provide a steady flow rate. The calibrated rate of application was set at 15 lbs. per acre, but the actual application rate calculated using collection containers randomly placed in the treatment area indicated the application was about half this amount.

Figure 6. Water sampling site BCMCP Wiles

Bioassay results from the July 10th Spinosad application indicated higher mortality from water samples taken inside the crypt in six out of ten sites. Inside samples from this treatment indicated 23 percent mortality inside the crypts. Mortality in water collected outside of the crypts was nine percent. This finding could possibly indicate that larvicide was moved into the crypt with rainwater.

BCMCP plans to continue this study in 2021 with improvements to application methods and rate of application. Each crypt will constitute a separate treatment area with a corresponding rate of application.

Figure 7. Crypt selection BCMCP Wiles

CLARKSBURG 2020

Crews from the Berkshire County Mosquito Control Project began larval surveillance in The Town of Clarksburg on 5/18/20 on the known breeding areas in the town. A total of 65 catch basins were treated in 2020. Arbovirus surveillance began on 6/17/20 and was concluded on 8/12/20.
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The following materials were used for larval control.

FOURSTAR 90 BRIQUETS 65 BRIQUETS

Larval Control:

BREEDING SITE INSPECTIONS 43
CATCH BASIN INSPECTIONS 174 TREATMENTS 65

DPH Arbovirus Surveillance:

POOLS SUBMITTED 10 NO ISOLATIONS WNV OR EEE

HINSDALE 2020

Crews from the Berkshire County Mosquito Control Project began larval surveillance on 5/1/20. A total of 103 catch basins were treated in 2020. Arbovirus surveillance began on 7/8/20 and was concluded on 9/17/20.

The following materials were used for larval control.

VECTOBAC G (BTI)	6.7 LBS.	.67 ACRES
FOURSTAR 90 BRIQUETS	101 BRIQUETS	

Larval Control:

BREEDING SITE INSPECTIONS	58	TREATMENTS	4
CATCH BASIN INSPECTIONS	261	TREATMENTS	101

DPH Arbovirus Surveillance:

POOLS SUBMITTED	7	NO ISOLATIONS WNV OR EEE

The following materials were used for adult control between 7/12/19 AND 8/16/19.

DUET	6.41 GAL.	1,821 ACRES

LANESBOROUGH 2020

Crews from the Berkshire County Mosquito Control Project began larval surveillance on 4/2/20. A total of 160 catch basins were treated during the breeding season. Arbovirus surveillance began in the town on 6/25/20 and was concluded on 8/5/20.

The following materials were used for larval control.

VECTOBAC G (BTI)	14.6 LBS.	1.5 ACRES
FOURSTAR 90 BRIQUETS (CATCH BASIN)		160 BRIQUETS

Larval Control:

BREEDING SITE INSPECTIONS	55	TREATMENTS	9
CATCH BASIN INSPECTIONS	628	TREATMENTS	160

DPH Arbovirus Surveillance:

POOLS SUBMITTED	7	NO ISOLATIONS WNV OR EEE

OTIS 2020

Crews from the Berkshire County Mosquito Control Project began surveillance on 3/26/20 of the known mosquito breeding sites in the town. A total of 78 catch basins were treated during the breeding season. Arbovirus surveillance began 6/16/20 and concluded 9/9/20.

The following materials were used for larval control.

VECTOBAC G (BTI)	31.5 LBS.	3.2 ACRES
FOURSTAR 90 BRIQUETS (CATCH BASIN)		78 BRIQUETS

Larval Control:

BREEDING SITE INSPECTIONS	82	TREATMENTS	4
CATCH BASIN INSPECTIONS	247	TREATMENTS	78

DPH Arbovirus Surveillance:

POOLS SUBMITTTED	13	NO WNV OR EEE ISOLATIONS

The following materials were used for adult control between 6/3/20 and 8/12/20.

DUET	22.2 GAL.	5,209 ACRES

PITTSFIELD 2020

Crews began surveillance on the known breeding sites in the City on 4/20/20. A total of 3,945 catch basin were treated with larvicide during the breeding season. Arbovirus surveillance began on 6/9/20 and concluded on 9/17/20.

The following materials were used for Larval Control.

VECTOBAC G (BTI)	492 LBS.	55.1 ACRES
FOURSTAR 90 (CATCH BASIN)	3,945 BRIQUETS	

Larval Control:

BREEDING SITE INSPECTIONS	146	TREATMENTS	10
CATCH BASIN INSPECTIONS	6,412	TREATMENTS	3,945

DPH Arbovirus Surveillance:

POOLS SUBMITTED	146	NO ISOLATION WNV OR EEE

RICHMOND 2020

Berkshire County Mosquito Control Project began larval surveillance 4/17/20. Arbovirus surveillance began on 6/18/20 and concluded on 8/5/20.

Larval Control:

BREEDING SITE INSPECTIONS	64

DPH Arbovirus Surveillance:

POOLS SUBMITTED	3	NO ISOLATIONS WNV OR EEE

The following materials were used for adult control 6/19/20 to 8/5/20.

DUET	6.4 GALS.	1,577 ACRES

SHEFFIELD 2020

Crews from the Berkshire County Mosquito Control Project began larval surveillance in the Town of Sheffield on 2/26/20 A total of 83 catch basins were treated during the breeding season. Arbovirus surveillance began on 6/4/20 and was completed on 9/17/20.

The following materials were used for larval control:

VECTOBAC G (BTI)	53.5 LBS.	7.3 ACRES
FOURSTAR 90 BRIQUETS (CATCH BASIN)		83 BRIQUETS

Larval Control:

BREEDING SITE INSPECTIONS	121	TREATMENTS	4
CATCH BASIN INSPECTIONS	339	TREATMENTS	83

DPH Arbovirus Surveillance:

POOLS SUBMITTED	33	NO ISOLATIONS WNV OR EEE

The following materials were used for adult control from 6/4/20 to 8/13/20.

DUET	28.7 GAL.	7,659 ACRES

SHERWOOD GREENS ROAD MANAGEMENT DISTRICT 2020

Berkshire County Mosquito Control Project began larval surveillance at Sherwood Greens Road Management District in Becket, MA on 4/28/20. Arbovirus surveillance began on 6/11/20 and concluded on 8/12/20.

The following materials were used for larval control:

VECTOBAC G	5 LBS.	.5 ACRES

Larval control:

BREEDING SITE INSPECTIONS	38	TREATMENTS 1

DPH Arbovirus Surveillance:

POOLS SUBMITTED	12	NO ISOLATIONS WNV OR EEE

The following materials were used for adult control on 7/8/20.

DUET	.72 GAL.	155 ACRES

STOCKBRIDGE 2020

Crews from the Berkshire County Mosquito Control Project began larval surveillance in the Town of Stockbridge on 4/16/20. A total of 226 catch basins were treated during the breeding season. Arbovirus surveillance began on 6/11/20 and was completed on 9/9/20.

The following materials were used for larval control:

VECTOBAC G (BTI)	16.1 LBS.	8 ACRES
FOURSTAR 90 BRIQUETS (CATCH BASIN)		226 BRIQUETS

Larval Control:

BREEDING SITE INSPECTIONS	91	TREATMENTS	8
CATCH BASIN INSPECTIONS	516	TREATMENTS	226

DPH Arbovirus Surveillance:

POOLS SUBMITTED	42	NO ISOLATIONS WNV OR EEE

The following materials were used for adult control from 6/5/20 to 8/14/20.

DUET	28.7 GAL.	6,816 ACRES

TYRINGHAM 2020

Crews from the Berkshire County Mosquito Control Project began larval surveillance in the town of Tyringham on 5/26/20. A total of 12 catch basins were treated during the breeding season. Arbovirus surveillance began on 6/22/20 and was completed on 9/17/20.

The following materials were used for larval control:

FOURSTAR 90 BRIQUETS (CATCH BASIN)	12 BRIQUETS

Larval Control:

BREEDING SITE INSPECTIONS	9		
CATCH BASIN INSPECTIONS	57	TREATMENTS	12

DPH Arbovirus Surveillance:

POOLS SUBMITTED	7	NO ISOLATION WNV OR EEE

Adult Control:

The following materials were used for adult control between 6/5/20 and 8/12/20.

DUET	7.9 GAL.	1,828 ACRES

REFERENCES CITED

-USGS (United States Geological Survey) 2014 National Water Information System: Web Interface, USGS water resources, USGS01197500 Housatonic River Near Great Barrington, MA.

-MADPH Arbovirus Surveillance Program 2019 (EEE Risk Map)